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THE FARMING FISSURE: A STUDY EXPLORING AGRICULTURAL DIVERSIFICATION
IN ONONDAGA COUNTY, NEW YORK

by

Monica Blaisdell

A thesis
submitted in partial fulfillment
of the requirements for the
Master of Science Degree
State University of New York
College of Environmental Science and Forestry
Syracuse, New York
April 2018

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Abstract

M.C.Blaisdell. *The Farming Fissure: A Study Exploring Agricultural Diversification in Onondaga County, New York*, 87 pages, 1 table, 9 figures, 2018. APA style guide used.

The development towards specialized, consolidated agriculture has prompted concerns over the strength of local food systems, through posing economic, environmental and social risk and threatening long-term resilience. One touted strategy to both tackle gaps in the local food system and support local farmers involves diversifying agricultural operations. However, diversification strategies have lacked contextualization in literature, and have not been examined through the lens of farmer perceptions. This mixed-methods study synthesized a local food assessment in Onondaga County, New York with in-depth interviews with farmers regarding diversification. Results highlighted social and institutional factors that contribute to varied perceptions about diversification, and distinct business models uncovered aligned with areas of over and underproduction in the local food assessment. These different business models were found to serve multiscalar agricultural systems yet all occupy local “place”, suggesting that opportunities to build resilience necessitate consideration of institutional context, and collaborative convergence of place-based, local-global networks.

Key Words: farmers, diversification, local food system, perceptions.

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Introduction

Within the past couple of decades, there has been considerable concern as to the strength of local food systems. Many concerns, both on the part of the farmers and the consumer, derive from trends towards uncertainty and risk in agriculture. Ambiguity of climate change, volatility of commodity markets, and threat of global competition are just a few factors that threaten long-term agricultural viability, including access to local food and resilience of local food systems as a whole. One touted strategy to both tackle gaps in the local food system and support local farmers involves diversifying agricultural operations (Jovanovic & Gilbert, 1993), (Chavas & Kim, 2007), (Roest, 2017), (Zavalniuk, 2017). However, diversification strategies lack clear definition within literature, and have not been explored in relation to structural and value-based farmer characteristics. An examination of farmer perceptions would help to ground the goal of diversification in context of farmer experience and perceptions. This study therefore involves a mixed-methods approach through conduction of a local food system assessment, coupled with in-depth interviews, in order to delve deeper into the state of the local food system and perceived conditions for diversification.

This study's two-pronged purpose, therefore, was to first identify quantifiable differences between production and consumption in the county to both situate agriculture in the county, and expose gaps and potential opportunities for diversifying agriculture and strengthening the local food system. Second, this study sought to understand what diversification means to farmers in Onondaga County, including its current definition and operationalization, factors that influence these perceptions, and future challenges and opportunities for diversifying. By coupling these two components, a certain depth can be added to the food assessment by contextualizing the data and highlighting unique farm structures in relation to diversification challenges. This synthesis

illuminated a discrepancy between equating local production with subsequent local consumption, by highlighting the complex nature of the food system after production. Farmer perceptions about diversifying were found to be influenced by two major factors: social factors such as family concerns and personal skillsets, and institutional factors, which seemingly mirror a distinct split in agriculture between certain business structures. Integral in these separate business models are variations on diversification perceptions: both what it means to farmers and to what extent diversification strategies are used or valued for agricultural resiliency.

In what follows, I will first provide a brief background of agricultural change, including the status of agriculture in Onondaga County. I will then provide a literature review of agricultural business theories: namely specialization and diversification, and gaps in current diversification literature. Next, I will explain the methods involved for both elements of the study. I will then discuss the results of the study, including insights made through connecting the local food assessment with farmer perceptions. I will finally conclude with reflections about the study, and significance of the findings when determining how to strengthen the local food system for farmers and the community in which they operate.

Literature Review

Brief History of Agricultural Structures

United States agriculture underwent dramatic transformation during the 20th century. In the beginning of the century, agriculture was dominated by small, diversified, labor-intensive farms in rural areas that housed over half of the U.S. population (Dimitri, Effland, & Conklin, 2005). Due to structural transformation that began during the interwar period, farming consolidated, specialized, and effectively removed itself from the daily lives of most Americans.

While shifts can be partly attributed to technological advancements and consumer influence (Dimitri, Effland, & Conklin, 2005) an underlying political dimension attributed to this structural change of agriculture. Concerned congressional responses to economic crises prompted a series of interrelated laws after 1933 (Bowers, Rasmussen, & Baker, 1984) to prevent farmers from experiencing economic turmoil and thus the country from experiencing future depressions. Beginning with the first Agricultural Adjustment Act of 1933, these laws acted to provide price support and supply controls to farmers for specific commodities, in order to increase returns to farms that were predominantly small and diversified. These price support subsidies were placed on certain commodities that could be efficiently produced in order to best ensure the economic security of small farmers, as well as to influence cost and supply of certain commodities, including wheat, corn, barley, dairy, and meat (Lumen, 2018). The government provided various levels of subsidization based on desire of increasing supply at lower costs, with overarching goals of supporting domestic agriculture. With that said, these price supports artificially altered prices by providing a price floor at which farmers receive payment, in order to support and incentivize future production (Lumen, 2018). Consequently, the concept of supply and demand has been confused and replaced with a system that values high-yield efficiency over market responsiveness. Ironically, these price supports intended to provide security for small farms incentivized high-yield production and thus growth of large commodity operations. Towards the latter half of the 20th century, farm policy, namely the Federal Agriculture Improvement and Reform Act, evolved to emphasize direct government payment to farmers as opposed to supply controls and high price supports (Dimitri, Effland, & Conklin, 2005). This adjustment aimed to reduce price distortions created by prior systems, yet operated based on historical production as opposed to existing production. Current commodity agriculture is thus comprised of large,

specialized farms that produce excess commodity products and compete on a globalized scale, reliant on government subsidies to account for inequities between supply and demand. The increasing volatility of commodities markets has rendered many farmers reliant on a globalized market in which input and production costs are increasing relative to payments.

Increasing Interest in Local Food Systems

As agriculture underwent industrialized consolidation in the 20th century, society became increasingly removed from farm life and the realities of food systems (Belotti, 2010). Globalized commodity markets simultaneously increased access of a wide variety of foods, increased competition in production, and contributed towards increasing ambiguities in logistics of the food system. In fact, issues of local food systems were not being given much consideration or priority for decision-making in the United States throughout most of the 20th century. However, within the past decade or two, food systems interest has grown and integrated into the planning framework (Pothukuchi & Kaufman, 2000). One predominant reason for recent interest has been due to concern over burgeoning uncertainty and risk in agriculture. Some literature has focused on agricultural risk associated with climate uncertainty, including climate change (Ackerman, 2012) (Griffin, 2014) (Peters, 2008) (Roest, 2017) & (KC, Pant, et al., 2016), pollution (Angotti, 2015), and other natural disasters. Many argue that these environmental uncertainties threaten the capacity of our current food systems to both retain productive land and generate enough food to feed the population on both regional and global scales. This lends to vulnerability of agriculture, and emphasis on necessity of adapting production systems (Roest, 2017).

Although studies have pointed to environmental risk associated with agriculture, a particular element of concern warranting discussion involves economic uncertainty, both in regard to commodity prices and globalized competition. The past couple of decades have seen

trends towards instability in national and global commodities markets. Since 1997, motor fuel and energy prices have seen double-digit annual price swings with food prices typically moving similarly to fuel prices (USDA ERS, 2017). Volatility in commodities markets has been claimed to have the potential to produce recurrent food shortages (Angotti, 2015), increase the unreliability of long-distance food travel (Peters, 2008), undermine capacity of farmers to absorb market shocks (Roest, 2017), and reduce revenue received by farmers (Barbieri, Mahoney et al., 2008). This all contributes to general resilience and long term sustainability concerns for both farmers and the regions in which they operate. Reduction of market support and protection, coupled with global interconnectivity has also increased diverse agricultural competition (Barbieri, Mahoney, et al., 2008), which both opens new markets and links economic crises on an international scale (Zavalniuk, 2017). These climatic and economic uncertainties have both forced the examination of long-term farmer viability, and placed pressure on local food systems to strengthen resilience and capacity to better meet localized needs. Consumer movements away from globalized food systems (Potteiger, 2013), and thus towards local food, have provided an incentive into exploration of capacity for and opportunities to strengthen the local food system.

Interest in Alternative/Local Food Systems

Dominance of globalized, commodity agriculture has exacerbated uncertainties regarding food systems and agricultural operations. Commodity agriculture has been characterized by blind overproduction, volatile prices, unreliable trade relationships, and market consolidation (Selfa & Qazi, 2005). This system also exhibits an extreme lack of transparency between various sectors of the food system. Within literature, there has therefore been discussion of “relocalizing” agriculture through alternative food systems. Much discussion in food studies has thus looked at reconnecting production and consumption (Goodman, 2002), in attempts to reel in “networks of

power” from global-industrial actors to “local” farmers and communities, thus re-embedding production and consumption relationships in place and community (Hendrickson & Heffernan, 2002). These localized “alternative” networks are argued to have the potential to fill in gaps that the global food system cannot provide for through niche markets, as well as address growing consumer rejection of globalized agriculture (Heffernan, Hendrickson, & Gronski, 1999). Therefore, local food movements such as “farm-to-fork”, “buying local”, and “slow food” have been gaining attention and popularity exercised through increase in farmers markets, community-supported agriculture systems, and community gardens (Noll & Werkheiser, 2018). With that said, these local networks lack geographic actuality and concrete definition. While a variety of scales can be given to “local food systems” based on context, work by Selfa and Qazi (2005) explored how these systems are conceptualized by multiple actors in the food system. They found that “local” can mean many things, including physical proximity to production, quality and freshness of product, and community networks built through food relationships. Further, they argued that opportunities for these alternative networks are highly contextual, and can vary based on a variety of historical, geographical, and ecological conditions. When exploring food system responses to industrial agriculture, it can thus be argued that each unique agricultural region presents its own unique set of challenges and opportunities.

Strengthening and Connecting Sectors of the Local Food System

One way in which opportunities for strengthening the local food system has been explored is through conduction of food system assessments. A variety of food system assessments exist depending on the goals of the study, but can be broken down into 8 typologies for clear definition (Freedgood, Pierce-Quinonez, & Meter, 2011). One popular typology has been a foodshed assessment; this method exists in a variety of forms but attempts to identify

either actual or potential production levels in relation to actual or recommended consumption levels. There have thus been a variety of food assessments conducted at various scales to understand gaps in local production and consumption sectors, and potential capacity of an area to produce more of the food it consumes. At a regional scale, Griffin (2014) assessed agricultural capacity of the Northeastern United States, concluding that production was disproportionately livestock-oriented in the region, and better connecting local production with consumption would require both a change in production type and exploration into alternative production on marginal land. Work done by Johns Hopkins University (2015) utilized USDA census data to calculate estimated crop and livestock production in Maryland, and compared it to food consumption in Maryland using USDA food availability data. The study found that some food production did not meet demand, including most fruits and vegetables, while a large surplus of chicken meat existed, which exposed gaps between different sectors of Maryland's local food system. Christian Peters (2006, 2008, 2011) conducted landmark research at the state scale, using spatial mapping, soil analysis, and agricultural data to draw the conclusion that although New York State cannot produce all of the food it needs, there is potential, especially for particular regions of the state, to increase the share of local production. A plethora of city-scale assessments in Toronto, Detroit, and Oakland, among others, have all similarly determined existence of land-based potential for connecting sectors in the local food system (Macrae, Gallant, et al. 2010) (Colasanti & Hamm, 2010) (McClintock, Cooper, et. al. 2012). Finally, a study conducted in Buffalo, New York at the Erie County scale compared production and consumption rates, as well as estimated potential production capacity in relation to consumption requirements (Conley, Falk, et. al 2011), arguing that soil-based potential existed to equalize the production field and diversify production. These assessments focus on closing the gap between "local" production

and consumption, and provide opportunities for strengthening farm resilience through identifying potential openings for agriculture.

Recent Commodity Agriculture Problems: Emphasis on Specialized, High-Yield

Although general concerns exist for risk and uncertainty in agriculture, commodity farming has been experiencing particular instability. A slow, declining trend in real agricultural commodity prices has evolved into an increasingly volatile market since 2000 (Hallam, 2011). Complicating this is the fact that crop commodity markets operate so that planting decisions are made prior to knowing crop prices, and thus production responsiveness is low (Dana & Gilbert, 2008) and volatility high. Commodity goods such as grain, dairy, and some livestock are thus produced somewhat blindly, aiming for high-yield to supplement any potential problems and operate with best odds in the global market. As a product of competing within a globalized scale of food production, commodity agriculture has shaped itself for comparative advantage (Klassen & Wittman, 2017) through specialization in certain commodities. This issue has been particularly exemplified within the dairy industry. Over the past three decades, consumption of dairy has decreased as productivity of cows has increased (Griffin, 2014), thus exposing a deep divide between productive ability and consumer demand. Further, costs associated with running farms have increased as milk price has been going down, due to surplus in production (Murray, 2016). In order to maximize revenue and steer away from threatening milk prices, dairy farms have consolidated and formed partnerships. These large dairy farms only make up a small percentage of overall farms, but account for over half of production (Paul & Nehring, 2005). This consolidation of the dairy industry has threatened smaller and midsize farms unaffiliated with economies of scale or without large conglomerate dairy contracts (Melhim, 2009) (Tropp, 2017). Pressure on both small, unaffiliated family farms and large contracted dairies has been further

expedited by unfavorable pricing policies. Weak milk futures resulting from low world prices and surplus of production correlate with recent Canadian pricing policies that incentivize domestic production at the expense of US dairy imports (Mark, 2017). These factors point to the idea that increased technological efficiency of dairy production does not optimally align with regional and international demand, and could be benefitted from alternative agricultural strategies.

Agriculture in Onondaga County

Soil, Water, and Topography

Many of the environmental and economic uncertainties associated with agriculture are relevant in New York State, and Onondaga County in particular. With that said, Onondaga County also exhibits unique agricultural challenges that warrant exploration. For as long as Onondaga County has existed, agriculture has been a predominant industry. The glacially based topography has left the county with optimal conditions for a variety of crops. A diversity of productive soils is derived from bedrock of limestone, shale, and siltstone, ranging from clay and loam to sand and gravel (Bitz, 2007). Onondaga also has mucklands, a soil comprised of humus that provides particularly rich soil for productive agriculture (Henderson, 2009). This variety has made the county well suited for growth of a wide assortment of crops and livestock. Additionally, Onondaga County is strategically located amongst large lakes, rivers, and streams that moderate the climate, provide adequate irrigation, and allow for transport capacity that has fostered the domination of agriculture in the area (Bitz, 2007).

Evolution of Agriculture in Onondaga County: Diversity to Dairy

Historically, the county has thrived in the salt making industry, forestry, and production of crops such as wheat, corn, barley, potatoes, cabbage, alfalfa, and apples (Bitz, 2007).

Competition and market demand resulted in the decline in several agricultural commodities, while composition of soils provided for the success of certain crops, such as apples (Henderson, 2009). Most fruit trees, tobacco, hops, and flax, among other crops, have essentially disappeared from production (Bitz, 2007). Throughout the fluctuations of crop production, the dairy and commodity crop industry contrastingly grew slowly and consistently. Today, they dominate agricultural production not only in Onondaga County, but also the Central New York region. In fact, the dairy industry is the “largest single segment of the State’s agricultural industry” (NYSDAM, 2017). With that said, both number of farms and acreage of farms have been steadily declining and have forced development of farmland protection plans. In 1875, over 6,000 farms existed in the county, and that number dropped to below 1,000 a century later. Since the late 1970’s, farm number and acreage has continued to decline (SOCPA, 2009), with the latest agricultural census identifying just under 700 farms (USDA Agricultural Census, 2012). This loss of farmland and drop in percentage of farms with dairy cows can interestingly be compared to a dramatic increase in the number of cows on dairy farms (Bitz, 2007). The latest county agricultural census identified 64 of 681 farms with milk cows, which averaged over 280 cows per farm, and contributed to over half of production sales in the county (USDA Agricultural Census, 2012). This shows how dairying has consolidated and industrialized in the county just as other crops have been removed from the production line.

Political Support of Dairy

One reason for the growth of the dairy industry in Onondaga County, in addition to history and ample water and soil for livestock rearing, has been the incentivization of industrialized growth through economics and policy. Initiatives spearheaded by the New York State government have focused on growing the dairy industry; regulatory burdens have been

removed, thus making it easier for dairy farms to grow herd sizes while simultaneously sidestepping costly environmental permits (Governor Andrew M. Cuomo, 2013). Caps of Concentrated Animal Feeding Operations (CAFO's) have also been increased to allow for dairy farms to grow in size (Governor Andrew M. Cuomo, 2013). Most recently, the New York State Grown & Certified program has expanded to include dairy, in order to boost and promote sales (Governor Andrew M. Cuomo, 2017). These efforts towards dairy growth have pushed New York State to top yogurt producer in the Nation, and fourth largest milk producer (Governor Andrew M. Cuomo, 2013). These maneuvers aim at growing local economies for both small and large sized farms, but also incentivize specialization towards dairy, which leaves farms more exposed to agricultural risk and uncertainty. This makes dominance of dairy not only a concern for the dairy industry, but for the region. Unreliability of commodities markets and of long-term environmental conditions questions viability of local farms, and ability of the county as a whole to grow a comprehensive local food system.

Specialization and Diversification of Agriculture: Two Strategies

The concerns of agricultural risk and uncertainty, especially associated with farm specialization, have inspired exploration into alternative strategies. A growing body of knowledge suggests that two major agricultural business structures exist, involving achieving either economies of scale or economies of scope. Economies of scale align with agricultural specialization, in that the farm realizes profitability through decreased average cost with increased focused output. Due to agricultural uncertainties discussed prior, traditional methods of specialization have been argued to be more susceptible to market volatility (Abouchakra, Moujaes, et al., 2008) through high dependency on certain commodities and pricing systems. Economies of scope, on the other hand, achieve efficiency through using similar inputs to

produce multiple outputs, thus lowering cost compared to producing them separately (Roest, 2017). This diversification of production has been argued to have potential for better efficiency and resiliency than specialized farming, by lowering the extent of dependence on particular commodities markets, spreading economic risk (Roest, 2017), enhancing biodiversity and environmental services (Bowman & Zilberman, 2013) increasing producer power through extracting more from the consumer (Jovanovic & Gilbert, 1993), curbing overproduction to make farming more responsive to the market (Campbell, 2002) and increasing opportunities to expand market presence in uncertain conditions (Chavas & Kim, 2007) (Zavalniuk, 2017). While historically agriculture has evolved towards large-scale, specialized, technical efficiency (economies of scale), recent interest in reaching “efficiency” through spreading risk from both market downturn and climatic damage has made the conversation towards diversification on many scales particularly salient. Thus, over the past couple of decades, there has been considerable interest, though lack of scientific literature (Barnes, Hansson, et al., 2015) in the phenomenon of diversification.

Diversity of Diversification Discourse

Although diversification has been touted as a strategy for addressing risk and uncertainty in agriculture, the term lacks concrete definition. After reviewing limited literature, diversification has primarily been defined on a farm scale. Most definitions involve the expansion of products and services on a farm, but vary on products and services that constitute the practice.

Farm Diversification

Foundational definitions of agricultural diversification involve the expansion of outputs, whether goods or services, relative to inputs on the farm. This includes the physical

cropping process, where actions include processes of crop rotation, double cropping, and/or intercropping (Johnston, Vaupel, et al., 1995). Definitions also include increasing on-farm crop diversity through addition of crops with similar inputs (KC, Pant, et al., 2016) (Lin, 2011). These crop-related definitions involve the process of shifting resources from certain crops or livestock to a larger mix, as defined by Joshi, Gulati, et al., (2004).

Other definitions involve an emphasis on finding other ways to add revenue to a farm business. This includes reallocation or use of underutilized resources (land, labor, or capital) into new crops, livestock, or enterprise, in order to increase revenue (Barnes, Hansson, et al., 2015) (Barbieri & Mahoney, 2009) (Kandulu, Bryan, et al., 2012). Medhurst & Segrave (2007) explicated that farm diversification adds other stream(s) of non-traditional, farm-based revenue to existing business. They further separated said practices into agricultural and non-agricultural categories; agricultural diversification involves introduction of new crops, livestock, or growing practices, while non-agricultural refers to introduction of activities such as leasing land, on-site processing or value added. These categories were perhaps most comprehensively expanded upon by Barbieri & Mahoney (2008). Their classification system includes 8 forms of farm diversification: introduction of nontraditional crops, livestock, or practices, agrotourism, value added, new markets and distribution, leasing or renting of land and resources, contracting services, cultural and historic preservation, and education. Barbieri's synthesis of diversification literature provides an extensive categorization of farm strategies that both clarifies and includes current practices.

Problems with Diversifying

As discussed above, diversifying agriculture has had many purported benefits, including spreading of economic and environmental risk, expanding of market opportunities, and allowing

for better provision of ecosystem services. In theory, strategies will then enable growth and resilience of the local rural economy and thus the community as well. However, there have also been associated theoretical problems with diversifying agriculture, including expense (Roest, 2017) and time demand (Zavalniuk, 2017) (Medhurst & Segrave, 2007) (Campbell, 2002). Therefore, some studies have attempted to characterize optimal diversification conditions, in order to better categorize certain strategies based on agricultural factors.

Factors that Influence Farm Diversification

Farmer Values and Decision-Making

In order to best understand the process of diversification, including how to approach certain farm management strategies, it is important to consider the role that certain factors have on farmer decision-making. Previous studies have concluded that farmer decision-making rests on a complex series of economic and non-economic goals, and that these goals are influenced by certain beliefs that then inform decisions (Barbieri & Mahoney, 2009). They argue that the business nature of farming necessitates economic goals such as maximizing profits, increasing revenues, and stabilizing finances in relation to the market. Apart from purely economic considerations, several studies (Gasson, 1973) (Rob & Burton, 2004) (Getz & Carlsen, 2000) have found that non-economic goals including importance of retaining farmer identity, being accepted in the rural community, and maintaining a certain lifestyle also play a large role in decision-making. Farmer decisions have thus been argued to be shaped by a wide variety of factors at many scales, in a highly contextual nature (White & Selfa, 2013). One conceptual model (White, Brown, Gibson, Hanley, & Earnhart, 2009) for understanding farmer decision-making highlighted four major factors that encompass both economic and non-economic goals: environmental/land characteristics, extent of new practice/compatibility, personal farmer

characteristics, and decision setting. It is clear that farmer decision-making in general is a highly complex process that necessitates situational context. With that said, there are a lack of studies that explore perceptions and factors that influence agricultural diversification decision-making in particular.

Farmer Motivations for Diversifying

Due to the highly contextual nature of diversification techniques, some research has focused on the factors that influence farm diversification, both structurally and motivationally. Hansson, Ferguson, et al. (2013), Barbieri & Mahoney (2009), and Northcote & Alonso (2011) all found that farmers diversify to reduce risk and best utilize farm resources. Others, like Vic & McElwee (2011) found social motives to influence farm diversification decisions more than financial considerations, yet did not elaborate as to the type of social motives that played a role. This shows lack of consensus regarding farmer motivations for diversifying, which makes understanding context particularly important.

Influence of Socioeconomic Characteristics on Diversification

Similarly, studies have found certain socioeconomic characteristics to influence success and extent of diversification, although many findings contrast each other. Barbieri, Mahoney, et al. (2008) found through surveying North American Farmers' Direct Market Association that diversified farmers were young, educated, female, involved in marketing and business, active in environmental stewardship, and existed at various sizes in acres. Roest (2017) found through a series of EU case studies that the success of diversification clearly depended on farm cooperation and collaboration, and that larger farms were more specialized than small, diversified farms, and further, that smaller farms were also looking to become even more diversified. Paul & Nehring (2005) and Melhim, O'Donoghue, et al. (2009) similarly found that smaller farms are more

diversified, and diversify at a faster rate. However, studies conducted by Culas & Mahendrarajah (2005), Medhurst & Segrave (2007) and Anosike & Coughenour (1990) found that larger farms are more diversified, as they are more advanced in their farming “life cycle”. It is clear that varying results exist as to the relationship between size of farm and diversification rates, which implies that simply comparing farm size and diversification does not allow for complex understanding of underlying decision-making.

Gaps in Current Studies

As discussed above, in the existing literature about agricultural diversification, a plethora of definitions of diversification exist, yet lack situational context. Further, many definitions given are based on researcher evaluations as opposed to farmer perceptions on what diversification means and how it is operationalized. While literature exists on farmer perceptions related to decision-making, not much has been done to connect these foci to the process of diversification in particular. Diversification literature that does exist focuses on certain socioeconomic factors, including farm size and farm tenure, that influence diversification, yet lacks consideration of both structural and value-laden factors that influence perceptions. In addition, there has been little done to explicitly connect socioeconomic characteristics, among other factors, with perceptions of diversification, including what it means to farmers and barriers and opportunities towards diversifying. On a broader note, there have been many local food capacity assessments conducted that analyze land-based and political opportunities for diversifying agriculture, yet little has been done to synthesize said assessments with perceived opportunities for diversification. By engaging agricultural producers in addition to conducting a local food assessment, an opportunity exists for connections to be made between different aspects of the local food system in more depth. In this study, therefore, efforts were made to

connect gaps in the local food system to farmer perceptions of diversification. The purpose of this mixed-methods study is to connect the discrepancy between agricultural production and consumption in Onondaga County with farmer perceptions about agricultural diversification.

Methods

Part 1

To address the research questions concerning production and consumption gaps in Onondaga County, synthesis of secondary data from multiple sources was conducted to complete calculations. These calculations sought to compare agricultural production of consumptive goods in Onondaga County to recommended consumption. The secondary data sources were utilized based on frameworks provided by two previous local food system assessments: *Room at the Table-Food System Assessment of Erie County*, and *Maryland Grown- How What we Grow Compares with What we Eat*.

From start to finish, production numbers from the USDA Census of Agriculture (2012) were compared with the Northeast Regional Food Guide (Wilkins & Bokaer-Smith, 1996). The Food Guide was utilized to account for regional suggestions as opposed to national proxies, in order to provide a localized agricultural viewpoint based on realistic regional diets. The *New York Annual Statistics Bulletin* (NASS, 2012) provided statistics on average yields per acre of various field crops, which allowed conversions between census production data and annual yield. For calculations where annual state yields were unavailable, national averages were taken from the USDA NASS *Statistics by Subject* (2012). Conversion factors available through the USDA ERS *Weights, Measures, and Conversion Factors: Equalizing Calculations* (1992) as well as the USDA *Food Patterns Equivalents Database 2011-12: Methodology and User Guide* (2014)

provided tools for converting census data into consumption metrics. Finally, consumption metrics were converted into serving sizes utilizing the *Northeast Regional Food Guide* (Wilkins & Bokaer-Smith, 1996). As will be discussed below, some additional sources were utilized for specialty goods. Additionally, the calculations did not represent all food a person could eat, but rather whole, unprocessed foods such as whole grains, vegetables, fruits, meat, eggs, and dairy. For dairy in particular, products were measured in milk equivalents, meaning milk necessary to make all dairy products. A comparison of this information illuminated gaps in production and consumption, and based on context given during literature review, gives graphic support toward exploring opportunities for diversification.

Comparisons were drawn to recommended consumption based on the five food groups defined in the food guide (grains, fruits, vegetables, dairy, and protein) consumed on a 2,200 calorie diets (the average regional food guide plan) to determine how much food is recommended for the county population to consume annually. Consumption was calculated using the United States Census Bureau Population for Onondaga County (2010), minus those under 5 years of age with drastically different eating patterns, mirroring previous food system assessments.

Microsoft Excel spreadsheet software was utilized to complete several conversions: raw census data to weight, weight to size, and size to servings. These conversions were then added to a comprehensive graph depicting gaps between production and consumption for all food groups. Food groups were then broken down further to depict quantities of certain goods produced in each food group. Additionally, several additional steps were completed for certain goods that needed additional conversions, and will be further elaborated on below based on food group. Subsequent steps will be discussed below.

Protein (Dry Beans, Nuts, Eggs, Meat)

Livestock and Poultry

Census data provided number of livestock and poultry produced, which was recorded into an Excel Spreadsheet. To estimate beef, pork, and mutton production, New York State average weight of cows, pigs, and lamb/sheep at slaughter was taken from a 2012 NASS report. This gave liveweight of beef, pork, and lamb produced in Onondaga County. From there, the USDA Weights and Measures Tool allowed for conversions from liveweight to dressing yield, and dressing yield to retail weight. Mutton conversions were also utilized as a proxy for goat meat produced. To estimate chicken (broiler) and duck production, New York State average pounds produced was taken from a 2012 NASS report. From there, USDA Weights and Measures provided conversions from live weight to ready-to-cook yield meat. To estimate egg production, New York State average eggs per layer was taken from a 2012 NASS report. Specialty livestock and poultry, including geese, guinea fowl, peacock, pheasant, pigeon/squab, rooster, and rabbit were eliminated due to lack of yield data. After production quantities were determined for livestock and poultry, pounds of meat produced were converted into serving sizes based on the Northeast Regional Food Guide. Servings produced were then compared to suggested Food Guide servings: population census data was utilized to determine number of servings needed to feed the county population, with the exception of those under 5 years of age, where diets significantly differ.

Miscellaneous Proteins

In addition to livestock and poultry, production quantities were also available for soybeans and sunflower seeds, which qualify under the proteins category in the Northeast Regional Food Guide. Census data provided both acres harvested and bushels of soybeans

produced. From bushels, conversions from USDA Weights and Measures were utilized to determine gram equivalents of unprocessed soy products as emphasized in the Northeast Regional Food Guide. This resulted in grams produced of full-fat soy flour. After gram equivalents were calculated, conversions into soymilk were completed through the use of Soy Fact Sheets from the Soyfoods Association of North America (2002). After production quantities were determined for soymilk, cups of soymilk were converted into serving sizes based on the Northeast Regional Food Guide. For sunflower seeds, grams of sunflower seeds were converted into serving sizes based on the Northeast Regional Food Guide.

Dairy

For dairy, census data provided number of milk cows and goats in Onondaga County. From there, average annual milk production per cow in New York State was taken from a 2011 NASS report to obtain total weight of cow milk produced in Onondaga County. For goat milk, a USDA APHIS Info Sheet: *U.S. Dairy Goat Operations* (2012) was utilized to determine average annual milk production per goat in the United States, to then obtain total weight of goat milk produced in Onondaga County. All subsequent dairy calculations involved milk equivalents, meaning milk necessary to make all dairy products. After production quantities were determined for dairy, cups of milk produced were converted into serving sizes based on the Northeast Regional Food Guide.

Grains

For grains, both acres harvested and bushels were provided by census data. From bushels, conversions from USDA Weights and Measures were utilized to determine gram equivalents of whole grain or unprocessed grain products emphasized in the Northeast Regional Food Guide Food Plan. This resulted in grams produced of whole grain cornmeal, whole-wheat flour,

unprocessed oats, pearl barley, and rye. After production quantities were determined for grains, grams of grains produced were converted into serving sizes based on the Northeast Regional Food Guide.

Vegetables

For vegetables, acres harvested were provided by census data. Average yield in pounds per acre were available for many of the vegetables through the 2012 New York State NASS Report. These vegetables included snap beans, beets, cabbage, cauliflower, cucumbers/pickles, eggplant, green peas, bell peppers, potatoes, pumpkins, squash, sweet corn, and tomatoes. For crops where annual state yield was unavailable, average yield in pounds per acre was provided by a 2012 USDA NASS report of National Statistics by Subject. This included yields for broccoli, carrots, garlic, lettuce, green onions, sugar/snow peas, peppers other than bell, and radishes. Yields for fresh herbs were inconclusive in the USDA data, and were thus excluded due to lack of yield data. After pound equivalents were calculated, weight was converted to cup equivalents through the USDA Food Patterns Equivalents Database for 2011-2012. After production quantities were converted to cup equivalents, cups produced were converted into serving sizes based on the Northeast Regional Food Guide.

Fruits

For fruits, total acres were provided by census data. Average yield in pounds per acre were available for many of the fruits through the 2012 New York State NASS Report. These fruits included apples, sweet cherries, peaches, pears, tame blueberries, raspberries, and strawberries. For crops where annual state yield was unavailable, annual yield in pounds per acre was provided by a 2012 USDA NASS report of National Statistics by Subject. This included yields for plums/prunes, and blackberries. After pound equivalents were calculated, weight was

converted to cup equivalents through the USDA Food Patterns Equivalents Database for 2011-2012. After production quantities were calculated to cup equivalents, cups produced were converted into serving sizes based on the Northeast Regional Food Guide.

Additional Agricultural Products

Two additional products recorded in the census data were maple syrup and honey. Maple syrup was recorded in gallons, and honey was recorded in pounds. These products were not included in the assessment, in that serving sizes are not given in the Northeast Regional Food Guide. These products should be used sparingly at best, and thus do not constitute a significant part of a dietary food plan.

Limitations and Points to Consider

The agricultural census was conducted in 2011-2012, and thus these calculations provide an assessment for a snapshot in time during the 2012 Agricultural Census cycle. As was previously mentioned, this assessment focused on whole, unprocessed foods a person could eat, including whole grains, vegetables, fruits, meat, eggs, and dairy. The categories analyzed altogether included cattle/calves, hogs/pigs, sheep/lamb, milk goats, meat goats, poultry, honey, miscellaneous livestock, selected crops, field crops, vegetables, potatoes, melons, fruits, berries, and maple syrup. This means that other foods in an individual's diet, especially processed foods, have not been considered. Additionally, some product categories in the agricultural census were demarcated as private (D) to avoid disclosing data of individual farms, or (Z), meaning less than an acre produced, and thus unsubstantial. Therefore, these products were not accounted for in the calculations.

One final important factor, as will be elaborated on in the second section, is the difference between local agricultural production and local consumption. This assessment

certainly depicts quantities of consumptive agricultural goods produced and recommended consumption figures for the Onondaga County population, and thus provides a notion of the local agricultural framework and capacity of production in the area. With that said, calculating local yields from census information does not account for all processing, distribution, and eventual consumption of the product. This means that calculating local production cannot account for actual consumption, due to the structural complexity and ambiguity of the food system. However, this assessment does provide a lens for understanding local agricultural production in relation to what should be consumed locally, and thus can initiate a conversation into relevant agricultural evolution and ways in which the local food system could be strengthened and expanded upon.

Part 2

The second portion of my study was based on in-depth, structured interviews with a mixed of closed and open-ended questions, which allowed for farmers to address their perceptions about agricultural diversification. Maximum variation sampling as defined by Creswell (2012) was initially utilized to encounter a variety of farmer perspectives in regards to diversification. The farm types interviewed align with the Northeast Regional Food Guide groups, with typologies identified by the North American Industry Classification System (USDA, 2012). The farm types include oilseed/grain farms, vegetable/melon farms, fruit/tree nut farms, dairy farms, and beef/poultry farms. This was then followed by both snowball and theoretical sampling to fill in gaps until no new ideas emerged, as defined by Charmaz (2014). Confidentiality of farm directory information with both the USDA and the New York Farm Bureau prevented sampling from a comprehensive, pre-established sample frame. Therefore, maximum variation sampling through utilization of the Google search engine with “farms in

Onondaga County” as a directive was conducted. A master list was created through combination of available lists online, including Cornell Cooperative Extension’s link to *Local Harvest*, Onondaga County Agriculture Council’s *On Farm Fest Host Farms*, New York State Department of Agriculture and Markets’ *Farms and Fresh Producers Map*, and *Google Maps List*. Given the general difficulty in contacting and scheduling interviews with farmers, all farms on the master list were contacted through available email and/or phone call to account for potentially low response rates. In cases where voice messages were not available, second attempts were made to contact farms. When contact was made, a description of participation in the study was given, as well as an outline of the purpose of the research. Additionally, prior to the beginning of each interview, a consent form was presented and signed by each participant, after thorough examination of the document and reiteration of the process and proper avenues if further questions were to arise.

Prior to the data collection, permission was obtained through the Institutional Review Board, to ensure that research conducted would be following ethical guidelines. In total, 117 farms were reached out to; 65 farms never responded to email/voicemail, 13 didn’t have voicemail machine, 8 numbers no longer existed, and 4 declined to be interviewed. This may be attributed to outdated contact information online, especially due to the rapidly evolving agricultural framework of the area. All together, 27 farms were interviewed from December 2017-February 2018. 22 interviews occurred in-person, either in the homes of producers, at farms/barns, or on-site business offices. Additionally, 4 interviews took place over the phone to accommodate the wishes of the farmers, and 1 interview was comprised of emailed responses to interview questions, as they did not wish to be formally interviewed. The interview frequency table is given below. Thorough notes were recorded by laptop as opposed to tape recorder to

accommodate some farmer wishes against voice recording and expedite the transcription process. Entire interviews were typed, and rare misses were demarcated as indirect quotes. Interviews were then immediately transcribed following each interview to correct any misspellings and/or abbreviations. Interviewee's were assigned numbers to protect confidentiality of the participants and scrub identifying information, and a master list was stored separately to avoid identification.

Farm Type Interviewed (By North American Industry Classification System)	Farm Size Interviewed (By Gross Cash Farm Income)		
	<i>Small (less than \$350,000)</i>	<i>Medium (between \$350,000-\$999,000)</i>	<i>Large (at least \$1,000,000)</i>
<i>Dairy</i>	5	3	3
<i>Crop (Grain)</i>	6	5	3
<i>Livestock/Poultry</i>	3	2	1
<i>Vegetable/Melon</i>	7	1	1
<i>Fruit/Tree Nut</i>	3	0	1

Table 1: Interview Frequency Table. Note: These frequencies do not total 27 interviews; many categories repeat when farms encompass multiple categories (12 farms were categorized as dairy/crop or crop/other duos).

Charmaz' (2006) grounded theory methodology was utilized through initial and focused coding of interviews, memo-writing, and use of sampling methods for theory development. Utilizing grounded theory methodology allowed for ideas to emerge from the data inductively, which provided the opportunity to discover perceptions that weren't based on deductive, a priori categories. Grounded theory methodology as defined by Charmaz emphasizes perceptions of individuals as orienting theory development. Despite efforts of past diversification studies, inconsistent/nonexistent results made grounded theory an option for discovering themes driven by farmer perceptions in Onondaga County. This practice of grounded theory allowed for interviewing focused on revealing participants' views and feelings about diversification, which was constantly being compared through the collection and analysis process. Initial, line-by-line coding was met with memo-writing after every 5 interviews, to synthesize codes and ideas, as

well as initial idea development. This then informed future data collection as well as focused coding and further development of ideas. Advanced memos then allowed for comparisons to be drawn between categories of data that emerged.

Interviews were comprised of 13-14 broad questions and can be found as Appendix B. Early questions introduced the interviewee to the topic and elicited demographic information, followed by broad, open-ended questions regarding perceptions about diversification, and ended with open-ended questions about the future. The interviews ranged from 30 minutes to 4 hours. Of the 27 interviews, 15 were with men, 9 were with women, 2 were a husband/wife pair, and 1 was a father/son interview. In some cases, spouses and other family members were present during interviews but did not participate. At the end of each interview, inquiries for further interviews were made to ensure a more complete sampling. Additionally, as consistent with Charmaz' grounded theory, theoretical sampling was utilized to fill in gaps uncovered through constant comparison data collection and analysis. Through the collection and analysis process, further perspectives were sought of all farms, but with emphasis on dairy and crop farms, as content was lacking from these farm typologies. Therefore, both suggestions through snowball sampling and theoretical sampling utilizing the USDA EWG's *Farm Subsidy Database* provided contact information for farms that had utilized dairy program subsidies in Onondaga County from 1995-2016 (this includes dairy and crop subsidies). Some farms on this list had already been contacted or no longer existed, so each new farm was contacted through phone number provided. No new themes or categories emerged after new interviews with farms through this database, and thus theoretical sufficiency was achieved partway through the list.

Through the constant-comparison process, themes and codes were continuously refined and expanded upon, and allowed for emergent themes to be data driven, without attempting to fit

into a pre-existing coding frame (Brain & Clarke, 2006). As will be further discussed in the results section, focused codes developed the spectrum of diversification uncovered in farmer perceptions. Initial gerund codes were synthesized into three focused code themes regarding the process of agricultural diversification: market, process, and product diversity. Initial codes such as “relying on one or two crops”, “growing many things”, and “expanding to new products” represent initial codes brought under the focused code of product diversity (as a spectrum). Initial codes including “focusing on production”, “moving into bottling”, “creating synergies on the farm”, and “doing things start-to-finish” represent initial codes that express the spectrum of process diversity. Finally, initial codes such as “not selling to people”, “relying on market price”, “not having a market”, “marketing at several places” and “developing diverse market streams” encompass the spectrum of market diversity as it developed into a focused code category. Based on this process of coding, initial codes were clearly refined and synthesized through memo-writing, further expanded upon through subsequent interviews, and connected through focused coding and advanced memo-writing to find patterns, nuances, complexities, and challenges in what participants discussed. The results will be discussed in Part 2 below.

Results and Discussion

Part 1

Onondaga County has an extremely productive agricultural system: in the county, there are just under 700 farms that produce goods dominated in crop and livestock sales. Just over 150,000 acres are dedicated to farmland, which has been in steady decline and continues to diminish as development and ambivalent farmland protection policies threaten the county. Although farmland has been decreasing, production efficiency has been on the rise. In the graph

depicted below, a summary of local production and recommended consumption shows disparities in both overproduction and underproduction in the county. Of the five food groups that comprise a healthy, well-rounded diet, the county produces vastly more grains than any other food group: almost double that needed to sustain grain requirements for Onondaga County. Farms also produce almost double the necessary dairy servings required to feed the population. The county also produces slightly more protein than should be consumed. This accounts for soybean production, a major commodity crop that will be discussed at length below. However, the county produces only a fraction of the fruits and vegetables needed to feed the county. Through synthesis with the farm interviews, these findings both illuminate diversification opportunities in agriculture, as well as the entrenched agricultural system that effectively splits production into distinctive business models, and thus contextualizes opportunities for diversification.

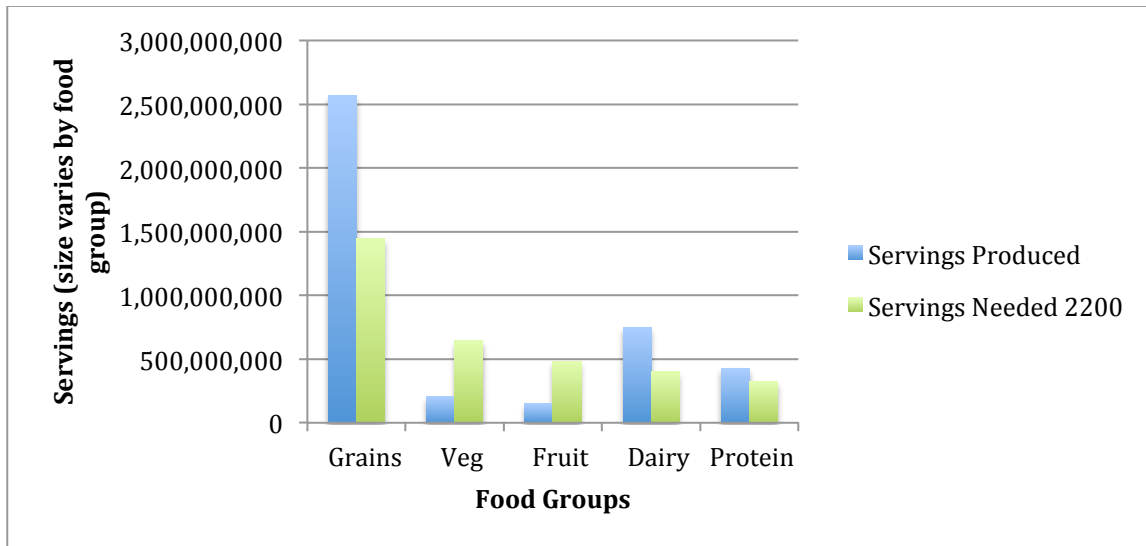


Figure 1: What we Produce and Should Consume in Onondaga County

Grains

Based on 2012 agricultural census data, Onondaga County produces 2,566,263,853 servings of grain per year as defined by the Northeast Regional Food Guide. These grains include corn, wheat, oats, barley, and rye. Based on diet requirements, the population of Onondaga County needs 1,444,388,220 servings of grains per year. Of the grains produced, 81.96% is corn grain, with wheat together accounting for almost 98% of the grains in the county. If utilizing a local food system framework, it is clear that the county vastly overproduces grain relative to what it should consume.

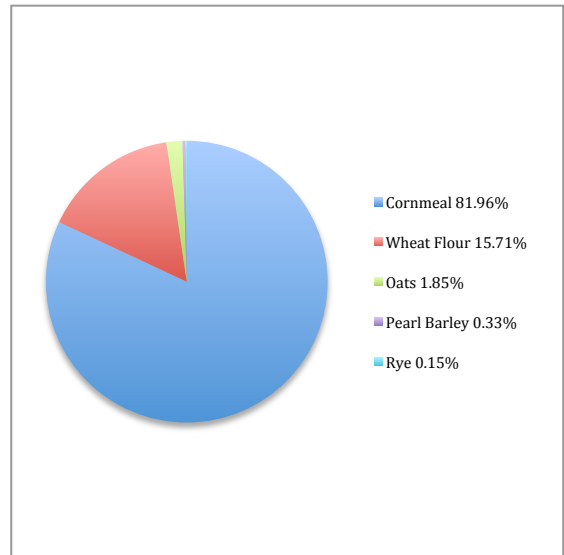


Figure 2: Grains Produced in Onondaga County

Dairy

Onondaga County farms produce 749,569,393.70 servings of dairy and milk equivalents (for making of other dairy products such as yogurt and cheese). Based on food requirements, Onondaga County needs 401,218,950 servings of dairy annually. Cow milk accounts for almost all of the dairy production, as goat milk constitutes as 0.15% of dairy. This food group, too, is vastly overproduced if looking to compare local production to subsequent local consumption.

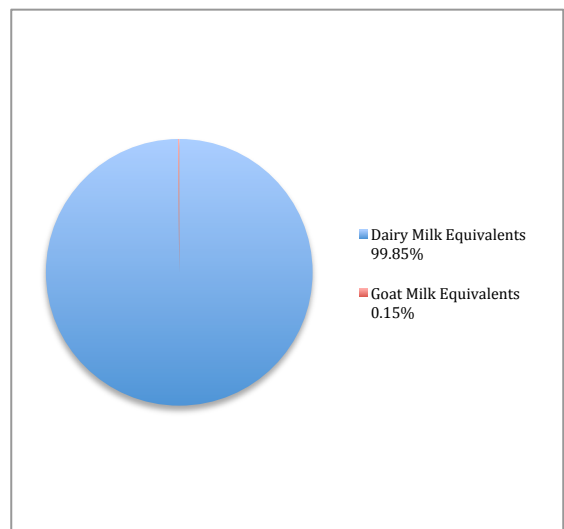


Figure 3: Dairy Produced in Onondaga County

Protein

The protein food group is comprised of dry beans, nuts, eggs, poultry, fish, and meat as defined by the Northeast Regional Food Guide. Based on these parameters, Onondaga County produces 423,689,466.70 servings of protein per year, and the population requires 320,975,160 servings annually. As the county does not produce nuts or fish, a large majority of this protein involves soybeans, which is an active commodity crop produced in the area. Soybeans alone constitute 83.97% of the protein produced, followed by eggs at 15.01%. Farms in the county thus produce more protein than the county should consume, especially if accounting for the dominance of soy as a protein.

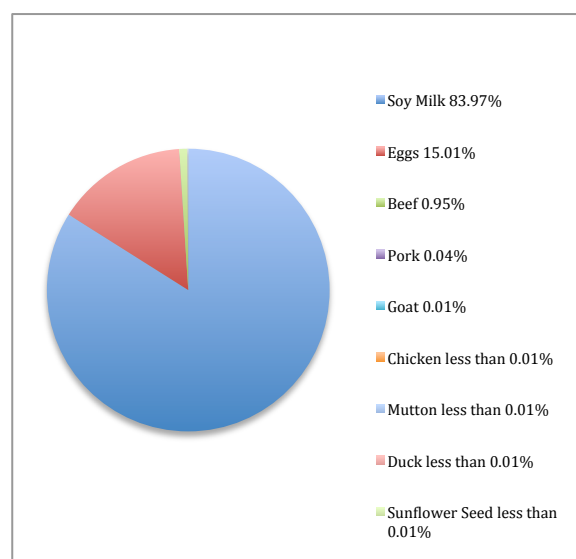


Figure 4: Protein Produced in Onondaga County

Vegetables

Of all of the food groups in Onondaga County, vegetables are by far the most diverse in terms of production. Though only second to fruits in lowest amount of servings produced per year, the county provides 19 distinctive vegetable categories. Additionally, some categories contain multiple subcategories, such as squash and peppers. Vegetables such as beans, corn, and squash account for 62.94% of production. All together, Onondaga County produces 204,701,954.90 servings of vegetables per year, and the Northeast Regional Food Guide requires

641,950,320 servings annually. This means that the county produces less than one third of the recommended amount. Further, vegetables are produced the least in relation to recommended consumption.

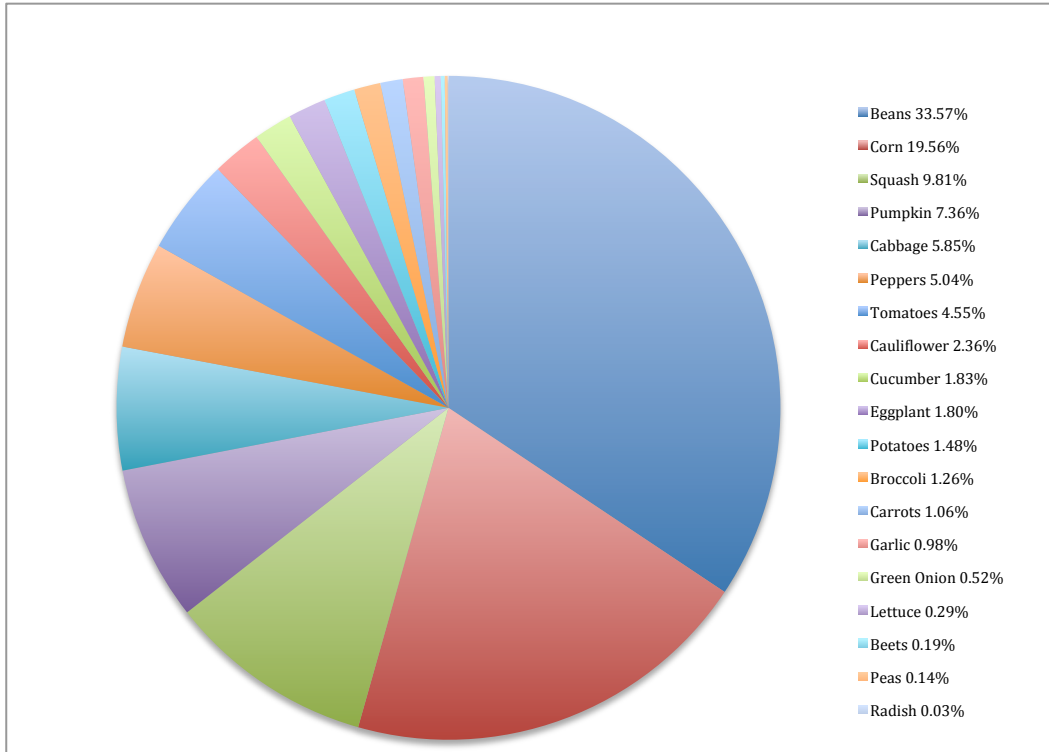


Figure 5: Vegetables Produced in Onondaga County

Fruit

In comparison to all of the food groups, Onondaga County produces the least amount of fruit. In total, Onondaga County produces 150,940,919.20 servings annually, compared to the Of the fruits grown, apple production dominates agriculture in the area: apples constitute 96.97% of fruit production by servings. Most of the other fruits produced are strawberries (1.26%), blueberries (0.71%) and raspberries (0.44%). This means that apples alone account for 30.40% of fruits that would be needed to feed the population of Onondaga County. Fruits, like

vegetables, are significantly underproduced in relation to consumption: more than three times below what the county should consume.

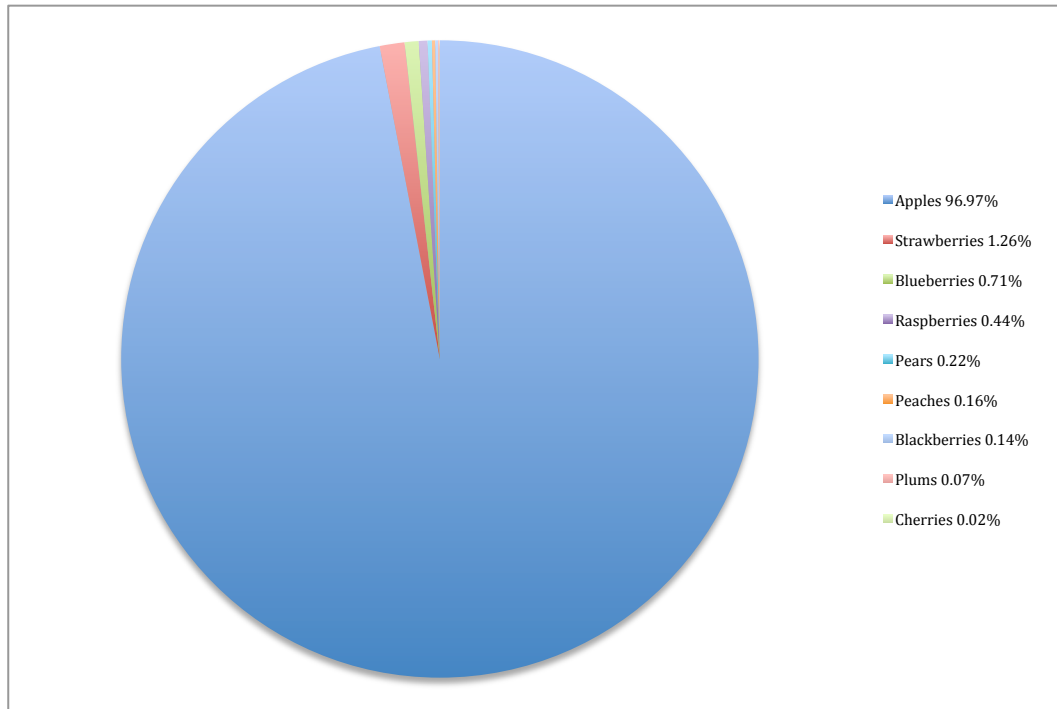


Figure 6: Fruits Produced in Onondaga County

Part 2

Diversity of Diversification: Varying by Social and Institutional Factors

The interviews revealed two types of factors that contribute to perceptions about diversification in Onondaga County. Farmers from all farm typologies spoke to social factors: family considerations and personal resources and skills, that influence diversification decisions. The second factor is institutional: varying agricultural business models that shape and dictate whether or not to diversify. This spectrum of business models ranges from large, specialized

commodity farms (oilseed/grain, dairy, and beef/poultry), to small, diverse produce CSA's (vegetable/melon and fruit/tree nut).

Based on perspectives given by farms across the spectrum, there are three different approaches to diversification: product, process, and market diversification. With that said, different business models either utilized these forms differently, to various degrees, or argued that certain methods within these forms were not conducive to the business structure. This is particularly noticeable in process diversification; many large commodity farms believe themselves to operate with process diversification defined by reaping “start-to-finish” efficiencies pre-production and post-consumption, yet recognize a lack of processing and distribution capacity. On the other hand, smaller produce CSA's perceive their process diversification as being directly involved in the entire agricultural process, including direct connection with the consumer.

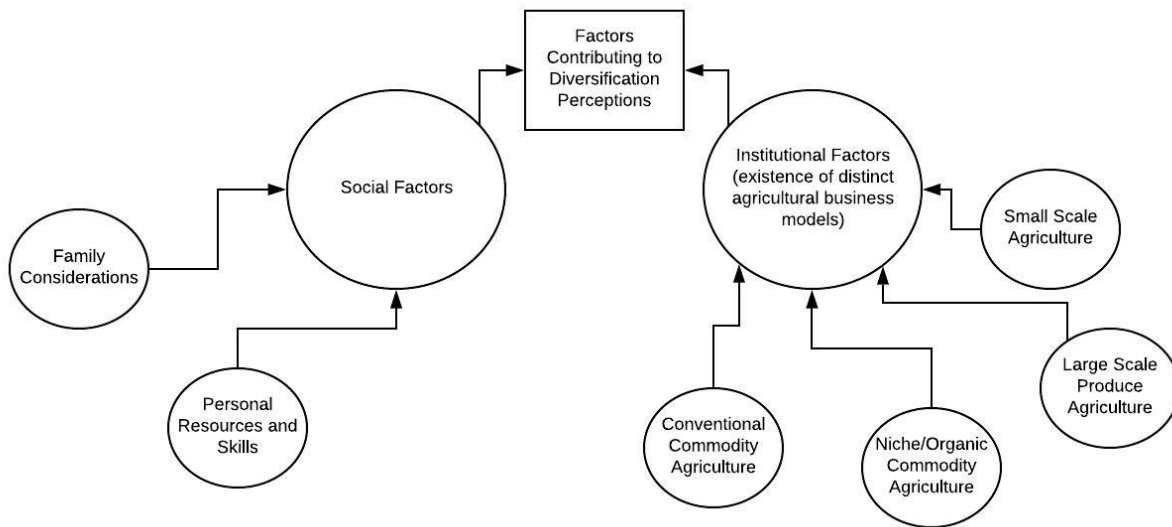


Figure 7: Factors Contributing to Diversification Perceptions

Diversification is not only defined and operationalized somewhat differently by various farms, it is also explicitly mentioned as having to vary by farm. The business structures of certain

agricultural systems can be broken down into a spectrum of models where an interplay between product, process, and market diversity exists. On one side exists conventional commodity farms that operate to reap efficiencies and serve a fixed, globalized market. These farms can be titled as “price takers”, whose mission is to become efficient in order to produce as much as possible, to give themselves the highest chance of making a profit. This system inherently focuses in on production: both quality and quantity of raw product. From there, goods are taken by middlemen, such as co-ops, marketers, and brokers, who then distribute, process, and sell to customers. This can be contrasted with the other end of the spectrum, which includes small, diversified farms that are many times dominated by produce, and incorporate several marketing outlets, including direct-to-consumer, into their business model. These farms both anticipate and create consumer demand, and operate within a system that values diverse streams of goods and market outlets to balance risk and accommodate varying desires of consumers. In between these two categories exists large produce farms and niche/organic crop and livestock operations. These business structures have varying degrees of diversification based on this interplay between product, process, and market variety. I will first expand on socioeconomic factors that influence diversification, and then speak to institutional farming structures associated with diversification.

Diversification Varying by Social Factors: Family, Resources, and Skills

Family Considerations:

Many farms mention the importance of family in considering diversification and future evolution of the farms. Farm 1, a small dairy, had experienced particular difficulty in the dairy business, and ended up halting production and moving south in 2003. However, being away from the farm both helped them recognize how much they loved farming, and also which values in farming meant the most to them: being true to themselves and the desires of the family. They

mentioned that when they decided to leave the old dairy farm, raising young children on top of lack of labor contributed to the decision to leave, while family similarly impacted not only the decision to return, but how to do so:

Farm 1 (Small Dairy): We wouldn't have [come back to farming] if we didn't go robotic. Being a housewife and a farmhand and doing bills and housework: it tore me apart.

Going forward, we are so computer forward--our new generation is about computers. How exciting would it be for a computer science person to be a farmer? So you learn [how to work the robot] as you go because it's new but when your new generation comes in and wants to buy this farm, it's robotic and that's what it's all about. My son says 'I will stay if that's what it's about'. He wants to do the robot because he understands that.

Not only did the decision to diversify into robotics require acquiring new knowledge and technical skillsets, but was ushered forward through consideration of balancing family and work, as well as increasing desirability for children to remain on the farm. This notion is echoed in comments from several other farms, who spoke of diversification as being contingent upon the desires of their children and grandchildren.

Farm 9 (Small Beef, Egg, and Poultry Farm): My father in law was renting to a commercial farmer when we were in the Phillipines and now we're back...and our grandson is going to take over. My son might do the maple syrup and [my grandson] will

be an engineer and then come back to farming. My three grandkids fight over who wants to take over the farm.

Farm 12 (Medium Crop Farm): I got a granddaughter now who graduated from Cornell as an agronomist and works at [an agricultural marketing company] and will bring new technology and drones to our operation. If I listen to her, I will try to be open, it will probably change somewhat.

Farm 20 (Small Berry and Crop Farm): But as far as diversifying, like our son has a full time job next door but his children are beginning to grow up and his wife is very interested in organic stuff and um, you know...so I can see there's a good chance they will take over.

These perspectives can be contrasted with two small farms that have both slowly shrunken in size due to consolidated dairying competition nearby. They have been struggling to continue production, and lack adequate labor and next generation family support. When asked if they anticipating diversifying in the future, they claimed that diversifying would be time consuming and requires a significant amount of labor.

Farm 5 (Small Crop Farm): No [we do not intend on diversifying]. We just go year by year...it is what it is and we don't have future generations to take over.

Farm 14 (Small Dairy Farm): Well we are probably around a year from ending milking so retirement is the first thing for me.

Personal Resources and Skills:

While many farms express that decisions to diversify are influenced by personal and family desires, several also mentioned that farms that choose to diversify should be cognizant of what is required to diversify in relation to personal resources, knowledge, and skills. One small diversified farming enterprise mentions needing to be brutally honest with yourself and understand what it takes to diversify. This includes doing significant research to understand both production requirements and market trends. They stated:

Farm 8 (Small Diversified Farming Enterprise): You've got to be brutally honest with yourself: things you suck at stop. We're looking to do farm to table here now but how do you promote it and make a profit? We're talking about leasing out land to people who might want to farm on it. Find something that you like but you can only do so much.

Several other farms similarly believe that diversification is not cut-and-dry. If one decides to diversify, it should be based on individual strengths of the farm:

Farm 19 (Large Crop and Beef Farm): [Business diversification] is definitely not for everybody. [One farmer I know] has a dairy with a processing plant but now he's going to New York City every week. Not everyone is cut out for diversifying the business side, so diversify with what your strengths are.

Farm 24 (Medium Dairy Farm): I can see...I know a lot of them are going into this brewery and stuff but you can't just go into something unless you have a desire to do a good job with it. I see some guys going in without skills and it just hurts them.

Diversification Varying By Institutional Factors: Business Structure

Interviews with farmers reveal a wide variety in perceptions regarding agricultural diversification. As has been discussed earlier, farmer perspectives about agricultural diversification vary and are explicitly argued to have to vary based on a variety of farm factors, including social support, resources, and skill sets. With that said, more broadly reflected in the data is a sense that agricultural diversification- both how it is defined and operationalized on farms in Onondaga County, varies and is reflected in contrasting business structures associated with different farm types. In short, these distinct business structures with different production goals are separated by and dependent upon different marketing scales, with various levels of connectivity in the process and with the consumer. Farmers all across the spectrum related their business models to opportunities, or lack thereof, for diversifying. They expressed the notion that diversifying is inherently built in to certain business structures, yet would inhibit the success of others. This raises questions about context for diversification, including optimal ways to build resilience into separate agricultural business models.

Conventional Commodity Farms: Focused Price-Takers

Within the agricultural framework of Onondaga County, one side of the agricultural business structure spectrum are small farms that grow non-real commodity goods such as fruits and vegetables. Separate from these farms are larger farms that grow produce, and niche/organic dairies and livestock operations. On the opposite side of the spectrum are the farms that produce conventional agricultural commodities, such as grain and dairy products. In some cases, farms may produce a mix of agricultural goods, and this typically occurs at a small scale on a very diversified farm, in which direct market relationships exist. Many farms in Onondaga County, especially those that classify as medium or large farms, are also those that operate within a

commodity pricing scheme. Commodity crops are those in which a price is set, and emphasis is given to efficiency and quality of raw product. This spectrum is illustrated below, and is more fully expanded upon in Appendix C.

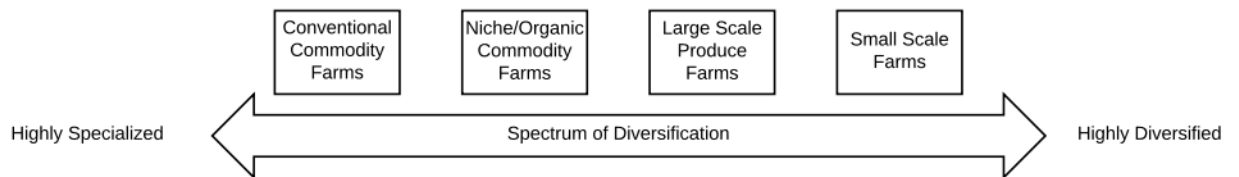


Figure 8: Spectrum of Diversification of Agricultural Business Models in Onondaga County

This spectrum of farm business models captures diversification as an interplay between product, process, and market diversification. These three diversification aspects were identified, either as an element of diversification or an actual operationalized component of the business, by interviewed farmers. Product diversification refers to any variation on the production of several goods or services. Process diversification refers to the incorporation of start-to-finish mentalities in the operation, either through processes that resemble vertical integration efficiencies, or incorporating processes such as processing, distribution, and sales into the business model. Market diversification refers to the variety of sales outlets available to the farm. Based on the opinions of farmers interviewed, small scale farms (dominated by produce or produce/livestock mix) tend to encompass high levels of diversity, and conventional commodity farms operate in highly-specialized systems. This can be first exemplified in the statements from dairy and crop farms of all sizes, in which diversification is defined and/or operationalized through minimal product and process diversity, and rigid, volatile marketing outlets. While desires for certain

process diversification opportunities are discussed, these farms argue too that diversifying is at many times inhibiting towards one's ability to reap efficiency gains.

The commodity farms tend to view reaping efficiencies as a primary motivation of their farming operation. In relation to diversification, these farms either argue that diversification hinders growth and reaping efficiencies, or exists in either the form of crop rotation (product diversification) or business integration of various aspects of dairying (process diversification). When asked to define and explain if/how methods of agricultural diversification are employed on these commodity farms, responses included:

Product Diversity

Farm 24 (Medium Dairy/Crop Farm): Well I consider [the farm] diversified because you're not just growing one crop but a variety of crops. Some years the market is good for soybeans, sometimes corn...sometimes milk is doing better than field crops.

Farm 27 (Medium Crop/Retired Dairy Farm): We rotate our crops and that's why we have the hay because it holds the soil.

Process Diversity

Farm 10 (Large Dairy Farm): We certainly are diversified at the lower level because we do a lot more than other dairy farms; we haul our own milk and inputs in...and sand and bedding, and do whey from Chobani and byproducts from yogurt...we receive food waste from the Walmart Supercenter and sell colostrum...and we sell a little surplus feed.

Farm 16 (Medium Dairy Farm): We started genomic testing our cattle about 6-7 years ago. So this became commercially available 6-7 years ago and we started doing the test on young calves and culled the bottom young calves and we found elite calves and used

embryo transfer so they sell for considerably more. That technology allowed us to diversify.

Farm 25 (Medium Dairy Farm): You can feed some of the [commodity goods] to your animals, so it reduces feed costs instead of buying it in.

These methods of diversification reflect either slight product diversity through rotating commodity crops or interrelating different aspects of the farming operation in ways that resemble vertical integration. Farm 10 in particular views efficiencies reaped through incorporating start-to-finish mentalities—controlling inputs, selling byproducts and surplus from the dairying process, and utilizing waste for agriculture, as methods of diversification within the farm structure. Similarly, Farm 16 views the ability to technologically determine optimal cattle genetics as a way to remove the burden of raising young, unproductive calves earlier on, and efficiently separate high-end cattle from milk cows. These “diversification” methods represent ways in which to either promote long-term productivity of the farm (crop rotation), cope with agricultural risk (crop rotation) or capitalize on existing resources during the entire dairying process to create efficiencies and maximize profit. In either case, slight, if any, diversity in regard to product, process, or market diversity exists.

While most farmers, including dairies, expressed belief that they employ some methods of diversification, many dairies claim that doing so hinders ability to reap efficiencies and do their best job.

Farm 10 (Large Dairy Farm): Um I guess I would say personal bias diversification would probably at a macro level be a disadvantage to a farm because you're spreading yourself and need expertise across a wide variety of areas.

Farm 11 (Large Dairy Farm): From a larger scale farm the need to diversify is less and it depends on many dynamics with that particular business. From our perspective being a larger farm is to create efficiencies that keep us going.

Farm 14 (Small Dairy Farm): To me, you've just got so much time in a day to do things. If you try to do a lot of different things, you might spread yourself too thin, where if I can increase by 10 animals I will get more volume.

Farm 23 (Large Dairy Farm): A farm can diversify if they want to. Within our farm now, with our farm no. After 300 cows, forget it. It's full time.

These perspectives reveal that diversification is viewed as a process that requires splitting focus, time and energy they feel is needed to create efficiencies that support the farm.

Specializing in dairy or cropping allows them to narrow in on skills and knowledge to effectively produce milk and crops, as well as to give proper time needed to account for managing a large farm. The goals of these farms focus on maximizing production, which they view as being best accomplished through targeted, specific operations.

Commodity farms either believe their farms to be somewhat diversified, or insist that diversification takes away from the optimal commodity agriculture business model. However, both dairies and other farm types in Onondaga County emphasized a future need and already-present initiative to invest in commodity agriculture in one of the aforementioned methods of

diversification: process diversification through the development of bottling and processing facilities for dairies.

Farm 8 (Small Diversified Enterprise): There has been tremendous investment in dairy or organic so the next step needs to be bottling.

Farm 10 (Large Dairy Farm): There hasn't been a lot of reinvestment [in dairy] on the processing side, even though production has stayed the same.

Farm 11 (Large Dairy Farm): [A milk marketer] has a group and we have taken steps to build a milk plant to basically kind of [diversify], so you can say we have diversified some but that's the only way we have.

Farm 19 (Large Beef/Crop Farm): Large dairy farms are investing into the whey plants, now you know. The government would be wise to push that, because they have to bail them out if they fail.

Farm 19 (Large Beef/Crop Farm): So from a macroperspective, if you're not doing what I'm doing- larger farms in commodity markets, we need processing capacity. Dairy farms ramped up because the government said to, so places got ready for Chobani and then they set up a huge farm in Iowa. Canada stopped importing a lot of our whey products so these size farms were built on trade and capacities and those don't exist, and its killing small dairy farms.

These comments all express the perceived need to develop processing capabilities for dairies. This step is deemed particularly necessary in order to account for previous investment in other aspects of the dairying process (production), as well as potential consequences to the

dairying industry if not provided avenues to expand; the dairy industry has received significant investment in terms of production capacity, and thus farms have consolidated and built efficiencies based on abilities to produce large quantities of milk. However, based on lack of investment in subsequent aspects of the dairying process, farms are left disconnected from realities of the end product and with limited control over marketing opportunities. Due to the structuring of commodities markets, this both separates commodity farms from supply/demand realities, disempowers dairies from doing more with their products through diversification, and links fate of dairies with government price supports. This can be exemplified by understanding farmer perspectives regarding business models in dairying/commodity cropping in relation to markets.

Diversification and the Commodity Market

When discussing current and future challenges and opportunities towards diversifying agriculture, many commodity farms referenced the condition of the market as critical towards the success or failure of their operations. Based on many perspectives revealed during interviews, it can be ascertained that the global commodity market in which dairies and crop farms operate within dictates production decisions, and many times this is not connected to local, or even global needs. These farms, in nature of operating within a commodity pricing structure, work within the constraints of a price-determined, globalized market in which competition exists on a global scale. This globalized scope promotes disconnect between producers and consumers, as middlemen, cooperatives, and grain brokers are responsible for transport, processing, and sales of the final product. Farms thus lack necessity/ability of direct-market connection and awareness of local consumer trends and desires, and thus opportunities for demand-based diversification. The farms instead operate towards efficient, high-yielding production of crop and livestock

goods in order to make as much profit as possible within the price support structure. This then promotes specialization in order to focus in operations towards the most high-yielding result. Crop and dairy farms, based on the current pricing structure, are thus concerned primarily with production, and leave future processing and market trend concerns to co-ops and other middle men. This notion is exemplified in many sentiments expressed by dairy and crop farms in Onondaga County.

Embedded in this commodity business model is a 3-way interplay between focusing on efficiencies of production (product specialization), reliance on middle-men (process specialization), and serving global markets (fixed market/specialization); This business structure facilitates specialized, high-yield production without participation in subsequent steps in the agricultural process, or direct connection towards consumer demand. As is expressed by many commodity farms, production of the raw product is of prime focus of the operation, which can be contrasted with focuses of other types of farms discussed later. This business model can be constrained by efforts towards diversification, as the focus is solely on yielding as much as possible regardless of demand to make profits.

Efficiencies of Production (Product Specialization)

Farm 11 (Large Dairy Farm): I can't speak to [diversification] specifically because we really haven't diversified a whole lot. Our business model is to produce raw milk...From our perspective being a large farm is to create efficiencies that keep us going...Our business model is to produce milk and create efficiencies through growth.

Farm 14 (Small Dairy Farm): Well we strive for quality milk, I guess that's the biggest thing, especially now because there's a surplus of milk.

Farm 16: (Medium Dairy Farm) The long term trend [in milk prices] is a downward one so that really forces you to be more efficient with everything.

Farm 27 (Medium Crop/Retired Dairy Farm): My main thing is to say get higher yields. With the prices going down 10 bushels more an acre, it doesn't hurt so much.

These farms, aware that a surplus or imbalance exists, feel the need to then produce the highest quality milk/crop possible in order to compete within the commodity market. Because of this, efforts are extremely focused on said production to create efficiencies. As explicitly mentioned by Farm 27, specialized, high-yield production acts as a buffer if commodity prices are to swing, and allows them to compete against the global market. Despite this ability to increase efficiencies, however, a disconnect exists between commodity farmers and the end market. As compared to other farms discussed later, the final stop for a farmer producing a raw commodity good is with a co-op, marketing group, or broker, who then proceeds with finalizing the product for the consumer. This simultaneously takes away some of the burden and disempowers commodity farms from controlling all aspects of their operations, and exploring opportunities to diversify.

Farm 1 (Small Dairy): We can't sell to people, because we're under contract with Upstate.

Farm 23 (Large Dairy) Ummm well diversification...first of all, you have to understand that milk is owned by the government. They do allow you to sell a certain percent of your milk on farm, which a lot of people don't know, but you need to do processing or raw...but that's additional headaches.

Farm 14 (Small Dairy): To try to diversify as far as selling your own milk--with regulations it's hard to do that.

These comments speak to the lack of freedom that commodity farms have towards both connecting with consumers and diversifying into other aspects of a dairying operation. In addition to regulatory hurdles experienced by commodity farms is a constant emphasis on segmentation of the dairy industry, which effectively prevents some aspects of agricultural diversification, such as processing, value-added, and direct sales.

Reliance on Middle Men (Process Specialization)

Farm 11 (Large Dairy): Um specifically for us we are focused on producing milk that the processors handle.

Farm 10 (Large Dairy): So in the dairy industry you don't sell your milk to a processor; 90% of the time there's a middleman that's selling and dealing with the plans.

Farm 16 (Medium Dairy): We haven't had any problems marketing milk like other people who have too much. Our co-op is taking out money every month to pay for the um-- basically getting rid of the excess milk that there isn't capacity for so it's reducing our pay price...[With milk], someone brings the trucks in and takes it away and someone else takes away the headache of where it goes and all that. Being in the co-op makes milk-marketing easy. The production part of it is what's difficult.

The dairying operation is thus segmented so that farmers produce raw products that are then processed. By virtue of said segmentation, there are lack of incentives towards diversifying,

as commodity farms are removed from many economic realities and aspects of commodity marketing and planning. Much of the disconnect can be viewed through the lens of a globalized market, in which agricultural safety is found through government subsidies and optimum yields, not spreading of risk through diversification.

Serving Global Markets (Fixed-Linked Market/Specialization)

Farm 10 (Large Dairy): It's all a global market now. Farmers are very good at making more of something at any time even when nobody wants it because it's the only way we can stay in business.

Farm 25 (Medium Dairy/Crop): We are dealing with a world market which is a challenge. The market is good [right now] because they're having weather problems in South America so it's changing the market. Wheat has gone up a lot this past week because of the drought in South America.

Farm 27 (Medium Crop/Retired Dairy): The markets are of great concern. What is gonna happen to NAFTA, what is gonna happen to China, what happens to South America? Cayuga County invested a lot of money to develop dry powder milk they thought they could send to Canada. China is a market now... what makes me nervous is our relationship with China. They might increase tariffs; they stopped buying our soybeans. They're being more... taking care of China, taking care of crops. China is our biggest customer for soybeans and protein markets: now they're raising their own.

Operating within a globalized market, as explicitly expressed by Farm 10, elicits overproduction through reaping efficiencies as a method to stay in business. By competing

globally, these farms specialize and are not structured to regard to local opportunities present for diversification. Instead, they see future challenges, including ways in which to expand the dairy business, as directly related to global pricing. Therefore, in searching for potentials for future diversification, if any, farms may expand operations to other segments of the dairying process, so as to open doors serving a global market.

The comments expressed by these operations illuminates the segmentation of dairy and crop farming, where focus is primarily on production, and thus concerns about marketing, supply and demand, and opportunities to fill gaps in the local food system (through diversification) are not prioritized. The business structure of these farms is to maximize production, with hopes of producing the highest quality product for the lowest price, all whilst reaping efficiencies and making as much profit as possible. The subsidies dominating this system seem to facilitate this segmented mindset in which farms simply look to increase yields to secure better chances of making profit, even if this system perpetuates overproduction and thus future further reductions in payments for these farmers. It can be deduced from farmer interviews that in this commodity-driven business structure, diversification is perceived to neither be consistent with reaping efficiencies in specialization nor consistent with a marketing scheme in which farmers themselves are unaware of how even to connect with consumers and potential trends in further product diversification. These findings align claims of Klassen and Whittman (2017), who argue that food production systems based on industrial scale specialization serve global markets. In the case of farms in Onondaga County, these industrial-scale goods are commodity crops, where focus on serving global markets seemingly replaces connectedness to the local.

Commodity farms, aptly named “price takers” by one farmer, thus develop business plans centered around product, process and market specialization, with the exception of slight crop

rotation and attempts to integrate the commodity agriculture process. Each agricultural commodity is attached to a particular market price, and many times these associated commodity prices are tied to each other. Therefore, while some crop and dairy farms produce either crop and livestock, or several crop products, they are based on the same pricing scheme in which efficiency is valued, and thus so is product and market specialization.

Other farms, too, have taken notice of commodity agriculture's position in regard to product, process, and market diversity. The challenges faced by commodity farms in diversifying are perhaps best exemplified by the opinions expressed by one small and one large produce farm in Onondaga County.

Farm 18 (Small Produce Farm): [Diversifying marketing] is definitely areas where dairy farms are not well diversified typically; they have a wholesaler come and shop milk and they get the price of what the co-op pays and they have no other market...

Farm 18 (Small Produce Farm): The only real hang up [in diversification] in commodity agriculture is it's much harder to insure yourself when you're a really diversified producer; if we were just growing corn, soybeans and oats it's an easy commodity program to insure those things. If we're suffering through, you still get a portion of the income back; it gets harder to do that on a diversified scale. Also insurance rates for those producers--if a commodity producer grows grain in the conventional market place for conventional prices and's insuring crops, they will get returns based on market rates. If they diversified to barley and oats and wheat to local brewers, they wouldn't actually...if

there was to be crop loss and they were going back and relying on insurance payments to buoy losses they would be getting less in their optimized market.

Farm 2 (Large Produce Farm): Everybody's idea of diversity is a little different. The strength of vegetable operations is that it's built in. If you think of dairy or grain, they have almost no diversity and there's a whole historical study of how that came to be. I'm not saying that's bad, but they have a lot more risk. It's been wet so people can't get their field corn in so they can't plant and their yields weren't good so you're basically relying on one or two crops like corn and soybeans and the market price has been really low recently so they spread their risk by the government subsidizing it. Dairy has one product and no control over how it's sold unless you're bottling your own milk which is a significant investment and hardly anyone does it. They're at the mercy of whatever the market will pay and milk prices and grain prices have been really bad, but they keep producing more! It's a cycle-it's the opposite of a free market...farming is the opposite of a free market.

These perspectives echo those of commodity farms; diversifying in a commodity agriculture business structure is difficult and at times not the right financial decision. In fact, accounting for agricultural risk and uncertainty, which is argued to be better secured through diversification for many farms, is achieved on commodity farms through crop insurance and federal pricing systems. This system is disconnected from free-market operations, and instead values overproduction in giving the best odds for survival and resilience. Once again, this

business structure not only promotes product specialization, but reliance on middle-men as their only market.

Middle Spectrum Farms: Various Degrees of Product, Process and Market

Diversity

While one side of the agricultural business model spectrum is comprised of commodity agriculture, there exists an in-between region in which farms experience varying levels of product, process, and market diversity. These farm typologies include large produce farms, and organic/niche commodity farms, including livestock and poultry. One such farm of interest is a large organic beef and crop farm (niche commodity), who evolved from a conventional commodity farm to one that is diversified both in terms of production and marketing. When discussing the process of evolving into a more diversified farm, they said:

Farm 19 (Large Beef/Crop Farm): Well when it started we were just 525 acres of conventional crop farm, which means you're growing the same corn as the Midwest. The reality is our weather--particularly being up high, doesn't offer the degree days, so you're banking on problems in the Midwest. Let's say 1 out of 10 years you have a good year. Then you're competing against commodities, which you can't do at a small scale. So your choices are niche by getting closer to the consumer and cutting out the middleman, or getting huge, so I did both... The ultimate goal is to go end to end on raising [crops and livestock], so have one processor between me and equipment. My animals go to [a butcher] then come back, my wheat gets ground then comes back, same with malt barley. So basically you've eliminated all the grain brokers, stuff like that, so as people--for

years, farmer's didn't know about marketing and business and those brokers took a majority of profits, so I can see that and I wanted to get away from that. Organics was step number 1, more direct to consumer, not coming from the Midwest. Organic eliminated the middleman and becomes more niche, the final step is moving to retail.

This exposes both the previously discussed challenges of conventional commodity agriculture as well as the requirements to transition into a more diversified operation. This farm not only invested in a transitional agricultural model based on thorough planning, but was passionate about a certain farming vision that embraced agricultural diversity. Therefore, they found ways in which to adapt their farm from production, processing, and marketing standpoints in order to best serve the needs of the operation. This includes making explicit efforts to institute control over their products through diversifying into organic, processing and direct-market connection with the consumer.

When speaking about challenges associated with the diversification process, this farm elaborated on this fissure between commodity farming mindset/business structure, and that of a direct market, produce farm. When transitioning, accounting for where the markets are suddenly became a large part of farming considerations, as did consideration for quality of end product and efforts in connecting with consumers. They stated:

Farm 19 (Large Beef/Crop Farm): Ummm most employees and farmers have been used to lets say...producing for a feed market or mass market or when brokers take it they clean it. When you're selling it to end customers you have to take care of quality and getting people to change effort towards the markets.

This demonstrates the stark contrast between producing commodity goods for a middleman who then transports, cleans, and processes for public consumption, and the sudden responsibility placed on the producer when operating within a more diversified, direct marketing scheme. The specified commodity market utilized by conventional commodity farms aligns with notions of high-yield efficiency, while decisions to become organic diversified this farm's market approach: both by introducing new, direct markets, closing the gap between production and consumption, and challenging farmers to raise production standards in a new way. Instead of aiming solely for high-yield efficiency, this more diversified operation inherently has to now value quality of end product and marketing efforts in order to best serve direct market streams.

Another player in this middle-zone of product, process and market diversity are dairy and crop farms that exist within niche markets and operate somewhat separately from conventional commodity markets. These include organic/small scale niche dairies or direct market livestock producers. Decisions to operate within this separate farming structure are consistent with marketing connectivity: deciding to produce commodity crops and goods at a smaller scale and sell either directly to consumer or to specialty market outlets. Wholesaling and direct-marketing recognizes that not growing and specializing, thus diversifying, with these sorts of goods requires a reliable and direct market outlet to offset reliability of commodity price supports. This is exemplified in business strategies adopted by those producing commodity goods outside of conventional marketing streams, and those operating within organic (niche) product production. One small dairy that exists outside of the traditional milk-marketing scheme explicitly identifies this decision to diversify as giving up efficiencies reaped by traditional commodity agriculture based on desire to be connected to farming. Therefore, staying small allowed them to operate

outside of traditional dairy farm structure and invest in infrastructure that facilitated product diversification, process extension, and direct-marketing opportunities.

Farm 14 (Small Dairy): We are a small grassfed dairy. I like to say that we do things start to finish because it's true. We do everything from growing the hay to milking the cows then making cheese and yogurt and we sell to customers at the small farm store and the Syracuse Regional Market. Within the dairy we diversify so we don't just bottle milk, we also make yogurt and cheese. Within cheese, we diversify by not just making cheddar-we make 7 kinds of cheese. We don't make bleu cheese at certain times in the year-we make it when the climate is better... There needs to be consumer demand for products from these diversified operations recognizing that when you diversify you're losing an economy of scale so it needs to grow together.

This illustrates how choosing to do niche, small-scale, value-added dairy involves an inherent degree of diversification that is intricately connected to the market in which they provide for. By having direct relationships with consumers, this dairying business structure revolves around gauging consumer interest, and thus being equipped to both provide products that accommodate desires, as well as introduce new products with hopes of sustaining novelty and intrigue. The growth involved in this sort of business structure is not one of specialized efficiency, as in large co-opped dairy farms, but one of mutual knowledge and reliability of a direct producer-consumer relationship. This structure also makes farms more aware of a need to be new and novel, as they are better connected to the marketplace and understand saturation points. This mentality is mirrored in other small-scale operations that exist on the opposite side

of the spectrum to conventional commodity farms: small produce, and small direct-market operations.

Small/Direct Market Farms: “Price-Makers”

Farms that exist on the other side of the business structure spectrum to conventional commodity agriculture tend to be small, direct marketed produce, such as CSA’s or on-site stores. These farms both produce a wide variety of products, whether that be many kinds of vegetables, or a mix of fruits, vegetables, dairy and meat. When asked how they perceive diversification, these farms mentioned variations on product, process, and market diversity, including relationships with both customers and other small-scale diversified farms.

Product, Process and Market Diversity

Farm 2 (Large Produce Farm): I think we’re very diversified because we grow such a wide range of things. I really don’t know how many items...probably at least 30 things. This year we had 10 different types of winter squash. Others say diversified is having animals and an ecosystem of its own but that’s not us. We have a lot of vegetables and it’s our strength.

Farm 3 (Small Vegetable Farm): We are working towards incorporating perennial crops in addition to standard crops—to a degree diversifying as ecosystem services and using crops for...like pollinators. We very intentionally include flowers to support pollination.

Farm 7 (Medium Vegetable/Greenhouse Farm): Growing different kind of crops and expanding from vegetables to greenhouse operations and being multifaceted.

Farm 9 (Small Beef, Egg and Poultry Farm): I say [a diversified farm] is one that has two or more or three or more enterprises, and may thinking of expanding to more.

Farm 18 (Small Fruit and Vegetable Farm): Diversification for us is diversifying to other areas. We are already diverse in terms of production, so looking at peripheral businesses that works in concert with our farms, and simultaneously developing diverse market streams.

Several of these farms also explicitly mention that the inherent crop, process, and market diversity involved is a product of the business structure: direct marketing involves being a price maker. This is perhaps best expressed through the comment of a small produce farm operating a CSA.

Farm 18 (Small Produce Farm): That direct market of the CSA requires diversity of crops so that's probably the biggest thing. [From starting out at square 1] we didn't have initially the capacity or infrastructure to specialize even if we wanted to. Sure we could have invested differently, but we invested in a system that supported the market path we headed down which is direct consumer and diverse to begin with... We were able to diversify and take lower profit margins as we began to grow more through the CSA and grow a diverse range of products that aren't nearly as profitable but you are trading that ability of profitable items with predictability of people saying that they will buy a share in advance so as that market continued to grow and was able to sustain the farm we really started putting all our eggs in that basket and it worked out nicely—both economically and in terms of personal desires: to have close connection with our community and customers and we like being able to do the farm pickup.

This bolsters the claim that agricultural diversification is an interplay between product, process, and market diversity, which is inherently supported by a business structure that values direct markets and relationship between producer and consumer. As compared with conventional commodity farms, combatting agricultural risk and uncertainty is not achieved through specialization to reach efficiencies and receive government subsidies. Instead, small farms like CSA's secure themselves through product, process, and market diversity, which embraces customer interactions that elevate the farm beyond a store, to a relationship worth paying a share in advance for. This claim is strengthened by perspectives of other small farms, which tend to be direct-market systems, who view diversification as a security measure made possible through a niche business structure that involves the consumer.

Farm 3 (Small Vegetable Farm): [Diversification] allows farms to create a niche that attracts people. People came to us because we had a few special things and were able to create an identity that elevated us above the standard farms. When something fails—the spring killed us, I still had multiple things so I could fill all the boxes in the CSA. It was only possible because we had such a highly diversified system and that's critical for customer's attention.

Farm 8 (Small Vegetable/Meat/Agrotourism Farm): A lot of our different things interrelate and a prime example of that is that when people come here for their pumpkins we've always wanted it so people can just buy a pumpkin, but we would like them to go on the wagon ride; it takes all the people from the pumpkin experience to the trees... We have created a monster though because people are always expecting something new and we have to always be on our toes.

As contrasted with conventional commodity agriculture, these small operations have business models built around diversification. Inherent in small produce farms are product, process, and market diversity, in that produce cultivation is more manageably diverse than dairy or crop, the cropping process requires follow-through from planting, cultivation, processing and sales, and the marketing structure allows for more direct, wide-ranging sales and thus awareness of consumer desires, evolutions, and opportunities for diversification. In fact, this farming structure is directly reliant upon an interplay between consumer demand and producer experimentation.

Business Structure Spectrum Defined by Product, Process, and Market Diversity

This spectrum of agricultural business models can be exemplified through understanding diversification as an interplay between product, process, and market diversity as identified by farmer perceptions. On one end are small produce farms as well as other small diversified agricultural operations that produce a variety of goods and have highly connected market outlets. Between these inherently diverse systems exist larger produce operations that produce a variety of products and are slightly more restricted on market outlets, but still may have several, even if they exist outside of direct marketing relationships and occur instead as contracts with grocers. Also moderate in product, process and market diversity are organic/niche crop and livestock farms that don't directly connect to typical commodity markets and have either direct sales with consumers or production of several goods, or both. Finally, conventional commodity markets occupy an end of the spectrum in which products are specialized for efficiency and markets, both outlets and price, are set and controlled by the government and middle men.

Understanding the Local Food System through Farmer Perceptions

Results of the local food system assessment revealed gaps in production and consumption between all food groups in Onondaga County. Overproduced were the commodity crops operating within a global pricing structure, while fruits and vegetables, many of which are produced on small, diversified, direct-market farms are underproduced relative to what the county should consume. However, simply conducting a food assessment to determine local production in relation to recommended local consumption doesn't account for the complexities and ambiguities of the local food system. Federal pricing schemes, middlemen, brokers, co-ops, processors, and grocer contracts all establish a farm structure that is perceived to necessitate growth in order to reap efficiencies, account for risk, and remain competitive in the nature of the market. This means that overproduction is a product of risk-management for large commodity farms, just as diversification may be for small produce operations. While crop rotation and process integration represent perceived strides taken to diversify, these methods are ultimately used to most effectively operate within the commodity business structure. Further, this overproduction cannot be properly calculated given the scale in which commodity markets operate: many times final destinations of these goods are unknown and span globally. On the other hand, produce is quite underproduced relative to what the county should consume. In Onondaga County, many produce farms are small and operate within a direct-marketing scheme. This means that they cater to a wide-spread trickle of customers on a personal level. The few large produce farms operate in competition with wider grocer contracts, many times distributing goods to destinations in contract, or willing to pay a premium. The small, direct-market produce farms both lack the infrastructural capacity to provide produce needed, and must compete against

larger market outlets that provide high-quality, reliable, and consistent product that society has become accustomed to procuring.

Conclusions and Points for Further Exploration

Agriculture has experienced extreme change since the beginning of the 20th century. While agricultural evolution can partially be attributed to technological advancement and consumer preference, the subsidies put in place to provide economic security for farmers and the country as a whole paradoxically spurred efforts towards high-yield, specialized overproduction competing in a globalized market. These political mechanisms thus effectively drove agriculture from scattered, diverse farming operations to industrialized specialization. Recently, arguments against specialization (Abouchakra, Moujaes, et al., 2008) claim that this evolution has left farmers exposed to economic and environmental risks, namely volatile markets, global competition, and climate change. Alternatively, “diversification” has been advocated for as a way to combat said risks through spreading out potential outputs, enhancing biodiversity and connection to surrounding environmental systems, and empowering farmers. While prior literature (Griffin, 2014) (Peters, 2006;08;11) (Macrae, Gallant, et al. 2010) (Colasanti & Hamm, 2010) (McClintock, Cooper, et. al. 2012) and (Conley, Falk, et. al 2011) has assessed measurable, land-based opportunities for strengthening and diversifying the food system through local food assessments, and other works (Anosike & Coughenour, 1990) (Barbieri & Mahoney, 2008;09) (Culas & Mahendrarajah, 2005) (Paul & Nehring, 2005) (Medhurst & Segrave, 2007) (Melhim, O’Donoghue, et al., 2009) and (Roest, 2017) have focused on definitions and characterizations of optimal agricultural diversification conditions, studies have remained rather inconsistent, or have neglected contextualizing diversification perspectives of agricultural

producers within their unique agricultural operations. This study thus explored both quantifiable gaps between agricultural production and consumption in Onondaga County, and farmer perceptions about agricultural diversification. Through synthesis of these areas of interest, parallels were drawn between areas of over and underproduction and agricultural business models that perceive themselves to be either inhibited by or inherently reliant upon diversification methods.

Farms in Onondaga County defined diversification as three major processes that can exist in agricultural operations: diversity of farm products, diversity of farm processes, and diversity of farm market outlets. While these definitions spanned the spectrum of farm business models, there was some variation in terms of degree of perceived operationalization. Conventional commodity farms either defined and operationalized diversity as any amount of crop rotation or process integration, or claimed that diversifying would actually inhibit success of the farm based on institutions that they operate within. Small produce farms contrastingly highlighted extreme variety in product, start-to-finish processes, and assortments of market outlets as necessary towards providing resilience for the farm. This speaks to the importance of context in determining how farms see themselves, as well as opportunities/lack thereof for building strength into these distinct systems.

Many farms emphasize the role that social factors play on decisions to diversify, yet both implicitly and explicitly emphasized is the fissure between agricultural business models that promotes high-yield efficiency in some cases and direct-market diversification in others. One side of the spectrum of agricultural business models encompasses large commodity farms (grain, dairy, and livestock) that are specialized in product, process, and market senses, with the exception of slight crop rotation to account for risk and promote long-term sustainability of the

farm, and minor process expansion to reach efficiencies. The middle spectrum includes niche or organic commodity farms, as well as larger produce farms, which embody moderate levels of product, process, and market diversity. Finally, small, direct-market farms (typically produce or produce/commodity mix) exemplify diverse production, start-to-finish processing, and direct, widespread marketing channels. This means that when exploring opportunities for strengthening the local food system and providing resilience through diversification, it is important to acknowledge the deeply entrenched institutionalized agricultural structures in place. Results from this study also put into perspective the distinct role of diversification for different farms; though it has been advocated for as a resilience strategy, different agricultural business models may solicit different forms of resilience based on the networks that they operate within. This study therefore illuminates the contextualization of resiliency, and calls into question the fundamental differences in what it means, or has to mean, to various agricultural business models. Through thinking of agricultural resiliency as contextual, future work should explore implications this may have on local food and local farmers.

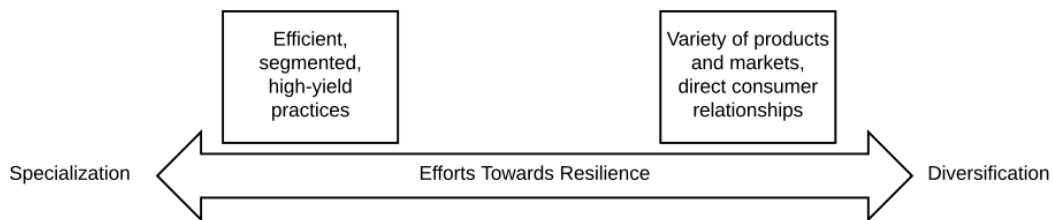


Figure 9: Multiple Notions of Agricultural Resilience

This research included a local food assessment and farmer interviews to explore the local food system in greater depth. With that said, the work highlights the importance of bringing in perspectives of farmers when attempting to understand agricultural diversification and resilience-

building. The research displays how these farmer perspectives are shaped by certain structural characteristics such as farm size and farm business type, as well as value-based social characteristics including family considerations, giving a nuanced idea of diversification. Apparent too are the separate spheres in which these business models operate, indicating that these distinct operations at many times exist independently of one another and thus should not be regarded in the same way. Through better understanding the multiscale networks that different farming business models serve, it is clear that agricultural change must occur at the structural level, or that opportunities to strengthen the local food system necessitate tailoring of diversification methods to fit unique conditions of agricultural business models. Further research should work to assess and develop optimal diversification methods based on agricultural business models, or explore other strategies to achieve agricultural resilience in cases where diversification is perceived to be inhibitory to success. This means that policy mechanisms with potential for strengthening the local food system and supporting diversification, including farmland protection plans, could benefit from the characterization of these farming models when determining how to proceed. With that said, further exploration into the structural complexities at work would help determine or pinpoint opportunities in which these divergent business models intersect, which could provide first steps towards tweaking institutions, or ways to strengthen institutions at play to build strength into the food system.

Challenges and Opportunities: Place-Based Food Systems?

This study has elucidated that a variety of definitions and hopes for diversification exist and vary by business model. It has also exposed the importance of context in considering methods for building resilience in farms and the surrounding food systems. Farmers in Onondaga County perceive diversification as an interplay of product, process, and market options, that vary

in degree and desire based on agricultural business models. It is thus clear that future challenges and opportunities involve strategically building resilience through appropriate networks while understanding institutions in place.

Although multiple agricultural networks exist in Onondaga County, from small, direct-to-consumer outlets, to large, globalized systems, these farms all still operate in the “local”, and thus future work could expand on and begin to calculate place-based opportunities for diversification. Klassen and Wittman (2017) advocate evaluating strength of these local, place-based food systems not solely on food miles, but also livelihoods of farmers. They define place as multiscalar, networked, and constitutive of relationships both between farmers and the communities in which they operate. This can be understood with food systems as a simultaneous drive to strengthen local networks by understanding and operating within complexities of global networks as well. Building food system strength, therefore, involves understanding, working within, and ultimately reshaping local, regional, and global supply chains with place-based knowledge, thus increasing transparency and resiliency into the system. If better understood, current obscurities in the globalized and financialized food systems (Clapp, 2014) can be accepted, networked, and related to place in a way that connects farmers to each other, and to communities. A more resilient food system, therefore, involves establishing and embracing networks that efficiently promote the interaction between global markets and localized production. This sentiment was exemplified in my synthesis of local food assessments and perceived complexities involved in local food systems through in-depth interviews with farmers.

Work by Pölling and Mergenthaler (2017) also argues that location matters when considering diversification strategies, especially when looking to “deepen” markets or “broaden” services. Understanding and developing strategies based on a farm’s location, both in relation to

consumers, transportation networks, or other farms, is thus an important step in future diversification decision-making. For some (small diversified operations) this may take many forms: increasing product variety based on soil conditions/topography, increasing process diversity through shared value-added technology, and market diversity through coordination with other small farms to aggregate and centralize in strategic locations. For others, like large commodity farms, this could take the form of exploring new markets that work in concert with commodities through crop rotation, or strategically locating cooperative processing establishments to allow farms to exercise control in more agricultural processes, as well as strengthen networks between commodity farms (as eluded to as a necessary next step by several farms in Onondaga County). However, even given these contextual opportunities for diversification through strategic use of land and connection with people, a central component of exercising long-term agricultural resilience must take into account the schism present in agricultural business models and thus the unique requirements for resilience-building in each farm. Through viewing opportunities towards agricultural resilience as a place-based undertaking, communities can both account for the multiscale networks that occupy the same productive space, and build strength and transparency into the system that may foster future opportunities for contextual realizations of diversification.

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Appendix A: List of Interview Questions

- 1) What do you farm/what is your farm type?
- 2) What is the size of your farm, both in acreage and in GCFI (Gross Cash Farm Income)?
- 3) How long have you been farming in Onondaga County?
- 4) Can you briefly describe your current farming operation (technology you use, policy you adhere to, markets you are involved in, etc.)?
- 5) How and when have your farming practices changed?
- 6) What drives or has driven change in your farming practice?
- 7) What changes, if any, do you think are necessary for agriculture in Onondaga County?
- 8) How do you define and operationalize agricultural diversification?
- 9) Do you see a need to diversify, at the farm and county level?
- 10) Do you consider your farm to be diversified?

IF YES:

- 11) What were the challenges you faced in diversifying?
- 12) What were the opportunities that made diversification possible?
- 13) What future challenges and opportunities do you see for diversification, both as a farm and as a county?

IF NO:

- 14) Do you intend on diversifying? Why or why not?
- 15) What future challenges and opportunities do you see for diversification, both as a farm and as a county?
- 16) Do you know any other farmers that I should reach out to?

Appendix B: Farm Typologies in Relation to Diversification Characteristics

Farm Typologies Identified	Methods and Extent of Diversification Identified		
	Product	Process	Market
<p>Conventional Commodity Farms: any combination of conventional oilseed/grain, dairy, and livestock/poultry</p> <p><i>*Size=Medium/Large: when small, farms mention phasing out</i></p>	-Crop Rotation	-Start-to-finish mentality pre-production and post-consumption: i.e. growing feed, production of raw product, and utilizing manure	-One fixed-price market outlet handled by a co-op, servicing a global market
	Slight Product Diversity	Slight Process Diversity	Minimal Market Diversity
<p>Niche/Organic Commodity Agriculture: oilseed/grain, dairy, and livestock/poultry</p> <p><i>*Size=Small, Medium or Large</i></p>	-Crop Rotation -Value-Added Dairy	-Start-to-finish mentality: i.e. growing feed, production of raw product, processing, direct sales, and utilizing manure	-EITHER: one fixed-price niche market outlet handled by a co-op, or multiple direct market outlets
	Moderate Product Diversity	Moderate Process Diversity	Moderate Market Diversity
<p>Large Scale Produce Agriculture: vegetable/melon and fruit/tree nut</p> <p><i>*Size= Large</i></p>	-Crop Rotation -Variety of fruit/vegetable types	-Production of product, cultivation, processing, distribution/marketing, and utilizing manure	-Combination of servicing grocery market outlets, and direct marketing
	High Product Diversity	Moderate/High Process Diversity	Moderate Market Diversity
<p>Small Scale Agriculture: any combination of livestock/poultry, vegetable/melon, and fruit/tree nut that isn't primarily commodity agriculture</p> <p><i>*Size: Small/Medium</i></p>	-Crop Rotation -Variety of fruit/vegetable types -Integration of produce and livestock production	-Growing of feed, production of product, cultivation, processing, marketing and utilizing manure	-Combination of servicing grocery market outlets, restaurants, and multiple direct marketing outlets, such as CSA, farmer's market or on-site farm store
	High Product Diversity	High Process Diversity	High Market Diversity

Monica Blaisdell

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EDUCATION AND HONORS

State University of New York, College of Environmental Science and Forestry

Master of Science in Environmental and Community Land Planning

Expected May 2018

Thesis Title- *The Farming Fissure: A Study Exploring Agricultural Diversification in Onondaga County, New York*

Cumulative GPA: 3.97/4.00

- Volunteer at Food Recovery Network, an organization bringing excess food to underserved areas
- Recipient of the 2017-2018 DLA Scholarship provided by the Kasprovicz Fund

Binghamton University, State University of New York, Harpur College of Arts and Sciences

Bachelor of Arts in Philosophy, Politics, and Law

Bachelor of Arts in Environmental Public Policy

Minor in Sociology

May 2016

Cumulative GPA: 3.86/4.00

- Dean's List all semesters
- Graduated Summa Cum Laude
- Herman Roberson Memorial Award Winner
- Phi Beta Kappa Honor Society
- Piano Society Events Coordinator Elect
- Study Abroad through Stony Brook University: studied Australian history and culture at Deakin University in Melbourne Australia in Winter 2015

WORK EXPERIENCE

Syracuse City Planning Division-Intern

Summer-Fall 2017

- Worked with Assistant Director of City Planning on ReZone Syracuse project by organizing public comments and determining scope of concern about project.
- Researched City archives to determine historical use of properties, and put together paperwork for grant proposals.
- Attended various planning meetings with other city planners, regional planners, zoning officials, city employees, ESF professors, environmental lawyers, and employees of the Mayor of Syracuse.

Onondaga County Department of Water Environment Protection: Save the Rain- Intern

Summer 2015

- Assisted Project Coordinator in organizing files, photos, and records during the program.
- Worked with social media accounts including Facebook and Twitter, and helped update the website.
- Inspected and updated Green Improvement Fund information for website.
- Participated in management and design meetings with engineers and consultants for new green infrastructure projects.
- Attended Urban Forestry ReLeaf Conference at SUNY ESF, as well as meetings with local legislation.
- Created employee appreciation posters that were put up around the complex.
- Visited sites of green infrastructure projects to evaluate success and document progress.

Independent Title Agency-Associate, Syracuse, NY

Summer 2014

- Worked in an abstracting and title agency as a typist and assistant abstractor.
- Filed all essential paperwork and property information.
- Contacted Town/Village/City/County Clerk's Offices to confirm tax information essential for Last Owner Searches and Title Insurance.
- Obtained recording information for Deeds and Mortgages, and contacted municipal offices to document official record.
- Typed Last Owner Searches and examined Deeds to determine ownership and boundaries of property.
- Assessed Deeds, Mortgages, Judgments, Federal Tax Liens, Surrogates, Oil and Gas Leases, and many other documents to confirm ability to pursue property objectives.

LaFayette After School Program- Child Care Provider, LaFayette, New York

Fall 2012-Summer 2013

- Actively provided care for children ages 4-12.