BALANCING VALUE AND VALUES: AN EXAMINATION OF THE SUSTAINABILITY OF U.S. FOOD HUBS USING THE NATIONAL FOOD HUB SURVEY

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A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Community Sustainability – Master of Science

2020

ABSTRACT

BALANCING VALUE AND VALUES: AN EXAMINATION OF THE SUSTAINABILITY OF U.S. FOOD HUBS USING THE NATIONAL FOOD HUB SURVEY

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Most scholars and practitioners agree that a food hub's identity must include social and environmental mission goals and activities that challenge the dominant food system. In practice, there are limits to the resources food hubs can expend on addressing such missions. Simply, if a food hub does not maintain financial viability, it is unlikely it will continue to exist to address social and environmental issues. Using data from the 2015 and 2017 National Food Hub Survey, this research uses multiple linear regression to examine the effect of mission related goals on financial viability. Findings suggest that food hubs whose missions highly relate to improving health in their community have a financial advantage over hubs whose missions do not. However, when missions are strongly related to increasing healthy or fresh food access specifically to economically disadvantaged communities, financial viability may suffer. Supplementing revenue with grants and generating non-sales revenue from multiple, diverse grant and fundraising sources acts to offset the impact of intense mission activities on the bottom line, but only when an established hub has been operating for multiple years. This research adds to the quantitative research linking food hub financial viability with business operations and complements qualitative work on food hub's social missions. In addition, this research provides guidance to food hub funders, planners, and operators as they grapple with the challenges of balancing profit and purpose.

This thesis is dedicated to my father, Sidney Dee Hardy,
who taught me that there will always be something to monkey with and
that there is satisfaction in paying attention to the details.

ACKNOWLEDGMENTS

This thesis was only possible because of the support and guidance form faculty and colleagues at Michigan State University, the Center for Regional Food Systems and the Wallace Center at Winrock International. I would especially like to acknowledge the mentorship of Dr. Michael Hamm whom I thank for his support and patience as I slowly wound my way through the graduate experience. I would also like to thank my committee members Dir. Rich Pirog and Dr. Daniel McCole for their input and suggestions.

I would also like to thank former graduate student, Michela Fisher for laying the operational groundwork on which this research built. Thank you to John Fisk and Jeff Farbman form the Wallace Center at Winrock International and Kathryn Colasanti formerly of the Center for Regional Food Systems for their research collaboration.

Finally, thank you to my mother, Beth Hardy Nay, and sister, Deena Hardy, for their gentle nudges. Especially thank you to my son, Cole Hardy Matthews, who, as an 11th grader agreed to take this journey with me. It took much longer than expected and things were not always great. My hope is that I will always be as supportive of your dreams as you were of mine.

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CONCEPTUALIZING FOOD HUBS AND FOOD HUB SUSTAINABILITY: A REVIEW OF THE LITERATURE

1.1 INTRODUCTION

A food hub is a business model whose primary value proposition is the active management of aggregation, distribution, and marketing of identity preserved, geographically proximate food products. Characterized as a logistical "missing middle", food hubs connect the small and medium sized producers to otherwise inaccessible markets. Among food hub advocates, scholars, and practitioners there are differing orientations on food hubs. Dichotomously, these orientations can be viewed as either enhancing the dominant agri-food system by creating niche supply chains or as challenging the social and environmental ills of the dominant agri-food system. Exploring the food system roles food hubs play requires an understanding of how the food hub concept evolved. Values-Based Supply Chain and Alternative Food Network frameworks are useful for that purpose. It is therefore useful to review what research reveals about the tangible ways in which food hubs translate their food system roles and goals into planning and day-to-day operations.

1.2 VALUES BASED SUPPLY CHAINS

A supply chain is a set of interconnected efficiency-producing steps starting with raw materials and ending with the lowest cost product that will fill the consumer's needs. By contrast, a value

chain has similar steps, but the process starts with understanding the consumer's needs. In each step in a value chain, adding value for the customer outweighs adding value for the sake of efficiency. The result is an added-value product whose cost reflects the price the consumer is willing to pay for desired product attributes (Porter, 2001).

The dominant food system supply chain paradigm makes it difficult if not impossible to participate profitably unless there is economy of scale. It also fails to provide products that reflect the values of certain consumers (Diamond & Barham, 2011). Rethinking supply chains and products in terms of Values-Based Supply Chains (VBSC) and building of the work of others (Van Donkersgoed, 2013), Stevenson and Pirog (2008) suggest a food system VBSC can couple economy of scale to activities that produce added product value. The added value can be in terms of attributes that differentiate the product, but also reflects the VBSC members' and customers' values. Among members of food VBSC these values may be expressed as high levels of competitive cooperation, trust, and transparency; shared vision and decision-making; and non-exploitation (Stevenson & Pirog, 2008).

1.3 ALTERNATIVE FOOD NETWORKS

Long before the term 'food hub' came into use, farmer's marketing cooperatives and later, worker's and consumer's cooperatives, and community support agriculture (CSA) formed around the failure of mainstream markets to address specific needs. These networks organized to solve problems related to aggregation, distribution, and marketing of food products and services (Kloppenburg Jr, Lezberg, De Master, Stevenson, & Hendrickson, 2000). They evolved

different solutions for small, geographically proximate producers to move product to market when they were shut out, volume or pricewise, from traditional market channels. Solutions varied and included such strategies as collective marketing and processing, negotiating prices, and consumer-direct marketing shares of anticipated harvest. Intentionally or not, these networks were using a VBSC approach to solve market problems. What was unique about this VBSC application was that these networks, because they address geographically bounded problems, were, by nature, tied inextricably to place (Faber & Jonker, 2015). The early place-based alternative food networks (AFN) paved the way for more recent organizational forms, including food hubs, that have emerged as the overarching alternative food movement gains traction and evolves to embrace new goals and larger scale.

1.4 CONCEPTIONS OF FOOD HUBS

Beginning in the early 2000's, some solutions being implemented and some thinking around VBSCs and AFNs began to coalesce around the concept of a food hub. The United States Department of Agriculture (USDA) proposed that a food hub or regional food hub is "a business or organization that actively manages the aggregation, distribution, and marketing of source-identified food products primarily from local and regional producers to strengthen their ability to satisfy wholesale, retail, and institutional demand" (Barham, Tropp, Enterline, Farbman, Fisk, & Kiraly, 2012). The widely applied USDA definition generally describes the critical business functions and AFN orientation of a food hub. Food hubs are generally perceived as the logistical "missing middle" connecting the shrinking number of small and medium sized producers to otherwise inaccessible markets, and the products of multiple suppliers to multiple outlets and,

ultimately, consumers (Morely, Morgan & Morgan, 2008). Food hubs represent a strategy to scale up local and regional food systems by increasing access to small and medium sized farmers (Barham et al., 2012; Koch & Hamm, 2015).

While it is true that food hubs actively aggregate and distribute food products, in practice, the food hub concept is more nuanced than a logistics-driven definition suggests**.** Among food hub advocates, scholars, and practitioners there are differing orientations on food hubs. These orientations can be broadly categorized as either working within or as an adjunct to the dominant agri-food system by creating niche supply chains or as challenging the social and environmental ills of the dominant agri-food system (Levkoe, Hammelman, Craven, Dandy, Farbman, Harrison, & Mount, 2018). Berti and Mulligan (2016) categorize food hub literature in terms of this dual orientation. A supply chain orientation conceptualizes food hubs in terms of market efficiencies (Barham et al., 2012; Fischer, Pirog, & Hamm, 2015a), consumer demand for local (Cleveland, Müller, Tranovich, Mazaroli, & Hinson, 2014), filling a gap in the dominant food supply chain model (Horst, Ringstrom, Tyman, Ward, Werner, & Born, 2011), and producer oriented (Horst et al., 2011). At the same time, as challengers to the dominant food system, food hubs are conceptualized as visionary environmental and social change proponents (Cleveland et al., 2014; Morely, Morgan & Morgan, 2008) and as community sustainability, health, and equity oriented (Fischer, Pirog, & Hamm, 2015a; Franklin, Newton, & McEntee, 2011).

It is important to point out that food hub is a descriptor self-appropriated by an AFN. Previously, I discussed AFN forms such as farmer's and consumer's cooperatives and multi-producer CSAs that predate the food hub concept. Some of these organizations, recognizing their existing alignment with the food hub concept, have adopted the term and actively integrated insight from other food hubs and offers of help from food hub support organizations. About one in ten organizations currently identifying as a food hub has been in operation for over 20 years, thus predating the notion of a food hub (Colasanti, Hardy, Farbman, Pirog, Fisk, J, & Hamm, 2018). Conversely, most newer food hubs start operation with an explicit food hub identity. In alignment with an AFN framework, new hubs emerge to address unfulfilled needs on the "edges of business and society" (Faber and Jonker, 2015). New place-based needs may be addressed by an existing form in a new place; or a new place-based problem may give rise to a new form. Food hubs that attempt to address food system racial inequity are an example of a new food hub form. Considerable work has already been done to pinpoint what makes an AFN a food hub and what the core attributes of a food hub are. What can be surmised is that there is no one definition that adequately captures the breadth of current food hub operations.

1.5 FINANCIAL SUSTAINABILITY

1.5.1 Food hubs can be financially viable businesses

Food hubs operate within or in the context of the traditional food supply chain where commodification, volume, and low price- values not aligned with the food hub model- are key to profitability. Nevertheless, food hubs can be financially viable businesses. Between 2012 and

2016, two-thirds to three-quarters of food hubs reported breaking even or better. (Colasanti et al., 2018; Fischer, Hamm, Pirog, Fisk, Farbman, & Kiraly, 2013; Hardy, Hamm, Pirog, Fisk, Farbman, & Fischer, 2016). In benchmarking exercises , hubs in the top profit quartile were operating at a 3% profit in 2013 and a 1% profit in 2017 (Farm Credit East, Wallace Center at Winrock International, Morse Marketing Connections & Farm Credit Council, 2015; Wallace Center at Winrock International, 2018). These studies show that in any year, large groups of hubs were profitable. Examining the same hubs across multiple years, on average, hubs were able to increase profitability between 2012 and 2016 (Colasanti et al., 2018; Fischer et al., 2013; Hardy et al., 2016).Matson, Thayer, & Shaw (2015a) showed evidence that food hubs have high survival rates and are resilient to economic downturns. Although food hubs may have an advantage because of philanthropic funding, between 2005 and 2011, the 5-year survival rate for food hubs was 88% compared to 53% for United States businesses overall. Between 2008 and 2011, the number of new business openings in the United States decreased 17% while new food hub openings increased (Matson, Thayer, & Shaw, 2015a).

There are several business and financial practices and market conditions that have been shown to be associated with food hub financial viability. Perhaps the strongest predictor of success is a food hub's total gross revenue. Breakeven estimates vary between a little more than $300,000 for typically lower overhead direct-to-consumer operations to about $1.2 million for wholesale and hybrid hubs (Table 1.1).

Table 1.1 Gross Revenue Break Even Analyses

Break-Even Gross Revenue	Business Model	Methodology	Authors
$600,000 & increase break-even odds by 1/3 with every additional $100,000	All hubs	Logistic regression	(Fischer, Pirog, & Hamm, 2015b)
$800,000	Wholesale	Model operating budget & sensitivity analysis	(Rysin & Dunning, 2016)
$1.2 million (wholesale/hybrid) $314,000 (D-to-C)	Wholesale, Hybrid and Direct-to-Consumer	Model operating budget	(Barham & Matson, 2017; Matson, Thayer, & Shaw, 2016)

Although a food hub that stays in business year after year may be said to be successful, years of operation is not a predictor of profitability (Fischer, Pirog, & Hamm, 2015b). Nor does adopting a for-profit legal structure correlate with or increase the likelihood of financial success (Barham et al., 2012; Colasanti et al., 2018; Hardy et al., 2016). On the other hand, food hubs legally structured as cooperatives may have a higher probability of being profitable (Entsminger & Westgren, 2019; Matson, Thayer, & Shaw, 2015a;).

Profitable food hubs are more likely to be associated with a lower cost of goods sold (Farm Credit East et al., 2015), higher annual revenue or sales (Fischer et al., 2015), having more institutional buyers (Feldstein & Barham, 2017; Matson, Thayer, & Shaw, 2016), production capacity (Feldstein & Barham, 2017) and making better use of physical facility space as measured by sales per square foot (Wallace Center at Winrock International, 2018). Food hubs that spend a higher percentage of expenses on employee wages and owning and maintaining a fleet have a higher probability of making a profit (Fischer et al., 2015b).

The effect of where a food hub operates on profitability is more complex. The region of the country in which a food hub operates has no bearing on financial success (Hardy et al., 2016). However, food hubs operating in states with high specialty crop production may find financial success more difficult. This may be because in such states, specialty crop producers that would typically benefit from selling through a food hub may have access to more traditional intermediaries (Matson, Thayer, & Shaw, 2016). Assuming hyper-local distribution, it appears most metropolitan counties, defined as having a population of greater than or equal to 182,000, can support one food hub (Cleary, Goetz, McFadden, & Ge, 2019). Because high levels of social capital- norms and networks to facilitate collective action- are associated with food hub profitability, geographies with high levels of social capital can support more food hubs than their population size might otherwise suggest (Cleary, Goetz, McFadden, & Ge, 2019).

1.5.2 Food hubs have unique viability challenges

Despite most food hubs performing financially well, one-third to one-quarter reported losses between 2012 and 2016. Mean losses of -9% in 2012 and -13% in 2015, suggest a small number of hubs were operating with very large losses. A 2017 benchmarking study showed that at the same time the top quartile of hubs was profitable, hubs were not making a profit overall (Wallace Center at Winrock International, 2018). In both benchmarking studies, neither hubs overall nor the model hub- average of 25% of hubs with the highest profits- were profitable when contributions and grants were excluded (Farm Credit East et al., 2015; Wallace Center at Winrock International, 2018). Between 2015 and 2016, for 25% to 30% of viable hubs, non-sales revenue made the difference between a loss or profit (Colasanti et al., 2018; Hardy et al., 2016).

Taking on debt to open or grow a food hub or relying heavily on grants puts food hubs at additional financial risk. In 2013, benchmarked hubs averaged a net worth of 68% and in 2017, 37%, indicating that it is not uncommon for a food hub to carry a moderate to large amount of debt (Farm Credit East et al., 2015; Wallace Center at Winrock International, 2018). For many hubs, the difference between making a profit or taking a loss is non-sales income (Wallace Center at Winrock International, 2018; Fischer et al., 2015b). Most non-sale income comes from grants (Fischer et al., 2013; Wallace Center at Winrock International, 2018). In 2013 and 2015, 13%-17% of hubs were highly dependent on grants (Fischer et al., 2013; Hardy et al., 2016). This percent almost tripled in 2017. Hubs who were highly dependent on grants tend to be newer non-profit hubs (Colasanti et al., 2018). The interest in food hubs from government and non-profit funding agencies has resulted in increased availability of grants that have spurred some of the growth in the number of new food hubs. But relying on grants cannot be a long-term substitute for a executing a viable business plan that generates strong sales revenue.

Consistently, food hubs cite balancing supply and demand and managing growth as their top challenges (Blay-Palmer, Nelson, Mount, & Nagy, 2018; Colasanti et al., 2018; Fischer et al., 2013; Hardy et al., 2016) In balancing supply and demand, hubs necessarily face the challenges of seasonality and weather event related problems. Hubs have challenges unique to both supply and demand. On the supply side, hubs often navigate and coordinate informal farmer networks to plan for and piece together product volume (Feldstein & Barham, 2017). At the same time, they help customers manage the risk of adopting a new purchasing strategy that may require “educational, cultural, or operational shifts” for the customer (Feldstein & Barham,

2017). Among producers and customers, individual needs and priorities may differ and present a barrier to coordinating networks (Mount, Hazen, Holmes, Fraser, Winson, Knezevic, ... & Landman, 2013). Overarching managing producers and consumers appropriately, food hubs must manage maintaining source transparency to ensure the competitive advantage of their value proposition is delivered (Diamond & Barham, 2011).

While the challenges of supply and demand are perennial, as a hub begins to scale up operations other challenges arise. Beginning food hubs may underestimate the needed expertise in marketing, management, logistics, food safety, and processing (Feldstein & Barham, 2017). Having a strategic plan that anticipates milestones can help hubs anticipate infrastructure, transportation, and technology needs and prepare for the complexities of operationalizing practices and procedures (Matson, Thayer, & Shaw, 2015a). Managing supply, demand, and growth is clearly not a comprehensive list of food hubs' financial challenges. Regardless of the financial challenge or whether a food hub envision their work as existing outside traditional distribution supply chains, food hubs exist in a space where they will be constantly challenged by both competition from traditional food businesses and by the emergence of new AFN forms.

1.6 SOCIAL SUSTAINABILITY

1.6.1 Food hubs as a financial means to social ends

From a social sustainability perspective, food hubs can be conceptualized as "networks and intersections of grassroots, community-based organisations and individuals that work together to build increasingly socially just, economically robust, and ecologically sound food systems that

connect farmers with consumers as directly as possible"(Blay-Palmer et.al., 2013). Food hubs do not form around a financial mission, rather they form around a market failure related to production or local access. More broadly, they form around addressing failures of a regional food system (Avetisyan & Ross, 2019). These place-based market failures form the basis for a food hubs' social missions.

1.6.2 Food hubs elevate place

Food hub case studies that explore the planning and implementation of food hubs or that document their operational successes and struggles consistently elevate place (Cleveland, Müller, Tranovich, Mazaroli, & Hinson, 2014; Levkoe et al., 2018). When a food hub is viewed as either community economic development tool or as a business model to enable small farmers to access markets, place is primary and place-based goals are explicit. When a hub is viewed as a tool to increase access to healthy foods (Hoey, Shapiro, & Bielaczyc, 2018), to address socio-economic inequities (Koch & Hamm, 2015), or to engage eaters and farmers in adhering to ecologically sensitive practices, place-based goals are implicit. As a group, food hubs express commitment to place in the way they delineate the potential pool of suppliers and customers. Nationally, almost all a hub's farm suppliers and customers are located 400 miles or less from the hub (Colasanti et al., 2018; Fischer et al., 2013; Hardy et al., 2016). Often distribution is hyperlocal- almost half of food hubs say all their customers are located within 50 miles of the hub (Colasanti, et al, 2017). From a place-based perspective, food hubs can be conceptualized as conducting business in a way that "values, builds, and upholds the social and material integrity of the community". Under this definition, the success of place-based food hubs does

not exist for its own sake. Rather, food hub success directly contributes to both community and business partner success (Fischer et al., 2015a).

1.6.3 Measuring progress toward social mission goals

Just as keeping good financial records is important to maintaining viability, business planning, and demonstrating value; so too should keeping good records of social mission activities be important to measuring impact, program planning, and demonstrating values. While virtually all hubs keep up-to-date basic financial records like income and profit and loss statements, a little more than half of hubs record metrics about their nonfinancial mission goal activities (Colasanti et al., 2018). Although there are methods and tools to assist organizations and researchers measure social impact and social sustainability, for the most part, they have not been applied to food hubs. One way food hubs' social impact can be measured is through their ability to spur community economic development. Using an input/output model for estimating economic impact, Economic Impact Analysis for Planning (IMPLAN), Jablonski, Schmit, and Kay (2016) found that when a food hub operates in a community, it can generate positive employment and economic activity outside the hub in the community at large. Non-conceptual and typically quantitative studies tend to focus on food hubs' financial sustainability rather than social mission sustainability. This may be because the organizations that have examined financial viability tend to have a values-based supply chain orientation. Further, these organizations act as advisors to food hubs; and food hubs consistently indicate that their top challenges and barriers are supply chain related (Colasanti et al., 2018; Fischer et al., 2015b; Hardy et al., 2016).

1.7 SOCIAL, ENVIRONMENTAL, AND FINANCIAL BALANCE

Leblanc, et.al. (2014) state that food hubs actively create the necessary environmental and cultural conditions for their success via educating and raising awareness of their mission and role among three groups: their existing customer base, their potential customer base (i.e. the community), and farmers. The financial challenges and failures hubs experience suggest that even with mission-driven funders and staff active in educating others about their mission and role, food hubs may find success elusive. It follows that there can be a disconnect between the hub's short term and long-term goals. Long term goals are rooted in a hub's social mission, but short-term goals often focus on keeping the business up and running (Avetisyan & Ross, 2019).

Food hubs may form to address a specific market failure, but from their vantage point it is easy to see all their local food system's faults and envision sweeping change. Part of a food hub's identity must be challenging the dominant food system through social and environmental goals, but in practice, there are limits to the extent that food hubs can expend resources to address such goals. Food hubs have shown they can successfully integrate non-financial goals. Yet, without measuring these goals, their impact is unknown. Further, it may be "unrealistic" to expect a hub to attend to core business functions and invest heavily or deeply in multiple, complex social goals (Hoey et al., 2018).

CHAPTER 2

FOOD HUB FINANCIAL VIABILITY AND SOCIAL MISSION

2.1 ABSTRACT

Most food system scholars and practitioners agree that a food hub's identity must include social and environmental mission goals and activities that challenge the dominant food system. In practice, there are limits to the resources food hubs can expend on addressing such missions. Simply, if a food hub does not maintain financial viability, it cannot continue to exist to address social and environmental issues.

Using data from the 2015 and 2017 National Food Hub Survey, this research used multiple linear regression to examine the effect of mission related goals on financial viability. Findings suggest that food hubs whose missions highly relate to improving health in their community have a financial advantage over hubs whose missions do not. However, when missions are strongly related to increasing healthy or fresh food access specifically to economically disadvantaged communities, financial viability may suffer. Supplementing revenue with grants and generating non-sales revenue from multiple, diverse grant and fundraising sources acts to offset the impact of intense mission activities on the bottom line.

2.2 INTRODUCTION

The USDA frames maintaining financial viability as the primary goal for food hubs, but acknowledges that, in addition to economic goals, food hubs tend to integrate community-based social and environmental goals, herein referred to collectively as social goals or social

mission, into their business models (Barham et al., 2012). While financial sustainability is the primary goal for some food hubs, two out of three food hubs view financial viability either as equally important to or only a tool to reach social goals (Colasanti, et al., 2018).

A small, but broad in scope group of quantitative studies have framed the basics of food hub financial viability, uncovered some important relationships, and tracked/benchmarked food hub financial and operational performance for multiple years (Colasanti et al., 2018; Farm Credit East et al., 2014; Fischer et al., 2013, Fischer et al., 2015b; Hardy et al., 2016; Matson, Thayer, & Shaw, 2016; Rysin & Dunning, 2016). Case studies and studies incorporating research with experts and key informants have described operational successes as well as challenges and barriers to financial viability.

Although few in number, qualitative studies have examined various aspects of food hubs' social sustainability through case study and mission statement analysis (Avetisyan & Ross, 2019; Feldstein & Barham, 2017; Koch & Hamm, 2015; Severson & Schmit, 2015; Stroink & Nelson, 2013). In addition to quantifying finances and operations, the same group of multi-year quantitative studies provides a high level descriptive statistical look at food hubs' social missions and mission-related activities (Colasanti et al., 2018; Fischer et al., 2015b; Hardy et al., 2016)

While the impact and sustainability of food hubs' social mission work is largely unexamined, there is evidence that food hubs are engaging in social mission efforts. Food hubs are very

explicit about the importance of non-financial goals (Koch & Hamm, 2015). At least nine out of ten food hubs have mission statements that include language related to environmentally sensitive production practices or improving community health. At least eight out of ten food hub mission statements addressed animal welfare, food access for economically disadvantaged populations, and food hub employee financial health. Addressing racism through food access and farmer training are mission-specific goals for over half of food hubs (Colasanti et al., 2018). The breadth of mission goals that food hubs are incorporating into their business practices is growing and changing.

It is interesting that food hubs, with very few exceptions, include social goals in their mission statements. Yet, one third of food hubs see themselves operating under neither a Triple Bottom Line nor social enterprise framework (Colasanti et al., 2018; Fischer et al., 2013). Equally puzzling, about one in ten food hubs say they have no non-financial goals (Colasanti et al., 2018). It is unclear why hubs missions include social goals but in practice, many hubs envision themselves as only profit driven. What seems to be true is that these diverse responses reflect the range of operating food hubs and their many interpretations of social goals. Table 2.1 shows the variety of social goals and activities food hubs are undertaking.

Table 2.1 Examples of Food Hub Mission Goals and Activities

Mission Goal or Activity	Authors
Addressing food insecurity via WIC, SNAP, food panty donations	(Horst et al., 2011)
Increasing food access to underserved communities	(Colasanti et al., 2018; Fischer et al., 2013; Hardy et al., 2016; Hoey et al., 2018; Koch & Hamm, 2015)
Addressing racism though food access and sovereignty	(Figueroa, 2015; Hossfeld, Kelly, O'Donnell, & Waity, 2017; Stroink & Nelson, 2013)
Community culinary, food systems, and nutrition classes	(Horst et al., 2011)
Farmer training and mentoring and providing space for new supplier businesses	(Ballamingie & Walker, 2013; Berman, 2011)
Requiring certain environmentally sensitive growing practices and animal welfare standards	(Cleveland et al., 2014)
Job and skill training particularly for disadvantage workers	(Mugica, 2017)

Research focused on supporting the fiscal sustainability of food hubs has left a gap around social sustainability. We are interested in this research gap in two ways. First, there is a lack of quantitative studies to complement existing qualitative studies. Quantitative studies may uncover new relationships or provide evidence of the generalizability of qualitative study findings. Second, we do not know how food hubs' commitment to non-financial social sustainability goals and activities affects their ability to be financially viable. Using inferential statistics including multiple linear regression, this research explores the effect of social mission on a food hub's financial viability and provides guidance for food hubs based on these findings.

2.3 METHODS

2.3.1 The National Food Hub Surveys

First conducted in 2013 and biennially in 2015 and 2017, the National Food Hub Surveys represent the only large source of detailed financial and operational survey data on United States food hubs. With each biennial National Food Hub Survey iteration building on the years before, the survey is a combination of questions verbatim and modified from the previous survey year and a small proportion of new questions. It is thus structured to consistently track key metrics over time and add new questions to clarify topics and address emerging issues. Administered in the spring, each round of the survey asks hubs to report on the previous year's activities. Thus, the 2013 National Food Hubs Survey reports on 2012 activities, and so on.

This analysis uses data from the 2015 and 2017 National Food Hub Surveys. Although specific questions varied slightly between years, the nine thematic sections of the survey include hub background, employees and volunteers, infrastructure and services, non-financial mission and values, financial information, producers and suppliers, food safety, local and regional aspects, and challenges and opportunities. In 2015 and again in 2017, a series of nine exploratory items were added to help understand the landscape of food hubs' social missions and to explore the relationship between social and financial goals (Table 2.3). The items were developed based loosely on the Michigan Good Food Charter (Colasanti, Cantrell, Cocciarelli, Collier, Edison, Doss, George, Hamm, Lewis, & Matts, 2010) and the expert opinion of the food hub survey collaborators. Hubs were asked to use a semantic differential 3-point scale to indicate how intentionally related the following items were to their food hub's mission:

- Improving human health in your community or region
- Increasing health or fresh food access to economically disadvantaged communities
- Addressing racial disparity through access to healthy food
- Increasing specifically small or medium sized farmers' and ranchers' access to markets
- Increasing specifically minority producers' or suppliers' access to market
- Training producers or suppliers in business or marketing practices
- Training farmers/ranchers in best production practices
- Ensuring producers or suppliers receive a fair price for their product
- Ensuring food hub employees receive a fair wage

2.3.2 Data Collection, Response Rates, and Model Inclusion Criteria

The 2013 and in 2017, the 2015 National Food Hub Survey responses, the USDA Food Hub Directory, the Wallace Center maintained National Good Food Network (NGFN) voluntary food hub database, Internet searches, and snowball sampling of additional hubs provided by survey respondents were used to compile a list of key food hub personnel which served as the sample. The surveys were administered via Web with the opportunity to complete by postal mail. Following a modified version of Dillman's method (Dillman et al., 2014), key personnel were sent an initial invitation, and key personnel from non-responding hubs were sent multiple, varied e-mail reminders. The first or most complete response received from an individual representing a hub was used as that hub's response in analysis. Response rates were calculated using American Association for Public Opinion Research (AAPOR) guidelines for Internet surveys

of specifically named persons and guidelines for establishment surveys (American Association for Public Opinion Research, n.d.). Duplicate key personnel for one food hub, duplicate surveys for one food hub, those organizations screened out as non-hubs, and hubs not doing business in a survey year were removed as ineligible and not used in response rate calculations. The response rates (RR2) counts partial completes as responses were 32.9% (2015, *n* =151) and 33.0% (2017, *n* =131).

A total of 115 food hubs are included in this analysis: 44 from 2015 responses and 71 from 2017. If a hub answered only in 2015 or 2017 and they had a complete set of model variables, their response was included. If a hub completed the survey in both years and provided a complete set of model variables for both years, their 2017 data was included. If a hub had completed the survey in both years but did not have complete set of model variables in 2017, their 2015 data was included.

2.3.3 Variable Definitions and Sample Characteristics

The measure of financial viability and the dependent variable in the multiple linear regression (MLR) analysis is Operating Expense Ratio (OER). OER is calculated by dividing the hub's total operating expenses by total revenue and is the reciprocal of profit. OER and profit have been used most often in the food hub literature as a measure of financial viability (Feldstein & Barham, 2017; Fischer et al., 2015b). An OER of less than one indicates a hub is profitable. An OER equal to one indicates expenses equal revenue and the hub is breaking even. An OER greater than one indicates the hub is operating at a loss. The mean OER for the 115 hubs in the

MLR analysis was 0.95 compared to 0.88 for 2015 hubs (*n* =143) and 1.13 for 2017 hubs (*n* =130) in the overall National Food Hub Surveys (Colasanti et al., 2018; Hardy et al., 2016).

Food hub characteristics included as independent, predictor MLR model variables were selected a priori based on our research question and existing literature that suggested they were either important to describing a hub's mission or because the needed to be included as control variables. Years in business is measured as the total number of years a food hub was in operation in the year for which financial data was reported. Hubs in business for less than one year are coded as being in business for zero years. To calculate grants as a percentage of total revenue, we summed a hub's revenue from federal, state, local, and foundation grants then divided the sum by the total revenue. Respondents indicated if their hub received or did not receive non-sales revenue from various sources. The number of grant and fundraising types was calculated as the count of affirmative responses to receiving non-sales revenue from federal grants, state grants, local grants, foundation grants, business donations, and donations from individuals. The number of grant and fundraising types variable measures whether hubs are receiving non-sales revenue from a variety of sources rather than from how many unique organizations or individuals they are receiving non-sales revenue.

We tested years in business, grant revenue as a percent of total revenue, number of grant and fundraising types, business model, legal structure, urbanicity, and nine mission relatedness items in the MLR model. Because not all hubs have employees and not all hubs deal with animal products, only nine of the eleven mission relatedness items, were tested in the model. The

remaining mission-relatedness items tested in the model covered a variety of social and environmental mission goals ascribed to hubs with intended beneficiaries scattered among the community at large, low-income community members in particular, people of color both as consumers and producers, beginning and established farmers and suppliers, and community and overall environmental health. In addition to hubs legally structures as non-profits, non-profit hubs included five publicly owned or private university-based food hubs. Legal Structure and Business Model were dummy coded and tested in the model. Urbanicity was determined based on the food hub's mailing zip code using United States Census' Metropolitan Statistical Area (MSA) designations. Characteristics of OER and continuous and discrete statistically significant independent predictor variables are shown in Table 2.2 and Table 2.3 shows characteristics and OER statistics for statistically significant categorical predictor variables. In our sample, correlation confirmed previous National Food Hub Surveys and other research that finds, in general, as the number of years a hub is in business increases so does profitability [r(115)=-.207, p=.027] (Colasanti et al., 2018; Feldstein & Barham, 2017; Fischer et al., 2013; Hardy et al., 2016). Consistent with previous studies, cooperatively structured hubs are more profitable on average than for-profit and non-profit hubs (Colasanti et al., 2018; Entsminger & Westgren, 2019; Feldstein & Barham, 2017; Hardy et al., 2016).

Table 2.2 Food Operating Expense Ratio and Business Characteristics*

	Mean	Median	S.D.	Range
OER	.95	.97	.54	.01-3.51
Years in Business	8.7	4.0	16.0	0-144
Grants Revenue as a Percent of Total Revenue	11.0%	0.0%	21.3	0.0%-91.5%
Number of Grant and Fundraising Types	1	0	1.5	0-6

* *n* =115

Table 2.3 Food Hub Business and Mission Characteristics by Operating Expense Ratio

Food Hub Characteristic	Operating Expense Ratio

	n	%	Mean	Median	S.D.
Overall	115	100	.95	.97	.54
Legal Structure					
Non-Profit or Other	50	43.7	1.10	1.00	.70
For-profit	43	37.4	.86	.92	.34
Cooperative	22	19.1	.76	.98	.35
Increasing healthy or fresh food access to economically disadvantaged communities					
Not or somewhat related	67	58.3	.82	.51	.92
Strongly related	48	41.7	1.12	.54	1.0
Improving human health in your community or region					
Not or somewhat related	45	39.1	.92	.98	.58
Strongly related	70	60.9	.96	.97	.52
Training producers or suppliers in business or marketing practices					
Not or somewhat related	80	69.6	.91	.97	.45
Strongly related	35	30.4	1.03	.98	.73

All statistical analyses were performed using SPSS software (Version 24.0, IBM Corp.). The criterion for statistical significance was set at $p<.05$. Bivariate correlations and hierarchical stepwise followed by backward enter elimination MLR analyses were used to evaluate the relationship between OER and mission relatedness characteristics. We employed a criterion of probability of F-to-remove >= .100 to remove variables in the backward elimination procedure.

2.4 RESULTS

2.4.1 Multiple Linear Regression Summary

The forward stepwise MLR procedure allowed us to observe the effect of adding variables one-by-one. The resulting full, saturated model included all the predictor and control variables supported by the literature or hypothesized as important. Noting that 8 of 15 coefficients were not significant in the saturated model, we used backward stepwise regression to create a final reduced model. The reduced model, as expected, had lower fit than the saturated model, but included variables that were approaching significance in the saturated model. When adjusted

for number of terms, the reduced model had better fit that the saturated model (Table 2.4). The reduced, final model met methodological assumptions.

2.4.2 MLR Model Results

The final MLR model adjusted R^2 was .297 (R=.588, R^2=.346). The model significantly predicted OER [$F(8, 106) = 7.015$, $p < .001$]. Recalling that comparatively, a lower OER indicates a higher profitability and a higher OER indicates lower profitability, we examined the model's standardized partial coefficients (Table 2.4). We point out that all other things being equal, a negative coefficient indicates that the variable acts to lower OER and thus increase profitability and vice versa. Therefore, increasing access in economically disadvantaged communities and training producers and suppliers in marketing and business practices act to lower profitability while all other model variables act to increase profitability. Training producers and suppliers in marketing and business practices was included in the reduced model but was not a significant predictor at the p<.05 level.

Table 2.4 Partial MLR Model Coefficients

	B	S.E.	β
Constant	1.484***	.149	
Increasing Access in Economically Disadvantaged Communities	.300	.106	.275**
Improving Health in the Community/Region	-.194	.097	-.175**
Training Producer/Suppliers in Marketing/Business	.171	.098	.146^
Legal Structure (Non-profit is reference category)			
Cooperative	-.410	.131	-.299**
For-profit	-.292	.117	-.262**
Grants Revenue as Percent Total Revenue	-.568	.262	-.223**
Number of Grant and Fundraising Sources	-.105	.039	-.284**
Years in Business (sq.rt.)	-.100	.027	-.310***

*p<.05
**p<.01
***p<.001
^ p=.082

To adjust for a positively skewed distribution resulting from a very small number of hubs that had been in operation 50 to almost 150 years, we transformed years in business using the square root function.

2.4.3 MLR Model Predictions: Increasing Access in Low Income Communities

To investigate the relationship between OER, missions involving increasing healthy or fresh food access to economically disadvantaged communities, and grants and fundraising we used the MLR model equation to predict OER for a hypothetical hub under various parameters. As with over 60% of the hubs in the sample, the hypothetical hub's mission was extremely related to improving human health in their community. The hypothetical hub's mission was not extremely related to providing producers and suppliers marketing and business training. Combinations of percent of revenue from grants and number of grant and fundraising types mirrored the sampled food hub's survey responses. OER was predicted for hubs legally

structured as non-profit or other, for profit, and cooperative. Mission orientation varied as either not related/somewhat related (Access Low) or strongly related (Access High) to increasing healthy or fresh food access to economically disadvantaged communities. We predicted OER for each year in business up to 20 years. Table 2.12 shows the number of years in business in which the 95% prediction interval of the mean OER did not contain a value greater than 1.00; in other words, the first year of operation in which all OER values in the prediction interval indicated breakeven or better. Under scenario 1, for example, the model predicts it would take a non-profit hub working heavily in the food access sector, deriving eight percent of their total revenue from grants and having only one type of grant or fundraising type more than 20 years to have a 95% probability of breaking even. Switching to a mission in which access work is not a priority, the same hub is 95% likely to break even after 14 years in operation.

Table 2.5 Minimum number of years in business under various scenarios before the mean predicted OER will be breakeven or better*

			Non-Profit		For profit		Cooperative	
% Revenue from Grants	**# of Grant/ Fundraising Types**	**Scenario**	Access Low (years)	Access High (years)	Access Low (years)	Access High (years)	Access Low (years)	Access High (years)
0	0	Base	>20	>20	4	>20	2	>20
8	1	1	14	>20	1	14	1	9
20	2	2	4	>20	1	5	1	2
40	3	3	1	7	**	**	1	1
60	3	4	1	4	**	**	**	**

*p<.01

**No hubs in the sample were operating under these parameters, thus it was considered an unlikely scenario and OER was not predicted.

2.5 Discussion

2.5.1 Model Limitations

The model findings must be seen in the light of some limitations. This research is important because it adds quantitative research to the bulk of qualitative research on food hubs. There are few examples of quantitative methods applied specifically to food hub and researchers must look to other disciplines such as business and marketing to find research and analytic tools adaptable to food hubs studies. Like adapting an existing tool for a new purpose, the measurements used in this analysis were not collected with this specific analysis in mind. We therefore discuss several limitations in the application of the methods and measures.

The MLR model uses OER in a single year to predict financial viability. We recognize that financial viability happens over the long-term. Other authors assigned a range of OER in a specific year as an indicator of financial viability (Fischer et al., 2015b). We defer to the statistical probability of the model fit and variables and the prediction intervals to express the uncertainty around repeated measures and by extension, variations in OER over time.

Self-report of the degree to which a hub's mission is intentionally related to various mission ideals is not a measure of the resources devoted to mission activities. It follows that there is uncertainty whether perceived mission relatedness corresponds to the measures of a hub's financial viability. In 2015, the National Food Hub Survey asked hubs to not only report on relatedness to missions used in this analysis but also about relatedness to day-to-day activities for the same mission items. On average, hubs reported higher scores for relatedness to day-to-

day activities than for mission relatedness (Hardy et al., 2016). In as much as day-to-day activity implies a cost of doing business, the relationship between mission and day-to-day activity relatedness suggests that mission relatedness can be used as a proxy for hub resources devoted to mission activities.

Previous research has shown that total revenue is a strong predictor of financial viability as measured by OER or profit (Feldstein & Barham, 2017; Fischer et al., 2015). Indeed, early iterations of our model included total revenue. The effect of total revenue was large enough that including it in the model rendered all other variables except years in business insignificant. Therefore, it is appropriate to model OER in the absence of total revenue to understand the contribution of mission variables. We are confident our model explores the unique contributions of mission to profitability for three reasons. First, to the extent total revenue and years in business are positively correlated, our model addresses revenue (Colasanti et al., 2018; Hardy et al., 2016). Second, we uncoupled the total amount of grants a hub receives from revenue by expressing grants as a percent of total revenue. Third, it is possible that within a certain class of mission activities, specific mission activities may require larger revenue to support than others. For example, subsidizing shares to low income families may cost more and impact the bottom line more drastically that accepting WIC payments. However, both are mission activities related to increasing access in low income communities. Thus, we used the measure of mission orientation. There is no evidence within the literature that a general mission orientation requires certain revenue levels.

2.5.2 Non-mission OER Predictors

Years in business was included in the model as a control variable and was a significant predictor. Previous research indicates years in business is correlated with OER (Colasanti et al., 2018; Fischer et al., 2015b; Hardy et al., 2016), but in the context of total revenue is not an OER predictor (Fischer et al., 2015b). Years in business is associated with mission via legal structure. Older hubs are more often organized as cooperatives; and hubs organized under the same legal structures tend to have mission similarities (Colasanti et al., 2018; Hardy et al., 2016). The model predicts that during the first few years a hub is operating, they will experience greater annual decreases in OER than older hubs. All other things being equal, the model predicts OER decreases by 9.0% in the first five years of operation. In the next five years, it decreases by 7.1%; between 10 and 15 years it decreases by 6.0%; and between 15 and 20 years in business, OER will decrease by 5.5%. Feldstein and Barham (2017) estimate that almost 9 in 10 food hubs survive at least 5-years. Combined with a business plan that moves a food hub toward a total revenue fit for the hub's business model (Barham & Matson, 2017; Fischer et al., 2015; Matson, Thayer & Shaw, 2016; Rysin & Dunning, 2016), findings suggests that a new food hub is on track, not necessarily if it is making a profit by year five, but rather if it sees substantial profitability improvements in its first five operating years.

Like previous food hub benchmarking studies (Farm Credit East et al., 2015), the model shows yearly profit increases in older, established hubs stabilizes over time. Of course, with enough competition within a market, the demand for food hub products may become saturated (Cleary, Goetz, McFadden, & Ge, 2019). However, with the continued and growing demand for

the kinds of products food hubs market, this is an unlikely scenario. Food hubs have been conceptualized as a model to scale up AFNs and if profit is a measure of impact on the system, older hubs may have less impact on scaling AFNs. For continued growth and impact, older hubs should routinely reevaluate and realign their value proposition to meet current market preferences and demands (Farm Credit East et al., 2015). Indeed, food hubs themselves, are concerned that competition for existing and new customers will increase and come from both the traditional food system and from other AFN actors (Colasanti et al., 2018; Hardy et al., 2016).

Because both OER and mission orientation are related to legal structure (Colasanti et al., 2018; Hardy et al., 2016), it is included as a control variable in the model; it is also a significant predictor. The model confirms previous research that cooperatively structured food hubs have a financial advantage over for profit food hubs (Entsminger & Westgren, 2019; Feldstein & Barham, 2017); and food hubs legally structured as for profit operations have an advantage over non-profit hubs (Entsminger & Westgren, 2019; Feldstein & Barham, 2017). This suggests that cooperative food hubs have enough similar characteristics to represent a unique type of food hub operation. From a research standpoint, there is scant evidence of why food hubs structured as cooperatives fare better financially.

Cooperative food hubs can be farmer, retailer, or consumer lead and each may have very different expectations of the food hub's role. However, because they are member owners in the cooperative, they may view interactions with the food hub as less transactional and more

collaborative. Member owners employ collective governance and action around a shared understanding of the market failure they are attempting to address (Severson & Schmit, 2015). Food hubs overall note that getting producers to embrace the food hub model or work with food hubs to ensure appropriate supply is challenging (Hardy et al., 2016). In the unique cooperative environment of shared governance and shared problem identification, supplier challenges may be easier to resolve. By extension, food hubs structured as a retail or consumer cooperative may be able to better understand and address the needs of their consumer owners than food hubs organized otherwise. This may be one reason cooperatively structured food hubs have a financial advantage over other legal forms. In the context of how the MLR model informs food hubs, it is meaningful to point out that legal form follows food hub function, and not vice versa. Therefore, it is not appropriate to interpret legal structure as a lever which can be switched to achieve a predicted OER. Rather it is an important fixed condition under which various OER predictions can be made.

Both grants as percent total revenue and the number of grant and fundraising types a hub has are significant predictors of OER. Although they are moderately correlated [$r(113)= .601$, $p<.001$], there was little change to the model fit when an interaction term was introduced during stepwise regression. This suggests these two variables are measuring different food hub characteristics. The model predicts that OER is reduced by .01- a 1% increase in profit- for every additional 1.7% of total revenue that is derived from grants while for each one additional grant and fundraising type a hub adds to its non-sales revenue stream, predicted OER is reduced by 0.1- a 10% increase in profit.

Hubs operating less than two years have shifted from relying on the founder's or bank financing to begin the food hub to relying on foundation and government grants for start-up expenses (Colasanti et al., 2018). Funders often expect that hubs wean themselves off the initial grants and be self-sufficient within several years. However, this is often not the reality (Aldrich, Alkhaledi, Pelland, & Toomey, 2017; Enderton & Bregendahl, 2017; Feldstein & Barham, 2017; Rysin & Dunning, 2016). Model findings clarify that across different legally structured hubs and in the absence of resource intensive food access mission work, a hub that does not rely on any grant or fundraising can expect to be in operation at least two (for profit) and up to twenty (non-profit) years before beginning to break even (Table 2.12). Further, hubs with mission statements related to consumer awareness, justice and/or equity or reshaping the food system or who offer paid employment opportunities for youth, accept Supplemental Nutrition Assistance Program (SNAP), host nutrition and cooking classes or operate a mobile market are more likely to assess themselves as highly dependent on grants to carryout basic food hub functions (Fischer et al., 2013). Feldstein & Barham (2017) dissected food hub closures and concluded "grants can be part of a strong financial foundation", but that "grants or investment deals that seem very attractive in the beginning, but may put the food hub at risk when the financial supports disappear or when the enterprise cannot keep up with the terms of the agreement" or when anticipated grants are not distribute.

Lastly, legal structure is a static characteristic and the age of a hub is an intrinsic characteristic, but non-sales revenue is dynamic- a hub can work to obtain more grants or pursue more donations. Results suggests that pursuing non-sales revenue can be a powerful tool for hubs to

increase their financial position. As we will show below - non-sales revenue can act as a counterbalance to the cost associated with pursuing social missions.

2.5.3 Mission Relatedness Predictors: Community Health and Low Income Access

The model predicts, all other things being equal, that hubs with missions highly related to improving health in their community, will, on average, have an OER 13.1% lower than hubs whose missions are somewhat or not related to improving community health. However, when a hub's mission is also highly related to increasing access in low income communities, all the financial gains from focusing on community health in general are lost. The model predicts, all other things being equal, when a hubs with a mission highly related to improving community health add a mission highly related to increasing access in low income communities, they will, on average, have an OER 20.2% higher than hubs with missions that are somewhat or not related to both community health and low-income access.

It is not surprising that findings suggest an incongruity between the financial impact of missions highly related to working on community health generally and working on community health in low-income communities specifically. Greater than 6 in 10 food hubs have missions related to improving health in their community and, almost entirely congruent with this set, 4 in 10 also have missions related to improving low-income access (Colasanti et al., 2018). Thus, a mission related to community health is more typical of food hubs in general. A mission around community health speaks to a core food hub function of distribution and is tied to the notion that locally grown product is healthier (Segovia & Palma, 2016). Further, pricing strategies for

food hubs with missions related to low-income access may have intentionally lower margins to both give the supplier a fair price and accommodate the incomes of their customers.

The newest food hubs that are also highly dependent on non-revenue sales to support operations carry out the highest number of food access activities (Hoey et al., 2018). This is a financially tenuous situation. The model predicts that a non-profit hub with a low-income access driven mission needs between 40-60% of its revenue from grants and must have at least 3 types of grant funds or fundraising if they expect to begin breaking after 4 (for profit) to 6 (non-profit) years in operation. Funders may not be realistic if they expect such hubs to generate all operating revenue while maintaining a tight focus on low-income access work. Similarly, new non-profit hubs with high aspirations to serve low-income communities should temper their expectations of mission work with financial realities lest they be tempted to dive into their work too deeply or too quickly to maintain their operations (Fischer, PIrog, & Hamm, 2015a; Stroink & Nelson, 2013).

Model predictions show that using grants to supplement a percentage of revenue can help offset the financial impact of a strong low-income access driven mission. These predictions quantify previous work that posits generating revenue through grants and donations or waiting until a food hub is more mature can be strategies for food hubs to work on access in low income communities (Farm Credit East et al., 2014; Matson, Thayer, & Shaw, 2015a). This also may help the philanthropic community understand the need for longer term commitments to these enterprises than may typically be the case – patience is certainly a virtue in the funder-

fundee relationship with respect to food hubs with a strong mission to increase healthy food access in limited-resource communities.

2.6 CONCLUSIONS

In summary, food hubs can be conceptualized as a financial means to social ends. Adopting a general mission orientation focused on improving human health in the community or region is both congruous with conceptions of food hubs and tends to increase a food hub's financial bottom line. However, a more focused missions, specifically a mission strongly related to increasing food access in economically disadvantages communities tend to hamper financial viability.

Findings suggest that, regardless of legal structure, established hubs in operation for multiple years may still find themselves unable to financially support low-income access related mission goals without additional non-sales revenue streams. We do not suggest this is the only method for food hubs to support low-income access operations. It is natural for food hubs to think about access work in terms of employing its core business competencies- aggregation and distribution- to specifically address access in low income communities. Practitioners and food hub support organizations have suggested that one way to extend this core competency in the service of increasing access is engaging K-12, childcare, healthcare and other institutions operating in low income communities rather than consumers directly (Barham et al., 2012; Levkoe et al., 2018). Another approach which allows foods hubs to rely on their core competencies to enable access work is long-term financial community investment. Such an investment recognizes the social benefits of economic value creation resulting from sustaining

an otherwise financially unviable food hub (Avetisyan & Ross, 2019). Thinking more broadly beyond core food hub competencies, letting organizations already working in the access area take the lead allows food hubs to leverage human and financial capitol on collaborations (Koch and Hamm, 2015). While almost all hubs collaborate with food banks (Colasanti et al., 2018; Fischer et al., 2013; Hardy et al., 2016), examples of collaborations include nutrition education, youth programs, and facilitating community-based projects such as gardening and food waste reduction (Levkoe et al., 2018) Another approach suggests that separating core food hub operations from philanthropic efforts may deter mission creep at the expense of financial viability (Levkoe et al., 2018).

CHAPTER 3

FINDINGS OF THE 2015 NATIONAL FOOD HUB SURVEY[1]

3.1 INTRODUCTION

The results presented in this report expand on the 2013 survey (Fischer et al., 2013) and present new information on food hubs. Together with the 2013 National Food Hub Survey, the 2015 National Food Hub Survey collected biennial information about food hub finances, structure, operations, markets, customers, suppliers, and challenges. In 2015, the survey included several new topics, such as food safety and business networks. We hope this report provides valuable information for existing and potential food hub operators, organizations that help support hubs, policy makers, advocates, and researchers.

3.2 BACKGROUND

At its core, food hubs are "businesses or organizations that actively manage the aggregation, distribution and marketing of source-identified food products, primarily from local and regional producers, to strengthen their ability to satisfy wholesale, retail and institutional demand" (Barham et al., 2012). More recently, Fischer et al. (2105a) suggested that food hubs be defined as "financially viable businesses that demonstrate a significant commitment to place through aggregation and marketing of regional food." As the food hub concept matures and evolves, so too do stakeholders' expectations of food hubs. Food hubs are viewed in many ways:

[1] This chapter was published as part of a report through the Michigan State University Center for Regional Food Systems. See Hardy et al. (2016). Updates to literature published since this report have not be added to this chapter. The report is available at https://www.canr.msu.edu/national_food_hub_survey/index

- As vital connectors between the shrinking number of small and mid-sized farms and large, previously inaccessible markets[2]
- As sources of community economic development and placemaking
- As part of a solution to the complex problem of food and nutritional insecurity
- As a key to scaling up local food

Amid these expectations, the market for local and regional food is growing rapidly (Low, Adalja, Beaulieu, Key, Martinez, Melton, S., ... Jablonski, 2015; Burt, Silverman, & Goldblatt, 2015). Food hub operators are left with questions about what defines success for a food hub; how to balance economic, social, and environmental goals; and how to respond to the dual tasks of seizing opportunities and addressing challenges in the growing market for food hub products.

The 2013 National Food Hub Survey (Fischer et al., 2013) and subsequent reports, presentations, and articles based on its results[3] provided an initial detailed picture of the food hub landscape and set the stage for the 2015 National Food Hub Survey.

The intent of the 2015 National Food Hub Survey was twofold:

- Build on the 2013 snapshot and create the first detailed longitudinal data on the operational and fiscal health of food hubs.
- Provide sound data to food hub operators and other stakeholders to inform decisions and further research.

[2] This report refers to businesses, institutions, and individuals buying product from food hubs as *customers* or *markets* interchangeably, depending on context.

[3] Access to these reports, presentations, and articles is available at the Michigan State University Center for Regional Food Systems website: http://foodsystems.msu.edu/activity/info/national_food_hub_survey

The Web-administered survey was conducted in March, April, and May of 2015. An invitation with a link to the survey was sent to a sample of 547 key U.S. food hub personnel. The 2013 National Food Hub Survey responses, the USDA Food Hub Directory, the National Good Food Network (NGFN) food hub database, and Internet searches conducted by investigators were used to create the invitation list. While a food hub may have had several key personnel listed in the sample, only one completed survey was included for each food hub. In an attempt to reach all food hubs, nonresearch partners at other universities and institutes with ties to food hubs distributed a generic survey link to groups with whom they worked.

The response rate was 33% and represented 143 hubs. Eight additional organizations that were verified food hubs and were not identified in the initial sample responded via the generic survey link. In total, 151 completed and partial surveys were used in analysis. The 2013 National Food Hub Survey data, which included 107 hub responses, were used in some comparative analysis. See Appendix A (page 127) for details of survey development, sampling, data collection, analysis, and response rate. Throughout, this report refers to 2013 and 2015 results. For clarification, 2013 results refer to the 2013 National Food Hub Survey, which asked respondents to report on fiscal year 2012, and 2015 results refer to the 2015 National Food Hub Survey, which asked respondents to report on fiscal year 2014.

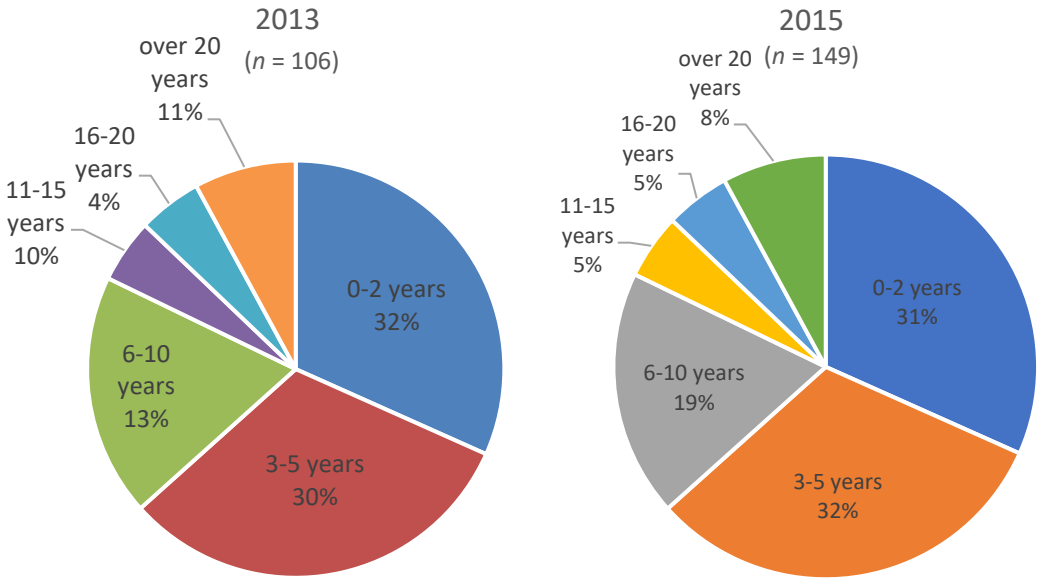
3.3 FINDINGS: OPERATIONAL CHARACTERISTICS

This section includes information on the general structural and physical characteristics of food hubs and a description of hubs' staff, suppliers, and products.

3.3.1 Years in Operation

The number of years that food hubs reported being in operation ranged from a dozen hubs reporting less than one year to several hubs reporting more than 50 years. The average length in operation was eight years and the median four years. The 2013 National Food Hub Survey reported that nearly one-third (32%) of hubs began operation in the previous two years (see Figure 3.1). Those hubs presumably either celebrated their third or fourth anniversary in business or are no longer in business as of the 2015 survey. This means that the 47 hubs indicating they were in operation for two years or less in the 2015 survey are almost certainly new hubs that opened since the 2013 reporting year. Further, several responding hubs indicated that they planned to open their hub's doors beginning in the 2015 growing season. Hubs indicating that they had not yet begun operations are not included in this analysis, but they do provide additional evidence that the number of food hubs is growing.

Figure 3.1 Food Hubs by Years in Operation



As in 2013, revenue for 2015 was significantly correlated to the age of the hub.[4,5] This collinearity[6]— the number of years in business and hub revenue increasing proportionally together—is important both observationally and statistically. Observationally, even with new hubs entering the market, older hubs appear to be not just maintaining but increasing their revenue. Details supporting this observation are discussed in the Findings: Finances section. Statistically, throughout this report, there are several mentions that particular variables are correlated to both the age and revenue of the hub. Because hub age and revenue are colinear, it is uncertain which of these factors (or combination of both factors) is driving the relationship with any third variable.

[4] $r_s = .54$, $p < .01$.
[5] Further explanation is provided in the Tutorial for Interpreting Statistical Test Results section of the Appendix.
[6] Two variables are considered colinear if (a) each variable can be graphed as approximately a straight line and (b) a change in one variable corresponds to a similar change in relative magnitude and direction of the other variable.

3.3.2 Geographic Location

The hubs' geographic distribution in 2015 was similar to 2013 (see Figure 3.2). There is no evident correlation between the number of hubs responding to the survey from a census region and the population of the region. This suggests that there are likely many historical, social, and demographic factors beyond population size that affect where food hubs are located.

Figure 3.2 Location of 2015 National Food Hub Survey Respondents by Census Region

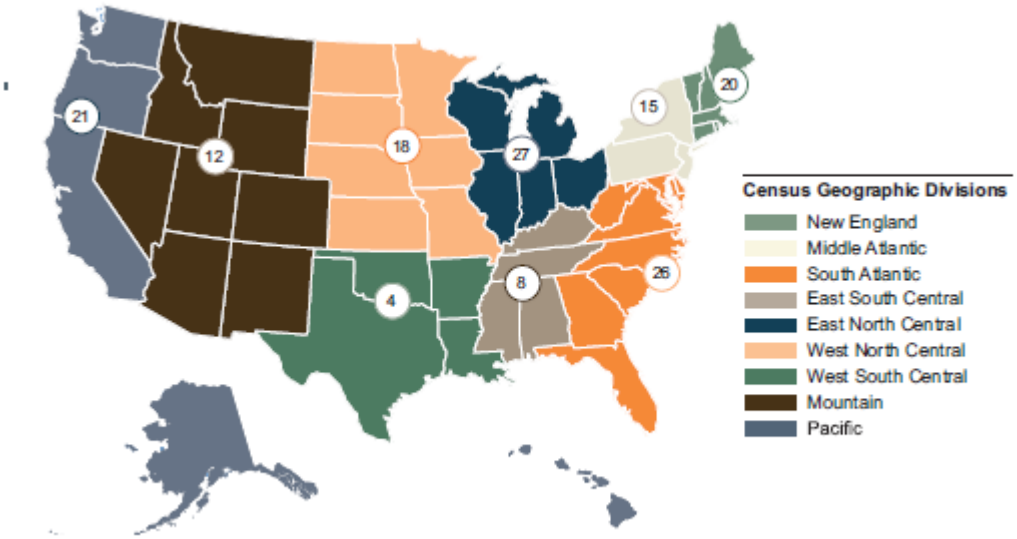


Table 3.1 shows the percentage of responses coming from each of the nine census regions in both 2013 and 2015. The hubs that responded to the survey in either year may not be geographically distributed in proportion to the locations of all known hubs. Because the number of hubs responding in any region is relatively small, it is not appropriate to interpret changes from 2013 to 2015 as accurate confirmation of a growing or shrinking number of hubs in a region.

Table 3.1 Percentage of Total Survey Respondents from Census Regions

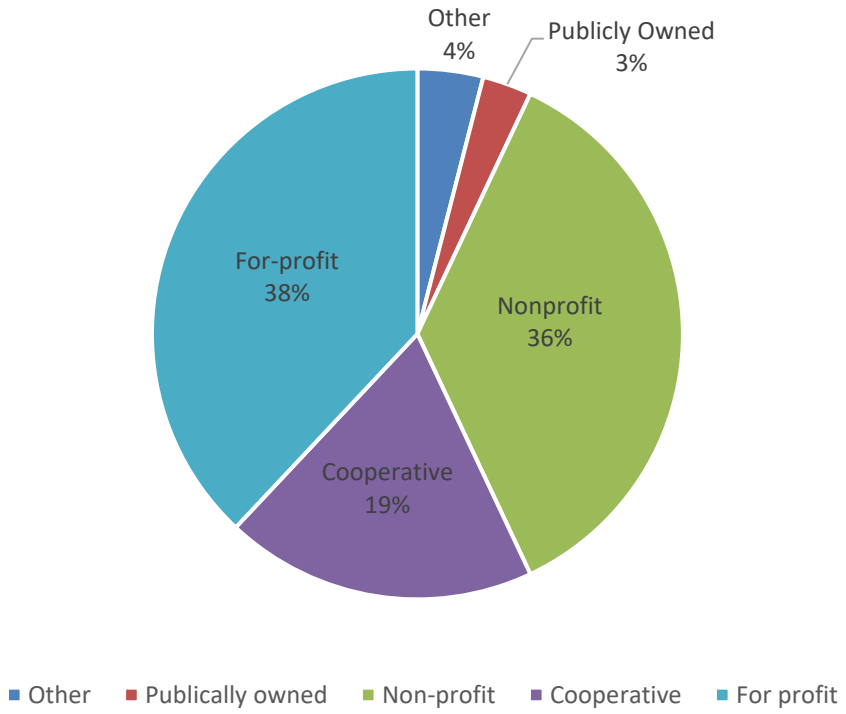
Census Region*	Percentage of Total Responses, 2013 (*n* = 107)	Percentage of Total Responses, 2015 (*n* = 151)
East North Central	11%	18%
East South Central	3%	5%
Middle Atlantic	16%	10%
Mountain	8%	8%
New England	16%	13%
Pacific	12%	14%
South Atlantic	21%	17%
West North Central	8%	12%
West South Central	5%	3%

* East North Central: IL, IN, MI, OH, WI. East South Central: AL, KY, MS, TN. Middle Atlantic: NJ, NY, PA. Mountain: AZ, CO, ID, MT, NV, NM, UT, WY. New England: CT, ME, MA, NH, RI, VT. Pacific: AK, CA, HI, OR, WA. South Atlantic: DE, FL, GA, MD, NC, SC, VA, DC. West North Central: IA, KS, MN, MO, NE, ND. West South Central: AR, LA, OK, TX.

3.3.3 Legal and Business Models

The same 11 legal operating structures for food hubs were identified in both years of the survey. As in the 2013 report, these categories were collapsed into five: nonprofit, for-profit, cooperative, publicly owned, or other (see breakdown in Figure 3.3). Nonprofit food hubs made up 36% of the survey responses. For-profit entities, including S, C, and B Corps, LLCs, L3Cs, and unspecified for-profit structures, combined to account for 38% of respondents. LLCs (21%) were the most frequently cited for-profit legal structure. Consumer, producer, and hybrid cooperatives accounted for 19% of responses. The remaining 4% of hubs had another or no formal legal structure. The numbers of publicly owned hubs or hubs with other legal structures were small. It was not possible in this report to analyze them by legal structure.

Figure 3.3 Food Hubs by Legal Structure*

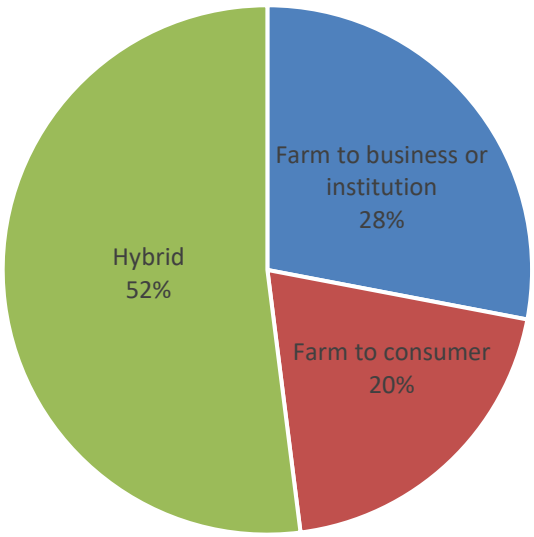


**n* = 151

A food hub's legal structure helps define its scope of operations. However, the markets a food hub serves likely influence operations far more than the hub's legal structure. Market groupings often used include farm to business or institution, farm to consumer, and hybrid (Barham, 2012). These three categories were the options given when the survey was administered in spring 2015. In summer 2015, the USDA proposed three revised categories that better describe food hub markets: wholesale, direct to consumer, and hybrid (Matson, Thayer, & Shaw, 2015b). These new categories reflect a renaming rather than a reclassification. To be consistent with the survey's wording, this report will use the older categories, recognizing that farm to business or institution most resembles wholesale and farm to consumer resembles direct to consumer. Figure 3.4 shows the percentage of hubs selling to wholesale market buyers, such as grocery

stores, restaurants, health care and educational food service providers, and other distributors (farm to business or institution); to community-supported agriculture (CSA), buying clubs, mobile units, and retail online and brick-and-mortar stores or home delivery services (farm to consumer); and to a combination of wholesale buyers and consumers (hybrid). More than half (52%) of hubs serve both wholesale (farm to business or institution) and direct to consumer (farm to consumer) markets.

Figure 3.4 Food Hubs by Business Model*



**n* = 151

This report will refer to the legal organization of the food hub as its *legal structure* and the market a food hub serves as its *business model*. Because these classifications represent such fundamental differences between hubs, they, together with the number of years a food hub has been in business, will be used throughout the report to group and compare findings.

3.3.4 Employees and Volunteers

In 2013 and 2015, food hubs reported using both paid and unpaid labor. Hubs were also asked about their senior managers.

3.3.4.1 Paid Employees

The total number of paid employees working at the food hubs surveyed increased 85% between 2013 and 2015 (see Table 3.2). While this increase was partly because more hubs responded to the survey, it is also true that the average number of employees per hub increased slightly. The median number of hub employees did not change between 2013 and 2015 overall or for hubs in business for more than two years. However, on average, hubs completing both years of the survey showed a 29% increase in the median number of employees. Of the hubs who provided employee figures for both years, five lost employees, four had no change, and 31 added 1–73 employees. Hubs that have been in business longer,[7] have warehouses,[8] and, as in 2013, have larger total revenues[9] are likely to have more paid employees. Based on these findings, it is almost certain that food hubs are creating new jobs.

[7] $r_s = .35$, $p < .01$.
[8] $t(124) = 1.86$, $p < .05$.
[9] $r_s = .75$, $p < .01$.

Table 3.2 Number of Hub Employees in 2013 and 2015 by Various Factors

	All Hubs		Hubs in Business More than 2 Years		Hubs Completing Surveys in Both Years (*n* = 40)	
	2013 (*n* = 77)	2015 (*n* = 130)	2013 (*n* = 53)	2015 (*n* = 86)	2013	2015
Total number of employees	1184	2187	1058	1675	564	843
Mean	15	17	20	19	14	21
Median	6	6	9	9	7	9
Minimum/ Maximum	0 / 165	0 / 280	0 / 165	1 / 189	1 / 155	1 / 189

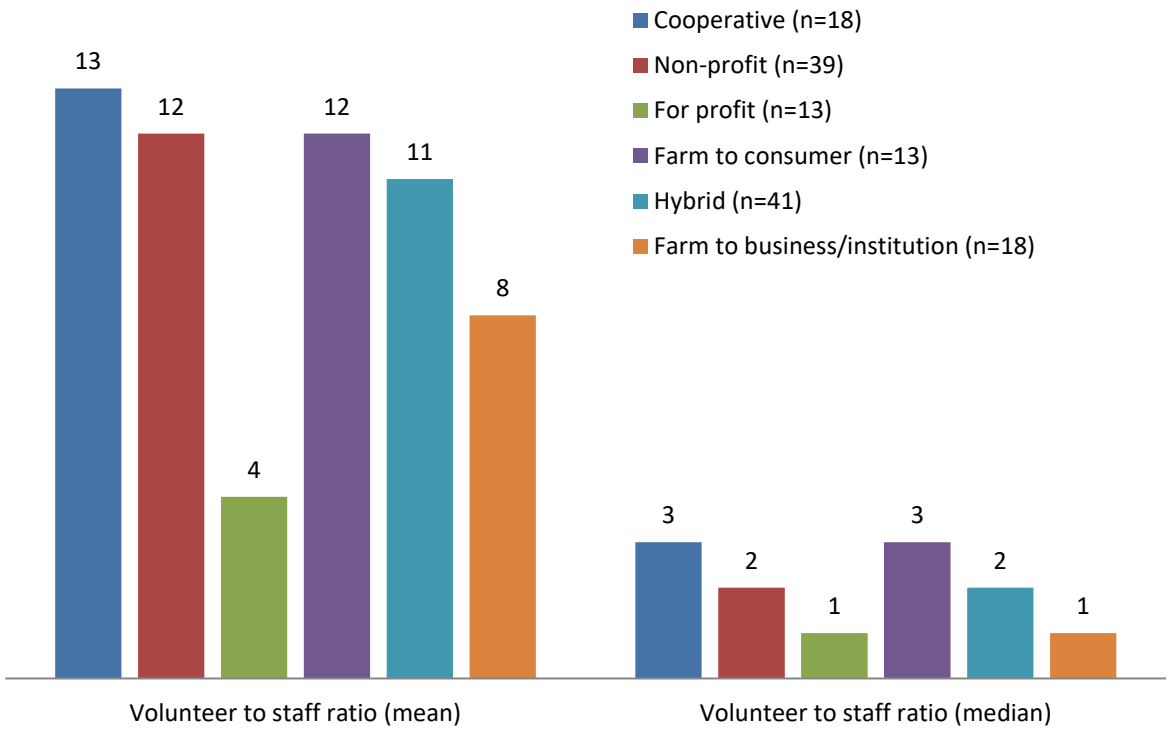
In 2015, 128 hubs reported that, in total, they employed 902 full-time, year-round, non-management employees; 570 full-time, part-time, and seasonal managers; 348 part-time, year-round employees; and 265 seasonal paid employees. For the 127 hubs that reported having women in paid positions, 8 out of 10 paid employees were female. For the 59 hubs that reported having people of color in paid positions, about 4 out of 10 paid employees were people of color.

3.3.4.2 Unpaid Staff

As in 2013, volunteers, including cooperative members and interns, continued to be important sources of labor for food hubs in 2015. Forty-two percent (*n* = 106) of hubs indicated that increasing staff was a barrier to growth, and 15% acknowledged that finding reliable seasonal and/or part-time staff was one of the hub's top five challenges. Since a little more than one-third (39%) of these hubs expected to have the resources or capital to increase staff levels within the next 12 months, volunteers may be an important part of meeting staffing needs.

Almost two-thirds (61%, *n* = 140) of hubs indicated they utilize unpaid or volunteer staff. About one-quarter use unpaid interns (27%), co-op members (22%), or volunteers who help regularly (29%). Thirty-nine percent use volunteers who help occasionally. Figure 3.5 shows the mean and median ratio of volunteers to paid employees for different hubs based on legal and business model. If the ratio is greater than 1, the hub has more volunteers than paid employees. The large difference between mean and median figures indicates that there are a few hubs with many volunteers. Hubs with the most volunteers (greater than 100) tended to be either nonprofit or consumer-based cooperatives. Overall, hubs for which a ratio could be calculated (*n* = 72) had a mean of 10 and a median of 2 volunteers for every paid employee. Sixty-five percent had at least a 1:1 ratio of volunteers to employees. A little more than 1 in 10 hubs (11%) acknowledged that they may be overdependent on volunteers.

Figure 3.5 Ratio of Volunteer Staff to Paid Staff by Legal Structure and Business Model



3.3.4.3 Senior Managers

Managers play critical roles in shaping business success. The 2015 survey took a closer look at food hub manager experience and education. Forty-two hubs, representing 28% of responding hubs, began operation in the last two years. Presumably, these new hubs needed to find qualified management. In addition, 7% of hubs that answered both years of the survey indicated having a different manager in 2015 than in 2013. It stands to reason that there is a demand for experienced and educated senior food hub managers. Figure 3.6 shows years of experience for seven key senior food hub manager expertise areas for 2013 and 2015. On average, food hub managers had less experience in all areas in 2015.

Figure 3.6 Food Hub Managers' Experience by Area*

* n is shown in parentheses for each area of experience.

**"No experience" was not asked as a separate category in 2013, but this information is captured in the "less than 1 year" category.

Managers' lack of experience appears to be, in part, because of the abundance of new hubs. Depending on the area of experience, 21–41% fewer hubs in operation two years or less said their senior manager had at least three years of experience in that area than did hubs in operation more than two years. The exception was production experience: 5% more hubs in operation two years or less said their senior manager had at least three years of production experience than did hubs in operation more than two years. However, when asked if their senior manager had formal training or education in an experience category, hubs in operation for two years or less and hubs in operation for more than two years answered similarly, on average. A small number of hubs reported that their managers had formal training in an experience area but little on-the-job experience in that area (see Table 3.3). Table 3.4 illustrates a general but weak trend for hubs in business for a greater number of years to have older senior managers.[10]

Table 3.3 Percentage of Food Hub Managers with Formal Training But No Experience

Area of Experience	Formal Training or Education with One Year or Less of Experience
Food processing (*n* = 20)	20%
Food marketing and sales (*n* = 34)	12%
Strategic planning (*n* = 44)	9%
Management (*n* = 45)	9%
Food retail (*n* = 15)	7%
Production (*n* = 33)	6%

[10] $r_s = .27$, $p < .01$.

Table 3.4 Average Age of Food Hub's Senior Manager by Year and by Age of Hub

	Average Manager Age	
Age of Hub in Years	2013	2015
0–2 years	44	45
3–5 years	44	48
6–10 years	41	47
11–15 years	51	51
16–20 years	51	52
21+ years	56	60

Food hub managers are a well-educated group. Seventy-one percent (*n* = 107) completed a four-year, graduate, or professional degree. Another 4% (*n* = 6) completed a two-year or vocational degree. Newer hubs tended to have managers with more formal education (see Figure 3.7). Close to half (46%) of hubs in operation for two years or less are managed by an individual with a graduate or professional degree. Food hub managers come from a wide educational background (see Table 3.5). Over a quarter of hubs' managers (29%) had higher education or degrees in general business, marketing, finance, or accounting.

Figure 3.7 Education Level of Food Hub Managers by Age of Hub

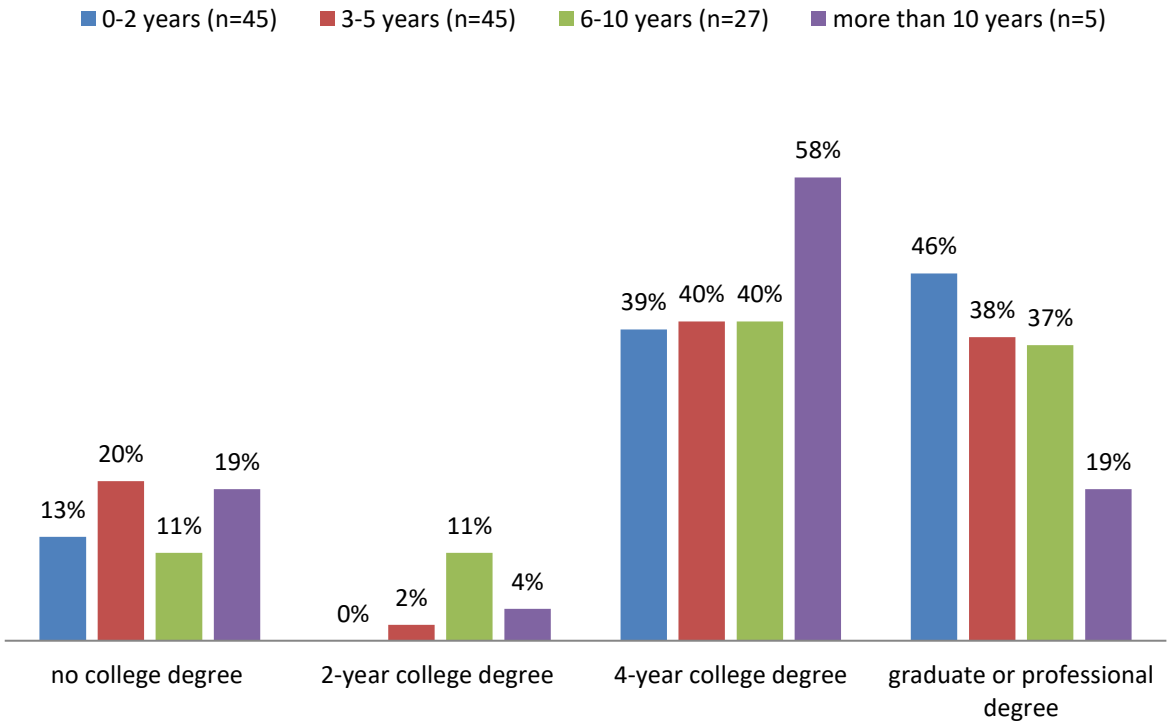


Table 3.5 Areas of Study by Food Hub Managers with Higher Education or Degree*

Degree Area	Managers
Business, marketing, finance, accounting	29%
Other liberal arts	14%
Other natural science, engineering	13%
Environment, urban planning, recreation, tourism	11%
Medicine, veterinary medicine, law	8%
Horticulture, agriculture, landscape architecture, soil science, sustainable agriculture	8%
Fine arts	5%
Nutrition, culinary arts, food science	4%
Education	3%

**n* =126

To summarize, in 2015, food hub managers as a group were less experienced than in 2013, although some had formal training that they had not yet put to use. Hubs in business for two

years or less tended to have younger, more highly educated managers with less food hub–related experience. Combined, the senior manager findings point to a possible interpretation that newly established hubs are recruiting younger, well-educated senior managers who may lack practical experience. A challenge is to provide appropriate support, guidance, and training to help these new managers be successful.[11]

3.3.5 Producers and Suppliers

For the purposes of this survey, producers and suppliers were defined as farms or ranches, food processors, or nonfood-related businesses not owned by the hub; other distributors; or the food hub's own farms, ranches, or enterprises. The survey provided hubs an opportunity to report the breadth of their suppliers and producers. While what follows is necessarily an estimate by the food hubs about their producers' and suppliers' activities, it nonetheless begins to tell hubs' supply-side story. Hubs were asked to indicate the number of producers and suppliers from which they procured or purchased product.[12] Recognizing that two or more hubs may conceivably be working with the same supplier and thus a specific supplier may be counted more than once, 79 of the hubs surveyed enumerated a total of 6,255 producers and suppliers. In 2015, hubs procured or purchased from an average of 83 and a median of 37 producers and suppliers. There was little change from 2013, when the average was 80 and the median was 36. Hubs procured or purchased from as few as three to as many as 1,500 producers and suppliers. Twenty-eight hubs provided a number of producers and suppliers as well as producer

[11] One such unique training opportunity is the University of Vermont's professional certificate in Food Hub Management: https://learn.uvm.edu/program/food-hub-management/

[12] The language of "procured or purchased" in the survey was intended to allow both hubs that paid for product and hubs that brokered product to better understand and answer questions.

information for both 2013 and 2015; those hubs had a 60% increase in the mean and a 53% increase in the median number of producers and suppliers (see Table 3.6).

Table 3.6 Number of Producers and Suppliers for Hubs Completing Both Years' Survey*

	2013	2015
Mean	72	115
Median	38	58
Minimum/Maximum	6–500	3–1500

*n = 28

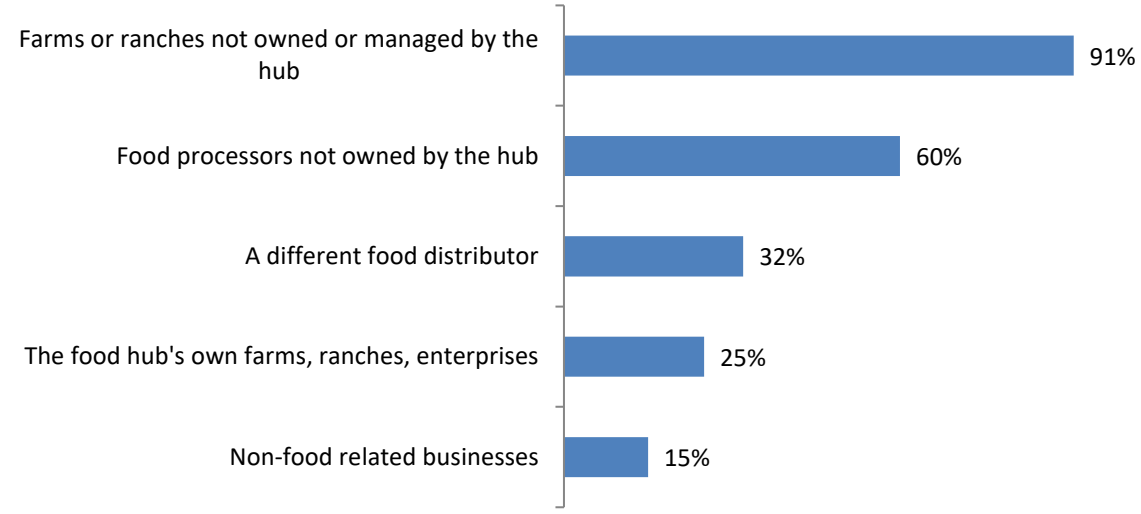
In 2015, on average, about one-third (31%) of hubs' producers and suppliers were owned or operated by women and one-fifth by people of color (see Table 3.7). In 2013, on average, hubs indicated that 16% of their producers and suppliers were owned by women and that 29% of their producers and suppliers were owned by people of color.

Table 3.7 Percentage of Producers and Suppliers Owned or Operated by Women or People of Color

	Women (*n* = 88)	People of Color (*n* = 72)
Mean	31%	20%
Median	30%	8%
Minimum/Maximum	2–100%	0–100%

Figure 3.8 shows the percentage of hubs procuring or purchasing product from various sources. One-quarter of hubs are maintaining their own farms, ranches, or enterprises and distributing the products produced. Almost one-third of hubs (32%) are procuring product from other distributors and 15% from nonfood-related suppliers.

Figure 3.8 Percentage of Hubs Purchasing or Procuring Product by Enterprise Type*



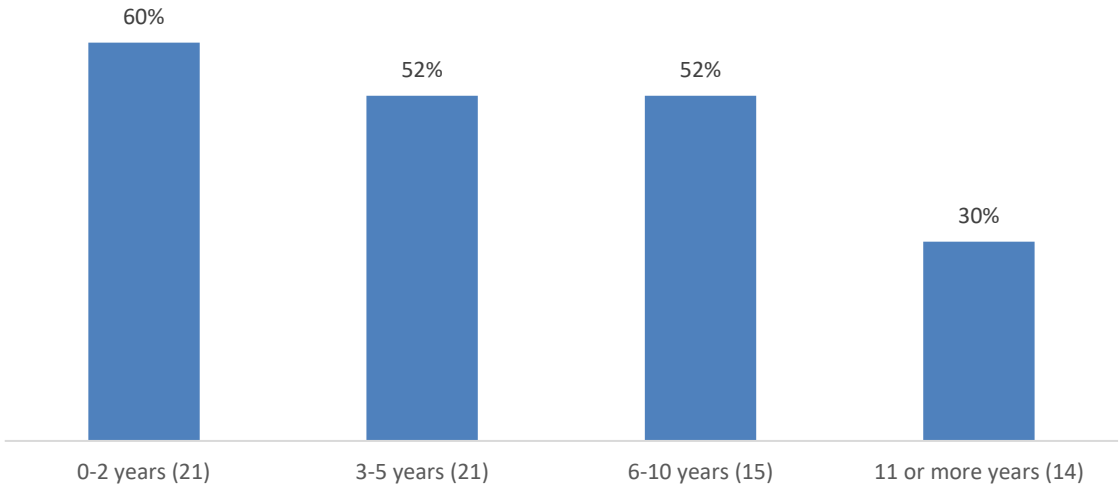
**n* =111

3.3.5.1 Beginning Producers and Suppliers

The USDA defines a beginning farmer or rancher as one who has been farming less than 10 years (USDA, 2010). The 2015 survey extended this definition to include any non-hub-owned food processors and nonfood-related businesses and other distributors from which a hub purchased or procured product. In 2015, on average, half of a hub's producers and suppliers began business in the last 10 years (n = 71), an increase of 24% from 2013. Hubs that answered about beginning producers and suppliers in both years showed a 4% increase, from 47% to 51%. Hubs in business for less time[13] and those with less revenue[14] were more likely to report that a higher percentage of their total producers and suppliers were beginners (see Figure 3.9).

[13] $r_s = -.45$, $p < .01$.
[14] $r_s = -.32$, $p < .01$.

Figure 3.9 Percentage of Total Beginner Producers and Suppliers by Age of Hub*



* n is shown in parentheses for each age category

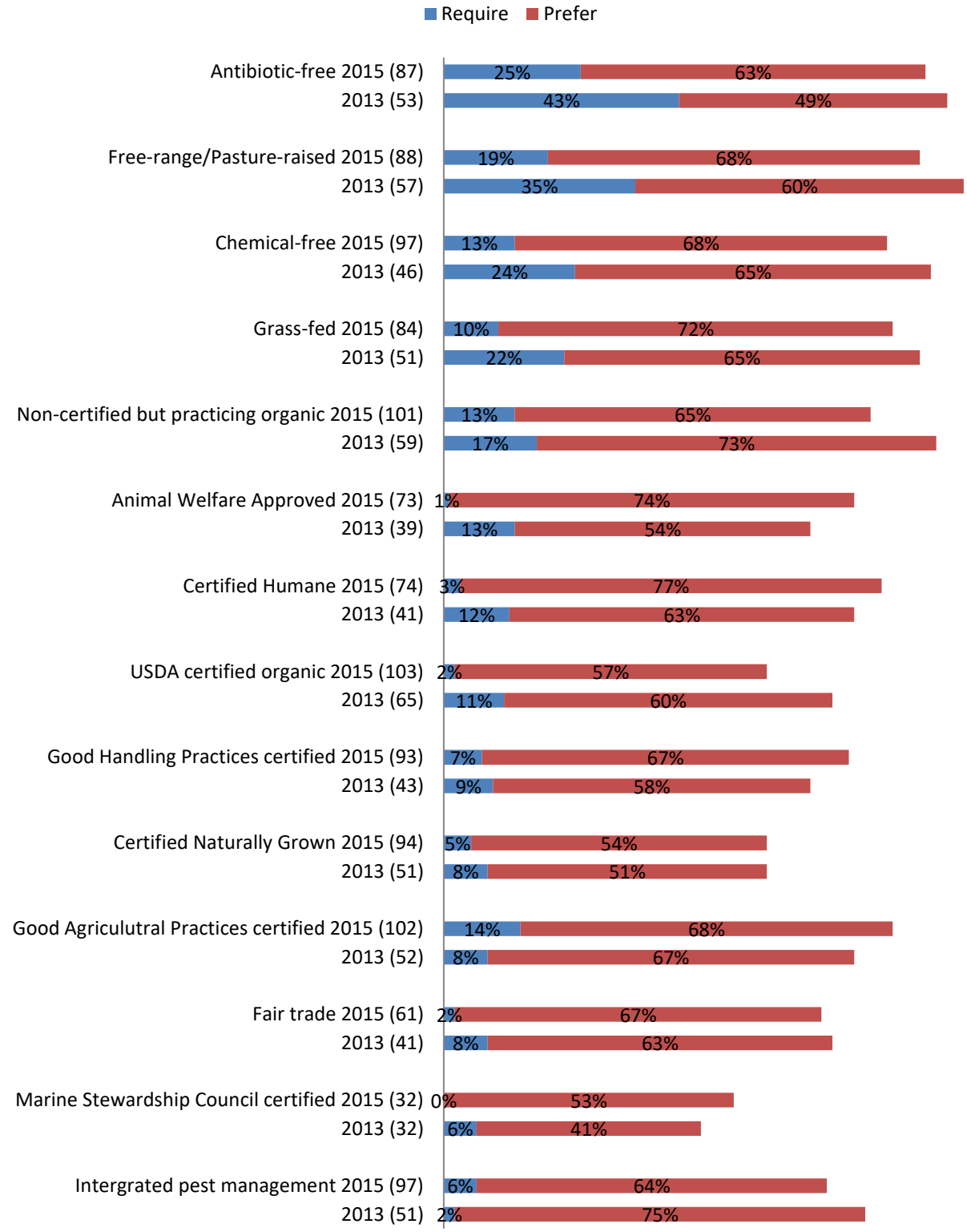
3.3.5.2 Producer Certifications and Practices

Hubs were asked to indicate if they required, preferred, or had no preference for producers and suppliers to use particular practices or have certain certifications.[15] Responses are shown in Figure 3.10. For better comparison from 2013 to 2015, the percentage calculation for 2015 excludes hubs responding "not applicable" for a certification or practice, and the percentages include only hubs stating that they either preferred or required producers and suppliers to use specific practices or have certain certifications. First, it is important to note that for all categories, at least 53% of applicable hubs either preferred or required a certification or practice. However, in 2015, hubs were less likely than in 2013 to require any particular practice or certification except for Good Agricultural Practices (GAP) certification (14% in 2015 vs. 8% in

[15] Some hubs specialize in livestock and/or seafood or, conversely, carry only plant-based products. Recognizing that some certifications and practices may not apply to the producers and suppliers of some hubs, the 2015 survey allowed hubs to answer "not applicable" to any certification or practice.

2013). Taking both requirements and preferences together, hubs were also less likely than in 2013 to either require or prefer any practice or certification except Certified Humane (80%), GAP certification (74%), and Marine Stewardship Council certification (53%).

Figure 3.10 Food Hub Required and Preferred Producer/Supplier Certifications and Practices by Year*



**n* is shown in parentheses for each certification or practice

Hubs in business less than two years more often required non-certified organic (24%, *n* = 100), grass-fed (17%, *n* = 83), free-range/pasture-raised (28%, *n* = 87), and antibiotic-free (33%, *n* = 83) practices than hubs in business more than two years (non-certified organic: 6%, grass-fed: 7%, free-range/pasture-raised: 15%, antibiotic-free: 21%). Hubs in business for two or more years were more likely to require integrated pest management (IPM; 9%, *n* = 96) and third-party certifications such as GAP (18%, *n* = 101), Certified Naturally Grown (7%, *n* = 93), and Good Handling Practices (GHP; 8%, *n* = 92) than hubs in business less than two years (IPM: 0%, GAP: 6%, Certified Naturally Grown: 3%, GHP: 3%).[16]

Farm to business or institution hubs were more likely to require any category of practices or certifications than hybrid or farm to consumer hubs. Farm to business or institution hubs (27%, *n* = 30) were three times more likely than hybrid hubs (9%, *n* = 56) and 4.5 times more likely than farm to consumer hubs (6%, *n* = 16) to require GAP certification.[17]

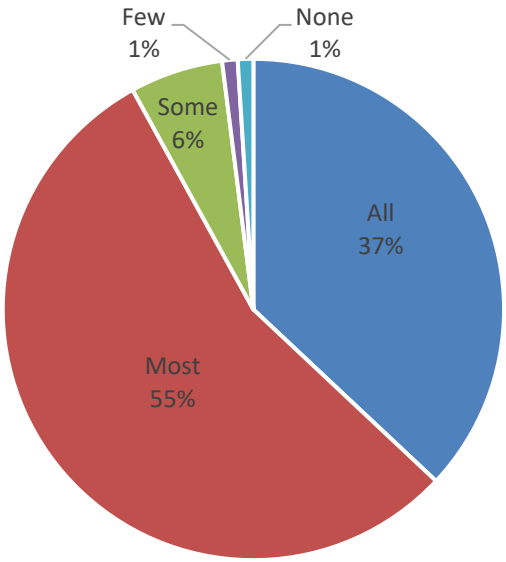
3.3.5.3 Small and Mid-Sized Farms and Ranches

Hubs were asked how many of their total producers and suppliers are farms and ranches, and they enumerated 4,083, accounting for 65% of their total suppliers. As with the total number of producers and suppliers, two or more hubs may be working with the same farms and ranches, although this is unlikely. Hubs were also asked how many of their total producers and suppliers were small or mid-sized farms and ranches (defined as having gross sales less than $500,000).

[16] To ensure a robust analysis by age of hub, practices required by 5% or less of hubs were not included.
[17] To ensure a robust analysis by market type, practices required by 5% or less of hubs were not included.

Ninety-two percent of food hubs reported that most or all of their farm and ranch suppliers were small or mid-sized (see Figure 3.11).

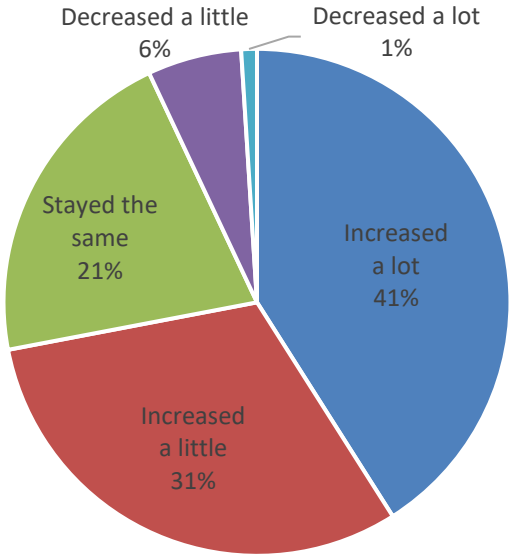
Figure 3.11 Number of Small and Mid-SIzed Farms and Ranches as Producers and Suppliers*



**n* =99

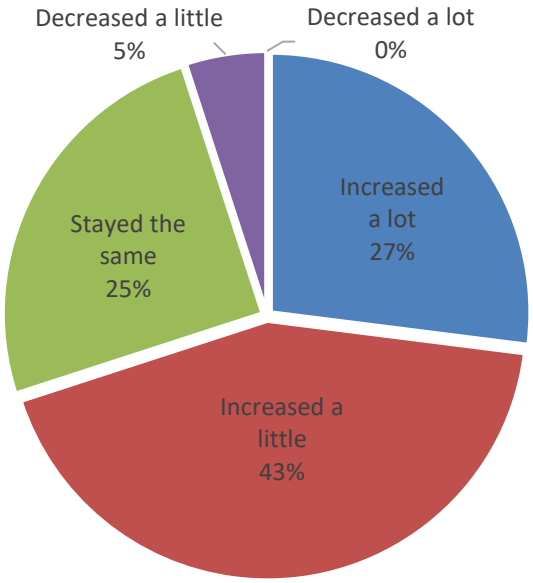
Over their hub's lifetime, 72% of hubs said the total yearly amount spent on product from small and mid-sized farms and ranches had increased (see Figure 3.12), and 70% said the total yearly amount had increased in the last two years (see Figure 3.13).

Figure 3.12 Change in Total Yearly Amount Purchased from Small and Mid-Sized Farms Since Hub Began*



**n* =100

Figure 3.13 Change in Total Yearly Amount Purchased from Small and Mid-Sized Farms Since 2013*

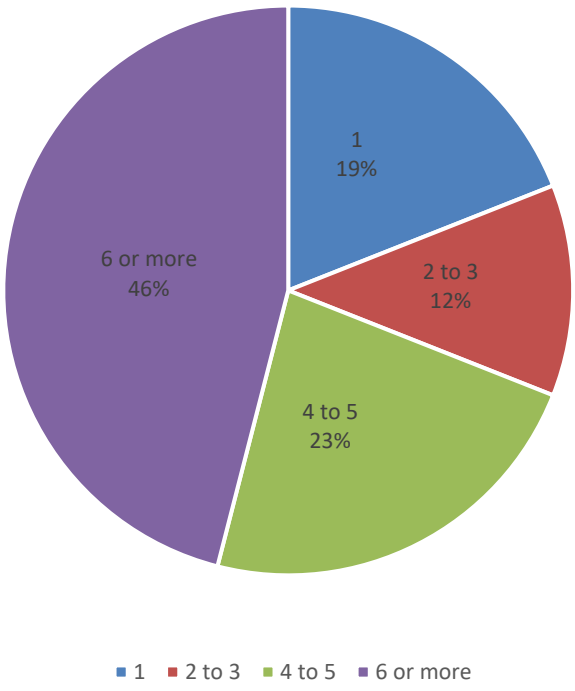


**n* =100

3.3.6 Types of Products Sold

Food hubs were asked about 11 different categories of products (see Figure 3.14 for the average number of categories and Figure 3.15 for categories). Hubs with more categories of product were somewhat more likely to purchase or procure product from more producers and suppliers.[18] Farm to consumer hubs (*n* = 17) averaged eight product categories, hybrid hubs (*n* = 59) averaged five, and farm to business or institution hubs (*n* = 24) averaged four product categories.

Figure 3.14 Number of Product Categories Carried by Hubs*



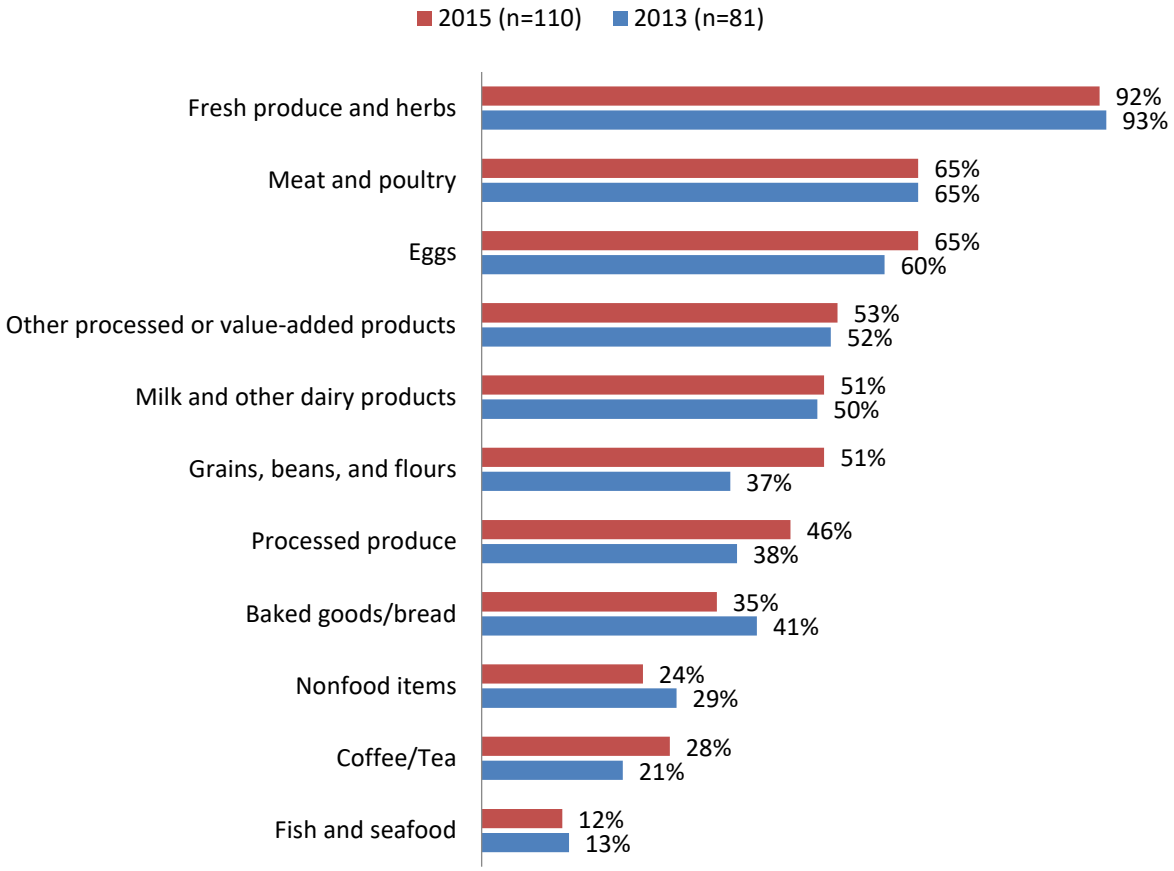
**n* =110

Almost all hubs (92%) carried fresh produce and herbs (see Figure 3.15). Eggs and meat/poultry were each carried by 65% of hubs. Approximately half of hubs carried milk and other dairy

[18] $r_s = .37$, $p < .01$.

products (51%); grain, beans, and flours (51%); processed produce (46%); or other processed or value-added products (53%). Figure 3.15 also shows that there was little change between 2013 and 2015 in the percentage of hubs carrying particular product categories.

Figure 3.15 Percentage of Food Hubs Carrying Products by Category

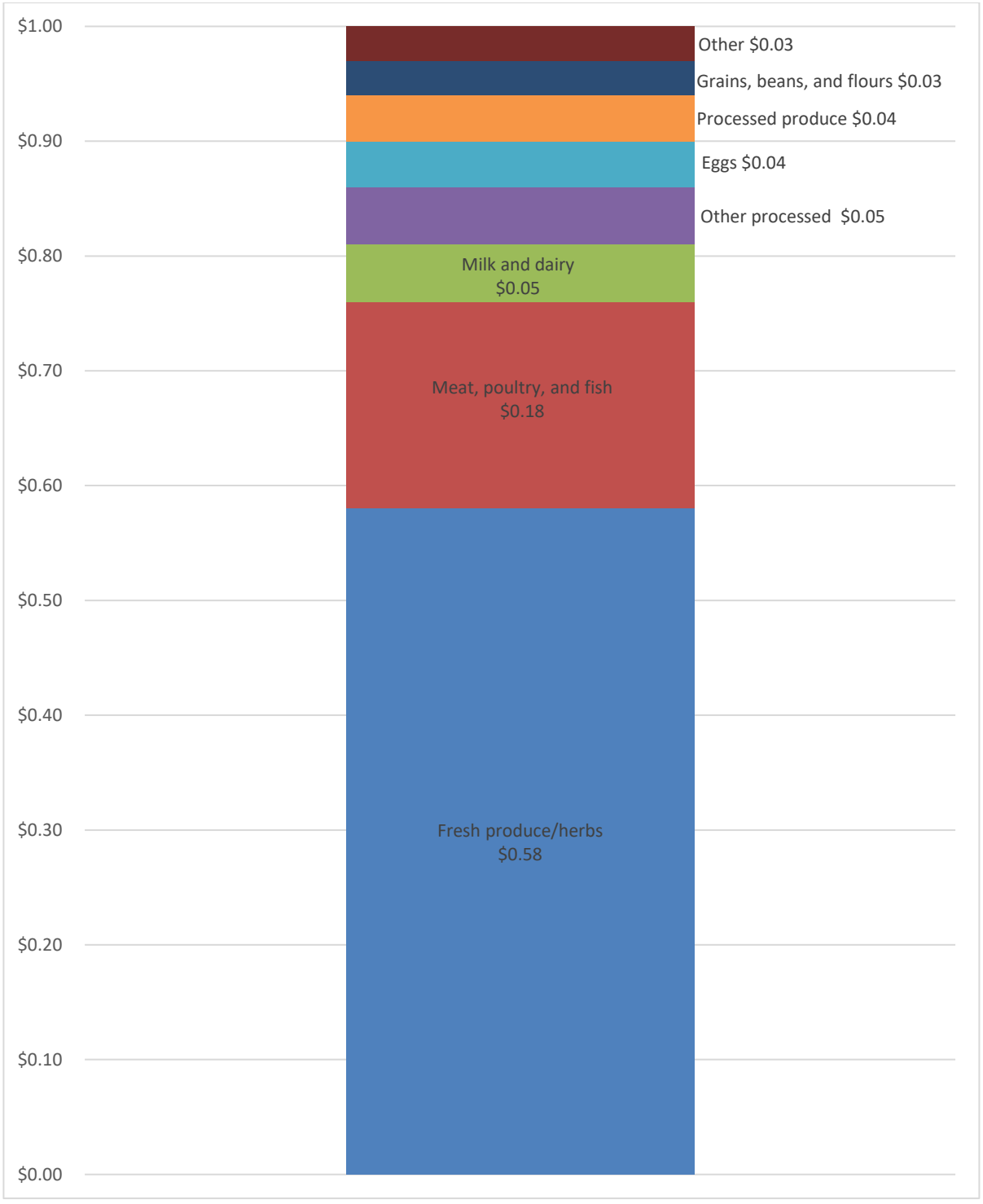


There was little change between 2013 and 2015 in the average percentage of food hub gross sales in each product category. In 2015 (*n* = 110), fresh produce and herbs accounted for 63% of total gross sales on average. Meat and poultry accounted for 26% on average. Milk and dairy products accounted for 10% of average gross sales; processed produce 9% and other processed

products 10%; eggs 6%; grains, beans, and flours 6%; bread and other baked goods 4%; fish and seafood 4%; coffee and tea 2%; and nonfood items 2%.

One useful way to think about category sales is as a portion of one dollar in sales across all food hubs. Figure 3.16 shows that the two largest sales-generating categories across all hubs are fresh produce or herbs, accounting for 58 cents of every dollar in food hub sales, with meat, poultry, and fish accounting for 18 cents of every sales dollar. All other categories combined accounted for 24 cents of every dollar in sales.

Figure 3.16 Total Food Hub Sales as a Fraction of $1



3.3.7 Infrastructure

Despite the apparent growth of the food hub sector in total number of hubs, food hubs reported little change in infrastructure utilization between 2013 and 2015 (see Figure 3.17).

Figure 3.17 Food Hub Infrastructure Types

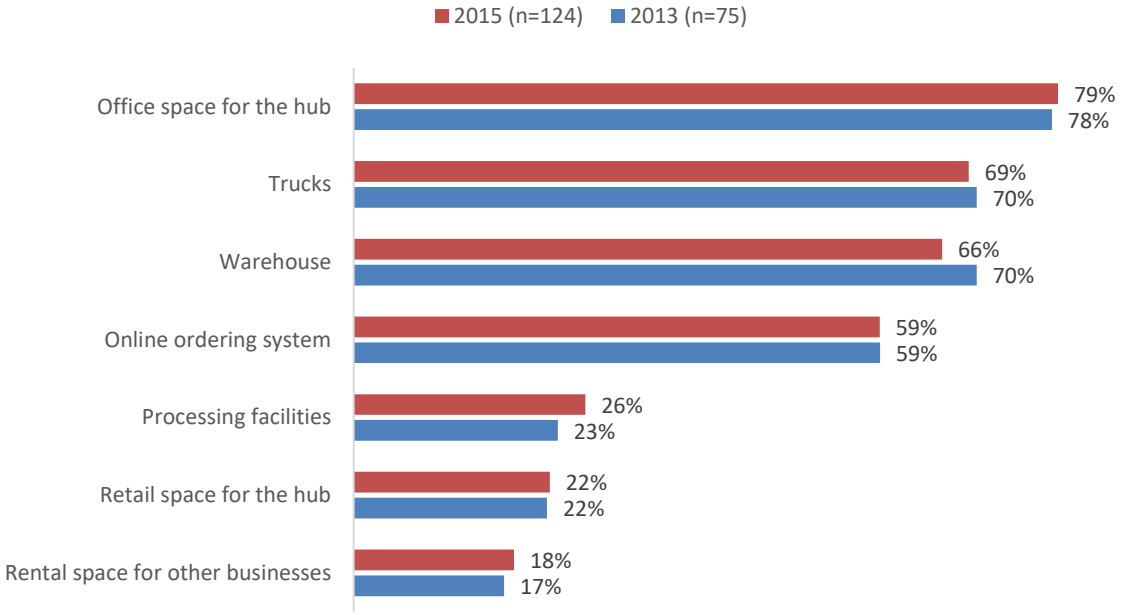
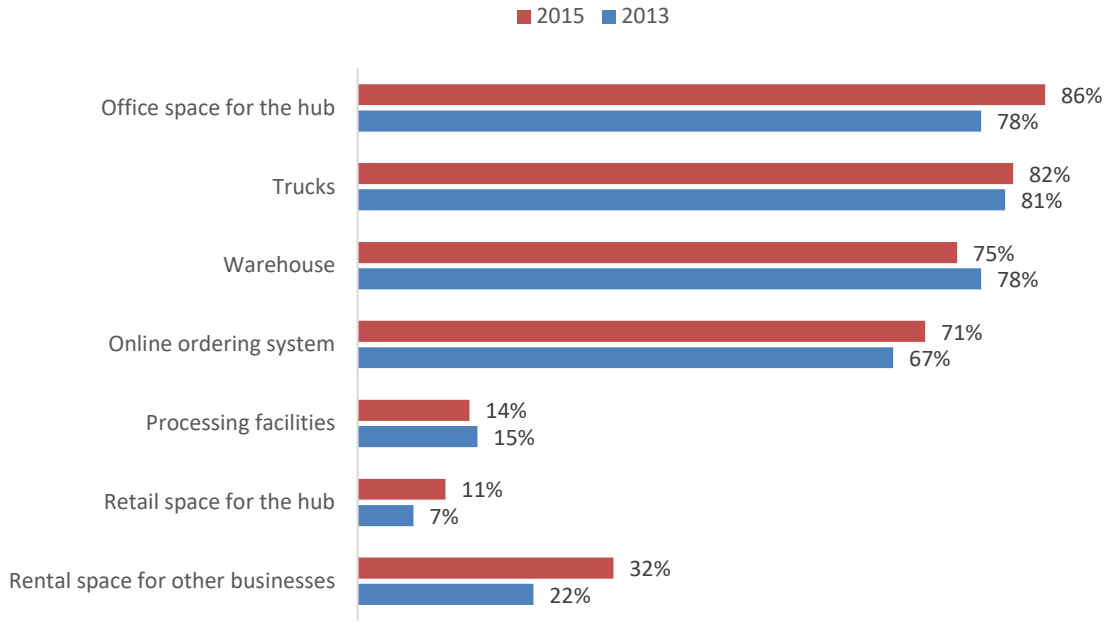


Figure 3.18 Same Hub Infrastructure Types in Both Surveys*



**n* =28

However, for the 28 hubs that answered in both 2013 and 2015, the percentage of hubs with their own office space and space to rent to other businesses increased (see Figure 3.18).

Among business types in 2015, hybrid hubs (*n* = 78) most often had delivery vehicles (75%), processing facilities (34%), retail space for the hub (32%), and licensed shared-use kitchens (21%). Farm to business or institution hubs (*n* = 41) most often had warehouses (74%) and office space for the hub (81%). Farm to consumer hubs (*n* = 26) most often had online ordering systems (73%).

Warehouse and delivery fleet size, online ordering systems, and usage of licensed shared-use kitchen space varied among hubs. Of the 91 hubs reporting on warehouse size, 25% had warehouse space under 1,200 square feet, and another 25% had warehouse space over 6,000

square feet. Farm to business or institution hubs were more likely than other customer market types to have a warehouse. However, all three market types had the same median warehouse size of 3,000 square feet. Three-quarters (75%, *n* = 99) of hubs with trucks, vans, or other delivery vehicles had four vehicles or fewer. Seventy percent of all hubs (*n* = 143) offered transportation services for producers, irrespective of owning delivery vehicles. Nine out of 10 hubs (*n* = 30) indicating that they had sales income from online sales had an online ordering system. Regardless of having an online ordering system, if a hub was selling via the Web, online sales accounted for 65% (*n* = 27) of sales on average. Licensed shared-use kitchens were available at 15% of hubs (*n* = 135). In most cases, hubs allowed a variety of groups or organizations, including those that were not currently suppliers, to access the kitchen facility (see Table 3.8).

Table 3.8 Licensed Shared-Use Kitchen Usage*

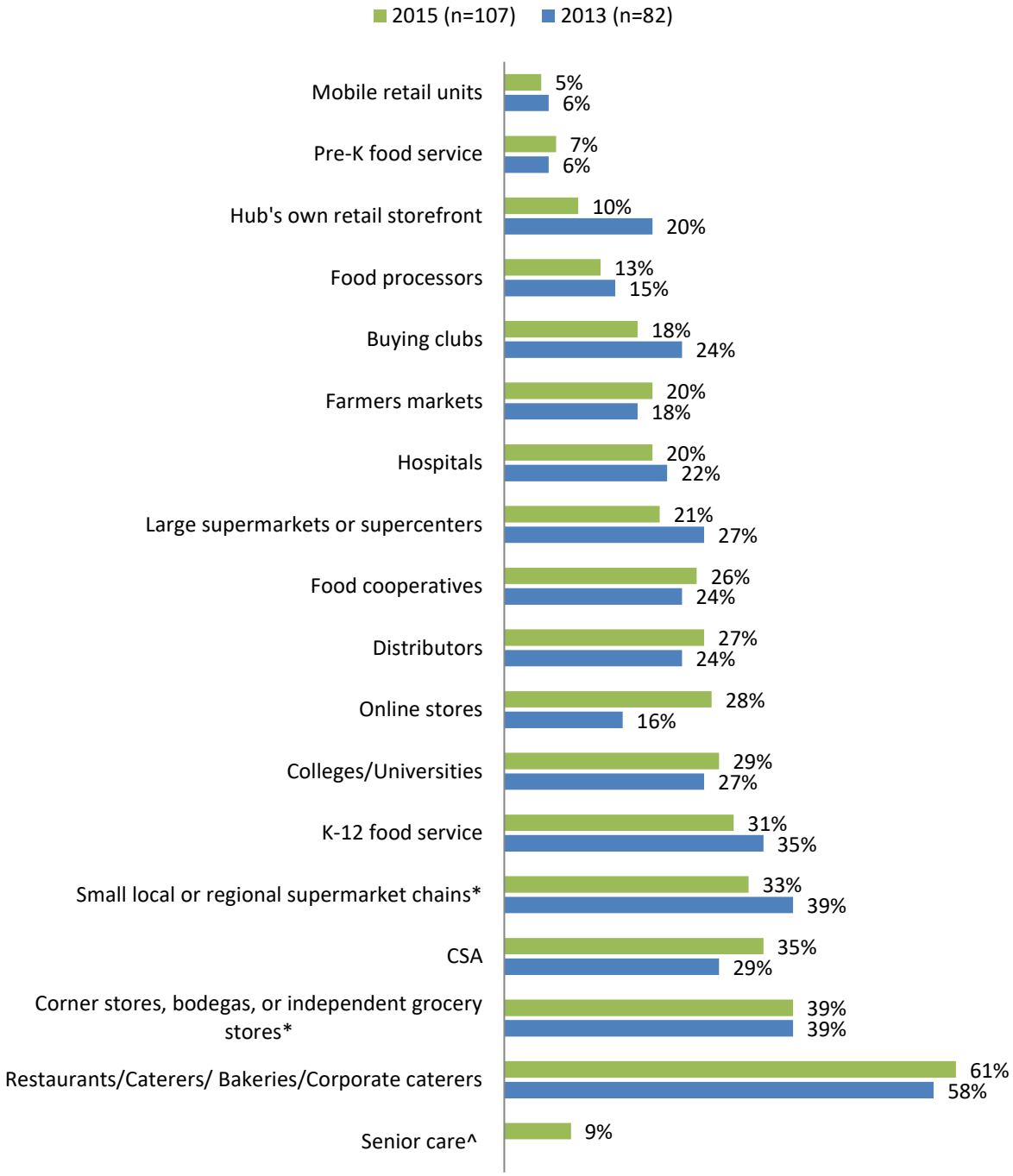
	Percent of Hubs Allowing Use
Food hub's current suppliers and producers	90%
Potential, incubator, or startup food businesses that are not currently the food hub's producers or suppliers	90%
Community organizations or public rentals for parties, events, fundraisers, etc.	70%
Mature food businesses that are not currently the hub's suppliers or producers	75%

Overall, hub infrastructure makeup was fairly unchanged since 2013 and differed mostly by the type of market a food hub served. For 30–45% of hubs, a lack of certain infrastructure elements such as vehicles, warehouse space, and processing facilities was cited as a barrier to growth (see Findings: Networks, Challenges, Opportunities, and Barriers to Growth, page 109).

3.3.8 Customers

Food hubs were asked to indicate if they worked with a particular customer category and, if so, the percentage of gross sales for that customer category. Percentage of gross sales by customer is discussed in the Findings: Finances section (page 79). The category including restaurants, caterers, bakeries, and corporate caterers is the only customer group serviced by more than half of hubs in both 2013 (58%) and 2015 (61%; see Figure 3.19). Fewer hubs sold product through their own retail storefront in 2015 (10%) than in 2013 (20%). In 2015, the percentage of hubs selling though online stores (+12%) and CSA (+6%) increased over 2013 levels.

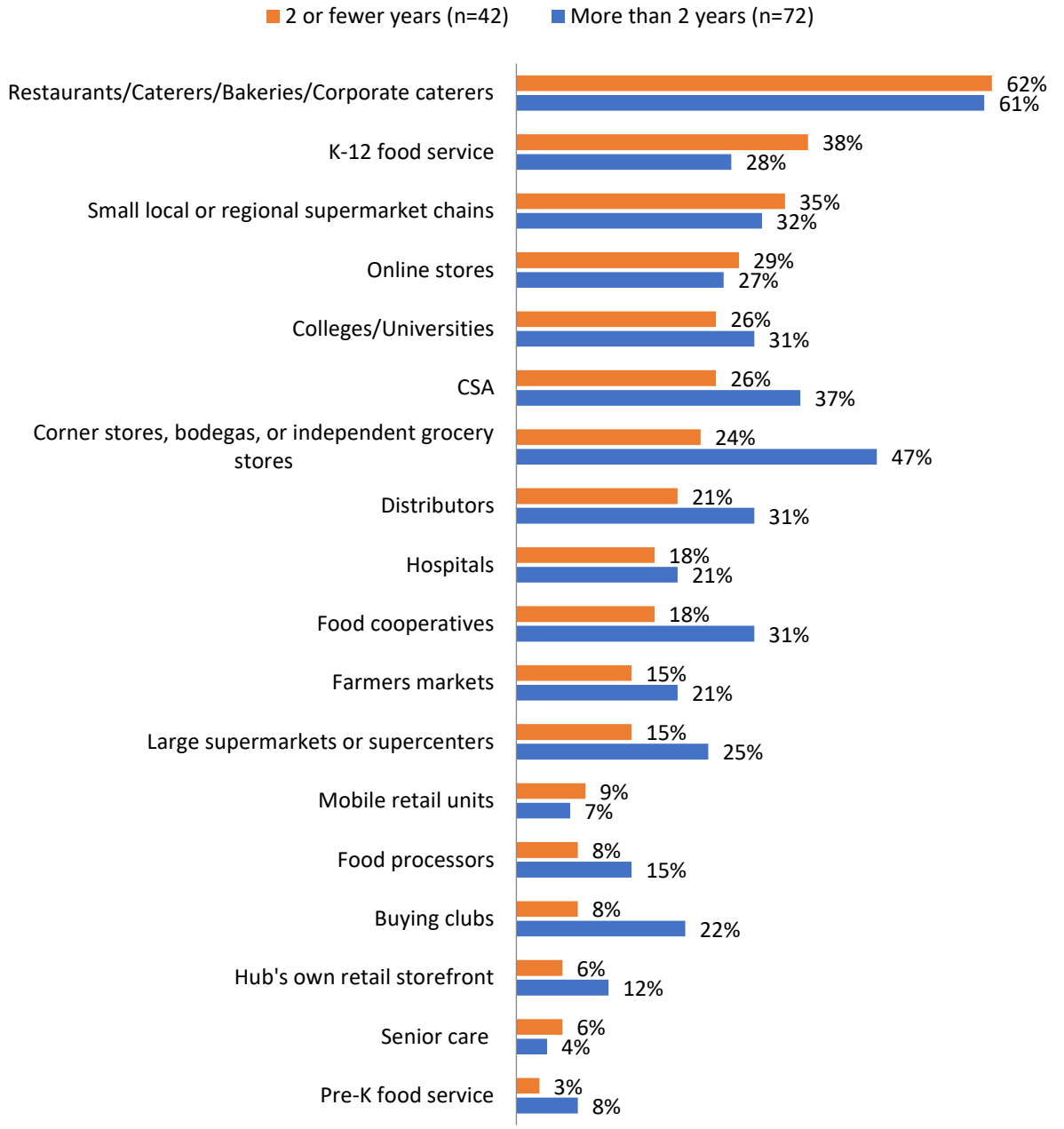
Figure 3.19 Average Percentage of Hubs Selling to Customer Types by Year*



* These categories were given as separate options in 2013. The percentage shown represents the combined category for 2013.

^ Senior care was not given as an option in 2013.

Figure 3.20 Food Hub Customers by Average Number of Hubs Selling to Them by Years in Operation



On average, hubs as a whole served four types of customers. Hubs in operation less than two years served four customer types on average, while hubs in operation more than two years served an average of five customer types. This is reflected in Figure 3.20, where a greater percentage of hubs operating more than two years are serving more categories of customers

than those in operation two years or less. As in 2013, the total revenue of the hub is somewhat positively correlated to the number of customer types a hub serves,[19] as is the number of years a hub has been in operation.[20] Farm to business or institution and hybrid hubs sold to an average of five customer types, while farm to consumer hubs sold to two customer types.

Restaurants/caterers/bakeries/corporate caterers (62%), K–12 food service (38%), and small local or regional grocery stores (35%) are served by the highest percentages of food hubs in operation two years or less, and these categories may represent good prospects for beginning hubs looking to diversify their customer base. Online stores (29%) and CSA (26%) may also be good prospects, but hubs tend to work more exclusively with these two categories of customers (see Figure 3.20).

3.4 FINDINGS: FOOD SAFETY

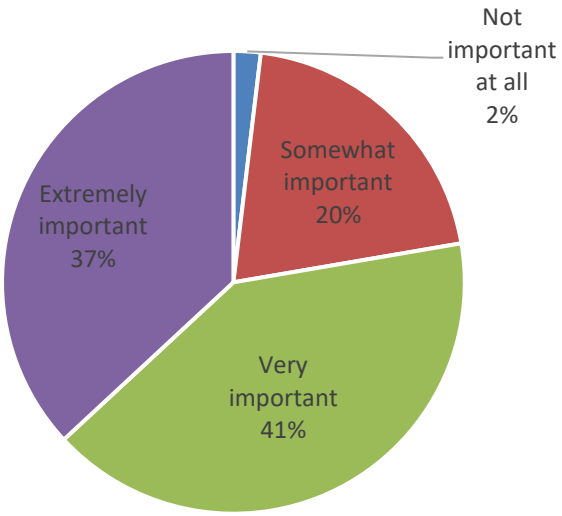
A new section on the 2015 survey, food safety is receiving increasing attention and concern from food hubs as Food Safety and Modernization Act (FSMA) rules begin to affect small and mid-sized farmers.

The current food hub customer demand for food safety certification is mixed. Among hubs that sold product to businesses or institutions, 77% indicated that, on average, 35% of their customers required GAP certification.[21] The remaining hubs selling to businesses or institutions

[19] All hubs: $r_s = .28$, $p < .01$; hubs with > 1 customer type: $r_s = .35$, $p < .01$.
[20] All hubs: $r_s = .20$, $p < .05$; hubs with > 1 customer type: $r_s = .24$, $p < .01$.
[21] Twenty-four percent of hubs who saw this question did not provide an answer.

(23%) had no customers who required GAP. Similarly, for the 72% of hubs selling to businesses or institutions, on average, 32% of their customers required GHP.[22] However, the average does not provide a complete picture. If a hub had some customers that required either GAP or GHP, about a fifth of hubs (GAP: 16%, GHP: 18%) had 90–100% of their customers requiring certification. On the other end, about half of hubs (GAP: 48%, GHP: 50%) had only 1–10% of their customers requiring certification.

Figure 3.21 . Importance of Suppliers' Compliance with FSMA Standards*



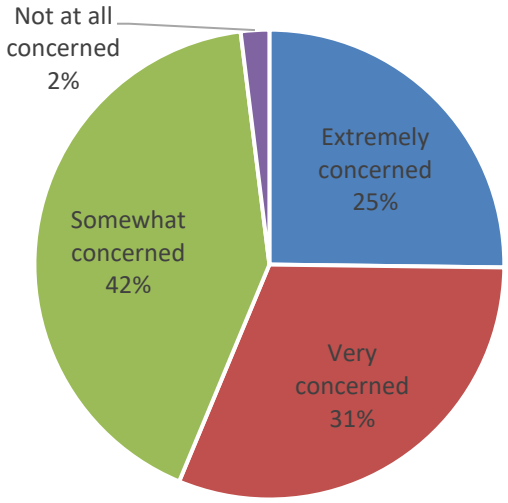
n = 103

Voluntary customer food safety requirements exist in the context of federal food safety legislation and FSMA in particular (see sidebar). Food hubs are in agreement that FSMA will affect their operation in some way. Almost all (98%) food hubs acknowledged that in light of the possible implications, it was important that their producers and suppliers complied with FSMA standards (see Figure 3.21). Of the hubs that acknowledged the importance of FSMA

[22] Thirty-four percent of hubs who saw this question did not provide an answer.

compliance, 98% expressed concern over their suppliers' ability to meet the new standards (see Figure 3.22).

Figure 3.22 Concern over Suppliers' Ability to Comply with FSMA Standards*



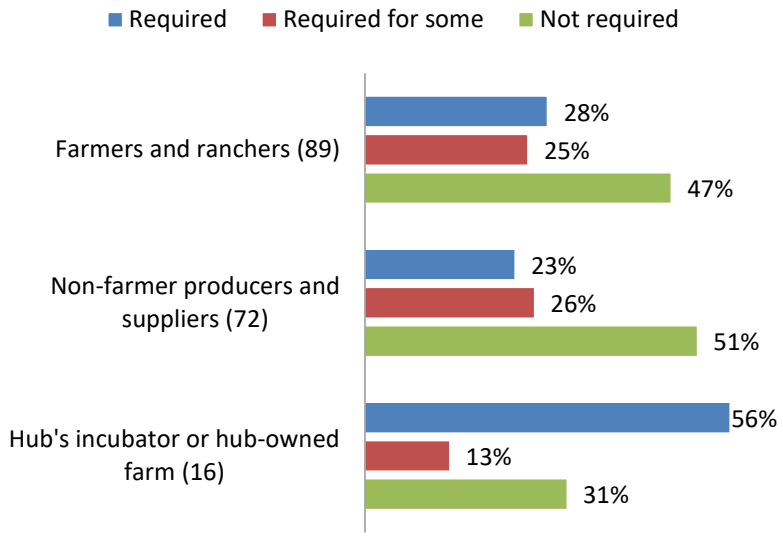
*Only hubs answering that it was at least somewhat important for suppliers to comply with FSMA (*n* = 101) are included.

Not only producers and suppliers will be affected by FSMA; food hubs will also need to comply with additional food safety requirements. Eighty-three percent of food hubs (*n* = 104) registered concern about their own ability to comply with FSMA. Hubs' overall top five challenges reflect this concern. Nearly one-third (31%) of hubs (*n* = 117) said meeting GAP or another food safety certification was a challenge.

As hubs begin to think about implementing FSMA and get requests from buyers for certification, they are placing requirements for food safety training, third-party food safety certification, and/or internal food safety monitoring on their producers and suppliers. Hubs

having their own incubator or farm more often place a requirement for food safety training on their own farm (56%) than on farmers and ranchers (28%) or on non-farmer producers and suppliers (23%) that they don't own or manage (see Figure 3.23).

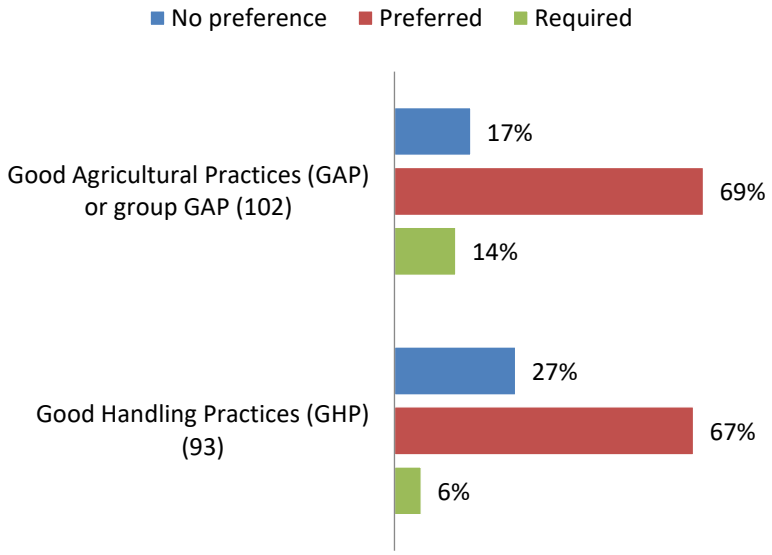
Figure 3.23 Hubs' Requirements for Producer and Supplier Food Safety Training*



* *n* is shown in parentheses for each category

Over two-thirds of hubs prefer their producers and suppliers to have GAP (69%) and/or GHP (67%) certification, while a smaller percentage of hubs require certification (GAP: 14%, GHP: 6%; see Figure 3.24). Between 2012 and 2014, the percentage of hubs preferring or requiring GAP certification increased from 75% to 83%. Similarly, the percentage of hubs preferring or requiring GHP certification increased from 67% to 73%.

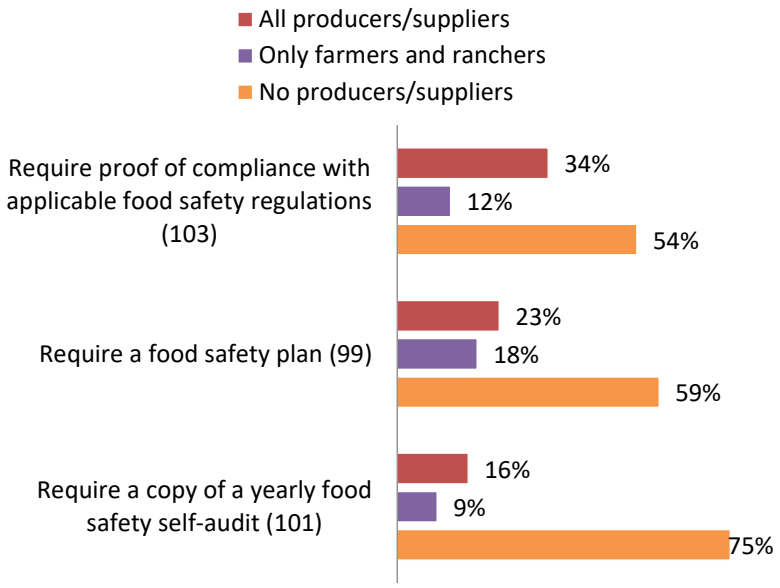
Figure 3.24 Hub Preferences for Producer and Supplier Food Safety Certification



* *n* is shown in parentheses for each category

Overall, hubs are more likely to require internal monitoring methods rather than required GAP or GHP certification. Figure 25 shows the requirements hubs use to monitor producers' and suppliers' food safety practices.

Figure 3.25 Hub Food Safety Requirements for Producers and Suppliers Handling Food Products*



* *n* is shown in parentheses for each requirement

Hubs are investing in food safety. Forty-nine percent (*n* = 107) have staff responsible for the hub's internal food safety compliance. Some hubs provide personnel and services to assist with and encourage producers and suppliers to engage in food safety practices (see Table 3.9). One-third of hubs have staff responsible for ensuring food safety training and compliance for suppliers and producers. As previously noted, 41% of hubs require that farmers and ranchers have a food safety plan (see Figure 3.25), and nearly two-thirds (61%) are willing to assist producers and suppliers in the development of such plans. Similarly, 14% of hubs require GAP certification (see Figure 3.24), and 43% are willing to assist with or provide GAP training and certification. Overall, 82% of hubs (*n* = 105) stated that they take a clear position on the importance and value of voluntary food safety programs.

Table 3.9 Hubs' Food Safety Services for Suppliers and Producers*

	Percent of hubs offering service
Assist producers and suppliers in developing or reviewing food safety plan	61%
Incentivize producer engagement with food safety	35%
Provide staff person responsible for food safety training and producers' and suppliers' compliance	33%
Assist with or provide GAP training and certification	43%

**n* = 105

3.5 FINDINGS: FINANCES

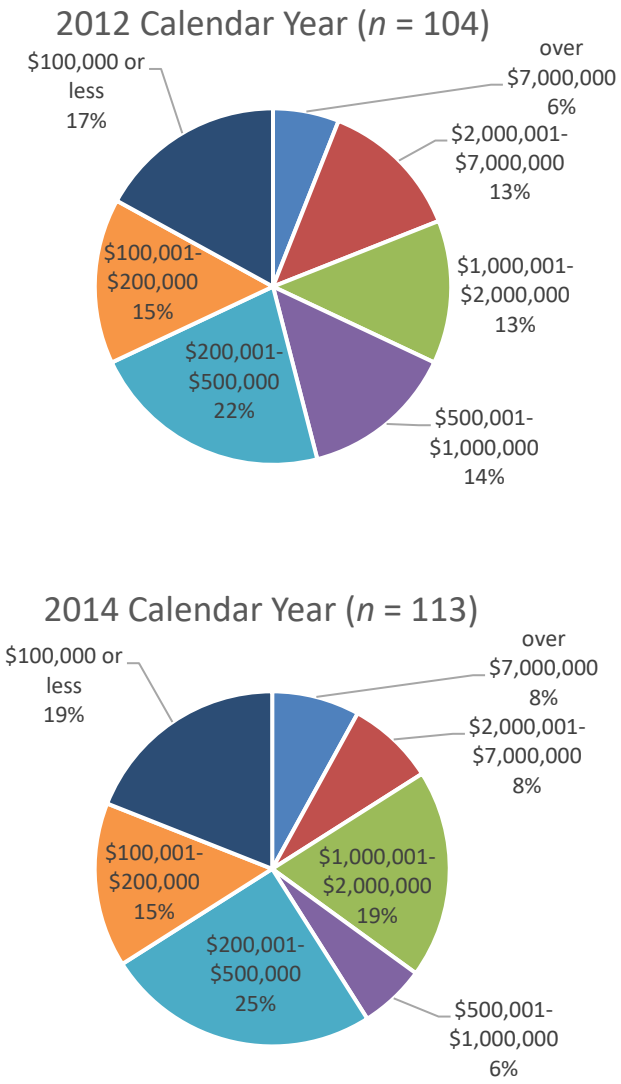
Without a solid financial base, no business can expect long-term viability. Unlike traditional businesses occupying analogous food supply chain spaces, food hubs have additional financial challenges that come from embracing environmental and social missions. Some of these challenges may include running social programs, managing grant and donation revenue, and ensuring that people, animals, and the environment are not exploited in the business process. For these reasons, having an understanding of food hubs' unique financial situation is important. This section examines sales and non-sales revenue as well as operational expenses.[23] Recognizing that every hub is unique, a calculated financial ratio, Operating Expense Ratio (OER), is used to make financial viability comparisons. This section concludes with discussions concerning profit and loss balance, loan readiness, and startup funds.

[23] In this report, *gross revenue* is defined as the total revenue generated from all sources and may be referred to as *revenue*. *Total gross sales revenue* is defined as the revenue generated from sale of products to customers and may be referred to as *sales*. *Operating expenses* is defined as the amount of revenue used to conduct business and may be referred to as *expenses*. All other definitions are included in the text.

3.5.1 Gross Revenue

In 2015, 113 food hubs in total reported gross revenues in excess of $370 million. Despite only 37% of hubs providing revenue figures in both 2013 and 2015, the percentage of hubs in each revenue category looks similar (see Figure 3.26).

Figure 3.26 Food Hub Revenue for 2013 (2012 Calendar Year) and 2015 (2014 Calendar Year)



In 2015, hubs reported as little as $5,000 to as much as $96 million in total gross revenue. Table 3.10 shows the number of hubs reporting and the mean, median, and range of total revenue by various categories for both survey years. Because of the large range of revenues and the small number of hubs reporting in each category, mean and median are not the best measures to compare across years or categories.

Table 3.10 Revenue by Category for 2015 and 2013

	2015				2013			
	Percent of Hubs Reporting	Mean Revenue	Median Revenue*	Minimum/ Maximum Revenue*	Percent of Hubs Reporting	Mean Revenue	Median Revenue*	Minimum/ Maximum Revenue*
Overall	113 (100%)	$3,282,016	$351,000	$5,000–$96,000,000	104 (100%)	$3,284,632	$450,000	$1,500–$75,000,000
By Years in Operation (*n* = 113)					(*n* = 103)			
0–2 years	30%	$604,764	$172,000	$5,000–$12,000,000	32%	$481,294	$175,000	$9,000–$6,000,000
3–5 years	31%	$834,891	$370,000	$18,000–$6,000,000	29%	$1,455,328	$571,000	$87,000–$15,000,000
6–10 years	20%	$1,631320	$509,000	$75,000–$8,000,000	14%	$635,182	$250,000	$2,000–$3,000,000
11+ years	19%	$13,580,409	$1,810,000	$17,500–$96,000,000	25%	$10,501,792	$1,453,000	$28,000–$75,000,000
By Legal Structure (*n* = 108)					(*n* = 99)			
For-profit	39%	$3,937,641	$1,020,000	$26,000–$70,000,000	49%	$4,244,308	$455,000	$31,000–$54,700,000
Nonprofit	36%	$1,146,641	$232,000	$5,000–$13,916,000	37%	$833,117	$254,000	$2,000–$45,000,000
Cooperative	25%	$5,232,476	$266,000	$18,000–$96,000,000	14%	$7,257,470	$231,000	$25,000–$75,000,000
By Business Model (*n* = 113)								
Farm to consumer	16%	$1,406,687	$197,000	$5,000–$12,000,000	Not asked in 2013			
Hybrid	53%	$1,074,388	$270,000	$7,000–$16,527,000				
Farm to business or institution	31%	$8,030,977	$1,077,000	$50,000–$96,000,000				

* Rounded to the nearest $1,000

3.5.2 Sales Revenue

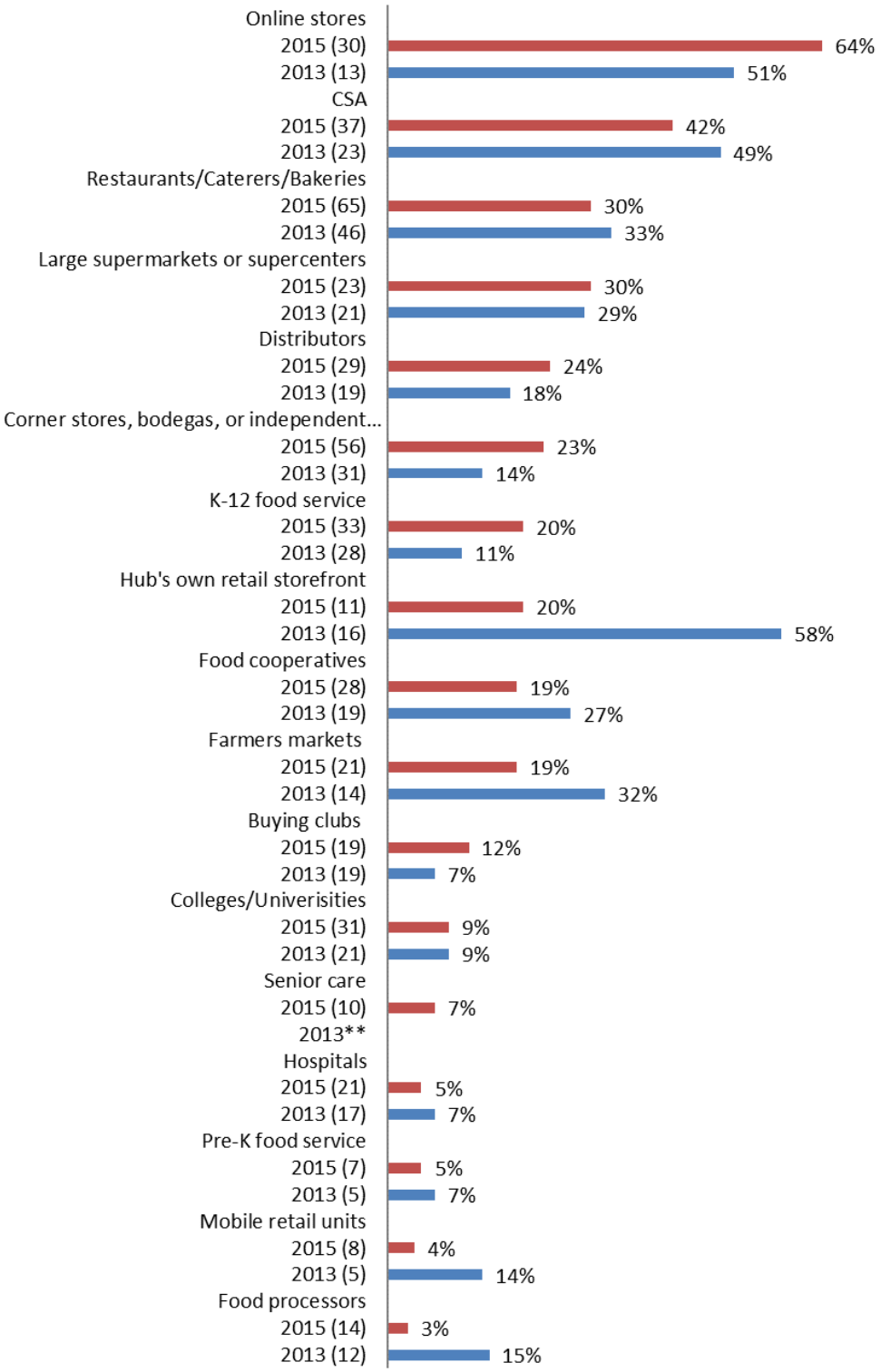
In 2015, 107 food hubs in total reported gross sales in excess of $333 million, amounting to 90% of gross revenue. Other studies report similar percentages (Fischer et al., 2013; Farm Credit East, the Wallace Center at Winrock International, Morse Marketing Connections, & Farm Credit Council, 2014). Figure 3.27 shows the average percentage of total gross sales for hubs selling to a particular customer category in 2013 and 2015.[24] For reference, Figure 3.20 (page 72) shows the percentage of hubs that sold to a particular category. For some hubs, one customer category accounted for a large portion of sales. Online sales accounted for 64% of total sales revenue, on average, for a little over one-quarter (28%) of hubs operating online stores. For almost half (48%) of hubs operating an online store, the online store accounted for 90% or more of the hub's sales. Thirty-five percent of hubs operated CSA programs, and those CSAs accounted for 42% of the hub's total sales revenue on average. Fourteen percent of hubs operating CSA programs counted on the CSA for 90% or more of their sales.

Similar to 2013, over half of hubs (61%) generated about one-third (30%) of total sales revenue, on average, from restaurants, caterers, bakeries, and corporate caterers. Since 39% of hubs (see Figure 3.14, page 65) sell to 2–5 different customer categories, it makes sense that several

[24] Five hubs did not keep track of the value of the products they brokered, but they provided estimates for the value of the brokered products as if they had physically taken possession and paid producers or suppliers for them. The sales estimates ranged from $65,000 to $1.72 million. These estimates were taken into account when calculating the value of product sold by department and customer type but were not used in revenue, sales, expense, or other financial calculations.

customer categories—restaurants, caterers, bakeries, corporate caterers (30%); large supermarkets or supercenters (30%); distributors (24%); and corner stores, bodegas, or small independent grocery stores (23%)—each account for about 25% to 30% of hub sales revenue each when a hub sells to them. While it is not appropriate to suggest a trend, it is interesting that at the same time online store sales increased 13% from 2013 to 2015, hub-operated retail stores (–38%) and mobile retail (–10%) decreased.

Figure 3.27 Average Percentage of Total Gross Sales for Hubs Selling to a Particular Customer Category by Year



* *n* is shown in parentheses for each category. ** This question was not asked in 2013.

Among the 75% of hubs breaking even or better (see Findings: Finances, page 79), two-thirds (66%, *n* = 57) covered at least 99% of operating expenses with product sales–generated revenue. The remaining one-third used non-sales-generated revenue to fill the gap and would not otherwise generate a profit.

Hubs were asked to account for revenue that was not attributed to product sales. Table 3.11 shows the percentage of hubs with particular revenue sources and the percentage of gross revenue from each source. Sources falls into three broad categories: grants; donations; and programs, services, and fees not generated as product sales.

Table 3.11 Non-Sales Revenue Categories by Year

	2015		2013
	Percentage of food hubs with revenue source* (*n* = 61 total responding)	Average percentage of gross revenue (*n* in parentheses)	Average percentage of gross revenue (*n* in parentheses)
Grants			
Foundation grants	46%	18% (28)	18% (22)
Federal government grants	25%	15% (15)	11% (15)
State government grants	15%	13 % (9)	6% (16)
Local government grants	13%	7% (8)	2% (3)
Donations			
Donations from individuals	28%	4% (17)	6% (9)
Other donations	26%	5% (16)	Not asked
Donations from businesses/organizations	13%	3% (8)	5% (7)
In-kind support	10%	18% (6)	4% (9)
Non-Sales Programs, Services, and Fees			
Other services/operations of the food hub	34%	8% (21)	Not asked
Membership fees	25%	4% (15)	11% (16)
Income from other programs of the organization	18%	8% (11)	3% (13)
Renting space to other businesses	16%	8% (10)	17% (8)
Commissions and broker fees not accounted for in product sales**	10%	15% (6)	Not asked

* Based on data collection differences, the percent of hubs with each revenue source could not be calculated in 2013 in a way that made it comparable to the same calculation in 2015.

** Only asked of hubs involved in brokering.

Close to half (46%) of hubs reported that they had foundation grants in 2015 and that the foundation grants accounted for, as in 2013, 18% of their gross revenue. More than one-third (34%) of hubs have other revenue-generating services or operations not related to product sales that account for an average of 8% of revenue. About one-quarter of hubs receive revenue

from federal government grants (25%), membership fees (25%), and donations from individuals (28%).

To further examine foundation, federal, and state grants, 54% of hubs with non-sales revenue reported grant revenue from at least one of these sources. Seven percent reported grant revenue from all three sources, 21% reported revenue from two of these sources, and 26% reported revenue from one of them.[25] Table 3.12 shows the grant sources for hubs with non-sales revenue by hub legal structure and supports the premise that nonprofit hubs rely more heavily on grants than hubs with other legal structures do. For-profit and cooperative legal structures may restrict hubs from applying for some types of foundation and government grants. Nevertheless, across all hubs, foundation, federal, and/or state grants were a source of income for 60% of nonprofits, 36% of cooperatives, and 15% of for-profit hubs.

Table 3.12 Percentage of Hubs' Grant Revenue by Legal Structure

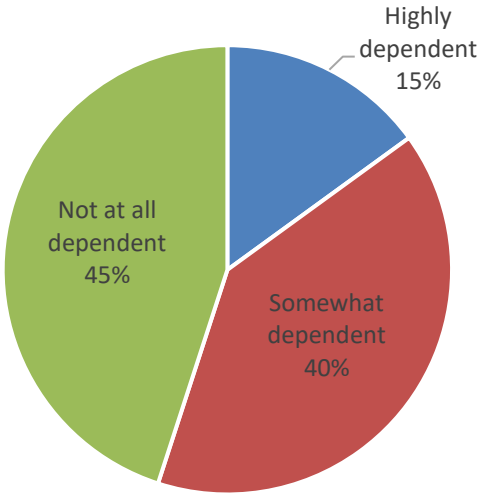
	Foundation	Federal	State
Nonprofit (*n* = 25)	72%	40%	28%
Cooperative (*n* = 18)	39%	11%	11%
For-profit (*n* = 17)	24%	18%	6%

Hubs were asked if grants were critical to their ability to carry out the core functions of aggregation, distribution, and marketing of local or regional foods. Recognizing that core functions may not account for all a hub's functions and thus all expenses, this question provides a different measure of grant dependence. Among all hubs, 45% were not at all dependent on grants to carry out core functions (Figure 3.28). However, for hubs with grants of any type (*n* =

[25] Number of sources does not indicate number of grants. A hub may have multiple grants from one source.

34), 28% were highly dependent and 59% were somewhat dependent on grants to carry out their core functions.

Figure 3.28 Food Hub Reliance on Grant Funding*



* *n* = 111

The difference in reliance on grant funding was significant for hubs in operation for two years or less and those in operation for more than two years.[26] More than one-quarter (27%) of hubs in operation for two years or less were highly dependent on grants, and half (51%) were somewhat dependent. Conversely, over half (58%) of hubs in operation for more than two years were not at all dependent on grants to carry out core functions.

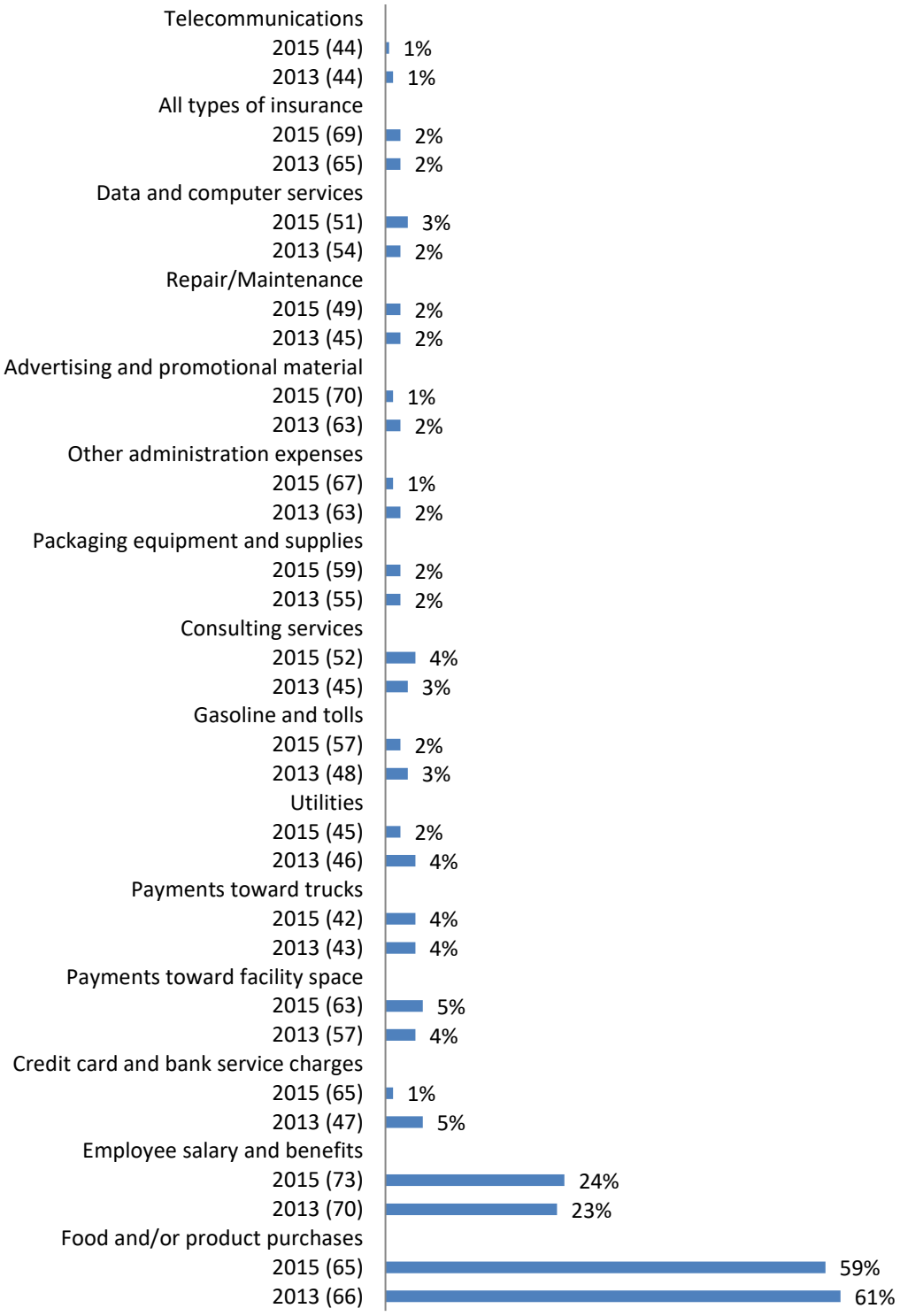
3.5.3 Operating Expenses

How food hubs incur operating expenses changed little between 2013 and 2015 (see Figure 3.29). On average, the majority of expenses (59%) were used to procure product. One-quarter

[26] $X^2(2, N = 110)14.74, p < .01$.

(24%) were payroll expenses. No other category represented more than 5% of operating expenses.

Figure 3.29 Food Hub Expenses as a Percentage of Revenue



* *n* is shown in parentheses for each expense category.

3.5.4 Operational Efficiency

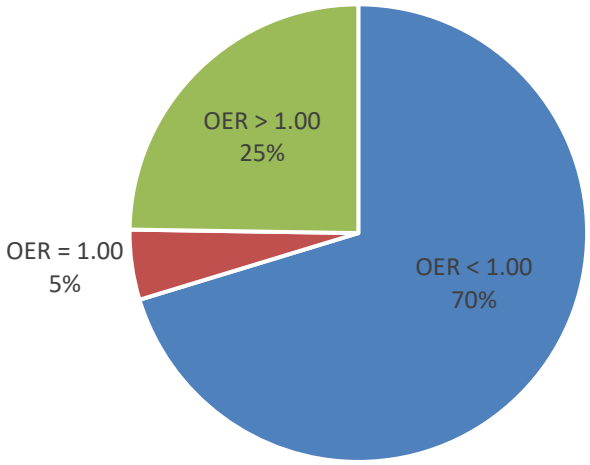
Business efficiency ratios can be useful to help measure the financial health of a business. While the ratios do not reflect the nuances of different value propositions of individual businesses, they allow comparisons across different businesses or business types. The OER expresses operating expenses as a function of gross revenue.

$$\text{Operating Expense Ratio (OER)} = \frac{\text{Total Operating Expenses}}{\text{Total Gross Revenue}}$$

When a business is covering all of its expenses with total gross revenue, OER will equal 1.00. A business with an OER greater than 1.00 has expenses in excess of its revenue and a negative profit margin. A business with an OER less than 1.00 has revenue in excess of its expenses and a positive profit margin.

In 2015, one-quarter of hubs had an OER greater than 1.00 (see Figure 3.30), which means that their expenses exceeded their revenue. Conversely, three-quarters of hubs were breaking even or better, with an OER of 1.00 or less.

Figure 3.30 Operating Expense Ratio*



* *n* = 86

Table 3.13 shows OER by legal and business model, and Table 3.14 shows OER by years in operation. While there appears to be a general trend suggesting that the longer a hub has been in operation, the lower its OER (the more profitable it is), the large range of responses makes it difficult to confirm this as a significant trend.[27] Similarly, the number of product categories carried,[28] the number of employees,[29] warehouse square footage,[30] and the total revenue received from government or foundation grants[31] are not predictive of OER. The implication is that there may be some other factor that has yet to be investigated or is hard to measure that is associated with OER and/or that there is a general OER trend dependent on some mix of variables.

[27] $r_s = -.09$, $p = .41$.
[28] $r_s = -.14$, $p = .22$.
[29] $r_s = -.07$, $p = .53$.
[30] $r_s = .02$, $p = .92$.
[31] Federal: $r_s = -.10$, $p = .37$; state: $r_s = -.02$, $p = .82$; foundation: $r_s = -.08$, $p = .44$.

Table 3.13 Operating Expense Ratio by Legal and Business Model

	n	Mean	Median	Range
All hubs	86	0.88	0.94	0.01–3.10
Legal Structure				
Nonprofit	29	1.00	0.90	0.17–3.10
Cooperative	22	0.74	0.88	0.04–1.21
For-profit	32	0.92	0.98	0.01–1.53
Business Model				
Farm to business	28	0.82	0.94	0.01–1.53
Hybrid	43	0.92	0.92	0.04–3.10
Farm to consumer	15	0.89	0.92	0.18–2.66

Table 3.14 Operating Expense Ratio by Years in Operation

	n	Mean	Median	Range
All hubs	86	0.88	0.94	0.01–3.10
0–2 years	27	0.99	0.82	0.27–3.10
3–5 years	25	0.89	0.98	0.18–1.53
6–10 years	17	0.83	0.94	0.01–1.50
11–15 years	4	1.00	0.99	0.96–1.06
16–20 years	4	0.77	0.95	0.17–0.99
21+ years	9	0.66	0.83	0.04–1.00

What can be said is that, since 2013, average OER has improved both overall (see Table 3.15) and for same-hub comparisons (see Table 3.16). Recalling that a lower OER or a decrease in OER is financially favorable, in 2015, hubs reported an average OER 19% lower than in 2013 and a median OER 6% lower. What is more compelling is that same-hub comparisons had an average OER decrease of 13%.

Table 3.15 Operating Expense Ratio by Year

	n	Mean	Median	Range
All hubs, 2013	77	1.09	1.00	0.04–6.79
All hubs, 2015	86	0.88	0.94	0.01–3.10

Table 3.16 Operating Expense Ratio by Year for Same Hubs

Hubs with OER for Both Years	*n*	Mean	Median	Range
2013	28	0.96	1.00	0.11–1.85
2015		0.84	0.99	0.04–1.50

3.5.5 Second Look at Operating Expense Ratio: A Conservative Estimate

Hubs were not asked for total expenses. Rather, they were asked to itemize expenses by category and account for any miscellaneous expenses generally. Of the 86 hubs for which an OER was calculated, 13 gave detailed answers on miscellaneous expenses and three indicated they had miscellaneous expenses but did not give dollar values for them. This suggests that not all hubs may have reported all miscellaneous expenses. For the reporting hubs, miscellaneous expenses represented from < 1% to as much as 46% of expenses. A second conservative calculation of OER used the average percent of miscellaneous expenses for the 13 hubs (10.7%) to estimate miscellaneous expenses for all hubs. The conservative OER estimate had a mean of 0.98 and a median of 1.04. Additionally, *Counting Values: Food Hub Financial Benchmarking Study* (Farm Credit East et al., 2014) examined detailed 2013 financial records for 48 food hubs. The authors concluded that the top 25% of hubs had a 4% profit and the average hub had a –2% profit (Farm Credit East et al., 2014). Comparable OERs are 0.96 and 1.02, respectively. Both OER estimates presented here and the findings of the *Counting Values* study (Farm Credit East et al., 2014) show that surveyed hubs are, on average, doing better financially in 2015 than in calendar years 2013 and 2012.

Data presented in the section Findings: Networks, Challenges, Opportunities, and Barriers to Growth will show that hubs expect competition from other or new food hubs. The OER analysis

suggests that despite many new food hubs entering the market since 2013, both young and more established hubs have, on average, lower OERs. Without a specific indicator that the observed decreases in OER are not a result of higher product prices or increased operational efficiencies, it is reasonable to suggest that the market for food hubs' products is not saturated and continues to grow. This suggestion is supported by recent USDA analysis (Low et al., 2015).

3.5.6 Additional Thoughts on Revenue, Sales, and Expenses: Breaking Even

Using a more complex statistical technique than we have used in this report, Fischer, Pirog, and Hamm (2015b) analyzed the 2013 National Food Hub Survey data to find that, all other things being equal, hubs might expect to break even when revenue is at least $600,000. In 2015, hubs were asked if they thought this amount sounded reasonable. Interestingly, food hubs were about equally divided in their opinions. While about a third (36%) said $600,000 sounded about right, 35% said it was either too high or too low and 29% said the amount would depend on other factors. For those that said $600,000 was too high or too low, their break-even estimates averaged $935,158. Some hubs who responded that the break-even point depends on other factors said there was no "average" food hub. Others pointed to factors such as the mix of services offered, creating jobs rather than relying on volunteers, the choice of consumers being served, grants, and infrastructure expenditures. Fischer, Pirog, and Hamm's (2015b) analysis agrees with many of the comments provided by respondents in saying that beyond the absolute amount of annual revenue a hub generates, decisions about expenditures are a hub's next most important financial viability predictor.

3.5.7 Accounting Practices and Loan Readiness

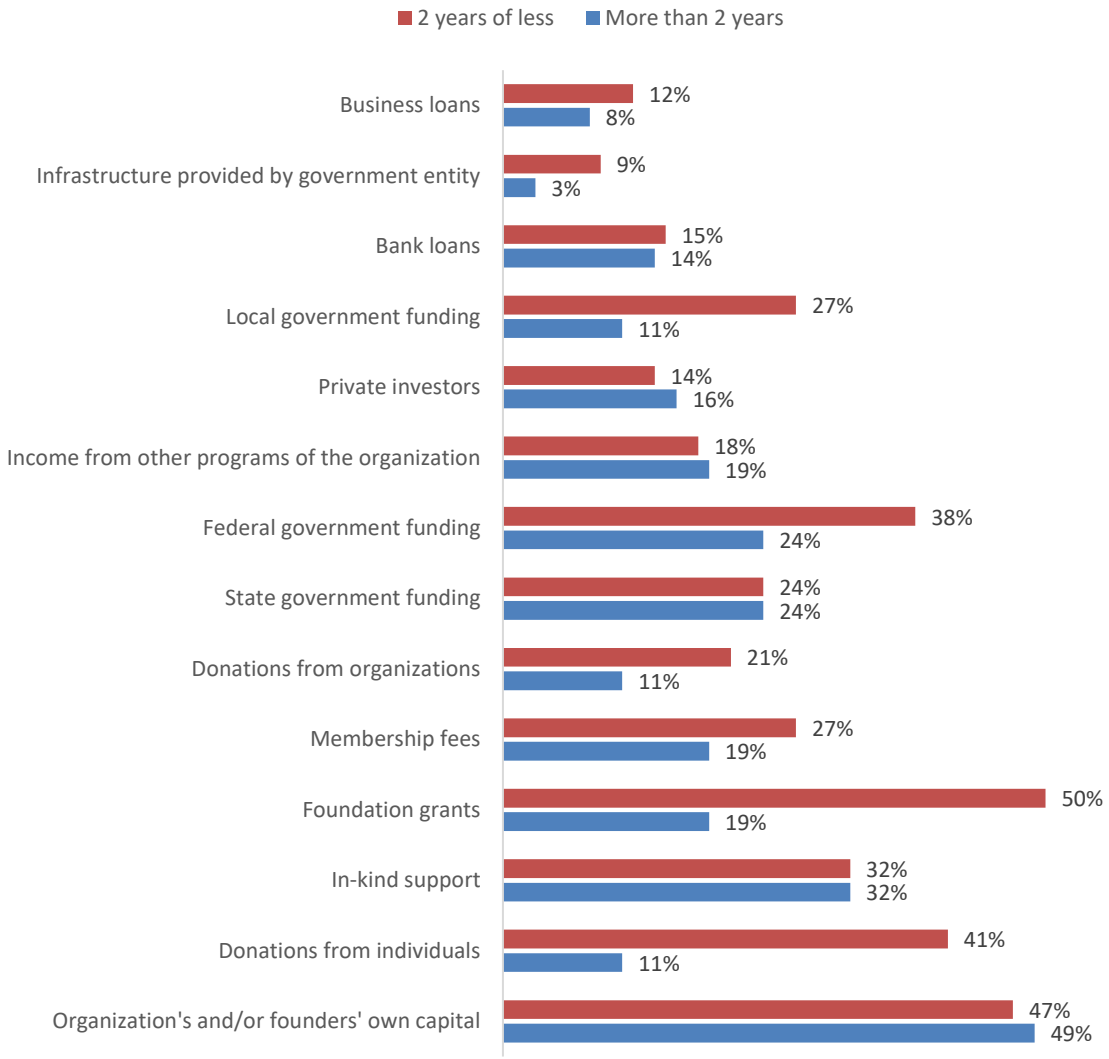
Asked to identify and rank their challenges, 39% of hubs included access to capital in their top five. Debt capital, or loans, can be one source of capital. Almost half (46%, *n* = 111) of hubs indicated that they met with lenders to discuss debt capital in the last two years. One-third (30%) went on to apply for debt capital; of those, 82% were approved for all of the loan and 12% for part of the loan.

Lenders and granting agencies require businesses applying for loans to provide various financial documents. Nine out of 10 hubs (*n* = 128) had current balance sheets (90%) and income statements (88%). Seventy-one percent had a monthly cash flow analysis. Thirty-nine percent of hubs had an up-to-date business plan, and 40% had an up-to-date marketing plan.

3.5.8 Revenue Sources to Begin Operation

Figure 3.31 shows the percentage of hubs that used various beginning revenue sources by the number of years the hub has been in operation. As in 2013 (46%, *n* = 91), almost half of hubs began operations using the overarching organization's or the founders' funds. Reflecting increased interest from government and foundations in food hubs, hubs that began operation two years ago or less were more likely to use foundation grants and local or federal funding at startup. Interestingly, state funding remained constant across 2013 (23%) and 2015 (24%) for both hubs in operation more than two years and two years or less. About a quarter (21%) of hubs began business with funds from one or two sources. On average, hubs had slightly more than three beginning funding sources.

Figure 3.31 Primary Revenue Sources to Begin Food Hub Operations by Years in Operation



The top three initial funding sources mentioned by nonprofits (*n* = 26) were foundation grants (75%), federal government funding (50%), and in-kind donations (50%). The top three sources mentioned by cooperatives (*n* = 14) were membership fees (64%), federal government funding (43%), and the founders' own capital (38%). For-profit food hubs (*n* = 25) ranked the founders' own capital (76%) first, followed by private investors (32%) and state funding (20%).

3.7 FINDINGS: VALUES AND MISSION

Showing commitment to community through the distribution of locally and regionally produced foods is the critical value that separates food hubs from other businesses occupying the same food supply chain space. Beyond that, food hubs are addressing a variety of social goals though entrepreneurship.

3.7.1 Local and Regional Aspects of Food Hub Producers and Suppliers

Food hubs themselves vary so widely; it is not surprising that their definitions of *local* vary as well. Food hub survey respondents tended to characterize their definition of *local* or *regional* in terms of mileage or geographic area or simply leave the definition up to the customer. A few hubs indicated they had separate definitions for *local* and *regional*. Respondents said they considered as little as 50 miles and as much as 500 miles from the hub to be within their definitions. Geographic areas as small as a county or as large as several states were also mentioned as definitions. Several respondents noted that anywhere within a day's drive was acceptably local. All definitions included a reference to place that Fischer et al. (2015a) propose is the critical definitional inclusion separating food hubs from traditional wholesalers. "Food hubs are, or intend to be, financially viable businesses that demonstrate a significant commitment to place through aggregation and marketing of regional food" (Fischer et al., 2015a, p. 97).

Eighty-seven percent of hubs (n = 95) reported that all of the farms and ranches from which they procured product were 400 miles or less from the hub's main facility. Overall, an average

of 94% of the farms and ranches from which hubs purchased product were within 400 miles of the hub. Nonfarm/ranch suppliers tended to be geographically further away. Sixty-eight percent (*n* = 56) of hubs reported that all of their nonfarm/ranch suppliers were located within 400 miles of the hub. On average, 82% of nonfarm/ranch suppliers were located within 400 miles. In 2013, no distinction was made between farms/ranches and other suppliers, but for reference, 81% (*n* = 76) of hubs stated that all of their suppliers were located within 400 miles of the hub. In 2015, hubs were more likely to procure product from farms and ranches and other producers that were further away from their main facility as years in business or hub revenue increased.[32]

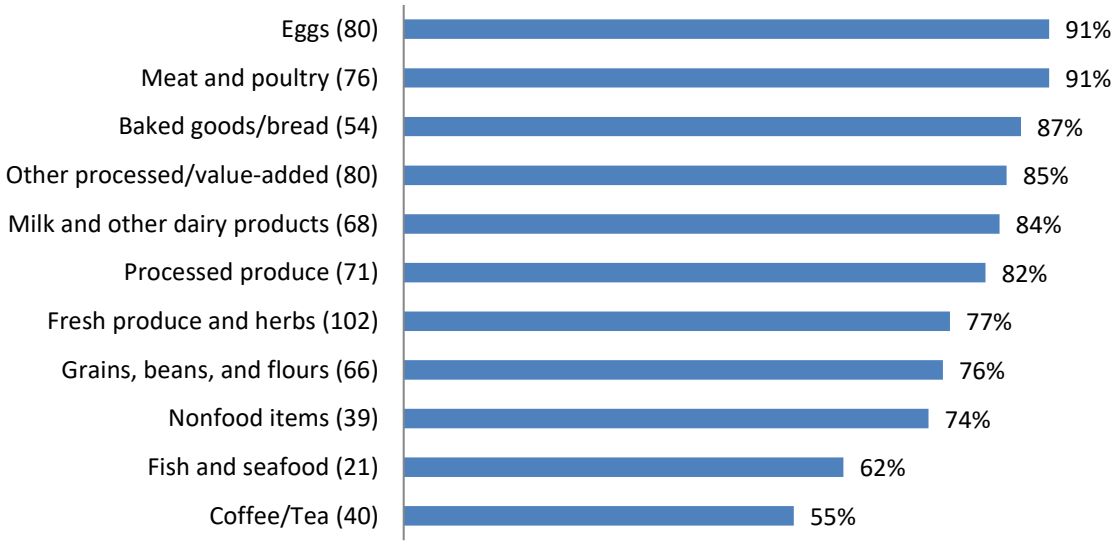
Figure 3.32 shows the percentage of hubs by food category carrying products that were exclusively local, defined as within a 400-mile radius of the hub.[33] In the 2015 survey, as reflected in the variable number of hubs answering for each category (shown in parentheses in Figure 3.32), hubs could answer that they did not carry a specific category. This was not true for 2013, so comparisons between 2013 and 2015 must be made carefully. In 2013 and 2015, the distinction between localness of ingredients and localness of the last step in processing was not made. For that reason, in 2013, processed food categories were left out of the analysis. In 2015, processed food categories are shown to illustrate that foods and products whose ingredients may not be exclusively local in origin are being processed or manufactured locally. Commitment

[32] Years in business: farms, $r_s = -.32$, $p < .01$; other producers, $r_s = -.37$, $p < .01$. Total revenue: farms, $r_s = -.35$, $p < .01$; other producers: $r_s = -.29$, $p < .05$.

[33] Two hubs receiving 100% of their product from the hub's own teaching or incubator farms stated that the farms were within 400 miles of the hub's main facility. Because of their unique situation, these hubs are not included in Figure 32.

to local is what distinguishes food hubs, suggesting that localness can be conceptualized as grown locally and to some extent processed locally.

Figure 3.32 Percentage of Food Hubs Carrying Exclusively Local Product Categories*



* *n* is shown in parentheses for each product category. *Exclusively local* was not defined in the survey. Based on hubs' answers, it appears that hubs defined *exclusively local* as locally grown and/or local final stage processing.

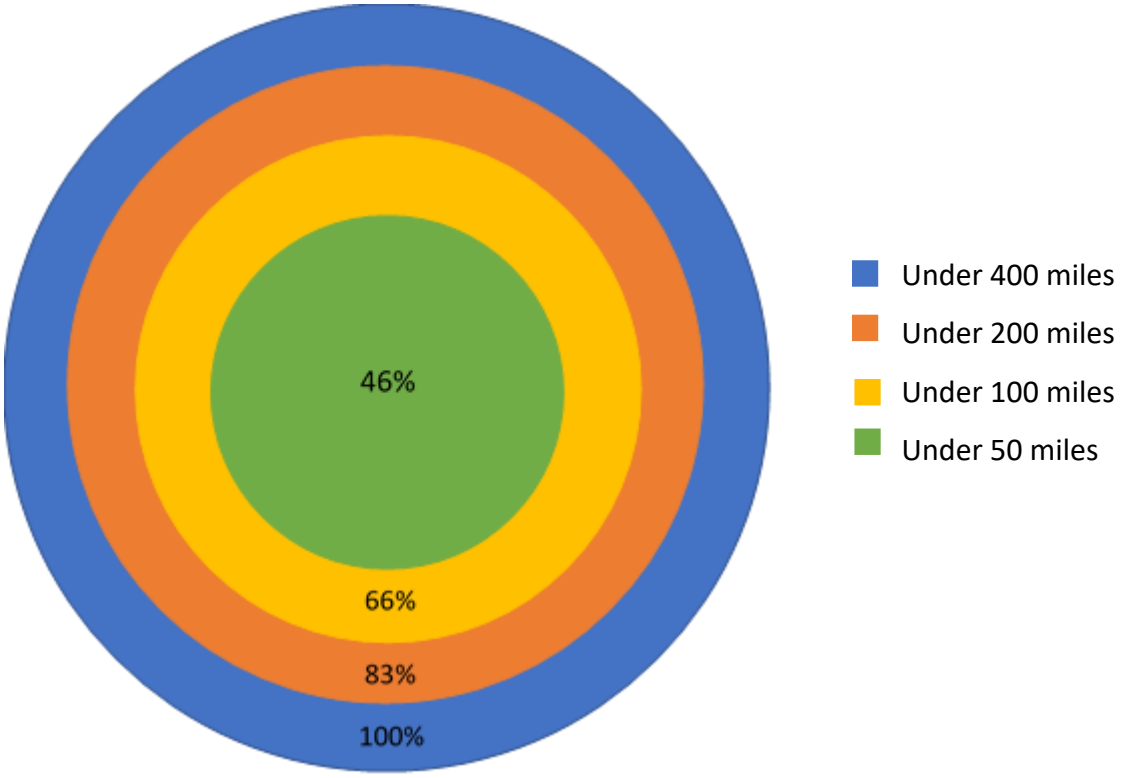
Fresh produce and herbs, noted elsewhere in this report as the hubs' largest dollar sales volume category (page 61), is exclusively locally sourced by three-quarters (77%) of hubs. Nine out of 10 hubs locally source all eggs (91%) and/or all meat and poultry (91%). Except for the fresh produce category, a higher percentage of farm to consumer hubs carried exclusively local product in all product categories than did hybrid hubs. The percentage of hubs carrying exclusively local product was lowest in all categories for hubs serving only wholesale markets.

3.7.2 Local and Regional Aspects of Food Hub Customers

To characterize the distance the hubs' customers were from the hub, hubs were asked to indicate a radius from the hub within which 75% or more of their customers were located (see

Figure 3.33). Almost half (46%) of hubs said at least that percentage of their customers were located within 50 miles of the hub. All hubs reported that at least 75% of their customers were located within a 400-mile radius. Hubs serving only business or institutional markets tended to have the most geographically distant customers, and hubs selling farm to consumer had the closest.

Figure 3.33 Distance from the Hub Where 75% of Customers or More Are Located*



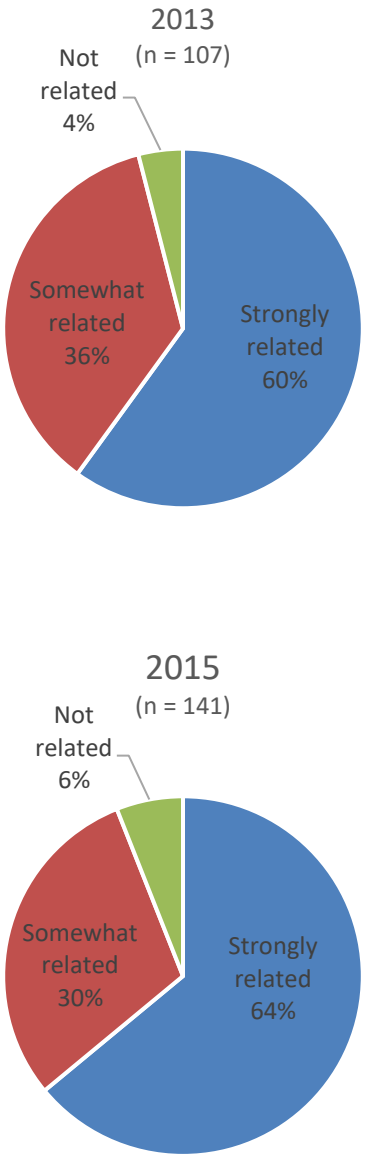
* *n* = 107

3.7.3 Stated Missions and Daily Expression of Mission Values

The 2013 National Food Hub Survey report provided a detailed analysis of food hubs' mission statements and examples of how food hubs were engaged in improving human health. The authors commented that extrapolating specific meaning from rather broad answers was difficult and that both stated and implied values contained in the hubs' answers may not fully represent their priority issues. Recognizing the limitations of mission statements to fully reflect the financial, social, ethical, and/or environmental priorities food hubs may embrace, hubs were again asked to provide mission statements in 2015. They were additionally asked to reflect on their mission and indicate to what extent their mission was or was not related to

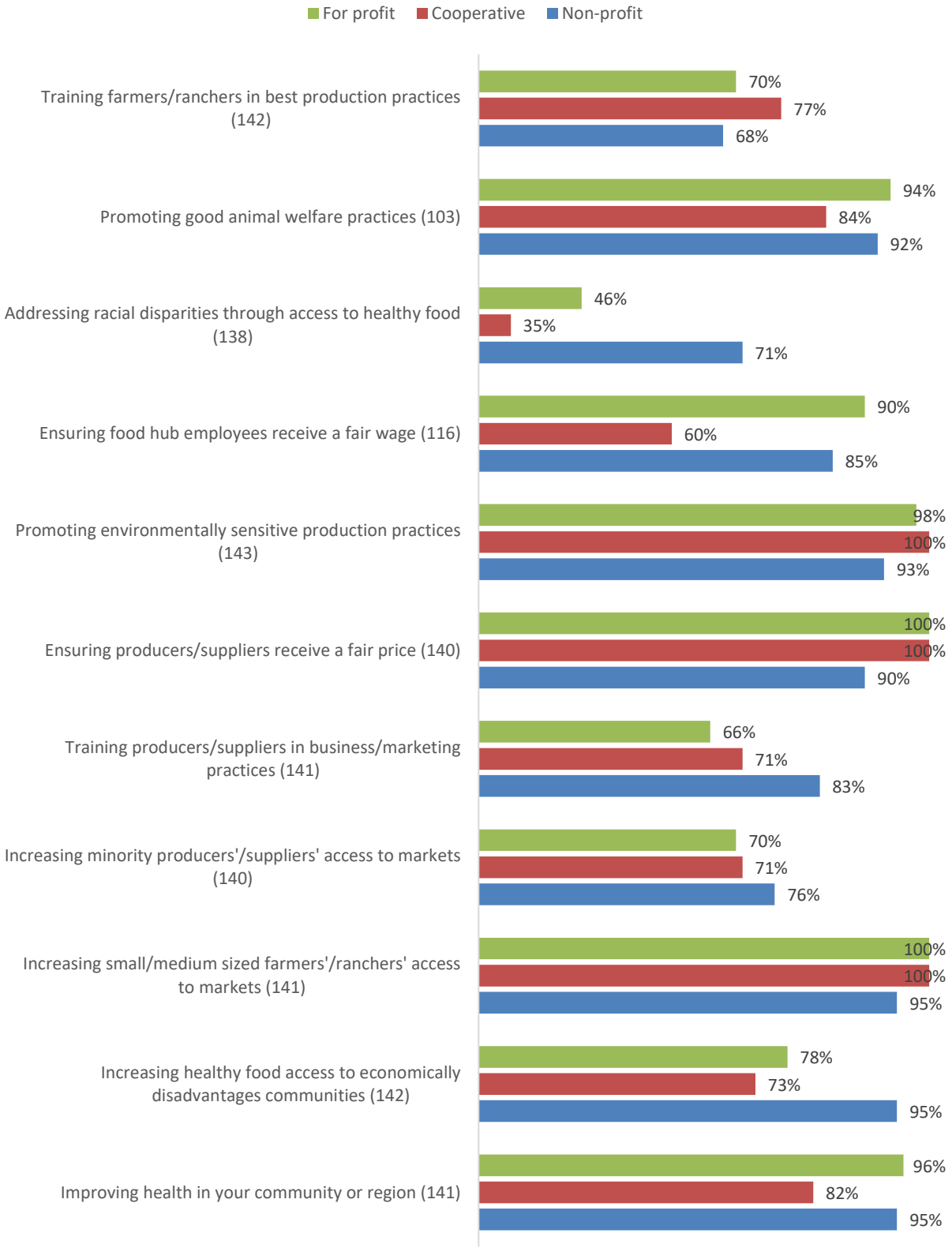
specific values. In both survey years, more than 90% of hubs stated that improving human health was related to their mission (see Figure 3.34).

Figure 3.34 Extent to Which Improving Human Health in Their Community Was Part of Hubs' Mission



On average, hubs' stated missions were heavily invested in all value areas (see Figure 3.35). Almost all (99%) hubs' missions were related to increasing small and mid-sized farms' access to markets. The least related value area, addressing racial disparities through access to healthy food, was still part of more than half (55%) of hubs' missions.

Figure 3.35 Percentage of Hubs with Missions Related to Values by Legal Structure



* *n* is shown in parentheses for each mission category.

Because the proportion of different legal structures represented by responding hubs is unequal, it is interesting to look at value areas as a function of legal structure. Legal structure dictates some of the ways hubs operate. Therefore, legal structure may influence the hubs' choice of mission goals and values or vice versa. The percentages shown in Figure 3.35 reflect the hubs that stated a value was somewhat related or very related to their mission, categorized by legal structure.

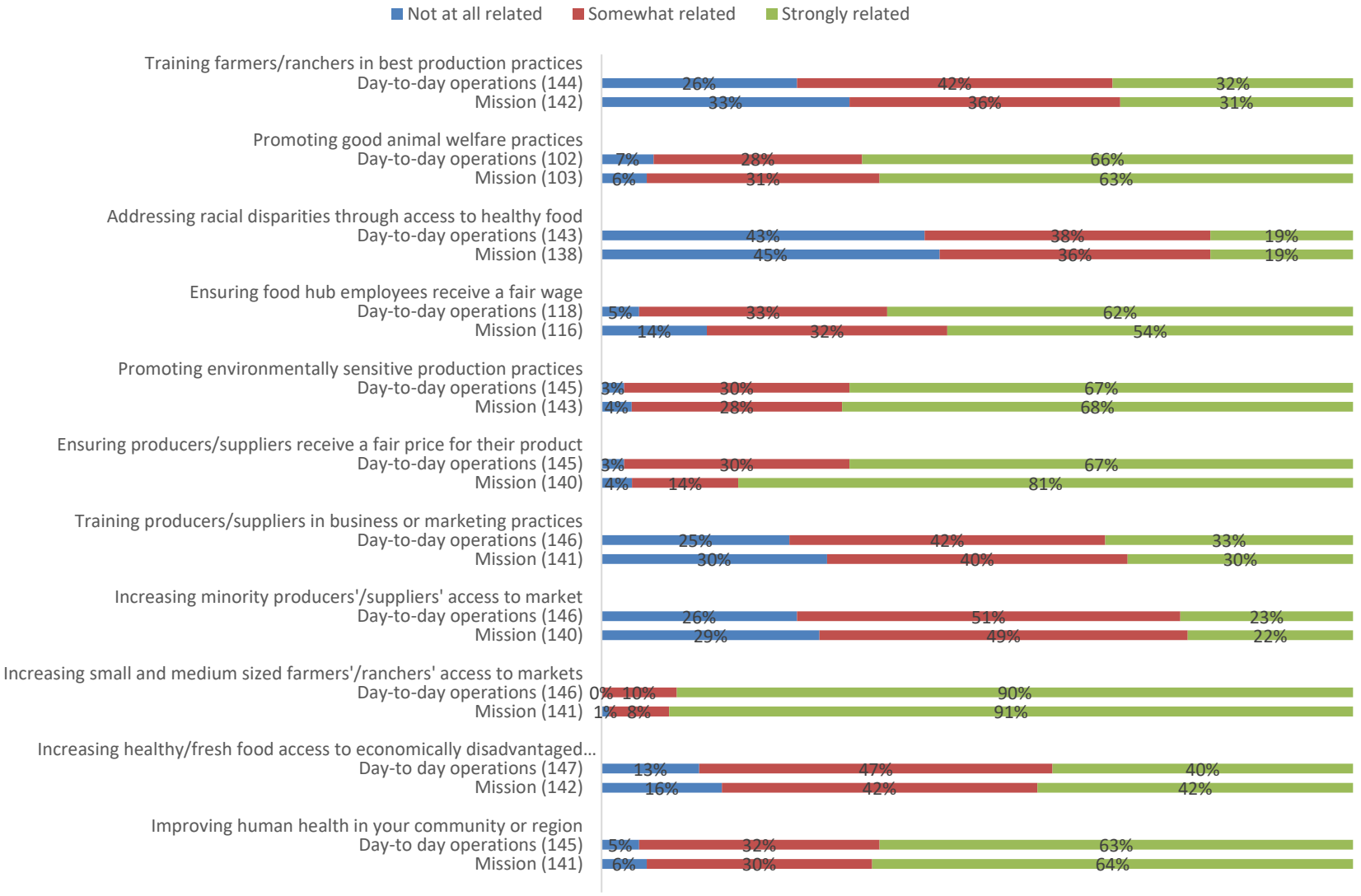
Figure 3.35 also shows that, generally, cooperatives' missions are focused more on farmers and nonprofits' missions are focused more on health and racial equality, with for-profits falling somewhere in between. Nonprofit hubs were more likely to state that their missions were related to addressing racial disparities through access to healthy food[34] and increasing healthy food access to economically disadvantaged communities[35] than for-profit hubs.[36]

In the day-to-day course of running a business, a stated mission may take an ancillary position to accomplishing daily operational tasks. To measure the extent to which mission values are embedded in hub operations, hubs were asked how related certain values were to their daily operations. By comparing hubs' intent (measured as a value's relatedness to a stated mission) to action (measured as a value's relatedness to day-to-day activities), a picture is formed to show the extent hubs may be creating a business culture around their stated missions (see Figure 3.36). Evaluating the "not related" percentages in Figure 3.36, for all mission values,

[34] $X^2(1, N = 95)5.67, p < .05$.
[35] $X^2(1, N = 96)5.41, p < .05$.
[36] Figure MV2 may show other differences. Because the number of hubs was small for some nonprofit/for-profit and all cooperative/nonprofit/for-profit comparisons, the statistical test was not valid.

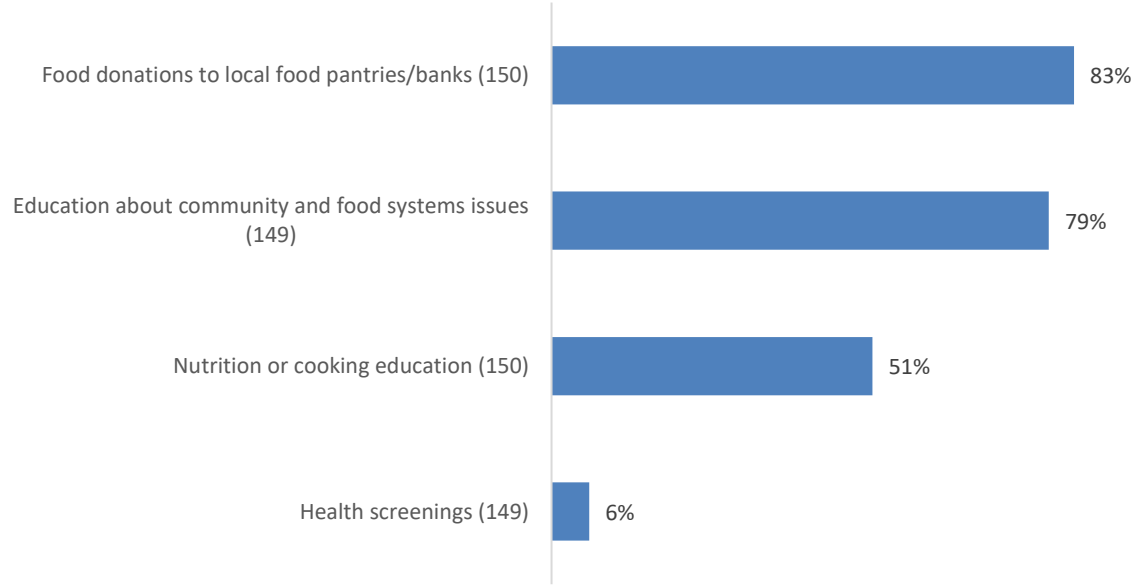
hubs' daily operation mission relatedness, on average, came within 2% or exceeded stated mission relatedness. In other words, hubs appear to be meeting or exceeding their stated mission's intent in their day-to-day actions.

Figure 3.36 Alignment of Hubs' Mission with Day-to-Day Operations



Food hubs were asked if they offered activities generally assumed to be non-revenue-generating. Eighty-three percent of hubs donated food to local food pantries or food banks. Six percent held health screenings (see Figure 3.37). Apart from the marketing or social capital value of creating goodwill, these activities are not likely to add to a hub's bottom line. A business's willingness to spend resources on programs or other endeavors that may not contribute to its financial bottom line supports the assertion that the business's mission—in this case, a food hub's mission—may extend beyond finances.

Figure 3.37 Percentage of Hubs Engaging in Non-Revenue-Generating Activities



* *n* is shown in parentheses for each activity.

In addition, hubs engage in yet other sales activities that could be argued to have relatively smaller returns on investment and to represent a social mission orientation. Nineteen percent of hubs selling directly to consumers offered subsidized shares. Ten percent offer consumer transportation services to and from the hub, and over a quarter (27%) operate a mobile market.

Hubs mentioned other social mission activities including booths at health fairs, food preservation classes, documentary film screenings, college scholarships, donating time and a vehicle for delivery to homebound customers, and maintaining a community center. Multiple hubs mentioned a variety of hub-sponsored programs specifically targeting low-income and/or low-access populations.

3.8 FINDINGS: NETWORKS, CHALLENGES, OPPORTUNITIES, AND BARRIERS TO GROWTH

Rapid growth does not ensure success. It does ensure that rapid change will be required for success. Being in tune with the current business climate and anticipating challenges can allow food hubs to gather resources to plan for and address challenges before they become barriers to growth and success.

3.8.1 Networks and Information Sources

Hub respondents were given a list of information sources and asked to rank them from most to least important.[37] More than half (52%) of hubs engaged informal networks to gather information (see Table 3.17). Forty-seven percent of hubs engaged formal networks or communities of practice, such as the NGFN.

[37] Hubs could choose and rank up to nine named and two hub-specified information sources. The lower the rank, the more important that particular network is. A rank of 1.0 had the highest importance.

Table 3.17 Percentage of Hubs Mentioning and Ranking Sources as Important*

	Percent of Hubs Mentioning Source	Average Importance Rank of Source
Informal networking with food hubs	52%	2.8
Formal communities of practice	47%	1.7
Annual meetings or conferences	44%	3.4
University's educational resources	39%	2.8
Federal government's educational resources	36%	3.1
Nonprofit organization's educational resources	32%	3.2
State government's educational resources	27%	3.7
Food policy council	16%	4.2
Local government's educational resources	10%	5.3

n = 109.

The hubs that used formal networks or communities of practice ranked the usefulness of this type of structured network 40% higher than they ranked informal networking with other food hubs. This finding highlights the utility of formal networks for learning and exchanging ideas. Regional formal communities of practice specific to food hubs are rare but do exist, for example, in Michigan (Pirog, Harper, Gerencer, Lelle, & Gerencer, 2014).[38] These findings suggest that it may be beneficial for hubs to join an existing food hub community of practice and for new regional food hub communities of practice to form.

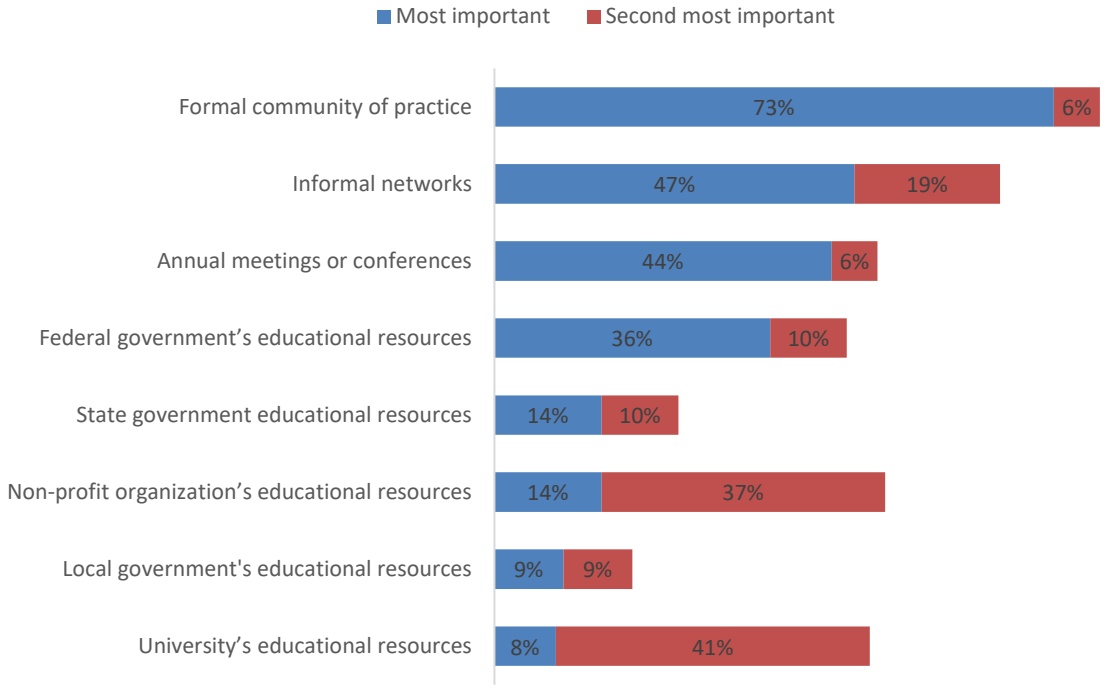
More hubs mentioned annual meetings or conferences (44%) than university (39%), federal (36%), or nonprofit (32%) educational resources. However, university, federal, and nonprofit resources were more important to hubs than were meetings or conferences. This finding points to particular challenges for meeting and conference organizers not only to increase attendance

[38] Regional food hub–specific communities of practice include the Michigan Food Hub Network, the Ohio and West Virginia Food Hub Network, and the Iowa Food Hub Managers Working Group.

but also to make sure the content is useful for participants and to structure opportunities for important informal networking.

Figure 3.38 shows what percentage of hubs ranked a mentioned information source as the first or second most important. University and nonprofit resources were most often ranked as the second most important information sources for 41% and 37% of hubs, respectively.

Figure 3.38 First and Second Most Important Information Resources*



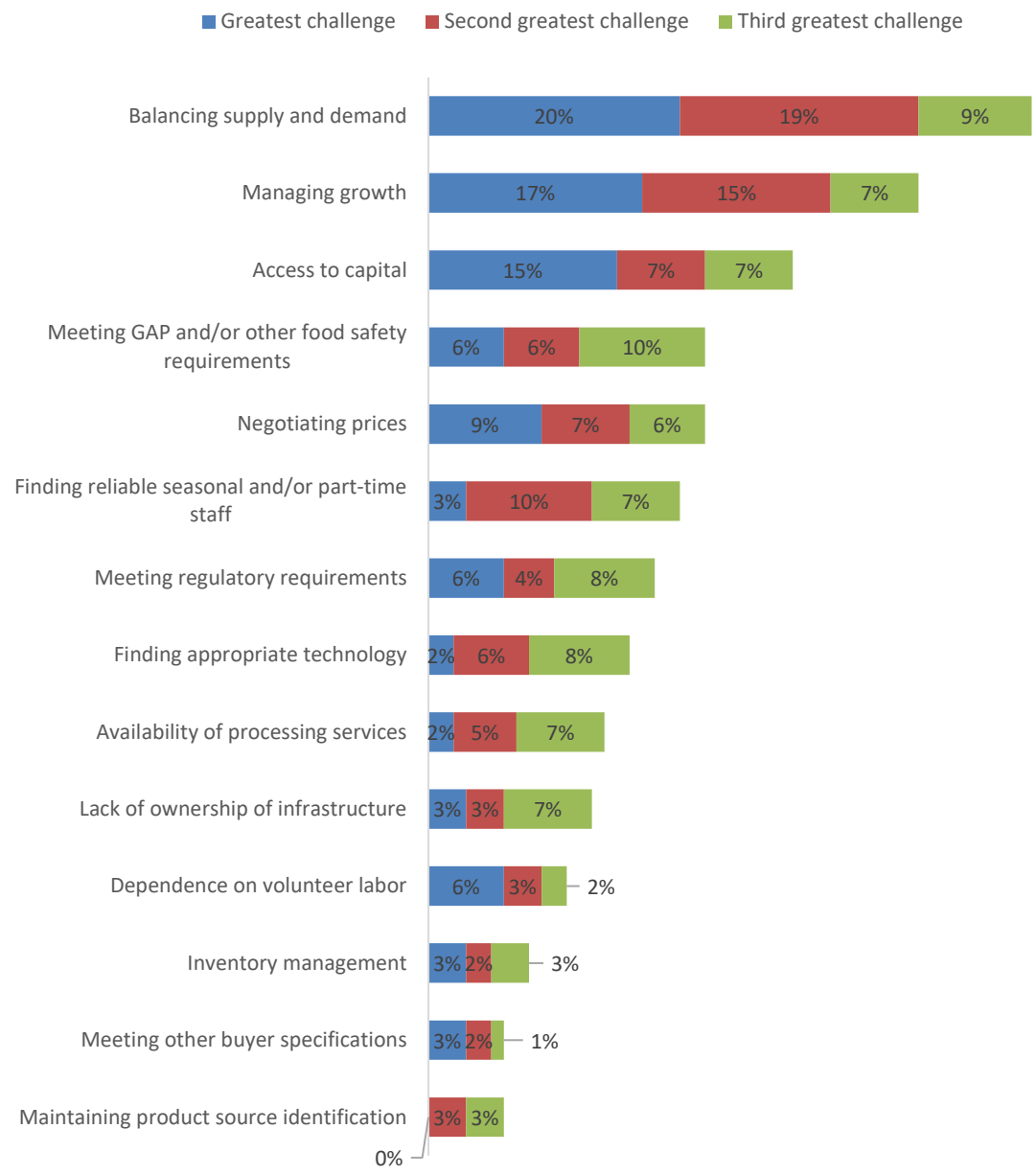
* *n* = 109.

3.8.2 Top Challenges

Hubs were given a list of possible challenges and asked to identify and rank up to five that affect their hub. Figure 3.39 shows the percentage of hubs including a particular challenge in their top three. Managing growth (2013: 19%; 2015: 17%) and access to capital (2013: 14%;

2015: 15%) remained top challenges for a similar percentage of hubs across the two comparison years. As in 2013, balancing supply and demand was the top challenge cited most often. However, 37% of hubs identified it as their top challenge in 2013, whereas only 20% identified it as such in 2015. It is unclear whether this change means that hubs are more effectively meeting the challenges of supply and demand or whether other challenges have become more pressing. Most notably, the percentage of hubs ranking GAP certification or other food safety requirements as either their top challenge or one of their top three challenges has doubled since 2013 (3% and 10% respectively in 2013).

Figure 3.39 Top Challenges for Food Hubs*



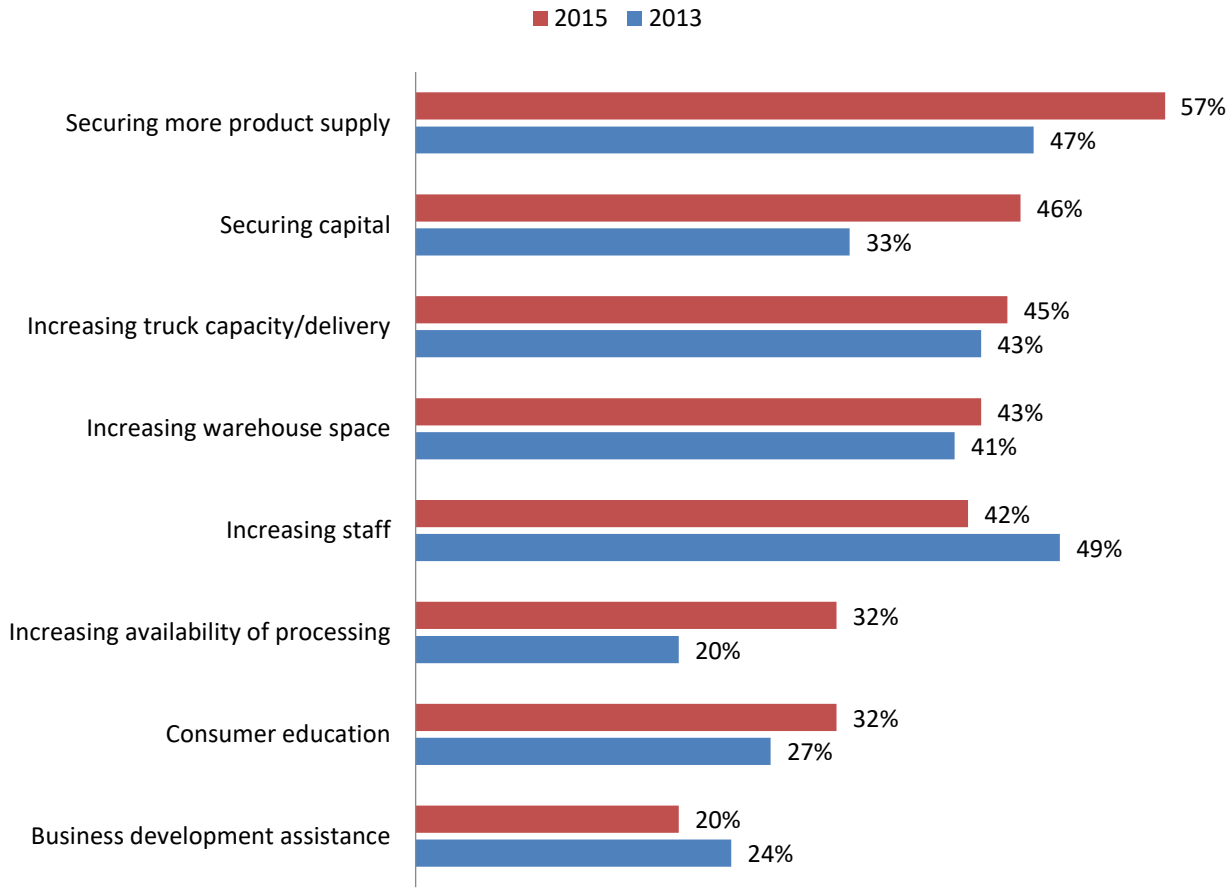
* *n* = 109.

3.8.3 Barriers to Growth

Examining barriers to growth can help businesses anticipate and avoid bottlenecks, maintain commitments, and plan for manageable growth. It can also help assistance organizations or consultants identify key focus areas. While barriers may take many forms, the 2015 survey asked about barriers that have actionable solutions over which food hub management could have some control. In the discussion of barriers, it will be useful to draw some comparisons between the challenges discussed above and barriers to growth, as some of the categories point to similar underlying issues.

Since the top identified challenge was balancing supply and demand, it is unsurprising that the most commonly identified barrier was related to supply constraints (see Figure 3.40). Fifty-seven percent of hubs said that securing more product supply was limiting their growth. Additionally, 23% of miscellaneous written responses included challenges such as increasing the number of suppliers who were GAP certified, growing specialty crops or specific commodities, or finding the resources to help new farms come on board. The majority of these written responses suggest that increasing the volume and/or type of product or increasing the number of suppliers may be the underlying barrier. Between 2013 and 2015, the percentage of hubs that identified securing more product supply as a barrier increased. This is consistent with the previously posited observation that balancing supply and demand is still a big challenge despite its drop in challenge rank.

Figure 3.40 Food Hub Barriers to Growth by Year*



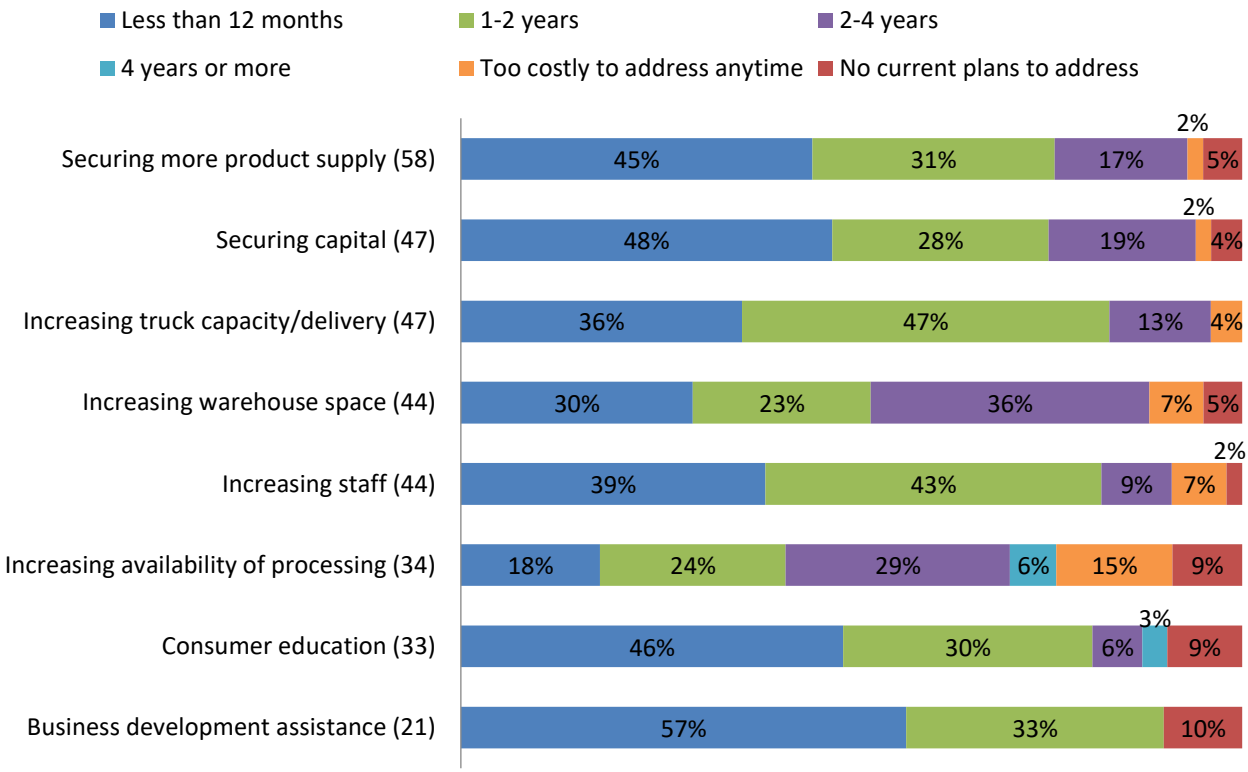
* *n* = 106.

Access to capital was the third highest ranked challenge, and securing capital was the second most cited barrier. Between 2013 and 2015, the percentage of hubs that identified securing capital as a barrier to growth increased from one-third of hubs to almost half of hubs (46%). The percentage of hubs citing increasing availability of processing as a barrier increased from one-fifth of hubs in 2013 to almost one-third of hubs (32%) in 2015. As the number of years a hub was in business or its total revenue increased, the total number of barriers identified decreased.[39]

[39] Total revenue: $r_s = -.26$, $p < .05$; years in business: $r_s = -.23$, $p < .05$.

Figure 3.41 is organized from the most cited to least cited growth barrier and shows the timeframe in which hubs identifying a specific barrier anticipated they would have the resources available to address it. In all barrier categories except business assistance, more than half of the hubs said they would not have the resources to address a currently identified growth barrier within the next 12 months. Barriers associated with large capital outlay (processing availability, warehouse space and truck capacity) were least likely to be addressed within the next year. For all barriers except processing availability and warehouse space, more than 75% of hubs felt they would be able to address the barrier in two years or less. More than half (53%) felt they could address warehouse space and 42% felt they could address processing availability within two years.

Figure 3.41 Timing to Address Barriers*

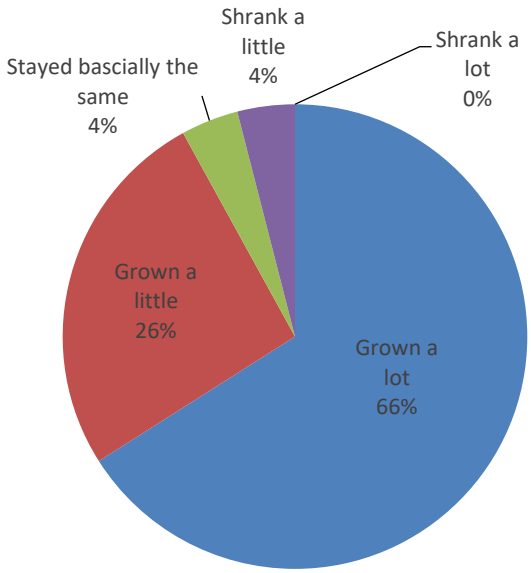


* *n* is shown in parentheses for each barrier.

3.8.4 Opportunities for Growth

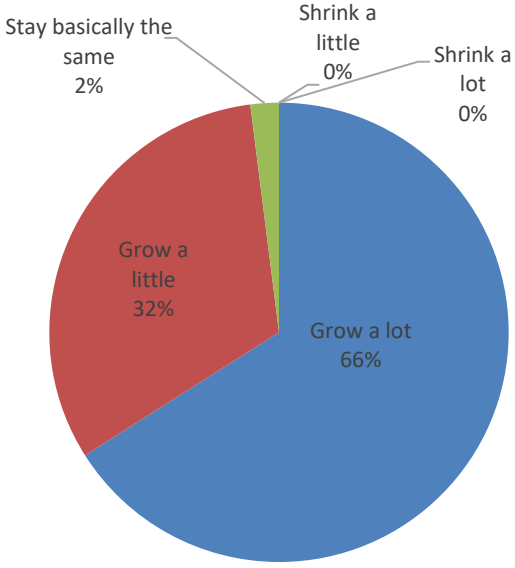
Food hubs were asked about their perception of changing demand and competition. In 2013, 96% of hubs felt the demand for hub products was growing; in 2015, 92% felt that the demand for their hub's products had continued to grow since 2013. Two-thirds of those said that demand had grown a lot (see Figure 3.42). Looking ahead to 2017, almost all hubs (98%) said that demand would continue to grow, and two-thirds expected demand to grow a lot (see Figure 3.43).

Figure 3.42 Perceived Change in Demand for Food Hubs' Products Since 2013*



* *n* = 106

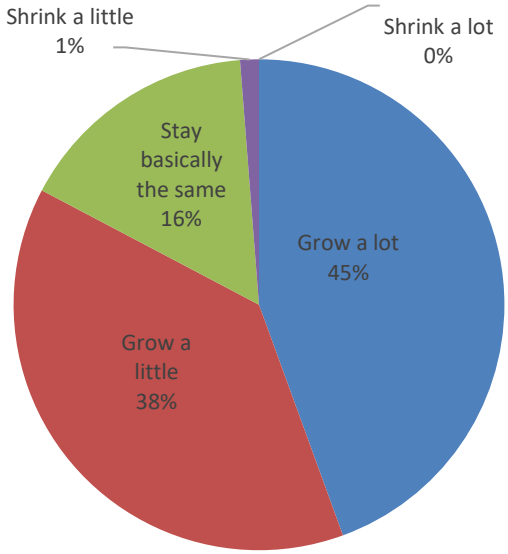
Figure 3.43 Perceived Change in Demand for Food Hubs' Products Through 2017*



* *n* = 106

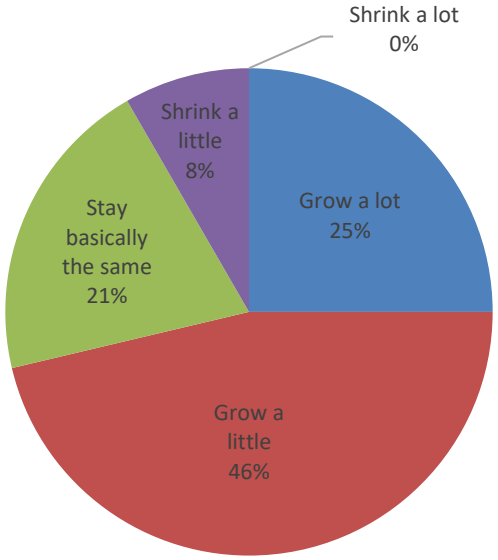
With growing demand often comes growing competition to meet demand. Eighty-three percent of hubs thought that competition for new customers would grow in the next two years (see Figure 3.44). They anticipated less, but still considerable, competition to keep their existing customers. One-quarter expect to encounter a lot of competition for their current customers, and another half (46%) expect a little competition (see Figure 3.45). Hubs expect this competition will come not only from other food hubs but also CSA, producer direct sales, and existing conventional distributors creating local programs.

Figure 3.44 Perceived Change in Competition for New Customers Since 2013*



* *n* = 106

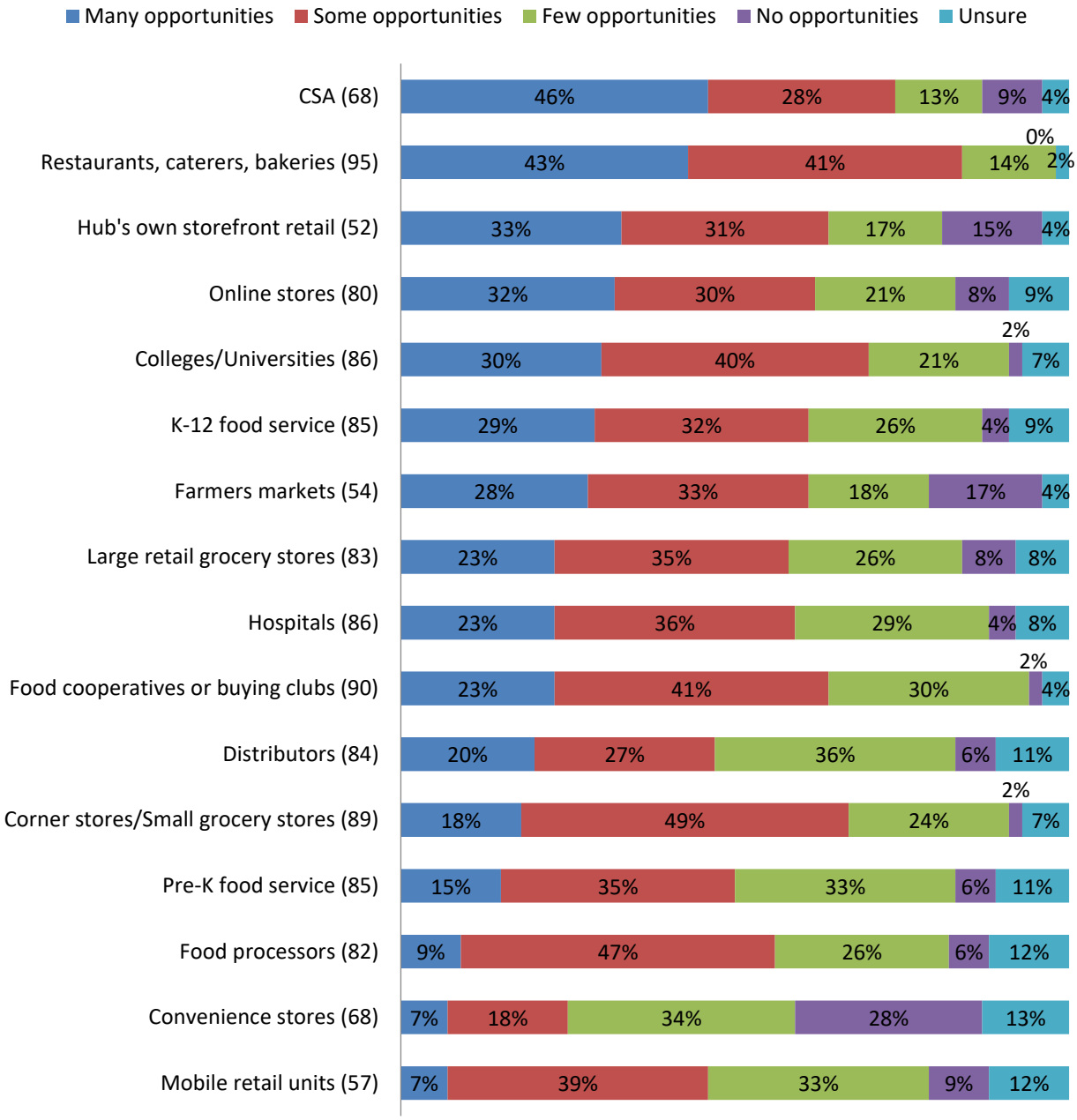
Figure 3.45 Perceived Change in Competition for Current Customers Through 2017*



* *n* = 106

Figure 3.46 shows customer types that hubs thought would yield the most future expansion opportunities. Hubs had the option to skip a customer category if it was outside the scope of their business vision. At least one-third of hubs identified CSA, restaurants, caterers, bakeries, and hub-run retail stores as having many expansion opportunities. Convenience stores offered the fewest opportunities.

Figure 3.46 Expansion Opportunities by Food Hub Customer Type*



* *n* is shown in parentheses for each customer type.

Expansion opportunities were viewed differently by various business types. Table 3.18 gives the customer types identified by 25% or more of hubs as having many expansion opportunities. All

three business types viewed CSA as offering many opportunities for new business. Farm to business hubs identified many opportunities across three different institutional customer types.

Table 3.18 Customer Type Expansion Opportunities by Hub Business Type

Farm to Business/Institution	Hybrid	Farm to Consumer
Larger retail grocery stores	Online stores	K-12 food service
Food cooperative or buying clubs	Colleges/Universities	Farmers markets
Hospitals	K-12 food service	CSA*
Colleges/Universities	Restaurants/caterers/bakeries	Online stores
K-12 food service	Farmers markets	
Distributors	CSA*	
Restaurants/caterers/bakeries*	Hub's own storefront	
CSA		

*The customer type in green was identified by the largest percentage of hubs.

No matter their size, businesses face challenges to adapt to growth and shifting markets. For food hubs, some challenges, such as managing growth and balancing supply and demand, are likely byproducts of a robust local foods market that is expected to continue to grow (Low et al., 2015) As long as growth continues, these challenges are not likely to disappear. The call is for food hub managers to thoughtfully plan for and promptly address challenges so that they do not become barriers to growth and success. To reduce the likelihood that challenges morph into barriers, food hub managers need information and knowledge of hub best practices. This report, like the 2013 report before it (Fischer et al., 2013) and the *Food Hub Financial Benchmarking Study* (Farm Credit East et al., 2014) are valuable for creating a picture of the overall food hub landscape and tracking trends over time. Building new networks, engaging with existing communities of practice, and using government, nonprofit, and educational resources are other important ways hubs are gathering knowledge to enable more informed business decisions.

3.9 DISCUSSION

Food hubs—businesses that actively manage the aggregation and distribution of source-identified food products—are receiving continued, growing attention from diverse stakeholders who see food hubs as vectors for economic growth and social and environmental change. As consumer desire for local and regional foods continues to grow and evolve, food hubs are increasing in numbers and adapting to shifting demand from intermediated local and regional food markets. The 2015 National Food Hub Survey and its predecessor, the 2013 National Food Hub Survey, represent a broad effort to aggregate national-level data on the characteristics and impact of food hubs. Together, these surveys represent the beginning of a longitudinal database for a large, broad national sample of food hubs.

Survey findings indicate that as new food hubs continue to open for business, more established food hubs continue to operate and thrive. One-third of hubs completing the survey began operations in the last two years. Three-fourths of surveyed hubs across the nation are breaking even or better. By comparison, a little over two-thirds (68%) of food hubs were breaking even or better in 2013. We think this change represents an important threshold that demonstrates the food hub model can be financially successful across a variety of legal structures and geographic or customer markets. Our findings suggest financial success coexists with mission-related success.

- **Food hub suppliers and customers are almost entirely regional.** More than 9 out of 10 food hub farm or ranch suppliers are located within 400 miles of the hub, and 3 out of 4 food hub customers are located within 400 miles of the hub.

- **Food hubs are good for small and medium agricultural operations.** More than 9 out of 10 food hubs source exclusively or mostly from farms and ranches with gross sales less than $500,000. Food hubs average nearly 80 farmer and food business suppliers.
- **Food hubs strive to increase community food access and improve health outcomes.** More than 87% of food hubs work to increase access to healthy or fresh food as part of their daily operations and programs. More than 95% of food hubs work to improve human health in their communities or region as part of daily operations and programs.

Almost all food hubs expect that business will continue to grow, but not without challenges.

- **Food hubs are addressing challenges that include compliance with FSMA.** Forty-six percent of hubs already require producers to show proof of food safety regulation compliance. The percentage of hubs requiring GAP certification increased 8% since 2013 and fully two-thirds of hubs either prefer or require GAP certification.
- **Food hubs turn to communities of practice and informal networks for information.** Almost half of hubs rely on informal networks and/or formal networks and communities of practice to learn and share business ideas. Formal communities of practice are the most highly ranked information source.
- **Food hubs are concerned about maintaining product supply and keeping up with business growth.** Securing more supply is a concern for more than half of surveyed hubs; however, less than half of those concerned think they can address this problem within the next year. Managing growth can perhaps be seen as a desirable problem to have. Yet without adequate capital and delivery, staff, and warehouse capacity, each of

which was mentioned as a barrier for at least 40% of hubs, growth can quickly become a liability.

In a growing and expanding market, our findings suggest that continued success will require encouraging and growing small and mid-sized producer and processor engagement with food hubs, looking beyond current customer categories, and using capital wisely to grow infrastructure. Organizations supporting food hubs can facilitate networking and manifest food safety and management training opportunities. Food hubs need support organizations to help them explore how to manage growth in ways that allow them to continue to pursue both financial and non-financial goals.

3.10 RECOMMENDATIONS FOR FUTURE STUDY

Based on the findings in this report, the authors suggest several topics for additional research:

- It is clear that food hubs are different from each other in many ways. No one model will fit hubs serving wholesale, hybrid, and consumer markets. Additional research that focuses on providing financial guidance and best practices on a more targeted level could help hubs make better decisions.
- The same is true for hubs with different social missions and goals: No one model will address the challenges of balancing profit and social good. A closer examination of hubs with similar social goals may produce a useful model.
- Hubs were asked to report on behalf of their producers and suppliers. Clearly, this reporting method is limited. Research on suppliers and producers both using and not using food hubs could help hubs find new and better serve suppliers and vendors.

- Ranking challenges, barriers, and opportunities is useful in assigning utility. However, the richness of a qualitative exploration of food hub challenges and opportunities could paint a better picture that will help food hubs and those helping them anticipate and address change.

APPENDIX

The Appendix[40] lists procedures for data collection and analysis and gives a tutorial for interpreting statistical test results.

A.1 Data Collection and Analysis Procedures

The following sections describe how the survey was distributed and how results were analyzed.

A.1.1 Survey Development

The 2015 National Food Hub Survey was a combination of questions, both verbatim and modified, from the 2013 National Food Hub Survey and new questions to clarify topics, address emerging topics, or address topics not covered in the 2013 survey. Topical sections of the survey included general characteristics of the food hubs, their mission and community, employees and volunteers, infrastructure and services, farm and producers/suppliers, finances, local and regional aspects of the hubs, food safety, and challenges and opportunities. Experts at the U.S. Department of Agriculture, Michigan State University's Center for Regional Food Systems, and the Wallace Center at Winrock International reviewed the survey questions for suitability. This research was reviewed and determined exempt by the Michigan State University Human Research Protection Program (IRB# x12-1251e).

A.1.2 Listed Sample

The sample was derived to include as many food hubs as possible. The sources used to compile the sample were the 2013 National Food Hub Survey responses, the USDA Food Hub Directory, the NGFN food hub database, and Internet searches conducted by investigators. These sources

[40] This appendix was published as part of a report through the Michigan State University Center for Regional Food Systems. See Hardy et al. (2016).

resulted in a list of 547 e-mail addresses for key food hub personnel. For the purposes of the survey, key food hub personnel are any individuals listed as contacts for a hub that included an e-mail address as a source of contact. A food hub may have several key personnel listed in the sample.

Food hubs completing the survey were asked to provide business names and key personnel e-mail addresses for other food hubs of which they were aware. As new key personnel were identified, they were added to the listed sample and e-mail invitation/reminder queue.

A.1.3 Additional Responses

Recognizing that the listed sample was likely incomplete, investigators asked individuals at universities and institutes with ties to food hubs to distribute a generic survey link to groups with whom they worked.

A.1.4 Data Collection

The survey was programmed and administered and output for this report generated using Qualtrics Software. The survey was administered via Web with the opportunity to download, complete, and return it via fax, scanned e-mail attachment, or postal mail. Following a modified version of Dillman's method (Dillman, Smyth, & Christian, 2014), key personnel were sent an initial invitation, and key personnel from non-responding hubs were sent multiple, varied e-mail reminders. Data collection began March 18, 2015 and ended May 17, 2015. The first or most

complete response received from an individual representing a hub was used as that hub's response in analysis.

A.1.5 Response Rate

Response rate was calculated using American Association for Public Opinion Research (AAPOR) guidelines for Internet surveys of specifically named persons and guidelines for establishment surveys (AAPOR, 2015). Duplicate key personnel for one food hub, duplicate surveys for one food hub, those organizations screened out as non-hubs, and hubs not doing business in 2014 were removed as ineligible and not used in response rate calculations. One hundred forty-three hubs out of the 434 enterprises not identified as ineligible responded based on targeted e-mails. The response rate (RR2), which counts partially completed surveys as responses, was 33%.

While it is not appropriate to include them in the response rate calculation, eight additional organizations verified to be food hubs and not identified in the listed sample responded via generic survey link. In total, 151 completed and partial surveys were used in analysis.

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