Connecticut Food Hub Study

A Statewide Analysis of Existing Conditions and Reporting

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Introduction

The purpose of this report was to investigate the status of food hubs in Connecticut and to see if a food hub in the state of Connecticut would be beneficial to Connecticut. Through reviewing published studies and reports concerning trends in agriculture, population fluctuations, consumer behavior along with mapping out agricultural supply chain businesses across the state, it becomes evident that a food hub based in Connecticut will not only be profitable but also answer a growing demand for locally produced food by Connecticut residents.

Break Down of the National Agricultural Market

97 percent of all food moves via supply chains that are more traditional (NLCFPC & UWSECT, 2015). According to the New London County Food Policy Council and the United Way of Southeastern Connecticut (2015), the conventual supply chain in the United States for whole produce consists of five stages which are: production, post-harvest, distribution, sales outlets, and consumption.

Farmers' markets and community supported agriculture are examples of direct-to-consumer supply chains. The producer is accountable for the managing post-harvest duties, delivery, warehousing, packaging, logistics, building a facility to sell the product straight to the consumer (NLCFPC & UWSECT, 2015).

Post-harvest defined by the New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) are the activities performed immediately after the agricultural product is harvested and are focused on getting the product ready to be shipped. The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) claimed post-harvest activities have the most significant effect on the agricultural

product's quality and include the grading, washing, cooling, sorting and packaging the food product immediately after harvest. Typically, parties that perform post-harvest activities are aggregators, grower cooperatives and grower-shippers (NLCFPC & UWSECT, 2015).

Distribution denotes the transferring the agricultural product from the post-harvest phase to sales channels (NLCFPC & UWSECT, 2015). Brokers, retailers, wholesalers, food services and farms often manage this step in the supply chain. Much of produce is distributed by independent wholesale operations that are accountable for the gathering, advertising and transporting the product to sales outlets (NLCFPC & UWSECT, 2015).

Grocery stores, convenience stores, restaurants, institutions like schools, other food retailers are examples of Sales outlets. Sales outlets sell the product directly to the consumer and are the stage of the supply chain that the public interacts with (NLCFPC & UWSECT, 2015).

Commodity crops such as cotton, rice, wheat, corn, and soybeans comprise the lion's share of the United States agriculture (NLCFPC & UWSECT, 2015). Specialty crops are fresh fruits and vegetables. 12.5 percent of the United States' total annual farm receipts, $401 billion, is made from Specialty crops. New London County Food Policy Council and United Way of Southeastern Connecticut (2015) in the *New London County Food Hub Feasibility Study* state that the annual cash receipts of specialty crops have been increasing. The most regularly imported specialty crops are kiwis, papayas, mangos, tomatoes, peppers, cucumbers, grapes and bananas (NLCFPC & UWSECT, 2015). The New London County Food Policy Council and United Way of Southeastern Connecticut (2015) claim the fruit trade is comparability more spread out than the vegetable trade. Most of the fruit trade product comes from countries that specialize in banana production like Costa Rica, Ecuador, Mexico and Guatemala (NLCFPC &

UWSECT, 2015). The vegetable trade is centered inside NAFTA and Asia (NLCFPC & UWSECT, 2015).

Wholesalers take legal ownership of the goods they sell while brokers manage the sale of assets without ever owning and touching the product (NLCFPC & UWSECT, 2015). 68 percent of the wholesale of fruits and vegetables in the United States has concentrated the West, Southeast and Mid-Atlantic regions of the nation (NLCFPC & UWSECT, 2015). 80 percent of the total wholesales of food is done by food service retailers, merchant wholesalers and contract food service providers (NLCFPC & UWSECT, 2015).

Beef Industry

University of Missouri researchers calculated that greater than 85 percent of all processed beef travels within just four national firms (Cargill, Tyson, JBS and National Beef) (NLCFPC & UWSECT, 2015). There is a higher level of vertical integration in the protein supply chain compared to that found in the produce supply chain according to the New London County Food Policy Council and United Way of Southeastern Connecticut (2015). In the United States, the highest collection of slaughterhouses are in the northeastern states and the Midwest.

United States cattle and calf production was estimated to be $4.95 billion in 2013, with only 10 percent exported out of the country, according to the United States Department of Agriculture (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) stated that the United States is a net importer of beef because of substantial importing of lower quality, grass-fed, processed meat. The three main inputs for beef cattle raising are feed, veterinarian assistance and seed stock for producing more cattle (NLCFPC & UWSECT, 2015). Generally, in beef production, the feed is the most

considerable direct cost. The land is also a significant input variable and may be costly contingent on the location of the operation (NLCFPC & UWSECT, 2015).

Poultry

Poultry includes geese, turkey, chickens, ostrich, game birds and other birds that are exotic to the United States (NLCFPC & UWSECT, 2015). The most abundant producer of poultry on the planet is the United States. United States comes in second for exporting poultry (NLCFPC & UWSECT, 2015). Broilers are chickens which are younger than 13 weeks old, constitute the lion's share of poultry meat production. In the United States, 80 percent of chicken that is commercially produced are broilers (NLCFPC & UWSECT, 2015). In the United States, the price of poultry is dependent on the cost of grain because poultry is mainly grain-fed (NLCFPC & UWSECT, 2015). In commercial supply chains, 90 percent of poultry production is owned by 24 firms. Pilgrim's Pride Corporation and Tyson Foods In., are the two most prominent broiler firms and represented two-fifths of the market in 2010 (NLCFPC & UWSECT, 2015).

New London County Food Policy Council and United Way of Southeastern Connecticut (2015) allege poultry products' conventual supply chain has a higher level of vertical integration than what is found in the beef industry. The poultry industry is very dependent and responsive to climate (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) affirmed that vertical integration paired with climate sensitivity caused the poultry industry to become geographically dense. Due to a favorable climate, the southeast, Appalachia, and mid-Atlantic are where most of the poultry production in the United States is located (NLCFPC & UWSECT, 2015). The states with the most significant output of poultry are Alabama, North Carolina, Arkansas and Mississippi (NLCFPC &

UWSECT, 2015). The top egg-producing states are Texas, Ohio, Indiana, Iowa and Pennsylvania (NLCFPC & UWSECT, 2015).

Current State of Connecticut's Agricultural Industry

In *Economic Impacts of Connecticut's Agriculture Updated 2015*, authors Rigoberto A. Lopez, Rebecca Boehm, Marcela Pineda, Peter Gunther and Fred Carstensen (2015) state that Connecticut concerning geographical area is the third smallest state in the United States with a total area of 3.2 million acres. 440,000 acres of Connecticut is farmland, which is roughly 14 percent of Connecticut's entire geographical area (Lopez, Boehm, Pineda, Gunther & Cartensen, 2015). The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) believe that Connecticut's and New London's climate is advantageous for agricultural production because precipitation is uniformly steadily spread-out over the year and freezing temperatures are only experienced from the middle of October to around April 15th. New London County Food Policy Council and United Way of Southeastern Connecticut (2015) argue that the state is a great place to produce fruits, vegetables and nursery crops due to the well-draining soil. Despite the state's small geographical area, Connecticut's total in farm sales were $574 million in 2015, which was the third highest in New England.

Rigoberto A. Lopez, Rebecca Boehm, Marcela Pineda, Peter Gunther and Fred Carstensen in their report, *Economic Impacts of Connecticut's Agriculture Updated 2015*, define the agriculture industry of Connecticut as the production of livestock, crops, forest products and the processing of agricultural products. Rigoberto A. Lopez, Rebecca Boehm and Marcela Pineda farther clarified the term "agriculture industry" in a presentation to the Connecticut Farm Bureau Association on February 16, 2017, and the Connecticut Department of Agriculture on March 10, 2017, titled, *Economic Impacts of Connecticut's Agricultural Industry Update 2015*.

Lopez, Boehm, and Pineda (2015) stated on slide two that veterinary services, landscaping, ground keeping services, food, and beverage processing that does not utilize agricultural products produced in the state of Connecticut are not part of the agriculture industry. Lopez et al. (2015) highlighted that the Connecticut agrarian industry helps many service industries such as equipment manufacturers, equipment repair, feed vendors, veterinary aid, financial services.

The *2012 Census Publication* found that 5,977 farms were operating in Connecticut. 880 nursery, greenhouse, floriculture, and sod operations were in the state, 149 farms selling milk from cows, 77 poultry and egg farms, 49 tobacco farms, 44 aquaculture farms, 490 Christmas tree and short rotation woody crop businesses. The census (2012) reported that 952 farms that sold vegetables, melon, potatoes and sweet potatoes farms. 556 farms sold fruits, tree nuts, and berries. 420 farms sold sheep, goats, wool, mohair, and milk. 335 operations dealt with hogs and pigs. 1,453 farms grew other crops and hay. 445 farms sold horses, ponies, mules, burros, and donkeys.

According to the National Agricultural Statistics Service, 949 farms were operating in New London County in 2012 (NLCFPC et al., 2015). The National Statistics Service found that 65,159 acres of land were in agricultural production in New London County. The 65,159 acres consisted of 99 vegetable farm operations with a mean of 4.4 acres, 51 orchards with a mean of 5.5 acres, 43 diary operations, 34 poultry operations and 192 cattle farms (NLCFPC et al., 2015). New London County has 192 beef farms with 1,298 head total. New London County has 43 milk farms with 3,799 head total and 34 farms raising broilers with 70,299 head total (NLCFPC & UWSECT, 2015). There are 158 egg layer farms in New London County with 4.7 million birds (NLCFPC & UWSECT, 2015). 70 farms that grow corn/silage with 6,628 total acres, 306 farms with 10,297 total acres that grow forage, 51 orchards with 301 acres total and 99 vegetable farms

with 432 acres total (NLCFPC & UWSECT, 2015). Five slaughter/processing facilities that are USDA-certified are in Connecticut, 52 additional processors that deal with meat, poultry, and eggs, also three facilities that process agricultural product (NLCFPC et al., 2015).

The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) in the *New London County Food Hub Feasibility Study*, brought attention to the fact that 454 farms, which is around half of all farms in New London County, have total sales less than $2,500 per year. New London County Food Policy Council and United Way of Southeastern Connecticut (2015) also reported in the study that there are 355 farms in New London County that have yearly sales that total from $2,500 to $25,000. Only 64 farms in New London County have yearly sales that total over $100,000.00. The medium size of New London County's farms is 28 acres. Just 13 farms have access to 500 acres or more in New London County (NLCFPC & UWSECT, 2015). A minimal number of farms use or have access to 180 plus acres (NLCFPC & UWSECT, 2015). NASS recognized that New London County had eight farms that were certified organic, nine farms that were exempt and two farms that were transitioning (NLCFPC & UWSECT, 2015). Sales for these farms in 2012 were more excellent than $315,000.00 annually (NLCFPC & UWSECT, 2015).

The Northwestern region of the state of Connecticut is home to a very diverse agricultural landscape (NHCOG et al., 2016). NHCOG et al. (2015) stated in *The Northwest Connecticut Feasibility Study* found cultivators growing vegetables, dairy businesses, livestock farms and beekeepers in this area of Connecticut. NHCOG et al. (2015) found that producers located in the Northwestern region of the state are small-scale operations. Just four produce producers in *The Northwest Connecticut Feasibility Study* utilized over 10 acres of land (NHCOG et al., 2015).

NHCOG et al. (2015) found that Litchfield County had a total of 1,207 farms operating on 90,963 acres in 2012. 36,000 out of the 90,963 acres was cropland. Litchfield County is the county with the highest number of working farms in the state (NHCOG et al. 2015). NHCOG et al. (2015) reported that Litchfield County had generated $46 million from farm gate sales in 2012 which made Litchfield County the 6th most agriculturally productive county in Connecticut. The low annual farm gate sales total for the county despite having the highest number of farms might be due to the farms being smaller located in Litchfield County than operations found in the other counties (NHCOG et al., 2015).

NHCOG et al. (2015) highlighted in the study the fact that 583 of the 1,207 farms located in Litchfield County are small-scale operations and report annual farm gate sales of less than $2,500.00. The study also claims 433 of the 1,207 farms in Litchfield County, generated total yearly farm gate sales between $2,500.00 to $25,000.00. There are just 64 farms that earn more than $100,000 in total annual farm gate sales (NHCOG et al.,2015). According to the study, a diary was the top agricultural product category for Litchfield County, generating $15.3 million in sales. Vegetables made $2.8 million in sales which is 7 percent lower than 2007 (NHCOG et al., 2015). Fruit brought in $2.7 million, and cattle/calf brought in $2.2 million in sales (NHCOG et al., 2015).

The leader of the primary agricultural processing industry in Connecticut is dairy processing. Diary processing makes up greater than 50 percent of the total direct sales for the state's agrarian processing industry (Lopez et al., 2015). Produce canning along with animal slaughtering are the next two most significant contributors to the state's total direct sales and are roughly equal in share size (Lopez et al., 2015).

Eggs and poultry make up greater than 50 percent of the New London County's sales (NLCFPC & UWSECT, 2015). Eggs and poultry farm gate sales are 36 times larger than any other Connecticut County (NLCFPC & UWSECT, 2015). 432 acres are utilized for produce production in New London County, making New London county the sixth largest produce producer out of the eight counties in Connecticut in 2012(NLCFPC & UWSECT, 2015).

Trends in Agriculture

New London County Food Policy Council and United Way of Southeastern Connecticut (2015) believe consumers have increasingly been wanting and buying locally grown produce. In 2014, 40.4 billion pounds of food was purchased by United States consumers, which was 225 million more pounds then what was purchased in 2013 (NLCFPC & UWSECT, 2015). Specialty crops' annual cash receipts summed to $50.5 billion in 2013, which was a 20% increase from 2010 and a 5 percent increase from 2011 (NLCFPC & UWSECT, 2015).

In 2013, 32 million head were the estimated commercial slaughter inventories in the United States (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) pointed out the 2013 estimate was a 7 percent decrease from 2008, where the estimated commercial slaughter inventories were 34.4 million head. Imports of beef cattle were expected to be slightly greater than 2 million head in 2013. 25.8 billion pounds of beef were produced in the United States, a one percent decrease from 2012. 99.8 percent of 2013's beef production was from commercial plants (NLCFPC & UWSECT, 2015). The United States had 831 slaughterhouses operating in 2014, which was up from 826 operating slaughterhouses in 2013 (NLCFPC & UWSECT, 2015).

The price of beef has consistently increased since 2002. In 2002, the cost of beef was $3.23 per pound, and in 2007 the price was $4.16 per pound (NLCFPC & UWSECT, 2015). The rate has continued to go up, and in 2013 the price was $5.29 per pound of beef (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) state that the beef prices have gone up due to the cost of grain increasing and droughts.

The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) highlight that in the United States' organic sector, eggs and poultry are some of the quickest growing food products. Since the 1980s, egg production on a small scale has rebounded due to increasing consumer demands. New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) stated organic, brown, free-range, designer; specialty eggs fulfill consumer demand for eggs that are fresh, safer, produced more ethically, more environmentally friendly and have better color. Organic eggs are now commonly sold in conventual grocery stores and natural food supermarkets (NLCFPC & UWSECT, 2015). Organic chicken is being sold in conventual grocery stores as well. Now, farm fresh eggs, locally processed chicken, and locally processed poultry products are sold at farmers' markets, gourmet food shops, restaurants, CSA's and farm stands (NLCFPC & UWSECT, 2015). $30.7 billion was the total broiler value in 2013, which a 24 percent increase since 2013 (NLCFPC & UWSECT, 2015). $8.5 billion was the total U.S egg value in 2013, which was up 8 percent since 2012 (NLCFPC & UWSECT, 2015). The average price-per-pound for poultry has increased from $1.57 in 2006 to $1.75 in 2010 (NLCFPC & UWSECT, 2015).

Over the course of the last 60 years, the consumption of poultry has grown in the United States (NLCFPC & UWSECT, 2015). The New London County Food Policy Council and the

United Way of Southeastern Connecticut (2015) reported that the average family in America consumed less than 20 pounds of poultry a year in the 1940s, but an average American would eat about 63 pounds of poultry a year in 1995, which is a 300 percent increase. By 2013, an average American would consume 100 pounds of poultry each year (NLCFPC & UWSECT, 2015). The New London County Food Policy Council and United Way of Southeastern Connecticut (2015) reported that 33 percent of consumers that purchase poultry, claim to ponder where the product originated. 68 percent of consumers would like to know where their poultry is produced (NLCFPC & UWSECT, 2015). The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) called attention to 80 percent of consumers were found to care about the treatment of the chickens and want the chickens to be humanely treated. The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) emphasized that only one-third of consumers believe that the companies that produce the poultry humanely treat the chickens.

Connecticut agriculture has grown by 22 percent concerning the number of operating farms in the state since 2007 (NLCFPC et al., 2015). State level support and resources are now offered, and accessible to local, small-scale agricultural production and marketing have helped the demand for local food to increase as well as the number of small-scale farms emerging in Connecticut (NLCFPC & UWSECT, 2015). The state agricultural commissioner attributes this growth to an increase in the demand local food and younger, new farmers entering the industry (NLCFPC et al., 2015).

There has been a small increase in direct sales in Connecticut's farm sector since 2007 when the total annual direct sales were about 551 million dollars to 2015 when the entire yearly direct sales were $574 million. Primary agricultural processing sectors also grew during this

period from $995 million to $1,224 million. The growth observed from 2007 to 2015 in the State of Connecticut's direct agricultural sales was fueled by a substantial enlargement in vegetable and fruit farming, poultry production, egg production, processed dairy products, seafood preparation, and wineries. During this same period, tobacco farming, greenhouse farming, nursery operations, floriculture and the creation of sod have all shrank in direct sales. Contingent on which model was employed, Lopez et al. (2015) computed Connecticut's agricultural industry to have an entire impact ranging from $3.3 to $4.0 billion on the state's economy.

The popularity of local food has been increasing in Connecticut. Purchasing local foods has increasingly become more accessible from the increase in the number of farmers' markets, farm stands, community support agriculture programs, pick your-own-vegetables and various other agricultural activities. Connecticut was ranked the 20th most "loca-vore oriented" state in the nation in 2014 (NLCFPC & UWSECT, 2015). In 2015 Connecticut was moved up in rankings to 10th place due to the state is home to 119 Community Supported Agriculture operations, 156 Farmers markets, 46 percent of the state's school districts were taking part in farm-to-school programs and had two food hubs (NLCFPC & UWSECT, 2015). Direct sales for winery products have steadily climbed from $30 million in 2007 to $85.8 million in 2015 due to increase in the demand for local wines. A spillover effect from the rise in demand for winery products is that the market for local grapes has increased as well. Lopez et al. (2015) estimated local food sales and agricultural tourism regarding total output sales to be 90 million to 2015. This, in turn, creates around 800 jobs and about $30 million in wages in Connecticut. Lopez et al., 2015 noted that the study highlighted the state's agricultural industry is shifting and

redesigning itself to produce more specialty crops and businesses that increase value further than the farm.

Money Growth in Agriculture

Connecticut's agricultural industry generates between 21,007 to 21,696 jobs according to the three models utilized in Lopez et al.'s (2015) report *Economic Impacts of Connecticut's Agriculture Updated 2015.* Lopez et al.'s (2015) analysis found that a mean of 5,363 additional jobs is contributed from primary agricultural processing sector in Connecticut. Between 7.7 to 32.9 jobs are created per million dollars in sales from the agricultural production sector. Between 5.1 to 9.8 jobs are created per million dollars in sales from Connecticut's agricultural processing sector. Concerning job creation per million dollars in sales, crop farming generates between 14.2 to 51.5 jobs, commercial fishing adds 16.4 to 35.6 positions, fruit farming contributes 19.2 to 30.0 jobs, forestry service activities and agricultural support actives add 23.7 to 28.1 posts.

In 2015, between $386 to $473 million in wages came from forestry production and agricultural production. In 2015, between $348 and $427 million in wages were generated from the agricultural processing industry in the state of Connecticut. In 2015, the wages produced from the entire agricultural sector of Connecticut were estimated to be in the middle of $759 and $899 million. (page 20)

Lopez et al. (2015)'s output impact estimation regarding sales per resident of Connecticut was almost $1,127.00. Two dollars are added to Connecticut's state economy from each dollar in sales in the state's agriculture sector. Between 20,007 and 21,696 jobs are created in Connecticut from the state's agricultural industry, which adds $759 to $899 million in wages (Lopez et al., 2015).

What is a Food Hub?

James Matson, Martha Sullins and Chris Cook (2013) in *The Role of Food Hubs in Local Food Marketing* proclaim that the materialization of food value chains arose from agricultural producers not being able to distinguish their product and earning low-profit margins in the traditional commodity food chain. James et al. (2015) explain that agrarian products are brought together and pooled into large groups to be sold in the conventional commodity food chain. James et al. (2015) highlighted that agricultural food products in most cases would not be sold with any information regarding the farm that cultivated them. This lack of branding or ability for farms to be associated with the product they developed paired with low margins in the traditional commodity food chain has led to the materialization of alternative food value chains, such as food hubs (James et al., 2015).

Tara Shewchuk, Brandon Okray, Robert Mahoney, and William Frankian (2013) stated in *An Analysis of New England Food Hubs* that one of the most challenging issues local farmers face is competition with corporations. Corporations can allocate billions of dollars of capital to improving products by decreasing prices, increasing efficiency and reliability (Tara Shewchuk, Brandon Okray, Robert Mahoney, & William Frankian, 2013). Shewchuk et al. (2013) believe that local farms, unfortunately, do not possess such funds to improve their product or have the infrastructure to deliver their products to high demand markets. Local farmers allocate most of their time to growing food (Shewchuk et al., 2013).

A food hub according to Shewchuk et al. (2013) is an entity that aggregates and distributes the agricultural farm products from small to medium size local farms. The USDA defines a regional food hub "as a business that actively manages the aggregation, distribution, and marketing of source-identified products from regional producers for strengthening producer

capacity and their access to markets." The definition of a regional food hub according to *Counting Values Food Hub Financial Benchmarking Study* by Farm Credit East , Wallace Center at Winrock International, Morse Marketing Connections and the Farm Credit Council, coordinated by the NGFN Food Hub Collaboration, "is a business or organization that actively manages the aggregation, distribution, and marketing of source-identified products primarily from local and regional producers for the purpose of strengthening producer capacity and their access to wholesale, retail, and institutional markets." Source identified is the information regarding the agricultural product such as the producer, the methods used to produce the product, the location where the product was cultivated remains with the product (FCE et al., 2015). In just terms, the buyer may know where who and how the agricultural product was created thus differentiating the product. For example, if a person buys a bushel of apples from a food hub, the person will possibly be able to know the name and location of the orchard that grew the apples. Food hubs usually provide customers with information regarding the practices used to farm the produce, the name and location of the farm that grew the product (FCE et al., 2015).

James et al. (2015) emphasized in their report that many food hubs grew out of either social or educational pursuit aimed at uniting producers with consumers. The selling of local agricultural products to consumers is the main task; these operations look to achieve a social cause such as teaching buyers about the significance of and protecting local farmlands and keeping food dollars in the local economy (James et al., 2015).

The majority of food hubs operate like businesses despite how the food hubs are classified regarding tax status (FCE et al., 2015). FCE et al. (2015) emphasized in their study that every food hub acquires and handles local product but the definition of local is not standardized and is defined by each food hub. Food hubs can define local as within a certain region, state

boundaries or radius (FCE et al., 2015). FCE et al. (2015) found that on average, the distance that food hubs acquire product is 385 miles.

Current State of Food Hubs

FCE et al. (2015) reported that currently, 300 plus food hubs are operating across the United States utilizing a vast array of business models. Specific food hubs solely do wholesale with businesses while some just do business with consumers directly and some food hubs do a combination of the both (FCE et al., 2015). There are food hubs that mainly function as agricultural product brokers and others that operate more like a co-op. FCE et al. (2015) assert that despite the many differences in the business models used by these food hubs, at their core all the food hubs possess the common objective of assisting local food producers and farmers in bringing their products to market while maintaining their product's differentiation.

The USDA's Regional Food Hub Resource Guide classifies food hubs based on the food hubs' structure. The USDA's Regional Food Hub Resource Guide used a pool of 168 operating food hubs and organized the food hubs based on the tax filing status of the food hubs. 40 percent of the 168 food hubs were privately held businesses, 32 percent of all food hubs were classified as non-profits, many of which were producer owned and functioned as a co-op. For-profit cooperatives accounted for 21 percent of the food hubs in the USDA's food hub pool. 5 percent of the food hubs were publicly held entities, and 2 percent were loosely organized food hubs.

FCE et al. (2015) found that the average food hub functions around break-even. FCE et al. (2015) discovered that food hubs concerning profitability, operate in a comparably small continuum, with the uppermost profitable 25 percent of food hubs achieving a 4 percent profit and the mean operating at percent profit of -2 percent. On average, food hubs with sales larger

than $1.5 million had profits of 2 percent (FCE et al., 2015). In the benchmark study, food hubs that had been operating between five and ten years averaged a profit of 1 percent. For-profit food hubs, on average, net a 1 percent profit while not-for-profit food hubs net -7 percent profit when excluding income from donations, fundraising, and grants (FCE et al., 2015). Uppermost profitable 25 percent of food hubs possibly netted their 4 percent profit from two factors. The first is that the cost of goods sold in these food hubs is 3 percent lower (FCE et al., 2015). The second factor identified by the study is labor is more productive uppermost profitable 25 percent of food hubs'. The top 25 percent of food hubs regarding cost per worker equivalent allocate 39 percent more on labor (FCE et al., 2015).

FCE et al. (2015) computed that the average food hub has a gross margin of 14.5 percent. In other words, after selling the product, 14.5 cents of each sales dollar are left over to pay for overhead or become profit. The study ascertained that around 75 percent of all food hubs did not operate on commission but took ownership of the product. Taking ownership of the product as opposed to brokering, allows food hubs to build their brand in the marketplace by selling the product under their name (FCE et al., 2015).

Fewer than 1 percent of food hubs create value-added products (FCE et al., 2015). An example of a value-added product is taking apples and processing them into applesauce. In *Counting Values Food Hub Financial Benchmarking Study*, FCE et al. (2015) observed most food hubs focus on sourcing and selling fresh produce while acquiring value-added products from a third party. Value-added products in most cases have a longer shelf life, bring about a more substantial markup, allowing sales to be expanded out of season and enlarger product lines (FCE et al., 2015). The *Counting Values Food Hub Financial Benchmarking Study* by FCE et al. (2015) reported that 15 percent of food hubs charged customers memberships fees and 28 percent

charged vendors membership fees. The report found on average; grants contributed 6 percent of operating income.

Successful Food Hubs near Connecticut

Red Tomato is a non-profit, located in Plainville, Massachusetts, and was founded in 1996 by Michael Rozyne ("History," n.d. para. 1). The goal of the Red Tomato was to seek for a method to join farmers and consumers using good produce. Red Tomato began as a small-scale distribution business and warehouse, focusing on aiding in the development of new goods and sells. Red Tomato ceased warehouse operations due to the traditional distribution model not being competitive when done on a small scale ("History," n.d. para. 3). Red Tomato shifted focus to supervising logistics through a matrix of farmers, independent truckers and wholesale associates ("History," n.d. para. 3). Red Tomato also concentrated on increasing visibility with consumers by putting much energy into marketing, branding, and packaging ("History," n.d. para. 3). The new business model was extremely successful for Red Tomato ("History," n.d. para. 3). Red Tomato now has 200 retail outlets throughout New England, New York and the mid-Atlantic that sell Red Tomato products ("History," n.d. para. 4). Colleges, neighborhoods, restaurants, schools, and produce distributes the types of businesses that Red Tomato sells too. Red Tomato claims that produce sales increase each year ("About Us," n.d. para. 4).

New Entry Food Hub's goal is to construct long-lasting food security and profitability for eastern Massachusetts communities and farmers, as well as increase availability of socially suitable foods in regions that are sufficiently supplied via the cultivation and processing of local food ("History," n.d. para. 1). New Entry Food Hub began in 2005 and was just a cooperative operation, aimed at assisting novice, immigrant and refugee agriculturalists build relations with consumers seeking fresh agricultural products in the eastern Massachusetts area ("History," n.d.

para. 2). The farmers that New Entry Food Hub worked with faced language barriers, transportation and time constraints ("History," n.d. para. 2). New Entry Food Hub created a small-scale cooperative that allowed farmers combined products to reach local consumers in a more economical and effective manner ("History," n.d. para. 2). New Entry Food Hub opened a warehouse facility in 2013 becoming an official food hub. New Entry Food Hub manages the aggregation and distribution of produce cultivated by assisting novice, immigrant and refugee agriculturalists that utilize organic methods ("History," n.d. para. 2). New Entry Food Hub also sources produce from farming operations that are located within a 100-mile range of Boston that utilized certified organic methods and integrated pest management practices ("History," n.d. para. 2). New Entry Food hub moves products by Community Supported Agricultural food share programs, supplies childcare programs, senior centers, institutions, and local shelter ("History," n.d. para. 2).

Berkshire Organics was founded with the goal of making it simpler for consumers to buy local and organic food ("About Us," n.d. para. 1). In 2007, Alesha Gibbons, who is the founder and co-owner of Berkshire Organics Market and Delivery, began a home delivery operation that served 35 customers ("About Us," n.d. para. 1). Currently, Berkshire Organics serves over 300 customers with their delivery service ("About Us," n.d. para. 1). Berkshire Organics Marker and Delivery's website allows consumers to order all their groceries online ("About Us," n.d. para. 1). Berkshire Organics Market and Delivery built a small outlet facility to enable consumers that reside out of delivery range to come and pick up their orders ("About Us," n.d. para. 2). Currently, Berkshire Organics Market and Delivery has an over 6,000 square feet facility in Dalton, Massachusetts ("About Us," n.d. para. 2). The Berkshire Organics Market and the Delivery facility offers consumers more than 5,000 non-GMO, organic, and local groceries as

well as a beer& wine bar, olive bar, cheese counter, and wholesale section ("About Us," n.d. para. 2). Organic Consumer's Association in 2012, named Berkshire Organics Market a top 12 grocer in North America. Berkshire Organics Market & Delivery Service from the get-go has always strived to increase the affordability of organic food for the local community and does so by reducing the price of goods by 20-30% on Sundays, Mondays, and Tuesdays ("About Us," n.d. para. 2). Berkshire Organics Market and Delivery also created a seconds section where imperfect produce is sold for a dollar a pound on Sundays and Mondays ("About Us," n.d. para. 3). Food that is not sold is donated to local food pantries, and the rest is composted then gifted to local farm animals ("About Us," n.d. para. 3). Berkshire Organics Market and Delivery has 20 people on staff and actively engages with the local community through events and charity donations ("About Us," n.d. para. 3).

Connecticut's Population

Connecticut has a population of 3,576,452 people (Srivastava and Riordan-Nold, 2017). Manisha Srivastava and Michelle Riordan-Nold (2017) reported in C*onnecticut's Population and Migration Trends: A Multi-Data Source Dive* that the median age of a Connecticut resident is 40.7 years old and that Connecticut's population has been declining since 2014 (Srivastava and Riordan-Nold, 2017). The number of births has dropped, and the number of deaths has increased. Srivastava and Riordan-Nold (2017) argue the most significant cause for the state's declining population is the increasing number of people leaving Connecticut and moving to other states. The study claims around 9,200 people, an increase of 55 percent since 2008, left Connecticut for other states. International migration has lessened the magnitude of Connecticut's population decline (Srivastava and Riordan-Nold, 2017). Srivastava and Riordan-Nold (2017) pointed out that New England's population has increased by 3.5 percent from 2004, while

Connecticut's population has only grown by 2.3 percent. Multiple states in New England were found by Srivastava and Riordan-Nold (2017) to have demonstrated amelioration regarding domestic migration trends compared to pre-recession levels or rebounded to rates that are on par with pre-recession levels. On the other hand, Vermont and Connecticut have not and both state's domestic outmigration rates have grown (Srivastava and Riordan-Nold, 2017). These findings showcase that Connecticut's population is shrinking mainly due to individuals moving out of the state and that immigration from other countries is lessening the decline.

Utilizing the IRS tax return data, Srivastava and Riordan-Nold (2017) deduced that more households are migrating to Massachusetts and Florida than people moving from Florida and Massachusetts to Connecticut. On the other hand, Srivastava and Riordan-Nold (2017) found the reverse to be true for New York and New Jersey. Massachusetts, New York, and Rhode Island are undergoing significantly more growth in total returns filed when judged against Connecticut. When comparing trends of post-recession rates to pre-recession rates concerning migration of individuals with bachelor's degree, associate's degree and those with less than high school education, Srivastava, and Riordan-Nold (2017) concluded Connecticut is losing a more significant percentage of those demographic groups.

Younger Connecticut residents were found by Srivastava and Riordan-Nold (2017) to move at a higher frequency compared to the other age groups of Connecticut residents. In total numbers and percentage of the age group's total population in the state, the net migration of residents 18-21 years old is negative (Srivastava and Riordan-Nold, 2017). The net migration of 22-29-year-old and 65 and older residents is negative. Individuals in these groups are leaving the state faster now than before the recession. Net migration is positive for 30-39 age group and is the largest group growing in the state (Srivastava and Riordan-Nold, 2017).

The United States Census Bureau (USCB) on the Connecticut Quickfacts webpage state between 2012 to 2016 Connecticut had 1,354,713 households with an average size of 2.56 people per household. According to the USCB data on the Connecticut Quickfacts webpage, there were 1,499,116 housing units in the state of Connecticut in 2016. The USCB reported that between 2012-2016 the owner-occupied housing units was 66.5%. Analyzing data from the same period, the USCB calculated that the median household income was $71,755.00 per year. The USCB also found that 90.1% of people that were 25 or older in the state were at least a high school graduate. Based on the same data, the USCB believes 38.0% of people in Connecticut that are 25 or older have earned at least bachelor's degree.

Hartford County was reported to have 892,389 residents in 2016 by United States Census Bureau (USCB) on the QuickFacts Tolland County, Connecticut; Litchfield County, Connecticut; Middlesex County, Connecticut; Connecticut webpage. Fairfield has found to have a population of 944,177; New London County had a population of 269.801, Windham had a population of 116,192 Middlesex County had a population of 163,329 residents, Litchfield had a population of 182,571 and Tolland County has a population of 151,118 residents.

Andrew Ba Tran (2016) reported in *Census: Only One Connecticut County Grew in Population Last Year* on Trend.Org, that Fairfield County, with an increase of just .2 percent, was the lone county that had a population increase from July 2014 to Jul 2015. Tran noted in the article that Litchfield County experienced the most substantial decrease in population in the same period in which Litchfield County's population declined by .7 percent. Regarding the change in total residents, Tran stated that New Haven County had the most enormous with a decline of 1,800 in the same period. Tran also highlighted the fact that Hartford was the only other county than Fairfield to have a larger population in 2016 than 2010. Tran emphasized that Hartford

County's population has been decreasing since 2013 and was just a mere 500 residents above its 2010 population.

Utilizing the ArcGIS *Connecticut Population Density* web map by Hartfordmaps, Philip Hornig (2018) concluded the densest populated areas in Connecticut are located around the towns of Bridgeport, Stamford, New Haven, Hartford and New London. In Connecticut, population density is correlated with the proximity to interstate highways. Areas where interstate highways intersect, such as Hartford, have the high densities and significant populations around them. The Northwestern corner of the state has no interstate highway route that passes through it and has the lowest population density in Connecticut.

Sylvie Tchumtchoua and Rigoberto A. Lopez (2005) in *A Town-Level Assessment of Community Food Security in Connecticut* concluded that Brooklyn, New Britain, Killingly, Hartford, North Canaan, Meriden, New Haven, Bridgeport, Willington, Ansonia, Sterling, and Windham to have the critically low community food security. The indicators that have the most robust correlations to overall critical food security are poverty and lack of wealth (Tchumtchoua and Lopez, 2005). Poverty and wealth were noted by Tchumtchoua and Lopez (2005) not to have correlations that were not perfect for indicating food insecurity and the study cited Greenwich as an example. Towns in which households have lower formal educational achievement and more fragile household compositions (elder households and households headed by females) were found to be more community food insecure (Tchumtchoua and Lopez, 2005). Tchumtchoua and Lopez (2005)'s research indicated that access to supermarkets did not strongly correlate to food insecurity. The lack of transportation to get food and income were found to be significantly associated with critical food insecurity by Tchumtchoua and Lopez (2005). The study found that higher access to transportation and more specifically transportation to locations that enable

individuals to procure food significantly increased the food security to the community. What did have a moderate but significant impact of food security was the presences of farms, farmland, and food production resources (Tchumtchoua and Lopez, 2005).

The lowest levels of community food security according to Sylvie Tchumtchoua and Rigoberto A. Lopez (2005)'s analysis to be in the Northeastern part of the state and poorer towns around Hartford and New Haven. The Northeastern part of the state lacks public transportation, major interstate highways and has a lower population density. That means food insecure individuals have transportation issues hindering access to affordable healthy whole food. The other areas that have food insecurity seem to be affected by poverty, lack of wealth, weak household structure and convenient transportation to food retail or other food providing entities.

Connecticut's Population Buying Habits

Tammy Warner, Rigoberto Lopez, Adam Rabinowitz and Ben Campbell (2012) in the report, *Estimates of Consumption of Locally-Grown Agricultural Products in Connecticut*, found locally produce food was 2.5 percent of Connecticut's total expenditures on food. Warner, Lopez, Rabinowitz, and Campbell (2012) noted that if 100 percent of the locally-grown food were utilized in Connecticut, it would make up 3.5 percent of the total food expenditures of Connecticut. Agricultural products produced locally via greenhouse and nursery operations are greater than the possible demand for local products (Warner et al., 2012).

The Center for Survey Research & Analysis (CSRA) surveyed in 2008, *Connecticut Grown Marketing Campaign Survey,* which found that Connecticut consumers consider the price to be a critical factor when purchasing groceries. The CSRA (2008) reported that 45 percent of Connecticut residents that buy groceries on behalf of their households are eager and open to

purchasing locally produced food products for a higher price. If price were held constant, most Connecticut residents would buy locally grown food products over food products not produced locally (CSRA, 2008). 75 percent of Connecticut residents have bought CT grown products during 2008 (CSRA, 2008). The survey unearthed that Connecticut residents usually drive a little bit more than 10 minutes for routine grocery errands and that Connecticut residents that buy CT Grown products drive a mean of 17 minutes for regular grocery shopping. When desired foods are in season, 67 percent of Connecticut residents will take a trip to farm stands, 50 percent will trek to pick your-own-farms, and 44% will go to farmers markets to buy CT Grown food (CSRA, 2008).

CSRA (2008) claimed 75 percent of all Connecticut residents had bought CT grown products during 2008. A breakdown of Connecticut residents that bought CT Grown products in 2008 is 81% of those residents bought vegetables, 69 percent bought fruits, 35 percent bought landscaping materials, 27% bought dairy products, and 23 percent bought eggs (CSRA, 2008). 57% of Connecticut residents that buy CT grown products purchase at the very least one CT grown product a week (CSRA, 2008). 60 percent of Connecticut residents who are the primary person responsible for buying groceries for their families, in CSRA's 2008 survey, indicated that price is a critical factor in their purchases. 45 percent of Connecticut residents that shop for groceries believe that it is of high magnitude that what they buy helps local family farms. 35 percent believed it is critically important the product they purchase originate in Connecticut (CSRA, 2008). If the price and quality were held constant, 88 percent of Connecticut residents that grocery shop would instead buy fruits and vegetables cultivated on local farms (CSRA, 2008). 45 percent of Connecticut residents that purchase groceries would buy locally produced food if the price were around the price they commonly pay for the items (CSRA, 2008).

The study reported that 31% of Connecticut residents purchase CT grown products to encourage local farms. 88 percent of Connecticut residents that buy CT Grown products said they do so for the freshness (CSRA, 2008). CSRA (2008) claimed 74 percent of the Connecticut residents that purchase CT Grown products state that farmland preservation is a factor why they choose to buy CT Grown products. 72 percent of Connecticut residents that purchase CT Grown products disclosed they do to promote local farms and 65 percent said expanding their money in the local economy (CSRA, 2008). 66% of residents that buy CT Grown products do so for nutritional value, and 66 percent of Connecticut residents that buy CT Grown products do so to enhance the environment (CSRA, 2008). Overall, based on the findings the CSRA (2008) survey, the two factors that motivate Connecticut residents to purchase CT Grown products are the freshness and supporting local farms.

36 percent of CT residents that did not buy CT grown products stated in CSRA (2008) survey, they did not know that there were CT Grown produces available close to them, and 27 percent reported they were unable to locate CT grown products in their local area. In the survey about half of the Connecticut residents that did not buy CT Grown products, claimed CT Grown products' price was too high for them to buy. 46 percent of Connecticut residents that did not purchase CT grown products in 2008 stated they did not notice a difference regarding nutritional value between CT Grown products and non-CT Grown products. 42% of Connecticut residents that did not purchase CT grown products in 2008 said they did not notice a difference in taste and 33 percent said they did not buy CT Grown products because they lacked time to prepare and cook fresh food (CSRA, 2008).

As you can see there is a large demand in Connecticut for locally grown food. Connecticut residents value freshness and supporting local farms. Price is the most critical

variable in Connecticut residents buying habitats concerning locally grown food. While the higher costs of the locally produced food products do deter a good percentage of the grocery shopping population, there is a significant percentage of shoppers that are willing to higher prices for the locally grown agricultural product. It is not unreasonable to believe if efficiencies were made and locally grown food prices decreased then more Connecticut residents would opt to purchase food that is locally produced.

Demand for Food Hub

There appears to be a strong demand for a Connecticut food hub based on Connecticut consumer data, growth in CSAs, growth in the number of small farms, growth in the number of farmers markets in Connecticut, growth in the number of residents in the 30-39 years old age group and the increase of sales from specialty crop sector in the Connecticut agricultural industry.

Seven of the buyers surveyed in the *Northwest Connecticut Feasibility Study* by NHCOG et al. (2015) anticipates that the pricing of local agricultural product sold at the food hub should be equal to the pricing of the standard market. Other buyers disagreed and desire to pay premium prices for the locally grown product (NHCOG et al.,2015).

NHCOG et al. (2015) believe that there is a large market opportunity in the region with a high number of independent and private schools located in the area. Interviews were conducted with private schools in the area, and it was learned regional admissions departments use the public perception of local and healthy food as a marketing strategy (NHCOG et al., 2015).

NHCOG et al. (2015) believe that the demand for locally produced agricultural products is high in the region and that many buyers already directly purchase goods from farms in the

region. Buyers in the region reported issues in their efforts to source local food such as pricing, availability of large enough volume, diversity of the products and how products are hindered by the seasons (NHCOG et al., 2015).

NHCOG et al. (2015) concluded that there are currently no operating food hubs in the northwestern region of Connecticut. NHCOG et al. (2015) noted there is a food hub being to materialize in the Berkshires called Red Barn Produce, and there is the Hartford Regional market. The competitive landscape is unique in the sense that competitors to the food hub can also purchase or vend to the food hub (NHCOG et al.,2015). NHCOG et al. (2015) theorize the competitors for a Northwestern Connecticut food hub possibly will function as infrastructure collaborators, suppliers and buyers to the Northwestern Connecticut food hub resulting in the enlargement of the demand and supply baseline found by the Northwest Connecticut Feasibility Study.

The *New London County Food Hub Feasibility Study* estimates that there is a tremendous unmet demand for local produce in New London County calculated to be about 149 million dollars encompassing all types of farm product (NLCFPC & UWSECT, 2015). The interviews conducted during the *New London County Food Hub Feasibility Study* imply that multiple, comparably sizable produce growing operations are eager to do business with the food hub but demand if the food hub aids them in moving excess product and seconds by providing facilities to process their product (NLCFPC & UWSECT, 2015). The *New London County Food Hub Feasibility Study* found buyers are primarily attracted to purchasing product from a food hub and are keen in backing the growth and creation of a local food hub that will enable them to buy local agricultural products. Large-scale buyers surveyed in the study are enthusiastic at the possibility of being able to obtain local produce easily (NLCFPC & UWSECT, 2015). Small-scale buyers

who are currently buying directly from local growers are intrigued at being able to increase the amount of local produce they buy. Buyers usually prefer to buy locally sourced products compared to organic and sustainably grown agricultural products.

In the *New London County Food Hub Feasibility Study* conducted by the New London County Food Policy Council and United Way of Southeastern Connecticut in 2015, buyers stated that the lack of reliability and continual four-season supply of local agricultural product was the most significant hindrance to buying local farm products. Buyers voiced that direct delivery of farm products was also a massive desire. Interested buyers expressed that they wanted to be able to place orders online (NLCFPC & UWSECT, 2015).

Buyers surveyed in the *New London County Food Hub Feasibility Study* defined the term local as a product that is produced under 100 miles from their location (NLCFPC & UWSECT, 2015). Open-ended comments from the buyers in the survey were that practices held greater weight then certification, time deliveries are critical, utilizing technology is crucial, and the type of methods utilized by the producers is an important matter (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) found that almost three-quarters of buyers survey need traceability from food suppliers and half of the buyers stated food producers need to have liability insurance (NLCFPC & UWSECT, 2015).

In the *New London County Food Hub Feasibility Study*, 9 out of the 15 buyers surveyed provided financial information about the dollar amount they allocated to purchasing farm products. New London County Food Policy Council and United Way of Southeastern Connecticut (2015) reported that 7.6 million annually dollars were the total amount the nine buyers allocated to purchasing farm products. On average, the each of the nine buyers spends 850,000 each year on farm products. $2.3 million each year is allocated to procuring whole fresh

produce, $880,000.00 is paid annually on buying produce that has been processed, and $4.4 million is used to purchase meat, poultry, dairy and eggs (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) discovered that most of the food that the buyers purchase does not come from local operations. Only 26 percent of all the buyers' whole produce purchases is local produce. Only 21 percent of the buyers processed produce purchases is on product produced locally and a mere 17 percent of the buyers' meat, poultry, dairy and eggs purchases are sourced locally (NLCFPC & UWSECT, 2015). New London County Food Policy Council and United Way of Southeastern Connecticut (2015) noted buyers voiced wanting a more significant supply of local produce especially in the summertime and that what type and quantity vary depending on the time of the year.

Ten buyers who are 83% of the buyers in the *New London County Food Hub Feasibility Study* were found by the New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) to be very or extremely likely to buy directly or indirectly from a food hub. One buyer was found to be somewhat interested in purchasing directly and indirectly from a food hub (NLCFPC & UWSECT, 2015).

The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) noted 30 percent of interested buyers in the *New London County Food Hub Feasibility Study* is full-line grocery stores that are also independent. 30 percent are k-12 public schools. 10% were universities. 10 percent were full-service sit-down restaurants. 10 percent were casinos. 10 percent was a broad line distributor (NLCFPC & UWSECT, 2015).

The New London County Food Policy Council and the United Way of Southeastern Connecticut (2015) con*cluded* that for the food hub to possibly be financially feasible, funds need to be allocated to expanding production capacity prior to construction of a food hub

building and convincing the producers that are "somewhat interested" to do business with the food hub. The study found that around 50 percent of the growers in their survey were interested in selling goods to a food hub and that ten growers were somewhat interested. The 50 percent of growers that were interested in selling their products to the food hub would be able to redirect 40 acres of present and future production to supplying the food hub. The growers that said they were somewhat interested would be able to reallocate 35 acres to providing the food hub with product (NLCFPC & UWSECT, 2015).

77% of revenue amongst every producer that answered the survey came from direct to consumer sales. The ability for these producers to do business on a wholesale or higher-volume sales channel is low. About 33 percent of interested grower's revenue is generated from small wholesales such as selling products to restaurants or small independently own grocery stores, indicating that the producers that are interested in selling to a food hub do possess a basic understanding of the insinuations and benefits of entering higher-volume sales channels.

Responses from growers and buyers concerning pricing are encouraging. Pricing transparency across the supply chain was of great importance to the interested growers and that they are willing to negate on product pricing but have strong desire to be the price makers in the food hub. Buyer input was that there is a willingness to pay a higher price for products that have a local farm origin and secondary value freshness, quality as well as food safety.

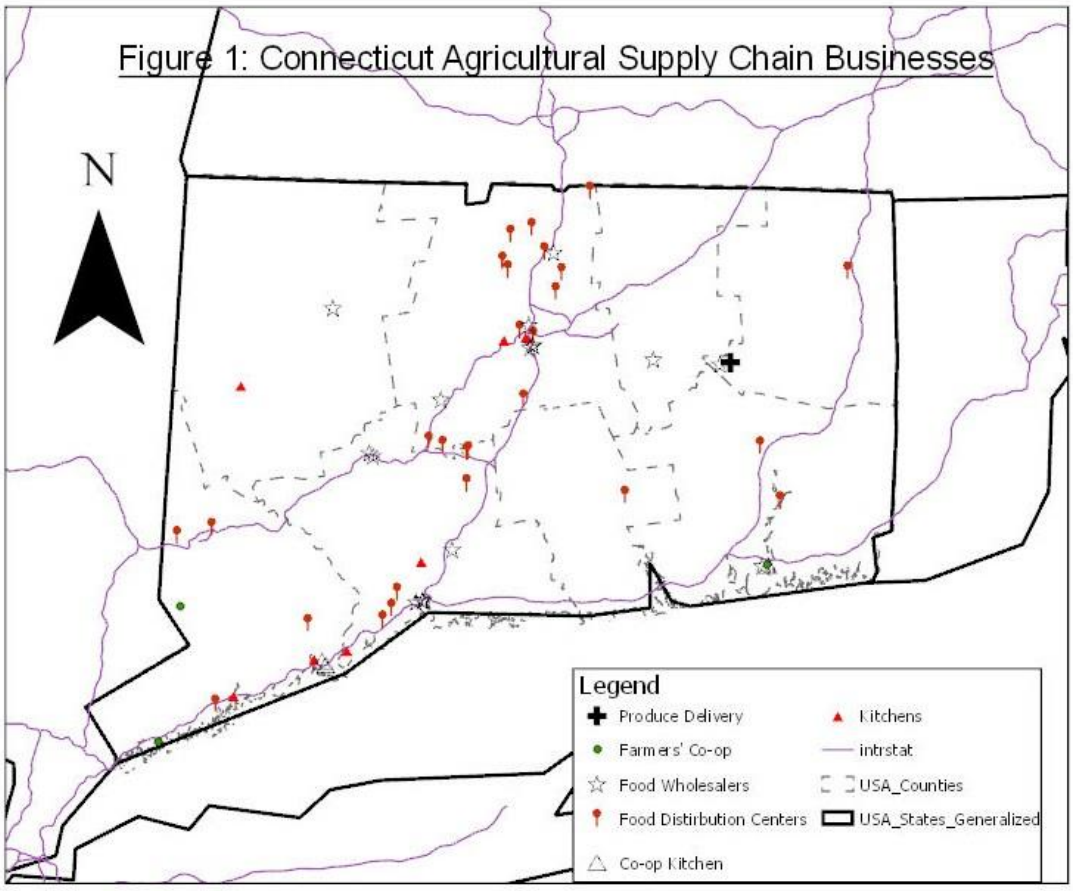


Figure 1: Connecticut Agricultural Supply Chain Business depicts that the state of Connecticut and that various agricultural supply chain businesses found within the state. These companies by nature focus on transportation and receiving of agricultural product, like this are located near interstate highways. It becomes apparent that areas that do not have an interstate highway present in them also do not have agricultural supply chain businesses present in them.

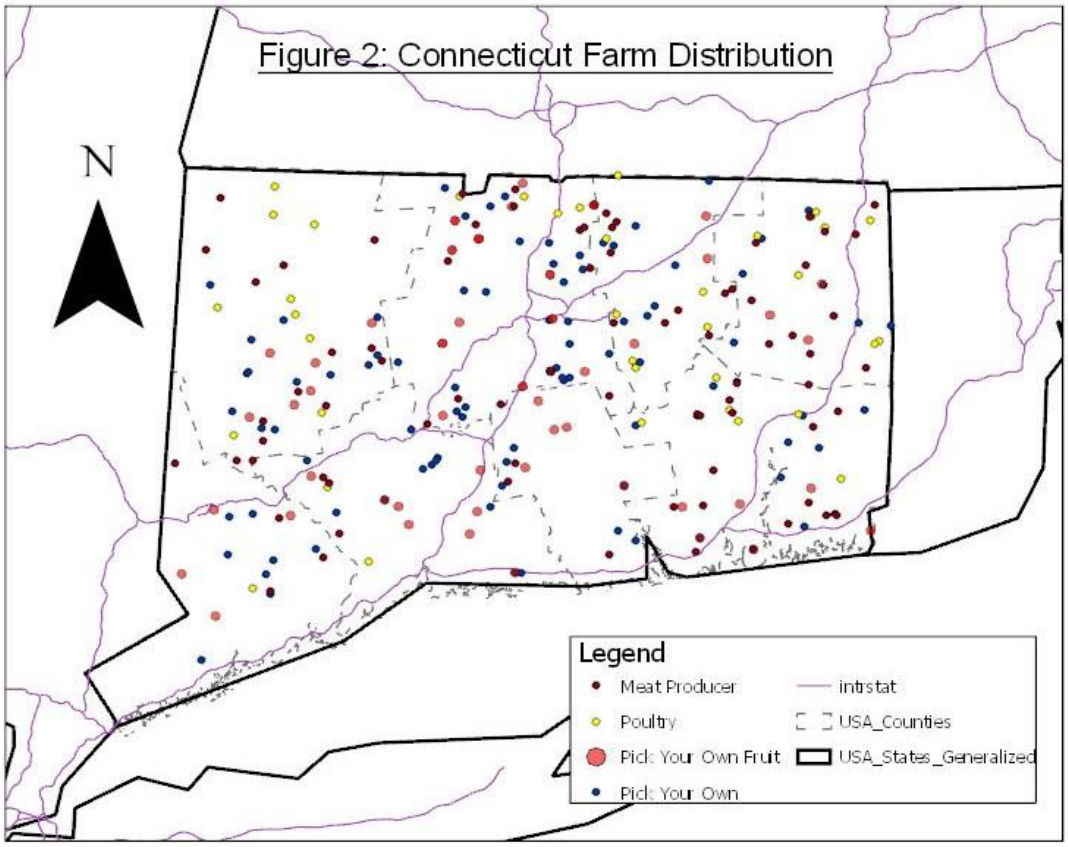
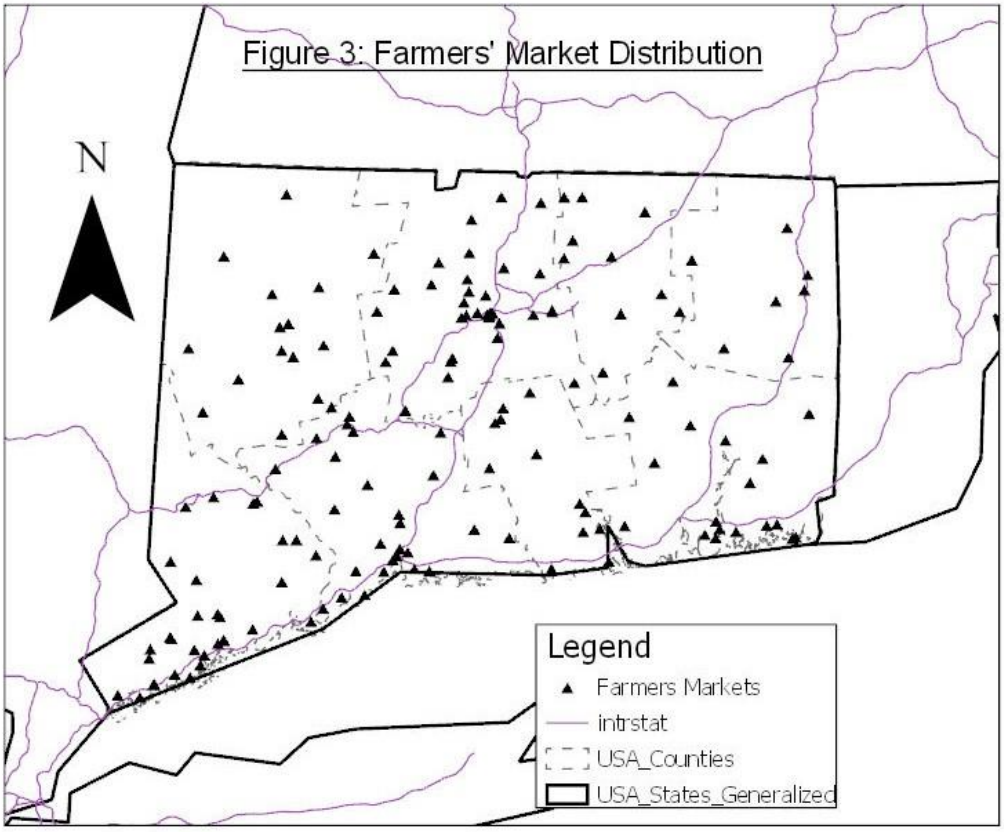


Figure 2: Connecticut Farm Distribution shows all the farms listed on Connecticut's Department of Agriculture website. The blue lines running throughout the states are interstate highways. The dots on the map are various farms in Connecticut. The farms, for the most part, are evenly spread across Connecticut and are not clustered around the interstate highway system like the businesses plotted in Figure 1. This means that farms must either travel very far to a shared kitchen, co-op, or a distributor.



Connecticut farmers' Markets are spread all though out the state. Combining Connecticut Farmers Markets data with the CT Grown data, it is a safe assumption that the state has a large demand for locally grown food. While farmers' markets are a great method for farmers to sell their product, they do present issues for farmers. Farmers must allocate time, infrastructure, materials, personnel and travel to farmers markets. The customers at farmers markets also are usually people shopping for their families or for fun. Bigger customer classes like restaurants usually do not go to farmers markets to source produce or meat. A Connecticut food hub would open an avenue for producers to supply bigger customer classes. In addition, farmers' markets are not open like conventual grocery stores. Farmers markets are usually a one-day event, that last for around three hours. Many potential customers may not be able to shop when the farmers markets are open. A food hub can be open multiple if not every day of the week which increases

the window for customers to buy local produce, which may convert to increasing the sales of the farmers products.

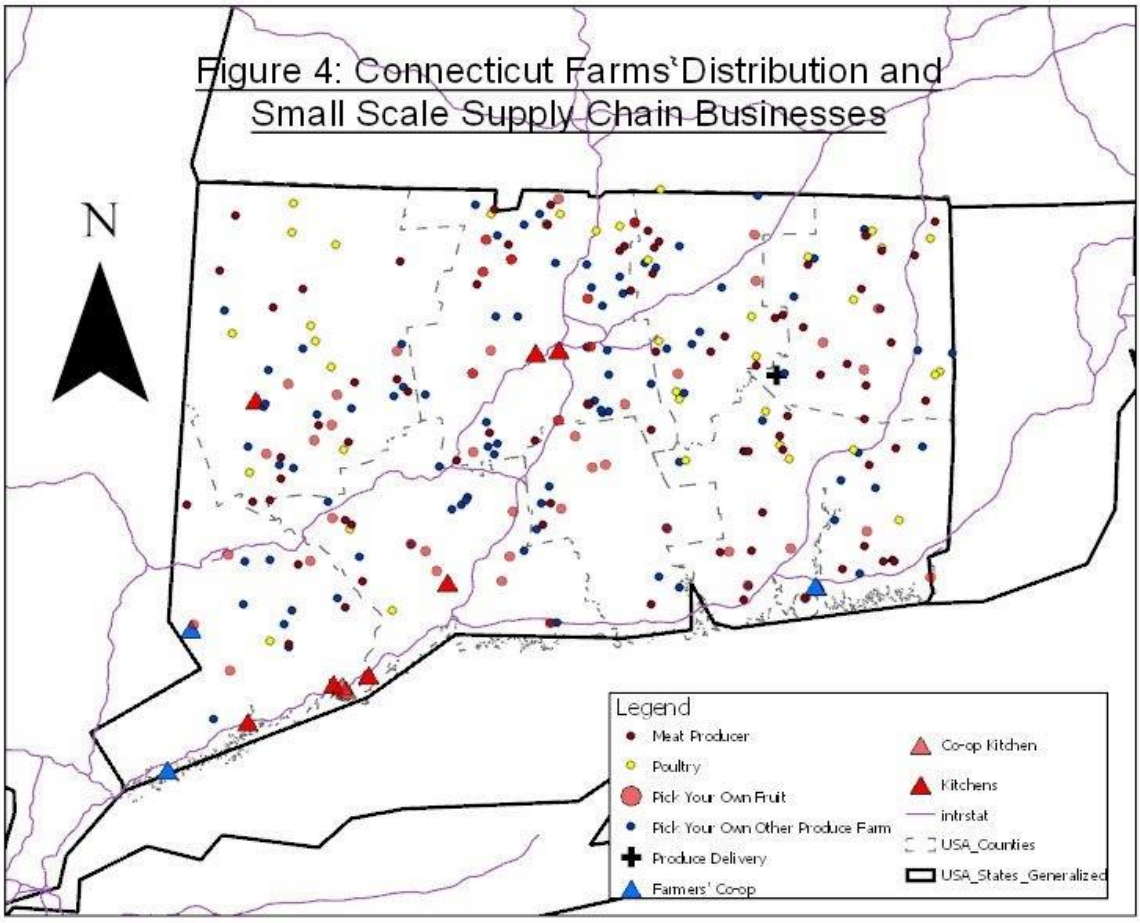


Figure 4 shows Connecticut farms and the businesses plotted in Figure 1, making it even clearer that most of the farms in Connecticut are simply too far away from these companies to conduct any sort of business. Also, traditional wholesale brokers, wholesale distributors, and food distribution centers traditionally move quantities much more extensive than what most

Connecticut farmers can produce. So even if a local Connecticut farm could get their products to a distributor, the Connecticut farmer in most instances would not have enough product to do business with the distributor. There is an opportunity for a Connecticut food hub to serve the farmers of the state. There is a massive demand for CT Grown products in the state. Most individuals who did not buy CT Grown products claimed they did not do so because they were unable to locate the products or that CT Grown products where priced too high. 36 percent of CT residents that did not buy CT grown products stated in CSRA (2008) survey, they were unaware that there were CT Grown produces available near them, and 27 percent stated they were unable to find CT grown products around where they live. In the survey about half of the Connecticut residents that did not buy CT Grown products, stated the price of CT Grown products was too much for them. Food hubs through marketing, economies of scale, sourcing similar product from multiple products, education can address this issues through decreasing the price of CT Grown food. Red Tomato and Berkshire Organics are prime examples of how to successfully to increase your consumer base, increase the number of suppliers for product sourcing and lowering prices of local food products.

A Connecticut food hub through aggregation, marketing, and economies of scales would be able to solve both those issues. Also, most Connecticut residents that grocery shop for their families only drives 10 minutes to their shopping destination (CSRA, 2008). A food hub can be the critical piece in getting locally grown food through to that destination. One of the main objectives of food hubs is reducing the span of the supply chain and providing additional benefits like enlarging local agriculturalists' capacity. Food hubs aid in answering consumers' increasing demand for local fresh food. Conventional markets are not capable of supplying the demand for local agricultural products James et al., 2015). Food hubs despite only managing a tiny

percentage of total food sales in the area they are located, food hubs can get in touch with a customer pier that is too big to be supplied by direct markets like CSA James et al., 2015).. An example to further illustrate this point is the USDA found that an intermediate supplier of beef in Minnesota moved a less total volume of beef than many supermarkets but moved 30 times the total amount of beef than the local direct market producer (James et al., 2015). Food hubs aim to sell to restaurants, grocery stores, institutions and other wholesale buyers that usually have a difficult time purchasing local food in suitable amounts. Food hubs are an avenue for small to medium-sized agricultural producers to advertise and sell their product locally. Food hubs reduce barriers to entry and enhance infrastructure to establish as well as increase food markets on the regional level (James et al., 2015). A food hub can provide the infrastructure and aggregation to create product quantities that restaurants, local grocery stores, schools and other food-based businesses require. Currently, restaurants, local grocery stores, schools and other food-based businesses often are unable to get local products in quantities that are usable for their needs. In the *New London County Food Hub Feasibility Study* conducted by the New London County Food Policy Council and United Way of Southeastern Connecticut in 2015, buyers stated that the lack of consistency and continual year-round supply of local agricultural product was the most significant hindrance to buying local farm products directly. Food Hubs sourcing product from multiple farms and providing storage support would be able to mitigate those issues.

References

Ba Tran, A. (n.d.). Census: Only one Connecticut county grew in population last year. Retrieved January 18, 2018, from https://trendct.org/2016/03/24/census-only-one-connecticut-county-grew-in-population-last-year/

Census of Agriculture - 2012 Census Publications - Ranking of Market Value of Ag Products Sold, Connecticut. (n.d.). Retrieved January 18, 2018, from https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Rankings_of_Market_Value/Connecticut/

Center for Survey Research & Analysis at the University of Connecticut. (2008). *Connecticut Grown Marketing Campaign Survey*. 341 Mansfield Road Storrs, CT 06269: Connecticut Department of Agriculture. Retrieved from http://www.ct.gov/doag/lib/doag/boards_commissions_councils/gcf/05_uconn_center_for_survey_research_and_analysis_ct_grown_marketing_campaign_survey.pdf

Farm Credit East, Wallace Center at Winrock International, Morse Marketing Connections, Farm Credit Council, & NGFN Food Hub Collaboration. (n.d.). *COUNTING VALUES Food Hub Financial Benchmarking Study*. Retrieved from http://www.ngfn.org/resources/ngfn-database/knowledge/Food%20Hub%20Benchmarking%20Study.pdf

Fresh Local & Organic Fruits & Vegetables, non-GMO Groceries, Farmers Market and Home Delivery in Berkshires Pittsfield Dalton Massachusetts, Berkshire Organics Market & Delivery Service: Company Info. (n.d.). [.com]. Retrieved January 18, 2018, from https://www.berkshireorganics.com/p-3-company-info.html

Hartford maps. (2011, June 17). ArcGIS Connecticut population density. Retrieved January 18, 2018, from https://www.arcgis.com/home/webmap/viewer.html?webmap=30ddceed4c4b4e0db767fd9d12afaebb

Lopez, R. A., Boehm, R., Pineda, M., Gunther, P., & Carstensen, F. (2017). *Economic Impacts of Connecticut's Agricultural Industry: Update 2015* (No. 47). Storrs, Connecticut: Zwick Center for Food and Resource Policy Department of Agricultural and Resource Economics University of Connecticut. Retrieved from http://www.are.uconn.edu/news_65_1329746848.pdf

Matson, J., Sullins, M., & Cook, C. (2013). *The Role of Food Hubs in Local Food Marketing* (USDA Rural Development Service Report No. 73). United States Department of Agriculture. Retrieved from https://www.rd.usda.gov/files/sr73.pdf

New Entry Food Hub | New Entry Sustainable Farming Project. (n.d.). [.org]. Retrieved January 18, 2018, from https://nesfp.org/foodhub

Northwest Hills Council of Governments, Partners for Sustainable Healthy Communities, & New Venture Advisors LLC. (2016). *Northwest Connecticut Food Hub Feasibility Study*. Retrieved from http://northwesthillscog.org/wp-content/uploads/2016/05/NWCT_Executive-Summary_Redacted-Version_4.8.2016.pdf

Red Tomato. (n.d.). About Us - Red Tomato. Retrieved January 18, 2018, from https://www.redtomato.org/about/

Rigoberto A. Lopez, Rebecca Boehm, & Pineda, M. (2017, April). *Economic Impacts of Connecticut's Agricultural Industry Update 2015*. Presented at The Connecticut Farm Bureau Association on February 16, 2017, The Connecticut Department of Agriculture on March 10, 2017, Zwick Center for Food and Resource Policy College of Agriculture, Health and Natural Resources University of Connecticut. Retrieved from http://www.zwickcenter.uconn.edu/presentations_8_368686563.pdf

Shewchuk, T., Okray, B., Mahoney, R., & Frankian, W. (2013). *An Analysis of New England Food Hubs With a Focus on Applications in Low Food-Access Areas*. Worcester Polytechnic Institute (WPI). Retrieved from https://web.wpi.edu/Pubs/E-project/Available/E-project-043013-151105/unrestricted/Food_Hub_IQP_Final_Report.pdf

Srivastava, M., & Riordan-Nold, M. (2017). *Connecticut's Population and Migration Trends: A Multi-Data Source Dive*. CT Data Collaborative and CT Department of Revenue Services. Retrieved from http://www.ct.gov/opm/lib/opm/budget/resourcesanddata/CTs_Population_and_Migration_Trends.pdf

Tchumtchoua, S., & Lopez, R. A. (2005). *A Town-Level Assessment of Community Food Security in Connecticut A Report for the Connecticut Food Policy Council and the Hartford Food System* (Research Monograph Series). Storrs, CT 06269: Department of Agricultural and Resource Economics College of Agriculture and Natural Resources University of Connecticut. Retrieved from http://www.zwickcenter.uconn.edu/documents/monograph2.pdf

U.S. Census Bureau QuickFacts: Connecticut. (2018, January 2). [.gov]. Retrieved January 18, 2018, from https://www.census.gov/quickfacts/CT

U.S. Census Bureau QuickFacts: Tolland County, Connecticut; Litchfield County, Connecticut; Middlesex County, Connecticut; Connecticut. (2018, January 3). Retrieved January 18, 2018, from https://www.census.gov/quickfacts/fact/table/tollandcountyconnecticut,litchfieldcountyconnecticut,middlesexcountyconnecticut,CT/PST045217

United Way of Southeastern Connecticut, & New London County Food County Policy Council. (2015). *New London County Food Hub Feasibility Study* (p. 64). Retrieved from http://www.uwsect.org/sites/uwsect.org/files/Final_NLC_Feasibility-Study_12915_web.pdf

Warner, T., Lopez, R. A., Rabinowitz, A., & Campbell, B. (2012). *Estimates of Consumption of Locally-Grown Agricultural Products in Connecticut* (p. 10). 1376 Storrs Road, U-21, Storrs, Connecticut 06269-4021: the University of Connecticut, Department of Agricultural and Resource Economics, Charles J. Zwick Center for Food and Resource Policy. Retrieved from http://www.zwickcenter.uconn.edu/documents/Outreach10-GrowCTAg.pdf