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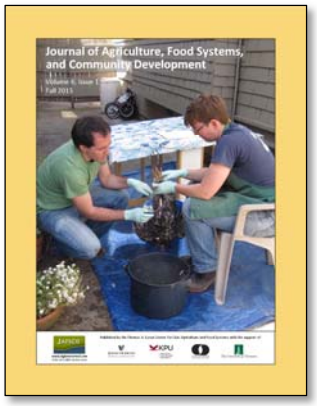

On the cover: Two neighbors in Oakland, California, prepare to pluck a chicken they have just slaughtered. After several years of egg production, this hen and her flockmates had slowed down, and their keepers decided to slaughter them and get new chickens. Backyard slaughter is neither explicitly allowed or prohibited by the City of Oakland. See *Regulating Backyard Slaughter: Strategies and Gaps in Municipal Livestock Ordinances* in this issue. (Cover photo by Stephanie Carnow and used with permission.)

Reviews

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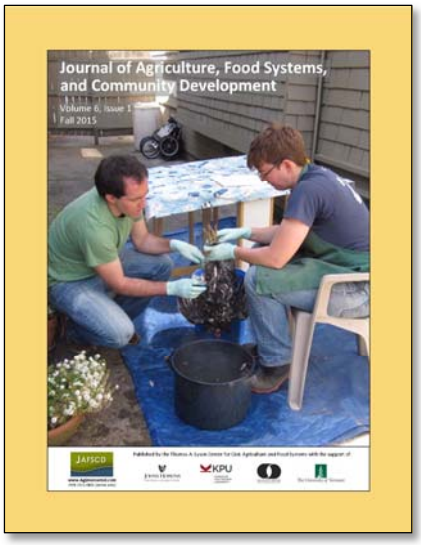
IN THIS ISSUE

DUNCAN HILCHEY

Working on wicked problems in food systems



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Quite by happenstance, the challenges, barriers, and limitations of local/regional food initiatives emerged as a thematic thread in this final issue of 2015. But we're not ending the year on a negative note since, while our authors in this issue do present us with a number of wicked problems, their applied research also sheds light on opportunities, alternatives, new strategies, policies, and research to address them. This positive practicality undergirds our mission with the Lyson Center for Civic Agriculture and Food Systems, and we are pleased that so many applied scholars are taking these issues head-on. Solutions, we hope, will come in time.

We start this jam-packed open-call issue with **John Ikerd's** "The Economic Pamphleteer" column in which he proposes a definition of a *Food Ethic* that complements Aldo Leopold's *Land Ethic.* As a seminal and influential concept, this piece should be distributed far and wide—so feel free to share it with your networks! By the way, in the coming year we will be publishing a collection of five years of the "Economic Pamphleteer," which promises to make great reading for students, food policy councils, food bloggers, and others.

Next is a viewpoint paper entitled *Local Food, Food Democracy, and Food Hubs* by **Allison Perrett** and **Charlie Jackson.** They argue that food hubs may not, in and of themselves, challenge the fundamental status quo established by mainstream food supply chains.

In a paper published under JAFSCD Open Choice, *The Unattainable Trifecta of Urban Agriculture,* **Sarita Daftary-Steel, Hank Herrera,** and **Christine Porter** reflect on the limitation of UA to provide good food, job training, and income to communities without outside funding. This paper is freely available thanks to the authors.

The cover image for this issue was supplied by author **Jennifer Blecha,** who in her paper *Regulating Backyard Slaughter: Strategies and Gaps in Municipal Livestock Ordinances* identifies five approaches to governing the increasingly contested issue of backyard slaughter. The photo was taken by Jennifer's colleague Stephanie Carnow; we appreciate her allowing us to use it.

Snehalatha Gantla and **Larry Lev** follow with *Farmers' Market or Farmers Market? Examining How Market Ownership Influences Conduct and Performance,* in which they reveal how three types of ownership influence market goals and mission, general operations, and performance outcomes.

In *Rural School Food Service Director Perceptions on Voluntary School Meal Reforms,* **Natoshia Askelson, Disa Lubker Cornish,** and **Elizabeth Golembiewski** find common challenges among rural school districts in

implementing farm-to-school and school garden programs were a very small staff, lack of concrete knowledge about how these programs work, and lack of access to local producers and chefs.

Similarly **Mahbubur Meenar** highlights the significant challenges related to administration, budget, collaboration, longevity, financial return, spatial mismatch, and community engagement that NGOs experience in community capacity-building in *Nonprofit-Driven Community Capacity-Building Efforts in Community Food Systems.*

In *Bioplastics: Acceptable for the Packaging of Organic Food? A Policy Analysis,* **Ching-Hua Yeh, Friedrich-Karl Lücke,** and **Johann Janssen** argue that more attention needs to be paid to bioplastics as packaging for organic food as part of a sustainable food supply chain.

Next, **Alicia Hullinger** and **Keiko Tanaka** examine how a state branding campaign can support mainstream farmers in *Agriculture of the Middle Participation in State Branding Campaigns: The Case of Kentucky.*

In *Associations Between Farmers Market Managers' Motivations and Market-Level Supplemental Nutrition Assistance Program Electronic Benefit Transfer (SNAP/EBT) Availability and Business Vitality,* **Rachel Ward, Deborah Slawson, Qiang Wu,** and **Stephanie Jilcott Pitts** find that nutrition and business are not mutually exclusive interests at farmers' markets.

Maximize Impact, Minimize Resources: Locating Food Deserts and Increasing SNAP Spending on Fruits and Vegetables by **Kelly Moore, Bruce Waite, David Dinkins, Marilyn Swisher, Alia Delong,** and **Tracy Johns** presents a case study of a new approach they have developed for doing rapid food insecurity assessments.

Allie Perline, Annie Heuscher, Annie Sondag, and **Blakely Brown** identify key opportunities and challenges for hospitals to using locally sourced foods as reported by local producers and hospital staff in *Perceptions of Local Hospitals and Food Producers on Opportunities for and Barriers to Implementing Farm-to-Hospital.*

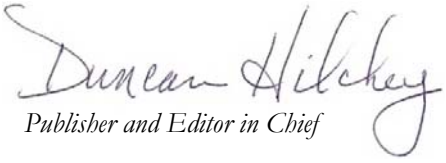
Whether aquaponic gardening and fish farming can contribute to food security is the key question addressed in *Production and Consumption of Homegrown Produce and Fish by Noncommercial Aquaponics Gardeners* by **David Love, Laura Genello, Ximin Li, Richard Thompson,** and **Jillian Fry.**

In *Assessing the Potential for Pocket Agriculture in Mountainous Regions: A Case Study in West Kootenay, British Columbia, Canada,* **Rachael Roussin, Julie Wilson, Gregory Utzig,** and **Les Lavkulich** suggest that climate change may increase the capacity of underutilized montane lands to produce food in isolated rural areas.

Julius Okello, Margaret Hutchinson, Agnes Mwang'ombe, Jane Ambuko, Florence Olubayo, and **Martin Mwakangalu** use a willingness-to-pay model to explore the viability of adding value to traditional crops in *Consumer Demand for Value-added Products of African Indigenous Vegetables in Coastal Kenya: The Case of Sun-dried and Frozen Cowpea Leaves.*

Finally, we offer a number of book reviews. **Matthew Mars** reviews the *New Bread Basket: How the New Crop of Grain Growers, Plant Breeders, Millers, Maltsters, Bakers, Brewers, and Local Food Activists Are Redefining Our Daily Loaf,* by Amy Halloran. **Molly Anderson** reviews *Food Security Governance: Empowering Communities and Regulating Corporations,* by Nora McKeon. **Angela Glore** reviews the *Growing Local* film series, "Pig not Pork," "Seeding a Dream," and "Changing Hands." And **Julia Russell Jozkow** reviews *Lentil Underground: Renegade Farmers and the Future of Food in America, by Liz Carlisle.*

The Lyson Center for Civic Agriculture and Food Systems (http://www.LysonCenter.org), publisher of JAFSCD, wishes you happy holidays in 2015 and peace and abundance in 2016.



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THE ECONOMIC PAMPHLETEER
JOHN IKERD

Toward a *Food Ethic*

Published online October 8, 2015

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Aldo Leopold's *Land Ethic* is credited with defining a new relationship between people and nature and setting the stage for the modern conservation movement (Aldo Leopold Foundation, n.d.). Most simply stated: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise" (Partridge, 1993, The Land Ethic, para. 10). Again, in the words of Leopold, "The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land" (Aldo Leopold Foundation, n.d., para. 1). I believe we need a similar *Food Ethic* to guide the

John Ikerd *is professor emeritus of agricultural economics, University of Missouri, Columbia. He was raised on a small dairy farm in southwest Missouri and received his BS, MS, and Ph.D. degrees in agricultural economics from the University of Missouri. He worked in private industry for a time and spent 30 years in various professorial positions at North Carolina State University, Oklahoma State University, University of Georgia, and the University of Missouri before retiring in 2000. Since retiring, he spends most of his time writing and speaking on issues related to sustainability with an emphasis on economics and agriculture. Ikerd is author of* Sustainable Capitalism; A Return to Common Sense; Small Farms Are Real Farms; Crisis and Opportunity: Sustainability in American Agriculture; A Revolution of the Middle; *and* The Essentials of Economic Sustainability. *More background and selected writings are at http://johnikerd.com and http://web.missouri.edu/~ikerdj*

Why did I name my column "The Economic Pamphleteer"? Pamphlets historically were short, thoughtfully written opinion pieces and were at the center of every revolution in western history. Current ways of economic thinking aren't working and aren't going to work in the future. Nowhere are the negative consequences more apparent than in foods, farms, and communities. I know where today's economists are coming from; I have been there. I spent the first half of my 30-year academic career as a very conventional free-market, bottom-line agricultural economist. I eventually became convinced that the economics I had been taught and was teaching wasn't good for farmers, wasn't good for rural communities, and didn't even produce food that was good for people. I have spent the 30 years since learning and teaching the principles of a new economics of sustainability. Hopefully my "pamphlets" will help spark a revolution in economic thinking.

modern sustainable agriculture movement.

Some may question the need for a new food ethic. There is already an interdisciplinary field of study called "food ethics" that "provides ethical analysis and guidance for human conduct in the production, distribution, preparation and consumption of food" (Peeler, 2015, para. 2). The Catholic Rural Life program has long reminded us that "Eating is a Moral Act," noting that, "We say this simply because food sustains life. But the world of agriculture is extremely complex and there are many moral dimensions to it" (Catholic Rural Life, 2012, para. 1). The idea of a food ethic also is a common sentiment among Native Peoples. Ethical eating certainly is not new idea.

Perhaps somewhere in all that has been written about the intersection of food and ethics there is a statement similar to Leopold's Land Ethic. In response to those who might ask, "Why try and reinvent the wheel?" I suspect the person who invented the wheel was criticized for trying to reinvent the sled. A new Food Ethic is needed to guide the sustainable agriculture movement in the way Leopold's Land Ethic has guided the conservation movement.

In the style of Leopold, I propose a Food Ethic that says: *Food is good when it nourishes the life and health of the eater, honors the sacrifice of life embodied in the eaten, and respects the purpose and inherent worth of all beings.* Food is bad when it does otherwise. I believe the ultimate success of the sustainability movement depends on our willingness to begin labeling intentional acts as either "good" or "bad," as Leopold labeled acts as "right" or "wrong" in his land ethic.

"Good food" nourishes the life and health of those who eat it. Again in the style of Leopold, I would put forth, *That food is life's energy, is a basic concept of sustainability, but that food is to be respected, honored, and loved is an extension of ethics.* Since life is sacred, food is sacred; but good food is about more than just sustaining life. If food sustains life without promoting good health and quality of life, it is not "good food."

A food ethic must also respect, honor, and love the eaten as well as the eater. Eating inevitably involves the act of killing or at least eating something that was once living or could have sustained the life of some other being. All biological beings, including humans, get their life's energy from other biological beings, typically from the dead carcasses of other once-living beings. Carnivores, vegetarian, and vegans all participate in acts of killing.

> **I propose a *Food Ethic* that says:**
> ***Food is good when it nourishes the life and health of the eater, honors the sacrifice of life embodied in the eaten, and respects the purpose and inherent worth of all beings.***

We are more sensitive to the sacrifice of life and suffering by the eaten when we kill and eat things that are more like us—particularly sentient animals. Thus the phrase "eating is murder" is more commonly associated with eating meat. However, most vegetables were alive when they were "harvested." Most fruits, grains, and seeds were embryos with the potential for new life until they were eaten. The milk of a cow could have nourished a calf. Anything we eat deprives some other living thing of a potential source of food and thus life.

The deprivation of life is an essential aspect of sustaining life. A food ethic must accept and respect this fact by honoring the sacrifice of life embodied in the eaten. This sacrifice includes not only the life represented by the food itself, but the sacrifice of everyone and every living thing involved in the process of producing the food. The sacrifice includes the exploitation or mistreatment of farmers and food industry workers, the degradation and destruction of natural ecosystems, and the deprivation of future generations of their basic human right to good food. A food ethic must respect and honor the goodness of all life—it must reflect a love of life.

Following once more from Leopold, *A food ethic, then, reflects the existence of an integral consciousness,*

and this in turn inspires the conviction of individuals to treat eating as an ethical act. A food ethic ultimately connects the act of eating with the health and well-being of all other living and nonliving aspects of the integral, universal whole. It goes beyond an ecological consciousness to include the social, economic, and spiritual dimension of the universal whole.

The food ethic acknowledges our common sense of the existence of purpose in life. Without purpose there is no way to distinguish *right* from *wrong* in our relationship with the land or *good* from *bad* in our relationship with food. Ethics presume purpose. The new food ethic accepts that life, including human life, has some purpose to fulfill within the integral whole of reality. Obviously, the purpose for all living things includes the purpose of providing food for other living things. I suspect dead human bodies were meant to provide food for decomposers rather than dry out in sealed vaults or be cremated.

The new food ethic accepts that life, including human life, has some purpose to fulfill within the integral whole of reality.

Since there is no possible means of determining that some beings are of greater or lesser inherent worth than others, the new food ethic accepts that all beings are of equal inherent worth. The purpose of no individual being, human or otherwise, is no more or less important than any other being in contributing to the purpose of the universal whole. Thus, ethical eating is not a matter of avoiding foods that involve the sacrifice of life but instead of honoring the purpose and inherent worth of the eaten as well as the eater.

Both unnecessary cruelty to food animals and a failure to respect the life of vegetative foods violate the food ethic. Killing or harvesting beings whose purpose is to provide food for other beings, including humans, does not. The key to ethical eating is to choose foods that allow every entity involved in the process—living and nonliving—to fulfill its unique purposes within the universal whole. Some part of the inherent worth of each living being is its ability to provide food for other living beings. When my purpose for living has been fulfilled, I personally would prefer to enhance my remaining worth by being *composted.*

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Local food, food democracy, and food hubs

Allison Perrett [a]* and Charlie Jackson [b]
Appalachian Sustainable Agriculture Project

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Abstract

In western North Carolina, where we and others have been working to build local food systems for the last 15 years, food hubs are part of an expanding network of local food distribution infrastructure intended to help the region's smaller local farms access larger, more mainstream market outlets. The impact of food hubs on the region's evolving food system, however, is contradictory. At the same time that food hubs further the development of local food supply chains and create market opportunities for farms, they can also run contrary to the bigger and longer-term goals of the local food movement. In this viewpoint article, we look critically at the role of nonprofit food hubs in efforts to build local food systems. Speaking from our experiences in the local food movement in western North Carolina and drawing from social movements and food systems scholarship, we argue that food hubs, when used as primary mechanisms of local food system building, can deprive the movement of its capacity to activate broad participation in the food system. We argue that efforts to build local food systems need a foundation of work that engages people (such as farmers, citizens, people who work in the food industry) in processes that can shape the practices, values, and impacts of systems of food production and distribution. While they can mitigate the mismatch between the smaller scale typical of local food and larger mainstream markets, food hubs alone cannot challenge industry norms and practices, and they can even aid the food industry in maintaining the status quo.

Keywords

food democracy, food hubs, local food, social movements, technological fix, western North Carolina

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Author note
The authors are employed by an organization written about in this paper.

Introduction

With the growth of the local food movement nationally, food hubs have emerged as a prominent local food system building strategy (Barham, Tropp, Enterline, Farbman, Fisk, & Kiraly, 2012; Fischer, Hamm, Pirog, Fisk, Farbman, & Kiraly, 2013; Matson, Sullins, & Cook, 2013; Schmit, Jablonski, & Kay, 2013). Food hub projects are receiving USDA and private grant funding (Barham et al., 2012; Schmit et al., 2013), and they have attracted the attention of big food industry players. Walmart, for example, recently invested US$3 million to support efforts to further develop the food hub model (Wallace Center at Winrock International, 2014). In a broad sense, food hubs are a supply chain management strategy and focus on the logistics and distribution of local food. Their organizers attempt to mediate the mismatch between the food industry and the smaller scale of farms and production typical of local food efforts. The authors of a recent report prepared specifically for food industry executives describe food hubs as a means of "solving local" (Cantrell & Heuer, 2014). As small-farm aggregators, food hubs are able to scale up local food and fit local food into mainstream food supply chains (Cantrell & Heuer, 2014).

In western North Carolina, where we and others have been working to build local food systems for the last 15 years, food hubs are part of an expanding network of local food distribution infrastructure intended to help local farms access larger, more mainstream market outlets. The impact of food hubs on the region's evolving food system, however, is contradictory. At the same time that food hubs may further the development of local food supply chains, create market opportunities for farms, and increase the availability and visibility of local food, they can also run contrary to the bigger and longer-term goals of the local food movement. They can provide smaller-scale farms struggling to stay economically viable with access to larger-scale market outlets. At the same time, in fitting locally grown food into the existing food industry, food hubs currently are not challenging the way the dominant food industry operates.

In this viewpoint article, with a goal of strengthening what we believe to be a potentially transformative social movement, we look critically at the role of not-for-profit (nonprofit) food hubs in local food system building efforts**.** If the movement is about challenging the food industry and creating food systems that are socially just, economically fair, and environmentally sustainable, then we—practitioners who are doing the work of local food system building—need to think deeply and critically about the strategies we are using to create change. We use nonprofit food hubs in this paper to critique an approach to local food system building that over focuses on "moving product" rather than on "moving people" in their perspectives and practices. Our perspective is informed by our experiences in the movement in western North Carolina. We also draw from ideas and theories in social movements and food systems scholarship that have helped us think about why and how local food system development can be a catalyst of change and about the strategies that can facilitate that change. With regard to the broader emergence of food hubs in local food efforts across the country, we argue that as a primary strategy of local food system building, food hubs alone cannot challenge industry norms and practices and can even aid the food industry in maintaining the status quo. Local food efforts need a foundation of work that engages people (farmers, ordinary citizens, people that work in the food industry) in processes that can shape the practices, values, and impacts of food production and distribution systems. Reflecting on the trajectory of the movement in western North Carolina, we argue that food hubs have not been the drivers of change but rather have emerged as incremental outcomes of a fundamental and ongoing strategy designed to engage people directly in the development of the region's food system.

To make our argument, we begin by looking at the goals of the local food movement, briefly reviewing the qualities that local food organizers and advocates typically attribute to local food, and a key critique, namely the tendency for local food organizers and supporters to attribute innate qualities to local food. Next, we explore theories and ideas that shed light on the reasons why local food system building in particular can be a path of change. Here, drawing from Hassanein (2003,

2008), Johnston, Biro, and MacKendrick (2009), and others, we look at local food system development as a strategy that can democratize the food system—that is, activate broad participation to change the food system. We also look at the significance of "place" and of social interaction for activating and mobilizing that participation (Diani, 1997; Escobar, 2001, 2008; Habermas, 1985, 1987; Spinosa, Flores, & Dreyfus, 1999). From this foundation, in the final section we examine the capacity of nonprofit food hubs to contribute to processes that promote food democracy.

Qualities Attributed to Local Food

The roots of the movement in western North Carolina go back to 2000, when organizers of a new initiative, Appalachian Sustainable Agriculture Project (ASAP), launched a local food campaign—an awareness-raising and community-organizing campaign designed to engage the public with local agriculture, create demand for locally grown food, and build markets for local farms. At the time, our local food campaign was one of a handful in the country in which people were responding to concerns about the loss of farms and farmland and to the decline of rural communities in the context of globalizing markets, changes in federal policy, and food industry consolidation. Organizers of these early campaigns, each located in a region with strong agricultural traditions and relatively small average farm size, aimed to build markets for locally grown food and, through consumer acts of buying local, stem the tide of farm loss.

Fifteen years later, these first campaigns, with innumerable newer campaigns and initiatives around the country, are leading an emergent movement focused on local food system development. What began as a marketing strategy to help farms left out of the dominant food marketplace has grown to be about much more than just supporting farms. Today, movement participants largely conceive of local food as a way of creating environmental, social, and economic sustainability and a path to transforming the food system. As documented in movement and academic literature, food system localization has been associated with a core constellation of qualities and outcomes.[1] Food produced locally is considered to be more nutritious because it is fresher (i.e., less travel time means more nutrient retention), and increased availability of local food is thought to improve nutrition because greater consumption of fresh fruits and vegetables reduces the incidence of obesity and other health-related problems (Alkon & Mares, 2012; Allen & Guthman, 2006; Bagdonis, Hinrichs, & Schafft, 2009; Cleveland et al., 2011; Ferrer, Fonsah, Ramirez, & Escalante, 2011; Freedman, 2009; Salois, 2012). Local food is assumed to be more environmentally sustainable: closer production/consumption relationships mean fewer food miles, less reliance on fossil fuels, and smaller-scale farms purportedly use more ecologically sound production practices (Clancy, 2015; Goodman & Goodman, 2007; Lockie & Halpin, 2005; Norberg-Hodge, Merrifield, & Gorelick, 2002; Pirog, 2004). Moreover, local food systems are understood to have the capacity to strengthen local economies (Allen & Hinrichs, 2007; Halweil, 2002; LaTrobe, 2001; Meter, 2011; O'Hara, 2011; Swenson, 2008, 2011; Tregear, 2011) and create market transparency through close production/consumption linkages and the development of community relationships and engaged consumers (Allen, FitzSimmons, Goodman, & Warner, 2003; Allen & Hinrichs, 2007; Johnston, Biro, & MacKendrick, 2009; Kloppenburg, Hendrickson, & Stevenson, 1996; Perrett, 2013).

While these qualities are typically attributed to local food, as Allen and Hinrichs (2007), Born and Purcell (2006), Johnston et al. (2009), and others have argued, they are not inherent to local food, and there is a tendency among local food movement supporters to assume that local food by virtue of being local has intrinsic, beneficent qualities. Born and Purcell (2006) have described this tendency as the "local trap," the assumption that local by nature of its scale is inherently more sustainable and just. Other critics have also cautioned against this assumption, noting that the proximity of food sourcing does not equate automatically to other attributes such as energy efficiency (e.g., Schlich &

[1] Authors are not necessarily supporting claims but documenting them.

Fleissner, 2005; Wallgren, 2006), environmentally sustainable production practices (e.g., Goodman & Goodman, 2007; Hinrichs, 2003), fair labor practices (e.g., Belliveau, 2005, as cited in Johnston et al., 2009, p. 515), social justice (e.g., Allen & Guthman, 2006; Allen & Hinrichs, 2007; DeLind, 2002; Hinrichs & Allen, 2008), or engaged citizens (e.g., DeLind, 2002; Guthman, 2008; Johnston, 2008). In a recent column, Clancy (2015), writing about the difficulty people have in accepting new evidence when it challenges pre-existing ideas and beliefs, takes this critique a step further. Drawing on local food as an example, she argues that even with evidence that has refuted the claim that local food is more energy efficient (assumed because foods are produced closer to the point of consumption), the claim is nevertheless still made. A key point we make in this paper is that we need to carefully scrutinize our strategies so that we are not undermining the potential of local food system building efforts to *create* the qualities and conditions we imagine are possible.

In the next section, we look at why local food system building can be a strategy for achieving the theorized qualities and outcomes of local food. We draw from the idea of food democracy to explore the importance of opening food system practices and values to citizen reflection and meaningful debate. We draw from perspectives that look at the significance of "place" in modern movements to explore the role local food system building efforts can play in activating this kind of participation and creating spaces for public discussion around food and agriculture.

How and Why Local Food System Building Can Be a Catalyst of Food System Change

Since the inception of the local food campaign in western North Carolina in 2000, our organization's strategies have focused on engaging consumers and people who work in the food industry in the region directly with local food and farms through things like farmers markets, community supported agriculture operations (CSAs), local food and farm fairs, farm tours, farm-to-school activities, and food and agricultural conferences. Before local food gained its current popularity, when local food was a relatively new idea, these types of activities were conceived as a way to "put a face on food." This phrase is commonly used by staff in our organization to describe the significance of direct interaction with farmers, farms, and food growing locally for embedding decisions around food and eating in local relationships. As the movement has continued to unfold and evolve (and with that, our thinking and understanding), we have come to see how vital these local food and farm venues are for facilitating social interaction, and that social interaction is vital to effecting food system change. Social interaction provides the space for dialogue among and between farmers, consumers, and food industry people around food and farming in the region—the space for farmers to share information about their farms and products, their business and production practices, and the realities of farming, and for consumers and food industry personnel to learn and ask questions about farming in the region and express their concerns or desires for food produced in particular ways. From our perspective, these conversations are vital, because they enable people who live and work here to actively participate in the region's food system and guide the direction of its development.

In the food systems literature, scholars talk about the significance of food system participation for creating food system change. Hassanein (2003) argues that conflicts over food production and food industry practices are fundamentally about values and the types of practices these values legitimize. Without our participation as citizens, we allow others to define those values for us, and currently we have a food system that is concentrated in the hands of a few large corporations with disproportionate control over the way food is produced and distributed. Local food initiatives are looked at as a way to move toward *food democracy* (Hassanein, 2003, 2008; Johnston et al., 2009; Levkoe, 2006). In alignment with the qualities attributed to local food, food democracy is a concept that describes systems of food production that produce nutritious, safe food in ways that are environmentally sustainable and that provide fair access to land and fair wages to those who labor in the food system (Hassanein, 2008; Johnston et al., 2009). These qualities and conditions are created through processes that lay bare food industry

practices and relations of production, empower people to shape the values, policies, practices, and outcomes of food production systems, and liberate food production from corporate control (Johnston et al., 2009). Creating food democracy is about people coming to actively participate in the food system, not remaining "passive spectators" (Hassanein, 2003, p. 79; Welsh & MacRae, 1998). Thus food democratizing efforts create spaces where producers and consumers "can act as citizens" (Johnston et al., 2009, pp. 514–515)—where individuals are able to gain knowledge about food and the food system, share their ideas and opinions about the food system with other people, and, with an increased capacity, exercise their power to shape the ways food is produced and distributed (Hassanein, 2008; Levkoe, 2006). As argued by Johnston et al. (2009), without processes that engage people in the food system, counter-movements like the local food movement lose their transformative potential, and "local food"—in keeping with the local food trap critique—becomes yet another label in the marketplace with assumed qualities and characteristics (Delind, 2011).

This perspective, that changing the food system requires a broadening of citizen participation and that local food is a means to do that, raises an important question: what is it about local food specifically that lends itself to this process? The answer has a direct bearing on the kinds of strategies we use to mobilize and sustain participation in the movement and is relevant to our assessment of food hubs. Scholars looking at the importance of "place" and at the realm of everyday ordinary life to modern social movements provide insight into the change-making potential of local food system building efforts. In social movements, "place" is important to the emergence of collective action because particular places are where specific economies, ecologies, and social practices are located and, as such, they are also the sites of struggle around them (Escobar, 2001). In relation to a dominant global economic system, place is the position from which we observe and experience adverse impacts to our livelihoods and communities, and to the landscapes and ecosystems of which we are a part (Escobar, 2001, 2008). Spinosa, Flores, and Dreyfus (1999) have argued that cultural innovation and the impulse to act in ways that challenge taken-for-granted cultural norms emerge not from positions of detachment but from a deep connectedness with or rootedness in the conditions and particularities of place. As sites of human experience and where we live our day-to-day lives, place is the position from which we encounter discrepancies between accepted, shared frameworks of meaning and our lived realities, and it is where we imagine and engage in new ways of being (Spinosa et al., 1999, pp. 22–24). The realm of everyday life (where we carry out mundane daily activities like shopping, eating, cooking, cleaning, working, interacting, etc.) is where we affirm and reproduce predominant ways of living and the ideas that underlie them, or resist them through the enactment of different ideas and ways of living (Escobar, 1992a, 1992b; Melucci, 1985, 1989; Perrett, 2013). Escobar (1998, 2008), drawing on his long-term study of a social movement in Colombia, points to the importance of everyday life for social movements for the space that it provides for social interaction. Social interaction is what nurtures and gives rise to collective action because it provides the space for collective reflection on current realities and the development of shared understandings, values, and goals (Escobar, 1998, 2008).

The importance of social interaction for the emergence of collective action and for democracy is not a new idea; it has been looked at by numerous scholars (Coleman, 1988; Diani, 1997; Paxton, 2002; Putnam, 1995, 2001; Woolcock, 1998; Woolcock & Narayan, 2000). Diani (1997), looking specifically at how movements achieve outcomes, argues that the ability of social movement organizations to affect change depends directly upon their capacity to reproduce existing social ties and generate new ones. He argues that community linkages are both preconditions and products of collective action, and that social ties among movement and potential movement constituents are necessary to mobilize and sustain movement activity. Habermas (1985, 1987, 2000 as cited in Randall, 2008), writing about conditions in the current stage of capitalism, discusses the loss of "public spheres" or spaces where members of a community can come together to interact, discuss

matters of public importance, develop mutual understandings, and work toward shared goals. With this loss and with the help of a corporately controlled media, Habermas argues that *instrumental rationality*, a logic grounded in capitalism and focused on the most cost effective means of achieving an end, has replaced a *communicative rationality*, one grounded in and guided by interpersonal interaction and reasoned discussion.

We think these ideas have enormous relevance for the work of local food system building efforts. If we come from the idea that democratizing the food system is going to be crucial to challenging and changing it, then actions that facilitate that process become important. Local food, because it is anchored in the particularities of place (in local people, resources, and relationships), offers a means to connect consumers in meaningful ways with food and agriculture and heighten their awareness and understanding of food and agricultural issues.[2] If, as Diani suggests, social movements depend on social interaction to mobilize participation and effect change, then the loss of public spheres has implications for movement actions and suggests the importance for organizers to create spaces that facilitate the flow of information and ideas and foster discussion.

In western North Carolina, the local food movement emerged from a deeply rooted perspective—from the lived experiences of a group of residents and farmers and their shared understanding that, without some kind of intervention, farming as a way of life could not survive in the wake of an increasingly dominant global economic system. "Local food" was the strategy early organizers conceptualized as a way to *deeply root* the public in a place where farming was important to its history, landscape, and culture. Farm tours, farmers markets, and the like were conceived by organizers as ways to meaningfully engage the public with local agriculture, build community ties centered on local food and agriculture, and link decisions around food and eating to a growing appreciation for local farms and a desire to preserve them.

Fifteen years later, at ASAP we also work directly with the buyers for larger-scale grocer, restaurant, and institutional markets to build local food supply chains—in some cases directly between farmers and these buyers, and in others by engaging the wholesalers in the region, for-profit distributors and packers and nonprofit food hubs. The base of our work, however, continues to focus on actions that provide members of the public as well as people that work in the food industry in the region with direct food and farm experiences. In western North Carolina, engagement strategies provide the foundation for the development of a shared belief that local farms are important to the region's economy and to our quality of life. They are the foundation of consumer interest and demand from markets that are part of the conventional food industry. And they have contributed to the emergence of other kinds of nonmarket movement activity, for example, the development of food policy councils, the actions of parents to challenge and change school nutrition services, the food, farm, and nutrition education programs of universities and colleges, and increasing public discussion around food access and food justice. Without this groundwork of engagement, we argue food hubs risk helping the food industry reduce "local food" to just another product in the marketplace.

Food Hubs and Food Democracy

In western North Carolina, the local food procurement strategies of many of the region's larger mainstream market outlets, including larger grocery chains and institutions (schools, hospitals, and colleges), use nonprofit food hubs to source locally grown food. Echoing a pattern dominant in the food industry, the larger food companies in this region want to source from a small pool of large suppliers year round and at a price achieved through economies of scale, i.e., through the cost savings that come from spreading out fixed costs over larger volumes. But locally grown food in western North Carolina is predominantly seasonal, the region's farms are small by national standards, and food production here is not easily scalable to high-volume production. In contrast to food pro-

[2] We do not mean to imply that local food is the only way to build democracy in the food system, but that it is uniquely positioned to do so for the reasons outlined.

duced for the conventional food industry, local food production is the purview of many smaller farms; the scale of production is smaller and decentralized, with limited infrastructure for aggregation, distribution, and processing. Food hubs serve as or aim to serve as market intermediaries to bridge mainstream markets and smaller-scale farms. They provide buyers in the food industry in the region with volumes needed and with required quality standards and safety assurances, and they save buyers the time and energy that would be required to source directly from multiple farms (Perrett, 2013).

The effect of food hubs on the region's evolving food system is complicated. Food hubs do provide a piece of aggregation and distribution infrastructure that helps connect smaller farms to larger scale markets, thus providing the region's farms with more market opportunities (and potentially more needed income), getting more locally grown food into more places, and increasing its availability beyond direct-to-consumer markets. At the same time, however, nonprofit food hubs as market intermediaries do not fundamentally challenge the principles and practices on which the food industry operates.

As a particular model of local food aggregation and distribution, nonprofit food hubs use grants and other outside funding to mediate between markets where large-volume production determines conventional prices and the smaller-scale production by farmers who produce at higher costs (LeBlanc, Conner, McRae, & Darby, 2014; Local Food Research Center, 2012). To mediate this disparity, nonprofit food hubs subsidize the higher cost of local food production and distribution to meet the price points expected by the food industry. Beyond the potential ameliorative role nonprofit hubs might play in connecting locally grown food to mainstream markets,[3] nonprofit food hubs—conceived as infrastructure to solve a barrier to the entry of locally grown food into mainstream markets[4]—can become a kind of "technological fix" (Scott, 2011). The technological fix concept is one that is commonly used in public debates surrounding science and technology and their contributions to solving human problems (Scott, 2011). Technological fix strategies cast problems as being technological and thus solvable through technological innovation (Scott, 2011).[5] In his examination of the technological fix concept in relation to agricultural biotechnology, Scott (2011) points out that the appeal of this kind of problem-solving approach is that it provides a means to simplify potentially complicated social problems and define clear courses of action. The limitation, however, is technological fixes do not address the root causes of problems and often create new ones, even if unintentionally. Rather than fostering people's abilities to critically question and examine the system (i.e., the ideas and presumptions that produce social problems), technological fixes draw attention away from root causes, thereby delaying examination and action and perhaps compounding problems (Scott, 2011).

When conceived as a means of "fixing" supply chain barriers to locally grown food and providing farmers with access to new markets at prevailing market price points, nonprofit food hubs simply reinforce that status quo. They do not facilitate, and may even impede, fundamental challenges to the food industry. In their reliance on grants and other outside support to help cover their operating costs, nonprofit hubs are able to sell their products below what it costs to produce and distribute them. In western North Carolina, according to reports from some farmers and food distributors, non-

[3] How effective nonprofit hubs can be at fulfilling this intermediary role remains to be seen. LeBlanc et al. (2014) note that dependence on outside funding for continued operation threatens the long-term financial viability of nonprofit food hubs. And after assessing 15 years of food hub development and practice in California, Community Alliance with Family Farmers (CAFF) concludes that as a strategy for local food system development, food hubs are not viable; they add extra costs to supply chains, duplicate and compete with existing regional distribution infrastructure, and struggle financially without ongoing subsidy support (Abellera, Signore, Derden-Little, Michas, Runsten, & Sabato, 2014).

[4] Some food hubs have goals related to increasing access by low-income consumer to locally grown foods (e.g., LeBlanc et al., 2014). The 2013 National Food Hub Survey indicates that food hubs with social goals make up a small minority of the total (Fischer et al., 2013).

[5] Technological innovation can refer to machinery and equipment as well as to processes and methods.

profit food hubs have had the unintended consequence of undercutting and taking business from for-profit local food distributors and/or farmers not using outside funds to subsidize their businesses. Unintentional as it may be, this strategy arguably functions similarly to a tactic common in the agro-food industry, namely cross-subsidization: using resources from other enterprises to sell products below cost and gain greater market share by both pushing competitors out of the market and discouraging new competitors (Heffernan, 2000). A recent report on food value chains alludes to the "market distortion" that operations like food hubs can produce through their reliance on subsidies. This distortion can be significant in that it creates in the minds of food industry buyers unrealistic expectations about price and puts unsubsidized operations at a disadvantage in the marketplace by undercutting the actual costs of production (Diamond, Tropp, Barham, Muldoon, Kiraly, & Cantrell, 2014).

Despite this critique, the intent of this article is not to wholly dismiss food hubs as a local food system building strategy. Our intent is to examine them critically in relation to the aspirations of movement activists and supporters, and in relation to ideas about how we can create the substantive change we want to see. In western North Carolina, food hubs are part of a food system that is in transition. Their presence points to the degree to which local food has captured the interest of the public (and, following, the market) and the degree to which movement ideas and practices are rubbing up against the entrenched ideas and practices of the food industry. At the same time, food hubs are emerging in a context of continuing farm loss. In this context, our organization struggles to balance actions that address the immediate situation—the need to slow or stop continuing farm decline—and actions grounded in a larger and longer term perspective—the need to fundamentally change the way that we as farmers, consumers, people who work in the food industry, etc., think about and relate to food, eating, and agriculture. Mediating between these two needs, our organization works with farmers, nonprofit food hubs, for-profit aggregators and distributors, and mainstream markets to build local food supply relationships (to provide the region's smaller-scale farms with market opportunities they need to stay viable, continue farming, and keep their land out of development) alongside engagement-based strategies centered around farms, local food, and movement participants. Without local farms there is no agricultural base to engage with or affect. Without strategies that engage people with local farms and food and other movement participants, we participate in a process that continues to alienate people from the food system and from processes that enable them to guide the direction of the movement and the formation of the region's food system. That these strategies co-exist in western North Carolina is a crucial point. Fifteen years ago, "local food" was a new concept. The movement had not begun. Demand from mainstream markets did not exist. The degree to which food hubs are an aspect of the region's developing local food system today is in large part the outcome of 15 years of local food campaign activity that at its core has focused on strategies to engage people in activities that raise awareness of problems and solutions surrounding the social, economic, and environmental issues that intersect with food systems. Food hubs have not been the drivers of food system change; they are provisional and incremental outcomes of an underlying effort that is striving to engage people directly in the development of a food system, to participate democratically in a process that informs what it looks like and how it operates.

Today the context for emerging local food initiatives is vastly different than it was in 2000: local food is a national movement. Awareness of and demand for local food is emerging not only from place-based local food campaigns, but also from a larger national discussion stimulated by stories in national media outlets, popular books (e.g., Pollan's *The Omnivore's Dilemma*) and documentaries (e.g., *Food, Inc.*), prominent movement figures (e.g., Mark Bittman, Michael Pollan, Joel Salatin), and from the increasing prevalence of local food messaging in national grocery store chains. The movement has become popular, and this popularity is fueling both the

growth of the market for locally grown food[6] and the interest in starting local food-based initiatives in communities and regions across the country. The result is that "local food" is now a known concept to many people and has a developed market presence. In this context, food hubs that are emerging as primary mechanisms of local food system building, in response to local food market opportunities, can deprive the movement of its transformative potential for fostering food system democracy. We believe local food efforts need a foundation of engagement that broadly activates people in the work of defining how food systems operate, and the values and principles on which food system practices are based, and that gives rise to place-based ideas and innovations to solve the problems (Lyson, 2005) of local food distribution. Based on what we have learned from 15 years of local food system building work and from research we conduct to evaluate the impacts of our strategies,[7] we believe that engagement-based strategies are what *move* people in their perceptions and actions around food and eating and agriculture, and that this kind of movement, in keeping with the idea of food system democratization, is the foundation of meaningful food system change. Without this foundation, food hubs can merely become an instrument of the food industry to "fix" local food, using the rhetoric of "local" while reducing it to a geographic characteristic, and undermining the larger, more difficult, and longer-term project that broadens participation to shape the food system.

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[6] According to USDA figures, local food sales increased from nearly US$5 billion in 2008 to US$7 billion in 2012 (USDA, 2013).

[7] ASAP's Local Food Research Center studies the processes and outcomes of the region's localizing food system. Using the framework outlined in this paper, we are developing indicators and measures of food system democratization to understand and document the effects of engagement-based strategies on people.

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The unattainable trifecta of urban agriculture

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Abstract

Urban agriculture (UA) has emerged as a promising way to address many important issues, including growing food for local communities, preserving open space, promoting health, and developing local leaders. A worrying expectation, however, has developed that UA can meet these important and ambitious goals while also being financially sustainable without outside funding. We call this expectation the unattainable trifecta of urban agriculture: the myth that urban agriculture, without long-term funding investments, can

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simultaneously do three things that are each difficult to do on their own:

(1) Provide good food to people with limited financial resources at prices they can afford.
(2) Provide job training, work experience**,** and/or leadership development for people typically excluded from employment and/or leadership roles.
(3) Generate income for producers and create jobs funded by profits from sales.

In this reflective essay, we draw from the academic literature on UA and from the combined 30 years of urban agriculture experience of the first two authors to document and discuss both what effects urban agriculture is having and what challenges UA operations face in achieving these social goals. We conclude with recommendations for funders, policy-makers and activists about the broader changes and supports that are needed to make these goals more attainable within the context of UA.

Keywords
urban agriculture, food access, food systems, employment, job training, sustainability, reflective essay

Introduction

Urban agriculture (UA) is often ascribed what DeLind (2014, p. 3) calls "phoenix-like effects" for solving urban problems; those effects range from beautifying blighted land, to providing fresh produce to people who otherwise do not have access to it, to revitalizing economies and creating jobs. For example, the titles alone of the following books on UA tout a range of benefits from urban food production: *Hunger-proof Cities* (Koc, MacRae, Mougeot, & Welsh, 1999), *Growing Cities, Growing Food* (Bakker, Dubbeling, Gündel, Sabel Koschella, & Zeeuw, 2000), *Growing Better Cities* (Mougeot, 2006), *Cities Farming for the Future: Urban Agriculture for Green and Productive Cities* (van Veenhuizen, 2006)*, Women Feeding Cities* (Hovorka, de Zeeuw, & Njenga, 2009) and *Urban Agriculture: Food, Jobs, and Sustainable Cities* (Smit, Nasr, & Ratta, 2001). While much of the literature on UA focuses on the Global South, including most of the books in the above list, attention to UA and claims about its benefits have grown rapidly in the United States in the last decade. The U.S. Environmental Protection Agency (EPA), for instance, lists UA benefits as including improving soil, filtering stormwater, improving diets and access to healthy food, improving local skills, increasing property values, promoting physical activity, and teaching "a new generation" (U.S. Environmental Protection Agency, n.d., para. 7). When she was serving as deputy secretary of the U.S. Department of Agriculture, Kathleen Merrigan released a memo suggesting that UA is an "an important tool in confronting several key challenges that Americans face," including supporting farm viability, improving access to healthy and affordable foods, and "realizing the potential of rural-urban linkages" (Merrigan, 2011, para. 2).

What counts as possible benefits of UA depends in part on what activities count as UA. Here, we use the New York City Five Borough Farm project's definition, as it is grounded in the experience of dozens of New York UA operations:

> Urban agriculture can be defined as growing fruits, herbs and vegetables, and raising animals in cities, a process that is accompanied by many other complementary activities such as processing and distributing food, collecting and reusing food waste and rainwater, and educating, organizing and employing local residents. (Cohen, Reynolds, & Sanghvi, 2012, p. 13)

As UA leaders[1] who have invested decades of our lives in UA-related activities in the United States, we believe in its promise and we have helped some of these promises become reality. However, we have also personally experienced a trend to expect from urban agriculture the potential and responsibility to meet important and ambitious social goals while being financially sustainable without outside funding. Out of the

[1] This refers to the first two authors only. The third author supports and learns from UA leaders and organizations.

myriad possible benefits of UA, the UA organizations we have led have been under particular pressure to achieve three goals without long-term external funding:

(1) Provide good food to people with limited financial resources at prices they can afford.
(2) Provide job training, work experience, and/or leadership development for people typically excluded from employment and/or leadership roles.
(3) Generate income for producers and create jobs funded by profits from sales.

We call this list the *unattainable trifecta of urban agriculture*—the myth that urban agriculture can and should, alone and without long-term funding investments, simultaneously achieve these three goals. As we discuss in this reflective essay, funders, governments, scholars, the media, and activists—including UA practitioners—have collectively set these expectations.

In what follows, we draw not only from the literature but also from our professional experience of decades of UA leadership and on our action-research collaborations to contribute to a body of peer-reviewed work that reflects our experience and expertise gained on the ground with UA. To provide context for the three goals of the "unattainable trifecta" posited here, we open by introducing the experience the authors bring to these themes and by cataloging benefits and challenges of UA as described in academic and grey literatures. Then we describe how expectations to meet the trifecta goals have manifested during our UA careers and the challenges we have facing in our work to attain them. Finally, we discuss strategies for activists, funders, and government agencies to help communities attain these three crucial social goals in collaboration with UA initiatives.

Background

The first two authors have most recently served as UA organizational leaders in East New York Farms! (ENYF) in Brooklyn, New York, and Dig Deep Farms (DDF) in the San Francisco Bay Area. The work of both UA organizations aligns well with the Five Borough Farm definition of UA, particularly including striving for food access, job creation, and community development goals. The mission of ENYF is "to organize youth and adults to address food justice in our community by promoting local sustainable agriculture and community-led economic development" (East New York Farms!, n.d.). This mission explicitly describes food production as a means of community organizing and fostering economic development. DDF, based in a densely urban yet unincorporated area near Oakland, California, was created as a "social enterprise" project of the Alameda County Deputy Sheriffs' Activities League (Bradley & Galt, 2014). DDF is "a network of integrated food businesses that provide access to healthy food and jobs in our community where access to both has historically been limited" (Dig Deep Farms, n.d., para. 1). Both of these UA organizations are partners in a collaboration called Food Dignity, which the third author leads. Food Dignity is a five-year action, research, and education project supported with US$5 million in funding from the U.S. Department of Agriculture (USDA)'s National Institute of Food and Agriculture's Agriculture Food and Research Initiative (Food Dignity, n.d.).

We have invested significant time and energy in UA through these and other organizations because we believe that UA forms an essential part of a social change strategy for communities to attain the trifecta outlined here. A growing body of UA literature documents many benefits of UA; that literature includes a summary of potential and proven benefits in a framework published by collaborators in the New York City Five Borough Farm Project. Their "metrics framework" outlines health, social, economic, and ecological benefits ascribed to UA, broken down into 19 subcategories of potential benefit. The authors identify at least partial evidence for 9 of those 19 possible benefits, particularly in improving food-health literacy and biodiversity and habitat improvement (Cohen et al., 2012).

In addition, for the subset of UA composed of home and community gardening, a wide body of observational studies report health benefits, such as

increasing food security (Bushamuka et al., 2005; Stroink & Nelson, 2009), fruit and vegetable intake (Alaimo, Packnett, Miles, & Kruger, 2008; Armstrong, 2000; Litt, Soobader, Turbin, Hale, Buchenau, & Marshall, 2011; Twiss, Dickinson, Duma, Kleinman, Paulsen, & Rilveria, 2003), and physical activity (Armstrong, 2000; Draper & Freedman, 2010; Park, Shoemaker, & Haub, 2009), while reducing stress (Hawkins, Thirlaway, Backx, & Clayton, 2011; Van Den Berg & Custers, 2011). Building social capital is another documented community and community health–related benefit of gardening (Alaimo, Reischl, & Allen, 2010; Firth, Maye, & Pearson, 2011; Kingsley & Townsend, 2006).

Recent research also has documented the significant quantities of food produced in UA, in home and community gardens in particular. Garden harvest studies have found yield rates ranging from 0.2 lbs/ft^2 (1 kg/m^2) in Paris gardens (Pourias, Duchemin, & Aubry, 2015) to 0.75 lbs/ft^2 (3.66 kg/m^2) in San Jose, California (Algert, Baameur, & Renvall, 2014). At the upper end, gardens are more productive per area than the average 0.67 lbs/ft^2 (3.27 kg/m^2) yield of vegetable farms (Seufert, Ramankutty, & Foley, 2012).

Other documented benefits of UA, such as community development, are more limited. Many people we work with directly at DDF, ENYF, and in other similar organizations, however, have consistently reported such benefits. For example, in audio interviews ENYF members discuss, from a personal perspective, reasons that growing food in their community has mattered in their lives, such as feeling connected to neighbors, family, and the earth; improving health; having access to culturally important foods; and feeling agency and pride (East New York Farms!, 2013). New urban farmers at DDF have also described how growing food in and for their community has beautified their environment, improved their individual lives, and improved quality of life as they experience it in their community, sometimes transformatively (see, e.g., Rucker, 2015, and Silva, 2015). Some published case studies have also documented these sorts of community and individual benefits of "complementary activities" in UA (e.g., Atkinson, 2012; Raja, Picard, Baek, & Delgado, 2014). At the same time, UA, and gardens especially, have been linked to raising property values (Been & Voicu, 2006) and, therefore property taxes; this could be considered to be contributing to community development, although it could also result in gentrification, which squeezes out the very community hoping to "develop." See also Meenar and Hoover (2012) for a discussion of how UA does and does not further social justice.

Several UA scholars recently debated the benefits of UA, particularly of gardening, in a series of "viewpoint" pieces in this journal. The opening piece argued that the societal benefits of UA are "exaggerated" and noted that the average 43 square foot (4 square meter) garden in Vancouver City is "suitable only for the growing of some flowers, vegetables, and herbs for personal enjoyment" (Hallsworth & Wong, 2013, p. 12). On the food production front, one rebuttal cited harvest data that the ENYF farm manager had provided (Weissman, 2013), an argument further substantiated by the harvest quantification studies discussed above.[2] We also agree with respondents' rebuttals to Hallsworth and Wong's singular emphasis on market-scale food production (Colasanti, Hamm, & 2013; Evans & Miewald, 2013; Lavid, 2013; Weissman, 2013), without also considering other benefits such as those to health, as indicated in the literature reviewed above, and to families who become not only consumers, but also producers of their own food.

Given that UA often operates on the margins —geographically, financially, and legally (Castillo,

[2] If Vancouver City gardens are as productive as those reported in a Camden, New Jersey, study, which yielded 0.51 lb./ft^2 of produce (2.49 kg/m^2) (Vitiello, Nairn, Grisso, & Swistak, 2010), then the average garden there would yield just under 22 pounds (10 kg) of food. The USDA recommends that adults eat 2.5 cups a day (5.9 cm^3) of vegetables (or, for raw leafy greens, 5 cups or 11.8 cm^3). So, if that yield were all green beans, this would supply an adult with over a month's worth of his or her daily recommended vegetables. If it were all leafy salad greens, the 22 pounds (10 kg) of yield would represent 2 months of an adult's vegetable supply. (These calculations use measures conducted in Food Dignity, which found that a cup of trimmed, halved and briefly microwaved green beans weighs 3.9 ounces (110.6 g) and 2 cups (4.7 cm^3) of raw mixed greens weighs about .95 ounces (26.93 g); each measure was repeated 3 times.)

Winkle, Krauss, Turkewitz, Silva, & Heinemann, 2013)—the myriad benefits discussed above that it currently yields, even if short of the trifecta of goals we outline, is impressive. Our argument here is that UA requires greater financial and political investments in order to yield the benefits promised by the trifecta of expectations that we outline in the next sections.

Examining the "Trifecta" of UA Expectations

Expectation 1: Provide good food to people with limited financial resources at prices they can afford.

The Los Angeles Food Policy Council describes UA as "helping to feed everyone, including the unemployed" (Urban Agriculture Working Group, 2014, "Background," para. 3). Of the book titles listed in our introduction, perhaps *Hunger-proof Cities* most clearly encapsulates the expectation that UA produce nutritionally meaningful quantities of food. Certainly both ENYF and DDF explicitly aim to create access to fresh, healthy, *good* food for people who would otherwise struggle to afford it. "Good" food being, per the Wallace Center's definition, "not only healthy but also produced in a manner that respects animals and the environment and supports economic viability for all those along the way from farm to table" (Wallace Center, Winrock International, n.d., "Background," para. 1).

But achieving this goal is complicated by at least two significant barriers. One is that for so many people in the U.S., what they can afford to spend on food is so little, particularly people living in neighborhoods such as those that ENYF and DDF call home. The U.S. arguably has a cheap food policy, which enables most people to afford a diet containing sufficient (or even a surfeit of) calories, rather than a living wage policy that would enable working families to afford the real cost of healthy, fresh food (Carolan, 2011). For example, half of households in East New York have incomes of US$40,000 or more, while nearly 30 percent earn US$20,000 or less, even though the employment rate is 85 percent (Capperis et al., 2013, p. 80). If a family of four receives the maximum annual SNAP benefit of US$7,788, this provides an average of US$7.13 per family meal (USDA, 2015). Other food assistance programs, while helpful, provide even less assistance; the Farmers Market Nutrition Program, which provides vouchers for seniors and women with children to use at farmers markets, provides only US$20 to US$24 per year per household. Therefore, if our UA operations charged the actual cost of producing our locally grown, organic fresh fruits and vegetables, our food would be unaffordable for most people in our neighborhoods. As discussed below, ENYF's produce sale revenues only cover about 2 percent of operational costs for the entire project. This means we either must sell the food we grow at prices below our production costs and make up the difference in other ways, or sell at our real costs, pricing the food out of reach for many people in the communities we exist to serve.[3]

Which brings us to a second problem: our largest food and farm policy programs do not support the production or consumption fresh, healthy food. The striking dissonance between our federal guidelines about what we should eat versus federal supports for what food we produce is noted with each federal farm bill (e.g., Barrington, 2011; Physicians Committee for Responsible Medicine, 2007). The USDA dietary guidelines urge that we fill half of our plates with fruits and vegetables. Yet our federal spending on agriculture programs allocates a fraction of a percent to fruit and vegetable production. Producers of these so-called "specialty crops," then, need to recoup their full cost of production, unlike those growing heavily subsidized commodity crops such as corn and soy. For example, according to the Environmental Working Group farm subsidy database of USDA-provided data, from 1995 to 2012, corn received a total of US$84.4 billion in subsidies, tobacco producers[4] received US$1.5 billion, and apples garnered US$262 million (Environmental

[3] While helping people to grow their own food, which ENYF does, can ameliorate this problem, there will likely always be large groups of people in any urban area who cannot or do not want to grow their own food.

[4] Since 2004 supports for tobacco farmers have been provided under the "Tobacco Transition Payment Program" (also known as the "tobacco buy-out") to help tobacco producers "transition to the free market" (USDA Farm Service Agency, 2013, para. 1).

Working Group, 2015). While the good food that ENYF and DDF produced did receive some federal support during that time in the form of competitive, short-term grants received, they received zero dollars in annual federal subsidies.

The combined realities of low incomes and comparatively high produce prices mean that the unhealthy options are too often the most affordable and accessible option for millions of people in communities like East New York and the unincorporated areas of Cherryland and Ashland in Alameda County, California, where DDF is located. However, if UA were subsidized at a scale proportional to that provided for commodity agriculture, operations like ENYF and DDF could more feasibly provide fresh, healthy food to people with limited financial resources at prices they can afford while also at least partly achieving the next two UA expectations we discuss below.

Expectation 2: Provide job training, work experience, and/or leadership development for people typically excluded from employment and/or leadership roles. As the EPA description of UA notes, one of the benefits of our work is teaching "a new generation" about work in general and growing food in particular (n.d., subhead 6). Certainly the need for innovative approaches to job creation and income generation is clear. One in seven young people in the U.S. is "disconnected," meaning not in school and not working (Salemson, 2012). Also, partly related to that, millions of people are released from prisons and jails each year (Re-Entry Policy Council, n.d.), many of whom have a difficult time finding a job. In New York State, the unemployment rate for parolees is 62 percent (New York State Department of Corrections and Community Supervision, 2011). Nearly 4 million Americans suffer from long-term unemployment, defined as such because they have been looking for work and have been unemployed for more than 6 months (Kasperkevic, 2014). These are some of the many Americans who lack a source of stable income, face barriers to employment, and thus are often the target of programs to expand employment opportunities through UA, including at DDF, which has crime prevention and restorative justice missions in addition to the usual UA goals.

Many capable individuals across the country are working hard to create innovative UA projects that can address some of these issues. Because UA is often community-based, therapeutic, and linked to local organizations, combining UA with job training, leadership development, or employment of the "least employable" (such as the differently abled, people with criminal records, or "disconnected" young people) is a natural fit. However, as we have found at ENYF and at DDF, both experienced staff and adequate staff-to-participant ratios are needed to provide appropriate support for people who need job training that goes beyond acquiring technical skills. ENYF provides leadership development and job training for youth ages 13 to 18 through a paid internship program (Daftary-Steel, 2015). DDF provides internship, apprenticeship, and employment opportunities for adults, many of whom have been previously incarcerated. As the story (see sidebar, next page) of one DDF farmer whom we will call Luke illustrates, the challenges many of the employees and interns face each day are not about accessing affordable fruits and vegetables, but about surviving.

Sometimes when we talk about our UA work at conferences, participants ask if we are helping people eat more vegetables. The short answer is almost certainly yes, but also, that is not the most salient point and is not, therefore, how we assess our work. As each of the DDF farmers can attest, consuming more kale does not shield Luke, his coworkers, or their families and friends from the grief puncturing their lives in the form of bullets.

Father Greg Boyle in East Los Angeles says "nothing stops a bullet like a job." The nonprofit he founded partly creates jobs by selling merchandise imprinted with that claim (Homeboy Industries, n.d.). In many communities with entrenched unemployment, people often engage in the informal economy—in particular the illegal drug trade—in order to make a living. Survival in this context is highly skilled, including capacities for keen observation, constant alertness, "reading" people and situations for risk and reward potential, and risk-taking. Often those who have been incarcerated have needed to further hone these skills to survive in jail or prison environments. This context also may operate with an ethic that is vastly

Luke's Story: A Former Urban Farmer at Dig Deep Farms
As told by author Hank Herrera

I call my boss at DDF to check in while waiting for a flight home. He says "Hank, I have bad news. Luke was shot yesterday. But they say he will be OK." Luke was one of our best farmers. I visited him the next day in the hospital. He told me what happened.

> They used a four five. They tried to get me, bro'. They tried to knock me down. I kept standing the whole time. But I don't know….I don't know nothin'. I'm just angry, bro'.

Later, at home, I reflected in a note to a friend: "Food justice. Community food security. Tell me what those words mean? We do this work so kids like Luke do not die on the street. So their children do not die on the street. So people do not eat food that poisons them. So kids have real jobs and can someday own real businesses. We believe that we prevent crime with good jobs in our food enterprise. But on a [expletive deleted] street corner in Oakland, nothing stopped those bullets. We all go to work the next day. Soon Luke will return to his job. He loves his job. We love him. Maybe our love, maybe our jobs, maybe our healthy soil, maybe our beautiful vegetables—maybe all of those will someday add up to hope and stop the bullets. Maybe someday the kid who shot Luke will give up his gun for a trowel. Maybe. We all go to work the next day."

In follow-up, we later had to fire Luke when he was found by a deputy sheriff breaking both organizational and legal rules. However, he has survived and even has begun to thrive in a new life he is building for himself.

different than what we call the "work ethic" in the mainstream world; for example, it may depend on demonstrating and enforcing personal loyalty and market dominance with physical violence. Many of these skills, however, are not transferable to the formal economy, in which they are viewed as problem behavior instead of assets and often as cause for dismissal.

Thus UA is creating mainstream work opportunities for people who may have learned very different rules of engagement than they will need for job success, including bringing survival skills that are suddenly reframed as problem behavior. Job "training" in this context requires a highly advanced skill set in addition to those needed for teaching new vocational skills. In our experience, this skill set does not include an unwavering imperative to be "nice." Perhaps "tough love" is the most salient description. These training programs also need to compensate for deficits in math, reading, and writing skills due to poor quality public schools, while also teaching technical skills, including farming, that are may be completely new to participants.

Creating opportunities for the many people chronically excluded from our workforce is a responsibility that our country cannot ignore. But expecting that urban farms could or should do this without long-term investments of outside funds for that purpose is unrealistic, all the more so if we are also expecting people new to farming and even to working in the formal economy to grow enough produce to sell at a profit.

Expectation 3: Generate income for producers and create jobs funded by profits from sales.
The *explicit* expectation for this often comes from UA organizers and proponents themselves. Van Jones' popular book *The Green Collar Economy* embodies this hope that "green" jobs in food and energy can, as promised in its subtitle, "fix our two biggest problems" of underemployment and environmental unsustainability (Jones, 2008). This specific potential, outlined in that book, is part of what led the Alameda County Deputy Sheriffs' Activities League to think about founding a UA enterprise in the form of the DDF urban agriculture program. As the DDF mission says, it "provide access to healthy food and jobs" (DDF, n.d.). ENYF's mission explicitly aims in a similar but somewhat different way for "community-led economic development," through our local farmers

markets where local entrepreneurs (gardeners, cooks, bakers, craftmakers) and regional farmers earn supplemental or primary income. The Los Angeles Food Policy Council UA statement above suggests that "urban agriculture can also contribute to local economic development, and provide much needed jobs" (Urban Agriculture Working Group, 2014, "Background," para. 3). Will Allen, who founded and leads the nation's largest UA operation, Growing Power, notes that "food is the most powerful thing; it is a necessity. It is a way to have fun, and it has the potential to end poverty and to create jobs. When people have jobs and food, it will essentially lower the crime rate. It will enable people to have lifestyles that are sustainable" (Belizaire, 2014, para. 6). As UA activists, we recognize that jobs and income are top priorities for the communities in which we work.

In our experience, funders often *implicitly* expect this of us, normally in the form of the nearly ubiquitous requirement in requests for proposals to explain how we will sustain our programs and projects in the future, in perpetuity, without any further financial support. For example, a potential funder that visited ENYF praised our strong leadership by community members, our highly successful youth internship program, and our community market, but was disappointed with the percent of revenue generated from produce sales to our community. Their representative suggested that if we did not want to take any of our current land out of community-directed production, perhaps we should start a rooftop farm on the top of our building and start selling this produce at higher prices to restaurants. A rooftop farm focused on high-end products would have involved adding or shifting a significant amount of staff time and required far more capital than we had or the funder would offer. A rooftop location would also move our work literally away from easy community access and view. Since the ENYF produce sells out at our markets each week, selling any of it to restaurants would directly interfere with our goal of meeting the need for fresh produce in our community. We gently explained why these revenue-generating strategies were not practical for us nor a fit with our mission. We were not invited for a full proposal and they suggested that we reach out to them if we were considering expanding our economic development focus in the future.

Even if our UA organizations did not have multiple social missions, making a farming business even moderately profitable is hard. The median farm operator in the U.S. incurs a net loss (Economic Research Service, 2014). Making a farming business profitable while also trying to provide other social benefits, including making food available at prices people can afford, is even more challenging. This is *not* because urban gardens or small, sustainable farms are less efficient or less productive than large farms; the opposite appears to be the case (International Assessment of Agricultural Knowledge, Science and Technology for Development [IAASTD], 2008). Within the Food Dignity project, for example, current research with gardeners to quantify their home and community garden harvests in Ithaca, New York, and Laramie, Wyoming, has found that average harvest yields per area in community gardens are on par with yield rates from commercial farms.[5]

Despite high yields per acre, urban farms often face barriers related to scale. Limited space and high property prices mean that urban farms tend to be small in size. Even with high yield rates, total production is constrained by limited land access. This harvest, especially if sold at affordable prices, yields limited revenue. To help improve produce access and expand income-generating opportunities, some UA projects, including ENYF, aggregate produce from a network of urban growers. Although this helps improve access to fresh produce and generates supplemental income to gardeners, it requires heavy investments of staff time and does not usually contribute to the

[5] In this study (results not yet published), Cornell University found that harvest yields of 22 experienced gardeners in Ithaca, New York, exceeded half a pound per square foot (2.4 kilograms per square meter), translating to over 14,000 lbs./acre (15,692 kg/hectare). Results from the parallel garden harvest quantification project in Laramie, Wyoming, have been similar, even in the dry, windy and colder climate there. Average per-acre yields in Northeastern U.S. (according to Mohler & Johnson, 2009) range from 6,000 pounds per acre (6,725 kg/hectare) for lighter crops (beans, greens) to 30,000 pounds per acre (33,626 kg/hectare) for heavier crops (potatoes, onions).

financial bottom line of the project doing the coordinating.

In sum, though producing and selling food in UA operations does generate some revenue, for those aiming to provide other benefits to their communities, such as affordable food to their neighborhoods and jobs for the least "employable," that revenue will not cover operational costs, much less generate a profit. ENYF, for example, earns about 2 percent of its operating budget through produce sales. City Slicker Farms, a UA organization operating in West Oakland for nearly 15 years, reports covering about 4 percent of its operational costs through sales (City Slicker Farms, 2013). Both of these operations focus exclusively on selling produce within their communities at affordable prices and run related programs that generate no income, such as helping community and backyard gardeners and providing job training and leadership development for teenagers. Growing Power, mentioned earlier as the largest-scale nonprofit UA operation in the U.S., garners about a third of its support from sales and services, but much of this derives from activities other than produce sales, such as conferences and trainings (Lepeska, 2013; GuideStar, n.d.). Thus for most UA operations working for multiple community goals, although produce sales provide an important pool of unrestricted funds, the challenges to achieving profitability mean that support for income generation and jobs cannot be derived from produce sales alone.

Discussion

All of the goals embodied in the trifecta we describe above represent necessary, if not sufficient, elements for building socially, economically and ecologically sustainable, healthy, and food-secure communities. UA projects and programs are well placed to contribute substantially to all three goals, including by activating often overlooked or underused assets such as vacant lots, rooftop space, and human potential and expertise. Additionally, UA projects that fulfill their greatest potential offer all kinds of underfunded "public goods," including healthy food, physical activity, education, public space, socially integrated aging, mental health, job readiness, and environmental stewardship, to name a few (Cohen, Reynolds, & Sanghvi, 2012). We can only do, sustain, and expand our work, however, with external investments or major shifts in our national wage structure.

Most UA organization operators know that we cannot meet the expectations to sell healthy food at prices that poor people can afford (i.e., have lower sales income) and provide substantial traditional and nontraditional workforce training (i.e., have higher production costs), while also generating sufficient income from sales to sustain a business. But in our experience, many UA operations are reluctant to admit this, at least publicly. Such an admission can look like a failure of their organization or enterprise, rather than a realistic statement about the failures of broader systems and what kind of support is required to enable UA operations to address some of these failures (Lawson, 2005). Some practitioners are speaking up and trying to craft a better-informed narrative of what makes an UA project successful (Johnson, 2014). Urban agriculture, in the words of LaDonna Redmond, requires "becoming organizers and not food science providers" (DeLind, 2014, p. 5).

So, although UA projects all over the country offer creative and effective responses to food access, land use, education, employment, and environmental issues, when we expect UA to tackle all of these issues without substantial outside support, we are encouraging UA organizations to pursue unattainable goals, and to fail—sometimes very publicly and sometimes by silently failing at some part of their mission. Some organizations know that meeting this triplet of goals is not realistic, but in response to the pressure they feel from funders or the media, they may tell a story that makes it seem possible, and that becomes the expectation to which others are held.

For example, as in the earlier story about a potential funder visit, ENYF staff are asked fairly often if we could sell some of our produce to high-end buyers to subsidize the cost of other produce that we sell to our community at low prices. The realistic answer is, not really. The United Community Centers Youth Farm, a half-acre (0.20 hectare) farm powered by youth interns that forms one component of ENYF, sells about US$10,000

worth of produce each year. If we took a quarter of that produce, quadrupled the price, and sold it to upscale restaurants, we would make an extra US$7,500, toward a total annual budget of US$430,000.[6] For that US$7,500, we would have to shift our mission, start a new program area focusing staff time on securing and delivering to high-end customers, and make our farm stand in our own community, which quickly sells out of most items, 25 percent emptier.

In our experience, many UA operations strive to be self-financing because they realize the challenges of being reliant on outside funding, especially foundation grants, which tend to be small, are rarely multiyear, are highly competitive, and require substantial quantities of staff time to acquire and manage. Below we outline our suggestions for making UA operations more sustainable while still enabling them to fill a need for affordable fresh food and transformative work and leadership training for our communities.

Implications for UA Operations

Make choices. Decide which one or two of these three things you can do, and do those well. For example, you can be a for-profit farm demonstrating the economic potential of sustainable urban agriculture, or a project using urban agriculture to provide food access and job training or leadership development for marginalized communities, but probably not all three**.**

Be honest with yourself, your funders, the media, and your community. If we say we can do everything, people will expect us to. If you thought you could do all of this, and realized that in reality you're doing only one or two of these things well, share that story.

Advocate for a new public agenda for UA, particularly renaming and expanding support for "specialty crops" and supporting some UA activities with social services funding streams, as described below.

Link your work with other groups working for related goals in our communities, such as living wage laws, education equality, and criminal justice reform. Creating healthy food systems has inextricable links to a healthy economic system, a healthy system of health care, a healthy criminal justice system, and a healthy environment.

Implications for UA Funders and Policymakers

Learn the reality of what it will take for urban farms to do effective leadership development or job training work, and allow the time and money to support that, including and especially for staff time.

Welcome the expertise and experience of practitioners. This includes, especially on the part of funders, asking real questions (with no "right" answers) about how a UA operation is working and welcoming honest answers to better support this work.

Keep supporting UA for all of the physical, social, environmental, and educational benefits it generates in communities. Many UA operations with broad social goals struggle to garner enough grant support to do their work well. Without other external supports like low or no rent for land and office space, DDF and ENYF probably would not be able to achieve even two out of the trifecta's three goals. SNAP incentive programs and other federal food assistance programs also help to keep the multiple goals of UA in operation.

Support "specialty crops" in the farm bill at a scale more proportionate to the U.S. Dietary Guidelines (and start calling them fruits and vegetables). In federal agricultural policy, the foods that are supposed to fill half our plate are called "specialty crops." This phrasing is indicative of the miniscule financial supports for growing fruits and vegetables vs. commodity crops such as corn, cotton, wheat, and soy. More of our tax dollars should support fruit and vegetable

[6] Even though ENYF programs are so integrated that it's hard to truly separate costs, we estimate that the UCC Youth Farm costs alone are about US$38,000 per year. This does not include any youth program labor, but does include farm manager labor, and time spent leading educational tours and hosting volunteers, since we cannot imagine running our farm and refusing to let a local first-grade class visit, for example. Staff salaries are low for New York City (US$35,000–US$40,000 per year), and overhead is low because we pay no rent for our basement office space.

production and, just as importantly, in ways that make those supports proportionately available to smaller producers, including urban farms. Also, while this is not a UA-specific issue, citizen and congressional support for such a measure might be easier to muster if we called them what they are, fruits and vegetables, in the farm bill legislation.

Commit some parts of funding streams for "standard" publicly funded social services to UA programs working to tackle root causes of deep social problems that give rise to the need for such services. This could offer a way for social work, employment, nutrition, and criminal justice services to begin to solve, rather than simply manage, these issues. The city of New York's Green Thumb program, run as a function of the parks and recreation department and funded by a HUD Community Development Block Grant, is a small-scale example of this type of funding that is helping community gardening operations. In California, DDF represents a groundbreaking attempt at this strategy in collaboration with many Alameda County government partners, and one that earned the state of California's Counties Innovation Award in 2014 (Alameda County Board of Supervisors, 2014). The growing cadre of federal USDA programs that support UA, such as the Farmers' Market Nutrition Program, are also small but important steps in this direction.

Conclusion

With the strategies, supports, and structures we outline above, UA operations could eventually achieve the first two goals of the trifecta: providing access to fresh food at affordable prices *and* operating sustainably with enough income to pay a living wage to their work force. To enable the educational aims of urban agriculture—specifically, the intensive job training and leadership development for marginalized people outlined here—UA operators, especially those trying to make their produce accessible to low- and middle-income people, will likely still need external financial support, in the same way that our public education institutions need external financial support.

In this essay, we have outlined three ambitious goals that speak to the potential of urban agriculture and to the issues we need to address in order for all people to live healthy, stable, dignified lives. We argue that UA is valuable even when it is not profitable, and that our colleagues, funders, policymakers, supporters, and critics should consider ways, as described above, to both support UA and to address root causes of the social issues that have driven UA initiatives to sprout in vacant lots all over the country.

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Regulating backyard slaughter: Strategies and gaps in municipal livestock ordinances

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Abstract

As the alternative food movement continues to grow and urban homesteading practices spread, many cities are revising their codes to more clearly address agricultural activities. Butler's (2012) study demonstrated a set of fairly coherent strategies for regulating the keeping of poultry and livestock. Related to livestock keeping, livestock slaughter appears to be spreading as well. The regulation of backyard slaughter, however, has scarcely been addressed in the literature. Building on Butler's study, this research examines the animal policies in 22 cities and identifies five approaches to governing backyard slaughter. Many of the cities do not address the practice at all, and in others significant gaps and inconsistencies leave the regulations open to interpretation. Drawing on examples from the 22 sample cities, the final discussion considers whether and how municipalities have chosen to regulate backyard slaughter, and suggests that policy-makers have a range of regulatory options for meeting local priorities, whether those are reducing nuisances, protecting public health, or addressing animal well-being.

Keywords

urban livestock, urban agriculture, nuisance, public health, slaughter, animal geographies

Introduction

During the 20th century, the once widespread practices of backyard livestock keeping and slaughter became less common and even illegal in many U.S. cities in response to socio-economic changes and parallel shifts in municipal regulation. Of course, many cultural communities and low-income households maintained animal practices that include backyard slaughter for economic (Arellano, 2010), cultural and familial (Pallana, 2011), or medical-religious purposes (Fadiman, 1997). However, within the dominant culture's understanding and management of the modern

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city, these individuals and communities often learned to hide, relocate, or modify their practices to fit the legal restrictions. Over the past decade a new demographic group has taken up livestock keeping in U.S. and Canadian cities: predominantly white, predominantly middle-class urban residents. Possessing greater social capital, these residents have demanded that laws be changed to allow them to keep poultry and livestock unhindered by restrictive regulations. In that period, dozens of U.S. (and to a lesser extent Canadian) cities both large and small have revisited and revised their ordinances in light of growing interest in urban livestock keeping. This trend has been the subject of recent research in legal studies and geography. Notably, William Butler (2012) examined 22 U.S. cities that had recently revised their livestock ordinances, detailing the variety of strategies and scales cities employ in managing whether and how residents may keep poultry and livestock animals. Whether or how they may kill the same animals, however, remains largely unexamined.

A decade ago, the new livestock-keepers in U.S. cities generally focused on keeping live animals for their production of eggs, milk, or honey (Blecha, 2007). Today they are increasingly choosing to slaughter animals for meat.[1] As the practice of backyard slaughter becomes more widespread and visible, conflicts are arising. While some residents believe it a right to provide food for one's family and oppose any efforts to restrict animal slaughter, others find the practice abhorrent and want it banned, or at the very least kept out of residential neighborhoods (Blecha & Davis, 2014). These conflicts indicate that cities large and small across North America need to consider how to define and regulate backyard slaughter.

Using the same 22 cities, this article builds on Butler's work with a specific focus on the regulation of small-scale animal slaughter for home consumption. The following questions frame this research: (1) What regulatory strategies do these cities employ to define, permit, or restrict backyard slaughter of poultry and livestock animals? (2) Are these regulations clear, comprehensive, and coherent, and if so, what framework(s) seem to lend cohesion? (3) How do these slaughter regulations compare with those governing the keeping of live animals? This paper proceeds with a review of the relevant literature and some context for the new era of backyard slaughter. After a brief description of methodology, findings are presented. Drawing on examples from the 22 sample cities, the final discussion considers whether and how municipalities have chosen to regulate backyard slaughter, and suggests that policy-makers draw on a range of regulatory strategies for meeting local priorities, whether those are reducing nuisances, protecting public health, or addressing animal well-being.[2]

Literature Review

This research is situated most directly within a range of literature on the spatial history and regulation of urban livestock and animal slaughter. Other writers have outlined the process of gradual exclusion of productive animals from English, Australian, and American cities during the 19th and 20th centuries (Cronon, 1991; Dyl, 2006; Gaynor, 1999, 2005, 2007; Gilje, 1987; McNeur, 2011;

[1] Choosing words to describe the killing of animals is fraught with emotion, politics, power, and meaning. Terms range from "murder," a word used regularly by anti-slaughter activists, to "processing," a term favored by practitioners, or "harvest" as suggested by one anonymous reviewer. In this paper, I use "kill" and "slaughter" in an effort to explicitly name the death of animals by human hands while avoiding the overt inflection of a particular perspective. The term "animals" itself is questionable when used in opposition to "humans," who are themselves also animals. I generally use the conventional terms "human" and "animal," though I recognize each animal's subjectivity in using personal pronouns, such as "she/her" and "who/whose."

[2] Deep philosophical and political divisions exist between the positions of "animal rights" versus "animal welfare." Briefly, advocates for animal rights recognize non-human animals as sentient beings with their own interests, and seek the abolition of human use of animals for any purpose. Meanwhile, proponents of animal welfare seek to improve the quality of life and reduce the suffering of animals used by humans (Bekoff, 2009). In this paper, the term "animal well-being" is used to refer broadly to any concerns and debates that focus on the lives and experiences of animals. Specific reference to "rights" or "welfare" perspectives are used when differentiation is appropriate.

Philo, 1998). A combination of factors drove this physical and emotional distancing: distaste for the nuisances of odor and noise, concern for public health due to the presence of rats and flies, new technologies that allowed for the transport of chilled milk and meat, and a desire by wealthy and business interests to remove loose animals from the streets to allow for more "dignified" mobility.

More specifically the historical geography of slaughter has also received recent attention. Scholars of urban geography and history have demonstrated how, in many cities, independent butchers (sometimes organized in a guild) were removed from city centers to their edge; this move was often accompanied by shifts in organization and increases in scale and mechanization. Commercial slaughterhouses appeared at the urban fringe, where the traditional butchers' craft was replaced by the (dis)assembly line (Atkins, 2012; Lee, 2008; Robichaud & Steiner, 2010; Shulman, 2012). Since the 1960s, another spatial shift has transformed the slaughter industry in the U.S. Reflecting tremendous consolidation in food and agri-business generally, the meat processing industry has narrowed to a handful of corporations. Moreover, most meat consumed in the U.S. comes from animals slaughtered at a small number of large rural slaughterhouses, hidden from the sight of urban Americans.[3] Geographers and other scholars have examined how these plants powerfully affect the local environment, economy, and ethnic make-up of the rural communities where they are located (Broadway & Ward, 1990; Drabenstott, Henry, & Mitchell, 1999; Fennelly & Leitner, 2002; Stull & Broadway, 2012; Stull, Broadway, & Griffith, 1995; Ufkes, 1998; Watts, 2004).

Given this context of urban exclusion and large-scale rural slaughter, the recent return of livestock to the city is all the more remarkable. An avalanche of popular urban farming literature has appeared in the past decade, signaling a renaissance for backyard chicken flocks, urban goats, rooftop beehives. A handful of scholars have begun to examine this trend, interrogating the motivations and practices of urban livestock-keepers (Blecha, 2007; Blecha & Leitner, 2014; McClintock, Pallana, & Wooten, 2014; Reynolds, 2010). A related body of work in geography (Blecha, 2008; Butler, 2012; LaBadie, 2008), legal studies (Orbach & Sjoberg, 2011, 2012; Salkin, 2011a, 2011b) and public health (Tobin, Goldshear, Price, Graham, & Leibler, 2015) has examined the regulation of urban livestock in U.S. cities, with a primary focus on the keeping of live animals (although several briefly mention slaughter). The present study is unique in its attention specifically to how U.S. cities regulate the slaughter of poultry and livestock animals at the household scale.

Backyard Slaughter: A New Era

In order to analyze municipal regulation of animal slaughter, it is important to understand why this issue is relevant in contemporary U.S. cities.[4] Since 2000, a growing number of middle-class, largely white urban residents with no previous livestock experience have begun keeping small livestock or poultry in their yards in cities across the U.S. and Canada. Most commonly, they began by keeping chickens, sometimes called the "gateway animal" for urban farmers. Qualitative research with "early adopter" chicken-keepers in Seattle, Washington, and Portland, Oregon (Blecha 2007), revealed that their motivations centered on four values or goals: (1) getting high quality, organic eggs, (2) providing their chickens with a "happy, healthy" life, (3) maintaining or improving the environment, and (4) learning practical skills and teaching them to children. None of the "new urban chicken-keepers" in 2003 had any intention of slaughtering their animals (Blecha, 2007). In the past decade,

[3] In 2012, four companies controlled over 70% of beef production in the U.S., operating 27 slaughterhouses. Similarly, the largest five pork producers required just 24 slaughter facilities to control 62% of the U.S. pork industry's total daily slaughter capacity. While some states have multiple USDA-approved slaughter facilities, other states have none, and their residents are indeed distant from industrial slaughter (North American Meat Institute, n.d.; Tyson Foods, 2015; U.S. Department of Agriculture [USDA], 2015).

[4] Much of the contextual information in this section comes from the author's own knowledge and experiences, in addition to formal research on this topic. As a chicken-keeper for the past decade in two different cities, I have participated in classes, e-mail lists, and informal conversations with other livestock-keepers, and have read numerous urban farming books, magazines, and blogs.

however, as the keeping of backyard chickens has become a more common hobby and the "urban homesteading" movement has gained momentum, a growing number of urban residents have slaughtered (or have at least contemplated slaughtering) an animal in their care. The discussion below explores this shift, noting that while some urban farmers intend to slaughter their animals, for others, it is simply an exit strategy from an unplanned situation.

A growing number of urban farmers are explicitly choosing to raise animals—chickens, ducks, rabbits, goats, or even pigs—for meat. Slaughter classes are popping up in cities across the country. In Berkeley, California, the Institute of Urban Homesteading offers courses to the public such as "Home Butchering: Fowl," "Rabbit Butchering and Tanning Demonstration," and "Micro-Farming: Quail."[5] In Oregon, the Portland Meat Collective offers classes, usually sold out, in "Basic Duck Butchery" and "Basic Pig Butchery."[6] Novella Carpenter, the author of an urban homesteading memoir, *Farm City,* has led a turkey slaughtering workshop in Austin, Texas (Carpenter, 2009) and "The Complete Rabbit" workshop in Brooklyn, New York, where participants paid US$100 each for the opportunity to kill and clean a rabbit (Severson, 2010).

This interest in homegrown, home-slaughtered, or home-butchered meat must be understood within the larger alternative foods movement. In the 1970s and '80s, individuals with environmental or health concerns were able to shop at natural foods cooperatives in many U.S. cities. By the 1990s, they could choose from an increasing array of certified organic and hormone-free foods (Fairfax, Dyble, Guthey, Gwin, Moore, & Sokolove, 2012). Since 2000, other signifiers (such as 'local,' 'sustainable,' 'humane,' 'fair,' 'heirloom,' 'real,' 'heritage,' 'clean,' and 'GMO-free') have gained prominence even at mainstream supermarkets, making grocery shopping a complex and information-dense project for shoppers with the means and desire to "eat ethically" (Beagan, Power, & Chapman, 2015). It is within this context of heightened sensitivities to all the things that can be "wrong" or "right" about our food that the food-processing skills of canning, fermenting, brewing, cheese-making, and slaughtering have gained the interest of a new generation. In a survey regarding backyard slaughter, Blecha & Davis (2014) found that San Francisco Bay Area urban residents who supported the practice of backyard slaughter cited an array of economic, ecological, spiritual, and/or emotional reasons. They "repeatedly refer[red] to ways of raising animals that are 'humane,' 'hand-raised,' and 'humble,' while producing more healthful meat, building social connections in the community, and reducing fossil fuel use" (p. 73).

Distinct from those who intentionally raise animals for meat, many urban livestock keepers may find themselves faced with a dilemma of how to get rid of an animal they are no longer able to keep. Because roosters are banned in most U.S. cities due to their noisy crowing, most urban chicken-keepers intend to keep only hens. Thus, when buying chicks at a feed store, they generally choose chicks who have been "sexed" (that is, the females selected and the males destroyed) at the hatchery.[7] Despite assurances from suppliers of at least 90% accuracy, it is not uncommon to discover a rooster or two in the flock as the chicks mature. Their keepers then need to figure out what to do with their "accidental rooster." (This situation is most common with chickens, but can also occur, for example, when a dairy goat has a male kid.)

A similar problem faces chicken-keepers with aging hens. Depending on their breed, chickens can lay 3–6 eggs per week (when not molting or on "winter break") for 2 to 3 years, with egg production declining each year. By age 5 or 6, laying is rare. Chickens can live to age 15 or more, which means that letting chickens die of "old age" requires a willingness to feed and care for them for a decade of retirement. While the aging of hens may seem like an obvious eventuality, new chicken-keepers rarely plan for it. In an urban setting, the number of chickens one can keep is often limited by regulations or by small yards, so mature hens

[5] http://www.iuhoakland.com/animals.html
[6] http://www.pdxmeat.com/classes/
[7] Hens lay eggs with or without a rooster.

occupy space that cannot be filled with younger, egg-laying hens.

Chicken-keepers who have named their birds and raised them by hand are often fond of their birds and concerned about their fate. Even when owners decide not to keep a particular chicken any longer, they can go to considerable lengths to find new long-term homes for them. Some chicken-keepers put their roosters up for adoption at the feed store where they bought them. Many roosters are "re-homed" through advertisements in a local paper, on chicken-keeping listservs, or Craigslist ads (Blecha, 2007). Of course, not all chicken-keepers are so thoughtful. Unwanted birds are sometimes tossed over the fence into Seattle's Woodland Park Zoo during the night; presumably some are eaten by predators (Leslie, personal communication, 2003; Sven, personal communication, 2003). Chickens are sometimes simply released to "go wild"; how long they survive must vary widely. In some cases, roosters are rescued from the streets by animal welfare advocates and taken into new homes as pets. Less fortunate roosters can be captured for cockfighting, killed by dogs, or slaughtered by someone with little regard for humane treatment (Clouse, 2013).

Deciding what to do with aging hens can be a more emotionally difficult problem, as the hens have usually been named and interacted with for several years, while noisy and sometimes-aggressive roosters are often removed just a few months after arrival. In either case, faced with the options above, some chicken-keepers decide to dispatch their bird(s) themselves, hoping to do it more humanely than a stranger would. One additional circumstance of unplanned slaughter occurs when a chicken (or other small livestock) is badly injured. If a predator, a raccoon for example, gets in the coop and maims but does not kill a chicken, people must make a decision whether take the bird to a veterinarian, let it suffer, or end its misery.

Whether or not slaughter is part of owners' original plans, as livestock-keeping spreads, situations will increasingly arise in which individuals will consider killing their animals. Municipalities will need to address questions of whether and how slaughter should be done. This study examines the state of policy in advance of any concerted response from communities to this growing and potentially contentious matter.

Methods

This research builds on Butler's (2012) study of livestock-keeping regulations in 22 U.S. cities. This study uses the same sample of cities, with the goal of identifying comparable data points. For his study, Butler chose cities that had "recently revised their animal control ordinances and/or zoning ordinances to allow for urban livestock" (p. 198). Moreover, Butler designed the sample to "emphasize variability" regarding region, population size, and "approaches to managing livestock" (p. 198). Butler's sample also suits my research objective to discover how the regulation of livestock slaughter compares with the regulation of livestock keeping.

Ordinances related to urban livestock often reside in a chapter of municipal code titled "Animals" that governs licensure for pet stores, definitions of cruelty and nuisance, and what types of animals may be kept as pets. Other relevant codes are found in sections that address fishing and hunting regulations, control of pest animals or "vermin," as well as in public health, zoning, and business permits. I searched the codes of the 22 sample cities online for a series of terms, including: "slaughter," "butcher," "kill," "meat," "animal," "livestock," "poultry," "fowl," "chicken," "hen," "rooster," "duck," "rabbit," and "goat." All the relevant ordinances were captured and entered into a spreadsheet.

The data were analyzed in three phases. The first phase identified each city's slaughter rules and compared them with the livestock-keeping rules in the same cities. In Table 1, I summarize both sets of regulation data (keeping and slaughter), using Butler's framework (2012, p. 200) in order to compare them. The sample cities used a variety of schemes for categorizing animals, but here I grouped the species into a handful of categories (e.g., small, medium, and large), also following Butler. Table 1 indicates by city whether keeping and/or slaughtering of each animal type is allowed (✓), prohibited (✕), or allowed under some circumstances (•). Immediately apparent in Table 1 is the large number of blank spaces in the slaughter columns, indicating that the practice is not addressed.

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Table 1. Municipal Regulations That Allow or Prohibit Keeping and/or Slaughtering Livestock by Type[a]

(✓= allowed; × = prohibited; ● = some in category allowed; blank = none specified or unclear)

Municipality	State	Hens		Roosters		Other fowl[b]		Small animals[b]		Medium animals[b]		Large animals[b]	
		Keep	Slaughter	Keep	Slaughter	Keep	Slaughter	Keep	Slaughter	Keep	Slaughter	Keep	Slaughter
Ann Arbor	MI	✓	×	×		×		✓		×		×	
Baltimore	MD	✓		×		✓[c]		✓[c]		✓[c]		×	
Bloomington	IN	✓	●	×		✓		✓		✓		✓	
Charlotte	NC	✓	●	✓	●	✓	●	✓	●	✓	●	✓	●
Chattanooga	TN	●[d]	✓	●[d]	✓	●[d]	✓	●[d]		●[d]	✓	●	
Cleveland	OH	✓	●	✓	●	✓	●	✓	●	✓	×	✓	×
Fort Collins	CO	✓	×	×	✓								
Kansas City	MO	✓		✓		✓		✓		✓		✓	
Longmont	CO	✓	×	✓		✓		✓		✓		✓	
Madison	WI	✓	●	×[e]	●	✓	●	✓	●	●	●	✓	●
Missoula	MT	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Mobile	AL	✓		×		✓				●		✓	
Morgan Hill	CA	✓				✓		✓		✓		✓	
Mountain View	CA	✓		✓		✓		✓		✓		✓	
Rogers	AR	✓	●	×		✓	●	✓		●		✓	
Round Rock	TX	✓				✓		✓		✓		✓	
San Antonio	TX	✓				✓		✓		●		✓	
Santa Clara	CA	✓	×	✓	×	✓	×	✓	×	✓	×	✓	×
Seattle	WA	✓		×		✓		✓	●	●		✓	
South Portland	ME	✓	×	×	×								
Stamford	CT	✓		✓		✓		✓	✓	✓	✓	✓	✓
Tallahassee	FL	✓	●	✓	●	✓	●	×		×		●	●

[a] The framework of this table and the data on *livestock keeping* are drawn from Table 1 in Butler (2012, p. 200). Honeybees are omitted here as bees are not subject to slaughter.

[b] "Other fowl includes turkey, geese, ducks, etc. Small animals include rabbits. Medium animals include goats, pigs, sheep, etc. Large animals include cows, horses, alpacas, llamas, etc." (Butler, 2012, p. 200).

[c] Baltimore updated its health code in 2013 to expand the keeping of chicken hens, pigeons, rabbits, and small goats (Baltimore City Health Department, Office of Animal Control, 2013; Witt, 2013).

[d] Allowed only on parcels of 5 or more contiguous acres (2 or more contiguous hectares).

[e] Discrepancy with Butler's data, which showed that roosters are allowed. Madison code 9.52(c): "Keeping of roosters is prohibited."

In the next phase, the cities were sorted based on similarities in how they regulate livestock slaughter versus livestock keeping. As I repeatedly read the ordinances and sorted the coded data, patterns and anomalies emerged, revealing where the slaughter ordinances are coherent, unclear, contradictory, or simply absent. While all 22 cities explicitly allow at least some livestock keeping, nearly half of them have no stated position on slaughter. In the rest of the cities, slaughter regulations vary widely. Among the sample cities I identified five different regulatory strategies, which will be outlined below. In the third phase of analysis, I coded details regarding the species and gender of animals mentioned in the ordinances and noted particular methods, locations, and purposes of slaughter that were allowed or prohibited, as well as any requirements for individual slaughterers.

Findings

Through repeated reading and coding of the ordinance data, I identified five "approaches" to livestock regulation among the sample cities, which I call *silent*, *quiet*, *prohibiting, uneven*, and *conditional* (Table 2).

The cities categorized as *silent* are those whose codes make no mention of slaughter at all. In some of these cases, such as Ann Arbor, Michigan, and Baltimore, Maryland, most of the silences are in reference to animals already prohibited from the city. However, even types of animals that are allowed in cities are commonly unaddressed. For example, five cities (Kansas City, Missouri; Longmont, Colorado; Missoula, Montana; Mountain View, California; and Stamford, Connecticut) allow roosters to be kept within the city but are silent on the issue of rooster slaughter. The slaughter of other types of permissible animals was left out even more frequently (hens, 9 cities; other fowl, 10; small animals, 9; medium animals, 6; large animals, 11). It is unclear whether these gaps are intentional or simply oversight.

Closely related to silence is an approach I call *quiet*. In these cases, no ordinance directly addresses slaughter, but other laws acknowledge the practice and give tacit approval. Four of the cities in this study are quiet on slaughter. For example, while the city code of Mobile, Alabama, does not mention the act of slaughter per se, animals "slaughtered for food within 24 hours" are exempt from dead animal reporting laws (Section 7-20(b)). In Mountain View, stores are prohibited from selling young chicks or rabbits whose down or fur has been artificially colored; however, they are allowed to sell the same naturally colored animals "to be raised for food purposes only." This phrase addresses only the raising of animals, not their demise, but there is no other way that rabbits become "food" than by killing them. Contradictions and loopholes may be vestiges of old laws still on the books or existing in whole other chapters of the municipal code. Whatever the case, despite the absence of explicit permission for slaughter, these cities quietly imply consent.

A third group of cities have *uneven* regulations by species or sex. For example, Ann Arbor, allows both hens and rabbits to be kept. However, while the law explicitly prohibits the slaughter of chickens (hens or roosters), it does not mention rabbits, creating a loophole for those who would like to raise rabbits for meat. Similarly, Longmont specifically prohibits the slaughter of hens, but not roosters. Here is a case where "accidental roosters" may not be kept, but may be killed.

The problems of this uneven approach would seemingly be solved in cities of the fourth group, which simply *prohibit* all slaughter. For example, in Santa Clara, California, "it is unlawful for any person, by any means, to slaughter any animal within the city…('Slaughter' means to kill an animal for food or butcher.)" These cities allow the keeping of hens, but with a prohibition on slaughter the law carries an implicit expectation that hens will be kept until the natural end of their lives. In a city with a strict slaughter prohibition, the killing of senior hens could conceivably be pushed "underground." Another challenge that may arise from a blanket prohibition is if a commercial slaughter operation or recreational fishing is unintentionally banned.

The fifth approach to regulation is *conditional*—that is, slaughter is allowed under particular conditions. Out of 132 regulatory opportunities (22 cities × 6 types of animals), municipalities prescribe in detail *where*, *how*, or *why* slaughter is

Table 2. Five Approaches To Regulating Backyard Animal Slaughter

Municipality	State	Regulations on keeping poultry and livestock	Regulations on backyard slaughter
Silent on slaughter			
Baltimore	MD	Chickens, rabbits, and small goats allowed.	Silent on slaughter.
Chattanooga	TN	Swine, goats, and fowl allowed on large (≥5 acres or 2 ha) lots only.	Silent on slaughter.
Morgan Hill	CA	Poultry and rabbits allowed. Swine in agricultural zones only. Medium and large animals on large lots only.	Silent on slaughter.
Round Rock	TX	Fowl allowed. Medium and large animals on big lots only.	Silent on slaughter.
San Antonio	TX	Fowl, medium, and large animals allowed.	Silent on slaughter.
Kansas City	MO	Chickens and rabbits allowed. Limited roosters.	Silent on slaughter.
"Quiet" on slaughter (permission implied)			
Mobile	AL	Hens allowed. No roosters. Cows with permit. Silent on rabbits.	Animals "slaughtered for food within 24 hours" are exempt from dead animal reporting laws.
Stamford	CT	Poultry and livestock allowed.	Residents may use firearms on own property to kill livestock.
Mountain View	CA	Poultry and rabbits allowed. Permit needed for medium and large animals. No roosters except agricultural zones.	Stores may display and sell young poultry and rabbits "to be raised for food purposes only."
Slaughter prohibited by species or sex			
Ann Arbor	MI	Hens and rabbits allowed.	Slaughter of chickens prohibited. Silent on rabbits.
Longmont	CO	Hens allowed. Other fowl and large animals allowed in some zones.	Slaughter of hens prohibited. Otherwise silent.
South Portland	ME	Hens allowed. Quiet on other animals except they must not run loose in parks or highways.	Slaughter of chickens prohibited. Otherwise silent.
Slaughter prohibited			
Santa Clara	CA	Fowl, rabbits, and other small, medium, and large animals allowed.	Slaughter prohibited.
Fort Collins	CO	Hens allowed; no roosters.	Slaughter prohibited.
Slaughter conditional (depending on circumstances)			
Bloomington	IN	Chickens allowed.	Slaughter prohibited on harborer's property.
Charlotte	NC	Fowl, small, medium, and large animals allowed with permit.	Slaughter allowed if humane, sanitary, hidden, and not otherwise prohibited.
Cleveland	OH	Poultry, small, and medium animals allowed with permit. Medium animals on big lots only.	Slaughter of chickens, ducks, rabbits, and similar small animals allowed on site and for consumption by occupants only.
Madison	WI	Hens and other fowl allowed.	Slaughter of chickens prohibited on site. Permit needed to slaughter medium and large livestock.
Missoula	MT	Hens and rabbits allowed.	Prohibited to kill animals except "commonly accepted agricultural and livestock practices." (Unclear if and how slaughter is included.)
Rogers	AR	Hens allowed. No roosters and no hogs. Silent on other animals.	Slaughter of chickens prohibited "outside."
Seattle	WA	Fowl and small animals allowed. Medium and large animals on big lots only.	Slaughter of rabbits must be hidden from other rabbits.
Tallahassee	FL	Hens and limited roosters allowed.	Prohibited to "inhumanely kill…any animal."

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allowed in 24 of them. Seven cities mention particular stipulations for slaughter, regarding location, conditions, and/or purpose (Table 3). These details provide initial insights into the local policy priorities (such as nuisance prevention, public health, or animal well-being) behind these policies, which are discussed below.

Discussion

As the practice of livestock keeping spreads and backyard slaughter likely follows, municipalities across the U.S. will increasingly face the question of whether and how to limit or shape these practices. In Butler's (2012) analysis, cities used regulations at different spatial scales to restrict where and how livestock animals could be kept. At the municipal scale, certain species were simply prohibited citywide, thereby indicating that these animals were incompatible with the municipality's vision of itself as an urban space. In the present study, at least five of the 22 cities explicitly prohibited slaughter of one or more animal species, taking a clear stance that slaughter is out of place within their municipality.

While Butler found that most cities chose to provide detailed codes for livestock keeping, the present study demonstrates that city codes offer few specifics regarding slaughter. For example, in three cities with *uneven* regulations, the code prohibited slaughter of one species or sex but it failed to address other animals allowed in the city. Several *quiet* cities mention slaughter in a roundabout manner while discussing other issues, but do not address the issue head on. Even those cities that explicitly allow for slaughter under some circumstances, those circumstances are poorly defined, particularly in regard to location. Cities differed in where they require slaughter to take place. In Cleveland, Ohio, residents may slaughter poultry and small animals "on site," while in Madison, Wisconsin, residents are prohibited from slaughtering "on site." In Bloomington, Indiana, residents "shall not slaughter chickens on harborer's property." As written, the laws appear to allow residents to slaughter their chickens, as long as they do not do it at home. The intent of the codes is unclear: did Madison and Bloomington intend to prohibit slaughter, or actually hold that it would be better for the "harborer" to kill their chickens at a neighbor's house instead? In none of these slaughter ordinances are there detailed specifications similar to those commonly prescribed for livestock keeping.

Butler argues that well-crafted regulations—whether detailed or flexible—can help municipalities navigate potential challenges associated with the return of urban livestock. Butler identifies two core conflicts that policy-makers needs to manage: tensions around animals and practices seen as "rural" in an urban setting, and concerns about public health. These two issues are also associated, of course, with slaughter, and the present research indicates that the relevant regulations are less than robust. The discussion below explores how cities might address and/or prevent conflicts over appropriate urban land use, safeguard public health, and—in response to a third tension—balance animal well-being with (human) desires for food and liberty. This discussion concludes by considering reasons why municipalities may or may not want to provide more detailed slaughter regulations.

One function of more detailed slaughter ordinances could be to define and prevent nuisances. Butler describes these types of detailed guidelines as part of a zoning tradition that aims to "minim[ize] negative impacts on the users of neighboring properties" (Butler, pp. 208–209). Some cities in this study have specific ordinances that could help accomplish this. Charlotte, North Carolina, specifies that slaughter "shall not be done open to the view of any public area or adjacent property owned by another" (Charlotte Code Part II, Sec 3-102(c4)). Similarly, Rogers, Arkansas, prohibits slaughter "outside." These restrictions would limit the visual (and probably aural) impact on neighbors. Other guidelines could include a permitted period for slaughter similar to hunting and fishing seasons or a limit on the number or type of animals slaughtered per year. These types of regulations—of type, number, and site—are common in ordinances governing urban livestock keeping, and could be useful if cities want to minimize nuisance conflicts between neighbors.

Protecting public health is another reason to regulate backyard slaughter. Several serious

Table 3. Slaughter Regulations Dependent on Variables of Location, Conditions, and Purpose

		Regulations by type of animal						Location	Conditions				Purpose
Municipality	State	Hens	Roosters	Other fowl	Small animals	Medium animals	Large animals	On site[a]	Hidden from view[b]	Humane[c]	Sanitary[d]	Permit[e]	Food[f]
Bloomington	IN	a						Prohibited					
Charlotte	NC	bcd	bcd	bcd	bcd	bcd	bcd		Human	Required	Required		
Cleveland	OH	ae	ae	ae	ae			Required					Required
Madison	WI	a	a	f	f	f	f	Prohibited				Required	
Rogers	AR	b		b					Prohibited outside				
Seattle	WA				bd				Animal		Required		
Tallahassee	FL	c	c							Required			

[a] Slaughter performed "on site" or "on harborer's property"—required or prohibited.
[b] Slaughter must be hidden from view of the public and/or neighbors ("human") or from others of its species ("animal") , or is prohibited outside.
[c] Slaughter must be "humane."
[d] Slaughter must be "sanitary."
[e] For consumption by household only.
[f] Permit required.

infectious diseases, including avian influenza, *E. coli,* and salmonella can be transmitted through livestock, and poultry in particular.[8] In light of this risk cities have a range of regulatory options ranging from education to prohibition. In a recent study of infectious disease outbreaks in the U.S. that can be traced to backyard poultry, Tobin et al. (2015) generated a set of seven recommendations for urban poultry ordinances in order to reduce this risk. These include prescriptions for frequent hand-washing, proper composting of wastes, and special attention to children, who are "more likely to touch, kiss, or snuggle live poultry (particularly chicks), put their hands in their mouth, and inconsistently practice hand washing" (p. 388). Of the seven recommendations, only one was rigid: "3. Prohibit slaughter at the home" (p. 389). The authors argue,

> slaughtering animals on site in urban environments poses opportunities for pathogen transmission from infectious birds to the environment, humans, and other animals. The urban household environment is not well suited for containment of pathogens from the slaughtering of birds, including viscera, blood, and feces, and in particular may draw wild and domesticated animals to the premises. (p. 389)

While not contradicting these potential disease vectors, this author questions the necessity of prohibiting slaughter on these

[8] The relative risk posed to public health by backyard versus commercial poultry flocks is important to bear in mind. In an outbreak of highly infectious avian influenza in 2003, Bavinck, Bouma, Van Boven, Bos, Stassen, and Stegeman (2009) found that "backyard flocks were considerably less susceptible to infection than commercial farms" (p. 247). Furthermore, Smith and Dunipace (2011) found that "the contribution of backyard poultry flocks to the on-going transmission dynamics of an avian influenza epidemic in commercial flocks is modest at best" (p. 71).

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grounds. Tobin et al. provide data on 22 outbreaks of salmonella in the U.S. since 1990; in every case, the source was contact with live poultry, not participation in slaughter. Although their article repeatedly warns that animal slaughter "poses a risk for pathogen transmission" (p. 389), the authors provide no examples of disease being spread that way, which begs the question whether slaughter is actually more dangerous for public health than keeping live birds. If good hygiene practices protect practitioners as they handle live birds and clean out coops, it seems possible that similar practices could protect them during slaughter. If one of the key concerns is contamination of children, surely it is easier to keep young children away from an occasional slaughter event than from the daily presence of live animals. Moreover, children would be less drawn to "touch, kiss, or snuggle" a dead chicken than a fluffy baby chick.

Tobin et al. argue persuasively that municipalities should require education on hygiene and disease prevention in order to grant a poultry-keeping permit. Rather than ban slaughter outright, municipalities could require similar instruction in sanitary slaughter and disposal of offal. For example, the state of Minnesota has worked with several live animal markets[9] to establish clear health guidelines for their customers. The Minnesota departments of agriculture and public health have produced posters and fliers in English, Spanish, Hmong, Somali, and Amharic that instruct customers in "healthy market" practices, such as washing their hands before and after shopping, transporting their purchases in a chilled and insulated container, and cooking the meat thoroughly (Minnesota Department of Health, 2015). These kinds of instructions could be provided to those who wish to slaughter at home as well. In this study, both Seattle and Charlotte require slaughter to be done in a "sanitary" manner, but what that means is not defined or described for the benefit of the practitioner.

Another type of regulation with a bearing on public health is restricting the sale or distribution of home-processed meats. One city in this study, Cleveland, specifies that "chickens, ducks, rabbits and similar small animals may be slaughtered on site only *if for consumption by the occupants of the premises"* (emphasis added). This intent of this law is unstated, but a likely goal is limiting the health impacts of improper slaughter. A more explicit example of this kind of restriction is the 2004 Minnesota law restricting the types of homegrown and home-processed food that can be sold in the state. Known as the "Pickle Bill," it allows the sales of pickles, fruits, and vegetables (with a pH $\leq$4.6) but prohibits the sale of all home-processed meat (Minnesota Department of Agriculture, n.d.). Alternatively, in 2011 the town of Sedgwick, Maine, passed a "food sovereignty" law which gave residents "'the right to produce, process, sell, purchase, and consume local foods of their choosing'" (Michaelis, 2011, para. 2), including locally produced meat and raw milk. These examples begin to show the options for regulation, including restricting the consumption of homegrown meat to the immediate household.

A third tension that can arise over the issue of slaughter is an ethical disagreement over the treatment of animals. In a survey of 345 urban San Francisco Bay Area residents, Blecha and Davis (2014) found drastically different perspectives on the practice of backyard slaughter. Some respondents who were opposed to the practice expressed concerns about nuisance or disease like those discussed above. Another group, however, described deep horror and moral outrage at the thought of animals being killed anywhere, but especially by their neighbors. They considered the killing of living beings murder and eating their bodies repugnant. Among those who supported the practice, two additional views emerged. Some respondents interested in "alternative" or "local" foods felt that animals raised by hand in a backyard setting generally had a far happier life and less painful and frightening death than those raised in the mainstream corporate food system. Others in the survey expressed reservations about the notion of backyard slaughter, but defended the "right" of residents both to feed themselves and to do what they

[9] At live markets, customers choose from an assortment of live fowl, goats, pigs, or other animals, who are then slaughtered on site, usually by market staff. At some facilities customers have the option to clean and butcher the animal themselves.

want on their own property as long as it does not affect their neighbors. Blecha and Davis (2014) found that for many participants in the survey, these perspectives reflect deeply held values that participants wanted to see reflected in their city's ordinances.

> We were surprised by the strength of feeling subjects conveyed. Even though the survey was lengthy and responding to the open-ended questions was optional, a majority of participants provided answer to all ten, often at length. The vigor of participation indicates that some portion of the public feels strongly, even passionately, about this issue… (p. 71)

Given these sorts of passions among the public, municipalities can face serious conflicts over the issue of slaughter.

Every municipality is different, of course, and residents' feelings about slaughter will vary with the local history and mix of cultures. In some towns with a relatively homogenous population, it may be fairly easy to outline local ethical norms regarding slaughter. In cities with a more diverse population the discussion can be fraught. Animal rights activists have vigorously opposed backyard slaughter in several communities, and recently succeeded in getting a slaughter ban passed in Minneapolis, Minnesota (City Council of City of Minneapolis, 2012). In Oakland, California, vociferous disagreement between slaughter and anti-slaughter activists—with up to 300 attending a single hearing—delayed the approval of an updated urban agriculture ordinance for several years. Eventually the new policy was approved after it excluded any decision on livestock keeping and slaughter (Zigas, 2011, 2014). Finally, municipalities must be careful about restricting practices that are important to the cultural traditions or ritual practices of minority communities. Filipino, Mexican, and Hmong communities, among others, have some animal practices that differ from Euro-American norms (Griffith, Wolch, & Lassiter, 2002; Park, Quinn, Florez, Jacobson, Neckerman, & Rundle, 2011; Xiong, Numrich, Wu, Yang, & Plotnikoff, 2005). Municipalities attempting to draft slaughter regulations would do well to consult with and consider the perspectives of diverse residents.

Of the cities in this study, only Charlotte and Tallahassee, Florida, specify that slaughter be accomplished in a "humane" manner, although that term remains undefined. In Seattle, slaughter of any small animal must take place out of sight of other animals of its kind. The rationale for this provision is not mentioned in the ordinance, but presumably it is to prevent fear or distress among the other animals. Along with hygiene training, cities could also require education about humane methods of slaughter.

Recommendations and Conclusions

Whatever a municipality's motivation for or approach to managing this growing practice, policy-makers would do well to consider thoughtfully how they will address the issue of slaughter in their community. In his study of the livestock-keeping laws of these 22 cities, Butler found two different regulatory styles, each with a key strength and weakness. Most of the cities provided detailed guidelines, especially regarding poultry: "the keeping of fowl in residential areas is highly regulated with setbacks, number limits, permitting processes, and detailed management specifications" (Butler, 2012, p. 209). With this detailed approach, "clarity and predictability is high, but where specifications are overly stringent, some individuals will be unable to engage in the practice of livestock keeping where they live" (p. 210). A looser management style was taken by a smaller number of cities, where "the codes specify the enforcement official and use vague language to describe what constitutes a nuisance or health violation" (p. 210). This approach allows for more creativity by urban farmers and discretion by administrators to suit local conditions; however, "such flexibility also could lead to inconsistent application of the intent of the law which could be construed as unfair or capricious" (p. 210). Butler argues that either strategy has the potential to effectively meet a municipality's goals of safeguarding public health and minimizing nuisances.

Additionally, a third option exists. Municipalities may choose to leave their position on the practice *undefined* to prevent the escalation of a

conflict where one had not previously existed. For example, when El Cerrito, California, was in the process of revising its animal codes, the city council was reluctant to wade into the issue of slaughter. One council member expressed concern that regulating slaughter could become politically and legally challenging if it interfered with any residents' religious or cultural traditions (Burress, 2012). Avoiding taking a stand on the issue may also have neutralized some of the passionate debates about animal rights versus residents' rights to feed themselves that arose at public hearings in nearby Oakland. Along the same lines, the city attorney advised the council that,

> Using the nuisance abatement approach would be the most effective means of dealing with animal slaughter, at least until there is some evidence that the practice is being used widely in the City to the detriment of the public health, safety, and welfare. (Woodruff, 2012)

The city council of El Cerrito chose not to stir up a potentially controversial debate in the city when many of the possible ills brought by slaughter could be controlled by nuisance laws already in place. Policy-makers in cities where slaughter has not been addressed will want to weigh the potential value of a public debate on this issue. If regulation is desired, they might also consider whether looser or more detailed ordinances would better serve their community.

As this is the first study of this topic, the discussions and conclusions in this paper are an entrée into an area of both theoretical interest and practical value. A study using a larger sample of cities would allow for a better understanding of the range and types of slaughter regulations currently on the books. In addition, case studies might trace the processes, constituencies, and rationale(s) behind the regulatory choices of individual cities. As practices of urban agriculture continue to expand in the U.S., more municipalities will find themselves facing issues related to small-scale livestock slaughter. This research offers some preliminary context for policy-makers when considering whether and how to address the practice.

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Farmers' market or farmers market? Examining how market ownership influences conduct and performance

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Abstract

Over the last two decades, farmers markets have been widely recognized for their contributions to local economies, support of small-scale farmers, and ability to reconnect consumers and producers of food. Farmers markets vary substantially in both the goals they set and the outcomes they achieve. By conducting a comparative analysis, this study examines whether and how market ownership influences outcomes. Additionally, our study focuses not on determining which ownership type is "best," but on highlighting how markets differ, and more importantly, the limitations that need to be overcome for each type. The research uses Henry Hansmann's (1996) ownership of enterprise framework and Muhammad Yunus's (2010) social business framework to analyze whether differences in ownership lead to variations in market governance, conduct, and performance. Interviews were conducted with managers of Oregon farmers markets representing various ownership structures. Data were analyzed using the inductive thematic analysis approach to understand how ownership influences market goals and mission, general operations, and performance outcomes. The three major market ownership types, vendor-led, community-led, and subentities, have distinct benefits and challenges associated with them. Our findings indicate that vendor-led markets have strong ties back to their vendors but have weaker links to the communities that host the market and are less able to enhance the market by adding activities and pursuing additional fundraising. We found that community-led markets benefit from strong community ties and are often able to draw upon the energy and expertise of board members and volunteers. Their links back to producers depend on vendor representation on the governing body. Finally, markets that function as subentities of broader organizations have the potential for

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access to greater financial and managerial resources but are often relatively poorly linked to their vendors. These results provide useful insights both for those who are considering starting a market and for those who wish to improve the performance of existing markets.

Keywords
comparative analysis, farmers markets, governance, local food, market managers, performance, ownership, qualitative

Introduction and Background

Introduction

In recent times, consumer interest in local food has grown dramatically, as reflected in consumers' willingness to pay higher prices for locally grown food (Darby, Batte, Ernst & Roe, 2008) and the growth of local food sales overall (Low & Vogel, 2011). Local food sourcing through direct-marketing strategies such as farmers markets, community supported agriculture, farm stands, and others enables producers to sell directly to consumers and increase their profit margin by receiving higher prices than are offered by wholesale markets.

Farmers markets, in particular, play an important role in developing local food systems and supporting small farms (Stephenson, 2008). These markets also increase economic activity in a community, help address food access and security issues, and serve as a general community-building mechanism. In providing these diverse benefits, markets serve a range of interest groups, including farmers, consumers, local businesses, and community organizations. It is increasingly common to have some combination of these actors involved in organizing and operating farmers markets. That is, many newer farmers markets are not *farmers' markets*[1] because farmers neither own nor operate them. This study explores how market ownership influences the priorities, processes, and outcomes of the market. Through qualitative interviews, we document how market conduct and performance differ based on market ownership. The final goal of this research is to inform best practices in organizing and operating farmers markets. Despite the overall growth in number of farmers markets, many of them fail (Stephenson, 2008). Findings and recommendations from this research may help to reduce failure rates for new markets and improve the performance of existing markets. Additionally, we highlight advantages and limitations of each market ownership type so that practitioners can better anticipate the weaknesses they will need to overcome for a particular structure.

Background

Farmers markets were in decline for much of the twentieth century and then surged in popularity in the 1990s. By 2014, the U.S. Department of Agriculture (USDA) listed over 8,200 farmers markets across the nation, a 3.6% increase from 2012 (USDA, Agricultural Marketing Service [USDA AMS], 2014). The Oregon Farmers Markets Association, a statewide organization, listed 160 markets during 2013 (Oregon Farmers Markets Association, n.d.). While farmers markets are significant because they support local food systems and local farmers, they also provide a hub for community gatherings and increase economic activity for surrounding businesses. As an example, Sadler, Clark, and Gilliland (2013) estimated the economic impact of farmers markets in Flint, Michigan, and London, Ontario, by taking into account the average amount of money spent among study respondents and total attendance at the markets each week. Using a market multiplier for each market, the researchers estimated that the annual impact of the London farmers market is CDN$7.0 million while it is US$6.8 million for Flint farmers market. Hughes, Brown, Miller, and McConnell (2008) examined the net economic impact of farmers markets in West Virginia by subtracting out reduced grocery store sales as a result of spending

[1] The distinction between "farmers' market" and "farmers market" is more than the absence of an apostrophe. A "*farmers' market"* implies that farmers or, in general, vendors, are the ones who own and operate the market. Contrastingly, "farmers market" does not convey who owns the market but describes the nature of a market as featuring products sold directly to consumers by farmers. The word "farmers" is an adjective in this second formulation.

at farmers markets. They found that farmers markets provided a net positive increase of US$1.075 million in sales and the addition of 43 full-time jobs. Though markets traditionally were grower-led efforts to carve out a niche for themselves, the focus on local food, and markets' multiple benefits have led to a wide variety of stakeholders becoming involved in the starting and running of farmers markets.

Exploring how ownership influences outcomes for market conduct and performance fills a knowledge gap in market literature. To date, there has been limited research on the organizational elements of farmers markets. In a study of Indiana farmers markets, Hofmann, Dennis, and Marshall (2008) hinted at a difference in performance of markets related to their organizational structure. Specifically, the authors found that, holding all other factors constant, markets that cited "provid[ing] farmers an outlet for their products" as the primary reason for the market's existence had 135 fewer customers on average than markets that cited "bring[ing] economic activity to the area" as the primary reason. The authors postulated that this difference could be a result of the expertise of the entity in charge of the market. For example, a government entity in charge of a market may have more advertising and marketing experience than a collection of vendors attempting to run a market.

The Role of Ownership

Farmers markets have a multitude of positive impacts, ranging from increased income for growers to revitalizing downtown areas, all of which create a strong incentive for various organizations and entities to start farmers markets. Hoffman et al. (2008) suggest that the organizational structure influences the way alternative food networks are operated. In order to examine the impact of ownership in market operations, we draw on *The Ownership of Enterprise* by Henry Hansmann (1996) and augment it to better suit the topic of this study. This framework allowed us to examine the costs and benefits of various types of market ownership. Hansmann defines ownership as the *formal* right to control and appropriate a firm's profits. As such, ownership effectively determines who has the power to do what with the firm's assets. Furthermore, ownership is the way that members of a firm gain access to the internal decision-making structure. This is achieved by allocating voting rights to some segment of the firm's patrons, investors, or other parties. In the case of a farmers market, this could be vendors, community members, city officials, or business associations. This variation in who controls a market led us to question whether markets with different ownership vary from a *farmers'* market, which implies vendor control.

In his analysis, Hansmann analyzes ownership structures using two criteria: the costs of contracting and the costs of ownership. Sources of the costs of contracting include market power, dependent relationships with various groups, risks of long-term contracting, asymmetric information, conflicts of interest, and alienation. In the context of farmers markets, contracting can be interpreted as whether vendors organize markets themselves or participate in markets that are organized by other parties. Costs of ownership stem from the costs of controlling managers, collective decision-making, risk-bearing, and costs of transition. In this characterization, the most efficient ownership structure is that which best minimizes costs. Though Hansmann argues that subjective interests and values can be incorporated into assessing the costs of an ownership structure, he does not consider that ownership structure itself could be a reflection of values that are considered independently from their costs. Furthermore, the goal of cost minimization when selecting a particular ownership structure may not hold true for farmers markets. One criticism of Hansmann's assessment of ownership is that he does not consider the benefits of different ownership structures. Additionally, his fundamental definition of ownership as "exercise of control and receipt of residual earnings" fails to consider ownership of assets and property, which becomes particularly relevant in the case of nonprofit enterprises that do not strictly have a class of owners (Orts, 1998).

Assignment of ownership determines who makes decisions, and therefore which interests have the most influence. Because the decision-making body of a firm determines the rules of operation, allocation of ownership rights influences the priorities and processes of the governing body.

In the context of a farmers market, analyzing who is part of the governance structure, what the priorities and processes are, and the outcomes of the market will demonstrate the influence that ownership may have on market conduct and performance. However, it is worth noting that this relationship between ownership, conduct, and performance is not necessarily unidirectional. It could be that the economic performance of a farmers market, in addition to the principles by which it is governed, influences its decision to maintain or alter a particular ownership structure.

Hansmann's framework is useful in evaluating the costs and benefits of ownership types. However, it does not consider how institutional values may affect the impact of ownership on a firm's outcomes. We incorporated the social business framework developed by Muhammad Yunus (2010) to supplement Hansmann's work and examine the role of ownership in a mission-driven organization.

Farmers markets are different from typical enterprises in that they may choose to seek multiple social objectives. From supporting local farmers to building stronger local economies, markets often have social values at the center of their operations. Social businesses are characterized by a handful of specific principles that distinguish them from nongovernmental organizations, social enterprises, and private businesses. A social business, while still having owners and investors, is primarily defined by its operational goal of addressing a perceived social problem (Yunus, 2010). This characteristic distinguishes a social business from a typical firm, whose goal is maximizing profit or minimizing cost.

Furthermore, a social business tries to improve its targeted social problems through the mechanism of selling goods or services. This enables the firm to be self-sustaining and thus distinct from a typical nonprofit, which is more reliant on charitable donations, grants, etc. Farmers markets generally charge vendors a nominal fee to be part of the market, which is the primary way the market is able to cover operational costs. However, many markets also seek other funding sources. In this paper, analyses of markets' funding sources and budget allocations reveal if markets are self-reliant and reinvest profits into the market, thus behaving like a social business in the mechanisms they use to address specific social problems.

Finally, Yunus constructs social businesses as part of a larger, systemic solution that is a "clearly defined alternative in order to change mindsets, reshape economic structures, [and] encourage new forms of thinking" (2010, p. 16). At this stage, we know that farmers markets are a mechanism that allow small-scale farmers to realize profits in the face of stiff global competition. In addition, farmers markets attempt to redefine the food system by focusing on principles of local and sustainable production and expanding consumer access to healthy foods. In this sense, they fit this final principle that social businesses act as an alternative. These facets of farmers markets are analyzed through interview questions pertaining to market goals and priorities, the mission of the market, and the particular efforts that the market pursues.

Applied Research Methods

The goal of this research is to understand how markets with different ownership forms differ in how they operate and what their outcomes are. Since these themes rely on understanding priorities, processes, and activities of market organizations, an interview method was suitable because it allowed for detailed descriptive data (Creswell, 2003).

Data Collection

Participant population and sampling

We compiled a complete list of Oregon farmers markets by crosschecking lists available from the Oregon Explorer project (Oregon Explorer, n.d.), the U.S. Department of Agriculture (USDA AMS, n.d.), and the Oregon Farmers Markets Association (Oregon Farmers Markets Association [OFMA], n.d.). Next, we consulted a former OFMA president and examined market websites and social media pages to confirm that the markets were still operating and to classify them by ownership type. Privately run market organizations were not included in this study because there are very few in Oregon. Through this process we constructed a list of 136 market organizations.

An initial recruitment letter was sent via email to organizations' listed contacts. Email bounces were recorded and added to the list of organizations to be contacted via telephone. A second participation request was made two weeks later via email. Organizations that did not have an email contact listed or whose email bounced were contacted via phone. In two cases, a board member was interviewed because the organization did not have a market manager in place.

Questionnaire and interviews

The interview questionnaire had four parts: general information (characteristics of respondent and market), governance structure (management and decision-making structure of market), market conduct (goals, decision-making, organizational capacity), and market performance (economic and social measures). Questions were developed to flesh out each of these aspects from the participating markets. All interviews were conducted via telephone by the primary researcher. A total of 29 phone interviews were conducted, yielding a response rate of roughly 21%. We stopped conducting interviews when new data added little to patterns that had already emerged (Merriam, 2009). All interviews were digitally recorded and transcribed for analysis. Markets with fewer than 10 vendors are managed quite differently from larger ones (Stephenson, 2008), and on this basis three markets, each with six or fewer vendors, were excluded from the study. In addition, one market was dropped from analysis due to poor recording quality, so 25 interviews were used in the analysis.

Data Analysis

The unit of analysis for this study is a market organization. An individual market organization can be in charge of running multiple markets. For example, a single organization operates the Corvallis Saturday Farmers' Market, Corvallis Wednesday Farmers' Market, and Albany Saturday Farmers' Market. Since the legal structure and governance of these markets are shared, it makes sense for the unit of analysis to be a market organization rather than an individual market. The 25 interviews used for analysis in this study represent 49 individual markets.

All data were transcribed and analyzed by the primary researcher, who was a graduate student at the time and had graduate-level experience with analyzing qualitative data. Data analysis was conducted inductively, with most of the themes being developed from patterns in the data (Boyatzis, 1998). Transcribed data were analyzed for the three major themes of ownership, conduct, and performance. While these three overarching themes were predetermined, data were also coded according to additional subthemes that emerged during the interview and data analysis process. Using predetermined themes allowed our analysis to be focused on answering the main question of the study, "how does conduct and performance of markets differ based on their ownership?" The use of emergent coding allowed us to take advantage of the rich data. The combination of these two qualitative analysis methods provided the opportunity to focus the analysis while taking full advantage of the depth and richness of the interviews.

Data analysis of the interviews involved two levels of coding. Data were coded for first-level, descriptive codes, and then coded again for second-level, pattern codes. First-level coding was done by organizing each interview according to the questions in the interview questionnaire to see how responses differed across all participants. As mentioned previously, ownership, conduct, and performance are the three main themes of analysis. Additional subthemes for each of these themes, particularly conduct and performance, were developed through pattern coding. As patterns emerged across the predetermined themes, they were coded and developed into more specific subthemes. Within the theme of conduct, we considered the following subthemes and variables (in parentheses): control of market (role of governing body and market manager), market orientation (mission, prioritization of goals), and access to and use of resources (sources of financial support). In order to assess market performance, we considered the subthemes of ability to meet consumer demand, level of community engagement (social programs and efforts, and community support), growth potential, and challenges to growth. In addition to the three primary themes, our analysis found seven major subthemes.

Results

Ownership

Three distinct ownership categories were defined based on the organization's legal structure and the composition of its governing body. Markets can either be independently run, where the market organization is legally recognized as its own entity, or they can be a subentity, where the market operates under the legal auspices of another organization. Governing bodies can be composed primarily of vendors with some representation from community members (vendor-led), or primarily of community members with some vendor representation (community-led). In looking at ownership through these two variables, three major ownership categories emerged: vendor-led, independent (referred to as 'vendor-led markets'); community-led, independent (referred to as 'community-led markets'); and subentities. One market that participated in the study operated as a subentity but had a governing body composed entirely of vendors. This market appeared to be an anomaly and was included in the "subentities" category of ownership for subsequent analysis. As seen in Table 1, among the 25 market organizations that participated in the study, 15 are legally independent. Seven of those 15 markets are governed by vendor-dominated boards, while eight are governed by boards composed primarily of community members. Of the seven vendor-led markets, four have boards composed only of vendors. The average number of vendors for the markets participating in the study was 69 for vendor-led markets, 62 for community-led markets, and 29 for subentities. The average age in years was 20.5 for vendor-led markets, 14 for community-led markets, and 8.4 for subentities. Table 2 in Appendix A shows these and additional details about the sample.

Markets that function as a subentity of a larger organization often do not have vendor representation on the governing body. This makes sense, as the community organization would be well established with its own governing structure before starting a farmers market and developing vendor relations. Two markets that function as subentities have one vendor position on the board. Markets that operate as a subentity often share a governing body with the organization. The only exceptions to this are two markets that were largely autonomous but shared the legal designation of a larger organization. These markets have full autonomy in governance and fiscal sustainability, but are able to benefit from the organization's legal status as a tax-exempt nonprofit. This is the circumstance under which one of the markets operating as a subentity has a vendor-led governing body.

Table 1. Ownership of Market Organizations

	Vendor-Led	Community-Led
Independent	7	8
Subentity	1	9

Conduct

This section examines how markets in different ownership categories vary in their day-to-day market management, mission, and prioritizing of market goals, as well as the resources they use and have available.

Control Over the Market

The role of each market's governing body and manager's autonomy were analyzed side by side to understand who effectively has control over market operations and direction. Governance of a market involves selecting new market vendors, determining market operation rules, setting rules for what kind of vendors qualify to participate in the market, etc. For vendor-led markets, the board plays a governance role and delegates responsibility for day-to-day operations to the market manager. Most market boards in this category are not involved in market-day activities because of time conflicts with their vending responsibilities. Managers have the latitude to propose ideas or changes to market operations, but they do not have decision-making authority. In this ownership category, the ultimate control of the market rests with the market board, and all decisions require final approval from the board.

In markets with community-led boards, board members maintain their governance roles but also contribute to market operations by assisting in day-

to-day activities, helping with fund-raising, and garnering sponsorships. Six out of ten community-led markets have boards that actively volunteer at the market. Another difference from vendor-led markets is that managers in this ownership category also wield considerable decision-making authority. In particular, managers of these markets often have the authority to make decisions regarding vendor selection, market rules, etc., and consult the board as needed. The manager's relationship with the governing body is collaborative and supportive to the extent that the board is actively willing and able to support the manager.

Similar to vendor-led markets, subentities generally do not have boards that are involved in day-to-day market activities. Beyond that, they have limited involvement in the governance of the market, often getting involved only when issues affect the whole organization. As a consequence, managers of these markets have a greater degree of autonomy. In some cases, managers have one or two people whom they could consult on decisions or to troubleshoot difficult issues. In subentity-owned markets, managers may be the only ones with considerable knowledge about the market.

Based on this analysis of manager autonomy and the role of the governing body, market control can be viewed as a continuum. In vendor-led markets the board has final decision-making authority over major decisions and assigns day-to-day tasks to the manager. Markets operated as a subentity are on the opposite end of the spectrum, as their managers make both major and day-to-day decisions with limited board involvement. Community-led markets fall in between these two extremes. Managers of these markets generally have some latitude and authority, but members of the governing body play supportive roles for both decision-making and day-to-day operations.

Market Orientation

Markets across the three ownership categories also display differences in their mission and prioritization of goals, with some being primarily vendor-oriented and others primarily community-oriented. In order to gauge whether a market is more vendor- or community-oriented, comments pertaining to market mission and prioritization of goals were analyzed.

All seven vendor-led markets stated that the primary organizational mission is to provide a venue for local farmers to sell their products. Six out of seven of these markets were also established prior to 2000, a finding that supports previous research by Stephenson (2008) that reported a statistically significant relationship between when a market was founded and its primary mission. This is not to say that vendor-led markets do not pursue any community-oriented goals or that their missions have not evolved, but their main priority was and is to advance the success of vendors.

In contrast, community-led markets have more diverse missions. While some list providing access to local food for their community as the primary mission, others have multiple missions that include supporting local farmers and the local economy, and creating a community gathering space. This mix and variability in the missions of community-led markets can be explained by the fact that a wider variety of interests are involved in setting the mission for these markets.

Markets that are subentities overwhelmingly place the focus of the market on serving a perceived need in their community. Examples of these missions include increasing economic activity in the local area, serving low-access communities, and generally improving the community's access to local food. Because community organizations choosing to start a farmers market already have a well-established organizational mission, the market reflects that larger mission. For example, a market operated by a downtown association has the primary mission of creating economic activity in the community. Similarly, markets operated by non-profit organizations with social missions are focused on expanding access and serving low-income communities.

In addition to asking respondents about the mission of the farmers market, we also asked them to rank four goals in order of their priority to the market: vendor income, market income, addressing consumer demands and expectations, and community-building. The general trends observed in the analysis of market missions are also present in how markets ranked these goals. A clear difference emerged between independently organized markets

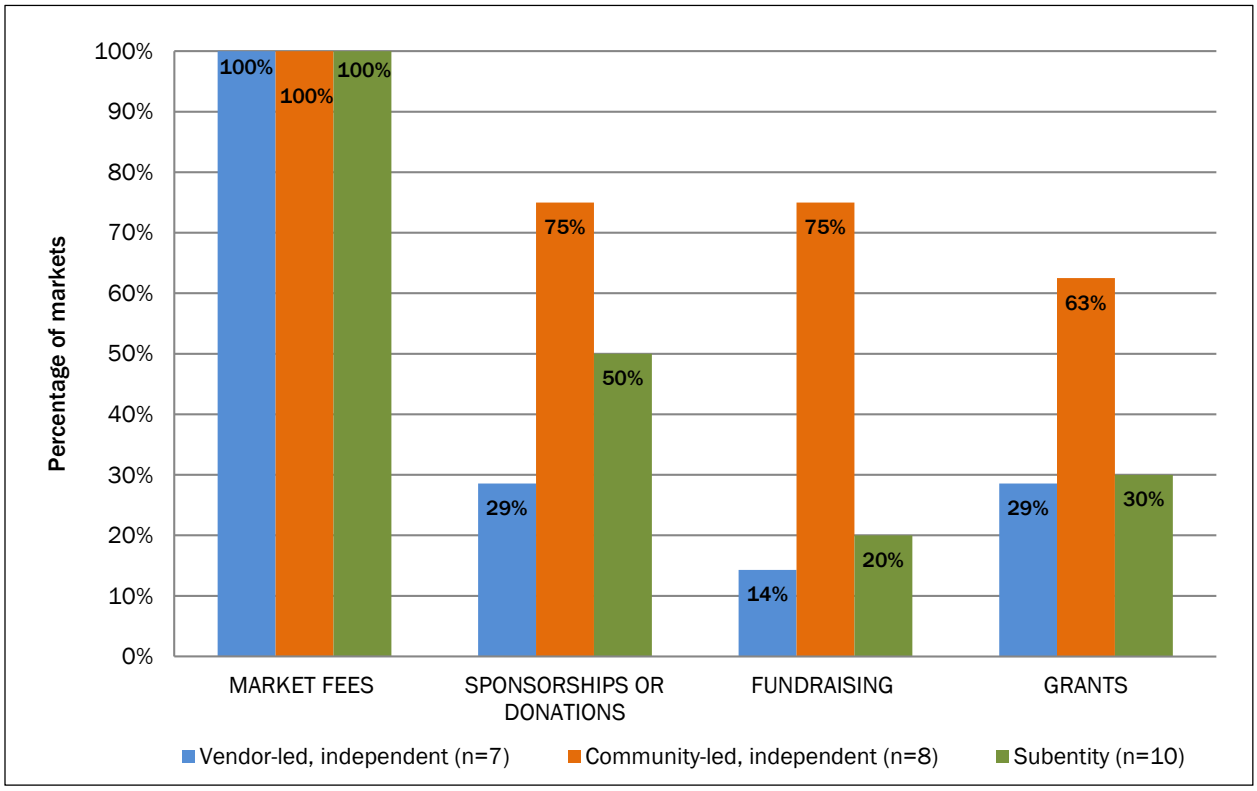
and subentities. Both vendor-led and community-led markets, on average, ranked "vendor income" as their top priority. In contrast, markets that are subentities overwhelmingly ranked "community-building" as the most important goal. Overall, among vendor-led markets, 43% (three out of seven) respondents ranked vendor-income as the most important goal. For community-led markets, 50% (four out of eight) ranked vendor income as the top priority. Most notably, among subentities, 70% (seven of ten) prioritized community-building over all other goals. Of the 25 respondents, only three ranked "market income" as the most important goal for the market (two of them are community-led and the other is a subentity).

Although markets recognize the importance of all four goals, they do exhibit differences in their priorities. Based on the mission and priority of goals of markets, it is clear that vendor-led markets and community-led markets are more focused on supporting and ensuring the success of vendors when compared with subentity markets.

Use of and Access to Resources

One of the potential advantages of a market being operated by an established organization is that it would not have to rely solely on market fees for financial support. Though 10 of the surveyed market organizations operate as subentities, only four received financial support from the parent organization. The markets supported by a parent organization received significant contributions, including both a designated program budget and salary for the market manager. Further analysis of sources of financial support for markets showed that all markets, regardless of ownership, rely on various market fees such as vendor fees, membership dues, and application fees to help cover market operations (Figure 1). However, community-led markets more actively tap into additional revenue sources, such as sponsorships, grants, or fundraising efforts. While 50% of subentities take advantage of donations and sponsorships, very few actively fund-raise or apply for grants. This may be a result of the level of board involvement required. Given the considerable time that grant-writing and fund-

Figure 1. Sources of Financial Support (Percentage of Markets Using Each Revenue Source)



raising efforts take, a more involved board can support the manager both directly in accomplishing these tasks and indirectly by taking on other duties. In contrast, because vendor-led markets and sub-entities have governing bodies that are less involved in market operations, the manager's time is more likely to be taken up by these daily tasks.

Furthermore, while the sentiment is not present among all vendor-led markets, one vendor-led market respondent voiced this reluctance to seek sponsorships:

> We don't really like the imagery of us being partly run or controlled by an outside entity.…Since we can't even be a 501(c)(3) they're never going to grant us that because the farmers are making some money and they feel that that is not a charitable organization.

Despite this perception that a market organization has to have tax-exempt, 501(c)(3) status to take advantage of sponsorships, many community-led markets that operate on sponsorships do not have that legal status (which allows for tax-deductible donations). More importantly, the notion that outside financial contributions to the market hurt the image of the market is striking and may hint at a fundamental difference in values between vendor-led markets and other markets.

Performance

The performance outcomes of market organizations were analyzed based on market revenues, respondents' perceptions of current ability to meet demand, level of community engagement, growth potential, and types of barriers to growth.

Market Revenues

Most markets operate on a very tight budget, barely managing to break even each year. Regardless of ownership type, markets typically use all of the market revenues to maintain or expand operations. Though uncommon, if a market has a budget surplus in a given year, it is allocated to the operational budget for the following year.

Meeting Consumer Demand

No specific pattern across ownership categories emerged when respondents were asked about the market's current ability to meet consumer demand. A market's ability to meet consumer demand seems to have more to do with the number of vendors at the market than its ownership structure. When ability to meet demand is considered in relation to the market's size, a clear pattern emerges where the largest markets appear to be doing extremely well while the smallest markets appear to be struggling. Three of the four markets with 15 or fewer vendors are located in central and eastern Oregon, where climate limits the growing season.

Community Engagement

Another subtheme examined to understanding market performance is community embeddedness (Murray, 2007).[2] This is measured by whether markets have educational programs or outreach efforts, have SNAP match programs,[3] and if they receive any in-kind donations or support from community organizations or members. Educational programs and outreach efforts range from programs that enable kids to shop at the market, gardening or cooking education, marketing efforts to reach particular communities (e.g., low-income,

[2] Murray's research explores how community involvement, in addition to consistent market presence, can improve market success. She finds that city support and strong connections with private organizations are crucial. Furthermore, garnering a mix of private and public support within the community and understanding vendor and customer needs to provide the best fit are important to embedding a farmers market.

[3] The Supplementary Nutritional Assistance Program (SNAP) is a federal program designed to provide food dollars for low-income persons and families. SNAP funds are delivered to clients in the form of a credit card (in Oregon this is called the Oregon Trail Card) that can be used at participating vendors. It is increasingly common for all markets to accept SNAP dollars through the use of a token program, which allows customers to swipe their Oregon Trail Card at the market booth and receive tokens that can then be used at individual vendor booths. Vendors can later turn in these tokens to the market and receive monetary compensation. Several markets have what are called SNAP matching programs, where the value of SNAP customers' food dollars is subsidized. For example, if a market has a matching program for up to US$5, SNAP customers can swipe their cards for US$5, and receive an additional US$5 in tokens, thus increasing their food dollars to US$10.

minority, elderly), to partnering with community organizations. Generally, community-led markets and subentities are more frequently engaged in these types of efforts.

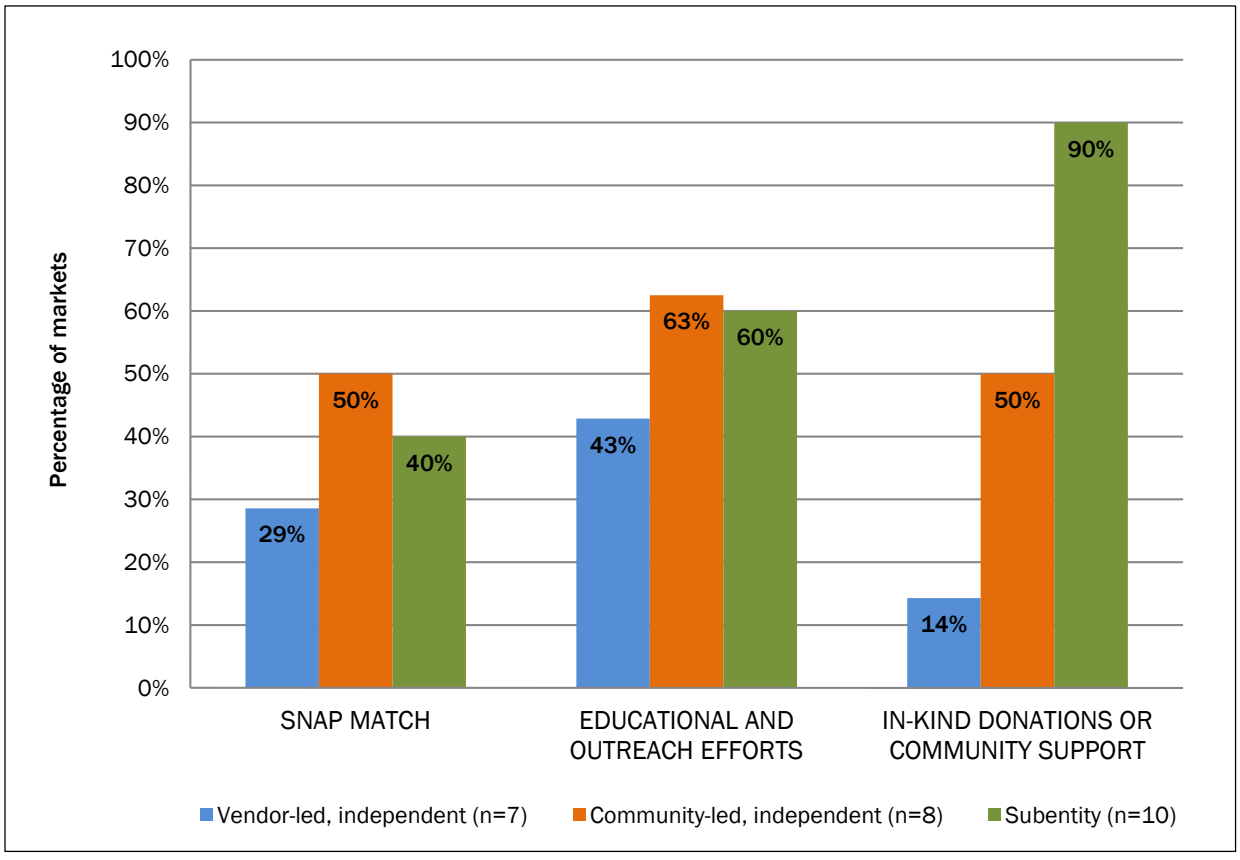
While most of the markets in the sample were able to accept SNAP dollars, only 10 of the 25 markets subsidize low-income shoppers by providing a SNAP match program. Community-led and subentity markets more frequently provide SNAP match programs than vendor-led markets do. The relatively low percentage of markets that subsidize low-income customers may be explained by the considerable financial demands of such a program. As documented in Figure 2, community-led markets and subentity markets rely on external funding sources more frequently than vendor-led markets. This added financial stability allows the markets to pursue SNAP matching programs and improve low-income consumers' access to farmers markets.

Lastly, nine out of 10 markets that operate as subentities received support from community organizations in the form of in-kind donations, such as use of private space with no charge, volunteer time, marketing or accounting services, etc. In addition to creating financial savings for the market, involvement by community groups also allows the market to expand its reach in terms of the programs and efforts it pursues:

> We were able to get parking for vendors in an empty lot down by OHSU because they already knew us and we had relationships there. Having that parking available saves us close to [US]$6,000 per year.

> [For] the sprout corner, we work with an organization who has been quite involved with the market. And then also for music, we have this cooperative group who helps us find and book acts from the neighborhood.

Figure 2. Social Programs, Outreach Efforts, and Community Support (Percent Implementing Programs or Receiving Community Support)



Potential for Growth and Barriers

Assessing growth potential and barriers to growth was complicated, as several factors not directly related to ownership demonstrated more influence. For example, climate, market size, geographical location of the market, and community size emerged as important factors in a market's outlook on growth and potential challenges. As a result, no significant patterns of growth and barriers in relation to ownership structure were apparent.

Discussion

Ownership

As evidenced in this study, the ownership or control of a farmers market has numerous implications. We used a combination of the legal structure of the market as well as the governing body's composition to divide markets into three primary categories: vendor-led, community-led, and subentity of another organization.

The primary advantage of vendor-led markets is that they are membership-oriented organizations rooted in their agricultural tradition and committed to advancing the interests of farmers. However, vendor-led markets face limitations because board members, who are vendors, have very little time to both assist with market-day operations and support additional market activities. Under this ownership type, a manager who is connected to the local community can be instrumental in developing community partnerships and building social capital for the market organization.

Community-led markets have diverse, multifaceted missions. They focus on both meeting community needs and increasing vendor incomes. The diverse makeup of these markets' boards develops the social capital and networks that can help the market access resources and increase its impact. A board composed of community members can devote more time to the market, enable the market organization to pursue additional activities, tap into more resources and connections, create more participation and buy-in from the community, and have a greater impact overall.

The last category, subentity markets, provide significant advantages, although with major limitations as well. The financial capacity of the parent organization as well as the nature of the relationship between the market and the organization are important factors in determining how much the market benefits. A market derives many more benefits when the market is truly a *project* of the organization, as opposed to an agreement of convenience that places the market under the umbrella of the parent organization's legal status. "Project" markets typically receive manager salaries and other resources from the parent organization. However, boards of subentity markets have limited involvement with the market, leaving the manager with little support. In the context of Hansmann's ownership framework, community-led markets and subentities allow vendors to trade ownership and control for fewer responsibilities in market operations. In order to avoid alienating vendors and ensure that vendor perspectives are still maintained, these types of market organizations can survey vendors and have vendor representation on the board.

Conduct: Markets as a Social Business

Although we predicted that the effect of varying ownership structures may be mitigated by the mission-driven nature of farmers markets, the results do not bear this out. One explanation is that although markets are mission-driven, differences in ownership and mission lead to variation in market conduct and performance. That said, most markets still meet some criteria laid out in Yunus's (2010) social business framework. Specifically, markets seem to be addressing social problems resulting from the market failure in providing community access to healthy food, providing a venue for small and local vendors, and boosting the resiliency of a local economy. Additionally, market revenues, when present, are reinvested into expanding and improving the services offered rather than simply benefiting the market vendors. However, in order to assess whether markets are *effectively* addressing social problems, further analysis of market vendors' revenues, low-income communities' access to healthy food, and evaluation of community food systems, all beyond the scope of this study, would be needed.

Community Involvement and Market Orientation

Pursuing sponsorships and donations from local

businesses or community members provides one means of developing community buy-in and additional market resources. In doing so, the market's own efforts can be furthered as partnerships provide the resources necessary to implement SNAP match programs, facilitate educational activities for various groups, and attract additional volunteers. Invariably, this shifts the market from solely a membership-oriented organization toward a more community-oriented organization.

The shift in the focus of markets and structure of governing bodies indicate a larger trend wherein farmers markets are becoming a strategy to achieve goals beyond the redefining of food systems and supporting farmers. This is further supported by our data, which show that markets that were started after 2000 are more frequently community-led or subentities, and have missions that are broader in their focus. This shift in market orientation brings up the question of whether markets can continue to serve the interests of farmers and whether they ought to be considered *farmers'* markets. This is echoed by some respondents in the study who expressed a sentiment of staying true to "farmers' markets" as opposed to being a "farmers market." While the lack of the apostrophe on "farmers" may appear to be trivial, it indicates this greater shift in which markets are becoming a means to achieving different ends. This trend may in fact be better for individual communities. One respondent noted that a change in the market's orientation, inclusion of vendors or products that are not strictly agricultural, allowing resale of nonlocal products, etc., better addressed the needs of the community than a pure farmers' market. For example, a rural community seeking to bring fresh food to the community but facing the challenge of a tough growing climate and not enough farmers would stand to benefit from allowing the resale of products. Furthermore, addressing an existing need in the community may ensure the success of the market, rather than adding the challenge of creating demand. This finding supports Murray's (2007) recommendation that understanding customer and vendor needs and expectations can help tailor the market to better fit a community and ensure more embeddedness.

Performance: Implications for Vendors, Consumers, and Communities

This research project provides insight into how different market ownership types function and which aspects of each market type are most likely to need special attention. In general, vendor-led markets stay true to their agricultural traditions and focus on supporting local agriculture and producers. This means the market focus is oriented toward vendors, involvement from other organizations and community groups is often limited, and the market has fewer extra programs and activities. Additionally, a vendor-led structure is difficult to organize and maintain if vendors are traveling significant distances to participate in a market.

Community-led and subentity markets are in many respects better equipped to meet the demands of customers and communities. These markets target diverse goals in their missions. While they do not entirely ignore vendor success, having more community involvement and awareness of the needs of the community place these markets in a position to expand the impact of the market with more social programs like the SNAP match. The broader scope in the mission of the organization also encourages greater community buy-in. Most importantly, these markets are in a position to address particular community needs and work to fill those gaps.

Recommendations

A farmers market is started when a group senses a need and launches into action. As such, in most instances the ownership structure is defined by the initiating group, not selected from a set of alternatives. Therefore this research focused not on determining which structure is "best," but rather on showing how ownership types differ, and more importantly the weaknesses that need to be overcome for a particular ownership type. This information can help managers and board members be prepared to face specific challenges and adopt practices that can strengthen the market.

It is clear that farmers markets can serve as mechanisms for achieving a multitude of goals, from restructuring food systems to advocating on behalf of small-scale farmers, and improving the overall health and resiliency of a community. The

broad reach of farmers markets means that a variety of stakeholders can be brought together in the organization. Partnership with a well-established community organization in the beginning can help to alleviate the start-up costs and stresses of creating a legal and organizational structure. Particularly, an established governing structure, recognition and standing in the community, access to financial sources, and important relationships eliminate extra steps that are necessary to start an independent market organization. This frees up valuable time and resources that can be better used to focus on recruiting vendors and building community support. This may ultimately help reduce market failure as markets operating as a project have more support in the initial stages when markets are most vulnerable (Stephenson, 2008). It is also possible that this relationship would not be permanent and the market could eventually develop a separate governing body.

We further recommend that market organizations recognize the benefits of bringing together diverse community members. As demonstrated by community-led markets, this enables the organization to tap into different skills, build partnerships, understand what gaps need to be filled in the community, and ensure community buy-in early on. Most importantly, this will create a more collaborative environment between the market organization and the community as well as increase the capacity of the organization, as it is less dependent on vendors who have limited time to give to market duties. Community members are able to contribute more time and effort to market operations as well as governance than vendors. Additionally, as markets draw vendors from different parts of the state or nearby states, encouraging vendor involvement may become more difficult. It also means that vendors are less rooted and aware of the community in which the market is operating. To encourage greater community participation and create more "local" ownership of the market, incorporating diverse members from the community is key.

While financial support through sponsorships, donations, and grants can increase market capacity and solidify relationships, these sources can also be inconsistent. Markets should work to ensure that their revenues are stable and able to support the organization's vital functions. Using additional resources like those listed above, however, can serve a vital role in expanding a market organization's reach and impact in the community through SNAP match programs, farm to school programs, etc.

Conclusion

This study tackles several important questions regarding how priorities and processes of market organizations differ across ownership, and the benefits and challenges associated with each. In general, farmers markets are becoming more diverse in the interests they serve and the roles they play in communities. While the overall trend is away from vendor-led markets, and new markets are more frequently developing under community-led and subentity structures, all three ownership types will continue to be observed. While this study focuses on markets in the state of Oregon, the investigation into the role of ownership in farmers markets fills a nationwide gap in knowledge on this topic. Consequently, the findings from this study can guide practitioners elsewhere in understanding what challenges and benefits they may encounter with specific types of organizational structures.

However, there is certainly need for additional research. The geographic focus on Oregon means that it may not fully capture the circumstances of market organizations in other areas of the United States. Privately owned markets were also excluded, so there is at least one more ownership structure that could be examined. Since respondents for this study were primarily market mangers, there may be some bias in their assessment or perception of market success and performance. Therefore, examining market rules, interviewing board members, vendors, customers, and surrounding business owners could provide more insight into market operations and performance, and community perceptions. Specifically, assessments of how well markets are satisfying their missions by looking at their overall impact in the community and the local food system, though difficult, may help us to further understand the significance of farmers markets in building local economies and local food systems.

We still need to understand more clearly how

ownership structures differ in serving vendors, customers, and communities. Though the results from this study were able to offer some insight into this, there are many factors to be considered in further assessing vendor, customer, and community experience with farmers markets. Lastly, quantitative analysis examining the statistical relationship between ownership, conduct, and performance of market organizations can further advance the lessons learned from this study and provide more insight into the relationships that were identified. 

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Appendix A. Table 1. Characteristics of the Sample Markets

Geographical Location	Year Started	Number of Markets	Size of Largest Market [a]	Community Size [b]
Willamette Valley	1998	3	160	157,429
Southern Oregon	1994	2	60	21,884
Central Oregon	1999	1	43	79,109
Willamette Valley	2010	1	10	Unincorporated
Northern Coast	1975	3	70	10,017
Southern Oregon	1987	4	85	20,366
Willamette Valley	1991	3	54	54,998
Portland Metro	2002	1	46	603,106
Portland Metro	1988	3	130	92,680
Portland Metro	2005	3	50	32,755
Portland Metro	1992	8	120	603,106
Portland Metro	1998	1	80	95,327
Eastern Oregon	2002	2	12	1,054
Willamette Valley	2007	2	18	15,740
Northern Coast	2006	1	40	605
Southern Coast	2000	2	35	15,857
Portland Metro	2007	1	25	603,106
Northern Coast	2011	1	18	9,527
Portland Metro	2012	1	35	603,106
Portland Metro	2001	1	80	37,243
Willamette Valley	2002	1	25	9,770
Central Oregon	2009	1	15	2,118
Portland Metro	2009	1	26	603,106
Eastern Oregon	2011	1	11	7,110
Portland Metro	1994	1	20	603,106

[a] Size of market is based on the average number of vendors at the largest market run by the market organization.
[b] Population estimates are based on U.S. Census Bureau estimates for 2012 (U.S. Census Bureau, 2013).

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Rural school food service director perceptions on voluntary school meal reforms

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Abstract

This mixed-method study examined rural U.S. food service directors' perceptions of and experiences with voluntary school meal programs, which have the potential to improve school nutrition but have not been widely adopted in rural areas of the United States. Little is known about how rural food service directors perceive these programs. Interview and survey instruments examined how rural food service directors characterize barriers and facilitators to participation in voluntary school meal programs like farm-to-school and school garden programs. Rural school food service directors participated in a semistructured telephone interview (n=67) and an online survey (n=57). We defined rural school districts by the most rural locale codes (as categorized by the National Center for Education Statistics) in a midsized Midwestern state. Quantitative data were analyzed using descriptive statistics. We analyzed qualitative responses using thematic coding. The qualitative analysis revealed that directors had little experience with these programs and perceived these programs to be very challenging to implement. Issues common to rural school districts were a very small staff, lack of concrete knowledge about how these programs work, and lack of access to local producers and chefs. These findings underscore

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the need to consider the unique situation of rural schools when promoting voluntary school meals reform programs. We make recommendations about adopting and adapting these voluntary programs to better fit the reality of rural areas.

Keywords
nutrition, schools, school meals, health promotion, rural

Introduction

The U.S. Healthy, Hunger-free Kids Act of 2010 (HHFKA) was the first legislation in decades to dramatically change school meals. Some of these changes included increasing the portions of fruits, vegetables, and whole grains that are served, while limiting fat, calories, and sodium. Voluntary changes and programs such as farm-to-school and school gardens have been options for school food service programs to supplement healthy school meals and provide sustainable outlets for food procurements. None of these voluntary reforms and programs, however, has been widely adopted. Particularly little is known about how these programs are being implemented in rural school districts. This project examined the barriers and facilitators for rural school districts participating in these voluntary programs through interviews and online data collection with rural food service directors. Understanding issues related to adoption is important when school districts and local agencies are planning and implementing these programs.

Background

Obesity and overweight are a public health crisis in the United States, particularly among rural children (McGrath-Davis, Bennett, Befort, & Nollen, 2011; Ogden, Carroll, Kit, & Flegal, 2012; Singh, Kogan, & van Dyck, 2008; Singh, Siahpush, & Kogan, 2010). Rural children are less likely than their urban counterparts to eat healthy foods such as fruits, vegetables, and low-fat milk (Joens-Matre, Welk, Calabro, Russell, Nicklay, & Hensley, 2008; Tovar et al., 2012). Additionally, adults living in rural areas are more likely to perceive their food environment as low quality and to report low access to grocery stores or fresh produce (Smith & Morton, 2009; Damiano, Willard, & Park, 2012).

Obesity and hunger coexist as serious public health problems among low-income adults and children (McMillan, 2014). As a result, school meals (including breakfast, lunch, and summer feeding programs) are an important source of nutrition for low-income and rural children experiencing food insecurity. However, rural food service directors often find themselves working to provide healthy meals on a shoestring budget, with limited financial resources. Approaches like collaborating with local growers, maintaining a school garden, and working with community members may provide solutions to challenges they face by increasing access to fresh food and student participation in meals.

There are many efforts nationally in support of voluntary school lunch reforms that aim to increase the nutritional quality of school meals; these include programs like school gardens, farm-to-school movements, and the Chefs Move to Schools initiative. Farm-to-school, school gardens, and chef-to-school programs, which compose the most widely implemented voluntary reform initiatives, are described in more detail below. There is some evidence that such efforts are slowly gaining acceptance among school districts; however, these programs are not yet widespread outside of urban areas (Turner & Chaloupka, 2012). The U.S. Department of Agriculture (USDA) Farm to School Census shows that rural Midwest and Western states have lower participation rates than more urban states (USDA, n.d.). Previous research has not specifically examined rural school district participation in these programs and the barriers related to participation.

The aims of farm-to-school have been defined in the literature as to (1) serve locally produced foods in school cafeterias; (2) improve nutrition education in the classroom (including to educate students about the local food system); (3) develop and sustain school gardens; and (4) support local farmers and producers (Joshi, Azuma, & Feenstra, 2008). Previous research suggests several benefits of farm-to-school efforts, including increased student knowledge and awareness of healthy foods, positive dietary and lifestyle changes among students and parents, and increased student meal participation (Colasanti, Matts, & Hamm, 2012;

Joshi, Azuma, & Feenstra, 2008). Additionally, farm-to-school programs may function to support small and medium-sized farmers in rural communities, a currently shrinking demographic who may be seeking new distribution outlets. These farmers may enjoy direct economic gains through increased market diversification, and there may be social benefits from the knowledge that students in their community are benefiting from their locally grown produce (Izumi, Wright, & Hamm, 2010).

However, research findings also suggest that significant barriers exist for schools attempting to implement farm-to-school programs. Barriers that have been identified in the literature include costs and availability of local foods, distribution logistics (such as delivery challenges), volume of food preparation needs, quality and reliability of local foods, food safety concerns, communication problems between schools and farmers, and problems with the seasonality of local produce (Colasanti, Matts, & Hamm, 2012; Vo & Holcomb, 2011). A recent ethnographic study highlighted the process of connecting a food service director with local farmers (Janssen, 2014). Throughout the process of connecting a food service director with local farmers, many barriers were apparent, including food service directors' lack of exposure to local farmers, and concerns about food safety. In addition, there may be perceived limitations to student tastes and an assumption that students will not "like" healthy foods (Poppendieck, 2010). We do not know specifically how rural school food service directors experience these barriers and challenges, which may have a greater impact in smaller communities with few local resources.

Voluntary programs include chef-to-school and school garden programs. Some evidence suggests that students consume more vegetables (Hanks, Just, & Wansink, 2013) and whole grains (Cohen, Smit, Parker, Austin, Frazier, Economos, & Rimm, 2012) when meals are prepared by chefs, but little research has been done about the implementation of such programs. School gardens have been shown to affect vegetable consumption, recognition of vegetables, attitudes towards vegetables, and preferences for and willingness to taste vegetables (Ratcliffe, Merrigan, Rogers, & Goldberg, 2011). Additionally, school gardening may be associated with positive academic and social outcomes among participating students (Blair, 2009).

The purpose of our current research is to explore the experiences of rural school food service directors with voluntary school meal reform efforts in one rural, Midwestern state with low participation in farm-to-school and school gardens. Only 42 of the 348 school districts (12%) in the state have some type of school garden in the district, and just 31% of the school districts report locally sourcing any of their food (Iowa Department of Agriculture, n.d.; USDA, n.d.). Specifically, we examined barriers and facilitators to participation in these programs.

Methods

We gleaned these findings from data collected as part of a larger study related to the experiences of rural school food service directors implementing the HHFKA changes. We used concurrent mixed methods: qualitative telephone-based interviews and an online questionnaire. Food service directors working in districts in the most rural locale codes (as categorized by the National Center for Education Statistics) were eligible for inclusion. We selected codes 42 (Rural Distant) and 43 (Rural Remote) to identify the most rural school districts. School districts in these categories include census-defined rural territories that are 5 to 25 miles (8 to 40 kilometers) from an urbanized area, or 2.5 to 10 miles (4 to 16 km) from an urban cluster, and school districts that are in a census-defined rural territory more than 25 miles (40 km) from an urbanized area and more than 10 miles (16 km) from an urban cluster. Informational letters were sent to the food service directors of these districts (N=215), and follow-up contacts were made to invite study participation.

In the qualitative telephone interview, we asked respondents questions regarding knowledge, attitudes, and experiences with the HHFKA and voluntary reform programs. The interviews lasted approximately 20 minutes and were audio-recorded for later transcription. The quantitative instrument (online survey) included items about respondents' professional responsibilities, training experiences, day-to-day programming operations, and

professional networks.

Qualitative analysis included close-ended coding of transcripts that led to the development of themes and codes based on interview guide content and initial reviews of the interview transcripts. Two trained researchers coded all 67 transcripts, first establishing intercoder reliability by coding two randomly selected transcripts and using a subjective assessment of coding results (Auerbach & Silverstein, 2003). Finally, a third coder was brought in to discuss inconsistencies with the original two coders.

The study was approved by the University of Northern Iowa's Institutional Review Board.

Results

Sixty-seven food service directors completed the telephone interview and 57 directors completed the online survey. The respondents on average had worked in the food service industry for 9.2 years. A majority (63%) of respondents said they had received some training or education after high school, most commonly in the form of state-sponsored opportunities such as Extension service trainings. Very few respondents reported receiving any formal education after high school.

Barriers to Participation

Only 5 directors indicated experience with a voluntary program of any kind. Some expressed interest in or future plans for participating, but these plans included varying degrees of specificity. The most commonly reported barrier to participating was a lack of knowledge about available programming options and how to get started. Other answers centered on logistics, lack of time, lack of support, and lack of resources needed for full engagement in the programs.

Lack of Knowledge

Many respondents cited a lack of knowledge as a barrier to participation. Some simply did not know about any of the voluntary reform programs, while others were aware of the program possibilities but did not have time to seek out specific information to get a better understanding of how to implement such a program in their school or district. For example, one food service director described being at a loss about how to get a program off the ground:

> I guess I would just need to talk to school board and administrators about…a green-house here on the premises and they do plant plants for spring time sell…Used to be FFA but I'm not sure who sells it now. But they plant the little seeds and make plants and they sell them in the spring time...I'm not sure…I don't know how that would work. I'd have to talk to somebody about how that would work. [1047]

The new HHFKA requirements created uncertainty in some food service directors about which foods and procedures are allowable and what procurement regulations would apply through participation in a voluntary program. Obtaining foods from large or established vendors was preferable to procurement through local sources because the "red tape" had already been worked through:

> I guess just maybe getting more information about like what I could or couldn't do… You don't want to do anything wrong and purchase anything that the government doesn't approve of. And so I think it is just easier for me to just get everything through my vendor then I don't have to worry about it. [1043]

Logistical Issues

Several respondents noted the lack of local growers in their area. Although rural school districts are often surrounded by corn or soybean farms, these crops are unfit for immediate consumption, and most respondents were unable to identify any local farmers growing crops that are viable for use in school meals.

Other logistical concerns included a general lack of knowledge regarding how to develop a system for regular delivery of local goods, including the lack of time available to pick up local produce from growers who were unable to deliver:

> I really haven't been able to really figure out

> how to really get the ball rolling, like where you can get some of these fresh fruits and vegetables and stuff more year round to bring in. I mean I don't have time to just go and get them myself. [1013]

Safety concerns expressed were related to the logistics of how to handle potential hygienic or health issues. As one respondent stated,

> My only thing is, I don't have the time to go and evaluate the food, and look it over and see what I think what will work and won't work. That's why I like the idea of it coming from my reputable vendor, I can order it, it comes, I don't have to worry about it. If there is a problem with it, I can go right back to him. [1005]

Respondents also raised concerns about the inability of small local farmers to accommodate the standards of institutional food service, such as limitations related to sanitation facilities, insurance, or the delivery of produce in a refrigerated truck:

> The local farmers are not necessarily going to want to do what the government wants them to do. For instance putting a hand washing station in their field or you know they don't want to have to deal with that. [1011]

Additionally, some respondents had not been able to locate a chef in their area for the Chefs Move to Schools program. Respondents indicated that their school district was too far from any restaurants to attract a chef:

> I checked into Chefs Move to Schools to ask someone to come in, some nutrition education and prep education or anything like that and there were no resources in [the state]. They told me there was not one resource in [the state] for Chefs Move to School [1038].

Other respondents believed that because their schools were small, their production volume would not be sufficient to attract any local farmers to work with them. Much of this sentiment seemed to originate from the difficulty that small, rural school districts have in attracting any vendors to provide food to them. As one respondent summed up: "We don't even have a local grocery store. I can't even get a person to deliver bread to my door" [1017].

Lack of Support

Respondents cited the lack of support from school boards, administrators, teachers, students, and parents as barriers. Respondents related this obstacle to both a lack of willingness from these parties to give time to support reform efforts and a lack of direct funding. For example, one food service director stated, "faculty [are] not interested and kids [are] not interested. I mean they would probably be interested if it was during school time but nobody wants to give up their private time to do anything like that" [1055]. Respondents noted a lack of time for students as a barrier to participation. As one food service director said, "Kids are too busy in a small district to get them to do it [school garden]" [1051].

Lack of Time

Respondents also reported it was not feasible to add any of these programs to their already busy days because their districts were small and had limited food service staff. Food service directors in rural districts face staffing shortages and lack the hours and/or volunteers needed to prep whole produce for the kitchen. Purchasing ready-to-eat (pre-prepared) foods from vendors lessens that perceived burden and also eliminates the issue of buying fresh produce in season during the year. As one respondent explained:

> Also, I think just labor hours. From what I understand from just talking to one other food service director and maybe this is not true for everything, but they have a lot of volunteers come in and maybe wash the green beans or wash different vegetables and fruit. I think that would be hard to get people to come in and volunteer their time. That's one of the reasons…I guess another reason would

be just, I'm so busy with the job now. [1025]

Directors also mentioned uncertainty regarding district policies that regulate whether volunteers are allowed to work in the kitchens at all: "No, I was told that no one is allowed in the kitchen except the cooks" [1061].

Some food service directors had attempted to engage in voluntary meal reform efforts, but made reference to negative experiences that would deter them from trying again in the future:

> I tried the farm to school one and with the dry summer and stuff he had the last couple of years he had not a lot of stuff for me and so that kind of fizzled. They tried a garden before the fall started. That wasn't accessible at all. [1018]

> I was under the impression he [the chef] was going to come in and show us how to do a few things but he just came in and went "what do you want me to do." You know and it's just like I was under the assumption he was going to bring some ideas with him. [1018]

Experience Participating in Voluntary Programs

Although most respondents had not participated in a voluntary reform program, several food service directors had done so and experienced positive results. Items like tomatoes, cherry tomatoes, cucumbers, and peppers were popular among students in school gardens. Districts had successfully purchased apples and watermelons from local farmers and served them to students.

Several food service directors who reported positive experiences procuring local produce from community members, parents, and even their own gardens suggested creative, nontraditional sourcing solutions. For example, one district receives free produce from a local producer. Similarly, other respondents recounted how community members had called in to offer produce from their gardens. Another director advertised in the local newspaper that the school would accept food from gardens. Other nontraditional contributors of produce included a teacher who owns an apple orchard and one respondent's spouse who is an avid gardener.

Several food service directors reported having success with their own independent volunteer programs in the kitchens. Students volunteering in the kitchen provide additional staffing that decreases the burden on professional staff and allows for more planning time for directors. An additional benefit was that students gained a new perspective on the work happening in the school kitchens. One director explains how their student volunteer system works:

> The kids have to meet certain requirements and they can come work in the kitchen. We also get them in here, and this sounds mean, but we have them trapped, where we can talk about, to them, what we have to do. A lot of them have seen the paperwork, they didn't understand that we did any paperwork and a lot of these kids didn't understand that we had guidelines. They just thought lunch ladies were mean and that's what they did. They just gave you food that…had to be healthy because that's what we choose in this kitchen to do so it's huge…opened a huge area for us with communication with these kids. [1062]

One respondent even reported that the student council had recognized that the kitchen was in need of help and developed a system to help with dishwashing and serving. At another school, high school students were working with elementary grades to introduce new fruits and vegetables.

Benefits and Challenges Experienced

Food service directors recognized a number of benefits to participating in voluntary programs. Some of the benefits were direct, such as children eating better food, learning about healthy eating, or simply having fun with food. Another noted benefit was that the fresher food secured by these programs tasted better. Some reported cost savings or supporting local businesses as benefits. Still others reported local community support as an advantage.

Benefits to Students

Food service directors report that involving students in the kitchen has,

> Just really changed the whole dynamic of our whole cafeteria, our whole kitchen. I have parents calling me with elementary kids that said I can't get my kids to tell me anything that happened at school today, just what happened at lunch because it's all positive. [1062]

Experience with school gardens benefits students, according to one director:

> Well, it is fun to watch the kids plant their seeds and you know be out there with their little watering cans, you know water their plants and watch them grow.…And that's kind of exciting. I'm a gardener at heart so I enjoy things seeing kids doing this. [1006]

Food grown in the school garden or by local producers tasted better, according to some directors, and the students enjoyed taking part in these programs:

> I think the kids get really excited. 'Cause when I have something fresh from a farmer, I make sure they know it and stuff. And the melons and stuff, they've just really, they've done really well with it. [1027]

Cost and Time Savings

For some directors, the local produce from farms or orchards was cheaper than items procured from their regular vendors. According to one director,

> And I benefit because my cost is a fourth of what I would have to buy a watermelon from my distributor is eleven dollars and I get a watermelon for two dollars and fifty cents. So my budget definitely pans out on that. [1042]

Another director reported that because the local producer was so close, deliveries could be made in 5 minutes. Food service directors were excited about ways to include the community and parents in the process. According to one director, "Yeah so that's the best thing I guess, that it's kind of the community involved. And next year hopefully I could ask more parents to plant more tomatoes, cherry tomatoes, cucumbers" [1033].

Challenges Experienced

Food service directors who had tried a voluntary program commonly articulated barriers related to time, children being unwilling to eat the food, not having a reliable community partner, food volume, and weather. School gardens were problematic due to lack of proper upkeep. Because of limited time, the gardens were often not tended well, especially during the summer break, and volunteers were not interested in weeding. During the school year, children did not always have time to gather the produce, so food went to waste. One director found it was still difficult to get students to eat vegetables, even if they had been grown at the school. The volume of produce was a concern, both for schools that required larger volumes and that needed smaller volumes. Seasonality and weather issues were also challenges. The region had suffered from an extremely wet spring and a very dry summer and fall. These growing conditions negatively affected school gardens and local producers.

Discussion

Participation in voluntary school meal reform programs such as farm to school was not common among study respondents, which is true of other rural states (USDA, n.d.). Some of the barriers to participation reported by rural food service directors mirrored the challenges identified in the literature for urban schools, while some barriers appear to be unique to rural districts. These barriers include logistical issues related to space for a garden when the focus of farming is corn and soybeans, few local growers with small farms, no local restaurants for the Chefs Move to School program, and concerns about the small volume of food schools might need. Even respondents who had participated in voluntary programming reported some barriers and challenges along the way.

Among those respondents who had not taken

part in farm to school programming, many simply did not know about the options available to them. These directors expressed a general lack of knowledge regarding a broad range of aspects related to voluntary programs. They were unsure about regulations, what programs were available, how to contact or communicate with potential vendors, the logistics of procurement, and other issues related to uncertainty about voluntary programs. Respondents also expressed little interest in seeking out programming possibilities or working to engage partners in such efforts. The lack of interest seemed to stem from the barriers to planning and implementation that appear to be very difficult to overcome. These issues and concerns related to adoption provide insights into ways program implementation might be facilitated or enhanced across other states with rural populations and low farm-to-school participation (USDA, n.d.).

In order to better support food service directors working in rural areas to implement successful voluntary programs, three intervention strategies should be pursued: (1) information about these programs needs to be communicated with rural food service directors; (2) tailored implementation strategies should be provided; and (2) professional and local community networks of people and agencies concerned about child nutrition need to be activated.

Barriers

The underlying barrier to participation in and implementation of voluntary reforms programs was often a lack of practical familiarity with these programs. This finding is echoed in other studies (Janssen, 2014) and may not be unique to rural areas. Food service directors may dismiss these programs at face value, believing that pursuing options like farm to school or school garden programs would add one more burden to their already-overloaded schedules. Food service directors in rural areas need informational support from state departments of education and agriculture and from agencies responsible for Supplemental Nutrition Assistance Programs in order to understand how these programs can fit into food service operations at their schools and even make their jobs easier and more satisfying.

Rural food service directors articulated specific barriers related to rurality. For instance, in lower population areas there are fewer local growers because the population is not large enough to support these types of farmers. Fewer local growers mean less variety, less competition, and less security for rural food service directors. Many rural areas do not have restaurants to support a Chefs Move to School program. Additionally, rural food service directors struggle with vendors who are not willing to drive further to serve a school district with low volume. This concern appears to have carried over to rural food service directors' perceptions about local growers. They are worried that the small quantity they would order would not be of interest to local growers.

These findings support several possible intervention strategies that have been suggested in limited previous research (Rosenberg, 2012). In order to best support rural food service directors, they should be provided with resources, knowledge, and skills that are directly relevant to their daily work and tailored to local challenges and locally available tools. This support should come from the state agencies that are responsible for agriculture, education, public health, and food assistance, and those agencies responsible for the implementation of the HHFKA. In every state this configuration of agencies is unique.

Although they may not all be conscious of this fact, food service directors are part of local community networks that can be mobilized to improve the nutrition of rural children. This mobilization can come from the food service director, locally engaged parents or other community organizations working on issues of nutrition and hunger. The potential mutual benefits of engagement in these networks can support both the food service directors and the community partners (for example, increased business for small and midsize farmers). Many rural food service directors need assistance connecting with existing opportunities in their communities in sectors such as agriculture, restaurants, faith-based institutions, and others. Given the extensive barriers often faced by these directors, such as a deficit of time and financial resources, practical assistance in setting up voluntary programs could go a long way to

contributing the logistical support these food service directors report that they lack. Significant community engagement is necessary to rally around schools to create opportunities for summer kitchen support.

In addition, given the distinct challenges faced by rural school food service programs, the use of creative adaptations to existing procurement models may be warranted in helping this population better implement school meal reforms. Thinking outside the box—beyond traditional food partners like restaurants and farms—food service directors could benefit from connecting with resources that already exist in rural areas such as long-term care facilities, food banks or food pantries, and faith-based institutions. Other potential partners in the venture to locally source food might be local community colleges (Feenstra, Allen, Hardesty, Ohmart, & Perez, 2011) or local hospitals (Klein & Michas, 2014), although these are not common in very rural communities. Likewise, these nontraditional partners could be drawn on to facilitate summer feeding programs to connect students to healthy foods. Many faith-based organizations and day-care centers operate on a year-round schedule and could provide sites for gardens.

In addition, it is important to begin discussions in rural communities with potential stakeholders in these activities. Qualitative and quantitative data collection should be conducted with small to mid-sized farmers, school administrators, community leaders, parent groups, faith-based organizations, day-care and other educational centers, farmers market boards, and other local groups that might be involved in community networks. Questions remain about the current state of those networks and ways in which they might be enhanced or expanded to the benefit of rural child nutrition.

A primary limitation of this study is the small sample size for the quantitative data portion. However, saturation was reached in the qualitative portion and descriptive analysis was possible with the sample size obtained. Larger sample sizes in future quantitative data collection will allow for between-group comparisons and additional depth of analysis.

Conclusion

This study improved understanding of the issues faced by rural school food service directors as they engage in considering, planning, and implementing voluntary school meal reform efforts such as farm to school, school gardens, and Chefs Move to Schools. Clearly, perceived and experienced barriers reduce willingness to become engaged and prevent rural schools from adopting new strategies. Providing tailored resources and activating professional and social networks may enhance the ability of rural school districts and communities to engage around the issue of child nutrition and voluntary reform efforts. Additional research is needed to understand how partners and stakeholders can become more involved and to understand how rural school districts might be uniquely supported in comparison to their more connected urban counterparts.

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Nonprofit-driven community capacity-building efforts in community food systems

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Abstract
This paper explores how community-based nonprofit organizations (NPOs) build community capacity through their programs and initiatives while responding to community issues such as food insecurity and vulnerability. Based on an original survey, interviews, field observations, and spatial network analysis, the paper examines Philadelphia-based NPO-driven community capacity-building programs by using the community capitals framework, which includes human, physical, financial, social, and organizational capitals. The findings suggest that NPOs are making an important effort to build community capacity, while facing significant challenges related to administration, budget, collaboration, longevity, financial return, spatial mismatch, and community engagement. Concluding remarks include policy suggestions for NPOs that are working on community issues.

Keywords
community capacity, community food systems, nonprofit organizations, Philadelphia, organizational capital, human capital, physical capital, financial capital, social capital

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Introduction

Community capacity-building efforts in urban neighborhoods are typically designed, catalyzed, and funded by nonprofit organizations (NPOs) (Chaskin, 2001). The broader purpose of this paper is to examine how NPOs, through their community capacity-building programs, respond to community issues. Here I summarize a Philadelphia-based study that focused on private NPOs, such as community-based or grassroots organizations and community development corporations, that offered or participated in any food-related programs, projects, or initiatives that served their constituents. My goal is to explore how NPO programs respond to community food insecurity and

vulnerability in disadvantaged or disinvested urban neighborhoods. Many NPOs play an important role in providing or distributing food that is physically and economically accessible, safe, nutritious, adequate, and culturally acceptable to vulnerable populations—meeting the conditions set by food justice theory, which is alternatively known as a place-based grassroots movement by many, and is connected to literature on democracy, citizenship, community development, community resilience, networked social movements, and social and environmental justice (Alkon & Agyeman, 2011; Gottlieb & Joshi, 2010; Wekerle, 2004). Many researchers have agreed that NPO-driven food-related projects are "the core of the food justice movement" (Alkon & Agyeman, 2011, p. 345).

Community food security (CFS) is a complicated topic that includes three layers of food access issues: geographic, economic, and informational (McEntee & Agyeman, 2010). CFS means having continuous access to adequate food for a healthy life (Nord, Andrews, & Carlson, 2009) and to food that is affordable, safe, nutritious, and culturally appropriate (Anderson & Cook, 1999; Kendall & Kennedy, 1998). Research has indicated that there are issues associated with many community-based food-related programs offered by NPOs, including but not limited to spatial mismatch of needs and services, social exclusion, and lack of coordination among NPOs (Meenar, 2012; Meenar & Hoover, 2012). While most studies related to NPO-driven community capacity-building efforts were focused on actual programs such as community gardens, few have focused on the NPOs who administered those programs. This paper attempts to contribute to such literature.

In this paper, I start with a brief literature review on NPO-driven community capacity-building efforts, followed by discussions and interpretations of the findings from a survey and interviews with staff of those Philadelphia-based NPOs with any food-related programs. Finally I discuss in detail the operational, financial, and other challenges these NPOs face.

NPOs and Community Capacity Building

Community capacity can be understood through social capital literature (Putnam, 1995). The definition of community capacity is based on the relationship between human, organizational, and social capitals used to solve problems and improve a community (Chaskin, Brown, Venkatesh, & Vidal, 2001). According to Coleman (1988), human capital is the knowledge and skills that a person has, and social capital is formed by community members building relationships with one another. Community capacity can be strengthened through four strategies: enhancing the abilities of individuals, making organizations stronger, building relationships among individuals, and building relationships among organizations (Chaskin, 2001).

Community capacity building has been defined in similar ways as community capacity, as it is synonymous with building human, social, and organizational capital (Taylor, 2003). While capacity is usually termed as the "ability" to carry out stated objectives (Goodman et al., 1998), capacity building is an indefinite or continuous "process" of improving that ability of a person, group, or organization (Brown, Lafond, & Macintyre, 2001). At an organizational level, capacity building may support an ongoing approach to development that is based on equity, empowerment, and participation of grassroots and other organizations, while promoting inter-organizational partnerships and networks (Labonte, Woodard, Chad, & Laverack, 2002).

The terms capacity, capacity development, and capacity building originated from applications in the fields of agricultural research, development, training, and management (Baillie, Bjarnholt, Gruber, & Hughes, 2009). Research shows that communities that take asset- and capacity-building approaches to development can be more successful in meeting community needs (Flora & Flora, 2007; Green & Haines, 2008). In addition to providing important services, NPOs can foster civic engagement and community mobilization (Twombly, De Vita, & Garrick, 2000). A place-based community capacity-building process includes discussions of democracy, citizenship, and community economic development (Fallov, 2010).

Research done by Lancaster and Smith (2010) examined the relationship between human and social capital and organizational resources in

addressing food insecurity problems and building community capacity. They used community gardening projects to understand such relationships. Community gardens can increase community connections, citizen participation, and sense of community, all of which in turn may help to build social capital. Foodcentric NPOs can build community capacity through the protection and development of human capital (e.g., nutritional education, cooking lessons, training, workshops, etc.), social capital (e.g., social events, community bonding, etc.), physical capital (e.g., vacant land remediation, site clean-up, etc.), and natural capital (e.g., orchard and tree plantings, sustainable energy education, etc.).

Instead of focusing on only one type of program, such as community gardens or farmers markets, this paper attempts a comprehensive look at various types of programs and activities initiated by NPOs and how they build community capacity. There is, however, no established framework to assess food-related NPO-driven community capacity-building efforts. Researchers have used community capitals framework to define and develop measures of community capacity (Apaliyah, Martin, Gasteyer, Keating, & Pigg, 2012; Emery & Flora, 2006; Mandarano, 2015; Mountjoy, Seekamp, Davenport, & Whiles, 2014). The variables used in this analysis are related to five components of community capitals and are grouped into four categories:

(i) Human capital–related variables: These include the enhancement of individual ability (Chaskin, 2001) and cultivation of transferable knowledge and skills (Goodman et al., 1998), such as food-related educational and training programs, internship and voluntary work programs, and events;
(ii) Financial and physical capital–related variables: These include community economic development (Phillips & Pittman, 2009), such as creating or retaining jobs through food-related programs, assisting local businesses, and producing food in vacant lands;
(iii) Social capital–related variables: These include equity and empowerment (Coleman, 1988; Labonte et al., 2002; Twombly et al., 2000) and citizenship (Fallov, 2010), such as community engagement with a focus on vulnerable populations; and
(iv) Organizational capital–related variables (Chaskin, 2001; Labonte et al., 2002): These include interorganizational networks, network density, and bridging and bonding networks.

Context, Methodology, and Data

This study was based in the city of Philadelphia, which has a population of about 1.5 million. Food insecurity and hunger exist in many lower-income urban neighborhoods, and Philadelphia is no exception. In many food-insecure neighborhoods, disadvantaged residents do not have easy access to healthy and fresh food, have poor food habits, and have diet-related chronic health conditions (Meenar & Hoover, 2012). The city, on the other hand, is nationally known for many of its NPO-driven initiatives and partnerships, including a healthy corner store initiative, financial incentives for building new grocery stores in disinvested neighborhoods, bringing fresh food from regional farms to the city, and distributing healthy produce to food cupboards.

The study methodology included GIS-based spatial network analysis, social network analysis (e.g., network density, spatial bridging and bonding network, etc.), and field observation of 25 food-related events, tours, and community or stakeholder meetings that were organized by NPOs. I collected primary data from an online survey and interviews of NPO representatives, as well as from online sources, (e.g., websites, blogs, and social networking sites).

Based on data from the Delaware Valley Regional Planning Commission,[1] GuideStar,[2] the National Center for Charitable Statistics,[3] and the Pennsylvania Community Development Corporations,[4] I compiled a list of 3,182 NPOs serving

[1] Metropolitan Planning Agency of Philadelphia (http://www.dvrpc.org).
[2] A national NPO database (http://www.guidestar.org).
[3] A national clearinghouse (http://www.nccs.urban.org).
[4] A citywide membership association of CDCs and affiliate organizations (http://www.pacdc.org).

Philadelphia. After initial screening of their names, descriptions, and key words, about 250 NPOs were chosen that seemed to offer any food-related programs. Two research assistants examined every organization's website or social media site(s) (e.g., blog sites or Facebook pages) that were available, and verified if they had any food-focused program in any part of Philadelphia. Based on this verification process, a list of 153 NPOs (study samples) was finalized with contact information, such as email addresses. This whole process took about 10 months to complete, from September 2011 to June 2012.

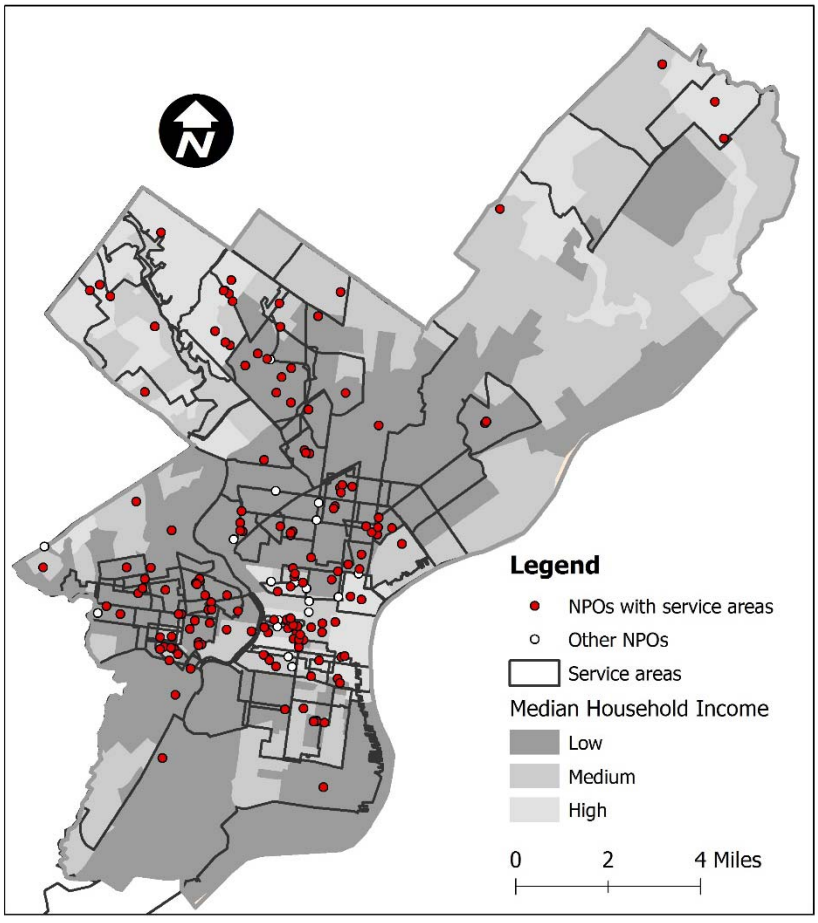
A 36-question online survey, created in Qualtrics, was active for two months, starting on October 14, 2012, and yielded responses from representatives of 116 NPOs (a response rate of 79%). About 18% of respondents did not answer questions about partnerships. Missing data were collected through Google searches. All of the NPOs had some kind of online presence, such as a website, blog site, Facebook page, or other platform. Generally, NPOs reported their partnering organizations' names and locations, but did not always specify types of partnerships (e.g., financial or working partnership). So, categorized partnership data were not used in this analysis. Following the survey, semi-structured interviews of NPO representatives were conducted, based on a purposeful sample (*N*=38) selected from diverse neighborhoods to maximize heterogeneity. I conducted the interviews from July 2012 to September 2012; 27 were conducted by phone, while 11 were in-person.

Results, Analysis, and Interpretations

About 71% of NPOs that participated in this survey had official nonprofit 501(c)(3) status. Most of these organizations (43%) were established in the 2000s. Almost all the organizations included more than one focus area in their mission, including food distribution (49%), community economic development (47%), community capacity-building (45%), food education and training (42%), food production (36%), food justice (35%), food security (27%), and food policy (25%).

About 52% of the NPOs were place-based and reported having designated service areas. Among the rest, many were either issue-based or had citywide service areas. A few considered the entire Philadelphia metropolitan region to be their service area. Another category of NPOs had community-based programs, but their programs were placed in a number of neighborhoods. Figure 1 highlights 80

Figure 1. Map Showing the Point Locations of Philadelphia's Food-Related Nonprofit Organizations (NPOs), 80 of Which Had Specific Service Area Boundaries



NPOs that had designated service areas, ranging from 0.08 to 66 square miles (0.2 to 171 square kilometers), with a mean value of four square miles (10 km^2) for a service area.

Human Capital Related Variables

As part of building human capital, Philadelphia NPOs offered or organized various types of food-focused programs throughout the year.

Educational program participation. The 48% of NPOs that participated in this survey each offered educational and training programs an average of 10 times in one year. These programs attracted a wide range of attendance, from just 5 to 300. Section (a) of Table 1 provides details by the number of times education is offered and the number of participants. Not included in this table was an organization that was an outlier that offered such programs 150 times in a year that drew a total 4,000 participants.

Internship and/or volunteer program participation. In general, the numbers of internships or voluntary programs offered were half the numbers of educational or training programs. About 67% of NPOs offered internships or voluntary work programs up to 10 times a year. A range of one to 30 participants enrolled in these programs, although one program had 80 participants. See section (b) of Table 1 for details by the number of times these opportunities are offered and the number of participants.

Community event participation. Many NPOs hosted or arranged food-focused events, such as block parties, potlucks, work parties, fund-raising events, lectures or discussions, movie or music events, tours, and workshops (e.g., on cooking, food preservation, drip irrigation, and green roofs). About 76% of NPOs offered 10 or fewer events in one year. These events were of various scales, attracting a wide range of participants, from only 5 to 20,000 people. However, about 75% of these events had fewer than 100 participants. Only two NPOs reported that their events attracted the greatest number of visitors (10,000 and 20,000 visitors). Section (c) of Table 1 provides a detailed breakdown by the number of times these events are offered and the number of participants.

Financial and Physical Capital Related Variables

Job creation and retention. About 71% of the NPOs that participated in this survey reported that their food-related projects created or retained one to 10 jobs during the last 12 months. About 19% reported creating or retaining 11 to 25 jobs, and the rest reported creating or retaining 26 or more

Table 1. Program and Event Participation by NPOs

NPOs (%)	Times Offered in a Year	No. of Participants (Range)
(a) Educational and Training Programs		
48.28%	10 and fewer	5 to 300
27.58%	11 to 25	85 to 500
24.14%	26 and more (highest reported: 69)	100 to 800
(b) Internships and Voluntary Work Programs		
66.67%	10 and fewer	1 to 30 (one program had 80 participants)
9.52%	11 to 25	4 to 35 (one program had 150 participants)
23.81%	26 and more (highest reported: 52)	5 to 100 (one program had 4,000 participants)
(c) Events		
75.82%	10 and fewer	5 to 20,000 (75% of the events had under 100 participants)
14.29%	11 to 25	8 to 300
9.89%	26 and more (highest reported: 100)	10 to 150

jobs. A few NPOs that were involved in urban agriculture (UA) mentioned that they hired full-time employees only during the growing season. In terms of the numbers of full-time and part-time staff, the organizations varied greatly. The largest NPO reported 200 full-time staff and no part-time staff. On the other hand, 17% of NPOs reported that they had no full-time staff and only 1 to 4 part-time staff, and they relied mostly on voluntary services. The largest proportion (39%) reported that they had 6 to 30 full-time staff and up to 20 part-time staff.

Assistance to local businesses. About 72% of NPOs that responded to the survey reported that they assisted other organizations or local businesses, including monetary, labor, technical, informational, or other forms of assistance such as consulting, grant-writing, training, and designing gardens and plantings.

Vacant land remediation. About 71% of the NPOs that participated in this survey had some kind of UA program. About 59% of organizations remediated vacant land for food production in their service areas. The NPOs managed a wide range of city parcels, from 1 to 30, located either in a single or multiple neighborhoods. One NPO representative responded that the organization maintained 2,000 properties, equivalent to 10 million square feet (930,000 square meters) of land. The nature of land ownership varied as well; 48% of the NPOs had an agreement with private property owners, 31% owned lands, 21% practiced guerrilla gardening, in which they garden on land they do not have the legal right to utilize, and 17% had a lease from the city.

Social Capital Related Variables

Engagement of vulnerable population. About 33% of the NPOs that participated in this survey reported that at least three-quarters of their programs, if not all, were targeted toward vulnerable or disadvantaged populations (e.g., older adults, lower-income, minority, refugees, ethnic groups, and minority religious groups). About 28% responded that their programs were open to all. "We do not target specific group of populations, our programs are all-inclusive," was one comment. Detailed data are available in Figure 2. Answering a follow-up question, about 76% of NPOs said their events were free and 10% said their events were donation-based. Only 15% charged a fee, ranging from US$5 to US$65 per event. About 58% of organizations that had any produce-selling programs accepted payments via either one or more types of government assistance cards (e.g., EBT, WIC). In this way they engaged lower-income families or individuals and contributed to the overall economic development of their service areas.

Community engagement. When asked about the approximate ratio of attendees in programs or events that came from the NPO service areas, about 10% of the respondents said that 50% of attendees came from their service areas, while the rest came from other parts of the city or even the

Figure 2. Percentage of Surveyed Nonprofit Organizations' (NPOs') Programs That They Report Are Targeted Toward Vulnerable Populations

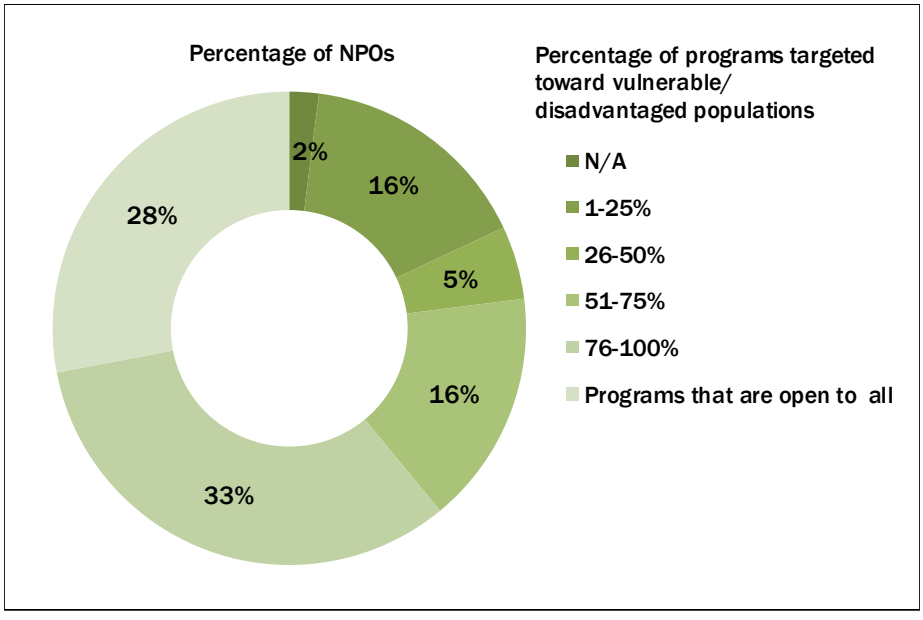
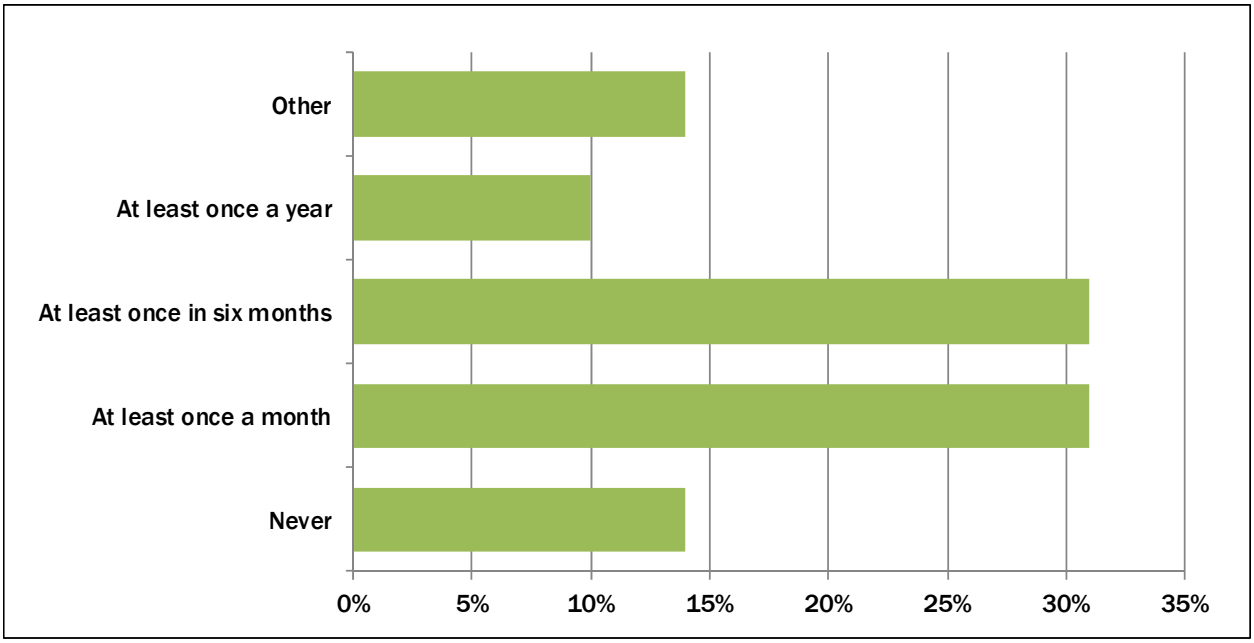


Figure 3. Percent of Nonprofit Organizations (NPOs) Hosting Meetings with Community Members by Frequency of Meetings



suburbs. About 77% of NPOs reported that their events and programs primarily attracted local residents, saying that about 75% to 100% of the attendees attended from their own constituencies. About 13% of NPO respondents said that they did not know the location of their participants and that they never asked for this information.

In response to a question about community engagement, "How often does your organization host meetings with community members or stakeholders to plan activities and events?" about 31% NPOs reported that they hosted such meetings at least once a month, or once in six months. Approximately 14% of these NPOs said that they never had such meetings or never communicated with their constituents in this way. See details in Figure 3. About 95% of the community meetings had an attendance ranging from 5 to 50 people, depending on the size of the NPOs, the type of programs, and the size of their service areas. Only two respondents claimed that they were able to attract up to 100 community participants in such meetings.

The next question was about the ways in which NPOs communicated with their constituents. About 94% of NPOs that responded to this question used digital communication highly or the most

Table 2. Methods of Communication with Constituents Reported by Nonprofit Organizations (NPOs)

Communication Type	% of NPOs — High Use	% of NPOs — Medium Use	% of NPOs — Low Use
Digital Communication[a]	94%	0%	6%
Print Media[b]	41%	34%	25%
In-Person Communication[c]	71%	18%	12%
Through Local Newspapers	7%	33%	60%
Other	50%	25%	25%

[a] Email, social media announcement or message, text message, website announcement, etc.
[b] Letter, leaflet, newsletter, brochure, poster, etc.
[c] Door-to-door outreach, social gathering, phone call, etc.
Note: Percentage calculated out of total responses in one particular category, not all responses in all categories. Total percentage rates differ, because not all NPOs answered in each category and few NPOs reported high use of both types of communications.

frequently, whereas 71% had high use of in-person communication. These two categories were not mutually exclusive. NPOs also used print media, local newspapers, and other categories such as "events," "word of mouth," and "community education workshops." Details of these findings along with an explanation of the communication types are provided in Table 2.

Since this study had a special interest in disadvantaged neighborhoods that may have a digital divide issue, there were a few additional questions about digital communication. Most NPOs that used digital communication used email listservs as the primary media. The number of listserv members varied from 10 to 25,000. About 93% of these NPOs also had either a designated website or a blog site. In terms of social media, 91% used Facebook; some used Twitter, YouTube, and other platforms. In social media, they posted various types of content and also welcomed contributions from their users or fans. Tables 3 and 4 provide details. The final question about digital community engagement was "Do users' comments posted on your website, blog, or social network sites influence the organization's activities?" Only 38% NPOs said yes.

Table 3. Types of Content Nonprofit Organizations (NPOs) Usually Shared Through Social Media

Content	% of NPOs
Event and program announcements	97%
Information sharing	82%
Post-event stories	70%
Educational posts	64%
Commentary	48%
Local and national policy tidbits	48%
Politically motivated messages	12%
Other	12%

Table 4. Types of Content People Usually Shared Through Nonprofit Organizations' (NPOs') Social Media Platforms

Content	% of NPOs
Information sharing	70%
Post-event feedback	60%
Commentary	57%
Program feedback	50%
Educational posts	33%
Local and national policy tidbits	27%
Other	7%
Politically motivated messages	3%

Organizational Capital Related Variables

Organizational capacity. The annual operating budget of the participant NPOs varied greatly. There were a few grassroots organizations without any operating budget, but 4% of NPOs had a budget above US$10 million, 27% had budgets of US$1 to US$10 million, 22% had budgets of US$100,000 to under US$1 million, 14% had budgets of US$10,000 to under US$100,000, and 6% had budgets below US$10,000. About 27% of survey participants did not respond to this question.

Spatial network analysis (SPNA). Visualizing the spatial network connections of all NPOs was probably the most exploratory and time-consuming task of this study. After collecting data on partnerships between all the NPOs, these network connections were drawn using AutoCAD software. This drawing was done on top of a scaled map of Philadelphia with actual organizational locations. Figure 4 features interorganizational networks (IONs) as line connections for NPOs that were included in this study. The straight or curved nature of line connections had no bearing on the significance or types of connections; they were chosen according to the ease or clarity of drawing. As interpreted from this figure, more NPOs were spatially concentrated toward the central part of the city (Center City), so naturally this area had a higher presence of network connection lines. The 38 NPOs that did not report any partners were left alone as single points without any connections. The ION is spread throughout a portion of the whole city, not concentrated in some smaller "network neighborhoods," as described by Hipp, Faris, and Boessen (2012).

Figure 4. Interorganizational Network of Food-related Nonprofit Organizations (NPOs) with Other NPOs with Similar Agendas

Spatial bridging and bonding networks. The Origin-Destination Matrix tool available in the GIS software ArcGIS Network Analyst Extension was used to locate these NPOs and their partners, display network connections and directions, and calculate the length (geodesic distance) of each network. Three examples are provided in Figure 5. According to this analysis, 65% of NPOs formed

Figure 5. Example of Three Nonprofit Organizations (NPOs) (in Circles) and Their Other NPO Partners (in Squares)

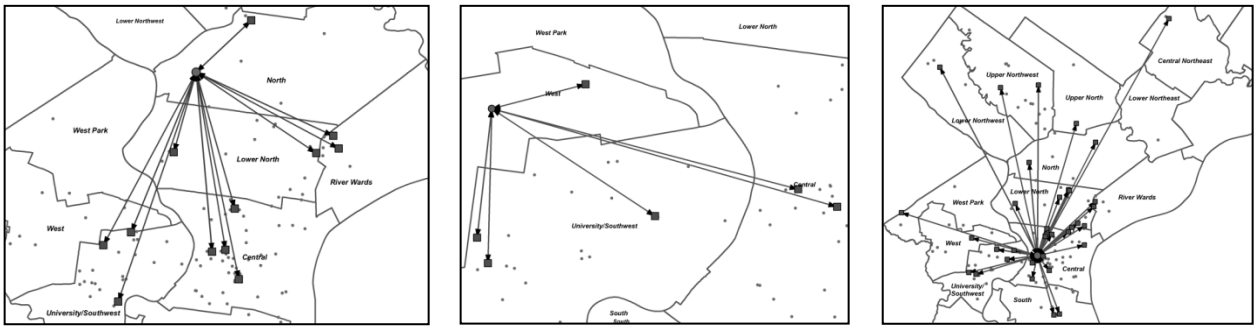


Table 5. Types of Interorganizational Partnerships

Types of Partnerships	% of NPOs
Received funding (grants, donations, sponsorships, etc.)	81%
Executed a program or policy together	81%
Wrote grant proposals together	67%
Provided funding (grants, donations, sponsorships, etc.)	28%
Other	8%

partnerships with at least one NPO located outside of their planning districts (we refer to these as spatial "bridging" partners). In contrast, 44% of NPOs made partnerships with at least one NPO located within the same planning district (we refer to it as spatial "bonding" partners). NPOs with higher numbers of spatial bridging partners were mostly located in the Central District. Most interviewees considered these NPOs to be key or central players in Philadelphia's food systems network. It was observed that the more spatial bridging networks an NPO had, the more central it was to the whole organizational network. This interpretation is consistent with Kropczynski and Nah (2011). Although distance was a factor for some networks (the majority of network lengths were in the range of only 2 to 5 miles, or 3 to 8 kilometers), a few networks went beyond the city limit, expanding to the inner-ring suburbs, rural Pennsylvania, and even the neighboring state of New Jersey. NPOs, however, did not prioritize any specific geographic boundaries when they chose a partner, either bonding or bridging.

Interorganizational network. The majority of NPOs (81%) said that they were related to other NPOs because they received funding, such as direct funds, transfer of funds, or subcontracts, from those NPOs. The same percentage of NPOs partnered with other NPOs to execute a program or policy. More details on the types of partnerships are provided in Table 5.

There were a few organizations that formed short-term financial partnerships with other NPOs. These partnerships often were manifested in the form of donations and tools or volunteer exchanges. On the other hand, there were a few organizations that partnered with big for-profit companies, most often in order to receive financial or food donations. Regardless of these factors, it is evident from this survey that most NPOs were partnered with not only other NPOs, but also with the government and for-profit organizations.

The interviews and field observations not only supported the findings from the survey, but also explained the ION patterns in the city. It was not distance or geographic boundary, but common agenda, power, or political interest that these food-focused NPOs were considering while choosing partners. Competition was one of the key reasons many NPOs did not want to form partnerships in the same neighborhood. One NPO representative explained this pattern:

> We make partnerships with [other NPOs] when there is a match.…Either there is a common interest, a grant proposal, or a

> project.…Yes, distance does matter, it's always great to have a partner in the same neighborhood, but we need more than that…say "power." [NPOs] in the Center City have the political and economic power to make things happen.…We need [a] continuous funding stream. Partnering with [NPOs with "power"] makes more sense [compared to] partnering with a small organization in your neighborhood that may not even last more than a year. (An interviewee from the West Philadelphia District)

Many smaller NPOs did not have enough staff support to pursue funding and partners. One NPO representative shared an opinion that reflected similar sentiments to another small NPO:

> Yes, [we are a] small organization. We care about food access issues and we are trying our best to bring some positive changes in the neighborhood landscape with the help of volunteers and community participants. Yes, partnerships are good, but as long as there is a common focus on the issues [of our own neighborhood]. We tried to participate in bigger forums and whatnot.…They discuss issues from city or regional perspectives. It's all good, but we [want to] be focused on our neighborhood for now. Yes, we don't get much visibility, attention, or news coverage, and that is okay as long as we are able to function. (An interviewee from the North District)

Many NPOs raised concerns about insecurity or inconsistency in an established network:

> It's great to be a part of a big, visible network, but we need to make sure smaller NPOs can survive without the help or dependency from bigger [NPOs]. In recent times we have seen that [some] long-term [programs] are being discontinued due to lack of funding or the change in administration in a foundation. What if an [NPO] is being unplugged from the system? What would happen to the [organizational] network? If two or three actors are thrown out of an established network, will the [network] safety net work? The [network] graph of NPOs is not monolithic—there will be rises and falls. (An interviewee from the University/Southwest District)

Challenges Faced by NPOs

NPOs that participated in this study reported facing a number of general challenges. According to most NPOs, the key challenges were related to organizational and physical/financial capitals. Table 6 provides a list of challenges, two of which were relevant only to the NPOs focusing on the alternative food movement (e.g., community gardens, farmers markets, community supported agriculture). The challenges were ranked based on their importance to these NPOs.

Administrative and Budgetary Issues

Most NPOs reported that administrative and budgetary issues are at the top of their list. With a larger budget they would be able to put more effort into educating the public on the value of buying local or eating nutritious food. Organizational challenges were also faced due to limited staff support. Many NPOs consisted of a group of volunteers; due to inadequate staff capacity, they could not perform program evaluation, which is one of the key deliverables for many grants. NPOs also reported that they found it difficult to respond to many funding requests for proposals (RFPs) due to the lack of clarity of organizational mission and criteria for eligibility for grant applications. This limited their funding further.

The lack of infrastructural investment was considered as a major challenge for many smaller NPOs. For example, most food cupboards did not have a refrigerator to store perishable food, including vegetables. They also did not have the capacity to collect, store, and distribute leftover foods from events and meetings. Budgetary issues caused inconsistency with quality and quantity of services. Cupboards denied potential clients or did not have enough food storage. Quality also varied to a great extent; they mostly distributed canned goods with limited nutritional value.

Collaboration and Coordination Issues

The responses regarding their organizational networks showed that 38 NPOs had no partners at all. Some NPOs had only short-term financial partnerships with others. These partnerships were often manifested in the form of donations, tools, or volunteer exchanges. On the other hand, there were a few organizations that partnered mostly with large, for-profit companies for financial or food donations.

In terms of evaluating potential partnerships, most NPOs preferred common interests or agendas, financial standing, and political connections over geographic proximity. This finding is consistent with Chen and Graddy (2010). Since most larger and issue-based NPOs were located in the Central District, many place-based NPOs rooted in different neighborhoods were connected with them, regardless of their distances or geographic boundaries. This tendency led to a particular pattern in the city, where the most "visible" NPOs were the ones that made partnerships with larger NPOs, were featured in the media, interviewed by university researchers and students, and invited to the policy-making process. On the contrary, many smaller NPOs, although working hard on the ground and in their own neighborhoods, did not get the attention they needed to promote their programs or attract new volunteers.

According to many NPOs, "collaborating with the right community partners to ensure long-term success" was a key challenge. Partnerships between NPOs most often are dependent on successful past collaborations and the trust generated among them (Bess, Speer, & Perkins, 2012; Kegler, Rigler, & Honeycutt, 2010). Unlike what Strauss (2010) suggested, NPOs studied in this research project formed more bridging partnerships than bonding, geographically speaking. Although NPOs within the same neighborhood always competed with one another to catch a funder's attention, there was no alternative to strengthening coordination and partnerships, not only among NPOs, but also with other organizations such as government agencies and institutions.

Uncertain Longevity, Financial Returns, and Availability of Programs

Although various *indirect* benefits of food-related programs and events were found, the *direct* contribution of these programs to the economic development of areas was somewhat limited. Most jobs created through these programs were not permanent, not full-time, not well-paid, and did not offer any fringe benefits.

Discontinuity of programs can become a major barrier in forming organizational partnerships. Philadelphia has witnessed a sharp decline in community gardens since the 1970s after the discontinuation of critical resources, including major fund-

Table 6. Challenges Faced by Nonprofit Organizations (NPOs), Ranked by Importance

Challenges	Relevance to Type of NPOs	Relevance to Type of Community Capacity Variables	Rank
Administrative and budgetary issues	All types	Physical/financial capital, organizational capital	1
Unreliable and/or unreachable collaboration partners	All types	Organizational capital	2
Uncertain longevity, financial returns, and availability of programs	Alternative food agencies	Physical/financial capital, organizational capital	2
Spatial mismatch of services	All types	Human capital, physical/financial capital	3
Lack of local and diverse community participation	All types	Social capital	3
Unfavorable city policy and neighborhood atmosphere	Alternative food agencies	Physical/financial capital, organizational capital	4
Lack of informational access	All types	Organizational capital	5

Note: Rank (1 to 5: higher to lower importance) in terms of importance of challenges, according to NPOs.

ing streams. It took almost two decades to explore new networks and find new funding sources for them. Since NPOs are often considered to be anchors and great resources to community life, many public and grant-providing agencies are interested in building their organizational capacities. Problems arise when programs start becoming successful and then are discontinued because of an obsolete funding stream.

Many programs and events organized by these NPOs, especially the smaller ones, are run mostly by volunteers. These volunteers are temporary; sometimes they participate as part of a service-learning course or school project, or due to work requirements. They thus do not have a long-term commitment to the programming of the NPO and do not continue volunteering after their short-term reason.

Spatial Mismatch of Services

NPOs reported three types of spatial mismatch. The first type is related to hunger relief agencies. About 700 food cupboards are located throughout the city, but some high-poverty areas either do not have cupboards or have cupboards with limited inventory and operating hours. This problem was also identified and explained by Meenar (2012). The second type of spatial mismatch is related to healthy food outlets. Some areas, typically known as food deserts, do not have affordable healthy food outlets, be they full-scale grocery stores or farmers markets. Due to lack of clientele for healthy food, the presence of crime, and lower population density, along with significant vacant and underutilized lands and properties, many chain grocery stores do not want to invest in these underprivileged neighborhoods. Due to unhealthy food habits or expensive healthy food, or misconceptions about healthy food prices, some residents may not make the effort to shop at grocery stores or farmers markets that are not easily accessible. The third type of mismatch is related to NPOs that administer urban food production and nutrition education or community development–related projects. In some parts of city, a group of people who are mostly nonresident volunteers may start community gardening projects that are not fully supported or embraced by local residents. Although they organize community events targeted toward nutrition education or community capacity building in that community, most participants may come from other parts of the city. Researchers have identified such areas as White spaces in Black or Latino/a places (see Meenar & Hoover, 2012, and Hoover, 2013).

Lack of Local and Diverse Community Participation

For many NPOs, engaging neighbors or volunteers in regular program decision-making and organizational development is an ongoing challenge. This may be more important in neighborhoods with diverse populations, including racially and ethnically diverse populations, immigrant populations, and economically diverse populations. NPOs struggle with outreach techniques that would be appropriate and consistent with such diversity.

Most NPOs appreciated feedback on their programs and events from neighborhood stakeholders or residents, but they did not necessarily incorporate this feedback into their decision-making process. Community meetings targeted toward the participation and engagement of local residents were not offered on a regular basis. NPOs usually received feedback through social media, email, or other tools only after the events or programs were over. Although soliciting comments or ideas prior to a program or event could be more useful or effective, many NPOs claimed that they could not attract many participants even though they offered such community meetings. On the other hand, in the event that feedback was provided by the residents and stakeholders, only a few NPOs were able to incorporate those comments into the planning process of future events. Lack of clarity or usefulness of the suggestions was a key concern.

In terms of civic engagement tools, it was surprising to see that digital methods were used at a higher level than in-person communication methods. This might be an appropriate approach to attract the primary clientele group of these programs and events, the majority of whom were young and tech-savvy people. However, considering that a good portion of the NPOs' programs were targeted toward a disadvantaged population, the question of the impact of any digital divide

would arise, as these NPOs are missing a significant proportion of the community they are trying to serve.

Unfavorable City Policy and Neighborhood Atmosphere

This challenge, also referred to as "political roadblocks or bad policy," was mentioned primarily by NPOs dedicated to the alternative food movement. They complained about the lack of an organized UA constituency, resource scarcity influencing an organization's unwillingness to collaborate, and unwillingness of city administration to fully recognize the value of UA. Some NPOs mentioned that designated land use, even if land is currently vacant, may be a barrier in obtaining permission to do UA. Getting water access for irrigation was another barrier. Many NPOs supporting gardens "see land tenure as key to preserving these UA projects that represent the community's legacy. Without land tenure or land use protections, many gardens have been lost, due to development pressure, when cities have sold UA spaces or allowed them to go to sheriff's sale" (Meenar, Featherstone, Cahn, & McCabe, 2012, p. 6). Unfriendly or harsh neighborhood conditions also jeopardize the operations of many UA projects. A few NPOs that participated in this study shared their frustration with levels of neighborhood crime and the types of vandalism their projects faced.

Lack of Informational Access

Although the programs and events offered by these NPOs primarily targeted people from their service areas, some of them attracted participants from all over the city—sometimes even at a higher rate. Most NPOs could not or did not regularly track their participants' locations. Lack of such locational data is a challenge for these NPOs, potential project funders, and researchers. In particular, the lack of or limited level of data on hunger relief recipients is critical. Even if available to a limited extent, such data are not comprehensive, not available in a ready-to-use format, not shared with public or other agencies, and not updated on regular basis. This creates barriers to the analysis and understanding of location-specific needs (Meenar, 2012).

Conclusion and Policy Recommendations

By taking the city of Philadelphia as a case example, this research has documented how NPOs attempt to build community capacity through a variety of food-related projects, programs, and events. The analysis was primarily based on the NPO contribution to the following community capitals: human, physical and financial, social, and organizational. Based on the findings and discussions in this study, it can be concluded that most Philadelphia-based food-related NPOs are generally trying to improve a range of community capitals in order to make a contribution to the overall community capacity. While a majority of NPOs are able to contribute more in improving human and social capitals, they face a number of challenges as well, mostly related to organizational and financial/physical capitals. Here I offer some policy suggestions for these NPOs. In order to increase their effectiveness in improving community capacity, the NPOs not only need assistance in responding the challenges mentioned in this paper, but also need to take their own initiatives in three areas:

(1) Making or strengthening coordination efforts with smaller, neighborhood-based NPOs. Community-based NPOs require "greater decision-making power in the policy-making process and resource autonomy for policy implementation" (Silverman, 2004, p. 2). This is especially important for smaller NPOs and grassroots initiatives in lower-income and minority neighborhoods. Better network connections need to be made with these NPOs in order to hear their voices, increase their visibility in the larger policy discussions (e.g., regarding zoning ordinances, citywide dialogue on food justice, etc.), and ensure their participation in the local food movement, which is primarily led by young, White, and middle-class activists. In order to achieve food justice, it is important to have representation of NPOs from disadvantaged and diverse neighborhoods in the citywide policy discussions and plan-implementation processes. Two examples of grassroots and community-based NPO coalitions in Philadelphia are the Campaign to Take Back Vacant Land (http://takebackvacantland.org/) and its recent food and garden-based offshoot, Soil

Generation (formerly Healthy Foods Green Spaces; http://www.groundedinphilly.org/HFGS-about/).

Lack of coordination is very common among smaller NPOs such as hunger relief agencies (Meenar, 2012). Smaller NPOs, in most cases, cannot increase their connectivity, as they do not have the staff support to reach out to potential partners or maintain an informal relationship. This is consistent with the findings by Lewis, Scott, D'Urso, and Davis (2008). This does not mean, however, that the network itself is flawed. Perhaps community-based, smaller NPOs do not need to be interconnected in that way, as long as their projects (such as community gardens) are grounded in the neighborhoods and well-connected to local residents. But advocacy, outreach, and membership-based NPOs that have citywide or even regional service areas need to be closely connected to smaller, community-based NPOs that oversee actual on-the-ground projects.

Although NPOs always compete with one another to catch a funder's attention, there is no alternative to strengthening coordination and partnerships not only among NPOs, but also with other organizations such as governments and institutions. Coordination efforts among NPOs and smaller agencies can be made stronger at both the local and state levels. Pennsylvania's Inter-Agency Council on Food and Nutrition proposed a blueprint for a hunger-free Pennsylvania by recognizing the fact that state government alone cannot address hunger or eliminate chronic food insecurity by 2020—a goal announced by the state in 2007.

(2) Engaging local and diverse stakeholders in the decision making process. Most community-based NPOs in Philadelphia work closely with neighborhood residents, regardless of their age, income, and race. Geographically, the majority of those residents who are active participants of community-based programs live within walking distance (a quarter of a mile or 0.4 km) of a project site such as a community garden (Meenar & Hoover, 2012). However, White, middle-class, young people are more actively involved in such programs and activities, even if those are located in a predominantly Black or Latino/a spaces (Meenar & Hoover, 2012). Other research suggests that African Americans participate less in the alternative food movement because recent programs have become "unbearably white" (Guthman, 2011) in many places.

NPOs need to explore new avenues to better connect with minority populations and engage them in their activities, as well as in decision-making or the planning and development processes. It is not about "educating" or "enlightening" them, but involving those individuals who are interested in such activities but may feel estranged from formal programs. A grassroots initiative in a neighborhood, or one initiated by an NPO that has worked in the neighborhood for a long period of time and earned the trust of neighborhood residents, will usually have a higher chance of success. Research suggests that "trust is a stronger prerequisite for, than an outcome of, civic engagement" (Jennings & Stoker, 2004, p. 370). Problems arise when an NPO with a citywide network decides to start a project in a specific neighborhood without any prior discussion and partnership with local residents. Many times those are the projects that become prone to vandalism. In addition, trust can be increased by implementing feedback or comments received from stakeholders via both traditional and digital communication methods.

(3) Addressing spatial mismatch issues. Geographic clustering of NPOs may seem important for providing synergy and facilitating collaboration; however, it is crucial for at least those NPOs that provide direct or on-the-ground services to be located in neighborhoods where most people live and need their services. The absence of this pattern will prolong spatial mismatch issues. Although NPOs need to consider a number of factors, including availability of office space, public safety, transportation routes, zoning restrictions, or community support, it is important that NPOs engaging community residents in their capacity-building efforts are literally grounded in those neighborhoods and earn community trust. Active support from government agencies can play a crucial role in minimizing gaps in service or spatial mismatch issues. Such support may come in the form of direct collaboration between government

agencies and NPOs to administer projects targeted to disadvantaged or disinvested neighborhoods, and assessment of the outcomes of such projects through research and publications. Philadelphia's health department has such partnerships with The Food Trust, which has become an important collaboration behind projects such increasing the number of farmers markets and healthy corner stores in lower-income neighborhoods.

In conclusion, I present the merit and limitations of this study and possible future research topics. According to the knowledge of this author, no other study has systematically analyzed the key challenges faced by urban NPOs that try to build community capacity through food-related programs and policies. At the same time, no other study has applied a combination of community capitals framework and spatial network analysis to food-related NPOs. These two would be considered to be the key contributions of this research to the literature on NPO capacity-building in food systems work. Although the study was based on Philadelphia-area NPOs, the findings and discussions are applicable and transferable to similar cities.

This study does have limitations. Learning local residents' opinions about the projects or programs of the NPOs in their neighborhoods could have provided an in-depth understanding of the role of NPOs in building community capacity, but this potentially time-consuming and expensive step was beyond the scope of this study. Engaging residents in such discussions should be the next logical step. This could be paired with a detailed spatial social network analysis of food-related projects and their participants. In addition, this study could have benefited from some discussions on cultural and natural capitals, which again could be included in follow-up research. Finally, this study could have been more effective and complete if more detailed and reliable data on financial capital were available. This may include systematic data on organizational budgets, surpluses, and expenses; job creation and retention; employee salaries and benefits; and dissolution or turnover rates. The economic development aspect of food-related research will be a key research agenda in the near future.

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Bioplastics: Acceptable for the packaging of organic food? A policy analysis

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Abstract

Bioplastics have been introduced as an alternative to petro-based plastics and to provide packaging materials with improved biodegradability and compostability. Over the past few years, several studies have been conducted on bioplastics and their application in global food systems. Although the potential environmental benefits have been discussed, little in fact is known about the specific requirements for the application of bioplastics as packaging for organic food.

In this policy brief, we examine the applicability of bioplastics packaging to organic food products, based on the perspectives of interviewed experts in industry and academia. We conclude that international regulations and standards for organic food production should include specifications on the use of bioplastics. This is necessary because consumers expect bioplastics to be an environmentally friendly packaging material. Yet bioplastic packaging remains problematic for producers and consumers of organic food, especially if the raw material is originally sourced from genetically modified plants. There is a need for clarification of the type of raw material that is suitable for use as packaging for organic food. Our findings should enhance

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understanding of the public's expectations and perceptions of bioplastics packaging with regard to environmental impacts and optimized organic food packaging.

Keywords
bioplastics, polylactic acid (PLA), organic food packaging, genetically modified organism (GMO)

Introduction

Packaging is an essential part of the food system that connects the product with the consumer (Luning, & Marcelis, 2009) via the four basic functions of containment, protection, communication, and convenience (Han, 2005; Marsh, & Bugusu, 2007). Food packaging has evolved in response to patterns of human consumption and changing lifestyles (Risch, 2009). By the late nineteenth century, synthetic polymers had been developed and plastic packaging was introduced. They revolutionized the market for food packaging due to their various desirable features such as plasticity, softness, transparency, flexibility, convenience, protection from oxygen, durability, light weight, and low production cost (Bertolini, 2010; Mahalik & Nambiar, 2010; Siracusa, Rocculi, Romani, & Rosa, 2008). The most commonly used plastic materials are polyethylene terephthalate (PET), polyethylene (PE), polypropylene (PP), polyvinyl chloride (PVC), and polystyrene (PS). However, such petrochemical plastics have caused the generation of greenhouse gases (GHG) during manufacturing and waste disposal (Organization for Economic Co-operation and Development [OECD], 2011b; Siracusa et al., 2008). It was estimated that, roughly 10 million plastic cups, 1 billion plastic bottles, and 10 billion plastic bags are thrown away each day (OECD, 2011b). The global consumption of conventional petrochemical plastics exceeds 200 million metric tons, with an annual growth rate of approximately 5%, which means a significant depletion of mineral oil resources (Siracusa et al., 2008). Consequently, innovative packaging technology was developed to attempt to improve packaging materials in order to minimize the use of resources and production costs, while simultaneously improving quality and safety (Han, 2005). Later on, plastic packaging became recyclable on an industrial scale; furthermore, plastic materials derived from renewable resources were developed, which are known as bioplastics, which are aimed to be biodegradable and compostable (Tharanathan, 2003).

Bioplastics

Bioplastics have been developed to be recyclable numerous times through natural or technical systems, with the goals of saving mineral oil and providing an alternative to petro-based plastics. Bioplastics create potential for composting as an alternative to waste disposal. This reduces the amount of conventional plastics accumulating in landfills and minimizes the amount of toxic substances released into the environment (Bertolini, 2010; Callister & Rethwisch, 2010). It is especially important for bioplastics to be compostable in consideration of the littering behavior in some countries. Moreover, it has been found by many researchers (Piemonte & Gironi, 2011; Ren, 2010; Singh, 2011; Vink, Glassner, Kolstad, Wooley, & O'Connor, 2007) that the use of bioplastics substantially reduce CO_2 emissions by achieving carbon neutrality.

As a type of food packaging, many bioplastics have low oxygen permeability, which makes them effective for packing fresh fruit and vegetables. The disadvantages of bioplastics include limited mechanical stability with high brittleness, and high moisture permeability that leads to a shorter shelf life when the food is exposed to a humid and high-temperature environment.

The prefix "bio-" of bioplastics catches the public's attention and suggests a high level of sustainability and environmental protection. In European countries, this prefix often refers to any agricultural products produced using organic production standards.[1] Hence the term "bioplastics" may imply, particularly to German consumers, that the

[1] The organic production standard is applied in organic farming. It involves the use of organic fertilizers, without chemical substances, rather than synthetic fertilizers. Additionally, methods of biological and mechanical pest management and crop rotation are used in organic farming instead of the application of synthetic pesticides and herbicides as used in conventional farming (Greene, 2007; IFOAM, 2012).

material has also been produced according to the same organic production regulations. However, "bio-" here is not in the sense of "certified organic," but stands for the two concepts of being bio-based and biodegradable (Beier, 2009). The European Bioplastics Association provides a brief definition: "Bioplastics are commonly defined as plastics that are biobased, biodegradable or both" (European Bioplastics Association, 2011a, p. 3).

The primary objective of this present policy analysis is to consider whether the current and possible future use of bioplastics really conforms to the expectations of manufacturers and consumers of organic food.[2] We therefore use a key informant approach to gain an understanding of the stakeholder perspective in the food industry with regard to bioplastic packaging for organic food. Finally, the current situation regarding the sustainability of bioplastics packaging for organic food is discussed, particularly the environmental impact.

Methods

This policy analysis employs a qualitative research approach. Our data gathering included two main phases. Firstly, current organic production regulations and standards in Europe, the United States, and Japan are reviewed and compared. The analysis of regulations and standards are concentrated on the up-to-date amended version of the respective regulation and standard that has been available since 2012. We studied the sections on organic food production and processing in the regulations and standards, with a focus on the manner of genetic modification, and particularly the issue of organic food packaging. By initially conducting an intensive secondary data review, we developed interview questions that considered the requirements for organic food backpacking, the dimensions extended from the use of bioplastics for organic foods, and consumer perspectives on bioplastics generally as well as on the acceptability and understandability with respect to the application of bioplastic packaging for organic food.

Secondly, qualitative data were collected through key informant interviews with an array of food experts in four countries, in order to explore their opinions on public understanding of bioplastic packaging and to identify disparities between perceptions and reality.

Respondents and Data Collection

The second phase of the qualitative approach, interviews with experts, was conducted to provide comprehensiveness and to consider the feasibility and applicability of bioplastics usage in the organic food sector. Due to geographic issues and location, expert interviews were conducted in English, individually and face-to-face where possible and practical, or otherwise by Internet phone and webcam. The length of each interview was approximately 60 minutes and was audiorecorded and later fully transcribed. The interview questions were cognitively examined and pretested initially by our first interviewee, a food packaging scientist whose work is devoted to the food packaging industry, in order to ensure their understandability and practicability by respondents.

Altogether, 10 key informants were recruited. Two key informants are staff at bioplastics producers based in the United Kingdom and Germany, both of which operate worldwide, as well as in the U.S. Two are organic food producers from Germany, and the remaining informants include one quality-oriented German food retailer, one European food law consultant located in Belgium, and four food scientists and researchers in food processing and food packaging organizations, from Austria and Germany. Interviewees were selected according to their background, profession, and work experience in the food or food packaging industry. One Japanese bioplastics producer we approached declined to be interviewed, unfortunately, but instead provided useful information and documents about Japanese regulations on organic food packaging. With the personal experiences and knowledge of these key informants, our

[2] Organic food is produced through organic farming products, based on the IFOAM principles of agriculture (IFOAM, 2012). In recent years, several studies (Canavari & Olson, 2007; Kristiansen, Taji, & Reganold, 2006; Oughton & Ritson, 2007; Zanoli, Gambelli, & Vairo, 2012) have indicated that the top three reasons for purchasing organic food are: (1) one's own health and safety; (2) environmental protection, meaning production and processing that prohibit genetically modified organisms (GMO) in farming and genetically modified (GM)-based food production; and (3) better tasting produce.

approach should provide new insights into stakeholders' opinions. Even though the selection and sample size are small, we believe it is sufficient to complete our analysis because of the diverse background of our participants, who represent stakeholders of the supply chain and have substantial experience and knowledge.

Data Analysis

After the interviews were completed, content analysis was conducted to identify essential information from the interview data. Responses from the experts were categorized into characteristics and consequences and analyzed in order to develop a meaningful interpretation of all individually stated concepts; the data were then coded into broader categories.

Major Themes in Bioplastics: Consumer Expectations and Reality

The main themes from our key informant interviewing data related to the understanding of bioplastics are summarized below. Some of the opinions are reflective of previous studies.

Misleading Statement of "GMO Free" for PLA Bioplastics

Within the bioplastics group, polylactic acid (PLA) bioplastics have the greatest market share and are also the most prominent thermoplastic derived from agricultural crops (Ren, 2010). PLA is produced through the bacterial fermentation of hydrolyzed corn starch, followed by the polymerization of lactic acid (Bund Ökologische Lebensmittelwirtschaft [BÖLW], 2011; Ren, 2010). Globally, the largest PLA producer has an annual production capacity of around 140,000 metric tons (NatureWorks, 2009). One key informant from a bioplastics manufacturer reported that raw material for the PLA production of this large bioplastic producer is derived from renewable resources and is a mixture of genetically modified (GM) and conventional field corns. Due to the intense heat applied during the manufacturing process, the PLA resin ultimately used in the production of bioplastics does not contain any GMOs, nor does it have a detectable modified gene remaining. Therefore, the PLA has a GMO-free certification, according to U.S. legislation declaring its GM-free identity.

However, contrary positions are apparent regarding perceptions of the "GMO free" label for PLA. According to our interviewees, organic producers' and consumers' perceptions of the "GMO-free" designation are that the overall supply chain for the item's production entails no genetically modified material, all the way from the field to the consumer. This is in contrast to the bioplastics producer's point of view that PLA has a GMO-free identity. The main reason for this view is that the product no longer contains recombinant DNA after processing and is essentially equivalent to PLA from non-GMO sources. This has been disputed, however, by stakeholders of organic food production and processes. One interviewee who is an organic food producer believes that the name "bioplastics" is misleading to consumers if the material is derived from raw material containing a GMO. From this point of view, "bioplastics" should *not* be labeled as "GMO-free." These stakeholders believe that consumers will not be able to understand the differences between products containing recombinant DNA and products which have been prepared from GMO-containing source material, while no longer containing recombinant DNA.

Lack of Packaging Specifications in Organic Production Regulation

In recent years, many food producers and processors have adopted bioplastics as packaging materials. This is not only due to their specific properties; it is also used as a marketing tool to address and draw attention to the benefits of biodegradability and compostability. Hence these potential environmental benefits are expected by consumers (Kale, Kijchavengkul, Auras, Rubino, Selke, & Singh, 2007). However, our interviewed experts also mention that, beyond the bioplastics producers, there is a lack of knowledge about the application and acceptability of bioplastics for packaging organic foods in terms of the specific requirements of the organic food sector. Currently the use of bioplastics packaging for organic food is allowed in the European Union since there is no restriction in EU Regulation (EC) No. 834/2007 (European Commission, 2007) that prevents the

use of bioplastics packaging, as long as it fulfills the general safety requirements.

As far as the common element of international and national organic production regulations and standards, GMOs are only forbidden for use in "food." In particular, the ban on GMOs in organic production regulations refers only to "organic farming" or "organic food production," which does not mention packaging in the legal standards on organic food, as listed in Figure 1. For example, the International Federation of Organic Agriculture Movements Basic Standards (IFOAM, 2012) and EU Regulation (EC) No. 834/2007 (European Commission, 2007) state that genetic engineering and GMOs are incompatible with the concept of organic *production*. Yet no specific requirements are mentioned for organic food *packaging*. Only three private organic production standards were found to contain specific requirements for organic food packaging materials: Naturland standards, Demeter standards, and the UK Soil Association standards (Figure 1).

In our interviews, the industry experts stated that, from the perspective of organic producers and processors, the GM-sourced bioplastic packaging is not suitable for their organic food products. This is mainly due to the fact that bioplastics producers do not reveal whether the raw material for bioplastics is derived from GM-based plants or from conventional ones, nevertheless, the end product of bioplastic packaging is detected GM-free after high-heat process. In addition, consumers may not accept the production of bioplastics that involves the use of agricultural commodities of GM origin (Ahvenainen, 2003). Gaskell et al. (2006) concluded that there is still a lack of acceptance by EU consumers for using GM plants even for non-food material, since GMOs are a comparatively important issue in European countries. Their possible negative environmental impacts conflict with the concept of organic agriculture (Gaskell et al., 2006).

Impacts of GM-Based Bioplastic Raw-Material Extraction in Bioplastic Production

Presently, the global production capacity of bioplastics derived from renewable resources is estimated at approximately 1 million metric tons annually (Goodall, 2011). This production capacity is based on 300,000 hectares (740,000 acres) of agricultural crops used to produce bioplastics, which is roughly 0.02% of the global total of naturally irrigated arable land (Goodall, 2011). In 2010, commercial bioplastics production for the European market reached between 100,000 and 150,000 metric tons, which is equivalent to around 75,000 hectares (185,000 acres) cropped today. This figure will grow continually to a projected maximum of 1.25 million hectares (3,089,000 acres) or approximately 0.7 percent of available agricultural land, if 2.5 million metric tons of bioplastics are expected to be used in Europe by 2020 (European Bioplastics Association, 2011a). As the data shows, the area of land used for bioplastics is relatively small, compared to the global amount of cultivated land. Therefore increasing the usage of farmland for producing bioplastics may not be seen as a threat, since, for the time being, the quantity of bioplastic production has not reached an economies-of-scale supply level worldwide. However, our interviewed experts, in addition to the experts from bioplastic producers, stated that it is important to consider the conflict between the value of crops for human food consumption and industrial use as manufacturing feedstock.

Moreover, the arguments against GMO crops as raw materials for bioplastics persist. The cultivation of GMO crops may have various advantages, such as higher yields, pest resistance, drought improvement, and salt stress tolerance (Kotchoni, Gachomo, & Mwangi, 2005). However, whether a higher salt stress tolerance really works on a commercial scale remains to be seen. On the other hand, possible undesirable effects include risks to human and animal health. There may also be negative effects on biodiversity and the environment, such as accelerating the depletion of natural resources, and increased soil erosion due to the conversion of rainforest ecosystems into crop land or pastures (Rosset, 2006; European Bioplastics Association, 2011a), as well as the toxicity to nontarget species and the uncontrolled spread of resistant weeds and pests (Carter, Moschini, & Sheldon, 2011).

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Figure 1. Comparison of Organic Production Regulations and Standards, with a Focus on GMO Concerns

		GMO concerns with organic food production (General specification on food product itself)	Packaging materials associated with GMO concerns in organic food production
International Standards	IFOAM Basic Standards	• "*Organic management system do not use genetically modified organism (GMO) or their derivatives, except vaccines, in all of organic production and processing* (IFOAM, 2012, p. 17)"	No specification on packaging materials with respect to GMO is included.
	Codex Alimentarius	• "*...genetically engineered/modified organisms (GEO/GMO) are not compatible with the principles of organic production*...(Codex Alimentarius Commission, 1999, p. 3)"	No specification on packaging materials with respect to GMO is included.
	EU Regulation (EC) No 834/2007	• "*Genetically modified organisms (GMOs) and products produced from or by GMOs are incompatible with the concept of organic production and consumers' perception of organic products.* (European Commission, 2007, p. L189/2)"	No specification on packaging materials with respect to GMO is included.
National Standards	NOP Standards (US)	• "*...genetically modify organisms or influence their growth and development by means that are not possible under natural conditions or processes and are not considered compatible with organic production.* (USDA, 2013)"	No specification on packaging materials with respect to GMO is included.
	JAS Standards (Japan)	• "*The criteria of the production methods for plant products are...processing and produced without recombinant DNA technology*...(MAFF, 2005b, p.1-3)"	No specification on packaging materials with respect to GMO is included.
Private Standards	Naturland Standards (Germany)	• "*Products that are produced in compliance with Naturland standards must be made without the employment of genetically modified organisms (GMO) and/or GMO derivatives.* (Naturland, 2013, p. 10)"	• "*The use of bioplastics is recommended. However, in this case genetically modified raw materials may not be used in their manufacture. Proof is to be provided by the packaging manufacturer or of the supplier in the form of a written declaration submitted during organic inspection that no genetically modified organisms (GMOs) and their derivatives were used.* (Naturland, 2013, p. 12)
	Demeter Standards (Germany)	• "*Procedures expresslz prohibited on DEMETER products.....that result from genetically manipulated organisms or from derivtives of such organisms* (Demeter, 2013, p. 10)"	• "*Allowed Materials:...Lactic Acid (From fermentation of a GMO free carbohydrate substrate only)* (Demeter, 2013, p. 71)"
	Bioland Standards (Germany)	• "*Products produced according to BIOLAND standards, have to be produced without the use of genetically modified organisms (GMOs) and/or GMO derivatives* (Bioland, 2015, p. 2)"	No specification on packaging materials with respect to GMO is included.
	Bio Suisse Standards (Switzerland)	• "*No use of genetic engineering...from genetic manipulation and from the use of genetically modified organisms (GMOs) and their derivatives.* (Bio Suisse, 2012, p. 7)"	No specification on packaging materials with respect to GMO is included.
	Soil Association Standards (UK)	• "*...must not use genetically modified organisms (GMOs) in organic food processing. They do not fit with the principles of organic agriculture*...(Soil Association, 2011, p. 33)"	• "*You must not use these materials in your packaging: ...that contain, have been derived from, or manufactured using, genetically modified organisms or genetically engineered enzymes.* (Soil Association, 2013, p. 63)" • "*For any compostable or biodegradable primary packaging...these materials are often derived from genetically modified organisms or use genetically engineered enzymes in their manufacture....is not permitted.* (Soil Association, 2013, p. 64)"

Sources: Based on Bio Suisse, 2012; Bioland, 2015; Codex Alimentarius Commission, 1999; Demeter 2013; European Commission, 2007; IFOAM 2012; Ministry of Agriculture, Forestry and Fisheries [MAFF], 2005a, 2005b; Naturland, 2013; Soil Association, 2013; U.S. Government Printing Office [GPO], n.d.

Consumer Confusion about Bioplastics

Our interviewees who come from the scientific field also mention that in Germany and other European countries, the prefix "bio-" normally refers to any agricultural products produced according to organic standards by certified farms and processing plants. The term "bioplastics" may suggest, especially to German consumers, that this material has been produced according to these standards, which is normally not the case. Bioplastics neither come from organic-certified agricultural production, nor are they certified as organic. Secondly, the terms "compostable" and "biodegradable" for bioplastics may be confusing to consumers, leading them to believe that bioplastics packaging will rapidly "disappear" after being littered (Mojo, 2007). Such misconceptions about bioplastics may lead to inappropriate disposal and indirectly increase littering.

The Myth of Life Cycle Assessment (LCA) on Bioplastics

To evaluate the sustainability and environmental friendliness of production methods and products, a life cycle assessment (LCA) has been used globally since 1990 (Mattsson & Sonesson, 2003). LCA is conducted to evaluate a product or a process by covering all stages throughout its life span, from primary production to end-of-life disposal. The interviewed scientific experts remarked that LCA studies may indicate that bioplastics could be superior to plastics made from fossil carbon in terms of reducing GHG emissions. This is mainly due to carbon being used in bioplastics production, which comes from CO_2 assimilated by crop plants. However, the application of LCA considers not only carbon measures, but also many other measures, such as energy, water usage, etc. Such remarks have been adequately reflected in the findings of Auras, Lim, Selke, & Tsuji (2010).

Discussion and Recommendations

Harmonization of Regulations and Standards for the Packaging of Organic Food

Organic food is produced according to the principles of natural and ecological methods (Courville, 2006; Kristiansen et al., 2006). Kristiansen et al. (2006) suggest that the main reason for prohibiting the use of GMOs is potentially irreversible processes with potentially negative effects on future generations and the ecosystem. As previously mentioned, official regulations on organic food production currently do not contain specific requirements or "positive lists" for packaging material, and few private organic organizations prohibit the use of bioplastics packaging derived from raw materials containing GMO, or processed with the involvement of GMO. Therefore there is a need for common regulations on organic food packaging. On the basis of our study, we suggest that such regulations ensure that no GMO is used in raw materials or in starch fermentation during the production of bioplastics.

Any revision of existing regulations for the use of bioplastics should consider the potential migration of material from GMO into food. For example, EU Regulation (EC) No. 10/2011 (European Commission, 2011) on plastic materials and articles intended for contact with food already covers several natural materials, such as starch and cellulose, that are used in bioplastics production, but does not yet address the GMO origin of food contact materials.

Correct End-of-Life Disposal for Bioplastics

It is important to inform consumers of how to properly dispose of packages made from bioplastics. A good example of the commercial application of bioplastic packaging was one yogurt brand (ACTIVIA), produced by Danone GmbH, that had been packaged in PLA cups produced by NatureWorks LLC. The PLA cups used to package yogurt are derived from a combination of GM and conventional corn cropped in the United States. However, as is common in yogurt packaging, the yogurt lid was made from *non*-biodegradable materials. Logically, the empty yogurt cup and lid should be disposed of in separate bins. However, many consumers may not do this due to the inconvenience such a disposal procedure, or they may simply not know the difference. Moreover, the composting of PLA bioplastics is only feasible at industrial composting facilities, not in households. In practice, PLA cups are not sorted out and recycled but incinerated (Deutsche Umwelthilfe,

2011). Therefore it is critical to inform the general public about the proper steps in disposing of packaging after food consumption, and the disposal of bioplastics should be further developed and optimized. This scenario confirms Beier's argument (2009) that there is no scientific evidence of PLA bioplastics being more environmentally friendly than petrochemically derived plastics in practice. Hence, at the end of 2011 the German Environmental Aid Association, Deutsche Umwelthilfe e.V. (DUH), launched a campaign criticizing statements on sustainability made in the advertisements for this yogurt brand (Deutsche Umwelthilfe, 2011). The manufacturer subsequently made changes to the advertisements. Any claims that bioplastics packaging is superior to alternatives by being more environmentally friendly should cease, as long as there is no credible scientific evidence to support this claim.

Proper Life Cycle Assessment for Bioplastics

There are many other issues that need to be considered when conducting LCA of bioplastic production. These issues include the consumption of nonrenewable resources and the impact on various areas such as biodiversity, climate, the nutrient balance of soil and water, and the health of humans, animals, and plants (Beier, 2009). Corn is presently the dominant crop for PLA manufacturing in the United States (Deutsche Umwelthilfe, 2011). Auras et al. (2010) pointed out that corn cultivation contributes markedly to eutrophication, soil acidification, and nitrate leaching. Specifically, monoculturing with the extensive use of fertilizers may reduce biodiversity and jeopardize natural resources. Moreover, eco-efficiency instruments may also be applied to examine the environmental impact of bioplastics. These include measuring GHG emissions, land space usage for crops, water utilization, and the generation of environmental toxicants.

Researching Alternative Raw Material for Bioplastics

The world's population is projected to reach 9.1 billion by 2050 (OECD, 2011a), and the production of both food and nonfood items, such as biomaterials and bioenergy, will put pressure on the agricultural system to meet consumer demand. Bioplastics are made from agricultural raw materials such as corn or starchy plants, which can also be consumed as human food. Hence it is highly desirable to find alternative raw materials to replace food crops for bioplastics manufacturing in the future. At present, there are various plant-based types of bioplastics that are readily available in the market, including cellulosic materials and biomass byproducts that do not compete with food production.

In addition, to foster the environmental superiority of bioplastics, efficient technology for increasing their production scale should be adopted, and the design of bioplastics packaging should be optimized to allow multiple uses (Beier, 2009; BÖLW, 2011; European Bioplastics Association, 2008).

Conclusions

The use of bioplastics is a valuable approach to sustainability in the packaging sector of the global food system. It aims to bring positive changes by reducing the use of energy and natural resource consumption and by generating less waste. This is in line with the principles of organic food production. Hence bioplastics attract considerable interest in research and development projects in academic institutions and industry. However, the terms "compostable," "biodegradable," and "from renewable resources" used for describing bioplastics do not necessarily reflect maximum environmental friendliness or the overall sustainability of food systems, especially when the use of GMOs for production of bioplastics is taken into account. When considering the compatibility between organic food and bioplastics packaging, it is necessary to take a critical look at the various controversial issues.

Consumers of organic food are likely to expect that the packaging of organic food to be produced from environmentally and socially acceptable raw materials, and that the packaging be recyclable or compostable. However, small and medium-sized food producers face problems in selecting suitable bio-based solutions for food packaging from the abundance of available raw materials and processed materials. This situation contributes to the persistent dominance of conventional plastics in the market.

In 2015, the Association of Organic Food Producers (AoeL, Assoziation Oekologischer Lebensmittelhersteller e.V.) in Germany developed an Internet tool called "Biokunststoff-Tool" (AoeL, 2015) that serves as a decision-making solution for food producers dealing with bioplastic and other packaging. The system gathers information on existing bioplastics variants in the areas of ecology, social acceptability, safety, quality, and technology. It focuses on key aspects such as avoiding food competition at the origin of bioplastic raw material, GM-free raw materials sourcing, and environmentally friendly packaging production. Food producers then can base their selection of packaging material and technology not only on the physical properties of the packaging, but also on the environmentally and socially responsible production methods used in these packaging materials.

Further research on the topic of bioplastics should address several issues. First, the development of sustainability parameters with predefined specifications (from field plant to composted soil) will help policy-makers and food producers prioritize targets appropriately within the dilemmas of our food system. Second, it is advisable to broaden and deepen insight into the sustainability issues of bioplastics by enlarging the sample size of stakeholders used in research. With regard to policy recommendations we first recommended that, in line with consumer expectations, a ban on GMO usage in organic food packaging is needed and should be clearly specified in the regulations. The second objective should be the replacement of corn (both GMO and conventional) in bioplastics manufacturing with agricultural and forestry by-products and food waste. Third, clear instructions to consumers should enable them to dispose of this kind of packaging appropriately.

Finally, there needs to be a compromise between legislative bodies and organic food stakeholders. Both parties need to reach a win-win agreement that will benefit all stakeholders along the value chain. This is a substantial challenge, but nevertheless we should not ignore this serious debate concerning the future of our food system. Flexibility on any future changes and developments in bioplastics packaging regulations should be maintained, because imposing additional regulations and restrictions on bioplastics could hamper its development. It is essential to remain positive and open to the development of bioplastics, as well as to welcome future innovations from advanced technology research in bioplastics packaging. 

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Agriculture of the middle participation in state branding campaigns: The case of Kentucky

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Abstract

In the past decade, statewide agricultural branding campaigns have blossomed. Examining the case of the Kentucky Proud™ (KyP) program, this paper investigates the potential benefit of a state-level marketing strategy for the declining class of midsize farms, referred to as Agriculture of the Middle (AOTM). First, we discuss why AOTM farms are important to maintaining a viable agriculture structure. Second, we introduce the context of state branding and explain how KyP developed as part of the transition from highly tobacco-dependent agriculture. Using recent agricultural census data and a survey of KyP members, we compare the key characteristics between three sets of pairs: (a) U.S. AOTM farmers and Kentucky AOTM farmers, (b) Kentucky AOTM farmers and KyP-member AOTM farmers, and (c) KyP AOTM farmers and other KyP-member farmers. The findings indicate that Kentucky's AOTM farmers are unique compared to U.S. AOTM farmers, and that the KyP program benefits particularly those AOTM farmers transitioning from tobacco-dependent agriculture. We also found that the logo of the state branding campaign helps member farmers differentiate their products, and that the program helps most members gain knowledge and skills for marketing their products. Overall, findings suggest that state branding campaigns designed to incentivize agricultural marketing of local foods have the potential to help farmers of the middle. Further research needs to be done in order to track the long-term impact of different agricultural branding campaigns.

Keywords

state branding program, impact analysis, agriculture of the middle (AOTM)

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Introduction: State Branding Campaigns

Since the 1930s, state governments have been involved in marketing and differentiating agricultural products through commodity commissions and marketing boards (e.g., Washington apples, Maine potatoes, and California peaches), in part to stabilize overstrained market conditions after the Great Depression. By the 1980s, the focus of state branding programs began to shift from one specialized commodity, such as Washington apples, or category of products, such as Wisconsin cheese, to any agricultural products produced in a state so as to create economic opportunities for farmers struggling to survive the farm crisis (Patterson, 2006). In the early 2000s, the availability of federal block grants (e.g., those made available through the Agricultural Producers Marketing Assistance Act of 2001) apportioned for specialty crops resulted in a surge of state-led agricultural branding programs, each with a distinctive logo to market locally produced agricultural and food products. By 2006, as many as 44 states had established state branding programs, as compared to about eight states in the 1980s (Patterson, 2006).

According to Hinrichs and Jensen (2006), there are three dominant objectives in state branding programs: (1) to promote a state's agricultural products, (2) to increase consumer awareness and consumption of those products, and (3) to develop markets and businesses within the state. The majority of these programs define "local" food as those products grown, raised, or processed within the state, and market those products as "superior quality" and "fresh." The definition for "local" for a significant number of states is based on a certain percentage of the product, measured by either weight or value, that has its production process take place within the state (Fisher, 2012). Regardless of the definitions or guidelines for "local" food, each state branding program aims to support that state's agricultural sector and food industry by expanding marketing opportunities for farmers within the state.

Given the level of public investment, understanding the impact of state-sponsored agricultural branding programs is important. In the existing research literature, the benefits of marketing and branding programs have been examined from three angles. First, consumercentric studies have focused on the factors that contribute to levels of consumer awareness (Carpio & Isengildina-Massa, 2009a; Govindasamy, Italia, & Thatch, 1999; Hu, Onozaka, & McFadden, 2011) and appropriate pricing of branded products (Carpio & Isengildina-Massa, 2009b; Onken, Bernard, & Peskek, 2011). Second, farmercentric research has shown that producer awareness levels and perceptions of state-sponsored programs affect the rate of program participation (Davis 2012; Velandia et al., 2012). The impact of promotional expenditures on farm cash receipts and farm business income is also an important factor in the program benefits (Govindasamy et al., 2004; Uematsu & Mishra, 2011). Third, research on the economic impact of state branding campaigns has shown a positive benefit on both the overall and agricultural economy in the state. For example, an economic evaluation of Kentucky Proud™ (KyP) from 2004 to 2006 (Infanger, Maurer, & Palmer, 2008) found that each dollar invested in the KyP marketing program returned US$5.20 in net benefits to the economy and between US$2.89 to US$3.39 in net cash income to farmers.

In this exploratory study, we look at the impact of Kentucky's state branding program, Kentucky Proud™, on the state agriculture of the middle (AOTM), a "disappearing sector [in the U.S.] of mid-scale farms and related agrifood enterprises that are increasingly unable to successfully market bulk agricultural commodities or sell products directly to consumers" (Lyson, Stevenson, & Welsh, 2008, p. xiii). In order to conduct our assessment, this case study uses national- and state-level data from the U.S. Census of Agriculture for the years 2002 and 2012, and data from a random-sample survey of KyP members conducted in 2011. This paper is organized into five sections. In the first section, we briefly discuss why it is important to focus on AOTM farms in examining the impact of state branding programs. Second, we present the background of the development of the KyP program. Third, we explain our research design. Fourth, we present our findings, comparing the key characteristics between three sets of pairs: (a) U.S. AOTM farmers and Kentucky AOTM farmers, (b) Kentucky AOTM farmers and KyP member

AOTM farmers, and (c) KyP AOTM farmers and other KyP member farmers. We conclude by highlighting the potential and opportunities for the state's role in supporting AOTM, recommending that policy-makers keep in mind that scale matters.

Why Agriculture of the Middle?

To examine impacts of a state branding program, this study focuses on AOTM, because these farms contribute to positive social, economic, and environmental outcomes in their community and state. Existing studies (see Goldschmidt, 1978 [1947]; Green, 1985; Kirschenmann & Stevenson, 2015; Lobao, Schulman, & Swanson, 1993; Peters, 2002) show that midsize farms are particularly critical in contributing to the economic and social viability of rural America by circulating money in local economies, preserving open space, providing environmental benefits, attracting tourists, and upholding quality life. These scholars maintain that AOTM farms are uniquely vital and valuable to U.S. agriculture.

Generally, AOTM farms are characterized by (a) their size, measured by annual gross sales (AGS) between US$50,000 and US$499,999; (b) their business organization, defined by the U.S. Department of Agriculture (USDA) as either "farming occupation farms" or "large family farms" category; and (c) their production and marketing strategies (Kirschenmann, Stevenson, Buttel, Lyson, & Duffy, 2013). As AOTM researchers emphasize regarding the definition of AOTM farms and ranches, "while it is not scale determined, it *is* scale related" (Kirschenmann, Stevenson, Clancy, Marlow, Simmons, Smith, & Yee, 2013, p. 1).

The 2012 Census of Agriculture shows that nationally AOTM farms make up 17.6% of all farms, produce 16.4% of farm sales, and manage 35.1% of farmland (Table 1). A large percentage of the value of agricultural production is generated by a small number of large- and very-large-scale farmers, or 7.6% of farms, grossing over US$500,000 in annual sales and capturing 80.7% of total farm sales. These same farms own 38.4% of all farmland. There is evidence that the domination of sales by the segment of U.S. farms that are large and very large is growing (MacDonald, Korb, & Hoppe, 2013). These national trends raise concern about maintaining the vitality of agriculture in state and local economies.

Access to appropriate markets is an important aspect of maintaining a farm as an economically viable enterprise. Direct-to-consumer markets such as farmers markets and community supported agriculture operations (CSAs) may be too small for some AOTM farmers to sell all their products, while global commodity markets are too capital-intensive for other midsize farms, yielding little return on investment. The vibrancy of AOTM therefore depends largely on production and marketing strategies that midsized farmers can adopt to differentiate their value-added products in the market. Values-based supply chains, food hubs, and producer or consumer cooperatives are among marketing strategies that have been reported to potentially benefit AOTM (Clancy, 2010; Diamond & Barham, 2011; Hinrichs & Lyson, 2007; Lev & Stevenson, 2013; Stevenson, 2009). To our knowledge, no research has been done on state branding marketing campaigns as a potential strategy for AOTM farms. To be consistent with this work, we follow the definition of AOTM by sales category (AGS between US$50,000 and US$499,999) in order to assess the impact of the KyP program on AOTM farmers.

Table 1. Number of Farms, Farm Sales, Farmland by Sales Category for U.S. Farm Operations, 2012

	Small	AOTM	Large
Farm Numbers	1,578,765	371,316	159,222
% of Total	74.9%	17.6%	7.6%
Farm Sales ($1,000s)	11,459,988	64,547,130	318,637,364
% of Total	2.9%	16.4%	80.7%
Farmland (acres)	242,976,041	320,726,687	350,824,929
% of Total	26.6%	35.1%	38.4%

Source: U.S. Census of Agriculture, 2012.

Background of Kentucky Proud

Kentucky ranks fourth among the states in number of farms (USDA-NASS, 2012). For centuries, numerous livelihoods across Kentucky depended on growing burley tobacco. The end of the federal tobacco program initiated a series of recent transformations in Kentucky agriculture and created the need for building a new agricultural economy. In 2000, the state General Assembly instituted the Governor's Office of Agricultural Policy (GOAP) and the Kentucky Agriculture Development Board (KADB) to distribute 50% of the state funds from the Master Settlement Agreement with the tobacco industry among projects that support the development of a new agricultural economy (GOAP, n.d.). The creation in 2004 of Kentucky Proud (KyP), a state branding program, was one of these projects explicitly designed to facilitate the transition of tobacco-dependent farmers and communities to new agricultural products and/or ventures (Caporelli, 2011).

The KyP program is administered by the Kentucky Department of Agriculture (KDA). The definition of a KyP product is written in state statutes as "any agricultural product grown, raised, processed, or manufactured in Kentucky" (Definitions, 2015). (Kentucky has not set a percentage requirement, however, for the state of origin for KyP products.) The program uses a KyP logo to promote Kentucky agricultural products, which appears widely on TV and in print advertisements as a means to increase consumer awareness about how "supporting Kentucky's farm families… [and]…building a sense of community" strengthens the local economy, and purchasing KyP products makes an "investment in Kentucky's land, people, and its future" (Kentucky Department of Agriculture, n.d., "Kentucky Proud," para. 1).

The program offers various resources and financial incentives to qualifying members to expand marketing of KyP products, including point-of-purchase grants, restaurant rewards, brand and advertising funds, trade-show funds, meat grader training, retail negotiation training, and distributor coordination. The KyP program offers financial incentives to participating members based on direct farm impact. For example, KyP restaurant and food institution members turn in cash receipts of local food purchases, or Kentucky agricultural products and agriculture-related value-added products that have direct farm impact, to receive a reimbursement of up to US$12,000 a year. The Point-of-Purchase Grant Program helps defray marketing costs for members who use the KyP label. For example, a KyP member who uses the logo to advertise point-of-purchase or sales items can qualify for financial reimbursement by turning in a receipt showing purchase of the marketing item, such as a sign with the KyP logo on it to be used at the Lexington Farmers' Market. A KyP member can be reimbursed for up to 50% of eligible marketing expenses. Again, direct farm impact, as reported by the member, is a crucial component in determining the amount of an awarded grant.

The number of KyP participants (growers, producers, retailers, and institutions) has grown rapidly, from roughly 30 in 2004 to 2,800 in 2011. Findings from a previous evaluation of the KyP program indicate that the main reason given by participants to join the state-sponsored program is to "increase consumer awareness for my product" (Fisher, 2013, p. 57). Other motivations cited in this evaluation include the opportunity to gain brand recognition, the incentive to gain financial benefits, and the desire to be part of the local food movement. According to KyP members in this study, the campaign has successfully increased consumer awareness for KyP products and has been fairly effective in providing members with the necessary education and tools to improve their marketing skills. According to a consumer awareness survey conducted by the KDA, a majority of Kentucky consumers are indeed aware of the KyP label, and the main motivation for consumers to purchase a KyP product is to support Kentucky farm families (Fisher, 2012).

Many KyP members recognize that the inclusive definition of what constitutes a KyP product—"agricultural products that have been grown, raised, processed, *or* [emphasis added] manufactured in the state"—leads to unintentional leakages of potential economic benefits of the brand, decreasing the multiplier effect (Fisher, 2012). On the other hand, this inclusivity keeps down the cost of the state branding program

because it does not require extensive accreditation and monitoring. In short, the KyP program can be an economic benefit for producers who participate in the marketing strategies by way of brand recognition. Our research investigates whether AOTM farmers specifically benefit from the KyP program.

Methods

In order to evaluate the impact of the KyP on the "disappearing" AOTM in Kentucky, we relied on two sets of existing data: Census of Agriculture data from 2002 and 2012, and the data from the random probability sample survey conducted in 2011 by Fisher (2012).

First, the 2002 Census of Agriculture data were used for an analysis to compare data for the KyP program, which started in 2004 (Table 2). Using the 2002 and 2012 Census of Agriculture data, the 11 categories designating farm operators based on agricultural sales were recoded into two categories for analysis: "All farms" and "AOTM farms." The U.S. AOTM was included for comparison to illustrate the locally specific, unique characteristics of Kentucky AOTM. The data collection methods for the 2002 and 2012 data were the same for the variables used in our analysis, except "Organic sales." (Data on the value of certified organic products were collected for the first time in 2002. In the 2007 and 2012 census years, data were collected for products conforming to USDA National Organic Program Standards, permitting reasonable comparison between these two census periods.)

Three types of variables from the Census of Agriculture were used for analysis of Kentucky AOTM:

(a) Characteristics of farm operations, including Average Farm Size, Number of Farms, Land in Farms, Total Sales, and Tobacco Sales;
(b) Use of "alternative" farming practices to differentiate and add value to farm products, including Direct to Consumer Sales, Agritourism, and Organic Sales;
(c) Use of a "conventional" farming practice, as measured by the total acreage treated with Commercial Fertilizers, Lime, and Soil Conditioners (labeled as "Chemical Fertilizer" in Table 2).

Following the methodology of the University of Minnesota Food Industry Center (2014), we selected these variables as food system indicators that measure structural, economic, environmental, and social changes in the food system. In order to illustrate Kentucky's unique regional differences, the U.S. AOTM is used as comparison.

Second, the data from the KyP-member survey were used to identify characteristics of KyP AOTM farmers' operations. The survey consisted of 54 questions and included both close-ended and open-ended questions, with demographic questions at the end (Appendix A). The survey was designed to learn more about the beliefs, practices, and motivations of KyP members.

Using the tailored design method (Dillman, Smyth, & Christian, 2008), randomly selected KyP members were contacted five times through different methods. A self-administered mail survey and/or Qualtrics® online survey collected data from 597 of 2,548 KyP farmer members (23.4% total response rate) who were asked to participate. Generally, farmers tend to have a low response rate, ranging from 10% (Walz, 2004) to 38% (Timms & Schulte, 2013). For a random-sample survey, the number of responses for this study is large enough to make statistical generalizations. After dropping cases for missing data, the responses from 320 of 597 survey participants were included for analysis, reducing the final response rate to 12.6% (320 out of 2,548 surveys sent). Of 320 KyP farmers who participated in the survey, 59 (18.4%) can be categorized as AOTM farmers.

Table 3 summarizes the key socio-demographic characteristics of the survey participants. We compared operation characteristics of KyP AOTM respondents to those of Kentucky AOTM farmers based on the 2012 U.S. Census of Agriculture. We then compared the KyP AOTM group with all KyP farmers who participated in the survey. Despite the end of the federal tobacco program, tobacco continues to play an important part in Kentucky's agricultural landscape. We therefore used *tobacco affiliation* (i.e., whether or not producing tobacco, presently or in the past) to identify the crop's significance for KyP AOTM farmers. Whether or not a farm is certified with Good Agricultural

Table 2. Key Characteristics of AOTM Farm Operations in the U.S. and Kentucky, 2002 and 2012

	2002		2012	
	U.S.	KY	U.S.	KY
Average Farm Size				
AOTM average (acreage)	1,142	491	864	401
% change in AOTM acreage			-24.3%	-18.3%
Farm Number				
AOTM total (farms)	391,272	7,812	371,316	8,721
% of AOTM of total farms	18.4%	9.0%	17.6%	11.3%
% change in AOTM farms			–5.1%	11.6%
Land in Farm				
AOTM total (1,000s acres)	446,702	3,837	320,727	3,521
% of AOTM of total farm land	47.6%	27.7%	35.1%	27.0%
% change in AOTM farm land			–28.2%	–8.2%
Cropland Harvested				
AOTM total (1,000s acres)	171,474	1,984	95,931	1,605
% of AOTM of total cropland	56.7%	39.8%	30.5%	30.0%
% change in AOTM cropland			–44.1%	–19.1%
Total Sales				
AOTM total (in $1,000s)[1]	80,368,268	1,418,089	64,547,130	1,270,683
% of AOTM of total sales	56.7%	36.1%	16.4%	25.1%
% change in AOTM total sales			–19.7%%	–10.4%
Tobacco Sales				
AOTM total (farms)	11,062	4,200	5,146	4,530
% of AOTM of all farms reported	19.5%	53.8%	51.5%	50.1%
% of AOTM reported of total AOTM farms	2.8%	53.8%	1.4%	51.9%
% change in AOTM tobacco farms			–53.5%	7.9%
Direct to Consumer Sales				
AOTM total (farms)	15,333	284	21,547	414
% of AOTM of all farms reported	13.1%	11.1%	14.9%	12.0%
% of AOTM reported of total AOTM farms	3.9%	3.6%	5.8%	4.7%
% change in AOTM direct to consumer farms			40.5%	45.8%
Agri-tourism				
AOTM total (farms)	8,544	75	6,971	74
% of AOTM of all farms reported agri-tourism	30.5%	17.8%	44.3%	11.4%
% of AOTM reported of total AOTM farms	2.2%	1.0%	1.9%	0.8%
% change in AOTM agri-tourism farms			–18.4%	–1.3%
Organic Sales				
AOTM total (farms)	2,118	26	5,627	34
% of AOTM of all farms reported	17.7%	5.0%	17.7%	39.5%
% of AOTM reported of total AOTM farms	0.5%	0.3%	1.5%	1.0%
% change in AOTM organic sales farms			165.7%	30.8%
Chemical Fertilizer2				
AOTM total (1,000s acres)	138,555	1,646	76,172	1,192
% of AOTM acreage of total acreage	55.9%	41.6%	30.7%	31.5%
% of AOTM acreage of total AOTM cropland	31.0%	83.0%	23.8%	74.3%
% change in AOTM acreage			–45.0%	–27.6%

Sources: U.S. Census of Agriculture (2002, 2012). Notes: 1. Total Sales (in US$1,000s) adjusted for inflation to 2012 real dollars. 2. "Chemical fertilizer" comes from the data labeled "Commercial fertilizer, lime and soil conditioners" in the U.S. Census of Agriculture.

Practices (GAP) certification[1] is used as a measure for environmental stewardship, contributing to potential added value of products.

As dependent variables, we used the presence or absence of economic gain (Change in Sales) and program benefit (Program Marketing Value*)* as shown in Table 4. Chi-square tests were used to analyze the link between these two sets of dependent and the following independent variables: different types of products sold as income, market outlets used to sell products, and marketing practices products sold as income.

There are some limitations to this study. The first limitation, among the survey data, is the small number of KyP AOTM farmers (*N*=59) after dropping nonfarmers and missing data. The second survey data limitation is the difference in data collection periods. The KyP member survey data were collected in 2011 while agriculture census data were collected in 2012. While the KyP survey response rate is low and could potentially lead to nonresponse error, the response rate is considered good for a population that tends to be surveyed frequently. Despite these limitations, the methodology is a first attempt to disaggregate state-level data in order to better understand AOTM dynamics,

Table 3. Key Characteristics of the 2011 Kentucky Proud (KyP) Survey Participants (*N*=320), in Comparison to Kentucky AOTM Farmers in the 2012 U.S. Census of Agriculture

		KyP All [a] (*N*=320)	KyP AOTM [a] (*N*=59)	Kentucky AOTM [b] (*N*=8,721)
Percent of Total*		100%	18.4%	11.3%
Farm Size (acres)	Mean	86.8	368.5	401
	SD[1]	159.3	422.3	
Age (years)	Mean	61.5	66.3	56.7
	SD	11.7	14.1	N/A
Education (years)	Mean	15.12	15.14	N/A
	SD	2.48	2.76	
White (yes)	%	95.2%	94.9%	99.6%
Female (yes)	%	44.2%	27.1%	5.4%
Rural County (yes)	%	31.0%	30.5%	N/A
Tobacco Affiliation (yes)	%	45.9%	66.1%	50.1%
GAP Certification (yes)	%	38.4%	38.6%	N/A
Total Sales	Mean	82,033	135,834	145,704
	SD	465,917	80,264	
Direct to Consumer Sales (farms)	%	85.9%	84.7%	12%
Agri-Tourism (farms)	%	16.6%	23.3%	11.4%
Organic Sales (farms)	%	32.2%	32.2%	39.5%
Chemicals-Fertilizer (farms)	%	60.6%	76.3%	31.5%

Source notes: [a] Fisher, 2012. [b] U.S. Census of Agriculture, 2012.
Notes: SD = Standard Deviation; * $p < 0.01$

[1] Along with Good Handling Practices (GHP) Certification, the USDA began implementing GAP in 2002 to ensure that fruits and vegetables are produced, handled, and stored in the safest manner to reduce food safety risks. The GAP/GHP audits are designed to improve agriculture sustainability by encouraging farmers to adopt farming practices that conserve natural resources, improve food quality and safety, as well as working conditions of farm laborers, create new market opportunities for farmers, and improve traceability of their farm products in the supply chain.

making a contribution to previous scholarship and opening up possibility for future research.

Results

Who are AOTM Farmers in Kentucky?

Table 2 summarizes changes in the key characteristics of AOTM farmers in both the U.S. and Kentucky from 2002 to 2012. Over this period, the number of Kentucky AOTM farms increased by 11.3%, while their average farm size and total sales decreased by 18.3% and 10.4%, respectively. Despite the end of the federal tobacco program, the number of AOTM farms in Kentucky selling tobacco crop increased by 7.9%.

Table 2 indicates that Kentucky AOTM differs from the national AOTM in several ways. First, the average size of AOTM farms in Kentucky is less than half the national average. From 2002 to 2012, U.S. AOTM farm numbers decreased by 5.1% while the number of Kentucky AOTM farms increased by 11.6%. In Kentucky, the number of AOTM farms selling tobacco had a small increase of 7.9%, while the number of U.S. AOTM farms selling tobacco decreased by 53.5%. While the number of U.S. AOTM farms selling organic products saw a large increase, of 165.7%, the number of Kentucky AOTM farms selling organic products increased by only 30.8%. Conversely, the area of U.S. AOTM farmland treated with chemical fertilizers had a more sizeable decrease of 45.0%, compared to Kentucky AOTM land (–27.6%).

Who Are AOTM Farmers Participating in the KyP Program?

Table 3 shows the key characteristics of KyP farmers who participated in our survey. For comparison, a column is added to list the relevant data from the 2012 U.S. Census of Agriculture on Kentucky AOTM farmers. There are a number of expected and more interesting differences between KyP AOTM farmers and all KyP farmers; the most significant difference is that a higher share of KyP AOTM farmers has a past or present affiliation with tobacco. This finding reflects the state aim for the KyP program to facilitate the transition of tobacco-dependent farmers into a new agricultural economy. Regardless of the sales categories, the majority of KyP farmers sell direct to consumers, indicating the type of market outlet that the KyP program is promoting for farmers.

As shown in Table 3, in comparisons between the KyP program and the state, a statistically significant difference exists between KyP AOTM farms and the state AOTM farms. A higher percentage of AOTM farms is represented in the KyP program in 2011 (18.4%) than the state average in 2012 (11.3%). Also, the average farm size of KyP AOTM operations (368 acres or 149 hectares) is smaller than the state AOTM farm size (401 acres or 162 ha).

Relatively smaller rates of adoption of "alternative" or "sustainable" farming practices by KyP and state AOTM farmers suggest that they are not effectively capturing price premiums generated from USDA organic or GAP certification. Less than 40% of KyP AOTM farms produce organic products (32.2%) or have GAP certification (38.6%). Compared with 31.5% of Kentucky AOTM farms, 76.3% of KyP AOTM farms use pesticides and herbicides.

Direct-to-consumer sales are the most important high-value, differentiated product practice for KyP AOTM farms. Compared with the state AOTM, a larger proportion of KyP AOTM farms (84.7%) sell directly to consumers. Although the number is small (23.3%), a larger percent of KyP AOTM farms participate in agritourism than the state counterpart.

How Does the KyP Program Affect AOTM?

The next set of findings analyzes the difference between two sets of dependent variables for KyP AOTM farmers and all other KyP farmers as follows:

(a) Dependent variable: Did KyP help to increase your sales?

- Independent Variables: market outlets, farming practices, products sold, and marketing practices

(b) Dependent variable: Is the KyP program valuable in helping to market your business?

- Independent Variables: market outlets,

farming practices, products sold, and marketing practices

As shown in Table 4, compared to all other KyP-participant farmers a higher percentage of KyP AOTM farmers report both an increase in sales (38.6%) and a positive value for the program in marketing their business (77.6%). The mean years of participation were four years for AOTM farmers and three years for all others. The number of years participating in the program has no significant association to whether or not respondents reported an increase in sales.

The next step in the comparison was to identify any distinguishing characteristics between those who indicated benefits from KyP and those who reported otherwise, for both groups. As shown in Table 4, the findings indicate that for both groups, both dependent variables are independent of market outlets used (e.g., direct sales or contract), farming practices (e.g., organic or conventional), and products sold for income (e.g., beef or vegetables/fruits), with no association at significance level of 0.05.

Findings indicate that both outcome variables for both groups are dependent on several marketing practices, with an association less than significance level of 0.05. These marketing practices include using the logo on products and using the logo for other marketing (that is, marketing materials other than the product itself, such as banners or brochures), which represent knowledge and skills developed through the KyP program. Those who reported an increase in sales appear to be those using the logo on their product and on other marketing tools, and who report that their marketing ability has increased due to the program. Members who find value in the program tend to be those who use the logo for other marketing tools, feel their marketing knowledge and ability have increased, and market their products better and more extensively because of the KyP program. Overall, our findings suggest that using the logo for marketing tools other than for the product is a valuable practice for members.

Both groups responded similarly to the questions about how the KyP program benefited them. They seem to enthusiastically embrace the use of the logo on their products and for other marketing. Of note, a higher percentage of AOTM farmers compared to all others feel the program has a positive impact on their business. Overall, an

Table 4. Impact of Kentucky Proud™ on Farmers, 2011 (*N*=320)

	Did KyP help increase sales?		Is KyP program valuable?	
Operational Characteristics	All Others (*N*=261)	AOTM (*N*=59)	All Others (*N*=261)	AOTM (*N*=59)
Yes (count)	71	22	184	45
Yes (%)	**28.1%**	**38.6%**	**72.7%**	**77.6%**
Direct to Consumer Sales	29.3%	35.3%	73.4%	76.5%
Agri-Tourism	37.0%	50.0%	75.0%	80.0%
Organic	33.3%	53.9%	79.3%	76.9%
Chemicals-Fertilizers	28.1%	28.1%	72.1%	71.9%
Use Logo on Products	34.2%***	44.8%*	83.5%***	75.9%
Use Logo for Other Marketing Tools [a]	35.0%**	47.8%**	82.5%***	82.6%**
Increase in Marketing Knowledge	34.9%***	47.6%	90.2%***	90.5%**
Increase in Ability to Market	40.4%***	48.2%*	92.9%***	92.6%***
Market Products Better	40.7%***	47.8%	93.2%***	91.3%***
Market Products More	40.6%***	44.4%	93.7%***	100.0%***

Source: Fisher, 2012. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

[a] May include such marketing tools as websites, brochures, banners, bags, etc.

increase in marketing knowledge, ability, and skills is correlated with member perception of how valuable the KyP program is.

Discussion

Midsize farms in the U.S. have been declining in numbers, and this a shifting farm structure negatively affects the quality of life of farm families and their communities. Could state-sponsored agricultural branding and marketing campaigns be a viable option for AOTM farmers? A label can be used to signify alternative identity and legitimacy, the two main features Mount (2012) cites as necessary for scale development.

Our findings indicate potential opportunities and limitations for the KyP program as a strategy for AOTM. The KyP program is a marketing campaign that has the goals of benefitting farmers and the agricultural sector economically. Our study suggests that as a marketing strategy, the KyP program is indeed serving AOTM. First, KyP has a higher percentage of AOTM farmers participating in the program (18.4%), compared to the percentage of AOTM farmers in the state (11.3%). Second, 77.6% of these farmers find the program to be of value in helping to market their business. The intent of the KyP program is to help farmers differentiate their products by using a label. According to the KyP consumer awareness survey conducted by the KDA in 2010, the logo has received a high percentage (70%) of consumer awareness (Fisher, 2013). The program offers members opportunities through its marketing strategy. The logo and various program services help member farmers lower the cost of marketing their products and businesses. While the program does not have any strict certification process, farmers can save on costs associated with monitoring compliance.

While the KyP program has the potential for differentiating products to help capture price premiums, more than half of KyP AOTM farmers (61.4%) have not yet seen economic gains from the program, even when using the well-recognized logo on their products (44.8%). Who is benefiting from the logo's branding, then? Here lies the limitation of a state branding program for AOTM farmers. As pointed out previously, the KyP Program defines eligible "local" products broadly, to include any agricultural products grown, raised, processed, and/or packaged in Kentucky. This means that purchase of a KyP product does not guarantee direct benefits to Kentucky farmers. For example, a bag of coffee roasted and packaged by a Kentucky-based company in the state can have a "Kentucky Proud" label, with no direct benefits to Kentucky farmers.

With this loose definition of "Kentucky Proud" products, can AOTM farmers count on the label to signal their products as unique from their competitors in order to build identity and promote their legitimacy? Would the inclusion of a state-of-origin percentage requirement in the KDA's KyP definition benefit more AOTM farmers by generating an increase in sales? Should the state incorporate other attributes, such as environmental and social justice indicators, to the state-brand label? These are questions Kentucky and other states should consider when making decisions on future agricultural development in their states. Policymakers can assess their existing state marketing strategies, starting with their branding campaign, because most states already have some type of program in place, such as a logo. In the case of Kentucky, although AOTM farmers find value in the program marketing tools, the knowledge, skills, and abilities gained through the program do not necessarily translate into economic gains for member farmers.

Conclusion

Although our findings show the *potential* of state branding campaigns to help farmers differentiate their products, further research is needed to track the long-term impact of different types of agricultural branding campaigns at multiple levels. Some critical questions to be investigated: How does a given state branding campaign affect different types of farm enterprises? What aspects of the campaign benefit and constrain participating farm enterprises? How does the campaign affect the economic, environmental, and social sustainability of agriculture within the state? An effective longitudinal research effort must be more comprehensive, therefore, by combining the existing research instruments that examine the efficacy of marketing and branding programs on producers, consumers,

and the state economy.

Additionally, we need a systematic comparative analysis of state branding campaigns using the same research instruments to answer the above questions. Such a study will allow us to identify "good practices" in state-sponsored marketing programs and facilitate collaborations between states to further improve the effectiveness of these programs.

This study is our first step in developing research instruments for tracking outcomes for farmers participating in state branding campaigns. We plan to contribute to Kentucky's efforts to monitor and evaluate the KyP program's impact on small-scale and AOTM farmers. Moreover, we hope that this study will help start a conversation among researchers to develop a longitudinal comparative study on state-sponsored branding campaigns and marketing programs in the United States. 

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Appendix A. Survey Questions Used to Analyze Types of Member Farming Practices, Products Sold as Income, and Market Outlets (Kentucky Proud™ Member Survey 2011, *N*=383)

Q1. Do you practice any of the growing methods listed below? (Select one in each row. 0 = No, 1 = Yes) Seed saving Certified organic Organic, not certified Conventional Biodynamic Permaculture Holistic management Cover crops Composting Spray Tillage Irrigation No-till Rotational intensive grazing Grass-feed livestock	*Q2. Do you use any of the items listed below for your operation? (Select one in each row. 0 = No, 1 = Yes)* Herbicides Pesticides Soil amendments Livestock feed purchased off the farm Livestock supplements Antibiotics for livestock Genetically modified seed
Q3. Which farm activities listed below do you count as your farm's income? (Select one each row. 0 = No, 1 = Yes) Tobacco Hay Beef Poultry Swine Horses Dairy Vegetables/Fruits Grains Aquaculture Agri-tourism Other	*Q4. Do you use any of the markets listed below to sell your farm products? (Select one in each row. 0 = No, 1 = Yes)* Contract Industry operation Local grain elevator/wholesaler Farmers market Consumer supported agriculture (CSA) Other direct sales to consumer Direct sales to retail grocer Direct sales to local school Direct sales to local restaurant Other

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Associations between farmers market managers' motivations and market-level Supplemental Nutrition Assistance Program Electronic Benefit Transfer (SNAP/EBT) availability and business vitality

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Abstract

Farmers markets are promoted to improve access to healthy food for low-income consumers by providing affordable produce via Supplemental Nutrition Assistance Program Electronic Benefit Transfer (SNAP/EBT). Having SNAP/EBT at markets also expands revenue opportunities for participating farmers. Market managers play a key role in implementing SNAP/EBT and promoting business opportunities for farmers, yet they are not motivated equally by public health and business goals. There are few studies examining market managers' influence on food access for low-income households and business opportunities for farmers. We examined associations between managers' motivations and (1) food access for low-income households, measured by SNAP/EBT availability, and (2) business vitality, measured by vendor participation. A survey assessing manager motivation, SNAP/EBT availability, and vendor

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participation was sent to all market managers (*N*=271) in North Carolina. Seventy (26%) managers completed the survey. Multiple regression models were used to examine the association between managers' motivations to (1) improve access to healthful food and SNAP/EBT availability, and to (2) support business opportunities and total vendor count, weekly vendor count, and the number of vendors who sell only what they produce ("producer-only"). There was no significant association between food access motivation and SNAP/EBT availability, or business motivation and total and weekly vendor count. A high business motivation score was positively associated with having 13 more producer-only vendors at the market. Manager pay was positively correlated with vendor participation, including total vendor, weekly, and producer-only vendor counts. Our results suggest that public health interventions should emphasize the business opportunities offered by SNAP/EBT at farmers' markets, ultimately leveraging market managers' business goals to encourage SNAP/EBT implementation.

Keywords
Electronic benefit transfer, farmers market, farmers market managers, Supplemental Nutrition Assistance Program, SNAP/EBT

Introduction and Review of SNAP/EBT and Business Opportunities at Farmers Markets

In the United States, policy and environmental change strategies to increase fruit and vegetable access and consumption are promoted to reduce obesity and prevent chronic disease (Centers for Disease Control [CDC], 2010; McCormack, Laska, Larson, & Story, 2010; Ogden, Carroll, Kit, & Flegal, 2014; Ward & Schiller, 2013). Among the CDC's recommended community-level strategies to increase fruit and vegetable access is the introduction of farmers markets (herein referred to as "markets") in communities where fresh produce otherwise is not available (Khan et al., 2009). Farmers markets require less capital than most retail food outlets, and their adaptability to different spaces facilitates their placement in communities where supermarkets do not exist (Briggs, Fisher, Lott, Miller, & Tessman, 2010).

Simply placing a market in a community does not guarantee that lower-income consumers, who may also be those with highest chronic disease risk, are the ones who will use it to purchase healthy foods (CDC, 2010). There are many barriers to market access, including lack of Supplemental Nutrition Assistance Program/ Electronic Benefit Transfer (SNAP/EBT)[1] capability, logistical barriers (e.g., hours of business operation not coinciding with preferred shopping times, inconvenient locations, lack of transportation to markets), and cultural barriers (e.g., feeling like an outsider) (Colasanti, Conner, & Smalley, 2010; Grace, Grace, Becker, & Lyden, 2007; Suarez-Balcazar, Martinez, Cox, & Jayraj, 2006). SNAP/EBT availability is one of the most important facilitators of market use by low-income consumers (Briggs et al., 2010). The availability at markets of SNAP/EBT creates a win-win situation wherein low-income consumers can afford farmers market produce, and participating farmers are exposed to a broader customer base. Despite the potential community health and economic benefits of the SNAP/EBT program, relatively few markets operate it. In 2011, only 35% of markets in the U.S. offered SNAP/EBT (King, Dixit-Joshi, MacAllum, Steketee, & Leard, 2014). An evaluation of North Carolina's farmers markets found that there are fewer markets with SNAP/EBT access in lower-income and minority counties, highlighting the importance a better understanding of the barriers and facilitators to offering SNAP/EBT at markets, particularly in underserved communities (Bullock et al., in press).

Technical and financial support for SNAP/EBT placement at markets is widespread and growing. For example, the North Carolina Community Transformation Grant (NC CTG) farmers market initiative helped markets overcome the cost barrier to operating SNAP/EBT by

[1] The Supplemental Nutrition Assistance Program is a federally funded nutrition assistance program for low-income individuals and households in the United States. SNAP Electronic Benefit Transfer (SNAP/EBT) is a program that allows SNAP recipients to authorize the transfer of their SNAP benefits electronically to pay for eligible food products.

providing technical assistance for SNAP/EBT implementation at markets (Jones & Bhatia, 2011; Pitts, Acheson, Ward, Wu, McGuirt, Bullock, & Ammerman, 2015). There remains, however, limited formative research on management-related barriers to SNAP/EBT operations at farmers markets (Cole, McNees, Kinney, Fisher, and Krieger, 2013). Managers are "the building blocks of any successful EBT program" (Briggs et al., 2010, p. 8). Managers also play critical roles in encouraging business vitality at their markets (as assessed for example by customer counts, vendor participation, and sales) (Stephenson, Lev, & Brewer, 2007). While all markets are established with the goal of selling food directly to consumers, there is variability in managers' backgrounds and motivations, and consequently, market operations. A mismatch of public health funding goals and market management could undermine significant public investment and derail strategic opportunities to improve public health and business outcomes at farmers markets.

To better understand how managers influence (1) healthy food access for low-income households and (2) business vitality, we examined associations between managers' motivations in their roles, and (Aim 1) food access for low-income households as measured by SNAP/EBT availability, and (Aim 2) business vitality, as measured by total vendor count, weekly vendor count, and the number of vendors who sell only products they produce (herein referred to as "producer-only"), the latter being a measure of a market's emphasis on supporting locally based agriculture (Oberholtzer & Grow, 2003). We hypothesized that managers motivated to improve community healthy food access would be more likely to have SNAP/EBT available at their markets compared to managers less motivated to improve community food access. We then examined whether managers more motivated by providing business opportunities had greater vendor participation compared to those who were less motivated to provide business opportunities, with the expectation that managers motivated by business would report more vital markets. Answers to these questions could support ongoing investment in market development and enhancements, and provide new insight into the managerial characteristics important for simultaneously achieving public health and business goals at farmers markets.

Applied Research Methods

Study Setting

This study took place in North Carolina (NC). In 2011, NC received Community Transformation Grant (CTG) funds, which were provided by the federal Affordable Care Act's Prevention and Public Health Fund. Through the CTG program, the CDC supported awardees across the U.S. as they developed and implemented chronic-disease prevention programs. Using these funds NC created new markets and promoted enhancements to existing markets, such as SNAP/EBT and transportation for low-income households (Pitts et al., 2013). The current study was part of the NC CTG farmers market evaluation and involved a quantitative survey of a cross-section of NC farmers market managers. All elements of this study were approved by the East Tennessee State University Institutional Review Board, and all participants provided informed consent.

The survey used for this study was informed by a qualitative study described in-depth elsewhere (Ward, 2014) and summarized here to provide context. In spring 2014 focus groups and in-depth interviews were conducted among market managers and farmers participating in markets in southwest Virginia, east Tennessee (TN) and western North Carolina, to gather their perspectives on market operations, the roles and motivations of managers, and managers' influences on market outcomes. We aimed to a hold two focus groups with eight farmers market managers in the region; however, due to scheduling conflicts and geographic spread of the managers, we conducted three focus groups and one in-depth interview. Two focus groups were held at a regional farmers market association meeting in Bristol, TN, in January 2014, with two managers participating in the first focus group, and three managers participating in the second. In February 2014, a third focus group was held with two NC-based farmers market managers, and an in-depth interview was conducted with the eighth manager in a public setting in Asheville, NC.

In-depth telephone interviews were conducted with farmers participating in markets in the same regions from February to March 2014. Eight farmers participated in the phone interviews, with interview length ranging from 10 to 90 minutes.

The resulting qualitative data were analyzed to develop survey items assessing what motivated managers in their roles. Further details on the data analysis and piloting of the survey items are described elsewhere (Ward, 2014). The items we developed were then combined with items assessing farmers market business vitality from the USDA 2009 Farmers Market Manager Survey (Ragland & Tropp, 2009).

The target population for the quantitative survey was NC farmers market managers identified in the North Carolina Fruit and Vegetable Outlet Inventory (FVOI). The FVOI is a directory of all fruit and vegetable markets in the state, developed as part of the NC CTG evaluation. Local health department staff gather and update the data yearly. Because this was a pilot study, we did not conduct a power analysis, but we attempted to survey all farmers market managers in NC who were included in the FVOI. To obtain the managers' contact information, all outlets categorized as "farmers markets" and their corresponding managers and contact information (i.e., email addresses, phone numbers, and mailing addresses) were queried. This search yielded 271 managers, who were then contacted by e-mail, or telephone if their e-mail address was not available, and invited to participate in the web-based survey (Survey Monkey, Palo Alto, California). Between May 14 and May 25, 2014, managers with an e-mail address received two reminder e-mails, and managers without an e-mail address received at least one reminder phone call. To increase participation, a second wave of data collection was conducted from July 22 to August 15, 2014. This involved bulk postal mailing of 200 surveys to managers who did not respond in the first wave of data collection. Participants were provided with the option of completing a hard copy of the survey and returning it in a prepaid envelope, or completing the survey online. All respondents were given US$10 as an incentive upon survey completion.

Community Food Access and Business Motivation

The two independent variables were dichotomous: (1) high or low community food access motivation, and (2) high or low business motivation. These categorizations were not mutually exclusive.

To develop the food access motivation variable, participants were asked: "Which aspects of your job as a farmers market manager do you believe to be MOST important?" Participants were asked to rank the list of six aspects of their roles as managers in order of importance (from 1 as most important to 6 as least important) (Table 1). If participants ranked "making healthy food more

Table 1. Distribution of Survey Items Used To Create Binary Food Access and Business Motivation Categorization Among North Carolina Farmers Market Managers (*n* ranged from 63 to 67)

Food access categorization, *n*=63		***n* (%)**		
Low food access motivation		25 (39.7)		
High food access motivation		38 (60.3)		
Item responses used to create categorization	**n**	**Mean (SD)**	**Variance**	**Range**
Role: Making food more affordable [a]	59	3.47 (1.39)	1.94	1–6
Role: Making food more accessible [a]	63	4.36 (1.43)	2.04	1–6
Business motivation categorization, *n*=67		**N (%)**		
Low business motivation		19 (28.4)		
High business motivation		48 (71.6)		
Item responses used to create categorization	**n**	**Mean (SD)**	**Variance**	**Range**
Role: Supporting local agriculture	63	4.83 (1.23)	1.50	2–6
Role: Supporting local artisans	64	2.20 (1.22)	1.49	1–5
Role: Supporting the local economy in general	63	3.19 (1.67)	2.80	1–6

n=sample size; SD=standard deviation
[a] Possible response range 1-6 (1-least important, 6-most important)

available in my community" or "making food more accessible in my community" in one of the top two most important roles, they were categorized as "high food access motivation." Thirty-eight (60%) had high food access motivation, and while the rest had low food access motivation.

To develop the business motivation variable, participants were categorized as having "high business motivation" if they ranked "supporting local agriculture," "supporting business in general," or "supporting local artisans" as one of their top 2 most important roles. The term "local" was not defined for participants, and thus managers were given freedom to interpret the term based upon their own experience. Forty-eight (72%) had high business motivation, and the rest had low business motivation.

SNAP/EBT Availability

The dependent variable in the model examining food access motivation was SNAP/EBT availability at the market. To measure SNAP/EBT availability, managers were asked: "In 2013, was SNAP/EBT handled through a market-wide program? For example, did the market operate SNAP/EBT centrally (Yes or No)?"

Business Vitality

The dependent variables in the model examining business motivation were total vendor count, weekly vendor count, and producer-only vendor count. Total vendor count was a continuous variable developed from the response to the question "How many vendors participated at your market in 2013?" Weekly vendor count was a continuous variable developed from the response to the question "On average, how many vendors participated at your market each week in 2013?" Producer-only vendor count was a continuous variable developed from the response to the question "In 2013, how many vendors at your market only sold farm products they produced themselves?" These items were from the USDA 2009 Farmers Market Manager Survey (Ragland & Tropp, 2009).

Covariates

Covariates were selected based on characteristics of farmers market managers and markets that were hypothesized to influence market outcomes (SNAP/EBT availability and business vitality) (Stephenson et al., 2007). Manager characteristics included: whether the manager was paid to manage the market (Yes or No), the manager's age (in years), and the manager's years of experience managing the market. Market characteristics included: the number of years in operation (including 2014), and the number of volunteers who work at the market (including the respondent, if a volunteer).

Data Analysis

Data were analyzed in SPSS version 21 (SPSS IBM, New York). Descriptive statistics were used to summarize participant and market characteristics. Binary logistic regression was used to examine the association between the likelihood that participants have SNAP/EBT at their farmers markets (dependent variable) and their community food access motivation (independent variable, high or low) (Model 1). Backwards selection was used to find the most parsimonious models. Models were adjusted for manager characteristics (age, pay status, and years managing the market, Model 2) and further adjusted for market characteristics (volunteers and years in operation, Model 3). A final, adjusted model retained only the covariates that were significantly associated with the dependent variable ($p<.05$) (Model 4).

Separate, crude (Model 1) multiple linear regression models were used to examine associations between continuous business vitality measures and the dichotomous business motivation (independent variable, high or low). These models were also adjusted for manager characteristics (age, pay status, and years managing the market, Model 2) and further adjusted for market characteristics (volunteers and years in operation, Model 3). Final, adjusted models retained only the covariates that were significantly associated with the dependent variable ($p<.05$) (Model 4). Participants with missing data for either the food access motivation or business motivation scores were excluded from regression analysis.

Results

Eighty (80) managers responded to the survey, including three duplicate responses that were

removed. Seventy (70) managers responded beyond the first two questions and were thus included for analysis (26% response rate) (Table 2). The average participant age was 48 years (range: 22–88 years). The majority of managers were paid to operate their markets (59%) and had an average of 5 years (range: 1–20 years) of experience managing the market. The average market had operated for 11 years (range: 1–41 years), and had an average of 8 volunteers (range: 0–300 volunteers). Markets had an average of 31 vendors in 2013 (range: 1–150 vendors), 19 vendors weekly (range: 1–65 vendors), and 17 producer-only vendors per season (range: 0–125 vendors). An average of 353 (range: 10–3,000 customers) customers visited the markets each week. Thirteen participants (19%) reported SNAP/EBT availability at their markets.

For the first aim, the association between community food access motivation and SNAP/EBT availability was not significant in the crude or adjusted models, suggesting that there was no association between community food access motivation and SNAP/EBT availability (Table 3). The number of years of operation was significantly associated with SNAP/EBT availability, such that markets that had been in operation for a longer time were more likely to have SNAP/EBT available (Model 3: OR 1.12, SE .04).

For the second aim, the association between business motivation and total vendor count and weekly vendor count was not statistically significant in the crude and adjusted models (Table 4). The association between business motivation and producer-only vendor count, however, was significant in the crude model (Model 1: β 13.05, SE 5.67) and when adjusted for manager characteristics (Model 2: β 12.93, SE 5.67) and manager pay (Model 4: β 12.55, SE 5.45). Having a high business motivation score was significantly associated with an average increase of 13 producer-only vendors per season. In addition, manager pay status was significantly associated with the three business outcomes of interest (total vendor count, vendors per week, and producer-only vendor count), such that markets with paid managers had better business outcomes compared to markets with nonpaid (volunteer) managers.

Discussion

Managers' motivations to improve access to healthful foods in their communities were not associated with SNAP/EBT availability at their markets. This suggests that the relationship between being motivated by community food access issues and providing SNAP/EBT is not as straightforward as was initially hypothesized. There are a number of necessary steps between being motivated to mitigate

Table 2. Characteristics of North Carolina Farmers Market Managers and the Markets They Manage, *n*=70

	n	Mean (SD)	Range
Manager characteristics			
Age (years)	67	47.8 (15.0)	22–88
Years managing the market	68	4.9 (4.2)	1–20
Paid; *n* (%)	69	41 (59.4)	
Market characteristics			
Volunteers (number)	63	7.7 (37.6)	0–300
Years in operation	67	10.9 (9.8)	1–41
Presence of SNAP/EBT; *n* (%)	67	13 (19.4)	
Presence of vendors who operate SNAP/EBT; n (%)	68	8 (11.6)	
Value of market SNAP/EBT sales, 2013 (in US$)	12	1958 (3107)	0–8000
SNAP/EBT customer count, 2013	10	131.3 (277.3)	0–900
Total number of vendors, 2013	69	30.9 (27.1)	3–150
Average number of vendors per week, 2013	69	19.4 (15.9)	2–65
Number of producer-only[a] vendors, 2013	67	17.5 (20.9)	0–125
Average number of customers per week, 2013	54	358.9 (512.5)	10–3000

n=sample size; SD=standard deviation
[a] Producer-only is defined as vendors having produced food or farm products themselves.

food access barriers in the community and actually implementing SNAP/EBT. Market finances, manager pay, manpower, vendor participation, and the community context are just several of many factors that contribute to the introduction of SNAP/EBT in farmers markets (Appalachian Sustainable Agriculture Project [ASAP] Local Food Research Center, 2012). For example, a recent evaluation of the SNAP/EBT program in 10 Michigan farmers markets found that SNAP/EBT availability increased self-reported fruit and vegetable consumption among SNAP recipients, and participating managers were positive and supportive of the program. However, only 29% of participating vendors believed the SNAP/EBT was successful, and only 13% reported they would be willing to pay to continue participating in the SNAP/EBT program at their market (Krokowski, 2014).

Table 3. Association Between North Carolina Farmers Market Managers' Food Access and Business Motivation Scores and Supplemental Nutrition Assistance Program Electronic Benefit Transfer (SNAP/EBT) Availability and Business Vitality (*n* ranges from 54 to 66, depending on the model)

Model	*n*	OR	SE	*P*
Regression of SNAP/EBT Availability on Food Access Motivation Score Among North Carolina Farmers Market Managers				
Model 1[a]	62	1.33	0.68	0.67
Model 2[b]	60	1.57	0.69	0.51
Model 3[c]	54	2.08	0.87	0.40
Model 4[d]	60	1.89	0.78	0.41
Regression of Total Vendor Count on Business Motivation Score Among North Carolina Farmers Market Managers				
Model 1[a]	64	11.76	7.31	0.11
Model 2[b]	62	12.79	6.89	0.07
Model 3[c]	54	10.78	7.91	0.18
Model 4[e]	65	11.18	6.67	0.09
Regression of Average Number of Vendors per Week on Business Motivation Score Among North Carolina Farmers Market Managers				
Model 1[a]	66	6.92	4.30	0.11
Model 2[b]	64	6.82	3.95	0.09
Model 3[c]	56	4.02	4.33	0.36
Model 4[f]	64	5.82	3.82	0.13
Regression of Local Vendor Count on Business Motivation Score Among North Carolina Farmers Market Managers				
Model 1[a]	64	13.05	5.67	0.03*
Model 2[b]	62	12.93	5.67	0.03*
Model 3[c]	54	11.41	6.62	0.09
Model 4[e]	64	12.55	5.45	0.03*

n = sample size; OR = odds ratio; β = beta coefficient; SE = standard error, *P* = *p*-value
[a] Unadjusted model
[b] Adjusted for manager characteristics (manager's age, years managing the market, and manager pay status (yes/no; yes is referent category)
[c] Adjusted for market characteristics (number of volunteers, years in operation)
[d] Adjusted for years in operation
[e] Adjusted for manager pay status (yes/no; yes is referent category)
[f] Adjusted for manager pay status and years in operation
* Statistically significant at $p < .05$

Markets that had been established for more years were more likely to have SNAP/EBT available. This may be a result of older markets having more resources, such as established management with the time and experience to oversee a SNAP/EBT program. Managers of older markets may also have a better understanding of the demand for SNAP/EBT in their communities and among their vendors, and thus be more likely to introduce the program if they think it will be successful.

The relationships between business motivation and total and average weekly vendor count were not significant. However, having a high business motivation score was significantly associated with an increase of 13 producer-only vendors per season. This finding indicates that managers who are motivated to support business may facilitate greater opportunities for producer-only vendors through their market compared to managers with a low business motivation. It may also be that managers with higher business motivation scores are also

more likely to know and accurately report market vitality data like vendor participation. Market managers who were paid had greater vendor participation than unpaid managers. This reflects findings from a study of farmers market failure in Oregon, which found a positive association between manager pay and administrative revenue generated from vendor fees at markets (Stephenson, Lev, & Brewer, 2006). Managers who are paid are able to invest more time into operating the market, and therefore are more likely to have markets that attract customers and vendors. Established markets are also more likely to have the funds to pay their managers compared to newer markets.

Managers who are not highly motivated by promoting food access but are motivated by promoting local business opportunities could be motivated to offer SNAP/EBT if they become more knowledgeable about the economic benefits of participation. In 2010, farmers market sales represented only 0.01% of all SNAP spending (McNutt, Price, and Dixit-Joshi, 2012). The potential customer base and sales potential for markets that expand their SNAP/EBT base is significant.

A key limitation of this study was the small sample size, and thus the study is not generalizable to all markets in North Carolina. Multiple attempts were made to contact managers directly using e-mail, telephone calls, and paper survey mailings. The response rate of 26% may be due to incomplete, outdated (due to manager turnover, changes in phone numbers, etc.), or inaccurate manager contact information provided in the FVOI, or market managers being busy during the market season. These factors may have introduced response bias whereby managers who were more likely to be involved or familiar with the NC CTG were also more likely to have responded to the survey. Another barrier to recruitment may have been the university's requirement of participants to provide their Social Security number to receive the incentive payment, which was met with reticence by some managers. The FVOI does not include data on market managers apart from contact information, and therefore we were limited in our ability to compare respondents to nonrespondents. Future studies could aim to increase the sample size by removing the Social Security number requirement for payment and recruiting managers during the market's off-season. Recruiting and surveying managers in person may also improve the sample size; however, this method was cost-prohibitive for the current study.

Another limitation was the poor reliability of certain indicators of SNAP/EBT participation and business vitality. Specifically, vendor and SNAP/EBT sales and SNAP/EBT customer counts would have been important outcomes to examine for this study, but they tend to be unreliable as most managers do not seem to document them. It will be important to develop a standard method for collecting these important indicators of market reach and impact, as these metrics could be useful for longitudinal evaluations of farmers market interventions. For example, there is ongoing development of a mobile device application so that various farmers market evaluation metrics can be entered directly into a mobile device (such as an iPhone) and uploaded into a standardized database (Freedman, 2014).

Conclusion

Farmers markets are uniquely positioned to meet both the healthy food access needs and economic opportunities of their communities. Currently, there is a gap in the understanding of how farmers market managers can influence these areas of opportunity. This study serves as a starting point for elucidating specific managerial characteristics that could converge with other important facilitators to maximize the potential of farmers markets to simultaneously improve food access for customers and business opportunities for farmers. Future studies with a larger sample of managers should aim to clarify which characteristics influence these opportunities. As our study suggests, this could lend more insight into how managers' business motivation and pay influence vendor participation at farmers markets. We did not find a relationship between managers' motivations and SNAP/EBT availability. Additional work is needed to identify barriers to offering SNAP/EBT at farmers markets, particularly among managers who perceive food access issues as being important, but do not operate markets with SNAP/EBT. Addressing managers' motivations, whether they are business-

oriented, healthy food access–oriented, or both, will be critical to improving the food environment through farmers markets. 

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Maximize impact, minimize resources: Locating food deserts and increasing SNAP spending on fruits and vegetables

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Abstract

Many community organizations addressing aspects of food insecurity have not traditionally participated in food systems development and are often not familiar with the populations most affected by food insecurity. Needs assessments are commonly used to better understand community issues and target populations, but can they be lengthy processes that often require significant resources to facilitate. We present a case study of Duval County, Florida, in which we develop an assessment procedure for identifying food-insecure communities and determining the specific locations

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in which food-security programming has the greatest potential to increase local fruit and vegetable purchasing by SNAP households. This assessment draws on existing databases, thus reducing the resources required to conduct the analysis and allowing organizations to implement programming in a timely manner in areas where there is potential to see the greatest gains in reducing food insecurity.

Keywords
food insecurity, food systems, food deserts, needs assessments

Introduction

Communities are increasingly turning their attention to local and regional food systems as both an economic development strategy and a potential solution to growing food insecurity. The U.S. Department of Agriculture's *Know Your Farmer, Know Your Food Compass* highlights thousands of programs across the country that focus on some aspect of local and regional food systems (USDA, n.d.). Project objectives usually include improving physical and/or economic access to healthy, nutritious food for food-insecure populations and/or creating additional market opportunities for farmers. Specific projects are often part of a larger strategy aimed at improving the local economy through local and regional food systems development.

Food systems development is an inherently interdisciplinary approach to addressing a variety of community issues, such as health outcomes, access to food, unemployment, and protecting green space, for example. Participating in or leading this type of programming can be challenging for organizations accustomed to more limited roles as subject matter specialists in a more narrowly defined field (Conglose, 2000). Organizations must work together and maximize each other's skills and expertise to develop crosscutting programming to address community food issues (Hamm & Bellows, 2003). Project collaborators can include but are not limited to farmer organizations, local government, health departments, school boards, financial institutions, and environmental conservation organizations. These organizations may have less expertise or familiarity with food systems issues or the population they are trying to serve. For this reason, project teams will often rely on some form of a needs assessment to learn more about the problem and the communities affected by these kinds of broad social issues (Pothukuchi, 2004). Needs assessments are typically used to identify which communities an issue affects and how they are affected (Caravella, 2006; Raison, 2014). However, field-based needs assessment procedures can require a substantial commitment of resources by project collaborators.

In this case study, we present an assessment procedure using existing data resources that we developed for identifying food-insecure communities with the most potential for local fruit and vegetable sales to SNAP households. The proposed assessment procedure requires less effort and resources than what may be required to facilitate a complete needs assessment, and may be sufficient for many local service providers who want to identify the geographical areas that offer the greatest opportunity for improving food security or accomplishing other food systems development goals. This assessment is also useful for multidisciplinary project teams composed of individuals and organizations with varying expertise regarding food systems development and the communities the projects aim to serve.

Literature Review

It is not uncommon for community food systems projects to involve a variety of partners. Project teams are generally composed of professionals representing community organizations, private businesses, and local government. Unlike many traditional community initiatives that are implemented by a single organization, each individual on the project team is employed full-time and participating as a project *collaborator* or volunteer; therefore, working on that particular food systems project is rarely his or her primary professional responsibility. This becomes a challenge for project teams because the individuals on the team do not have much time in their professional roles to devote to the project. In addition, individual organizations represented on the project team usually have limited or no financial resources

dedicated to the initiative. As a result, project teams become charged with the task of facilitating community initiatives that accomplish specific objectives with limited resources.

Big Goals, Limited Resources

Collecting data that are representative of a community can require a lot of effort on the part of project collaborators; with limited human and financial resources, this can depend heavily on volunteers. A common approach in facilitating community food assessments that seek to map local food venues and determine the availability of food is to canvas entire neighborhoods, communities, or in some cases counties or regions (Palmer, Smith, Haering, & McKenzie, 2009). This type of assessment requires an extensive amount of time and often depends on volunteers. After the data have been collected, analyzing the results requires research expertise and can also be rather time-consuming, depending on the amount and type of data collected. Pothukuchi (2004) advises community groups to seek assistance from professional planners to ensure that the information collected is valid and useful for community development and policy decision-makers, which increases the need for financial resources. Salt Lake City, Utah, for example, hired a consulting firm to facilitate a local community food assessment that would be the basis for a long-range plan addressing identified community needs and interests (Carbaugh Associates, Inc., & VODA Landscape + Planning, 2013). They created original research instruments that assessed multiple aspects of Salt Lake City's food system within a 250-mile (400-kilometer) radius of the city. Initiatives such as these require enormous resources even when implemented on a smaller scale at the community or neighborhood level. Similar projects addressing food access and availability can take a year or more, require substantial personnel support, rely on federal grant funding, and use multiple research methods that necessitate research expertise to analyze (Bleasdale, Crouch & Harlan, 2011; Crouch, Phoenix Revitalization Corporation, & Harlan, 2011; Liese, Weis, Pluto, Smith, & Lawson, 2007; Pothukuchi, 2004; Raja, Ma, and Yadav, 2008).

Existing Measures

Currently, there are few options for project teams operating on limited human and financial resources and lacking research methods expertise. The USDA has developed several assessment toolkits to explore community- or household-level food indicators, removing the need to create original research measures. However, many of these assessments still require extensive time to collect data or expertise to analyze the results. For example, the Current Population Survey Food Security Supplement assesses household food expenditures, food spending need, food program participation, food sufficiency, and household ways of coping with food insecurity (USDA, ERS, n.d.-a). This survey consists of five sections totaling over 80 items. Data are collected monthly by the Census Bureau and compiled into a yearly report. This database can be useful for comparing individual communities to national trends; however, collecting this data independently on a local scale can be a costly and time-consuming process (Bickel, Nord, Price, Hamilton, & Cook, 2000). The USDA's Community Food Security Assessment Toolkit is another useful tool when local service providers want to facilitate a comprehensive needs assessment (Cohen, Andrews, & Kantor, 2002). The toolkit includes established quantitative and qualitative instruments for assessing household food security, food resource accessibility, availability and affordability of food, and community food production resources. Overall, this is an excellent resource for local organizations that want to facilitate an in-depth analysis of various aspects of local food systems. Organizations can also benefit from an in-depth analysis such as this one because the process can enhance community capacity for addressing food issues by building a cadre of individuals and organizations to address the problem, which is a necessary step for successful community based projects. The efficacy of existing instruments like these is not under scrutiny. The authors recognize that several useful techniques for facilitating community food assessments already exist. However, all of these techniques require some combination of time, money, and expertise that is often limited or unavailable to organizations or multi-organizational efforts addressing community food needs.

New Instrument Development

In addition, existing instruments do not always capture the data needed for a specific project, forcing project teams to modify existing instruments or create their own. Liese et al. (2007) developed an original survey and interview instrument for their assessment of food availability and price. Van Hoesen, Bunkley & Currier (2012) revised an existing methodology for mapping food sources available to rural communities and evaluating the quality and diversity of food available through each source using geographic information systems (GIS). Meenar & Hoover (2012) also used GIS analytic methods to examine how urban agriculture affects food insecurity in Philadelphia using preexisting data they purchased from five different sources. The project team also developed original survey and interview instruments and completed 35 field visits to record field observations. Other disciplines have developed assessment procedures designed to reduce the human and fiscal burden on project teams that could serve as useful models for food systems work.

Examples from Other Disciplines

Rapid rural appraisal (RRA) is one of the more widely utilized and adapted rapid assessment techniques. RRA was originally developed as a way to assess rural conditions, specifically agricultural and environmental conditions, when personnel, finances, and time are limited (Carruthers & Chambers, 1981). Since its inception in the 1970s the idea of rapid assessment procedures has been adapted for many uses, including assessment of the ecological condition of wetlands, management of protected areas, mortality risk, potato seed systems, development of local knowledge networks, and identification of agricultural research priorities, to name a few (Ervin, 2003; Fennessy, Jacobs, & Kentula, 2007; Ilangantileke, Kadian, Hossain, Hossain, Jayasinghe, & Mahmood, 2001; Ison & Ampt, 1992; van Bodegom et al., 2009; Zanetell & Knuth, 2002). The specific steps taken to complete a rapid assessment vary with each project, but in general the approach involves quickly collecting data that can be used to guide project objectives. For example, the Urban Management Programme (UMP) developed the rapid urban environmental assessment approach in response to the need for "urban environmental research that is comprehensive, multisectoral, relatively short term, and consistent between cities" (Leitmann, 1994, p. 9). Likewise, the rapid impact assessment matrix (RIAM) was developed as a tool for environmental planners for the purpose of streamlining the organization, analysis, and presentation of environmental impact assessments (Pastakia & Jensen, 1998).

Rapid assessment has been criticized by some for the degree to which results are reliable and valid. Van Bodegom et al. (2009) evaluated the validity of a rapid assessment technique for identifying mortality risk based on socioeconomic data. They concluded that the rapid appraisal method was not only valid, but at times more accurate than more in-depth and cumbersome methods. Other common names for rapid assessment techniques include rapid epidemiological assessments and rapid assessment procedures (Manderson & Aaby, 1992). McNall and Foster-Fishman (2007) review commonalities and differences between rapid evaluation and assessment techniques and offer suggestions for facilitating rapid assessments that are both feasible and credible, which we have tried to apply in this case study. Among their recommendations is establishing clear objectives for the rapid assessment so that appropriate data are collected from appropriate sources and the process is not slowed by altering which data are needed and from whom.

Developing an Assessment Procedure for Food Security Projects

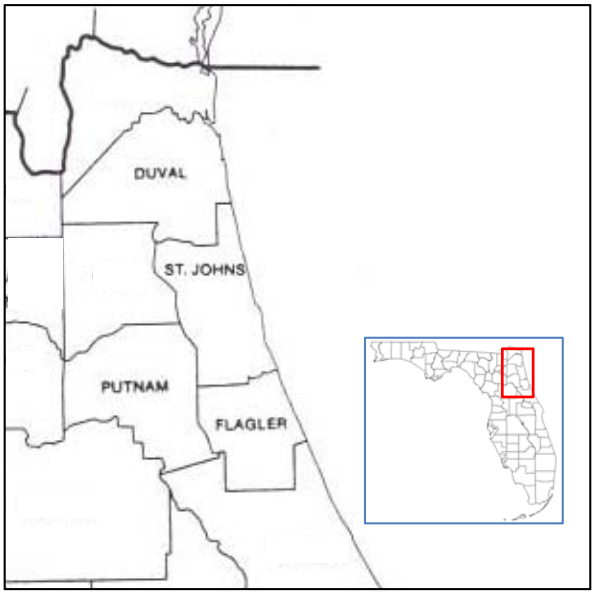
Reducing food insecurity is a common objective for many community food projects. Our rapid assessment technique is useful for identifying food-insecure communities with the highest potential for increasing local fresh fruit and vegetable sales to SNAP households. We define food security based on community-level indicators rather than household-level indicators, such as those used in the Community Food Security Assessment, in order to reduce the amount of data needed and identify communities or neighborhoods where community food programming would be most effective. We therefore choose to use food deserts as an indicator of food security in this assessment

procedure. The link between food deserts and food insecurity is widely recognized (Apparico, Cloutier, & Shearmur, 2007; Hendrickson, Smith, & Eikenberry, 2006; Shaw, 2006; Ver Ploeg, et al., 2009; Walker, Keane, & Burke, 2010; Wright Morton, Bitto, Oakland, & Sand, 2005). The U.S. Centers for Disease Control and Prevention (CDC) define a food desert as an area that lacks outlets for access to affordable fruits, vegetables, whole grains, low-fat milk, and other foods that make up the full range of a healthy diet (CDC, 2012). It is well established in the literature that income, distance to a food store, vehicle ownership, and the availability of public transportation are some of the factors that can affect access and availability of food (Dutko, Ver Ploeg, & Farrigan, 2012). These same indicators are used to identify food deserts.

Case Selection

This assessment procedure was developed for use in the three northeast Florida counties that make up the Tri-County Agricultural Area (TCAA) along with an additional county. The TCAA comprises Putnam, Flagler, and St. Johns counties. The city of Jacksonville, Florida, lies in neighboring Duval County. Duval County was included in the project due to the regional economic impact of Jacksonville in the TCAA (Figure 1).

Figure 1. Case Study Area Consisting of Duval, St. Johns, Putnam, and Flagler Counties, Florida



We selected this case because of the enthusiasm expressed by local organizations, government, and extension for regional food systems development with a particular interest in reducing food insecurity, and the existence of a community food systems collaborative group already working in this area. The researchers have collaborated with a variety of community groups in northeast Florida on multiple other food projects as well, including assessing the availability of transportation to grocery stores, establishing a new farmer cooperative, and exploring the feasibility of a mobile farmers market. Project collaborators include economic development councils, a new farmer cooperative, county extension services, county and city governments, nonprofit organizations, and financial institutions. This group works together frequently to accomplish the overall goals of reducing food insecurity in northeast Florida and expanding marketing opportunities for local farmers. As part of their ongoing efforts the project team wanted to facilitate programming to target SNAP recipients in particular. The project team turned to the authors of this case study to assist in accomplishing the objectives of this assessment.

Like many community food systems initiatives, there were no individuals dedicated full-time to developing this assessment procedure. All but one of the individuals associated with the development of this assessment procedure are employed by the University of Florida's Institute of Food and Agricultural Sciences and are expected to assist the communities we serve in addressing social issues as part of our permanent job descriptions. There was also no specified budget for this case study, so it was important to accomplish the stated objectives efficiently. We did not want to engage in original instrument development due to time and cost limitations, so we chose to focus on gathering as much information as possible using existing data resources.

Assessment Development

This assessment procedure was developed based on the specific goals and objectives of the community food group in northeast Florida described above. The goals of this ongoing collaborative

effort are to reduce food insecurity in four northeast Florida counties and expand marketing opportunities for local farmers. The assessment procedure developed in this case study provides information to the project team that will facilitate programming to move the project team closer to accomplishing their overall project goals. The specific objectives of this assessment procedure are to: (1) identify food insecure communities; (2) estimate the value of Supplemental Nutrition Assistance Program (SNAP) benefits available in the identified communities; and (3) determine the communities with the most potential for local fresh fruit and vegetable sales to SNAP households. We followed the six steps presented below to accomplish these objectives.

Step One: Determine Indicators and Level of Measurement

First, we identified available data resources and evaluated their suitability for achieving the stated project objectives. We were interested specifically in identifying publically available resources in which the data was tied to a specific geographic location. It was imperative we could link the data to a specific geographic location so we could identify the area that presented the greatest opportunity for increasing SNAP spending on local fruits and vegetables. We therefore focused on geographic databases that provided information on food insecurity indicators at the community or neighborhood levels.

We selected the USDA Food Access Research Atlas (FARA) database to accomplish our first objective, identifying food insecure areas. The FARA identifies food deserts at the census-tract level based on 2010 census data using a number of indicators and at various levels of measurement. The available indicators are low-income, low access to supermarkets, low vehicle access, and high group quarters, each of which is defined below. The user can identify all census tracts that meet only one of the criteria or select a combination of indicators. The FARA automatically classifies census tracts that are both low-income and low access as a food desert. The FARA defines low-income tracts as those census tracts that (1) have a poverty rate of 20 percent or more, or (2) a median family income less than 80 percent of the statewide median family income, or (3) a median family income less than the surrounding metropolitan area for census tracts in metropolitan areas. Individual households are classified as low income if total family income falls below 200 percent of the federal poverty threshold. The federal poverty threshold is dependent on the size of the household.

The definition of "low access" is more complex. The default definition of low-access census tracts in urban areas, which the atlas automatically identifies, is census tracts where it is more than one mile (1.6 kilometers) to a supermarket for a significant share of the population. The user can change the distance to a supermarket to half a mile (0.8 km) for urban areas or 10 miles (16 km) or 20 miles (32 km) for rural areas if desired. A tract is identified as low access if more than 500 individuals or 33 percent of the tract population is further than the selected distance to a supermarket. Users can also include an additional measure of vehicle access. Tracts with low vehicle access have at least 100 households more than half a mile (0.8 km) from a supermarket who do not own a vehicle, or, regardless of vehicle ownership, have a significant share of the population (500 people or 33 percent) who are at least 20 miles (32 km) from a supermarket.

The FARA will also identify high group quarters census tracts, defined as tracts in which at least 67 percent of the population live in group quarters situations. Group quarters refer to housing units for multiple individuals or families that are owned by an organization. Individuals living in these units often receive services from the organizations as well. College dorms, nursing homes, and homeless shelters are examples of group quarters.

We did not include vehicle access or high group quarters as indicators in our analysis because these were not relevant to our stated project objectives. This information might be valuable for projects that target a particular population, such as elderly in assisted living facilities, or that aim to address transportation challenges, like expanding public transportation routes to provide neighborhoods with low vehicle ownership a direct route to a supermarket, for example.

Step Two: Identify Food Desert Clusters

The FARA identifies all census tracts that contain the indicators at the level of measurement the user selects. However, most community programs are not implemented at the census-tract level but rather at a community or neighborhood level. We therefore chose to group census tracts into clusters of tracts with contiguous borders. Census tracts in close proximity to one another typically share some population characteristics and market dynamics that are useful for developing projects or programs. Grouping the census tracts into clusters also simplified defining the geographic boundaries of food-insecure areas.

We grouped the census tracts with contiguous borders into clusters, listed the census tracts forming each cluster, geographically defined the area, and designated the roads bordering the cluster. Figure 2 provides an example from Duval County, Florida.

We recorded the Federal Information Processing Standards, or FIPS code, for each of the census tracts within a cluster by clicking on each tract in FARA. The FIPS code is a 15-digit number used to identify all census tracts. The first two numbers represent the state code. The next three numbers represent the county code, and the final six numbers are the census tract code. We also learned there is an implied decimal between the fourth and fifth digits of the census tract code. Some census tracts may not have numbers after the decimal place, for example census tract 0133.00 in Duval County, while others might, 0144.01, for example. Some databases, such as the U.S. Census, include the decimal point in their information. The FIPS code is important to record in order to find information about a particular census tract in other databases.

Step Three: Identify Zip Codes Represented in Each Cluster

We found that the zip codes represented by the census tracts forming a single cluster are important because they provided a way to examine the availability of other resources within the community, such as churches, schools, and community service agencies. We believe these resources can be approached as future project collaborators or may be useful when implementing project initiatives. For example, local churches could be used as a mobile farmers market site, and community service agencies may offer space for community education classes.

Unfortunately, census tract and zip code boundaries do not match. Zip code boundaries usually encompass a larger area than a single census tract. Zip code areas are based on geographic location, are designated by the U.S. Postal Service, and are subject to change based on population density. Census tracts include a smaller segment of the population (between 1,200 and 8,000 inhabitants) and are fairly stable in order to make comparisons over time.

To determine the zip codes included in each cluster, we visually overlaid the map of a cluster with the corresponding zip code map (sourced for free from United States Zip Codes, at http://www.unitedstateszipcodes.com) using a simple photo-editing program that allowed us to change the transparency of images. Figure 3 provides an example using a single cluster identified in Duval County in step 2.

Figure 2. Cluster of Four Census Tracts Identified as Food Deserts in the North End of Jacksonville, Florida

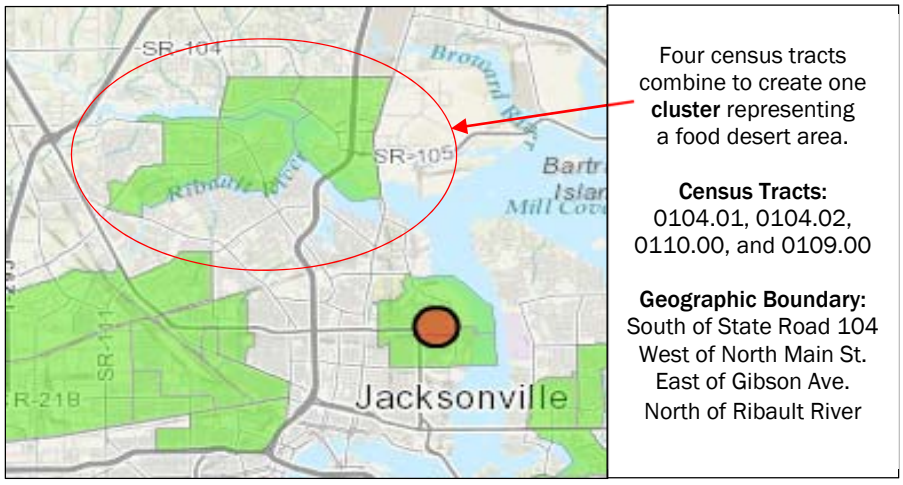
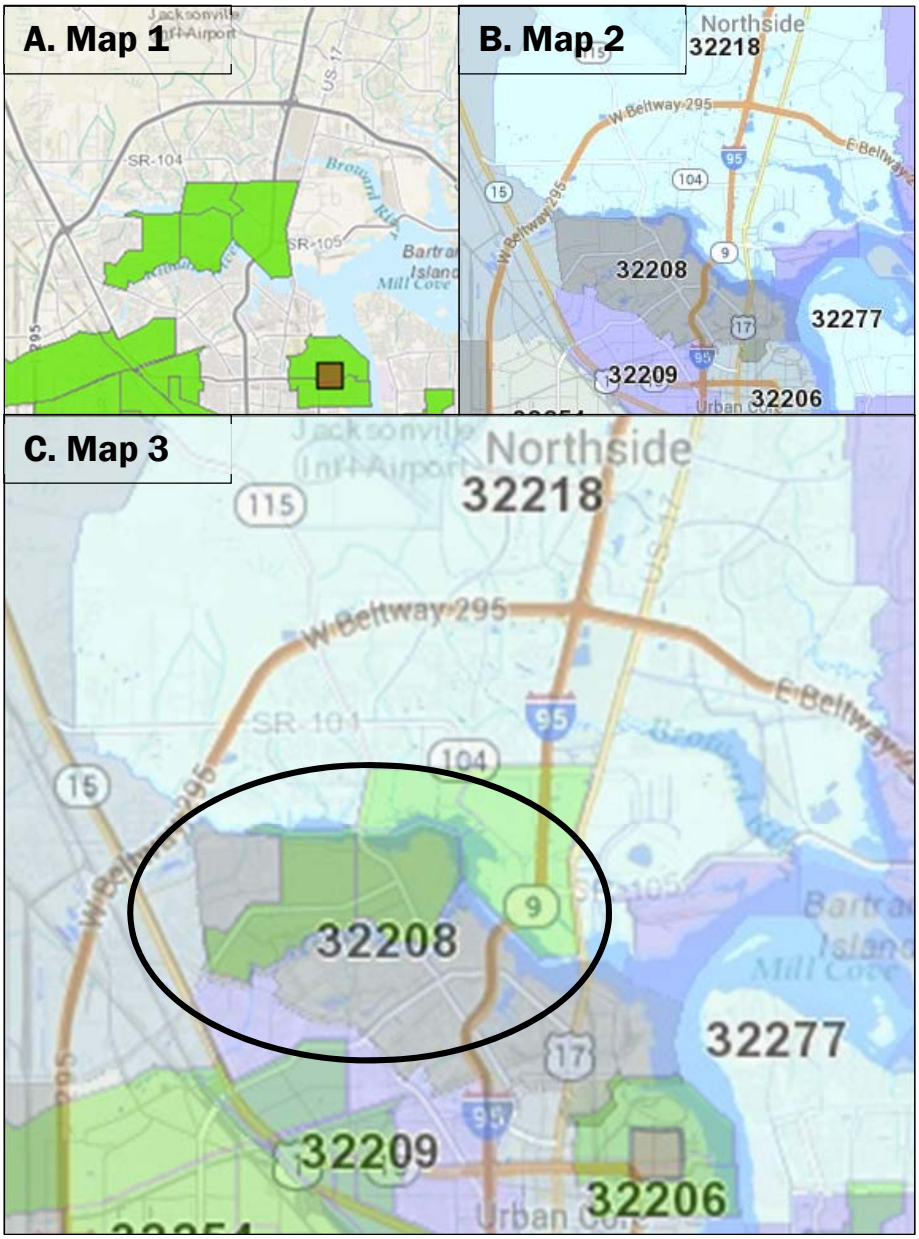


Figure 3: Identifying Zip Codes Within the Cluster Area. (A) Clusters identified using the Food Access Research Atlas; (B) Zip code map of area the cluster is located in retrieved from www.unitedstateszipcodes.com; (C) Visual overlay of maps A and B showing the food desert cluster includes two zip codes.



Step Four: Explore Population Characteristics

Community programming requires an understanding of the population in the communities being served. We discovered that the FARA displays detailed information about the households within each census tract if we clicked on the tract. For example, 10 percent of households in census tract 0110.00 do not have vehicles and live more than half a mile from a supermarket. Other information available included the number of housing units and total population, the portion of the population living in group quarters, the number and proportion of individuals living various distances from a supermarket, the number and proportion of individuals who are low income, level of access to vehicles, and the number of children and elderly affected by food insecurity.

Next, we compiled the information of interest into a table for each census tract within the cluster. The information of interest will vary depending on project goals and objectives; for our project we were particularly interested in the number of low-income and low-access individuals and the number of housing units without vehicle access. Table 1 shows the population characteristics for one of the food-insecure clusters identified in Duval County.

Step Five: Calculate SNAP Expenditures

This next step of our procedure used the American Community Survey to determine the number of households receiving SNAP benefits per census tract. The U.S. Census Bureau completes the American Community Survey (ACS) annually. The

Table 1. Selected Population Characteristics for Identified Food Desert Cluster in Duval County, Florida, Including Total Population and Number of Households, Number and Proportion of Individuals Experiencing Low Access (LA) And Low Income (LI) and the Number and Proportion Also Without Vehicle Access (VA)

Census Tract	Total Population	Total Households	Individuals LA and LI		LA Housing Units Without VA	
			#	%	#	%
0104.01	3,240	1,194	583	18%	84	7%
0104.02	3,955	1,635	572	14%	48	3%
0110.00	3,998	1,534	1,026	26%	50	3%
0109.00	4,017	1,547	464	12%	28	2%
Cluster Totals	15,210	5,910	2,645	17.39%	210	1%

ACS offers data at the census-tract level regarding a variety of variables useful to many different kinds of community initiatives. It provides demographic information about individuals such as age, sex, race, educational attainment, and income, and household-level information such as insurance status, estimated household expenses, and employment status. We searched for the census tracts of interest to find all available data sources for those census tracts. We then searched for data related to "SNAP" and found a table titled "Food Stamps/ SNAP" that provided county-level data as well as individual census-tract data for each of the census tracts in the cluster.

Our second project objective sought to estimate the value of SNAP benefits available in the identified food deserts. We chose to use the ACS to identify the total number of households receiving SNAP benefits in each census tract, but this was not enough information to accomplish our objective. For our objectives we also needed a measure of the magnitude of SNAP benefits received. The USDA Economic Research Service's (USDA, ERS) SNAP Data System provides information at the state and county levels regarding SNAP participation and benefits. We chose this database to determine average monthly household benefits received by county. We located the most recent data for county-level "SNAP Benefits" and then "average monthly SNAP benefit per participant." We used the ACS and SNAP Data System together to calculate an estimate of the total SNAP benefits received in each census tract and a total for each cluster.

Step Six: Calculate Potential Consumption of Fruits and Vegetables

Our third objective was to determine the areas with the most potential for local fresh fruit and vegetable sales to SNAP households. We therefore needed an estimate of fruit and vegetable purchasing for food-insecure individuals. The USDA Thrifty Food Plan (TFP) provides a healthful and minimal cost meal plan that shows how a nutritious diet may be achieved with limited resources. The standards established in the TFP are used to determine the level of SNAP program benefits individuals are eligible to receive. As part of the 2006 TFP, a study was commissioned by the USDA ERS presenting data showing food consumption by food type for 15 age and gender groups (Carlson, Lino, Juan, Hanson, & Basiotis, 2007). We used the data available in this study to estimate the average amount of fruits and vegetables purchased per person across all age groups.

The study estimated that the average amount of fruits and vegetables purchased per person across all age and gender groups is 14.872 pounds (6.75 kilograms) per week (Carlson et al., 2007). To our knowledge Carlson's work presents the most recent and complete estimation of fruit and vegetable purchases in the U.S. We used this estimate to calculate the potential purchasing of fruits and vegetables by individuals living in a food desert cluster assuming that all low-income and low-access individuals consumed the average amount of fruits and vegetables estimated by Carlson et al. (2007). It is unlikely individuals in each cluster are currently purchasing this amount of fresh fruits

and vegetables due to lack of access and income. However, with increased availability of fruits and vegetables and the assistance of SNAP benefits, we are considering this the *potential* for purchases.

We multiplied the total number of individuals who are low-income and low-access in a cluster (Table 1, Column 4 Total, 2,645) by the estimated 14.872 pounds (6.75 kg) of fruits and vegetables purchased per week, then multiplied this by 52 weeks to calculate the annual fruit and vegetable purchasing potential for the cluster. This information could also be used in other projects for program planning at the county level by totaling the results for all food desert clusters within a county.

Case Study Results

We applied this assessment procedure to four northeast Florida counties: St. Johns, Putnam, Duval, and Clay counties. Below we present the results from each step in the procedure outlined above and, for illustrative purposes, highlight our analysis for Duval County. The city of Jacksonville lies at the center of Duval County. The population of Jacksonville is approximately 850,000 people. The median income in Jacksonville is roughly US$48,000, and 16.1 percent of the population was at or below the poverty line from 2008 to 2012.

The FARA automatically identifies census tracts that are both low income (LI) and low access (LA) according to the criteria described above as food deserts. We chose to use one mile (1.6 km) to a supermarket to designate an area as low access in Duval County because this is the standard distance used by the federal government in urban areas (Dutko et al., 2012). We identified 29 census tracts as food deserts in Duval County based on the indicators we chose to include in our analysis.

Seven food desert clusters were identified in Duval County (Figure 4). A single census tract lying along the eastern coastline was identified as a food desert in step one but was excluded from further analysis due to its proximity to other food desert census tracts.

We used the tables created in steps five and six to determine which of the clusters offered the most opportunity for increasing fruit and vegetable sales to SNAP households, or food-insecure individuals generally (Tables 2 and 3).

Two of the food desert clusters, numbers two and six, had substantially more low-income and low-access individuals and the greatest number of households receiving SNAP benefits in Duval County. These clusters were selected as top priorities for programming as these communities offer the most potential for retaining SNAP benefits in the community through local fruit and vegetable

Figure 4. Seven Food Desert Clusters in Duval County, Florida, Showing Census Tracts with Contiguous Borders That Are Both Low Access and Low Income According to the Food Access Research Atlas

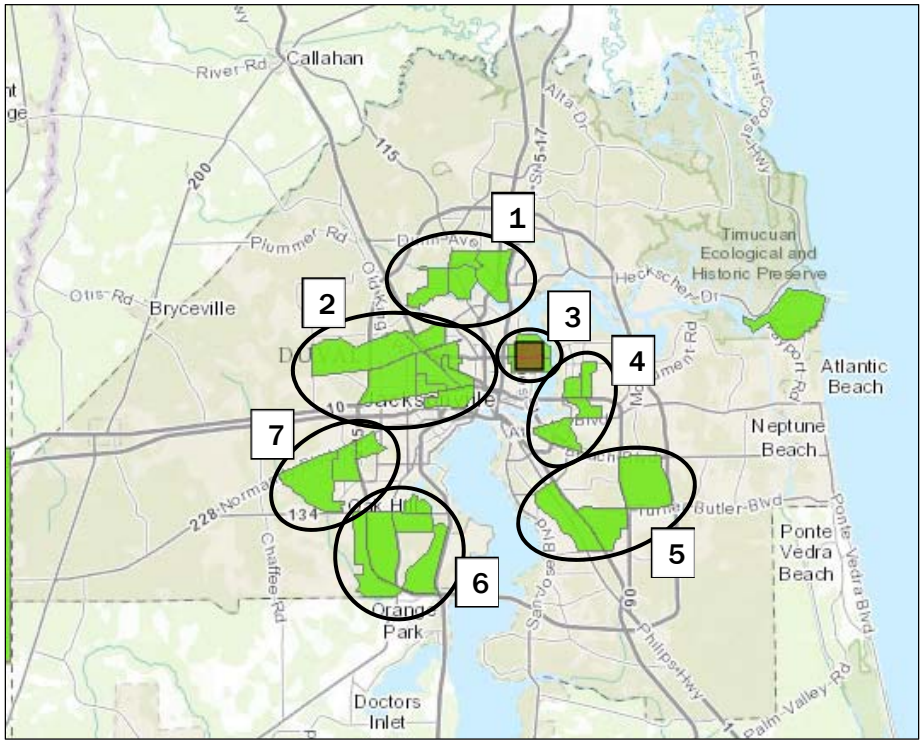


Table 2. Estimated Annual Amount of Fruits and Vegetables Purchased by Low-income (LI) and Low-access (LA) Individuals in Food Desert Clusters in Duval County, Florida, by Multiplying the Product (4) of the Total Number of Low-access and Low-income Individuals (2) and the Average Pounds of Fruits and Vegetables Purchased per Person per Week (3) by 52 Weeks and Dividing by 2,000 Pounds To Convert to Tons (5)

	(1) Total Cluster Population	(2) Total Individuals LI/LA	(3) Average Lbs. of F/V* Purchased per *Person* per Week	(4) Average Lbs. of F/V Purchased per LI & LA Persons in a *Cluster* per Week	(5) Average F/V Purchased by LI/LA Persons per Cluster per Year (in Tons)
Duval Cluster 1	15,210	2,645		39,336.44	1,022.75
Duval Cluster 2	31,995	7,478		111,212.82	2,891.53
Duval Cluster 3	4,901	1,886		28,048.59	729.26
Duval Cluster 4	15,013	1,385	14.872	20,597.72	535.54
Duval Cluster 5	23,901	2,986		44,407.79	111.02
Duval Cluster 6	35,419	6,405		95,255.16	2,476.63
Duval Cluster 7	13,629	2,529		37,611.29	977.89
Total				**376,470**	**8,745**

* F/V = Fruits and vegetables

Table 3. Estimated SNAP Benefits Received per Food Desert Cluster Identified in Duval County, Florida, Using Data from the 2008–2012 American Community Survey and the Supplemental Nutrition Assistance Program Data System by Multiplying the Product (Column 4) of the Average Monthly SNAP Benefits Received per Household in Duval County (Column 3) and the Number of SNAP Households (Column 2) by 12 Months (all in US$)

Cluster	(1) # SNAP Households	(2) Average Monthly SNAP Benefits Received per Household in Duval County	(3) SNAP Benefits Received per Month for Cluster	(4) Total SNAP Benefits Received per Year for Cluster
1	1,151		$162,889.52	$1,954,674.24
2	3,577		$506,181.27	$6,074,175.24
3	609		$86,185.68	$1,034,228.16
4	1,235	$141.52	$174,777.20	$2,097,326.40
5	1,213		$171,633.76	$2,059,605.12
6	2,725		$385,642.00	$4,627,704.00
7	968		$136,991.36	$1,643,896.32
Total	**11,478**	**$141.52**	**$1,624,300.79**	**$19,491,609.48**

purchases, thereby potentially reducing food insecurity in the region.

We used the same procedure described above to identify food desert clusters in St. Johns, Putnam, and Flagler counties as well. In total, we identified 29 census tracts as food deserts in Duval County making up seven clusters. There were five census tracts identified as food deserts in Putnam County that we split into two clusters. St. Johns County had seven census tracts we sorted into two clusters, and Clay County had only two census tracts forming a single food desert cluster. We have shared our findings with the rest of the project team and are in the process of forming a community action plan to reduce food insecurity in the identified clusters that includes programming that

will increase the availability of local fruits and vegetables in neighborhoods where the potential for SNAP spending is highest.

Discussion

Communities frequently develop unique methodologies for evaluating food-related aspects of the community that then require extensive time and resources (Van Hoesen et al., 2012). We developed this assessment procedure in response to the need for a standardized, rapid, low-cost approach to identifying the specific areas in a broad geographic region, such as a county, where interventions to reduce food security through increased purchasing of fresh fruits and vegetables by SNAP households would be most effective. Many nonprofit organizations and public agencies need to identify areas that have high potential for impact from interventions targeting food-insecure populations, particularly those receiving SNAP benefits. However, resources for needs assessments are often limited. Where budget and personnel are limited, a prolonged needs assessment process can deplete resources that could be better used to develop and implement interventions. The need for a reliable way to conduct a rapid needs assessment that provides at least initial guidance about where interventions are most urgently needed and most likely to alleviate food insecurity motivated the development of this assessment procedure. We also wanted a procedure that could be used in any region of the United States — that would not depend on state or local databases that may differ from place to place. Our assessment required only two days to complete and no expenses were incurred beyond that of the salaries to pay for the time of those who completed the procedure.

Household-level needs assessments provide the most detailed information about food insecurity and can include information about food preferences, cultural norms that affect food consumption, and household differences (both within and between) in access to food and food consumption. We are not suggesting that this assessment procedure replicates the kind of information that a more traditional household-level "on the ground" assessment would provide. However, there are limitations in conducting household-level surveys. A needs assessment based on household-level data can take weeks or even months to complete and requires trained data collectors, transportation, and in some cases assistance with statistical or GIS data analysis (Liese et al., 2007; Pothukuchi, 2004). Project collaborators need to consider whether the added detail and quality of the data are (1) critical to project implementation and potential success, and (2) justify the expenditure of human and fiscal resources needed to conduct them. Where resources are limited and/or time is of the essence, we believe that this assessment offers a viable alternative and can be modified to meet specific project objectives. We would also suggest that once a project is implemented and project personnel begin their work with members of the food-insecure community, the kind of data typically generated by a household survey can be collected as a part of ongoing project activities. Using a similar process, Baltimore used the results of multiple smaller community food assessments to develop citywide goals and objectives that created the job description for a new food policy director (Santo, Yong, & Palmer, 2014).

Depending on specific project objectives, we also suggest that project personnel use additional data sources to supplement the insights provided through this assessment. For example, the USDA ERS has many data sources that provide information regarding community food availability and federal food assistance programs at the census-tract level, such as the Food Environment Atlas[1] or the Supplemental Nutrition Assistance Program (SNAP) Data System.[2] Both of these resources function similarly to the FARA utilized in this assessment but offer different types of data. The Food Environment Atlas consolidates data on food choices, health and well-being, and community characteristics that could influence the food environment (USDA, ERS, n.d.-b). This assessment uses one piece of data from the SNAP Data

[1] http://www.ers.usda.gov/data-products/food-environment-atlas.aspx

[2] http://www.ers.usda.gov/data-products/supplemental-nutrition-assistance-program-%28snap%29-data-system.aspx

System, but the SNAP system also includes information on SNAP participation and benefits, poverty, and other socioeconomic indicators (USDA, ERS, n.d.-c). These can be used in conjunction with our rapid reconnaissance approach to refine and improve planned interventions. Other potential data sources include the U.S. Census Bureau, U.S. Census of Agriculture, state departments of agriculture, Kids Count Data Center, and USDA's National Farmers Market Directory. In short, for many project planners our assessment procedure can provide the information needed to get a project started, but should not be seen as the sole approach to data collection that the project may choose to use.

We anticipate that many communities will elect to expand on this assessment and complete more detailed and focused research in which they collect original data as a project evolves, which could include interviewing key stakeholders, facilitating focus groups of community members, or collecting additional quantitative data. There are a number of existing instruments and guides (discussed above) that we would suggest using to complement this initial rapid reconnaissance of food needs before spending time and money developing original instruments. The developers of many of these existing rapid assessment approaches recommend using the technique for initial exploratory purposes to develop project goals and then advise users to build on the results of the assessment using more in-depth research methods appropriate for the project.

Limitations

This assessment procedure is based on utilizing existing data resources, which can be an advantage for community organizations with limited resources but also poses some limitations. Communities may face challenges because the assessment is dependent on existing resources. For example, organizations may not always be able to access the specific data of interest at the level of measurement they desire if they depend only on available data, which may create weaknesses in the assessment depending on the degree to which data are extrapolated. It is also possible that because data is typically only available at the census tract or broader that the variance within census tracts is overlooked. For example, one of the poorest neighborhoods suffering from severe food insecurity could be located in the same census tract as a very wealthy neighborhood, and thus this census tract may not be identified using resources such as the FARA.

Project teams also do not have control over the quality of data when relying on existing data sources (Leitmann, 1994). Organizations should look for data from credible research institutions and that include a detailed methodology section to ensure the data are valid. Many publically available databases exist, and we encourage users to identify the datasets that work best for their specific project objectives. This assessment procedure is also limited in that some data are not collected frequently and available data might be outdated. For example, the purchasing data used in step six are based on sales in 2006. In light of population growth and the significant increase in the number of people receiving SNAP benefits, these data should provide some helpful information, but should be used with caution given changes over time.

In general, step six is not highly accurate. Use the estimates with caution as a guide for planning, not as accurate predictors of food purchases. This assessment procedure does not take into consideration the buying habits of individuals who actually live in the food desert areas, who may have limited access to food at the cost levels displayed in the study from which we drew our estimate of purchasing behaviors.

Estimates of quantities of food purchased may be useful in strategic planning for determining a distribution or sales plan when considered in conjunction with other demographic information. The results of this step in the assessment are probably best used when they are tied to a comparison of the potential production of fruits and vegetables in the county.

Conclusion

Local agencies and organizations are routinely expected to do more with fewer resources. Community food systems planning is a relatively new program area in many counties and often requires learning about a complex community issue that

affects populations that service providers have not traditionally served. Needs assessments are useful tools for identifying communities dealing with specific food issues and exploring the nature and extent of the problem. However, needs assessments can be time- and labor-intensive because project teams must collect original data. They also require expertise in social research methods and data analysis. The proposed assessment procedure included in this article will not provide the level of detail or depth of understanding gained when collecting original data using the USDA Toolkit or other resources available, but it also does not demand extensive time and cost from project collaborators. This assessment can be used to assist community food systems project teams in identifying the areas in the community that have the most potential for impact, for example, establishing a mobile market in the food desert cluster with the highest number of households receiving SNAP benefits to capture that market and keep the value of the SNAP benefits circulating in the community. There are many other data sources not discussed in this assessment procedure that may also offer service providers relevant information that can be used for planning purposes. We encourage users to modify this procedure to meet their community's needs and interests and to explore the existing data resources available in order to reduce the amount of effort expended developing research instruments, collecting data, and analyzing results.

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Perceptions of local hospitals and food producers on opportunities for and barriers to implementing farm-to-hospital programs

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Abstract

The farm-to-table movement has significantly increased in the United States during the last decade. More locally sourced foods are being used in meal programs on a larger, institutional scale. Farm-to-hospital initiatives have been emerging as an effort to reestablish local, healthy diets into the health care model. As a result, barriers, opportunities, and capacity-building strategies specific to farm-to-hospital initiatives are being more closely explored. The purpose of this study is to investigate perceptions and attitudes of local food producers and hospital staff towards using locally sourced foods in hospital food service programs. To identify these perceptions, in-depth interviews were conducted with staff involved with food procurement and management at two Montana hospitals and with local food producers and distributors. Barriers for hospitals to use locally sourced foods included price, product availability, and quantity, while opportunities included positive relationships, product quality, and champion leaders of the local food system movement within the hospital setting. Furthermore, capacity-building

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strategies suggested by the interviews included development of cooperative distribution of local foods and formalized working-relationship contracts. Most significantly, collaborative dialogue was identified as a method to further support the extent of locally sourced foods being used in hospital food service programs.

Keywords
Farm-to-hospital, local food systems, qualitative research, farm-to-institution, hospital food service

Introduction and Background

To increase food availability and to meet growing demand on a global scale, food production and distribution shifted away from small local businesses to a larger, industrialized system during the 1930s and 40s (Lobao & Stofferahn, 2007). Throughout this period, farm production transformed to emphasize specialization, standardization, and consolidation in order to enhance productivity and economic efficiency (Ikerd, 2009). Although food production increased, growing monopolization of the food system eventually spurred a nationwide movement to revitalize local, community-based food systems (Lyson & Green, 1999). Locally based initiatives and direct marketing arrangements gained significant momentum by the 1990s in efforts to reconnect communities with the food production and distribution processes. Direct marketing arrangements, such as farmers markets and community-supported agriculture (CSA), are reviving working partnerships between food producers and food consumers. Building on these initiatives, local farmers are now connecting with schools, local restaurants, grocery stores, and other institutions (Dauner et al., 2011).

As the local food movement continues to grow, opportunities and challenges involving locally grown food in institutional settings are emerging. Kloppenburg, Wubben, and Grunes (2008) conducted a literature review on the implementation of farm-to-school programs and assessed the Wisconsin Homegrown Lunch program in three schools of the Madison Metropolitan School District. Three core challenges that emerged around implementation of a farm-to-school program pertained to cost, procurement, and supply, all closely reflecting challenges identified in the literature and other assessment studies. Gregoire, Arendt and Strohbehn (2005) surveyed 151 local food producers on perceived benefits and challenges of working with local restaurants. Producers identified support for local farmers, delivery of fresher food, and shorter travel distance as benefits that result from working with restaurants; the greatest challenges included year-round availability of products, lack of dependable demand, communication with institutions, and ability to fulfill quantity demands (Gregoire et al., 2005).

The health care system is emerging as a significant leader in developing relationships between healthy, sustainable food systems and healthy communities. Increasingly, health care facilities are choosing to model healthy food choices and environments as they engage in farm-to-hospital programs (Cohen, 2006; Dauner et al., 2011). On-site farmers markets and stands are being implemented in hospitals across the country in order to better serve patients, staff, and the wider community (Kulick, 2005), and are already demonstrating positive health impacts. Kaiser Permanente has been hosting farmers markets at its medical campuses since 2003 across four states. In 2010 a survey of over 2,400 market patrons was conducted at 37 Kaiser Permanente locations; 74 percent reported eating more fruits and vegetables as a result of attending the market (Cromp et. al, 2012). Another example of successful on-site farmers market programs is a market initiative that the National Institute of Health in Maryland has hosted for over 20 years. Duke University Medical Center offers a stand for employees, and Allen Memorial Hospital in Iowa offers a farmers market open to hospital staff and patients, as well as to the general public and surrounding community (Kulick, 2005). An emphasis on healthy diet is also changing food service programs in various ways, such as eliminating deep fat fryers, using organic produce and rBGH-free milk, and substituting beef for leaner alternatives such as bison (Kulick, 2005).

As health care facilities more deeply explore farm-to-hospital programs, challenges and opportunities are emerging that often reflect those of other farm-to-institution initiatives. Dauner and her colleagues explored barriers and opportunities

in using and procuring local foods in health care settings, in a study consisting of 25 semi-structured interviews with individuals in food acquisition, preparation, and service. Barriers included meeting quantity demands, restrictions due to contracts with group purchasing organizations (GPO), and lack of human, physical, and financial resources necessary to procure and prepare local-food ingredients from multiple producers and distributors (Dauner et al., 2011). A survey of 105 Ohio hospital food service directors (Raison & Scheer, 2015) identified similar challenges to incorporating local foods into meals. Both food service directors using local foods in their operations and directors not currently using local foods highlighted the quality of local food items as a top concern. Meeting large quantity demands, restrictive GPO contracts, food safety protocol, and delivery and shipment sizes were also identified as challenges to using local foods in service meals (Raison & Scheer, 2015).

Although hospitals are facing challenges to adopting more locally based food service meal programs, opportunities are also being identified that support farm-to-hospital programs. For example, opportunities identified by Dauner and her colleagues included food purchasing and preparation based on shared responsibility, effective communication, and teamwork (2011). Organization and community support for using locally grown foods, along with interest and commitment of food managers, were also identified as opportunities or facilitators of change (Dauner et al., 2011). Further supporting community-wide commitment as an opportunity in farm-to-hospital initiatives, Conner and his colleagues (2014) specifically explored the impact of shared values among farmers, distributors, and institutions in facilitating farm-to-institution (FTI) efforts. Semi-structured interviews were conducted with Vermont farmers and distributor and buyer supply-chain actors in FTI programs; results suggested that supply-chain actors with similar values are more flexible and creative in facilitating successful FTI programs (Conner, Sevoian, Heiss, & Berlin, 2014).

Farm-to-hospital initiatives are relatively new. Thus, there has been limited assessment and evaluation of these initiatives and associated opportunities and challenges. Additionally, studies with these kinds of goals primarily utilize surveys and other forms of questionnaires. The focus tends to be either on perceptions of producers or perceptions of institutions, rather than an integrated analysis between these groups. Therefore, the purpose of this study was to compare and contrast both the perceptions of food producers and distributors, as well as hospital staff involved in food procurement and management. Through comparing and contrasting these perceptions, barriers and opportunities for locally sourced foods in food service meals were identified, along with culturally relevant capacity-building strategies, as informed by the data, that further support use of local ingredients in food service meals.

Community Profile

Montana is ranked fourth in size, but forty-eighth in population density of the 50 states. There are a wide variety of food growers and producers in Montana; many are located in Missoula County in northwestern Montana, producing crops that include produce, dairy, meats, flowers, and other artisanal products. There are various initiatives for supporting local producers and agriculture in Missoula, such as farmers markets, community gardens, food co-ops, CSAs, and farm-to-school programs. The Western Montana Grower's Cooperative (WMGC) supports local food producers by expanding their access to Montana markets. The WMGC is based on a cooperative (co-op) model: particular food items grown by participating members are aggregated and then distributed to meet the needs of purchasing institutions. This approach enables small producers to offer the larger quantities that institutions require. As a result, the WMGC creates opportunities for individual producers to work with institutions that otherwise might not be feasible due to the small scale of production on local farms. Another Montana resource for food producers is the Mission Mountain Food Enterprise Center (MMFEC), a food processing facility in northwest Montana. The MMFEC provides equipment and facilities for small, start-up producers to process or freeze their products before delivering orders to an institution. This infrastructure allows producers to process and

sell "seconds," or products with visual imperfections — but that are more than adequate for consumption — which otherwise would not be sold at farmers markets or grocery stores.

There are two primary care hospitals in Missoula: St. Patrick Hospital and Community Medical Center. St. Patrick Hospital has 253 licensed beds and admitted nearly 8,000 patients in 2011 (St. Patrick Hospital, n.d.). St. Patrick is the only health care facility in Montana that has signed the Healthy Food in Health Care Pledge, and through its Green 4 Good campaign it practices a variety of guiding principles supporting environmental stewardship. St. Patrick Hospital also participates in a staff community supported agriculture (CSA) program. Community Medical Center has 151 acute-care beds and nearly 5,000 patients are admitted each year (Community Medical Center, n.d.-a). The facility advocates a connection between nutrition and a person's overall health and well-being. A commitment to this connection is supported through the hospital's Big Sky Café, which sources local dairy products, breads, beef and seasonal produce for its food service program (Community Medical Center, n.d.-b).

Methods

This study used a qualitative research design to engage hospital staff and food producers and distributors in identifying opportunities and barriers to using locally sourced foods in hospital food service programs. The University of Montana and Community Medical Center Institutional Review Boards jointly approved the study. Researcher Perline conducted interviews with staff knowledgeable about food procurement and management at the hospitals, along with local food producers and distributors in Missoula, Montana, from January 2014 to March 2014. Initially, key informants at both hospitals and a local food policy organization helped the researcher connect with staff knowledgeable about the management of the hospital food service programs or sustainability efforts and with local food producers and distributors. These individuals were then recruited to the study. Additional interviewees were recruited through convenience sampling, in which participants were recruited based on accessibility, and snowball sampling, in which participants initially chosen for the sample were used as informants to locate other participants fitting the criteria of the study (Penrod, Preston, Cain, & Starks, 2003).

Prior to facilitating the interviews, the researcher received training in qualitative methods, including conducting mock interviews followed by feedback. The research team constructed two moderator's guides, one tailored for hospital staff and one for food producers and distributors. Each guide included 16 open-ended questions based on themes identified in the literature for farm-to-school programs and challenges and enhancements for using locally grown foods in non-school-based institutions. Authors Brown and Perline, who are trained in qualitative research, reviewed the guides. Examples of the 16 questions include the following:

> If there was an interest in increasing the amount of local ingredients used in food service meals, how easy or difficult do you think it would be to do this?
>
> Have you, or someone you know, had an experience in this hospital working with any local food producers or distributors? What was this experience like?
>
> Can you describe an experience in which you have, or tried to have, a working relationship with an institution?
>
> What, if any, kind of changes or resources would be needed to make a partnership with one of the hospitals or another institution more accessible or feasible?

The moderator guides also included discussion rules, recommendations for probing, and a time sequence.

Audiotapes and session notes were transcribed immediately following each interview and formed the basis for analysis. (The authors have corrected minor grammatical inaccuracies in the quotes presented here to illustrate the themes.) Authors Brown and Perline constructed coding categories based on the inductive methods of grounded

theory, as described by Ulin, Robinson, and Tolley (2005). To construct the initial coding scheme, author Perline read all the interviews and developed a draft-coding frame. Microsoft Excel was used to conduct a coding sort in which similarly coded blocks of text were grouped together. This allowed the researcher to determine the frequency with which coded blocks appeared in the data set as a whole. Another researcher trained in qualitative research methods applied the initial coding frame to 30 randomly selected transcript segments to determine reliability of the coding scheme. When codes were discrepant across coders, researchers discussed discrepancies until overall agreement was equal to or greater than 81 percent, or Cohen's kappa coefficient equal to 0.820. The final, overall agreement between coders was 83.33 percent (25/30). Obtaining a Cohen's kappa equal to or greater than 0.820 indicated that overall agreement for this coding scheme was higher than would be expected to occur by chance (Landis & Koch, 1977). Because the initial coding showed high reliability, it was used for the remainder of the study. Themes and sub-themes were closely explored to identify the most significant themes, connections, relationships, and broader significance of the data.

Results and Discussion

In total, eight hospital staff, five food producers and two food distributors participated in the study. There were ten females and five males in the study and the majority of participants were 45 to 54 years old. Analysis of the interviews identified common themes across the two groups (e.g., hospital staff, and food producers and distributors) involving opportunities and barriers to increasing the role of locally grown foods in hospital food service programs. The two main themes that emerged were commitment to buying and economy of scale for farm-to-hospital partnerships. The main themes and sub-theme elements are described below. Following each set of subthemes are capacity-building strategies that emerged from the in-depth interviews and were further explored by the researchers.

THEME 1: Buying Commitment

Several significant barriers were identified as reducing buying commitment between local food producers and distributors, and institutions. Barriers included lack of formal contracts, high turnover, limited customer demand, and resources needed for procuring and preparing local foods.

Lack of formal contracts: Local producers identified a lack of consistency in commitment to buying from institutions as a significant challenge to expanding farm-to-institution initiatives in Montana. A local food producer said, "[Institutional buying partners] say 'okay — I'll buy from you this much cabbage at this time. You plant it; I'll be ready to buy it.' And it's not an ironclad contract. It's like, you can grow it and they still might not buy it....So it's more like we all agree to do the best we can and honor this agreement and we'll see where it goes." Small-scale food producers talked about not being in a position to take on a significant level of risk, as unsold products equates to wasted time, labor, space, and money. A food distributor said, "And so right now it's like we don't have growers that necessarily want to make a huge commitment because we don't have institutions who are willing to make the huge commitment. [Food producers] are not in the position just to take these large risks. We can't." Without solid buying commitment from a hospital or other institution, working directly with institutions that have larger food demands is much less feasible for local food producers.

High turnover: Local food producers also identified high turnover in institutions as a barrier to committed buying partnerships. Food producers explained that production planning and seed planting needs to occur early in the spring, and thus farmers need to know what kinds of products institutions will need early in the year. Participants viewed institutional staff and management turnover as associated with sudden changes in menu planning, desired ingredients, and overall communication between the institution and food producer. Producer subjects also perceived staff turnover as entailing extensive time and energy in order to reestablish a working relationship and mutual understanding between producer and institution. A farmer said, "I think another issue is, in terms of the institutions, is turnover. For example, two years ago we grew a lot of lemon cucumbers because the

[educational institution] really liked them and would buy a lot of them. And then someone in the food buying sector changed and they didn't want to use lemon cucumbers anymore."

Limited customer demand: Hospital staff described limited customer demand as a barrier to selling local food items in their food programs. A lack of enthusiasm for local products and lack of receptiveness to consuming healthier but less familiar menu items can cause dissatisfaction and frustration among customers. Such dissatisfaction has even been seen, at times, to negatively impact sales of particular food items. A participant said, "And you can tell them, 'This [grass fed beef] is good for you.' And they're like, 'Well, I'm not eating a cheese burger because it's good for me.' " Due to the nature of the hospital environment, some patients and visitors crave comfort foods over interest in nutrition education or experimentation with new food ingredients. This sentiment, as well as lack of interest in healthy, local food items, was identified as an obstacle for hospital food management in healthy menu planning and local foods purchasing.

Furthermore, respondents also identified a disconnect in understanding the benefits of consuming local foods as a barrier to increasing demand for these items in the hospital cafeteria setting. Although hospital staff and visitors often recognize the value of a nutritious diet, they often don't understand the benefits of buying and consuming locally. Hospital staff members discussed this challenge, and the process of increasing knowledge and support for using more local foods in hospital and daily diet:

> It will be slow though. It takes a lot of time to just plant a seed and then it takes the germination time from someone putting the idea in your head that kale may be a good thing to eat, to going vegan and eating locally. That's a huge shift in someone's life. It's a whole shift in your lifestyle, in your priorities. So I think it's going to be really slow.

> If you look at just how hard it is to get your food, to know that your food is safely organic vs. "natural." There's such a knowledge barrier for the average consumer who walks into [local grocery store]. You have to teach them what they should be looking for first and why this carrot is better than that carrot and why that's even a priority and why you should spend 45 cents more on this carrot.

Resources needed to procure and prepare local foods: Hospital staff identified several factors contributing to inconsistent purchasing commitment for local food. For institutions with large food demands, consistent and year-round product availability facilitates more efficient menu planning. Availability of local foods, however, is dependent on seasonality. Hospital staff identified the short Montana growing season as a barrier to using local ingredients. One hospital staff person said, "[Using locally sourced food's] really a challenge in a larger facility and in a state or a climate where you don't have it year round." Large distribution companies, or group purchasing organizations (GPOs), offer a streamlined ordering and delivery process, discounted prices, and processed (e.g., carrots are sliced, artichoke hearts are trimmed and cleaned) food items. Procuring and using local ingredients, however, often requires additional resources not required when working with a GPO. For example, meeting the large-scale hospital demands often means working with multiple local food producers, requiring additional time and resources to establish and maintain the relationships. One hospital staff person said, "A few years ago when the chef's predecessor was trying to do local food, she was trying to deal with the farmers individually and you can't do it. You don't have the time." Moreover, in contrast to prepared and processed food items offered through a GPO contract, planning season-specific menus and processing and preparing local food ingredients were identified as requiring additional input of resources. A hospital staff member commented, "I guess if there were any other challenges, it's the additional labor it takes to prep that stuff. …I think that would probably be the next step to ease some of the burden on our cook's team and still provide our customers with perhaps more local than we did last year."

Passionate champion leaders within the institutional setting were identified as a significant enabler of producer-institution relationships. As examples, working with multiple local vendors often results in increased time and effort to procure local foods. Additionally, menu planning based on local and seasonal food items requires time and work. However, kitchen staff most directly involved in food procurement and preparation processes were very willing to accommodate more frequent deliveries, coordinate with multiple vendors, and viewed seasonality as a creative challenge and opportunity, rather than a barrier. This intrinsic enthusiasm and passion for local foods held by kitchen management was identified as supporting institutions in overcoming potential challenges associated with moving away from the streamlined conveniences of a large food distributor and increasing the amount of healthy, local food items used in food service menus. The sentiment of these champion leaders is exemplified by the following:

> There's just more appreciation and more of a cognizant thought process once you realize something was local. It just seems like, as much as it's local, it almost seems like it's kind of exotic. So you treat it like that type of an ingredient. You just really treat it the best that you can without doing necessarily too much to it. So I don't think it's a challenge at all, it's just more work on the back hand. But it's something fun, going through some of the offerings they have, some of the seasonal items.

Strategies to address THEME 1: Limited Buying Commitment

A. Cooperative distribution in order to address consistency and availability: The Western Montana Growers Cooperative (WMGC) was identified as a resource that creates market opportunities for direct food producer-hospital relationships. By coordinating with multiple local food producers, WMGC is able to meet larger food quantity demands from institutions, provide more personal relationships with food service management, and customize delivery schedules — benefits hospital staff viewed as invaluable to facilitating increased use of local food in food service meals. A hospital staff person said:

> That one contact. It's shocking. They [WMGC] send you the list instead of six emails from six different producers. They're [food producers] funneling all their information through the co-op and the co-op sends that out. You place your order and they bring it to your door. So the communication is great. Knowing what's coming to plan the menu…But yeah, just having all the information in one place, and then one contact saves you six phone calls twice a week probably.

Based on this resource, a capacity-building strategy is to develop more fully the cooperative distribution model. Streamlining the process for institutions to procure locally sourced foods can strengthen capacity to compete with large-scale distributor services (or group purchasing organizations), thus improving institutional buying commitment. Therefore, expanding the visibility of Montana cooperative distributors to institutions, as well as facilitating opportunities for contracts between these two groups, will support the feasibility of using local foods and committing to buy these ingredients.

B. Expand processing facilities to support institutional use of local foods: Expanding processing could address challenges associated with ease-of-use, and support institutional demand for local food ingredients. For example, producers using the Mission Mountain Food Enterprise Center (MMFEC) can prepare and freeze their food products, enabling them to sell their products year-round. MMFEC infrastructure enables local producers to compete more competitively with large distributors by offering less expensive processed commodity foods. A capacity-building strategy is to expand the Center and its outreach throughout Montana to facilitate greater institutional purchasing of local foods. For example, MMFEC has recently partnered with WMGC to increase the amount of processed local food offered in public schools across the state. Hospital

staff identified an interest in becoming more familiar with the special services of MMFEC in order to make better use of the facility and further facilitate hospital use of local products. By aggregating produce from a larger number of producers and utilizing "seconds," MMFEC can reduce prices to make local foods more competitive. By processing on-site, MMFEC can also address processing limitations at institutions by delivering a product that is ready to use. Finally, by processing whole vegetables into a variety of products (such as beef taco crumbles or frozen squash chunks), processing can meet consumer demand concerns by producing local food products that have the same appearance and taste as readily available conventional options.

C. Develop training and networking opportunities for staff to increase commitment: Worksite-based educational staff programs can help promote a healthy workforce and thereby model healthy behaviors for patients. For example, hospital staff participants identified staff CSA programs as a way to increase nutritional awareness and behaviors among staff. Local and regional programs and cooperatives, such as WMGC, have already begun establishing CSA programs for institutions, so the feasibility to expand such staff-based programs already exists. Education and training workshops for kitchen staff also serves as a feasible strategy in promoting group-wide enthusiasm and support for using locally sourced foods and season-specific menus. Furthermore, educational workshops for hospital administrators may help foster healthier food awareness at the higher, managerial levels and more broadly influence support for farm-to-institution efforts among hospital staff.

Hospital staff also identified connections between institutional chefs as another way to support greater use of local foods in hospital food service meals. For example, chefs could share information and ideas at networking meetings about how to balance the cost of local food ingredients with costs of large distributors more effectively, and how to integrate local foods into hospital food service meals successfully. One hospital staff member described the positive outcome of meeting with other institutions: "So we had that meeting and it was really good that they forced it on me because the [institution] is such — they're doing so much more than we are. And they're pulling it off!"

D. Develop formalized contracts to strengthen farm-institution relationships: Participants identified formalized contracts between food producers and hospitals as a way for producers to better anticipate future hospital food product demands. Formal contracts can ensure more solid buying commitments and working relationships, and promote a degree of consistency in purchasing. This in turn encourages greater commitment and resource allocation from producers to meet growing needs of institutional markets. One food producer said:

> I think the key is that the farmers have to know right now, or really a month ago what we're going to be growing for this season. So those accounts need to be in place and we need to know what these institutions would want so that managers of the Co-op can produce projections, tell everybody what they need and then farms say, "we'll grow this amount." So we just need to know how much to grow and that doesn't always happen early enough.

THEME 2: Economy of Scale for Farm-to-Hospital Partnerships

As a result of economy of scale, hospital staff and food producers identified several barriers impeding farm-to-institution partnerships. The main barriers were commodity food prices and market saturation.

Commodity food prices: High local food prices were identified as a significant barrier to building capacity for Montana's farm-to-institution efforts. Our study shows that the systemic challenge of economies of scale and commodity food prices impact the ability of local producers and hospital food service programs to work together. Local producers perceived commodity food prices as inaccurately reflecting actual costs of food. Such a phenomenon is

associated with economies of scale, where the marginal cost of producing a particular product falls as larger quantities are made (Hamel, n.d.). Without accounting for full production costs, transportation costs, and other externalities, commodity food prices appear highly affordable, making it hard for local producers to compete with such prices. One food producer said:

> Part of that is because the cost is lower. So institutional markets, you get a lower cost, generally wholesale you get a lower cost. So you need a higher retail. And I imagine that institutional markets ask for even lower costs than even a lot of the wholesale markets. So that trickling down to the farmer, for us, we wouldn't be able to produce our salad mix for a whole lot cheaper than we're doing now just because we don't have that much space. But if we had 10 acres of salad mix, we could probably do it. So there's an economy of scale there that can be difficult for small farmers.

To further demonstrate this challenge, hospital staff identified the convenience and services of a large distributor as appealing and often more feasible for food service programs which lack resources and infrastructure otherwise needed to process local food ingredients. Due to economy of scale, however, small producers often lack feasible options to process their own products to compete with services of large distributors. One food producer described this challenge:

> As a for instance…we take horse trailer trips every other week to [name of Montana-based facility] where we process. So let's say we have four animals on that horse trailer. The mileage, the fuel, the labor to deliver those four animals to [name of Montana-based facility] on a per head basis is about the same as it would take on a per head basis to ship a semi-load to Nebraska. And so there, you know, that cost, when you start thinking about how much difference scale makes, is really big.

Market saturation: Hospital staff perceived lack of availability of local products as a barrier to increasing the amounts of local foods being used in food service meals. Our study found dissonance, however, between the two sets of subjects on perception of availability. Hospital participants generally expressed concern about quantity and the ability of local producers to fill food service needs. For example, one staff member said, "And you just can't hardly get that around here. We would deplete the valley, more or less. And that's an interesting conundrum because why wouldn't we grow enough food for the people who live here?" In response to this concern, food producers instead noted challenges around limited demand and market saturation. Individual community members and institutions committed to local products and supporting the local food system are already engaging in the local food system movement, interacting with local food producers, and purchasing locally sourced ingredients. Local food producers are therefore already filling this committed market's demands. One food producer described this market saturation:

> It's this line. Like on one side, there are people who want to buy local food….There are people already aligned with these values and we are killing each other to meet their needs. There are more farm owners than those people need. So there are farmers being left out. The supply is greater than the demand for people in this sphere of values.

Market saturation poses a challenge for producers trying to establish direct working relationships with institutions. At this point, the needs of supportive markets—individuals and local-oriented restaurants—or "low hanging fruit," are being satisfied sufficiently by local producers. Local food production in Montana is beyond the present level of demand for local food ingredients. For example, participants described market saturation in terms of farmers markets as an outlet for local food products. The number of small local producers is so abundant in Montana that competition for business is increasing, which makes farmers markets a less profitable option. A

dilemma therefore arises in which small producers with limited financial resources are unable to risk large investments to increase production levels until the demand from institutions (such as hospitals, restaurants, and correctional facilities) significantly and committedly increases. Conversely, institutional demand and committed use of local foods cannot increase until levels of production expand to fulfill the large quantity demands of a hospital or other institutional facility.

Strategies to address THEME 2: Economy of Scale on Farm-to-Institution Partnerships

A. Conduct a gap analysis of Montana's food processing infrastructure to understand the gaps in connecting small and mid-sized producers to institutions: Gap analyses are used to determine the steps necessary to move from a current state of function to a greater, more productive state of functioning in the future (Gap Analysis, n.d.). This process creates opportunity to identify strengths and resources currently in place, as well as gaps that need to be filled in order to achieve the desired future state. Conducting a gap analysis would include examining processing, distribution, and aggregation gaps, and could improve institutional capacity to use local foods (Ecotrust, 2015). While MMFEC is an excellent resource, it is one small, rural facility in a large state. However, many hospitals have kitchen infrastructure in place such as food preparation equipment and well-trained kitchen staff that could also be utilized for enhanced processing. Conducting a statewide gap analysis of food processing infrastructure and capacity of hospitals to source and use local foods could provide insight on how to build capacity for more local food processing in Montana. Identifying gaps within both hospital and producer capacity can provide a more systematic assessment and approach to supporting greater competition between locally sourced foods and the prices and conveniences currently associated with commodity food distributors.

B. Develop collaborative problem-solving processes to improve farm-hospital communication: Dissonance between interview groups suggests that opportunities exist for capacity building and support of direct producer-hospital relationships. Local producers identified market saturation as a significant barrier to the growth of Montana's local food system, but also expressed a willingness and readiness to engage with institutions in addressing such challenges. Participants said:

> I think that we could definitely solve these problems in institutions if we were thoughtful about how they were approached. If they're on the same page in terms of values, it's pretty easy, we just do logistics.

> These people [local producers] are ready. Most of the folks have the land to do it. And we're getting to the point where we have the capability as a cooperative to service these people, to distribute to them, to market to them. It takes a little bit of time I think. The answer to that in short is I think definitely, especially with the number of growers coming onto the scene.

> I guess what I'm trying to say is if we're able to be really well organized as a community of growers, we can definitely fulfill the need for the food.

Corresponding capacity-building strategies are networking and collaborative, strategic planning. Networking could help identify ways to overcome misconceptions that local producers and institutions have about working with one another, such as market saturation versus limited availability of food products in relationship to the ability of local producers to fulfill the extensive quantity needs of medical institutions and other large facilities. Creating opportunities for collaborative dialogue between institutions and local producers could ensure that all invested stakeholders are at the table. Additionally, implementing a strategic planning process at an organizational level could facilitate infrastructural change within the hospital setting. Although such reorganization requires collaborative investment and commitment, strategic planning can result in a redistribution of time and management to address more effectively the

procurement and preparation of locally sourced foods. Through shared investment of a strategic planning model and joint ownership of the process and outcomes, more durable solutions will be generated and implemented in order to increase the amounts of local food used in hospitals (McKinney, 2013). Such a process could resolve misconceptions and challenges currently occurring between local food producers and institutional food services, and further support successful producer-hospital relationships.

Limitations

Limitations to this study were that information gathered was only specific to experiences of the individuals who participated in the interview process, and that participants might have felt compelled to give socially desirable answers to the interview questions. Additionally, limited participation and reporting findings describing farm-to-institution challenges and opportunities specific to Montana, render the results less generalizable. However, the capacity building strategies identified in the study could provide a strong basis for building farm-to-institution systems in other areas. Finally, rather than conducting a full triangulation of emergent themes during the data analysis process, only two researchers established coding reliability and agreement.

Future Work

The study aimed to identify capacity-building strategies for addressing opportunities and challenges to support working relationships between local food producers and hospitals. By exploring the perceptions of both hospital staff and local producers, a situational assessment was developed to describe the strengths and challenges of Montana's farm-to-hospital system. Additional exploration of the strategies and capacity-building opportunities identified from the in-depth interviews will further enhance the validity of the study. For example, developing and conducting a comprehensive survey for additional small- and mid-scale producers would provide insight into the degree to which local food producers truly identify with the established themes.

Montana has a solid local food system and is engaged in the farm-to-table movement. From the in-depth interviews, other hospitals and schools throughout Montana were mentioned as role models successfully engaging in farm-to-fork efforts, and utilizing strengths such as champion leaders and successful, committed partnerships among different institutions and local food producers and distributors. Closer examination of such local initiatives and their successes could contribute to a greater understanding of capacity-building strategies relevant to increasing the use of local foods in other Montana institutional food service programs. The aggregated food system, or farming cooperative model (such as WMGC), was also strongly identified in the study by participating producers and food service management as a capacity-building strategy and a significant enabler in moving away from restrictive contracts with large food distributors. Further exploration of the cooperative model and other potentially important strengths or enablers inherent to other non-hospital institutions in using local food ingredients could support broader farm-to-institution relationships and efforts in Montana beyond farm-to-hospital.

Many participants observed that while the use of local foods has increased in the health care cafeteria setting, these efforts haven't transferred to patient meals. This study primarily focused on the identification of barriers and opportunities to using local food ingredients in the cafeteria, with limited reach into using local foods in patient meals. This observation therefore suggests that future work could explore barriers pertaining specifically to the use of local foods in patient meals compared to use in the cafeteria. Additionally, food producer participants identified untapped markets as a significant opportunity for strengthening the farm-to-institution movement beyond farm-to-hospital. For instance, conventional grocery stores have significant potential to support the farm-to-table movement, as large quantities of food quickly and naturally move through these outlets. However, producer and distributor participants perceived these institutions to be a particular challenge for establishing working relationships. Thus, the associated barriers and capacity for establishing contracts between local producers, conventional grocery stores, and other food retail markets

should be more closely explored to further build successful partnerships within the larger farm-to-table movement.

Conclusion

Collaborative communication and joint problem solving were identified as significant capacity-building strategies specific to Montana's farm-to-institution efforts. However, while collaborative dialogue can decrease misconceptions and support joint problem solving that strengthens farm-to-institution food systems, collaboration alone will not fully address the identified challenges. It will require institutional and infrastructural build outs, such as further development of food aggregation processes, identification of the most cost and resource-efficient approaches to food processing, and expansion of local cooperative distribution systems. Ultimately, a multi-prong approach to strengthen farm-to-institution food systems will successfully increase the use of locally sourced foods in hospital food service programs.

The main purpose of this study was to identify opportunities and barriers for local producers and hospitals to work together to use more locally sourced foods in food service meals. This study lays the groundwork for more comprehensive efforts to build capacity, and offers insight into particular opportunities and challenges unique to using local foods in institutional systems. Although these findings are specific to Montana producers and institutions, similar concerns and challenges regarding scale are experienced in communities across the country, and are reflected in the established literature exploring farm-to-institution efforts. With similar challenges being faced throughout the country, others could apply our methodology and approach to further explore ways to strengthen farm-to-institution systems. Conducting a gap analysis to better connect small and mid-sized producers to the local institutional systems, strengthening locally based aggregated food systems for greater purchasing efficiency, and exploring collaborative and mutually beneficial relationships for greater communication and problem-solving, may therefore provide a framework for building farm-to-institution efforts in other communities beyond Montana.

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Production and consumption of homegrown produce and fish by noncommercial aquaponics gardeners

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Abstract

Aquaponics is the integration of hydroponics and aquaculture into a single food production system. The aims of this paper are to describe production practices and costs among noncommercial aquaponics gardeners, and identify factors related to homegrown food consumption using a survey. The sample size was 399 respondents from 24 countries. The median aquaponics system was 350 gallons (1,325 liters) in volume, 100 square feet (9 square meters) in size, and cost respondents US$500 to US$999 annually. Respondents consumed homegrown aquaponics plants far more often than they consumed fish. The primary factors that affected weekly homegrown plant consumption were location in warm climates, which allows for a longer growing season and likely lower input costs; an interest in improving diet; size of aquaponics garden; and years of experience. Respondents with high school or less education consumed homegrown fish and crops more often than those with college or graduate education, indicating that aquaponics may contribute to

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community food security at the household level for these individuals. Noncommercial aquaponics gardens have significantly higher yearly costs compared to soil-based gardens, so the participants who are attracted to aquaponics (typically middle-aged men with high levels of education) may not be food insecure, which weakens the case for aquaponics as a means of improving food security. Based on our findings, further research on this topic and other work to expand aquaponics to improve community food security should focus on low-cost yet productive aquaponics systems in warm climate regions and among more diverse populations.

Keywords
gardening, garden, homegrown, fish, health, aquaculture, aquaponics, food security, tilapia

Introduction and Literature Review

Aquaponics is the integration of soilless crop production (hydroponics) and aquatic animal production (aquaculture) into a single food production system. Fish are raised in tanks and their waste is broken down and converted into nutrients by bacteria. Plumbing connects tanks that hold plants and fish, so the system water can be continuously recycled. Crops such as leafy greens, tomatoes, and herbs absorb nutrients from the water, which partly cleans the water for the fish. A handful of studies of aquaponics were conducted in the 1970s, 1980s, and 1990s (Bailey, Rakocy, Cole, & Shultz, 1997; Lewis, Yopp, Schramm Jr, & Brandenburg, 1978; McMurtry, Nelson, Sanders, & Hodges, 1990; Naegel, 1977; Rakocy, 1988–89; Sneed, Allen, & Ellis, 1975; Todd, 1980; Zweig, 1986) that focused on aspects of commercial production. Since then, the field of aquaponics has expanded beyond the research and development stage, and is being practiced by farms, nonprofit organizations, community garden groups, schools, and noncommercial gardeners. In 2013, we conducted what we believe is the first large-scale survey of aquaponics practitioners and found a rapidly growing field in which noncommercial gardeners were the largest group of respondents (Love, Fry, Genello, Hill, Frederick, Li, & Semmons, 2014). In 2013, the U.S. Census of Agriculture identified 73 commercial aquaponics operations in 21 states, with total sales between US$1.4 and US$5.1 million (U.S. Department of Agriculture [USDA], 2014). In the same year, our survey identified 145 commercial aquaponics operations in 38 states with harvests of 131,000 to 212,000 lbs. (59,400 to 96,000 kg) of fish, 630,000 to 1,400,000 lbs. (286,000 kg to 635,000 kg) of plants, and total sales between US$2.5 and US$7.1 million, including aquaponics-related revenue beyond food sales, such as consulting and agrotourism (Love, Fry, Genello, Hill, Frederick, Li, & Semmons, 2014).

Businesses marketing aquaponics kits and supplies make claims about the benefits of aquaponics, including self-provisioning, disaster preparedness, food sovereignty, food safety, and/or as a small business. For example, Friendly Aquaponics says, "You've come to the right place if you: want to reduce your food bill and save money; want to get control of your food, and always have safe food; want to make a good living from growing food for others" (Friendly Aquaponics, n.d., "Free Food!" para. 2–5). Nelson + Pade markets a small aquaponics kit to "seriously supplement your family's food supply" (Nelson + Pade, n.d., "Home Garden," para. 1), medium-size kits that are "great for home food production and big enough that you'll likely have extra to share with friends or family" (Nelson + Pade, n.d., "Family Plus," para. 1) and larger kits that are "enough to provide fresh fish and vegetables to a family, with extra to sell at a farm stand or local farm market" (Nelson + Pade, n.d., "Family Farm Market," para. 1). The Aquaponic Source sells aquaponics kits with a logo including the phrase "control your food," and, in case of disasters, a promise that gardeners will have "household food security no matter what happens" (Bernstein, 2015).

The purpose of our research was to learn more about noncommercial aquaponics production and practices from practitioners in order to determine the amount of food produced and understand how it is used, and to compare noncommercial aquaponics to soil-based gardens. Although noncommercial aquaponics practitioners outnumber commercial growers (Love et al., 2014), there has been little research focusing specifically on this category

of aquaponics operation. In addition, this is an important area of research because there may be parallels between aquaponics and other forms of gardening, specifically in terms of aspects of gardening that promote health, nutrition, exercise, food security, and other social and ecological benefits. An estimated 43 million households in the United States had food gardens in 2009 (National Gardening Association [NGA], 2009). Research has shown that gardening improves life satisfaction and provides other psychological benefits (Kaplan, 1973; Waliczek, Zajicek, & Lineberger, 2005). For the elderly, gardening helps with managing dementia and provides physical activity (Caspersen, Bloemberg, Saris, Merritt, & Kromhout, 1991; Simons, Simons, McCallum, & Friedlander, 2006). For children, gardens represent an opportunity for hands-on learning and can augment nutrition programs (Robinson-O'Brien, Story, & Heim, 2009). A wide range of health, nutritional, and social benefits have also been well described for community gardens (Draper & Freeman, 2010; McCormack, Laska, Larson, & Story, 2010; Poulsen et al., 2014). Health promotion aspects of community gardens have been identified by studies in Baltimore (Corrigan, 2011), Denver (Teig, Amulya, Bardwell, Buchenau, Marshall, & Litt, 2009), upstate New York (Armstrong, 2000), and Philadelphia (Blair, Giesecke, & Sherman, 1991).

Several studies have focused on consumption of fruits and vegetables from home gardens or community gardens (Alaimo, Packnett, Miles, & Kruger, 2008; Blair et al., 1991; NGA, 2009; Kortright & Wakefield, 2011; Litt, Soobader, Turbin, Hale, Buchenau, & Marshall, 2011; Nanney, Johnson, Elliott, & Haire-Joshu, 2007), which can serve as a yardstick for comparison with consumption of crops grown by aquaponics. Home gardens also impact food security by promoting food accessibility, diversity of fresh produce, and healthy diets (Kortright & Wakefield, 2011). Additionally, individuals with home gardens (Litt et al., 2011) and community garden plots (Alaimo et al., 2008) eat more fruits and vegetables than non-gardeners, independent of whether the food was homegrown or purchased.

The objective of this study was to analyze survey data on noncommercial aquaponics gardeners that describes this group's farming practices and spending, and to identify factors related to homegrown food consumption. We then modeled factors involved in the consumption of aquaponics-grown fish and plants and compared the findings to literature on soil-based gardens. We also discuss current and potential roles of noncommercial-level and commercial aquaponics regarding household and community-level food security.

Methods

We conducted an online survey to better understand the production methods, experiences, and demographics of aquaponics practitioners in the U.S. and internationally. The authors, along with partner organizations, distributed the survey using a chain sampling method, also called "snowball sampling," in which participants help recruit other participants using their own social networks. This approach was particularly useful in identifying hard-to-reach individuals. The survey began on June 25, 2013, and closed on October 1, 2013, hosted on Qualtrics.com (Provo, Utah). The inclusion criteria for the survey was as follows: respondents must be at least 18 years old, able to read English, have completed the entire survey, and have operated and maintained an aquaponics system in the previous 12 months. Descriptive statistics about aquaponics operations (including commercial, noncommercial, and educational operations) as well as survey methods and the codebook have been published elsewhere (Love et al., 2014).

The present study analyzes a subset of the survey data (399 of 1,084 total respondents) to ask specific questions about noncommercial aquaponics gardeners, factors related to homegrown food consumption, and their relationship to food security. The inclusion criteria for this study were that in the previous 12 months respondents must have practiced aquaponics not as their primary occupation; not sold aquaponics-raised plants or fish; not received payment for consulting, design, or equipment sale of aquaponics systems; and responded to the survey with their personal activities with aquaponics (i.e., not on behalf of an organization or company).

Survey data (Qualtrics survey software) were

exported and analyzed in Excel and STATA, and figures were produced in Prism (version 5, GraphPad). Significance for statistical tests was set at an alpha of 0.05. Error was reported as standard deviation. In order to quantify possible statistical associations between product consumption and various factors, we performed statistical tests (t-test and chi-square) on the outcomes for plant consumption (respondents who ate homegrown plants at least once per week versus less than once a week) and fish consumption (respondents who ate homegrown plants at least once per month versus less than once per month) with all the continuous and categorical covariates obtained from the survey.

We examined variables that were statistically associated with homegrown plant and fish consumption on a weekly and monthly basis, respectively, using bivariate analyses. These variables were then considered for inclusion in the multivariable logistics regression models fitted separately for plant and fish consumption. The final model for plant consumption incorporated a set of variables involving respondent knowledge, beliefs, years of experience, and their garden physical factors, such as size and climate zone.

Results

Survey Responses. In total, 1,084 completed the online survey, and 399 respondents met the inclusion criteria for the current study as noncommercial aquaponics gardeners.

Demographics. Table 1 presents the demographics of the survey respondents. Seventeen percent of respondents were female, and the mean age of all respondents was 48 ±13 years old. Most respondents (88%) had more than a high school level of education and were relatively new to aquaponics. Roughly a third of respondents had been practicing aquaponics for less than one year, and nearly all respondents (96%) had less than or equal to 5 years of experience practicing aquaponics. The majority of respondents (78%, *N*=304) lived in the United States. The rest lived in 23 other countries, ranked by number of respondents: Australia (*n*=44), Canada (*n*=7), United Kingdom (*n*=4), India (*n*=3), Italy (*n*=3), Philippines (*n*=3), Spain (*n*=3), China (*n*=2), Malaysia (*n*=2), Panama (*n*=2), and a single respondent from Aruba, Botswana, Brazil, Greece, Netherlands, New Zealand, Puerto Rico, Saint Martin, South Africa, Sweden, Thailand, Trinidad, and Venezuela.

Motivation for Practicing Aquaponics. Respondents were asked about their personal motivation for participating in aquaponics. On a five-point Likert scale, the typical respondent agreed or strongly agreed that "growing my own food," "improving my health," "improving the health of my community," and "environmental sustainability" were motivating factors for their aquaponics gardening. Respondent interests relative to each other were assessed using correlation

Table 1. Demographics of Survey Respondents

Characteristics	N	%
Overall	**399**	
Gender		
Male	325	81%
Female	66	17%
Do not wish to specify	8	2%
Age, year		
18–29	31	8%
30–39	75	19%
40–49	101	26%
50–59	104	27%
60–69	61	16%
70+	19	5%
Education		
Graduate degree	59	15%
College degree or college classes	288	73%
High school, GED, or some high school	49	12%
Country		
United States	304	78%
Aquaponics experience, years		
<1	126	32%
1–2	135	34%
2–3	74	19%
3–4	34	9%
4–5	14	4%
>5	14	4%

statistics. These findings help distinguish respondents that are purely interested in personal issues or bridged personal issues with community issues. Not surprisingly, there was a strong positive correlation between growing one's own food and improving personal health (correlation coefficient (cc) = 0.51, $p < 0.01$). Among respondents for whom growing their own food was a priority, there was only moderate interest in improving community health (cc=0.28, $p < 0.01$). Feeling strongly about environmental sustainability also aligned with improving community health (cc=0.49, $p < 0.01$).

Physical Components and Investments in Aquaponics. Most respondents (75%) housed their aquaponics garden at home (Table 2). Respondent aquaponics systems were typically located outdoors, or sometimes located in a greenhouse (which allows for an extended growing season), or in a building (for complete climate control). Nearly all respondents designed their own aquaponics system, but occasionally respondents purchased a kit or hired a consultant to design their system. Respondent aquaponics systems were small compared to commercial aquaponics facilities: the median aquaponics system was 350 gallons (1,325 liters) with a footprint of 100 ft² (9 m²) The median amount of money respondents spent on aquaponics systems in the previous 12 months was US$500 to US$999. A small fraction (8%) of respondents spent greater than or equal to US$5,000 in the previous 12 months. Because there are high fixed costs in starting an aquaponics garden, we compared spending between individuals who have been practicing aquaponics for less than or equal to one year versus greater than one year. We found there was no difference in annual spending between these two groups (p=0.7).

Table 2. Location, Design, and Investments in Aquaponics Among Respondents

Characteristics	N	%
Location of aquaponics system		
Inside a building	75	19%
Inside a greenhouse	133	33%
On a rooftop	5	1%
Outdoors	199	50%
Is your aquaponics system located at your home?		
Yes	302	76%
Person who designed respondent aquaponics system		
Self-designed	376	94%
Purchased a kit	24	6%
Designed by consultants	18	5%
Aquaponics-related investments (US$) in the previous 12 months		
$0	5	1%
$1–$499	139	35%
$500–$999	90	23%
$1,000–$4,999	129	32%
$5,000–$9,999	18	5%
$10,000–$49,999	11	3%
Prefer not to disclose	6	2%

Fish, Plant Production, and Consumption. Respondents raised fish and plants mainly for consumption, but also as ornamentals. Nearly three-quarters of respondents raised edible species of fish, the most popular being tilapia (Table 3). The remaining 26 percent of respondents only raised ornamental fish. Some respondents (27%) raised both ornamental fish and a species of edible fish.

Respondents raised a wide range of plants, including fruits and fruiting vegetables as well as leafy greens, herbs, and cruciferous vegetables. The median number of crops grown in the previous 12 months was seven. Tomatoes, basil, peppers, and salad greens were the most popular crops, raised by 72, 65, 57, and 56 percent of respondents, respectively. Less than one-fifth of respondents (18%) raised ornamental plants and flowers, and all but three of these respondents also grew edible crops.

Respondents were asked to report their consumption frequency of homegrown aquaponics plants and fish. Sixty-five percent of respondents ate homegrown plants at least once per week, 18 percent of respondents ate homegrown plants 1 to 3 times per month, and 10 percent ate homegrown plants less than once per month and eight percent never ate homegrown plants. Aquaponics fish were consumed far less often than plants. Sixty-four percent of respondents reported never eating the fish they raised. Fourteen percent of

respondents ate homegrown fish 1 to 3 times per month, five percent ate homegrown fish 1 to 3 times per week, and no respondents ate homegrown fish on a daily basis. There was a striking difference in plant and fish consumption by respondent nationality (Figure 1a and 1b). Non-U.S. respondents ate homegrown fish, and to a lesser extent homegrown plants, more frequently than their U.S. counterparts. Consumption frequency was also related to level of education. Respondents with a high school education or less composed 12 percent of the study population, yet disproportionately consumed homegrown plants on a daily basis (Figure 1c). The effect of education on consumption was more pronounced for homegrown fish (Figure 1d).

Modeling

Mathematical models help us understand the relative influence and significance of multiple factors simultaneously. We created multivariable logistic regression models for plant consumption (Table 4) and fish consumption (Table 5) to understand how factors such as climate, facility size, respondent experience, knowledge, etc., are related to consumption of homegrown foods. Below is a description of the significant factors and their relationship to the outcome of eating homegrown food.

Years of Experience. Respondents were asked the date they started their first aquaponics system. With the model, we found that respondents would eat more plant and fish if they had more years of experience with aquaponics. The odds of weekly plant and monthly fish consumption were predicted to be 1.36 and 1.68 times higher, respectively, for each one-year increase in experience.

Facility Size. Facility size is the square-foot footprint of the operation. We found that respondents were more likely to eat fish if their operation was larger. To make the size of the aquaponics facility normally distributed, the data were transformed to the log scale prior to performing any statistical analyses. The odds of monthly fish consumption were predicted to be 1.46 times greater for each one-unit increase in the log-area with the logistic model.

Water Volume. The water volume of an aquaponics system helps us understand outcomes due to the size of the operation, and larger operations can hold more water. We found that respondents would eat more plants if they had larger volume aquaponics systems. Water volume was also transformed on the log scale prior to analyses. The odds of weekly plant consumption were predicted to be 1.48 times greater per one-unit increase in the log-volume of the aquaponics system.

Improved Diet. We asked if improving health was a personal priority for aquaponics practitioners, and found that respondents would consume more homegrown plants if they wished to improve their health. The survey question was on a 5-point

Table 3. Fish and Plants Raised by Respondents in the Previous 12 Months

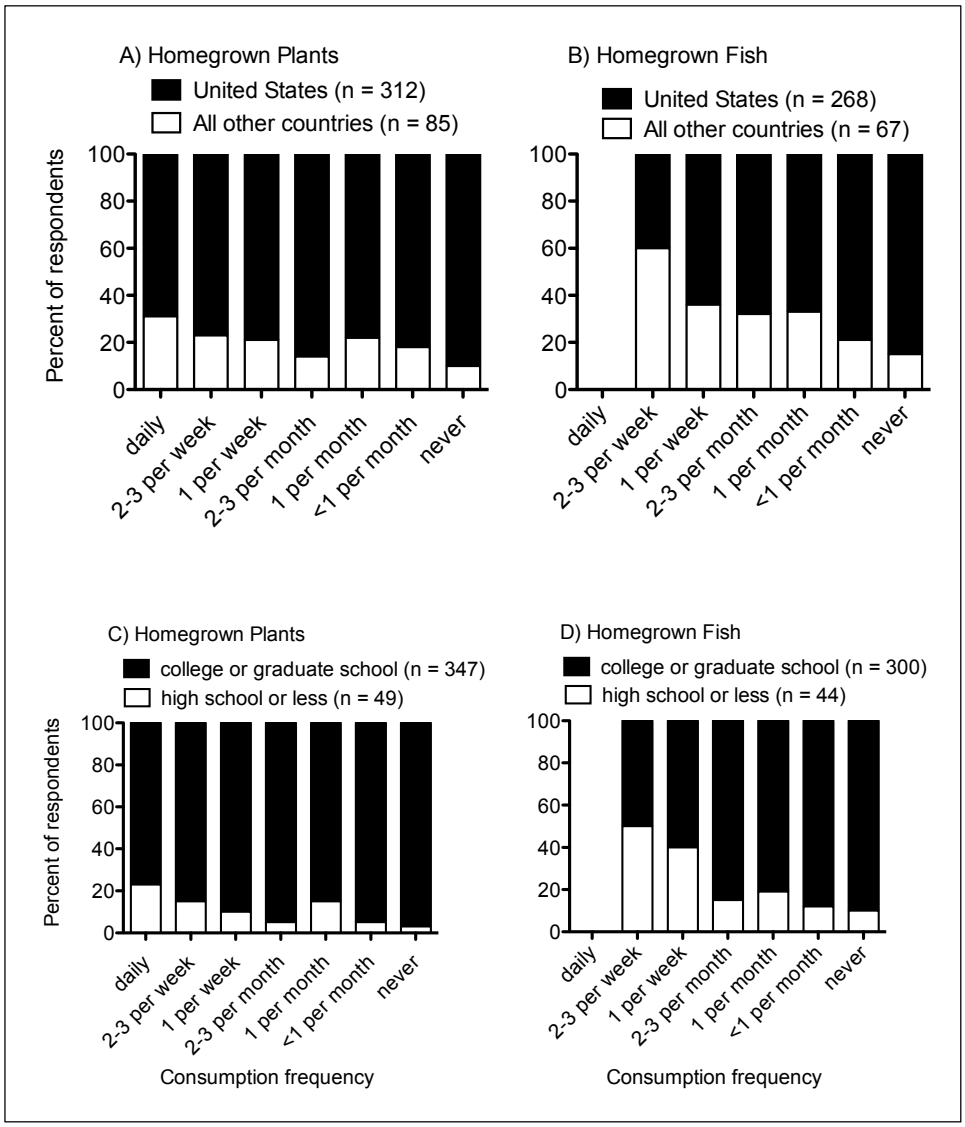
Products	N	%
Fish		
Ornamental fish [a]	212	53%
Edible fish	294	74%
Tilapia	173	43%
Catfish	56	14%
Other animals [b]	52	13%
Perch	49	12%
Bluegill	36	9%
Trout	31	8%
Bass	12	3%
Plants		
Fruiting vegetables [c]	333	83%
Head, leaf lettuce and chard	300	75%
Herbs	296	74%
Cruciferous vegetables [d]	249	62%
Fruit [e]	170	43%
Rooting vegetables [f]	161	40%
Ornamental plants and flowers	71	18%
Other [g]	36	9%

[a] koi, goldfish, tropical fish
[b] crayfish, prawns, yabbies, etc.
[c] peppers, tomatoes, beans, cucumber, squash, eggplant, etc.
[d] collard greens, kale, cabbage, broccoli, cauliflower, bok choi, etc.
[e] strawberries, melons, etc.
[f] beets, carrots, onions, etc.
[g] corn, celery, etc.

Likert,where agree or strongly agree corresponds to improving health as a personal priority. The logistic model predicts that aquaponics farmers who indicated that improving health was one of their motivations for practicing aquaponics were 2.48 times more likely to consume aquaponics plants on a weekly basis than those who did not consider improving health to be a personal priority. Respondent views on improved health were not a significant factor used in predicting fish consumption.

USDA Climate Zone. We expect plants to grow better in regions with milder winters, and we found that respondents would consume more plants if they live in regions with mild winters. The USDA designates climate zones called plant hardiness zones as measured by the average annual minimum winter temperature, and we identified the climate zone for each respondent by overlaying their zip code onto USDA climate zone maps using GIS software. We created three climate zone categories: areas with a mean minimum winter temperature below –10° F were classified as regions with severe winters (USDA plant hardiness zones 1–5), areas with a mean minimum winter temperature between –10° F and 20° F (USDA plant hardiness zones 6–8) were classified as regions where the winters are less severe, and areas with a mean minimum winter temperature greater than 20° F (USDA plant hardiness zones 9–13) were combined into a region classified as having non-severe winters. The results from the model shows that people in the non-severe winter and less-severe winter regions are 5.08 and 4.83 times more likely, respectively, to consume plants on a weekly basis than people in the severe winter region.

Figure 1. Consumption of Homegrown (a) Plants and (b) Fish by Country, and Consumption of (c) Plants and (d) Fish by Level of Education



Edible Fish. This was a binary variable indicating whether or

not the farmer raised an edible fish species as listed in Table 3 during the past 12 months. If a respondent raised ornamental fish, in addition to or in place of edible fish, then they were less likely than other respondents to consume aquaponics fish product. Not surprisingly, the odds of monthly fish consumption for people who raised edible fish was 5.92 times larger than those who did not raise these species.

Table 4. Factors Affecting Weekly Aquaponics Plant Consumption

Weekly Plant Consumption	Odds Ratio	*P* value	95% Confidence Interval
Years of Experience	1.36	0.015	1.06–1.75
Area (log sq. ft.)	1.48	<0.001	1.22–1.80
Improved diet	2.48	0.013	1.22–5.06
USDA plant hardiness zone [a]			
Severe Zone (1–5)	1.00		
Less Severe Zone (6–8)	4.83	0.010	1.45–16.05
Nonsevere Zone (9–13)	5.08	0.009	1.50–17.24

[a] The climatic zones for non-U.S. respondents were converted to the USDA plant hardiness zone scale.

Table 5. Factors Affecting Monthly Aquaponics Fish Consumption

Monthly Fish Consumption	Odds Ratio	P value	95% Confidence Interval
Years of Experience	1.68	0.000	1.31–2.17
Water Volume	1.46	0.010	1.08–1.95
Edible Fish	5.92	0.101	0.708–49.5
Ornamental Fish	0.255	0.001	0.112–0.579
Knowledge	2.76	0.005	1.362–5.57

Ornamental Fish. This was a binary variable indicating whether or not the respondent raised ornamental fish in the past 12 months. Given that the types of fish the gardener raised will most likely affect fish consumption from aquaponics operations, the logistic regression model predicts that farmers who raised ornamental fish were less likely to consume fish they raised on a monthly basis than those who had not raised ornamental fish in the past year (odds ratio=0.255).

Knowledge. This was a binary variable evaluating the knowledge and ability required to maintain an aquaponics operation, and was based on the average overall responses to aquaponics-related knowledge and skills questions in the survey. These questions were given with a 5-point Likert scale, where agree or strongly agree corresponds to being knowledgeable about or having the ability to perform the operation(s) described in each statement. Based on the logistic regression model, the extent of monthly fish consumption was predicted to be 2.76 times higher for people more knowledgeable about aquaponics-related operations than those with less knowledge. Knowledge was not a significant variable for predicting plant consumption.

Comparison of Noncommercial Aquaponics Gardens to Soil-Based Gardens. Aquaponics gardens and soil-based gardens share many similarities: size (~100 ft² or 9 m²), location (at home), and the types of crops (NGA 2009) (Table 6). We found that aquaponics gardens contained more leafy greens than soil gardens, most likely because the nitrogen-rich water promotes leaf growth, and because fruit trees and some rooting crops are not suited for aquaponics.

There were several areas that differentiate our study respondents from the average gardener: the sex of gardeners, age and experience, and level of spending (Table 6). Women constitute slightly more than half of U.S. gardeners, but only 17 percent of respondents in our study. Aquaponics respondents were slightly younger and had less experience than the average gardener. Aquaponics respondents had higher rates of college education compared to the average U.S. household gardener, and aquaponics gardeners spent significantly more money annually on gardening activities.

Comparison of noncommercial aquaponics gardens and commercial aquaponics operations. Noncommercial aquaponics gardens were

Table 6. Comparison of Noncommercial Aquaponics Gardening to Soil-based Gardening

Characteristic	Aquaponics (present study)	Soil-based (NGA, 2009) [a]
% female	17%	54%
Education		
College, some or degree	88%	79%
Experience (median years)	2	4
Garden size (ft^2 | m^2)	100.3 | 9.3	96 | 8.9
Annual cost	US$500–US$999 [b]	US$70
Located at home	76%	91%
Vegetables grown		
Tomatoes	72%	86%
Cucumbers	41%	47%
Sweet peppers	57%	46%
Beans	36%	39%
Salad greens	56%	17%
Collard greens	42%	9%
Kale	31%	3%

[a] NGA (2009) used a stratified random sample of over 2,000 U.S. household gardens and reported values weighted to the U.S. population.
[b] The median interval reported by respondents.

significantly smaller in size, had less money invested annually in operations, and used different methods than commercial aquaponics operations (Table 7). Both commercial and noncommercial aquaponics operations attract visitors, with the number of visitors commensurate with the size of the operations. Currently, commercial aquaponics gardens resemble other small farms regarding size, sales, use of direct marketing, and labor force (Love, Fry, Li, Hill, Genello, Semmens, & Thompson, 2015).

Discussion

The purpose of this research was to better understand noncommercial aquaponics gardeners, describe their growing practices and costs, and identify factors related to homegrown food consumption. We modeled factors that relate to homegrown food consumption for fish and plants in order to identify opportunities for enhanced consumption of homegrown foods. We compared noncommercial aquaponics gardens to an existing survey of soil-based gardens to assess ways this new form of agriculture differs from standard approaches. To understand the scope and scale of noncommercial gardens, we compared our findings to our own published data on commercial aquaponics operations. Finally, we examined the current and potential roles of noncommercial and commercial aquaponics in regard to household and community-level food security.

Table 7. Comparison of Noncommercial and Commercial Aquaponics

Characteristic (median values)	Noncommercial aquaponics gardens (present study)	Commercial aquaponics farms [a]
Farming method	media bed [b]	raft [c]
Tank volume (gal. | liters)	350 | 1,325	7,000 | 26,500
Facility size (ft^2 | m^2)	100 | 9	2,900 | 269
Fish harvests (lb./yr. | kg/year)	unknown	100–499 | 45–226
Plant harvests (lb./year | kg/year)	unknown	500–999 | 227–453
Annual gross sales	US$0	US$5,000–US$9,999
Annual spending	US$500–US$999	US$10,000–US$49,000
Annual no. visitors	1–24	100–499

[a] Data from Love et al., 2014, using data from commercial farms with sales of fish or plants in 2013.
[b] Media beds contain soilless media, such as expanded shale or clay pebbles, and are used to grow crops with a flood-and-drain irrigation method.
[c] Rafts refer to polystyrene or other materials used for buoyancy to float crops in tanks of water about 0.2 to 0.4 meters deep. Crops are then planted inside net-pots, which are inserted into holes in the floating rafts.

In the survey, we assessed respondent motivations for practicing aquaponics, which were primarily to raise their own food, enhance environmental sustainability, and improve their personal health and the health of their community. Homegrown plants were consumed on a weekly basis by about two-thirds of

respondents; weekly consumption was more likely among individuals interested in improving their health, and who had a larger area under cultivation and had more experience with aquaponics. Consumption of homegrown crops does not necessarily cause improved health outcomes; however, improved access to produce is a contributing factor to improving health. Respondents were more likely to eat their crops if they lived in mild to warm climates, a finding that occurred on a gradient of USDA plant hardiness zone groups (zones 1–5; 6–8; 9–13). The association with climate is not surprising because shorter, milder winters allow for longer growing seasons.

An unexpected finding was that aquaponics-raised fish were not regularly consumed by most respondents, making it difficult to substantiate claims about noncommercial aquaponics gardening as a means to improve self-provisioning of animal protein. These findings differ from the marketing claims used by some businesses to sell aquaponics kits. There are several possible reasons why this may be the case. First, over a quarter of respondents raised only ornamental fish. Second, fish can take a year or more to reach harvestable size, and about a third of respondents had less than one year of aquaponics experience, indicating that the fish may not have reached harvestable size. Third, aquaponics systems can have low stocking densities of fish and still achieve high plant yields, which makes these enterprises geared towards crop production. In a survey of commercial aquaponics operators, fish were harvested in lower amounts than vegetables (Love et al., 2015). Fourth, respondents may lack the skills or be unwilling to slaughter, clean, and cook fish, while in comparison fruits and vegetables can be eaten raw or minimally processed. We did not assess respondent competency in fish processing or cooking, which may be a barrier to preparing homegrown fish.

Two subsets within the study population ate more homegrown fish than the average respondent. Non-U.S. respondents ate more homegrown fish than U.S. respondents, suggesting differences in food culture between U.S. and non-U.S. respondents. Respondents with a high school degree or less education consumed homegrown fish more frequently than respondents with more education. Education can serve as a proxy for income (De Gregorio & Lee, 2002), and respondents with less education may have fewer economic resources and more incentive to consume homegrown fish for dietary needs. Noncommercial aquaponics may be contributing to household food security for these individuals; however, the typical respondents were middle- aged men with high levels of education and an interest in technology and/or engineering, who may not be food insecure.

We compared noncommercial aquaponics to soil gardens, because soil gardening has a wide range of benefits such as promoting physical and mental health, nutrition, and food security (Blair et al., 1991; Kortright & Wakefield, 2011; Waliczek et al., 2005). We found that individuals practicing aquaponics were more likely to be male, have higher levels of education, to be less experienced gardeners, and to invest ten times more money than soil gardeners. The same types of crops were raised in soil gardens and aquaponics gardens (with the exception of fish), and plots of land were roughly the same size. Because aquaponics does not require soil, these gardens can easily be located inside a building; nearly one fifth of respondents located their aquaponics garden indoors. Operators of aquaponics systems may find advantages in the greater flexibility of system placement and the potential for year-round production. The higher costs in aquaponics can be attributed to the capital costs needed to purchase equipment such as tanks, pumps, and other materials, and recurring costs for fish, fish feed, and soilless planting media. The recurring costs in aquaponics are not insignificant; we did not observe a difference in average annual spending between individuals who had operated a system for less than or equal to one year and who had for one or more years. More research is needed to understand why noncommercial aquaponics gardeners are willing to spend more than soil-based gardeners on similar-sized gardens, and whether these costs produce added benefits, aside from the attraction of using a new technology. Interestingly, despite an abundance of aquaponics kits available on the market, only 11 percent of respondents used a kit or a consultant to design their system. The technology and the process of system design may be an attraction for many aquaponics

gardeners. The provisioning of food is not the only reason to garden; soil-based gardeners rarely produce enough for self-sufficiency (Kortright & Wakefield, 2011) and spending on grocery bills is similar between gardeners and non-gardeners (Nanney et al., 2007).

We found that commercial aquaponics operations were an order of magnitude larger, more costly to maintain, and more productive than noncommercial operations. From a community food-security perspective, larger commercial operations may be better suited than personal gardens for producing and distributing food. Commercial aquaponics is still an emerging field, however, with perhaps 150 farms in the U.S. (Love et al., 2015). We estimate that about 20 acres (8 hectares) are in commercial aquaponics production in the U.S. (Love et al., 2015), which is 0.0003 percent of the 6.6 million acres (2.7 million hectares) in U.S. vegetable production in 2013 (USDA-ERS, 2013). There is a similarly dramatic difference between commercial aquaponics fish harvests and total U.S. aquaculture harvests. At the current scale, commercial aquaponics is not making a substantial impact on community food security. Two case studies, and our survey, indicate that the profitability of many, but not all, commercial aquaponics operations is in question (Love et al., 2015; Tokunaga, Tamaru, Ako, & Leung, 2015). Scaling up aquaponics would require effort from a variety of disciplines, including training to develop a workforce knowledgeable in hydroponics and aquaculture, outreach to city and state officials who may not be knowledgeable on how to permit or regulate aquaponics facilities, and a cohesive set of industry guidelines or best management practices. New business models may be needed to identify what factors enable an operation to succeed.

Given the real challenges in expanding aquaponics beyond household-level operations — including the considerable effort required to build necessary capacity — aquaponics should be weighed against other approaches for improving community food security, such as community gardening, using SNAP/EBT cards at farmers markets, and other activities that increase access to healthy food choices. For groups seeking to site commercial aquaponics in a community, several factors need to be considered, such as climate zone, economic sustainability of the business, zoning laws, availability of skilled and unskilled labor, knowledge, the cultural relevance of the products, and for whom the products are intended (local consumers versus consumers in distant markets). In addition to commercial farms and noncommercial gardens, a third approach practiced by nonprofit organizations such as Growing Power in Milwaukee (Growing Power, n.d.) seeks to provide education, job training, and food security within a community using aquaponics. The Center on Disability Studies at the University of Hawaii runs the Aquaponics Workforce Development program (University of Hawaii, n.d.), another example of job training using aquaponics. In some cases, nonprofits are engaging in commercial sales; studying the community benefits of these types of organizations is beyond the scope of this paper, however.

Our research does have some limitations. Due to the snowball sampling method and nonrandom sampling used to reach this population, we may have missed some aquaponics gardeners, and our findings may not be representative of all people practicing aquaponics at the household level. In particular, it is likely that we did not capture the entire population of non-U.S. aquaponics gardeners in a representative manner.

Conclusions

Aquaponics is a niche form of gardening practiced in the United States and internationally. Aquaponics gardeners are motivated by the desire to grow their own food, improve their health and the health of their community, and improve environmental sustainability. Most aquaponics respondents consumed homegrown plants on a weekly basis, while homegrown fish consumption among respondents was infrequent. Non-U.S. respondents and respondents with less education ate homegrown fish more frequently than the average respondent. Noncommercial aquaponics gardeners are similar in many ways to soil-based gardeners, and their gardens contribute to household dietary intake; however, two major differences are higher yearly costs and fewer women practicing aquaponics compared to soil-based gardens. For lower-income households who participate in noncommercial

aquaponics, they may be contributing to community food security at the household level by attracting a different audience to home gardening and providing a soil-less means of self-provisioning produce and fish. At the community level, commercial aquaponics is more appropriate for producing larger amounts of food, but this form of food production faces certain barriers and the current scale of commercial aquaponics production is very small compared to soil-based agriculture and other forms of aquaculture.

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Assessing the potential for pocket agriculture in mountainous regions: A case study in West Kootenay, British Columbia, Canada

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Abstract
Food security is a growing concern for rural communities that rely on imported food. Increasing a region's food self-reliance is a strategy to address this concern, but is a challenge in regions with limited arable lands as a result of topographically diverse, mountain-dominated landscapes. Mechanized, large-scale agriculture relies on contiguous areas of arable land, rather than small parcels of dispersed arable soils and suitable climates. The Kootenay region of British Columbia, Canada, serves as an example of the opportunities for mountainous, rural communities to increase their food self-sufficiency by considering the potential for agriculture on small parcels of land. Soil capability survey maps that provide a biophysical assessment of arable lands were used as a basis for determining (a) the potential land base available for small-scale agriculture, and (b) the potential for niche crops that may be grown on poorer capability lands in

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the Kootenay region. The soil capability criteria, coupled with farm survey data, were used to measure and quantify the distribution of underutilized farmland in the region. Results indicate that up to 90 percent of land capable of agriculture and 69 percent of high quality farm land protected under the Agricultural Land Reserve is not under production for crops or pasture. Global Climate Model scenarios for 2050 indicate that the region will have a longer growing season, hotter summers, and more frost-free days, which could increase the region's capacity to grow food but might require additional water for irrigation. The assessment suggests that soil surveys based on biophysical attributes can assist mountainous regions in assessing their potential for agriculture.

Keywords
small-scale agriculture, climate change, local food production, pocket agriculture, soil surveys, agricultural capability, food security

Introduction

As recently as the 1950s, much of the food consumed in the West Kootenay region of British Columbia (B.C.) was grown or raised locally, whereas now about 95 percent of food consumed is imported from outside the region (Brynne Consulting, 2011). B.C. currently imports about CA$2 billion worth of food each year, including most of its fruit and vegetables, and is highly dependent on the state of California (U.S.) for most of this produce (Ostry, 2010; Ostry, Miewald, & Beveridge, 2011). The reliance on food that is sourced from far away has exposed the vulnerability of many communities' food systems to climatic events such as the recent droughts in California (Crawford & Beveridge, 2013; Dai, 2013). The uncertainties that climate change places on reliable food imports have led to the promotion of local agriculture as a suggested policy strategy for B.C. (Ostry et al., 2011).

There are regions of many countries, including Canada, that have not developed intensive agricultural enterprises, in part due of the lack of large contiguous landscapes with arable soils to facilitate today's technically sophisticated agriculture. The West Kootenay region of southeastern B.C. is an example of one of these regions. In this region, settlement and industrial development was initiated by resource-extractive industries dominated by forestry and mining (Turnbull, 1988). Although there was limited agriculture to meet the needs of the local citizenry, there was also little incentive or opportunity to develop a viable and sustainable basis for commercial agriculture. The rugged landscapes, the relatively few contiguous areas of productive soils, the large diversity of microclimatic conditions expressed over short distances, and the relative mobility of the work force were factors that negated the establishment of a commercial mechanized agricultural industry. Settlers within the region did establish small parcels of crop production to meet within-season food requirements, and agriculture was established in some larger river valleys.

Local governments and organizations in the West Kootenay recently have identified the reliance on food imports as a vulnerability to adapting to the impacts of climate change (Columbia Basin Trust, n.d.-a). Producing more food locally has been identified as a resilience strategy and also an economic opportunity, and this has spurred interest and research on local agricultural development in the region (Brynne Consulting, 2011; Columbia Basin Trust, n.d.-a; Steinman, 2011). Climate change may actually have the potential to create agricultural opportunities in the West Kootenay by extending the growing season and expanding the varieties of fruits and vegetables that might be grown.

Food self-sufficiency can be defined as being able to meet a region's consumption needs (particularly for staple food crops) from its own production rather than by buying or importing (Minot & Pelijor, 2010). The B.C. Ministry of Agriculture and Lands (2006) suggests that to achieve food self-sufficiency from a land-based perspective, about one-half a hectare (0.5 hectare) of farmland is needed to produce the food for one person for one year, given the production technologies available today. Although this is an oversimplified way to evaluate food self-sufficiency, it does provide a land-based measure and could include small parcels, or pockets, of arable land that provide opportunities to increase local food production.

It is from a land-based perspective that we have chosen to investigate the agricultural potential of the West Kootenay and its relevance to food self-reliance in the region.

Farmland in the West Kootenay Region

As a result of British Columbia's mountainous terrain, less than 5 percent of the total provincial land base is considered arable or potentially arable (Green, 2006). Of this, about 600,000 hectares (ha) (1.5 million acres) are in crops and 1.61 million hectares (3.98 million acres) are used for pasture or grazing (B.C. Ministry of Agriculture, 2011). Farms on lot sizes less than 4 hectares or 10 acres are defined as "Small Parcel Agriculture" and make up 29 percent of all B.C. farms (B.C. Ministry of Agriculture, 2011; Statistics Canada, 2011).

Arable soils in B.C. have been classified on the basis of their capability to support crops, in terms of *Soil Capability for Agriculture* (Runka, 1973). This classification system categorizes soil landscapes into a series of classes from Class 1 to Class 7 (best to least suited for soil-based, mechanized commercial agriculture). Most of the soil landscapes in the best classes (1–4) have been placed within the province's Agricultural Land Reserve (ALR), which was established in 1973 by the government of B.C. to permanently protect valuable agricultural land from being lost (Agricultural Land Commission, 2013; Green, 2006). Certain conditions that limit mechanized agriculture, such as excessive stoniness, topography, or soils with limited water-holding capacity, may result in a Class 5 rating, but may not be significant limitations for particular niche crops, such as tree fruits or grapes in areas which are climatically suitable (B.C. Ministry of Agriculture and Foods, 1983).

The *Soil Capability for Agriculture* classification does not consider several factors, including the productivity of any specific crop, the distance to market, available transportation, hazards of crop damage due to storms, nor economic viability. The soil capability classification system as developed in B.C. differs from other systems that rate the "suitability" of soil landscapes for agriculture, which are based on crop productivity (Green, 2006). The capability classification system is not restricted to productivity of present crops common in the region; instead, it presents the potential of the range of crops that could be grown, thus serving a more proactive planning process (Green, 2006).

In the West Kootenay region, the total amount of farmland, including its primary limitations to crop production, are largely unknown. The ALR provides an estimate of the amount of land reserved for agricultural purposes for mechanized agriculture (Classes 1–4), but does not include land (e.g., Class 5 soils) that might be suitable for niche crops or tree fruit production.

Agriculture in North America, including British Columbia, is dominated by large-scale, highly mechanized management on relatively large and contiguous land holdings. In mountainous regions, large contiguous land areas are usually not available, restricting agricultural activities to small localized areas. This is the situation in the Kootenay region. We introduce the concept of 'pocket agriculture' to identify small parcels of land that can be used for agricultural uses that do not require large holdings or climate regimes that are conducive to a range of crops, but have potential to serve local food needs. As Miller et al. (2013) posit, society should optimize resilience by developing food chains that incorporate risk and complexity, which entails creating local, national, and global systems that better capture change and learning. These scenarios embrace adaptation and opportunities for multiple types of food production, integrating traditional and novel approaches to attain food security.

Thus, although the West Kootenay region does not contain large tracts of contiguous land for today's mechanized agriculture, the question becomes, *if there is a need and interest in local food production, is there an opportunity to develop pocket agriculture in the region?*

As such this study's three objectives are to:

1. Assess the area of arable lands within the West Kootenay region;
2. Identify the soil and climate challenges and potential for small-parcel agriculture; and
3. Make a preliminary assessment of the effects of climate change on this potential for small-parcel agriculture.

Methods

Study Area

West Kootenay agricultural land

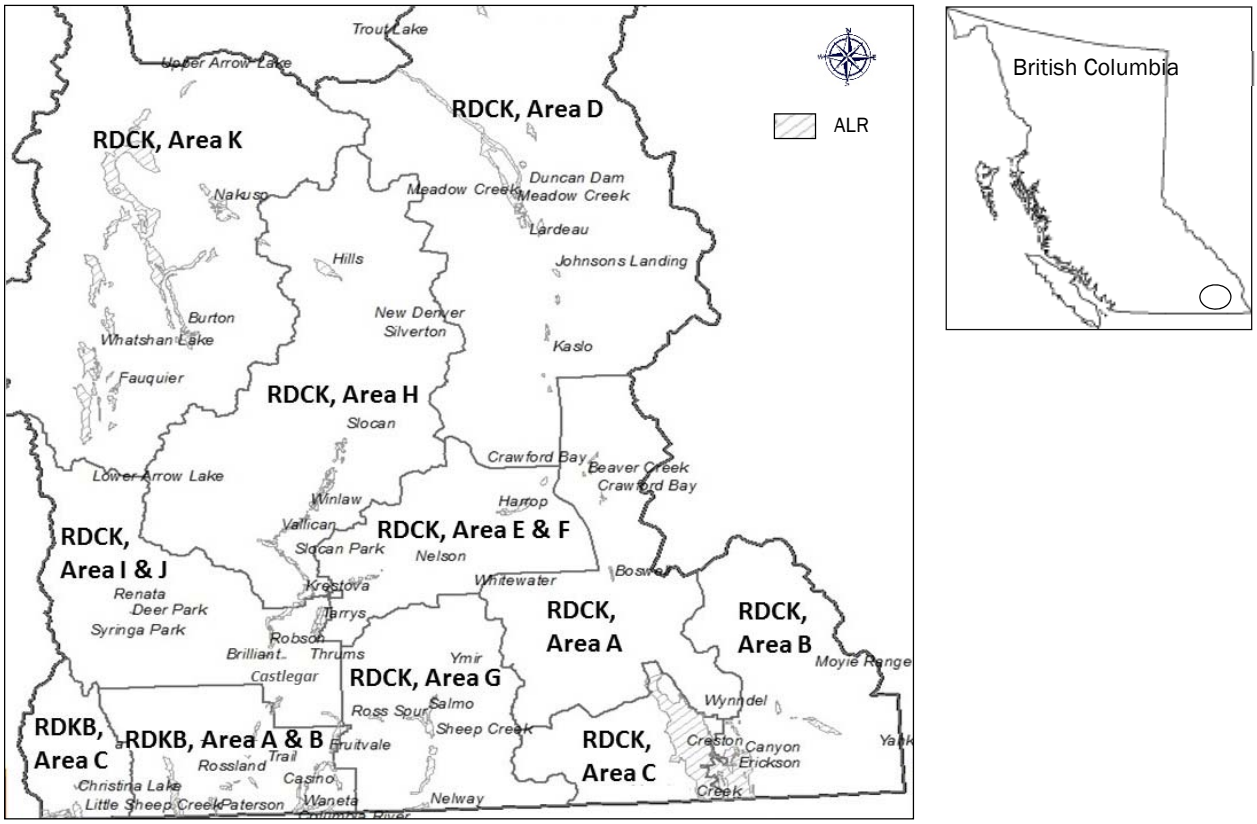
The Kootenay region comprises the Kootenay Boundary, Central Kootenay, and East Kootenay districts in the Southern Interior of British Columbia. The West Kootenay study area comprises all areas within the Regional District of Central Kootenay and areas A, B, and C in the Regional District of Kootenay Boundary, for a total of 2,484,575 ha or 6,139,519 acres (Figure 1). The study area includes several urban centers (Trail, Rossland, Nelson, Castlegar, Creston, Salmo, Nakusp, and Kaslo) and, combined with rural areas, is home to approximately 70,000 residents.

Soil capability and climate

The most suitable soils for agriculture (Class 1–4) in the study area are located on fluvial and lacustrine deposits (Jungen, 1980). Moderate limitations of these soil for agriculture include poor soil drainage on the floodplains, poor soil structure in the lacustrine areas, and low moisture-holding capacity on the sandy terraces. Other areas suitable for arable agriculture include some glaciofluvial terraces, fluvial fans, and glacial till deposits. Limitations of these soils include adverse topography, low soil moisture-holding capacity, stoniness, and a short annual frost-free period. Class 5 soils have more severe limitations and are dispersed throughout the region on moderately sloping glacial till, coarse textured fans, stony glaciofluvial terraces, and some areas that are susceptible to flooding (Jungen, 1980). As mentioned earlier, although the definition of *Soil Capability for Agriculture* (Runka, 1973) includes only Classes 1–4, this study extended the definition of potentially arable soils to include Classes 5 and even 6, in consideration of specialty or niche crops.

Climatic characteristics that affect crop

Figure 1. Map of the West Kootenay with Regional District Boundaries by Census Area



Note: Map generated in ArcGIS by the authors.

production determine the potential agricultural capability of the land. Thus, Class 1 land must be located in an area which has at least a Class 1 climate capability for agriculture rating (Jungen, 1980). Precipitation and growing conditions are influenced by the mountainous topography and, as such, vary considerably throughout the region. Temperature is more consistent than precipitation; microclimates such as rain shadows and frost pockets exist in the region. Long-term records show a historic range of frost-free periods from 130 to 149 days, and greater variability in precipitation, with historic climate moisture deficits ranging from –180 mm to almost –400 mm (–7.09 inches to almost –15.75 inches) (British Columbia Land Inventory, 1981).

Analysis

Farmland data

This study employed geographic information systems (GIS) to determine the amount of agricultural land in the West Kootenay region. Data sources included 1:125 000 maps of the *Soil Capability for Agriculture* classification (Canada Land Inventory, 1972) and the 1:50 000 agricultural capability GIS maps and data (B.C. Ministry of Environment, n.d.). The boundaries of the ALR were based on GIS files from B.C. Data Distribution Services (2014).

The study area included areas with digitized soil capability data for a total of 2,035,790 ha (5,030,547 acres), of which 65,750 ha or 162,472 acres (3.2 percent) are within the ALR. Approximately 440,000 ha (1,087,000 acres) were excluded from the analysis due to lack of data in a digitized format; however, these areas contained very little agricultural land.

This information was analyzed based on the *unimproved* Soil Capability Class ratings, which reflect the soil and climate conditions that existed at the time of the survey, without irrigation (Runka, 1973). Potential improvements that could result in an *improved* rating include drainage, irrigation, diking, stone removal, salinity alleviation, subsoiling, and the addition of fertilizer.

Climate data

Global Climate Models (GCM) from the Intergovernmental Panel on Climate Change's Fifth Assessment Report (2014) were downscaled (that is, localized) to the West Kootenay region using ClimateBC models for the Pacific Northwest and B.C. region (ClimateBC, desktop version) to project future climate scenarios to 2050. The models calculated seasonal and annual climate variables for specific locations based on latitude, longitude, and elevation. Three GCMs were chosen to represent the broad range of projected climate scenarios for 2050 with the RCP 8.5 scenario. The RCP 8.5 represents a "business-as-usual" scenario, meaning no measures would be taken to mitigate climate change or decrease in greenhouse gas emissions (Table 1).

Seven localities in the study area were chosen to downscale the climate scenarios. Multiple data points in GIS were taken in a one km (0.62 mile) grid for each location for all Class 1–5 lands over 800 meters (2,625 feet) elevation and were averaged.

Agricultural census data

Data from the 2011 Canada Agricultural Census were used to estimate the land currently under crop production and in pasture in the West Kootenay region. The "Hectares in Crops" variable was used to quantify the amount of land currently under cultivation for field crops, tree fruits, vegetable, berry, and nut production. The "Farms Reporting" variable was used to show the number of farms growing different crops and the average area or size of farm. These variables do not include Christmas tree plantations, nurseries, sod and

Table 1. Global Climate Models Used and Characteristics Analyzed for the West Kootenay Region, B.C.

Global Climate Model	Characteristics
HadGem	Hot/Dry
GFDL	Very hot/Wet
MRI	Warm/Moist

Models from Intergovernmental Panel on Climate Change, 2014

mushrooms farms, summer fallow land, herbs, or garlic gardens. The census data only account for farms that report to Statistics Canada and therefore excludes backyard food production. As there is limited published information on suitable crops for the region, this information was augmented by guides and feasibility studies for crop production in other areas of Canada and the United States (Garland, 1990 Otto, 1993; University of Wisconsin-Extension & University of Minnesota, 1992).

Results

The entire Kootenay region (East, Central and Boundary districts) has about 392,550 hectares (970,010 acres) in the ALR, which is approximately 8 percent of B.C.'s total agricultural land in the ALR. Of this total, 17.5 percent is in the West Kootenay region. The mountainous landscape of the West Kootenay limits agriculture, but pockets of arable land with a suitable climate permit the production of field crops, annual vegetables, tree fruits, berries, poultry, beef, and dairy. The area at Creston (Central Kootenay B and C) is the commercial agricultural center of the region, and its major crops are tree fruits, forage, and some grain. The Nakusp area (Central Kootenay Area K) has the most land in the ALR and produces the second highest amount of forage and alfalfa crops after Creston (Statistics Canada, 2011).

West Kootenay Soil Capability and ALR Summary

Class 1–4 soils that can support a wide range of crops compose 5 percent of the total study area, while Class 5 soils that support forage, animal pasture, or specialty niche crops compose an additional 6 percent. Thus, about 11 percent of the total study area has some agricultural capability, for a total of 200,000 ha or 494,000 acres (Figure 2). Although agricultural land is limited in the region, in most areas it is underutilized and thus has potential for increased agricultural activity. Of the land classified as suitable for agriculture (Class 1–5), only 10 percent is under production for crops and pasture, or 31 percent of the ALR (Table 2).

The land zoned for agriculture (ALR) makes up 3.2 percent of the total study area. The majority of the land in the ALR is high quality, with 42 percent being prime agricultural land (Classes 1–3) and 40 percent being Class 4. Lower capability classes compose very little of the ALR, with Class 5 making up 10 percent and Class 6 and 7 less than 8 percent (Table 3).

The majority of prime agricultural land in the region (Classes 1–3) is protected within the ALR. Only 6 percent of Class 5 land is protected in the ALR, and a negligible amount of Class 6 and 7 (Table 3).

Based on the B.C. Ministry of Agriculture's self-sufficiency estimate of approximately 0.5 hectare (1.24 acres) of land required to produce food for one person for one year (2006), 35,000 ha (86,500 acres) would be required for the West Kootenay's current population of 70,000. There is insufficient Class 1–3 land to provide for 70,000 people (Figure 3); however, if Class 4 lands were included, it brings the total area of agricultural land (Class 1–4) to 86,000 ha (212,500 acres). The 66,000 hectares (163,090 acres) in the ALR

Figure 2. Percent of West Kootenay Study Area (2,035,790 ha or 5,030,550 acres) in Soil Capability Classes 1–7

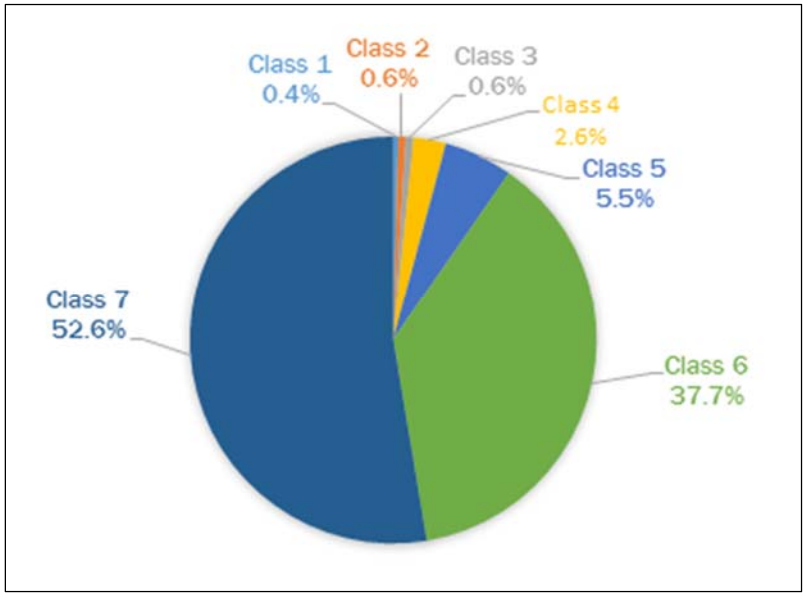
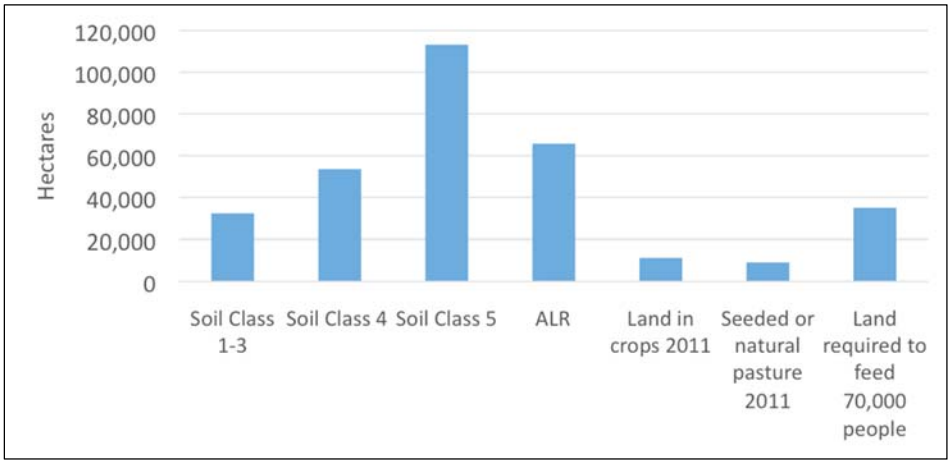


Table 2. Land Used for Agriculture as a Percent of the Agricultural Land Reserve by Regional District Electoral Area in West Kootenay, B.C.

Regional District Electoral Area	Land used for agriculture (ha) (crops and pasture)	Land used for agriculture as % of ALR (ha)
Central Kootenay A	218 | 539	44%
Central Kootenay B	5,118 | 12,647	69%
Central Kootenay C	7,858 | 19,418	65%
Central Kootenay D	259 | 640	4%
Central Kootenay E & F	377 | 932	34%
Central Kootenay G	882 | 2,179	36%
Central Kootenay H	1,257 | 3,106	28%
Central Kootenay J & I	576 | 1,423	31%
Central Kootenay K	2,883 | 7,124	13%
Kootenay Boundary B & A	1,002 | 2,476	21%
Kootenay Boundary C	*	*
Total	**20,430 | 50,484**	**31%**

* Agricultural data amalgamated with Kootenay Boundary B

Figure 3. Land Inventory and Land Use Comparison of the West Kootenay Region



Note: 1 hectare=2.47 acres.

Table 3. Total ALR in the Study Area by Capability Class

Capability Class ALR	Area (hectare | acre)	% of total capability class	% of ALR
1	7,000 | 18,000	90.5%	11%
2	10,994 | 27,167	89.1%	17%
3	9,551 | 23,601	76.0%	14%
4	26,279 | 64,937	49.1%	40%
5	6,724 | 16,615	5.9%	10%
6	3,699 | 9,140	0.5%	6%
7	1,488 | 3,677	0.1%	2%
Total ALR study area	65,737 | 162,440	3.2% (of study area)	100%

approaches double the required area to feed the current West Kootenay population (Figure 3).

Limitations for Agriculture

Moisture-holding capacity, topography, stoniness, and excess water are the main soil and land limitations for mechanized agriculture on ALR land in the West Kootenay.

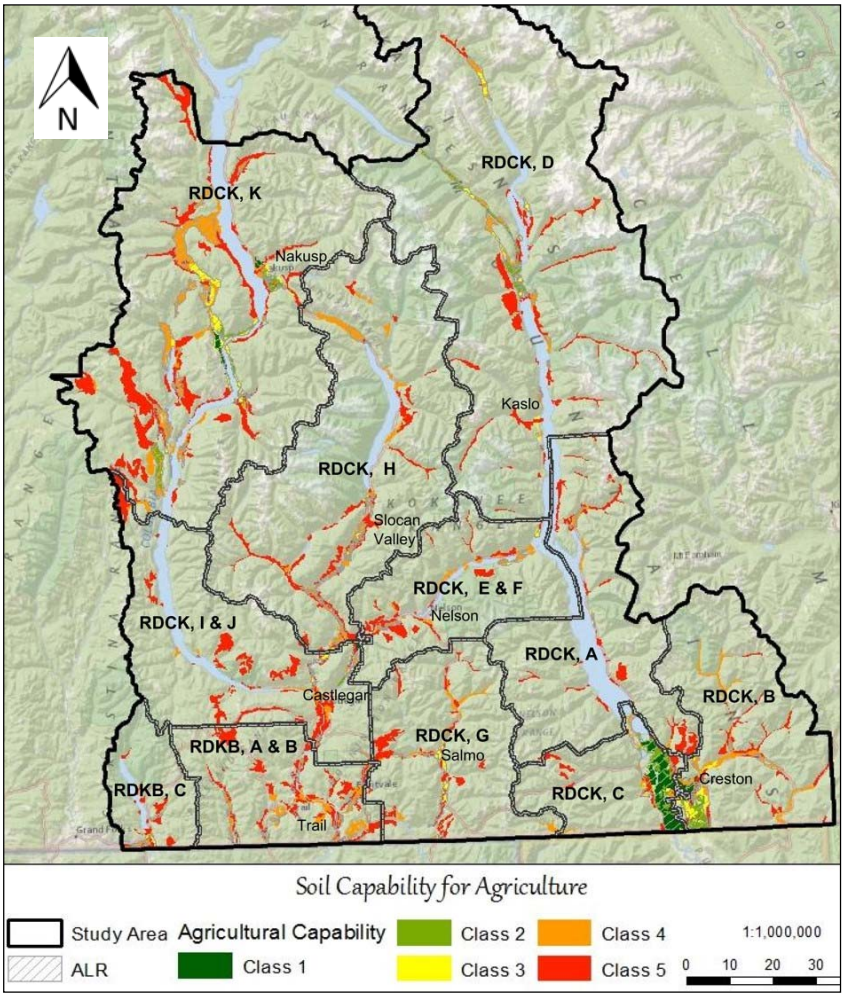
Moisture-holding capacity is the primary limitation affecting 35 percent of land in the ALR. Irrigation could decrease this limitation for agricultural use. Topography is also a limiting factor, affecting 22 percent of the land in the ALR. This limitation cannot easily be overcome. Excess water and stoniness are limiting factors for about 11 percent of ALR land.

It is important to note that a Class 5 limitation of moisture-holding capacity, topography, or stoniness may not be a significant limitation for the production of tree fruits, grapes, or hops where the climate is suitable (Canada Land Inventory, 1972), and therefore soils with these limitations may have more agricultural potential, especially with more favorable changes in climate.

Regional Distribution of Farmland

Regional District of Central Kootenay (RDCK) Areas B, C and K have the highest amounts of prime agricultural land (Figure 4) and the most hectares in the ALR. These areas also have the most hectares under agricultural production, demonstrating that farmland is currently being used in these areas (Table 2). Area D, in the northeastern portion of the study area, has the fourth largest area of high quality farmland and ALR but a minimal amount of land under agricultural production, with only 4 percent of land being used for crops or pasture compared to the ALR in this area (Table 2 and Figure 4). Many Regional District Areas have underutilized agricultural land, such as Central Kootenay Area G, which has 2,430 ha (6,005 acres) in the ALR, of which only 36 percent is used for crops and pasture (Table 2).

Figure 4. Distribution of Farmland in the West Kootenay Region, B.C.



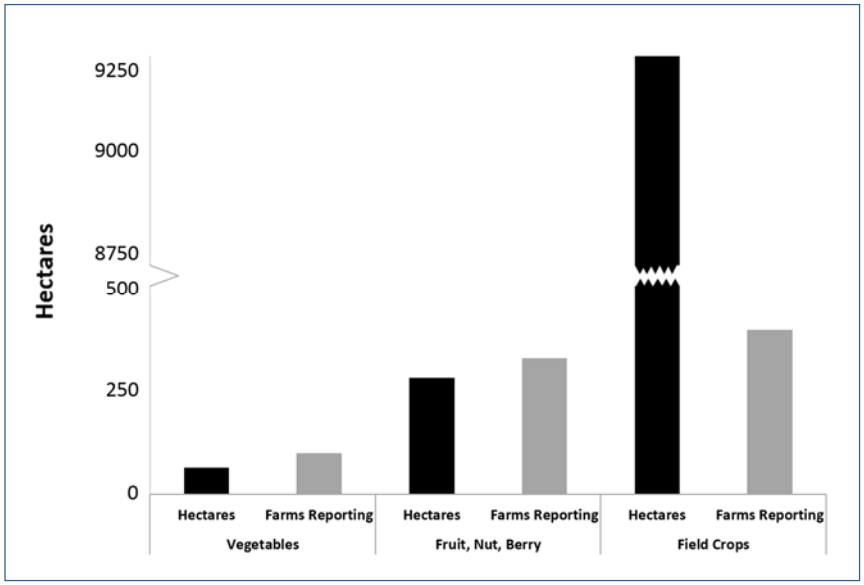
Agricultural Crops Grown

The majority of crops cultivated in the West Kootenay region fall under the category of field crops, which include wheat, barley, sweet corn, corn for silage, potatoes, and forage such as alfalfa (Figure 5) (Statistics Canada, 2011). Of these, alfalfa hay and fodder are the most widely grown. The Creston area (Central Kootenay B and C) has the most hectares in field crops, with 7,190 ha (17,767 acres) and 215 farms reporting, while Central Kootenay Area K has 945 ha (2,335 acres) and 50 farms reporting. The remainder of the region combined has 1,000 ha (2,471 acres) with 128 farms reporting, indicating that the majority of larger scale commercial field crop production is in Creston (Figure 6).

Total gross farm receipts for 2010 support the crop data that suggest the scale of agricultural activity in the study area, outside of the Creston area, is dominated by small-scale enterprises with annual farm receipts mostly being less than CA$50,000.

The climate is favorable to a range of fruit and vegetable varieties, but it has historically limited the production of some perennial and annual crops that require mild winters, Growing Degree Days (GDD) greater than 2,000, and a Frost Free Period (FFP) greater than 160 days. A total of 262 hectares (647 acres) are in production for fruit, nut, and berry (Figure 5) with Creston reporting the most hectares of tree fruits, with the dominant crop being sweet cherry. Berry production is minimal in the region, with only 16 hectares (40 acres) under cultivation (in blueberry, strawberry and raspberry). Nut production is negligible. A diversity

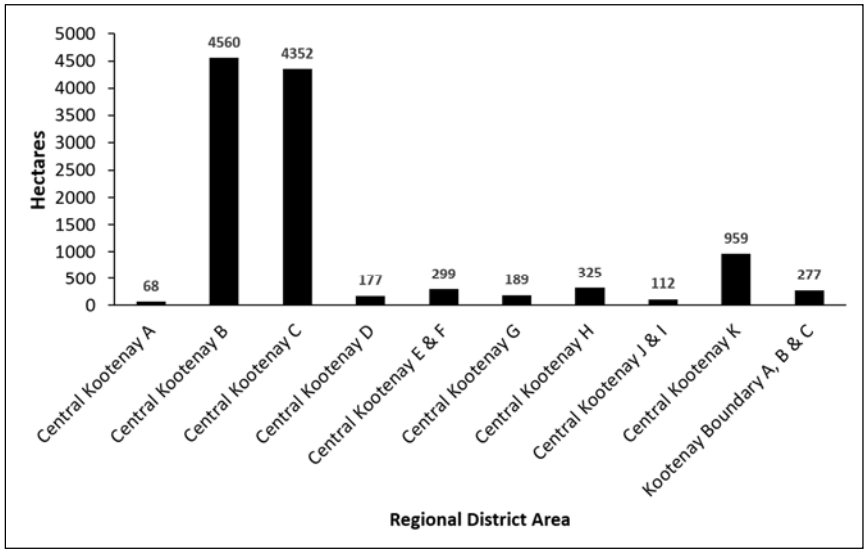
Figure 5. Land in Crops* (Hectares) and Number of Farms by Category (Excluding Pasture), 2011 Census Year. Note the break in the y axis indicating a rise in values.



* Does not include greenhouse vegetables, seeded pasture, herbs (including garlic) or Christmas trees.

of annual vegetables are grown in the region on a total of 65 ha (161 acres) (Figure 5). The crop data do not represent the full amount of produce being grown in the region as the data is limited to farms that report to Statistics Canada and thus does not include production from backyard gardens.

Figure 6. Total Land in Crops (Excluding Pasture) by Regional District Area, 2011 Census Year



Global Climate Model Projections

Climate change projections that simulate climatic scenarios to the year 2050 indicate a substantial increase in the FFP and GDD throughout the West Kootenay region. This could extend the growing season by approximately 30 to 90 days and increase the range of crops that can be grown.

Climate projections vary throughout the region, with cooler, moister climates projected in the North and some small microclimates in the South (Central Kootenay K, D and G), while warmer and drier climates are projected in the South (Figure 1). All three GCMs suggest an increase in temperature-related variables by 2050 for the FFP (Figure 7), GDD (Figure 8), and Mean Warmest Month Temperature (MWMT).

The increase in the projected FFP illustrates the trend, with increases from 17 percent with the MRI GCM and up to 84 percent with the HadGem GCM (Figure 6). The MWMT is projected to increase by up to seven degrees in some areas and mean temperatures for each season show an increase including the winter.

Summer precipitation and Climate Moisture Deficit (CMD) show more variability among climate scenarios than the projections related to temperature. The MRI and GFDL scenarios suggest an increase in summer precipitation for most areas, and the HadGem model predicts a slight decrease. The CMD and warmer temperature projections suggest that all arable land will likely require

Figure 7. Projected Frost-Free Period (Days/Year) for Two Localities in the West Kootenay Region for the Year 2050 (Compared to Historical Climate)

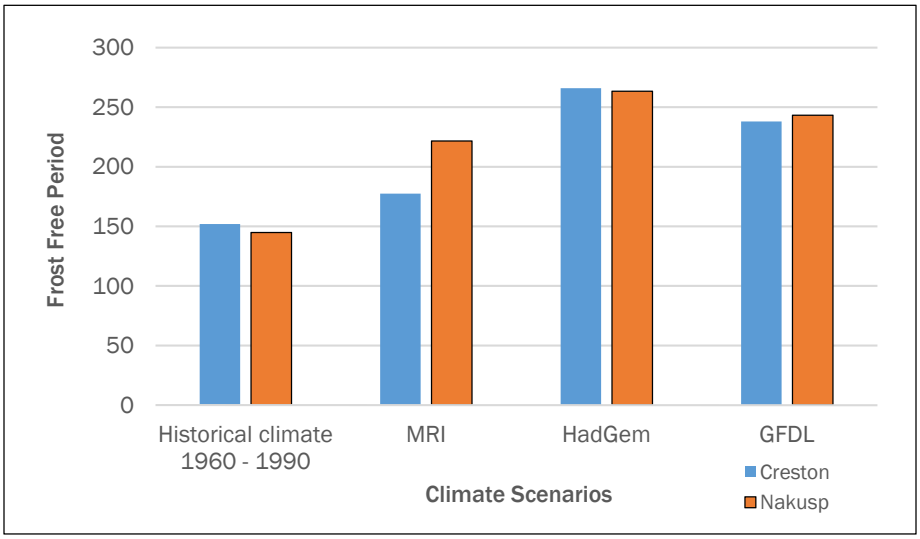
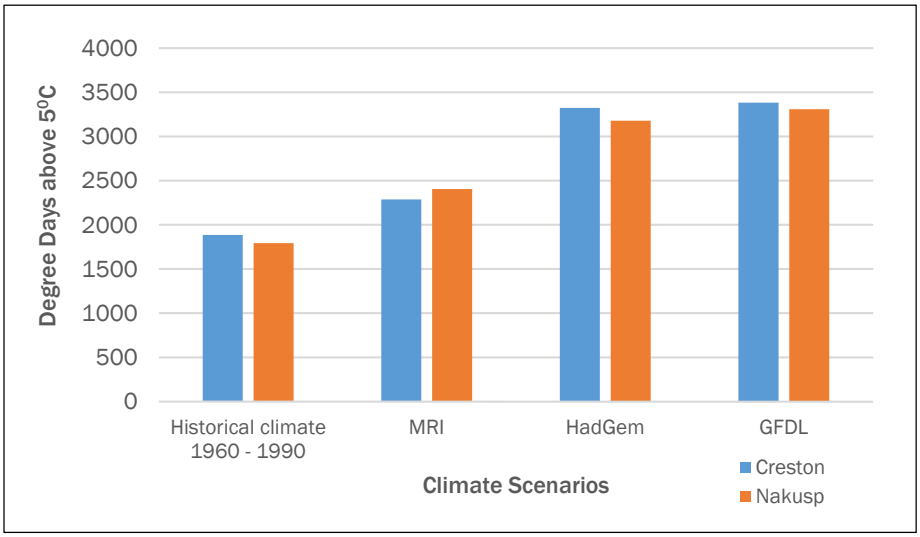


Figure 8. Projected Growing Degree Days above 5° C for Two Localities in the West Kootenay Region, for the Year 2050 (Compared to Historical Climate)



increased irrigation with climate change, especially areas with the highest CMD.

Discussion

The *Soil Capability for Agriculture* classification scheme provides an initial tool to assess the agricultural potential for pocket agriculture in this mountainous region, and suggests that from a biophysical perspective there are opportunities to increase crop production in the West Kootenay. Only 10 percent of capable agricultural land, Classes 1–5 (or 31 percent of the ALR), is actually used for crops or pasture, meaning that there is high potential to increase agricultural production from a soil capability perspective. Underutilized farmland is distributed in pockets throughout the region, making small-scale agriculture the necessary production system (see Figure 9 for an example). With the concerns about the region's reliance on imported food and the introduction of mechanization for small-scale agriculture (Johansen, Haque, Bell, Thierfelder, & Esdaile, 2012) there appear to be opportunities for local agriculture to satisfy some local consumption needs. For example, the Kootenay Co-op grocery store in the city of Nelson (population 10,000), which specializes in local products and sells over CA$2 million in produce annually, frequently experiences a supply gap. The store's produce manager stated that in 2013 they could have purchased, each week, an additional 1,000–1,500 lb. of apples, 1,000 lb. of blueberries, 300–400 lb. of broccoli, and 400–600 lb. of melons (Kootenay Co-op produce manager, personal communication, May 2014).

Three GCM scenarios provide the most accurate climate projections while also demonstrating the range of uncertainty. A longer FFP could extend the season for annual vegetable crops, making it possible to produce more food through the year. Crops that may have historically been limited by

Figure 9. Earthy Organics Farm (Kootenay Boundary Area C), an Example of a Mixed Vegetable Farm on Class 4 and 5 Soils That Has Overcome the Limitations of Stoniness and Low Moisture-Holding Capacity

Photo credit: Rachael Roussin, Earthy Organics Farm, Fruitvale, B.C., 2011.

climate but that do well in marginal soils, such as tree fruits or grape, could be suitable for Class 5 soils, which are considered poor quality for mechanized agriculture.

Challenges exist to increasing food production. The total number of farms in the entire Kootenay region decreased by 9.4 percent between 2001 and 2011, and the area being farmed decreased by 18.6 percent. In addition, the average age of farm operators increased from about 54 to 57 years between 2006 and 2011, indicating that young people are either choosing not to farm or are having difficulty entering the agricultural sector (Columbia Basin Rural Development Institute, 2013). Land access for new entrants has been identified as a barrier to increased agricultural production in the region (North Kootenay Lake Community Services, 2013).

Climate change also presents potential challenges to local crop production, such as an increase in weeds and pests, drier soils, extreme climate events, and more water needed for irrigation (Columbia Basin Trust, n.d.-b). Although there appears to be an abundance of fresh water in the region (both surface water and ground water), increasing human activities, population growth, and the projected impacts of climate change are placing pressure on water resources such that municipalities and organizations are collaborating to conserve water use (Columbia Basin Trust, n.d.-c). Therefore, given the dependence on irrigation for crop productivity in the region, water requirements for increased agricultural development would need to be investigated further to fully understand the potential of the region.

A central limitation of this study is the assumption that an increase in local crop production will achieve greater food self-sufficiency for a region. There is a long-standing debate on whether food self-sufficiency is a useful strategy to achieve food security (Minot & Pelijor, 2010). Increasing the food security level and developing a local food system involve a range of socio-economic and infrastructure considerations that are not addressed in this study.

Conclusions

Although the mountainous regions of British Columbia are not considered to be important agricultural areas due to the small extent of suitable soils for larger-scaled mechanized agriculture, in areas with underutilized farmland such as the West Kootenay, adaptations and adoptions of small-scale agriculture with a potentially more favorable future climate for crops could lead to an increased importance of pocket agriculture to meet local food security concerns and provide opportunities in the agricultural sector.

The analysis using *Soil Capability for Agriculture* classifications revealed that there are substantial areas for expansion of agriculture in the West Kootenay region. The ALR protects 66,000 ha (163,090 acres) of the most valuable land for agriculture in the West Kootenay, with enough land to feed almost double the current population (based on the assumption that .5 ha or 1.24 acres is required per capita, per the usual British Columbian's diet). The region's capacity to feed itself is actually much greater, as there is a total of 86,000 ha (212,510 acres) of Class 1–4 lands that can support a wide range of crops, and 113,000 ha (279,229 acres) of Class 5 lands that are suitable for forage, animal pasture, and specialty niche crops. Only 10 percent of capable agricultural land (31 percent of the ALR) is actually used for crops or pastures; thus, using land quality as an indicator of agricultural potential, the West Kootenay is well situated to grow more food.

Climate change also presents potential opportunities to expand the range of crops that can be grown, extend the length of the growing season for annual vegetable crops, and make use of poorer quality lands for specialty niche crops, such as tree fruits and grapes whose cultivation has historically been limited by climate.

The results suggest that there is potential from a biophysical perspective to increase mixed small-scale agriculture in the West Kootenay region. The approach developed in this study could be adapted to many mountainous regions as a means to assess potential to increase local food production, especially for the more labor-intensive agricultural practices and the growing of fresh produce for local communities. We recognize that other issues, including socio-economic factors such as land access and the economic viability of small-scale farming, offer challenges to increasing the amount of land used for agricultural purposes, and that crop production does not necessarily equate to a regional food system nor confer food self-reliance or security. These issues are complex. The results of this study suggest that soil biophysical information, coupled with climate data and projections, can provide objective information on the agricultural potential of a region which then can be used by communities and governments as the initial step in understanding the crop production potential for increased regional food self-reliance.

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Consumer demand for value-added products of African indigenous vegetables in coastal Kenya: The case of sundried and frozen cowpea leaves

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Abstract
Some recent efforts to improve the food and nutrition security of rural households have focused on the promotion of African indigenous vegetables (AIVs). This has been due to the challenges smallholder farmers face in participating in high-value global food systems. AIVs contain vitamins and micronutrients not found in most exotic vegetables, and therefore their consumption could contribute to resolving malnutrition among poor rural households. Higher consumption could also lead to improved rural incomes through sales into urban niche markets, resulting in enhanced community development. Despite the role AIVs can play in promoting food security and community development, the AIV supply is highly seasonal, characterized by large gluts and acute shortages. Much study of AIVs has focused on production rather than consumption. In this study we use descriptive analysis to describe AIV consumers and assess demand for basic value-addition practices by AIV retailers. We then use regression analysis to examine the factors conditioning consumers' willingness to pay (WTP) for more advanced value-addition processes that can smooth out the supply of AIVs. It focuses on cowpea (*Vigna unguiculata*), one of the most widely consumed AIVs in western, eastern, and coastal Kenya. We find that several socio-economic factors and varietal attributes condition the WTP

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for value addition. Specifically, WTP is affected by age, gender, education, awareness of the selected value-addition techniques, and the self-reported likelihood of purchasing value-added vegetables. Additionally, color, tenderness of leaves, and the washing off of soil affect WTP for value addition. The paper discusses the implications of these findings for traditional fresh produce food systems, community development, and policy.

Keywords
urban consumers, willingness to pay, value added, attributes, African indigenous vegetables, AIVs, cowpea leaves, Kenya

Introduction

The need to earn revenues from foreign trade has led sub-Saharan African countries to pursue a rural development strategy that focuses on production and sale of fresh vegetables for export to developed countries. The aim of this strategy is to use export horticulture to promote employment creation (and hence income-earning opportunities), improve rural households' food security, reduce rural poverty, and thus contribute to community development. Export horticulture targets the lucrative markets of developed countries, especially those in Europe. However, over the past decade or so these efforts have faced major challenges from the imposition of stringent and continuously changing international food safety standards. Examples of these standards include the GlobalGAP, Tesco Supermarket's Nature's Choice, and Mark & Spencer's Farm-to Folk (Okello & Swinton, 2010). Studies indicate that these standards have tended to discourage many smallholder farmers from continued participation in global food systems because the investment costs are high in terms of human, physical, and financial capital items (Graffham & Macgregor, 2009; Nyagah, 2009; Okello & Swinton, 2010). This situation can contribute to entrenching household food insecurity and poverty if alternative markets do not function well.

The challenges of maintaining the participation of poor smallholder farmers in horticultural export value chains are leading to an increased emphasis in development work on domestic horticulture, including some work on African indigenous vegetables (AIVs) (Abukusta-Onyango, 2003) that until recently were neglected by policy-makers and treated as "poor women's subsistence crops," a low-value nontradable commodity, and a crop for the poor that merited no attention (Muhanji, Roothaert, Webo & Mwangi, 2011). As the value of these crops becomes more recognized, three additional factors are contributing to the increased interest in AIVs. First, research indicates that the majority of AIVs have beneficial nutritional and medicinal properties (Irungu, Mburu, Maundu, Grum, & Hoeschle-Zeledon, 2007; Okonya & Maass, 2014), making them an important component of traditional food systems. Second, an increase in disposable income among middle-class consumers, who frequently demonstrate strong awareness of the importance of healthy diets rich in fruits and vegetables, together with an increase in urban populations, has led to increased demand for fresh fruits and vegetables and their value-added products (Abukutsa-Onyango, Kavagi, Amoke, & Habwe, 2010). As demand for AIVs has increased, so has the number of farmers who are shifting into commercial production of these crops, especially around peri-urban areas (Okonya & Maass, 2014). Ngugi, Gitau, and Nyoro (2007) found that up to 30% of vegetables sold in Nairobi are AIVs produced in peri-urban farms. Third, the richness of some AIVs' micronutrient levels has led to their promotion as good foods for managing HIV-AIDS in adults (Irungu et al., 2007) and for addressing micronutrient deficiency problems (including vitamin A, iron, calcium, magnesium, zinc and iodine) (Hutchinson, Kipkosgei, & Akundabweni, 2011) in young children and lactating mothers (Flyman & Afolayan, 2006; Müller & Krawinkel, 2005). AIVs help to tackle the problem of malnutrition because they provide important key micronutrients.

Furthermore AIVs have attracted the attention of agencies focused on community development because they are mostly grown by smallholder farmers who make up a majority of the poor in farming communities. Among these, women are a majority (Abukutsa-Onyango, 2002; Irungu et al., 2007; Weinberger, Pasquini, Kasambula, & Abukutsa-Onynago, 2011). Studies conducted in

the three East African countries find that more than 73%, 69%, and 65% of AIV farmers in Kenya, Uganda, and Tanzania, respectively, are women (Abukutsa-Onyango, Kavagi, Amoke, & Habwe, 2010; Weinberger et al., 2011). Since women play important roles in household food provisioning, and in rural food systems in general (Johns & Sthapit, 2004), it is arguable that the development of this subsector can significantly contribute to household food security and poverty reduction by enhancing the effectiveness of their role. At the same time, the tolerance of most AIVs to a wide spectrum of abiotic and biotic stresses makes them more suited to smallholders' low-input production techniques than their exotic counterparts, which frequently require pesticides and fertilizers and an adequate supply of water to perform well. Interest in AIVs is being further driven by health consciousness among the more affluent urban consumers who associate these vegetables with a low risk of pesticide and pathogen contamination (Karanja, Njenga, Mutua, Lagerkvist, Kutto, & Okello, 2012).

The importance of AIVs in the current development agenda is further illustrated by the interest they have attracted among the donor community. Donor interest is translating into significant support for projects that promote production and marketing of AIVs in African countries, including Kenya. The International Development Research Center, the Bill and Melinda Gates Foundation, the United States Agency for International Development, and the Food and Agriculture Organization of the United Nations have recently supported programs and projects that target the improvement of AIV value chains in many African countries. In Kenya, Farm Concern International, the University of Nairobi, Jomo Kenyatta University of Agriculture and Technology, Egerton University, and the Kenya Agricultural Research Institute are some of the organizations with projects focusing on the development of AIV value chains. A major area of focus of these projects is increased production through better agronomic practices; improved postharvest processing and quality preservation; value addition through various processing options; and retailing practices. Processing and value addition is especially intended to ameliorate the seasonal fluctuations in supply (Kumar, Singh, Kumar, & Mittal, 2011).

Despite the strong interest and donor support for the development of AIV value chains, the literature remains very scanty on demand for value-added AIV products. Studies to date have tended to focus primarily on production and marketing segments of the value chain (Abukusta-Onyango, 2003; Abukutsa-Onyango et al., 2010; Muhanji et al., 2011; Mundua, 2010) and less on consumption and demand for AIVs. Only a few studies have examined the importance of value addition to consumers. Matenge, van der Merwe, De Beer, Bosman, and Kruger (2012), for instance, use hedonic scaling to evaluate consumer preference and acceptance of AIVs. Mundua (2010), on the other hand, assesses consumer WTP for cowpea varieties. Neither study, however, focuses on the WTP for value addition. This study fills this knowledge gap by assessing demand for value addition by consumers in urban markets. It specifically characterizes urban consumption and demand for basic value-addition practices at the retail level, and then examines demand for more advanced value-addition processes specifically meant to make AIVs available during dry seasons when the green leaves are usually unavailable. By focusing on the consumer end of the chain, this paper adds value to the literature on AIVs and on value-chain development more broadly.

This study is based on data collected from urban consumers of cowpea leaves in main market outlets in Mombasa and Kilifi districts in coastal Kenya. Cowpea is one of the main fresh vegetables consumed by both urban and rural residents in both districts. It is the third most consumed vegetable by urban consumers after kale and amaranth, and also by rural producers and consumers in the two districts, making it an important component of both rural and urban food systems. It is especially popular among Mijikenda ethnic communities, where a majority of people consume it as boiled leaves, usually cooked in coconut milk. The supply of cowpea leaves, however, is currently highly seasonal, with glut experienced during the rainy season (approximately April to August) and acute shortages during the dry period (approximately December to March). The leanest months in terms

of availability of cowpea leaves are January and February, the peak of the dry season in the study areas. These fluctuations in supply mean that market prices vary widely over the season and are usually highest during the peak of the dry season. One strategy to smooth out the supply, reduce postharvest losses, and ensure availability of cowpea leaves even during the dry season is through processing.

There are various available options for processing cow peas. These include air- or sun-drying, solar drying, greenhouse drying, freezing, and freeze-drying. Each of these processing options affects the nutritional and aesthetic quality of cowpea leaves differently, and consequently affect consumer acceptance and demand. This study therefore sought to determine if consumers would pay for value-addition strategies that would enable cowpea leaves to be available during the dry season. The rest of this paper is organized as follows: Section 2 outlines the theory and methods used. Section 3 discusses the data, and Section 4 presents and discusses the results. Section 5 concludes and highlights key policy implications.

Research Methods

This study draws from consumer theory following Lancaster (1966) and several recent studies that argue that individuals obtain utility from the benefits a good delivers, that is, its characteristics (for instance, in our case, time utility) rather than only from the good per se (Akgüngör, Miran, & Abay, 2007; Lacaze, Rodríguez, & Lupín, 2009; Lippe, Mergenthaler, & Isvilanonda, 2010; Lusk & Hudson, 2004; Takatsuka, Cullen, Wilson, & Wratten, 2009). These studies specifically posit that consumers derive satisfaction not only from the good itself but also from the attributes or characteristics of the good. In the context of this study, willingness to pay is defined as the resources individuals are willing and able to give up for value addition. It encompasses the availability of food of a desired quality (and desired time and amounts). Thus value addition is conceived of as a process that makes food of desirable quality available at the desired time, quality, and quantity.

Consumer theory further posits that consumers will balance the additional benefits associated with value addition and the increase in the unit price of a value-added food. The marginal utility of value addition, on the other hand, depends on consumers' socio-economic characteristics, learning abilities (i.e., the ability to process information), and exposure levels to food-borne hazards (Blend & Ravenswaay 1998; Gao & Schroeder, 2009). WTP is therefore interpreted as an indicator of demand for value-added vegetables. Indeed, Gracia, Loureiro & Nayga (2009) suggest that consumers' abilities to process information affect their evaluation of product information, and hence products, while Eom (1994) found that consumers' stated preferences (i.e., utility) are affect by information about risk of pesticide exposure.

Stated WTP (P_i) for cowpea leaves for each consumer i was used as the dependent variable in the study. P_i is interpreted as the additional money that consumer i is willing to pay for the value-added cowpea leaves. It is assumed that estimates of implicit values of characteristics can be used to estimate the price of an unobserved product by valuing embodied characteristics, namely value addition in this case (Hanley, Wright, & Alvarez-Farizo, 2006). In this study, separate WTP models were estimated for sundried cowpea leaves and frozen cowpea leaves. The functional form of the model estimated is specified as

$$P_i = \alpha + X_i\beta_i + Z_i\gamma_i + \varepsilon \quad (1)$$

Where,

P_i = stated marginal WTP for a bundle of value-added cowpea leaves in Kenya shillings.[1] That is, P_i is the additional amount of money a consumer is willing to pay,

X_i = a vector of consumption attributes preferred by the consumer,

β_i = the estimated coefficient on the consumption attributes,

Z_i = a vector of household socio-economic characteristics,

γ_i = the estimated coefficients for household socio-economic characteristics, and

ε = Stochastic error term.

[1] US$1 was equivalent to 85 Kenya shillings at the time of this study.

The variables (X and Z) used in the estimation of the model in Equation 1 were selected based on the literature and are:

1. Socio-economic variables (Z): *lnage* = natural log of age of the respondent in years; *gender* = dummy variable equal to 1 if the respondent is male, 0 otherwise; *memgrp* = dummy variable equal to 1 if the purchaser is a member of a social/consumer group, 0 otherwise; *lnincome* = natural log of income earned by the purchaser's household in 2011 in Kenya shillings; *drymthd* = dummy equal to 1 if the purchaser is aware of sun-drying method of value addition, 0 otherwise; *freezmthd* = dummy equal to 1 if the purchaser is aware of freezing method of value addition, 0 otherwise; *buydry* = dummy equal to 1 if the purchaser would buy sundried vegetable, 0 otherwise; *buyfrozen* = dummy equal to 1 if the purchaser would buy frozen vegetable, 0 otherwise; *info* = dummy equal to 1 if purchaser has ever received information about value addition in vegetables from any source; 0 otherwise; *qntyconsmd* = quantity of cowpea leaves consumed by the household in bundles.
2. The consumption attribute variables (X) include: *clean* = dummy equal to 1 if a purchaser prefers clean (nonsoiled) leaves, 0 otherwise; *taste* = dummy equal to 1 if a purchaser prefers good taste, 0 otherwise; *color* = dummy equal to 1 if a purchaser prefers leaves that have good-looking (green) color, 0 otherwise; *tender* = dummy equal to 1 if a purchaser prefers leaves that are young and/or tender, 0 otherwise; *uninjured* = dummy equal to 1 if a purchaser prefers leaves that are uncrushed, uninjured, and/or unbruised, 0 otherwise; *price* = dummy equal to 1 if a purchaser prefers a fair price, 0 otherwise.
3. Since the dependent variable (willingness to pay) is a continuous variable that is censored at 0, i.e., there are zero values for consumers who are not willing to pay anything for value addition, the Tobit regression models were estimated separately for the sundried and frozen cowpea.

In order to test for differences in WTP between frozen and sundried cowpea leaves, the Wilcoxon Signed Rank test was used. This nonparametric test examines whether subsamples, in this case WTP for sundried and frozen cowpeas, generated from the same population are different (Rosner, Glynn, & Lee, 2006). In addition, following Wooldridge (2010, p. 450), we use the Wald test of multiple exclusion restriction to test whether variables that are statistically insignificant, and do not appear to contribute to the variability in the WTP, can be jointly excluded from the regressions model.

Data and Scenario Description

This study was conducted in Kongowea, Mtwapa, Kilifi, Majengo, and Saba Saba markets in coastal Kenya. The four markets control the greatest share[2] of the vegetables traded in Mombasa and Kilifi districts. Data were collected via personal interviews by trained enumerators using pre-designed and pretested questionnaires. The sampling procedure was as follows: In each market the respondents were selected from among the purchasers of cowpea leaves using random sampling techniques. Specifically, every third person who purchased cowpea leaves was picked and interviewed. This was continued until the predetermined quota of 15 purchasers was interviewed in each day.

The interviews were conducted at different times of the day (morning (from about 7:00 am), noon, and afternoon to evening (ending at about 5:30 pm)), and were also conducted on both weekdays and weekends in order to capture different consumer buying patterns. In markets that are expansive and/or where cowpea leaves were sold at different locations, the market was divided into four zones and an interviewer was stationed in each zone. The interviewer then interviewed every third person who bought cowpea leaves in that zone. A total of 147 consumers were interviewed.

On average, one in every five cowpea buyers approached for interviews declined to participate in the study, resulting in a nonresponse rate of 20%.

[2] Other channels through which cowpea leaves are traded in the study areas are (a) street peddlers (i.e., *mama mboga*) and (b) kiosks. Due to time, financial, and logistical reasons, this study did not interview purchasers who use these channels.

The most commonly cited reason for refusing to take part in the study was lack of time. For respondents who were willing to participate, data were collected on, among other things, WTP for value-added cowpea leaves, and the socio-economic factors and consumption attributes likely to affect WTP for value addition in cowpea. The interviews were conducted in April and May 2012.

This study used the payment card method in collecting the WTP data. Past studies mainly used the dichotomous choice method in collecting WTP bids. However, the dichotomous choice method usually obtains very little information from each respondent and hence is inefficient (Ngigi, Okello, Lagerkvist, Karanja, & Mburu, 2011). Multiple-bounded dichotomous choice approaches, an improvement on earlier models, nevertheless have the drawback that they yield internally inconsistent responses. The payment card approach overcomes these challenges by improving the efficiency of the WTP estimates (Kerr, 2000). It also has the additional advantage of being simple to implement while minimizing the probability of starting-point bias found in interactive bidding techniques.

Table 1. Payment Card Illustrating the Distribution of Willingness To Pay Bids

Scenario 1: Normal cowpea leaves	Scenario 2: Sundried cowpea leaves	Scenario 3: Frozen/vacuum-packed cowpea leaves
Indicate by ticking in the appropriate box how much more/extra shillings* you are willing to pay for product described in Scenario 2 (and 3) as compared to product in Scenario 1.	0 shilling/heap	0 shilling/heap
	1 shilling/heap	1 shilling/heap
	2 shilling/heap	2 shilling/heap
	3 shilling/heap	3 shilling/heap
	4 shilling/heap	4 shilling/heap
	5 shilling/heap	5 shilling/heap
	6 shilling/heap	6 shilling/heap
	7 shilling/heap	7 shilling/heap
	8 shilling/heap	8 shilling/heap
	9 shilling/heap	9 shilling/heap
	10 shilling/heap	10 shilling/heap
	More than 10 shilling/heap	More than 10 shilling/heap

* The exchange rate at the time of the survey was US$1 = 85 Kenya shillings.

The payment card had these instructions:

> On this sheet are written different amounts of money from zero up to more than 10 Kenyan shillings (Ksh). Starting at the top of the list and moving down kindly ask yourself: 'Am I willing to pay 1 KSh over and above what I would pay for a standard heap of cowpea leaves in order to buy similar amount of value-added cowpea leaves?' If you are certain you would pay the amounts of money in the card to buy the value-added cowpea leaves then place a tick (√) in the space next to the amount you will be willing to pay. Please tick only when you are sure you can keep paying this additional amount even in future.

The payment card used for eliciting responses, along with the various WTP bids, is presented in Table 1.

The three scenarios presented to consumers were:

Product Scenario 1 (Normal/standard cowpea leaves): This product is grown using standard production practices. It is abundant during the rainy season, and hence the amount of leaves in a bundle or heap costing KSh10 is large. It is therefore very cheap during the rainy season. However it is not easily available during dry season, and when found, the leaves are hard, fibrous, and small. The bundle size selling for KSh10 during the dry period is very small.[3]

Product Scenario 2 (Sundried cowpea leaves): This product is grown using standard production practices. However, it is preserved through open sun-drying, and hence the leaves are brownish. The dried leaves are hygienically stored. How-

[3] The normal practice is for fresh vegetable retailers to reduce the size of the bundle rather than the price during times of scarcity (such as the dry period).

ever, due to drying, leaves from a regular bundle or heap look small. There is, however, no difference in the amount of vegetables once it is cooked. This product is therefore readily available during the dry season.

Product Scenario 3 (Blanched and vacuum-packed frozen cowpea leaves): This product is produced using standard production practices. However, it is preserved by being frozen after blanching and vacuum-packing. The preserved cowpea leaves retain their green color and tenderness. Preservation makes it possible to store the product for longer periods; thus this product is available even during dry season.

One of the most often cited criticisms of WTP bids elicited using hypothetical situations is the hypothetical bias. In this study, we use "cheap talk" proposed by Cummings and Taylor (1999) and subsequently applied by List (2001) and Chowdhury, Meenakshi, Tomlins, and Owori (2011) to mitigate such bias. Specifically, the respondents were advised to select the additional payment only if they were prepared to pay it regularly. Such warnings significantly reduce or even eliminate the problem of hypothetical bias (Chowdhury et al., 2011).

This study also examined some of the basic value-addition practices undertaken by cowpea leaf retailers and traders and the willingness by consumers to pay for such practices. The basic value-addition activities examined included: (a) presenting the vegetable on a raised bed (i.e., wooden structure or frame with a flat top about three feet or one meter from the ground), (b) chopping the leaves, (c) grading and/or sorting, (d) packaging well, (e) washing the produce and (f) destalking (i.e., plucking the leaves from the stalks). WTP for these practices was assessed using a binary dummy variable equal to 1 (=Yes) if a respondent was willing to pay for a basic value-addition practice, and 0 otherwise.

Results and Discussion

Characteristics and Consumption Patterns of Cowpea Leaf Consumers

Table 2 presents the variables used in the analysis and estimation of the econometric models along with the results of summary statistics that characterize the purchasers interviewed.

The summary statistics indicate that the average WTP for value-added cowpea leaves (i.e., both sun-drying and freezing) is approximately KSh5.00 per heap, with a standard deviation of 4. That is, the respondents are willing to pay an extra KSh5.00 per heap with value addition. Results further show that the minimum WTP for both forms of value addition is KSh0 (zero), indicating that there are some consumers who did not attach any value to the processes that will make cowpea available during dry seasons, when it is usually very difficult to find in the market. Indeed, 34% and 44% of consumers indicated that they would pay nothing (i.e., KSh0) for sundried and frozen cowpea leaves, respectively. The summary statistics further show that the average age of the respondents is 31 years, suggesting that many of cowpea leaf consumers are young. Results also show that the respondents, on average, have 10 years of education, earn KSh21,000 per annum, and are mostly women. The low annual income of the cowpea consumers is not surprising and has often been interpreted to mean that cowpea is an inferior, low-value good. In addition, the finding that most of the respondents are females indicate that shopping for vegetables is done mostly by women. This is in line with findings involving urban vegetable purchasers in Kenya (Lagerkvist, Hess, Okello, Hansson, & Karanja, 2013).

Table 3 presents the frequency of consumption of cowpea leaves by the respondents. Most households consume cowpea 2 to 3 times per week. Overall, 69 and 64 of the 147 respondents consume cowpea leaves 2 to 3 times per week and at least once per week, respectively. Results further reveal no major gender differences among the survey respondents other than slightly more males consuming cowpea leaves 2 to 3 times per week. Analysis of the frequency of consumption of other vegetables showed similar results. Results also indicate that most consumers have a greater preference for clean (i.e., those with any soil washed off) and tender cowpea leaves, and pay much less attention to the color of the leaves.

Table 2. Summary Statistics of the Variables Used in the Study Consumers' Willingness to Pay for Value Addition in Cowpea (*N*=147)

Variable	Variable Description	Mean	Std. Dev.
wtpdry	Willingness to pay for sun-drying	4.74	4.12
wtpfrozen	Willingness to pay for freezing	4.83	4.45
age	Age of the respondent (years)	31	9.58
gender	Gender of the respondent (1=male, 0=female)	0.24	0.43
hhldsize	Household size (head count)	3	2.03
education	Education (years of schooling)	9.76	4.31
under5	Children below age five (head count)	0.69	0.80
memgrp	Member to social organization (1=Yes, 0=No)	0.50	0.50
info	Access to information (1=Yes, 0=No)	0.40	0.49
income	2011 income in Kenya shillings*	21,147	28,500
clean	Clean leaves	0.82	0.39
taste	Taste is good (1=Yes, 0 =No)	0.25	0.44
tender	Tender leaves (1=Yes, 0=No)	0.09	0.29
price	Price is is fair or low (1=Yes, 0=No)	0.25	0.44
uninjured	Uninjured and/or uncrushed leaves (1=Yes, 0=No)	0.85	0.36
color	Color is attractive (1=Yes, 0=No)	0.56	0.50
freemthd	Aware of freezing method (1=Yes, 0=No)	0.51	0.50
drymthd	Aware of drying method (1=Yes, 0=No)	0.79	0.41
buyfrozen	Would buy frozen vegetable (1=Yes, 0=No)	0.83	0.38
buydried	Would buy sundried vegetable (1=Yes, 0=No)	0.46	0.50
qntyconsmd	Qunatity of kale consumed (count)	1.99	0.91
consmfreq	Frequency of cowpea consumption (count)	2.45	0.73

* US$1 was equivalent to 85 Kenya shillings at the time of the study.

Table 3. Frequency of Purchase of Cowpea Leaves by Respondents' Households (*N*=147)

	Gender (count)		
Frequency	Female	Male	Total
Daily	5	3	8
2 to 3 times per week	50	19	69
At least once per week	51	13	64
Monthly	4	1	5
Seldom	1	0	1
Total	**111**	**36**	**147**

Cowpea leaves are mostly eaten fresh (Figure 1). Overall, more than 93% of the respondents cook cowpea leaves immediately after or on the same day of purchase. The immediate preparation

Figure 1. Time Taken Before Cooking Purchased Cowpea Leaves (Count), by Gender (*N*=147)

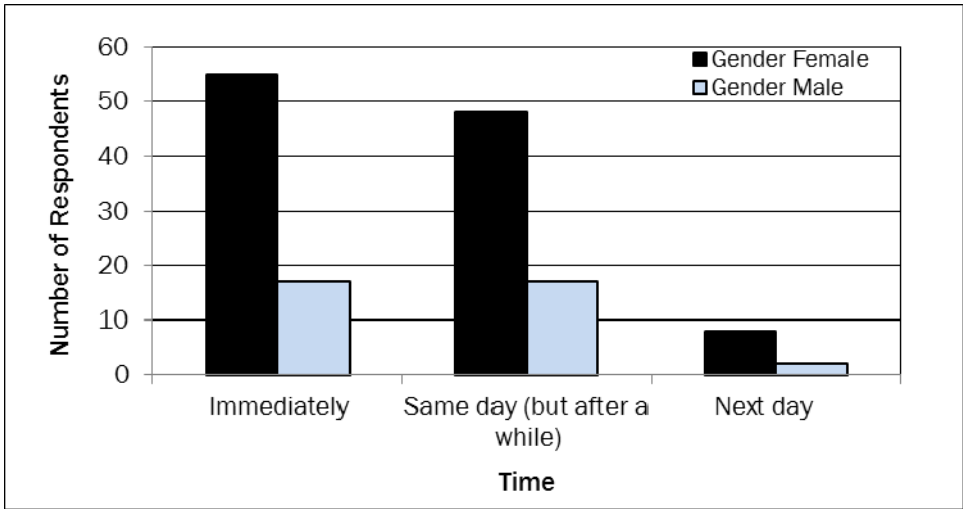


Table 4. Willingness to Pay for Basic Value-Addition Services (%) Among Urban Consumers of Cowpea Leaves (*N*=147)

Type of value addition	Do you need this service? (% of Yes responses)	Are you willing to pay for the service? (% of Yes responses)
Hygiene (sprinkled with clean water)	96.6	17.7
Washed produce	91.8	18.4
Presentation style (raised bed)	90.5	18.4
Good packaging	88.4	6.8
Graded and sorted	87.1	16.3
Destalked	35.4	14.3
Chopped	25.2	4.8

is mainly intended to preserve taste and tenderness. The timing of cooking is important to a value-addition strategy that would keep produce longer but also change the color, taste, or tenderness. Indeed, 63% of the respondents ranked young leaves, and tenderness and freshness of the leaves, as the most important attribute they look for in cowpea.

Results also indicate that only 5% of consumers value the color of the leaves. This finding has positive implications for value-addition processes that affect the color of the leaves, such as sun-drying. Nonetheless, sun-drying is also likely to affect the tenderness of the leaves, which is ranked highly by about 14% of the respondents.

Results further indicate that consumers eat cowpea leaves for a variety of reasons, namely taste, health, nutrition,[4] and price. Specifically, 39% of the respondents indicated that they eat cowpea leaves because of good taste, 35% because they perceive cowpea leaves to be healthy to eat, and 11% because they are nutritious. These findings indicate, in general, that most of the study respondents prefer cowpea leaves because of health and taste and therefore corroborate the results of a past study (Okello, Lagerkvist, Hess, Ngigi, & Karanja, 2011).

The ethnic background of respondents also affects their consumption of cowpea leaves. More than 78% of the 57 respondents who identified taste as the main factor were from the native Mijikenda tribes and those originally from western Kenya (i.e., the Luo, Luhya, and Kisii). This finding is in line with the researchers' *a priori* expectations, since cowpea leaves are widely eaten in these regions. The results further show that 51% of the respondents from western, 67% from coastal, and 42% from central Kenya eat cowpea leaves because they consider them healthy and/or nutritious. Analysis by gender

[4] Health in this case mainly meant preventing one from falling sick. Nutrition, on the other hand, was used to refer to the nutrients supplied by the vegetable. While nutrition presupposes good health, the respondents in this study treated the two aspects differently.

revealed the same trend, with 40% and 38% of women indicating that they eat cowpea leaves in preference to other vegetables because of taste and health/nutrition, respectively, while 26% and 25% of men eat cowpea due to taste and health/nutrition, respectively.

WTP for basic value-addition practices undertaken by retailers of cowpea leaves

Results of the assessment of respondents' WTP for the basic value-addition practices and services by percentage are presented in Table 4.

The majority of the respondents indicated that they needed most of the basic value-addition services. Indeed, more than 88% of the respondents wanted fresh cowpea leaves moistened using clean water, sold in raised beds, cleaned to remove soil, and graded and sorted. The exceptions were destalking and chopping , which were needed by only 35% and 25% of the respondents, respectively. The low WTP for these two services could be attributed to the fact that cowpea leaves spoil faster after they are chopped, unlike kale, where the practice is very common. Table 3 further shows that despite the high demand for some of the basic value-addition practices, no more than 18% of the respondents were willing to pay for any of these services. Only 4% of the respondents were willing to pay for chopping of the leaves. This finding may be related to the above argument that the quality of cowpea leaves deteriorates much faster when they are chopped. Overall, these findings indicate that there is no effective demand for the basic value-addition services.

Results of the analysis of the demand for the more advanced value-addition processes are presented in Figure 2. These value-addition processes included (a) direct sun-drying, (b) blanching and sun-drying, (c) freezing blanched leaves, (d) freezing fresh leaves, and (e) vacuum-packing fresh leaves.

Figure 2 shows that the majority of the respondents would occasionally buy sundried cowpea leaves. However, more than 70% would not buy freshly frozen or fresh vacuum-packed cowpea leaves. Given the earlier finding that most consumers prefer young and tender leaves and often cook the cowpea leaves immediately after harvest or purchase, we had hypothesized that consumers would purchase products that are not adversely transformed by value addition. Thus the direct sundried leaves, which tend to be brown, were expected to be less attractive hence less preferred. Figure 2, however, presents a different picture. It shows that most of the respondents would purchase sundried leaves either occasionally or all the time. Indeed, while 67% (*N*=147) of consumers indicated that they would buy fresh

Figure 2. How Often Would You Buy Value-Added Cowpea Leaves? (count; *N*=147)

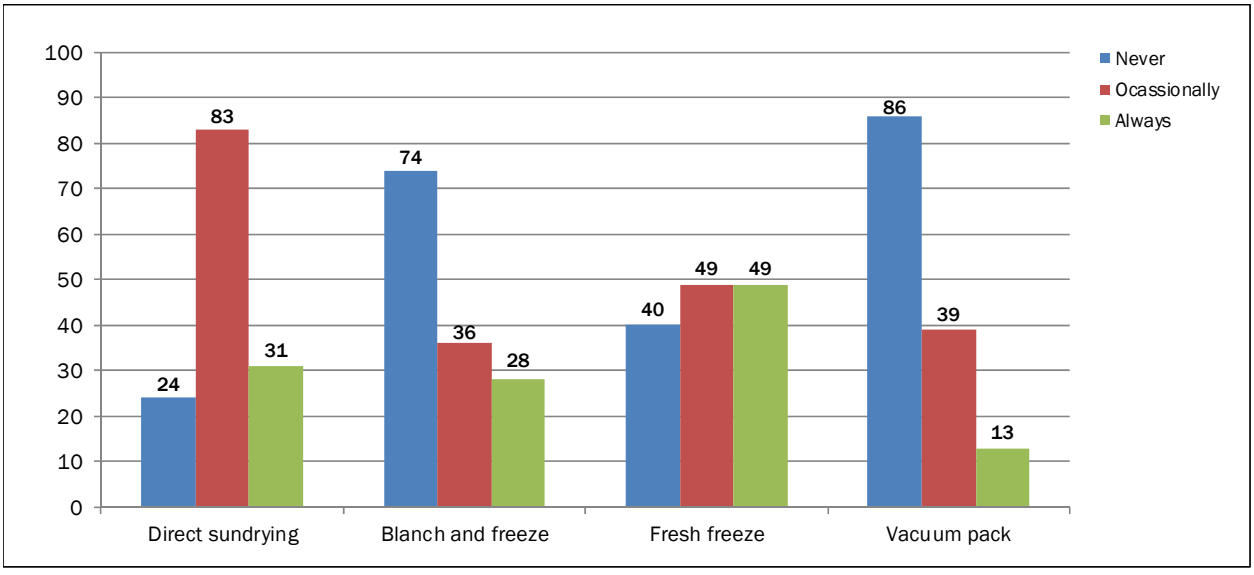
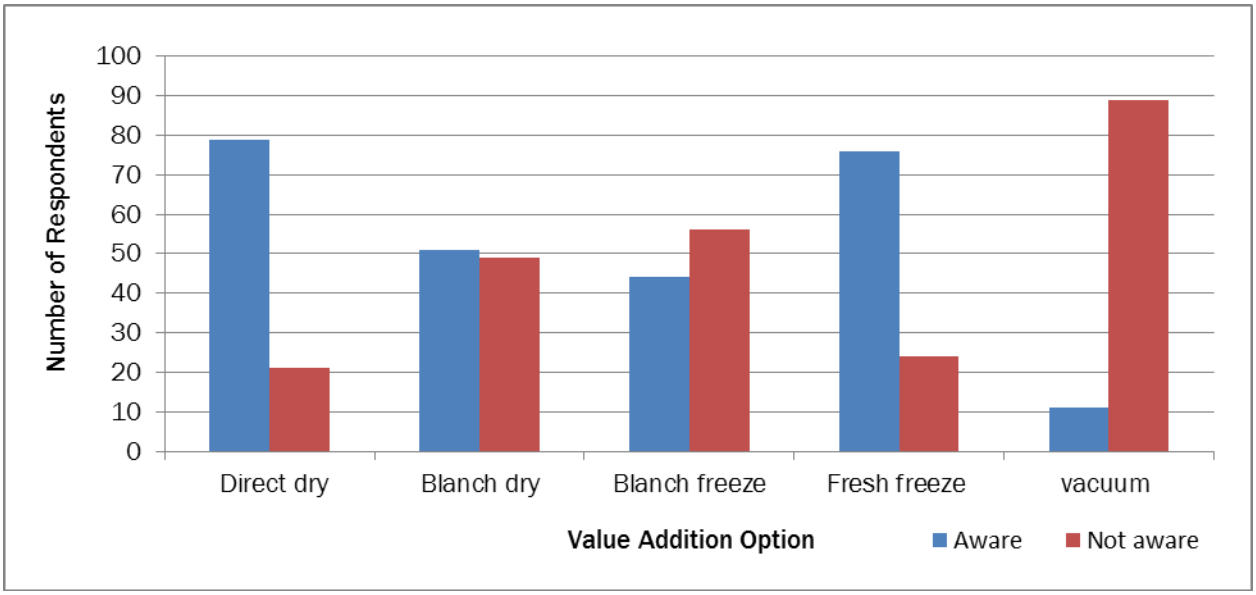


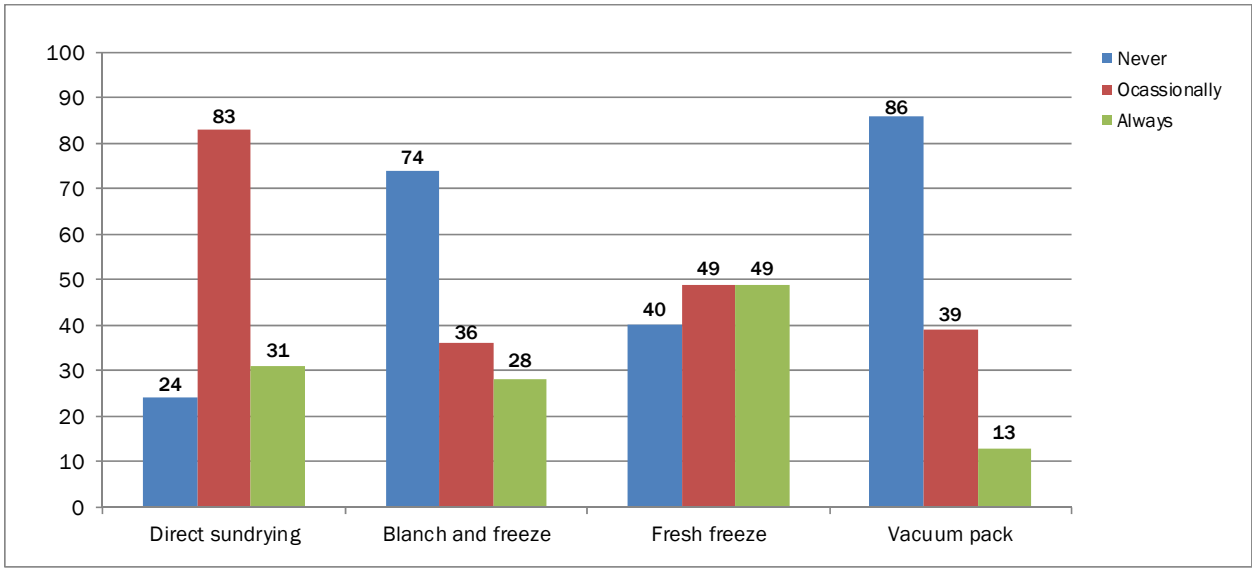
Figure 3. Have You Ever Heard of the Following Value-Addition Activities? (%, *N*=147)



frozen cowpea leaves always or once in a while, a majority of the respondents would not buy the fresh vacuum-packed or blanched-and-frozen cowpea leaves at all. These contradictions may be due to the respondents' unfamiliarity with some of these value-addition technologies. It is also likely that the respondents linked the processing with high purchase prices, since value-added products tend to be associated with supermarkets rather than open-air (wet) markets, and hence are likely to be more expensive.

Analysis of awareness among cowpea leaves consumers of these more advanced value-addition processes is shown in Figure 3. It shows that a majority of the consumers have heard of the direct sun-drying and fresh freezing of cowpea leaves. However, most respondents were unfamiliar with the process of blanching and drying or blanching and freezing vegetables, while only a few had heard of vacuum-packing fresh vegetables. These find-

Figure 4. How Often Would You Buy Value-Added Cowpea Leaves? (count; *N*=147)



ings indicate the need to educate consumers about the advantages and disadvantages of these techniques before training farmers and processors in their use. Blanching prior to drying and freezing stops enzymatic activities and hence fixes and retains the green color of the leaves. Freezing, as opposed to drying, the blanched vegetables minimizes the loss of water-soluble vitamins. Lack of awareness of these facts could lead consumers to underrate the importance of value addition in enhancing their own health. The data further reveal that nearly half of consumers (46%) would buy direct sundried cowpea leaves even if products from the other options were available and sold at the same price. Only about 9% of respondents would buy blanched and frozen cowpea leaves.

Table 5. Distribution of Consumers' Willingness To Pay for Dried and Frozen Dried Cowpea Leaves (*N*=147)

Extra KShs/bundle	Dried leaves		Frozen leaves	
	Frequency	Valid %	Frequency	Valid %
0	34	23.1	44	29.9
1	13	8.8	12	8.9
2	18	12.2	10	6.8
3	1	0.7	2	1.4
4	2	1.4	1	0.7
5	32	21.8	25	17.0
6	0	0	1	0.7
7	1	0.7	0	0
8	0	0	2	1.4
9	0	0	0	0
10	36	24.5	29	19.7
> 10	10	6.8	21	14.3
Total	**147**	**100.0**	**147**	**100.0**

Figure 4 shows that among the 147 consumers interviewed, only 18% have ever bought prepacked vegetables in the supermarket. Analysis of the most preferred shopping outlet indicates that only 1% of the study respondents buy fresh vegetables at a supermarket, the only outlet that sells frozen vegetables (Okello, Narrod, & Roy, 2007). The most preferred shopping outlets were wet markets. These markets tend to be closer to consumers (and hence easier to access) and offer consumers fresh cowpea leaves at cheaper prices (Figure 4).

The distribution of consumers' WTP for the more advanced value-addition processes (i.e., dried and frozen cowpea leaves) is shown in Table 5. The Wilcoxon Signed Rank test showed that there is no difference in WTP for the two value-addition methods as compared to the alternative hypothesis that differences exist in the WTP, by yielding a z-statistic of 1.16 and a *p*-value of 0.244. These results indicate that there is no statistical difference in WTP for sundried and frozen cowpea leaves.

Two key observations emerge from the data in Table 5. First, the nature of the sale of cowpea leaves is related to the WTP values. All traders sold cowpea in bundles or heaps and at a price of KSh10 per bundle or heap. The bundle or heap sizes varied among traders and markets, but the unit price did not change. This selling practice is reflected in the WTP bids the consumers stated. Specifically, the WTP data are clustered around the values of 0, 5 and 10, which are factors of 10, suggesting that consumers could relate more with values that reflected how much they currently pay for a bundle of the produce.

Second, at least one-third of the consumers interviewed were not willing to pay anything extra for the frozen cowpea leaves, while 23% were unwilling to pay anything extra for dried cowpea leaves. The higher proportion of consumers unwilling to pay for frozen leaves could, as argued earlier, suggest unfamiliarity with the technology, rather than actual lack of demand for frozen cowpea leaves. We had expected that more respondents would prefer frozen leaves to dried leaves because freezing preserves both the color and tenderness, while drying does not. However, the data do not reveal such differences. The only exception was the responses of permanently employed consumers. Among such consumers, the mean WTP for sundried and frozen cowpea leaves was KSh5.5 per bundle and KSh7.25 per bundle, respectively. The overall WTP for both forms of value-addition is KSh5/bundle.

Table 6. Factors Affecting Willingness To Pay for Advanced Value-Addition Processes: Tobit Regression Models

	Sun-drying		Freezing	
Variable	**Coeff.**	***p*-value**	**Coeff.**	***p*-value**
Socioeconomic variables				
gender	1.68	0.062	0.59	0.579
lneducation	0.46	0.169	0.95	0.025
lnincome	–0.05	0.781	–0.11	0.621
memgrp	0.91	0.267	0.60	0.036
consmfreq	0.16	0.004	1.40	0.036
kaleqnty	–1.24	0.008	–1.34	0.017
drymthd	2.93	0.003	–	–
buydried	0.07	0.000	–	–
frozmthd	–	–	1.91	0.058
buyfroz	–	–	0.08	0.001
Attribute variables				
clean	–0.17	0.864	2.15	0.082
taste	0.88	0.400	–0.96	0.446
color	0.20	0.010	0.26	0.007
tender	2.69	0.049	–0.41	0.881
uninjured	1.71	0.127	3.15	0.027
price	–1.34	0.133	–0.02	0.984
constant	–18.72	0.008	–6.88	0.406
N	147		147	
p-value	0.000		0.000	
Pseudo R^2	0.1695		0.1729	

Despite the low WTP for some forms of value-added cowpea leaves, the majority of respondents are not able to find this vegetable during the dry season. Approximately 81% of the respondents indicated that it is difficult to find cowpea leaves during the dry season and they are forced then to switch to other vegetables, namely kale, cabbage, and spinach (which are grown outside the district) and amaranth (which is produced along valley bottom and/or using irrigation within the districts, and hence is quite expensive). As a result kale is the most widely consumed vegetable in the study areas during dry periods, with approximately 84% (*N*=108) of the respondents indicating that they switch to kale when cowpea leaves are not available in the market.

Determinants of consumers WTP for advanced value addition: Regression results

Table 6 presents the results of Tobit regression models estimated to assess the factors conditioning consumers' WTP for value-added cowpea leaves. The models were estimated for sun-dried and frozen leaves. The dependent variable in both cases is the WTP bid (in Kenya shillings). The estimated models have a *p*-value of 0.000, indicating that they are highly statistically significant.

Factors affecting demand for sundried cowpea leaves

Starting with the sun-drying model, results indicate that a number of socio-economic factors affect WTP for value addition. Specifically, respondents' age and gender can be associated with WTP for sun-drying of cowpea leaves. With other things held constant, a unit increase in the natural logarithm of age increases the willingness for sun-drying by approximately KSh3. This finding is not surprising. Cowpea leaves are particularly popular among older consumers (50 years[5] and above). Among these consumers, cowpea is typically cooked in either coconut or cow milk until it loses its green color. In some cases, the cooked vegetable is boiled repeatedly for several days with sour milk, thus transforming the color to brown. This practice is common among consumers from western and coastal Kenya. Drying cowpea leaves will therefore not affect the appeal of this vegetable to such con-

[5] This age is based on discussions with some consumers.

sumers unless it significantly alters the taste. The significance of this variable may also be related to medical health reasons. The recent increase in documented cancer cases in Kenya, the perception that pesticides are not used in cowpea production, and the argument that it is rich in micronutrients, are causing a shift in diet from foods associated in the public mind with cancer (e.g., meats) to vegetables in general, and AIVs in particular, especially among urban consumers (Ng'etich, 2011). Indeed, in urban areas the rise in demand for cowpea leaves has led some leading urban supermarket chains (such as Nakumatt, Tuskys, and Uchumi) to introduce it into their green groceries sections (Okello et al., 2011). Gender also affects WTP, with data indicating that male consumers are less willing to pay additional money for value addition via sun-drying. This finding may be attributed to the fact that preparation and cooking of vegetables is mostly done by women.

Responses also indicate that awareness of sun-drying as a value-addition process, the frequency of consumption of cowpea leaves in the household, and the consumer's self-reported likelihood of buying sundried vegetables will result in an increase in WTP by KSh1.60, KSh2.90 and KSh0.10, respectively, other things held constant. This finding corroborates our earlier argument that awareness influences demand for value addition and underscores the need for promoting awareness of sun-drying as a value-addition strategy among consumers. As expected, households that consume more of the substitute vegetable, kale, will pay less for sundried cowpea leaves. An increase in consumption of kale by one bundle per week reduces WTP for sundried leaves by KSh1.23, other things held constant.

Among the attribute variables, the factors affecting the stated WTP for sun-drying are color of the leaves and tenderness of cooked leaves. The positive sign on the coefficient of the dummy variable for color suggests that consumers are generally willing to pay more for fresh green leaves, other things constant, even though its availability is seasonal. This finding suggests that consumers who care more about the color of vegetables are not willing to pay for a value-addition process that alters the color. Similarly, the results indicate that consumers are willing to pay more for tender leaves, suggesting that the sun-drying process that makes the leaves hard or fibrous will reduce demand for the value-added cowpea. At the same time, the results indicate that there is no statistical evidence to suggest that price, taste, or freedom from bruises individually affects the WTP for sun-drying, although the signs are as expected. However, a Wald multiple exclusion restriction test of the hypothesis that all the attribute and preference variables have no joint effect on WTP yielded an *F*-statistic of 2.49 and *p*-value of 0.025. These test results indicate that attribute and preference variables increase the stated WTP when acting together, but not individually. Together, they suggest that consumers desire a value-addition process that does not change some of the key attributes of fresh cowpea leaves, such as color and tenderness.

Factors driving WTP for frozen cowpea leaves

The results of the Tobit model estimated to assess the conditioners of WTP for frozen cowpea leaves are presented in the last two columns of Table 6. Among the socio-economic variables, education and participation in nutrition-focused consumer and/or community groups increase the WTP for the value-added (frozen) cowpea leaves. Holding other things equal, a unit increase in the natural logarithm of years of schooling increases the WTP by about KSh1.00, while participation in community groups increases WTP by KSh0.60. Results further show that the frequency with which a household consumes cowpea leaves, awareness of vegetable processing via freezing, and the self-reported likelihood of purchasing frozen vegetable all increase consumers' WTP to pay for value addition via freezing. As in the case of sun-drying, a higher quantity of kale consumed by the household reduces WTP for frozen cowpea leaves.

The attribute and preference variables that affect WTP for freezing are cleaning dirt from the leaves, color, and freedom from bruises and injuries. Notably, the coefficient on color is positive, indicating that similar to sun-drying, consumers are more concerned about color of the vegetable. Combined with the results on education, this finding suggests that those more likely to pay for frozen vegetable are the more educated women

who are discerning about physical quality.

Conclusions and Policy Implications

This study characterizes AIV consumers and consumption, and examines the factors conditioning the demand for value-addition processes aimed at smoothing the availability of cowpea leaves. The study shows that while there are clear benefits to simple value-addition services (including using clean water to moisten cowpea leaves, selling cowpea leaves in raised beds, washing off soil, and grading and sorting the leaves), most consumers are currently not willing to pay more for such services.

The results of the estimated Tobit regression models show that WTP is affected by the consumer's age, gender, and education; their awareness of the value-addition techniques; and whether they are likely to purchase value-added vegetables of any kind. The study shows that certain attributes, notably color, tenderness, freedom from bruises, and cleanness from soil increase the demand for value-added cowpea leaves.

Several implications for community development actors interested in investing in AIVs, and in cowpeas in particular, in order to improve rural communities' food systems arise from the findings of this study. First, demand for value-added cowpea leaves exists, but there is still a sizeable share (at least 30%) of consumers who do not currently exhibit effective demand for value-addition services in relation to cowpea leaves. This is partly because cowpea leaves consumers are unaware of various value-addition processes applicable to cowpea leaves, and because they broadly associate value addition with costliness. Two implications arise from this finding: (a) the need to create awareness of value-addition processes and provide information on the benefits of value addition, including the fact that it does not necessarily negatively affect the nutrient composition of the vegetable, and (b) the value-addition process adopted need to even out the availability of the vegetable across the year while keeping the price down to ensure it remains affordable. This is especially crucial given that majority of consumers are from low-income households. Efforts to expand production and consumption of cowpea leaves should therefore focus on promoting the value of drying and freezing the leaves to improve availability and reduce cost, particularly during the dry season, to potential consumers. Otherwise, value-chain actors will find themselves needlessly investing time and money in value-addition practices for which there will be little to no return.

The findings with respect to age, ethnicity, and education clearly point to the market potential for targeting value-addition processes at specific niche markets. They suggest that value addition via drying of leaves should be targeted at communities that typically consume cowpeas leaves in boiled brown form (such as those from western Kenya and the Mijikenda) and also older consumers (above the age of 50 years). Value addition by

freezing should target consumers who prefer freshness and greenness of the leaves. These include more educated and younger consumers, and consumers from ethnic backgrounds who typically consume cowpea leaves mainly for health and nutritional reasons.

The findings of this study further suggest the need to use processes that conserve the color of the leaves. This is especially important in targeting the emerging middle- to high-income, educated consumers, particularly in urban areas. This group of consumers is already associated with demand for indigenous vegetables and is therefore probably more susceptible to marketing strategies related to cowpea. More expensive value-addition options such as freezing and blanching accompanied by vacuum packing can target such consumers. Urban niche markets can therefore provide a fairly lucrative outlet for AIVs. In countries like Zambia such markets are very important. In addition, gender-responsive smallholder value-chain development is required to help women, who are the majority in this chain, sustain their role in such competitive urban niche markets.

This study focused on urban and peri-urban cowpea consumers and therefore did not include poor smallholder cowpea producers who are more vulnerable to food insecurity and also form a large segment of cowpea leaves consumers. Future research should extend the investigation of WTP for value addition to cowpea producers. The study also did not include cowpea leaves consumers who buy from hawkers and kiosks, due to logistical reasons. The proportion of consumers who use this channel is unknown but may be sizeable, especially in peri-urban areas. Their inclusion in future studies could lead to a better understanding of the role value addition can play in the development of peri-urban fresh produce food systems as well. At the same time, more detailed gender analysis, based on gender-disaggregated data, is needed to understand whether and how women and men consumers differ in their demand for value addition.

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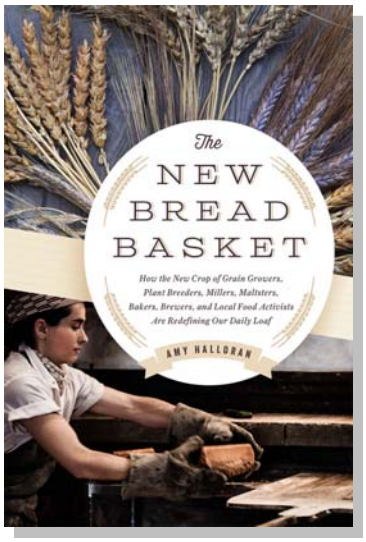
The framing and celebration of the American local grain movement

Book review by Matthew M. Mars *



Review of *The New Bread Basket: How the New Crop of Grain Growers, Plant Breeders, Millers, Maltsters, Bakers, Brewers, and Local Food Activists Are Redefining Our Daily Loaf,* by Amy Halloran. (2015). Published by Chelsea Green Publishing. Available as paperback and eBook; 246 pages. Publisher's website: http://www.chelseagreen.com/bookstore/item/the_new_bread_basket

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In the book *The New Bread Basket: How the New Crop of Grain Growers, Plant Breeders, Millers, Maltsters, Bakers, Brewers, and Local Food Activists Are Redefining Our Daily Loaf,* Amy Halloran takes readers on an imaginative tour of the revitalization of regional grain economies within and across the United States. The harvesting, processing, preparing, and consuming of grains is at the very root of humankind and the subsequent emergence and evolution of society as we know it today. From chapter to chapter, Halloran illustrates this same capacity of regional grain production and consumption to bring people together and help form and sustain meaningful relationships in the context of contemporary local food movements.

Perhaps the most important theme to emerge from Halloran's description of the initiatives and strategies of regional grain entrepreneurs and other leaders of the revitalization movement is the importance of community and cross-functional interconnectedness to the growth and development of local food systems. The chapters that compose

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the book combine to present compelling evidence that the development of regional grain economies requires the fostering of relationships between actors who bring multiple perspectives and diverse forms of capital to common problems. Halloran demonstrates, for instance, the value of such relationships in the second chapter of the book through a description of the collaborative efforts of a farmer, miller, and baker, as well as additional local food champions, to enable the opening of a community-based mill in upstate New York. In this case, cross-trade collaboration resulted in the development of a mill that processes grains grown on the farm on which it is located, as well as from other farms across the surrounding region. In turn, local bakers are now better able to bake with locally sourced and milled flour, which is also being sold to urban customers through New York City farmers' markets. The ability of diverse stakeholders to connect and collaborate proved vital to the mill's success, as well as the farmers, bakers, and markets located both upstream and downstream from it. This case clearly illustrates the importance of intimate relationships between local food entrepreneurs and leaders positioned across local food supply chains in overcoming problems of scale in production, crop availability, and reliability, access to markets of adequate size, and other challenges. The value of such cross-system collaboration is consistently shown by many of the other cases presented throughout the book.

Halloran also demonstrates the importance of interconnectedness across communities of practice when describing in detail the development and expansion of both the Washington State University Bread Lab and the Hudson Valley Farm Hub. Through these two examples, readers are able to see how synergy among grain farmers, local food entrepreneurs, academia, government agencies, and even to some degree the commodity-based agricultural industry is able to breathe innovation and life into otherwise struggling regional grain economies. Further evidence of the importance of actor interconnectedness and diversity to the development of regional grain economies is made evident through many of the other stories Halloran shares from chapter to chapter. Two such additional examples include Michael O'Malley, an artist turned mobile oven designer, who provides energy and inspiration to the home baker movement in Southern California, and the Maine Grain Alliance, which brings volunteers, community leaders, educators, and experts from around the nation together in support of revitalizing its regional grain economy. Overall, Halloran does a masterful job of weaving stories together to illuminate the importance of human connectedness and relationships to the revitalization of regional grain economies and the diverse businesses that are beginning to thrive within them.

Convincing examples of the efforts of bakers, brewers, farmers, and millers to build momentum for regional grain consumption by reaching customers through outreach and education activities are found throughout *The New Bread Basket.* However, Halloran also develops persuasive examples of the importance of craftspersons educating craftspersons to support production, as was the case when Andrew Heyn of Elmore Mountain Bread "cast his net for advice" to gain input and guidance from like-minded bakers and millers on the design and building of a custom, in-house mill. More formal institutions are also shown to be vital in creating and disseminating the knowledge needed to advance regional grain revitalization initiatives, as seen by the outreach to Central New York grain farmers provided by Cornell University and Cornell Cooperative Extension through the region's food hub. Education empowers communities. Halloran underscores the truth and relevancy of this statement for readers in the direct context of regional grain production and consumption through the cases of knowledge co-creation and dissemination she develops throughout the book.

The New Bread Basket is a worthwhile addition to the local food system development literature. However, it is not without limitations. First, Halloran moves from what seems to be a mostly anthropological exploration of "off the grid" staple crop activities and initiatives to unnecessarily complex explanations of the scientific properties of grains. This is especially the case in the chapter dedicated to the biological and chemical processes associated with the human digestion of gluten. Halloran's effort to counter the popular attack on wheat products through a scientific argument that illustrates the overlooked differences between

authentic grain products and those that are over-processed is admirable. Unfortunately, the punch line is overshadowed by the scientific complexities that are likely to be lost on the mainstream reader.

Second, the claim made throughout the book that regional grain economies are the keystones of local food movements is overexaggerated and at times fanatical in nature. For example, Halloran proclaims at the very beginning of the book that, "as people work to regionalize food production, staples like grains are the last piece in the locavore puzzle to be solved" (p. 2). This proclamation left me searching for compelling evidence that I did not find in the book. Moreover, Halloran's fanaticism, while sometimes contagious, unnecessarily casts a shadow over the many other exciting and equally important activities and initiatives being led by entrepreneurial farmers, processors, restaurateurs, and others that extend beyond grain. For example, she states at one point, "To be able to connect with the person who grows your cucumbers or cheese is great. To be able to connect with the people who grow your flour is better than great, because it is such a novelty and an education" (p. 137). A statement such as this one is unfortunate, as Halloran is clearly capable of making a strong case for the dynamic and intimate value of regional grains without diminishing the invaluable contributions of other local food system inputs.

Despite a few limitations, *The New Bread Basket* provides a set of cases and stories that are both engaging and impactful, and will leave readers with a greater appreciation for the role of regional grain economies in bolstering the viability and vitality of the movement to relocalize food.

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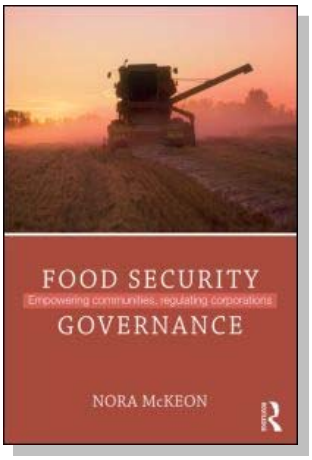
Balancing power relations for food security

Book review by Molly D. Anderson *
Middlebury College



Review of *Food Security Governance: Empowering Communities, Regulating Corporations,* by Nora McKeon. (2015). Published by Routledge. Available as hardcover, paperback, and eBook; 246 pages. Publisher's website: http://www.routledge.com/books/details/9780415529105

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Opinions about how to better govern food systems to prevent food shortages and food price jumps have diverged since the food crisis of 2007–2008, with battle lines drawn between camps that have little common ground other than the shared understanding that hunger is a huge yet ultimately tractable problem. On one side are interests claiming that increased production is essential; on the other side are those who say increased control by hungry people of access to resources and markets are much more important, and increasing production will do little to solve hunger without concomitant sociopolitical changes.

One of the consequences of the global failure to predict and protect vulnerable people from food price jumps was the reform of the United Nations Committee on World Food Security (CFS) in 2009. Understanding the CFS and the Food and Agriculture Organization of the United Nations (FAO), which hosts the CFS's annual meetings, is critical to understanding how decisions are playing out that affect whether millions of people have sufficient healthy food to eat, as well as control over how that food is produced, by whom, and for whose benefit.

Imagine a knowledgeable guide to the CFS who accompanies you through the halls of the FAO — playing Virgil to your Dante — while explaining the background, history, and important actors who have shaped current issues. Nora McKeon is just such a guide: she brings an

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unparalleled perspective on the CFS, having worked as civil society liaison for the FAO for years and now regularly engaging in Rome with CFS activities and in Africa with grassroots food sovereignty activists. *Food Security Governance: Empowering Communities, Regulating Corporations* picks up the story and questions she introduced in her previous book, *The United Nations and Civil Society: Legitimating Global Governance — Whose Voice?* (Zed Books, 2009).

This book begins with a historical review of food governance and its intersection with the rise of neoliberalism. Next, various perspectives and approaches to food provision are described, with the corporate-led global food system contrasted with small-scale family farming and the local food webs that feed most of the world's people today. Productivism is counterpoised with food sovereignty and the right to food. The story moves into the recent reform of the CFS after its failure to predict or resolve the precipitous rise in food prices in 2007–2008 that pushed hundreds of thousands of people over the brink into food insecurity. The reform was designed to overcome policy fragmentation; be more inclusive of people most affected by hunger through the creation of a Civil Society Mechanism; use the right to food as a foundation for all policies; and move past ideological paradigms through evidence-based reports provided by a High Level Panel of Experts. The next chapters describe the efforts of food sovereignty movements to build a better food system from the bottom up, meeting the efforts at the global level to institutionalize those improvements from the top down, with particular attention to deliberations on tenure guidelines and agricultural investments. The book ends with a strong message of hope that food governance can escape the single-minded emphasis on profit for the few dominant capitalist interests and move to being accountable for achieving human rights for the people who are not served at present: hungry people and the small-scale producers whose livelihoods are being destroyed by corporate-controlled industrialized agriculture. Such accountability would bring powerful environmental and health benefits, as well as greater equity and justice. The CFS may be somewhere in Purgatory now; we cannot yet know whether the 2009 reform will lead to full accountability of governments to their people. But McKeon believes that it is on the right track and shows great potential.

This book is clearly organized and written in accessible, compelling language. There is abundant documentation of factual material and good interconnections between chapters. With each topic she raises, McKeon avoids superficial explanations and digs deeply into the motivations, obstacles, and successes of the actors involved. Her sympathies for social movement actors are clear, but this does not blur a sharply etched portrayal of the challenges that civil society has met in the six years since the CFS reform.

While food security governance may seem at first glance to be a rather dry subject, this book illustrates its importance to the present-day and future well-being of most people in the world. In the United States, interest in food justice has risen rapidly over the past decade. Food governance and democracy are perhaps the most critical elements of food justice, although they are just beginning to emerge as emphases in the U.S. Justice will not be possible without the full political participation of marginalized people affected by food policies. This book is an excellent addition to upper-level undergraduate or graduate courses on food security, food justice, and the sociopolitical context of food. In addition, it will be useful to policy-makers who want to understand the global context of efforts to address food security.

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Both timeless and new: Behind the scenes of locally grown food

Film review by Angela Glore *
Community Food Council for Del Norte County and Adjacent Tribal Lands

Review of *Growing Local* film series, directed by Bridget Besaw. (2015). Executive producer Bridget Besaw. Limited release. Film's website: http://www.growinglocalfilms.org

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Each time I watch the *Growing Local* trilogy of short films, my heart feels like I've chosen the wrong profession. The early-morning-mist beauty of these films makes one yearn for more direct participation with farms, farmers, and the business of providing real food to real people.

For many people, the public face of local food is their local farmers markets: the hands ingrained with dirt stacking a bountiful rainbow of vegetables and fruit on tables shaded by the ubiquitous pop-up canopy. The *Growing Local* films showcase some of the other faces of local food: the retiring dairy farmer struggling with how to transfer the farm to his son; the accidental butcher providing fair middle-man services to his meat-producing neighbors; the young couple who feel they were born in the wrong time, creating a vibrant hub for local food and community.

Growing Local is a collaboration between Seedlight Pictures (Bridget Besaw, executive producer and director) and Maine Farmland Trust. Each of the three shorts highlights a single Maine farmer or farm family to represent a pressing issue in small farm life.

Changing Hands, the story of the Beal family and Rocky Ridge Organic Dairy Farm, is at times

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Angela Glore is a member of the Community Food Council for Del Norte County and the Adjacent Tribal Lands, and represents California's North Coast on the steering committee for the California Food Policy Council. She holds a master's and doctorate in anthropology from Washington University in St. Louis, where she studied food and farming in North America's past and present.

tense, as father and son acknowledge their different ways of farming and the financial difficulties in transferring farmland from one generation to the next. As the film points out, 400 million acres (162 million hectares) of land across the United States will be changing hands as farmers retire over the next decade or so, and self-employed farmers often have their retirement funds tied up in the land and equipment. The senior Farmer Beal says it plainly: "The farm is my retirement. I can't just give it to him."

In *Pig, Not Pork,* change is in the system, not the farm. Ben and Erin, former meat producers, run Farmers Gate Market, a butcher shop linking consumers to a network of local, small-scale livestock producers. Farmers Gate Market is an indirect market for local foods — a shift from the face-to-face transactions consumers have grown used to. Ben wonders aloud if there's enough money in the price difference between his roast and an industrially produced roast for his business to survive. Increasing the scale of local food production will require fair middle-men like Ben so that, as one of his suppliers says, producers can concentrate on what they do best: produce good food.

Seeding a Dream, the last of the short films, weaves together several issues raised in *Changing Hands* and *Pig, Not Pork*. Ben and Taryn lease land and buildings on land protected by an agricultural easement. Ben farms and sells at farmers markets while Taryn operates Sheepscot General, a store, restaurant, bakery, library, live music venue, and community space. The former landowner wrote the conservation easement himself, with the intent that the land would be actively used for food or fiber production in perpetuity. The current owner leases to Ben and Taryn to honor that intent and sees them as his own children as they work together to forge a lease-to-buy arrangement. Without the access to land this arrangement allows, Taryn and Ben could not have created the community that has grown up around Sheepscot General, something both timeless and brand new.

The *Growing Local* films are a testament to local food producers whose livelihoods are dependent on weather and soil and the fickle whimsies of consumers. A message repeated throughout the films is that consumers need to change as much or more than producers in order to fully realize a strong local food economy. Consumers have become used to artificially low food prices. As Ben the butcher muses: we eat three meals a day and see a doctor once a year, so why do we put a higher value on the doctor's services than the food producer's?

Taken together these films demonstrate that the building blocks for a relocalized food economy exist. Putting them together may not be easy, or come quickly, but we have the pieces if we collectively have the will. The families featured in *Growing Local* don't have all the answers, but they have found solutions, or are working toward them, for their farms, in their communities.

Who should watch this collection of films? People in the trenches of the good food/local food movement should watch them for inspiration, to shake themselves out of occasional doubt, and to reimagine the possible. Local food consumers should watch to understand better why local food often costs more than industrially produced food, and to be inspired to commit to change. Communities should watch together and push for local, state, and federal policies that encourage more small farms and small-scale food hubs. These films are a reminder of the unceasing work required to feed America every day — and we can all use one of those.

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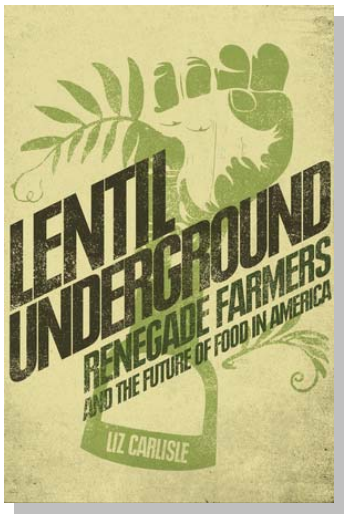
Alternative dimensions: *Lentil Underground: Renegade Farmers and the Future of Food in America*

Book review by Julia Russell Jozkow *
University of Northern British Columbia



Review of *Lentil Underground: Renegade Farmers and the Future of Food in America,* by Liz Carlisle. (2015). New York: Penguin Group. 298 pages. Available as hardcover, paperback, and ebook. Publisher's website: http://www.penguin.com/book/lentil-underground-by-liz-carlisle/9781592409204

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Lentil Underground: Renegade Farmers and the Future of Food in America is author Liz Carlisle's first book and is based on ethnographic research she undertook while a doctoral student at the University of California, Berkeley. Carlisle traces the history of organic agriculture in Montana to the present day, with a richly written narrative that makes for an easy read.

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Julia Russell Jozkow is a graduate student in the School of Health Science at the University of Northern British Columbia. Her research has focused on food access for people during times of homelessness in both Canadian and Bolivian contexts.

In this book Carlisle explores the literal, below-the-ground workings of nitrogen fixation and legume crops, with lentils taking center stage as the stars of the show. At the same time, Carlisle explores the emergence of a community of tenacious organic farmers centered around Dave Oien, a founding farmer and CEO of Timeless Seeds. Dave Oien serves as the hardworking and tireless hero of this tale.

The author selected the Timeless Seeds growers as a point of interest and resistance in the food system. She examines their work as climatic systems shift, as they navigate systems of governance, and as they connect with buyers, sellers, and consumers. For the Timeless Seeds crew, systems thinking is a central philosophy of their work, so they become engaged in shaping the physical,

social, and macrolevel environments toward diversity and sustainability.

The challenges that the protagonists have confronted during decades of work remain pertinent issues today, and include farmland buyouts. Carlisle's lively writing tends towards the romantic at times, which obscures the magnitude of the issues the protagonists face. Throughout the book Carlisle hints at significant generational issues in regard to the state of the occupation of farming and the rising average age of a farmer. To highlight this she consistently refers to people in their early to midthirties by the unlikely diminutive of "youngster." She also mentions some of the challenges with succession of the family farm, the high price of farmland that drives it out of range for beginning farmers, and the deterioration of rural communities. Globally these issues are often linked to land grabbing or the concentration of farmland in the hands of large agribusiness.

Carlisle discusses some of the challenges related to dwindling populations of farm families and the work being undertaken to revitalize rural communities. As Carlisle reports, the farmers in this book believe that disconnection from the land is a primary issue. This is a theme that is gaining increasing attention in a range of disciplines, including health care and Indigenous peoples' well-being (Parkes, de Leeuw & Greenwood, 2010; Richmond & Ross, 2009; Wilson, 2003)

The farmers Carlisle describes in this book are working to share knowledge rather than compete, because they are striving to build a way of living, in addition to earning a living. Yet financial poverty is an undercurrent in this book. Working collectively these farmers can earn a modest income within a capitalist system, where they would otherwise be unable to sustain themselves individually. Ironically, this requires developing niche market products for which consumers are willing to pay a premium; Carlisle does not shy away from discussing issues around lack of affordability of organic foods for low-income people.

Carlisle explains that the challenge of bringing organic produce to market is more than needing a closely knit community of like-minded people, but also needing organic agriculture to be supported at every interval along the food system. She explores how small-scale organic farming may not necessarily operate along the same timeframe on which the markets presently rely, and this requires a reorientation of both consumers' and producers' priorities. Thus the Timeless Seeds farmers face challenges related to remaining true to their ideals while trying to make a living and achieve market success. For example, exploring new methods in sustainable farming techniques requires trial and error, but the errors can result in failed crops and lost contracts.

Carlisle also examines some of the contradictions in modern food movements, including attitudes toward locavore eating and conventionally grown produce. As the author writes about the history of the organic movement in Montana, the reader will come to recognize an ebb and flow in the trendiness of environmentalism, which went out of favor in the early 2000s but is once again gaining traction. Carlisle could have extended her argument by advancing the sustainability aspect further. The potential of legumes is not fully explored in this work and I would have liked to have seen Carlisle push further on not only how as a society we should adapt our farming practices, but also how we can adapt our diets to become more sustainable. In this day and age, one of the most pressing global environmental concerns is climate change. In her argument Carlisle connects climate change and conventional farming, but she primarily discusses produce and does not tackle the meat and dairy industries. She discusses the shortcomings of the locavore movement, and weighs the pros and cons of a local conventional diet in comparison to an organic diet. Carlisle also briefly discusses challenges common in industrial agriculture, such as nitrogen depletion, erosion, and agricultural run-off.

This book emerged from an ethnographic study, and Carlisle richly describes the lives of the people and the culture of organic farming. However, she could explore some themes further. Carlisle aptly describes the challenges faced by farmers (especially organic farmers). Yet her mention of Black Elk without any exploration of his teachings again hints at romanticism and I felt is used as a tool to legitimize the presence of farmers on the land. There is an assumed premise

that farmers are the rightful inheritors of the land, and there is no acknowledgement of the displacement of Indigenous peoples—the land's original inhabitants and stewards.

At times the narrative is difficult to follow as Carlisle takes the reader on an adventure back and forth through time, compelling one to revisit previous paragraphs in order to clarify during which timeframe events are taking place. However, other seemingly unimportant details are repeated numerous times. In the early pages, when the author is attempting to position herself and connect to the community she is researching, she grasps at weak links that she frames as astounding parallels, such as the age she was when undertaking this research and the age of the protagonist when he started on his organic journey (both at age 27). Canadians may appreciate the links the author makes to agricultural research that took place in that country, and may chuckle as they read about the challenges of "northern" farming that are faced by Canada's southern neighbors.

The appendices are well developed and quite helpful. I would recommend skimming through the appendices before delving into the book, as Carlisle offers detailed explanations of how she crafted her descriptions of protagonists' thoughts and actions that occurred years and sometimes decades before she began her research.

This book takes the reader on a journey that can help to illuminate the human side of farming. *Lentil Underground* serves as an engaging introduction to some of the multiple compounding challenges that are faced in the movement toward more sustainable agricultural methods, and why there is no such thing as a simple solution. Overall, this was an enjoyable light read that may leave the reader hungry to further explore the subject matter.

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