

# **Feasibility Study of a Food Hub in Champaign-Urbana**

**ENVS 492: Sustainability, Energy and Environment Capstone**

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## **Executive Summary**

The Land Connection works with local farmers to achieve a more sustainable future in which every farmer could grow food sustainably and where consumers have easy access to local food. Sarah Simeziane, Farmers' Market and Food Access Manager, envisions a potential food hub in Champaign-Urbana that may help bring them one step closer to this reality. In a report published by Dr. Lindsey in partnership with the USDA, he defines a food hub as a "business or organization that is actively trying to coordinate the aggregation, distribution, and marketing of sources identified locally or regionally grown food products from primarily small to mid-sized producers" (qtd. in Lindsey, 2012).

The purpose of this project is to determine whether a food hub network will be feasible in the long run by finding a break-even price point that will help sustain the food hub while allowing easier access for local food in order to satisfy consumer demand. This will be done by doing both a cost and benefit analysis. We will focus on restaurants because it is what Ms. Simeziane wanted to attend to. Consequently, the stakeholders of this project include chefs, farmers, and consumers. Additional research includes finding the wholesale price of several selected fruits and vegetables and additional costs such as storage, labor, and transportation. It is assumed that the food hub will be more feasible than farmers markets or farm stands in the quest for easily accessible local food because if the system manages to successfully work in theory, then the food hub will turn in a substantial profit based on Ms. Simazine's predictions.

The group visited the Champaign and Urbana farmer's market to find the average price of several selected fruits and vegetables. Farmers Molly Oberg, from Meyer Produce, and Traci Barkley, from Sola Gratia Farm, were interviewed to gather data on crop yields. Additionally, one chef, Jordan Baldarotta, from Dish Passionate Cuisine/Baldarotta's Porketta & Sicilian Sausage, was interviewed.

Our group concluded that the hypothetical food hub can be successful and feasible, but only if it was open to other markets and institutions and not just restaurants.

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## Introduction and Background

### Local Food Hub and Local Food

The mainstream food system is dominated by large, private corporations, which not only mean high levels of production, but negative environmental externalities, such as CO2 emissions, as well. Because of these problems, there is a high interest in alternative sustainable food systems. Localization has become a big alternative strategy for advocates, and food hubs are often a key component. One of the biggest drawbacks to localization is the lack of economic, organizational, and physical structures of the appropriate scale for local aggregation and distribution of local food (Cleveland et al. 2014). The definition of local food refers to products obtained within a 150-mile radius. However, the targeted radius would preferably fall within 60-90 miles. According to the National Resources Defense Council, most produce grown in the United States travels an average of 1,500 miles before it gets sold. Local food minimizes food miles and environmental impacts during transportation.



Figure 1- Model of a typical food hub  
(Source: National Sustainable Agriculture Coalition (2017).)

This project examines why a food hub is a great way to promote local food in the community. A food hub is defined as a “business or organization that is actively trying to coordinate the aggregation, distribution, and marketing of sources identified locally or regionally grown food products from primarily small to mid-sized producers” (Lindsey, 2012).

Local food is good for public health. According to the Indiana State Personnel Department, the key word in describing the health benefits of locally grown is “fresh.” Produce that travels far to get to a supermarket is often sprayed with plant hormones to speed up ripening to make the food look fresh and ripe. In the process, the plant can’t accumulate as many nutrients and as much flavor as it would if it slowly ripened on its own (Indiana State Personnel Department, 2012). This is not a case of organic vs. commercially grown food, but rather focuses on how local food doesn’t have to go through very intensive processes in order to stay fresh since it is consumed quickly after harvest.

Local food promotes sustainable farming with a large variety of products. As a result, soil diversity improves over time (FAO, 2015). According to the Food and Agriculture Organization of the United Nations, conservation agriculture has significantly improved soil conditions, reduced land degradation and boosted yields in many parts of the world. By limiting the use of mechanical soil disturbance, or tilling in the farming process, the rate of soil formation is faster than the loss of organic matter therefore increasing soil diversity, promoting local food consumption will foster a healthier environment. Recent farm to table events and activists in the Champaign-Urbana area have raised awareness on “food miles” – the distance food travels from where it is grown or raised to where it is consumed (Van Passel 2013). This means that food hubs will reduce the

transportation needed to deliver food, therefore reducing carbon emissions in the process. While farmers that sell on the market can sell most of their produce, there is still some leftover that can be purchased by these food hubs. Since food hubs process food on site, rather than trying to sell blemished tomatoes, they can make them into salsa. Therefore, aesthetics won't play a part of this process if the produce retains their quality value, allowing for the reduction of food waste. Finally, local foods help maintain farmland, green, and open space in our communities (Klavinski, 2013).

A food hub can bring many social benefits to the community makes fresh produce more available to local consumers. Crops grown locally are picked at their peak of ripeness, usually within 24 hours of consumer purchase, and therefore the food is full of flavor and nutrients.

A food hub creates a community that helps generate jobs and employment. Additionally, farmers need to sustain themselves financially as well. In the long term, a local food hub will transition into a self-sustainable business that brings employment, community events, and a place for organizations to collaborate, which is beneficial for long-term community development.

### **Current Distribution Channels for Local Produce in Champaign-Urbana**

We also evaluate and compare two current distribution channels, farmers' markets and farm stands, to find out why a food hub is different from the two and could be the most effective at supplying local food.

#### **Farmers Markets**

A farmer's market is defined as a place where local farmers gather to sell their vegetable, fruit, meat, and dairy products directly to consumers. The focus of this project will be on vegetables and fruit. The two most significant farmers markets are downtown Champaign Farmers Market on Tuesday evenings and downtown Urbana Farmers Market on Saturdays from May through the end of fall. Other smaller-scale farmers markets also run from May into the summer, such as Danville Farmers Market, Homer Farmers Market, and Farmer City Chamber Farmers Market. The Harvest Market in Champaign also promotes local produce.



Figure 2- Picture taken by authors at the Urbana's Farmer's Market

#### **Farm Stands**

A farm stand is a stand that sells farm produce. Farm stands try to maximize the connection between local farmers and consumers since customers will go directly to the farm to purchase any

food they need. The main difference between a farm stand and a farmer's market is that an individual owns a "farm stand, while a farmer's market is a shared space with many farmers" (Fleisher, 2017).

### **Disadvantages of Farmers Market and Farm Stands**

In particular, farm stands are difficult to access affordable local food if consumers aren't actively seeking them. Unfortunately, while they are cheaper than farmer's markets, they are not easily accessible. Most consumers would not be willing to travel on a regular basis to a farm to purchase local food.

One of the most significant drawbacks to farmers' markets is that they are seasonal and pricey. Farmer's markets are more expensive because they command a premium. For example, apples may cost \$1.50 per lb. at a farmer's market while they sell for 90 cents a pound if bought directly (Fleisher, 2017). Additionally, farmers markets are open for one day during the week and are usually inactive during the winter. Although farmers' markets provide a space for gathering local farmers, attendance could still be low due to bad weather. It's hard to control outside factors like weather to maintain a consistent connection between end consumers and farmers.

Therefore, from the comparison above, we conclude that a food hub will be the most feasible and viable option. Details of benefits will be discussed in the next section. According to the report published by Dr. Lindsey, in partnership with the USDA, a food hub is "a centrally located facility with a business management structure facilitating the aggregation, storage, processing, distribution, and marketing of locally/ regionally produced food products" (Lindsey, 2012). Farmers usually get a higher price for selling to the food hub than compared to wholesale, but not as high as the farmer's markets' prices. However, the difference between a food hub and a farmers' market is that a food hub is an all-year-round program, unlike farmers market that run only for 3-4 months a year. For this project, we have chosen 5 products to include in the cost and benefit analysis due to their seasonality: potatoes, tomatoes, onions, carrots, and butternut squash.

### **Introducing A Food Hub In Champaign-Urbana**

#### **Literature Review on Food Hubs**

The Western Massachusetts Food Processing Center promotes economic development through entrepreneurship, provides opportunities for sustaining local agriculture and promotes best practices for food producers. Its facilities consist of large capacity mixers, choppers, shredders, frozen storage, shipping and receiving areas, vegetable wash and prep areas, and a complete sanitation program and equipment. There is a \$600 annual membership fee to use the facility, equipment space and sanitation supplied, plus \$38 per hour for all facilities including dry, cold and frozen storage, shipping, washing and prep areas e.g. dry storage runs around \$35-45 a month and cold storage \$8-\$24 per week. The Center charges the facility fee. For individual members, a batch or per unit charge may be negotiated with the program manager (FCCDC, 2014). These are the current rates the center charges for the facility which businesses can rent.



Figure 3- Food Hub Warehouse (Source: Appalachian Sustainable Development (2015).)

## **Challenges to a Food Hub**

### **Infrastructure**

Depending on the scale of the food hub, it's possible to start in a small commercial kitchen for processing purposes and then transition to a more prominent operation as time goes. In the beginning, it's a good idea to rent space first and test it out.

### **Finance**

The cost of land, storage, and maintenance all need to be factored in during this project. There will also be a full-time staff running the project, so salary is part of the cost too. A lot of food hub projects were started but couldn't keep operating due to financial reasons, such as not enough sales to cover overhead.

### **Education**

Educating consumers on the importance of eating local food is critical. Restaurants are more likely to purchase local food when customers demand it, or if the chef requests it. Educational programs such as labeling local food on the menu or programs that encourage buying local food would be beneficial to serve the purpose of a food hub.

### **Seasonality**

Because the food hub is based in Illinois, there is no direct way to translate success from other food hubs, where farmers must balance year-round demand between seasons, since storage and preservation of produce during winter must be considered. Therefore, storage and preservation of produce during winter must be considered since Illinois has cold and harsh winters.

Aside from choosing crops according to popularity, seasonality also plays a big factor as the chosen crops (tomatoes, potatoes, carrots, onions, and butternut squash) can be grown during winter and consumers won't have to worry too much about the product not being fresh. Tomatoes, carrots, and potatoes are crops that grow well in greenhouses. Many of the benefits of greenhouse culture include season extension, better yield and quality, and protection from adverse weather and pathogens. Additionally, carrots taste sweeter when they are grown during the winter in greenhouses because carrots convert their starch stores into sugar to keep the water within cells from freezing (Feltman, 2015). Butternut squash is a type of winter squash that is consumed when it reaches maturity when the rind has thickened properly. The squash stores well without refrigeration or canning and each vine yields 10 to 20 squash if properly maintained (Rhoades, 2016). We chose these five crops because they are easier to store and have longer shelf life.

## **Objectives**

This project is a feasibility study on having a food hub that will collect local produce and sell them to local restaurants. A cost-and-benefit analysis was done for the evaluation.

### **Scope**

Local leaders and chefs will be interviewed for this project. Farmers include Traci Barkley from Sola Gratia Farm and Molly Oberg from Meyer produce. However, for this project, there's a great emphasis placed on restaurants, so Jordan Baldarotta from Dish Passionate Cuisine/ Baldrotta's Porketta & Sicilian sausage were interviewed. After we interviewed these people, data on price was collected, and pricing from other food hubs around the state was evaluated to look for trends. The group took two trips, one to Champaign Farmers' Market and one to Urbana Farmers' Market in order to get a better understanding of the pricing of produce.



## Methodology

### 1. Data Collection

This project requires data on price, variety of crops, and costs on transportation, facility, and operation. Our first goal was to gain contact information from farmers and chefs located here in Urbana-Champaign, which was collected from Sarah Simazine from the Land Connection who maintains a partnership with many of them. This resulted in a faster response and familiarity with the project. There are many crops grown locally. However, only a few crops will be chosen based on popularity with consumers and their seasonality: tomatoes, potatoes, carrots, onions, and butternut squash. The factors that were addressed was the range of the food hub and local food and the institution that was going to get the deliveries, which were restaurants. The USDA national average was taken for all produce as well as observed farmers market prices.

### 2. Writeup

After determining the average farmer market price and the USDA national average for our desired crops, we had to find extra costs to running a food hub such as storage, labor, and transportation costs. To reach this goal, we looked at past reports that were analyzing the cost of running a food hub here in Illinois. After putting all these prices together, we can find a breakeven point to determine whether a food hub is feasible or not. Potential new commercial avenue.

## Data Analysis

### 1. Fixed Cost Analysis

As recommended both by the article “Building successful food hubs” (Illinois department of Agriculture, 2012) and the report by Matson et al. (2016), the fixed cost of running a food hub includes cost for storage, transportation and labor. According to the report “Running a food hub: Assessing Financial Viability” (Matson & James Barham, 2016) published by the United States Department of Agriculture (shortened as “USDA”), the calculation model is assumed to be a combination of two typical models, the “Direct-to-consumer” and the “Wholesale” Food Hub model. The reason for this is that “Wholesale” targets the retailers rather than chef while the “Direct-to-consumer” model expects the consumers to head for the warehouse themselves to acquire the product which eliminates the need for transportation costs.

In terms of the storage, the unit cost is estimated using Loopnet, a warehouse rental agency website, at an annual 4 USD per sq. ft. We calculated the cost based on the assumption that the warehouse was going to be a 1,000 square feet industrial storage area. The Direct-to-Consumer warehouse lease in the report (Matson et al., 2016) is sampled to the left of the Table 1. This is to ensure stakeholders that the annual rental for Champaign, IL is indeed probable. The calculation for storage cost is shown in Table 1.

Item	unit	Champaign, IL	Sample from USDA
Expected Rent	per square foot per year	\$4.00	\$2.20
Estimated Size of Warehouse	sq. feet	1,000	1000
Total Rent	per year	\$4,000.00	\$2,200.00

	per week (48 working weeks a year)	\$83.00	\$46.00
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Table 1- Simulated calculation diagram for storage

The transportation cost is approximated by using the “Table 20 Wholesale Transportation Summary” (Matson et al., 2016). The number from that table is used directly for the transportation cost and is equal to \$145/week and includes diesel expense, overhead cost, vehicle maintenance and wear. Deliveries consist of 8,183 pounds of product per day for a total of three days per week adding a total of 24.5 kilo pounds (11.1 tons) per week. The assumptions made throughout the calculations were:

- a. Each delivery is loaded as expected in terms of units
- b. All crops bought by the food hub will be sold to restaurants

Labor cost is evaluated in the same manner as discussed in transportation cost where the numbers are taken from “Table 19 Wholesale Labor Summary” (Matson et al., 2016). As was assumed in the beginning that a multi-type model was being used, the additional cost for products delivery labor is needed and is thus set at \$10.75 per hour in accordance to “Table 24 Direct-to-Consumer Labor Summary” (Matson et al., 2016). Consequently, the total weekly cost production comes to \$1,300.00. Additional assumptions include the fact that most employees, excluding the manager, will be part-time. The calculation for labor cost is shown in Table 2.

Employment	Rate/Hour	Number of Employees	Total working Hours/week	Weekly Cost
Volunteer Labor	\$0.00	13	11.75	\$0.00
Driver	\$13.25	1	6.38	\$84.00
General Labor	\$10.25	1	6.38	\$65.00
Pickup Point Labor	\$10.75	2	12.63	\$136.00
Warehouse Manager	\$15.50	1	53.50	\$829.00
Office/Administrative	\$16.50	1	11.25	\$186.00
Total Cost Production				\$1,300.00

Table 2-Simulated calculation diagram for labor

Thus, the total fixed cost for running a food-hub will add up to \$1,529 per week. The weekly cost of each portion is shown in table 3.

Fixed cost Item	Cost per week
Labor	\$1,300
Storage	\$83
Transportation	\$145
Total	\$1,529

Table 3-Fixed cost diagram

## 2. Benefit Analysis

There are three critical variables in pricing, including the wholesale price ( $x$ ) from farmers, the intended purchase price ( $m$ ) from chef and the retail price ( $n$ ) from the farmers markets. The profit is assumed to be the difference between the wholesale price for farmers and the price the chef will be willing to buy from the food hub.

We used the retail price from the farmers market and the national average price from the USDA report. However, the price for carrots is taken from the USDA report because this crop is not recorded by the farmers market. With these prices available online only, the wholesale price for crops is assumed to be a fixed percentage of it (25%). We will take corn as an example to run through the calculation: Based on the wholesale price provided by CME group website,  $x$  value is taken as \$153 per ton, which is equivalent to \$0.07 per pound. As the annual average price for corn is roughly \$0.29 per pound, the wholesale price is taken as 76% of the retail price.

As described by Sarah, the wholesale price could be used as a reference to determine the price of products sold to restaurants ( $m$ ) from the food hub. She suggests that 70-80% of the purchase price would be paid to farmers. For instance, for every hundred-dollar sale, if 75 dollars are distributed to the farmers, then the revenue would be 25 dollars. Thus, the rate of revenue is set to be 1/3 of the buying price ( $x$ ) while the marked price for restaurants is set to be 32% of the farmers market price. To make sure that those are reasonable, questionnaires were sent to chef about these prices. In comparison to the response from chef, the original price is lower than the price points they are paying currently, indicating that the estimation may be reliable. The unit revenue for each crop is shown in figure 4. As is shown in the chart, the estimated price marked in orange is lower than the blue ones which are the current price the chef is paying for each type of crop. The potential rise in revenue is the gap between blue and orange bars. To maximize the revenue for unit weight of crops, the products sold to chef are priced at the blue values.

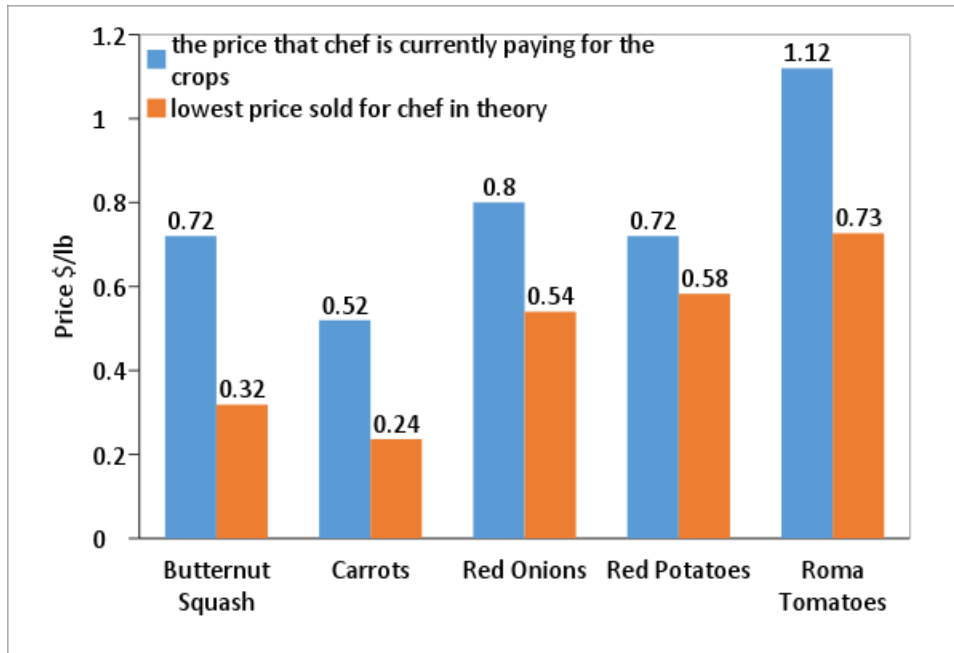


Figure 4- The price range on sale

Thus, the profit for crops can be conducted and is shown in figure 3.

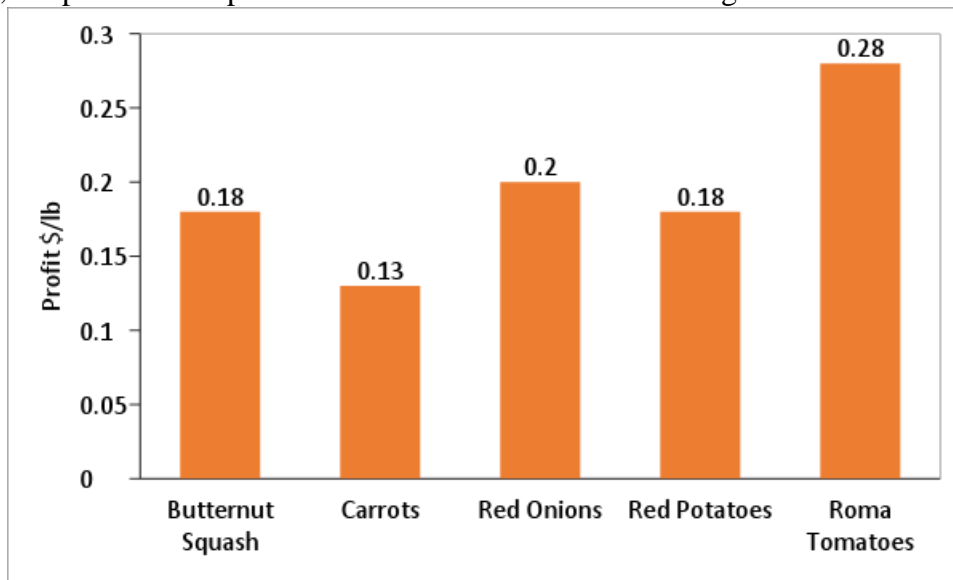
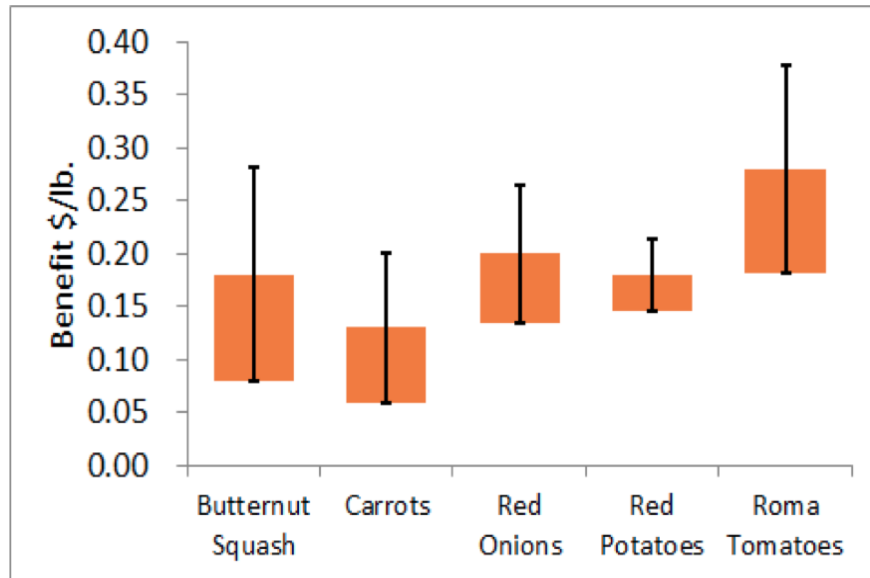


Figure 5- The profit for unit weight of crops sold

### 3. Benefit Analysis

The unit price for each crop is determined based on the wholesale price found in the online index and the price that was given by the chef. The profit is taken as a fixed portion (25%) of the price, as suggested by the Land Connection.



#### 4. Breakeven Point

If it's assumed that the fixed cost consists of 48 working weeks in a year and the crops are sold at their average price of the year (bought from the greenhouse during winter), the breakeven can be reached by conducting the weekly net benefit. The fixed cost, \$1,529 per week, is to be covered by the profit, if only one type of crops is being sold, the break even points measured by that specific type of crop are shown in figure 4. However, the weekly transportation capacity is limiting maximum numbers to 11.1 tons, which is assumed to be the exact weight of produce sold weekly in the previous section. Thus, we can fairly say that a trade of 3.7 tons per day (or \$1,529 per week) is practical and sustainable in running a food hub.

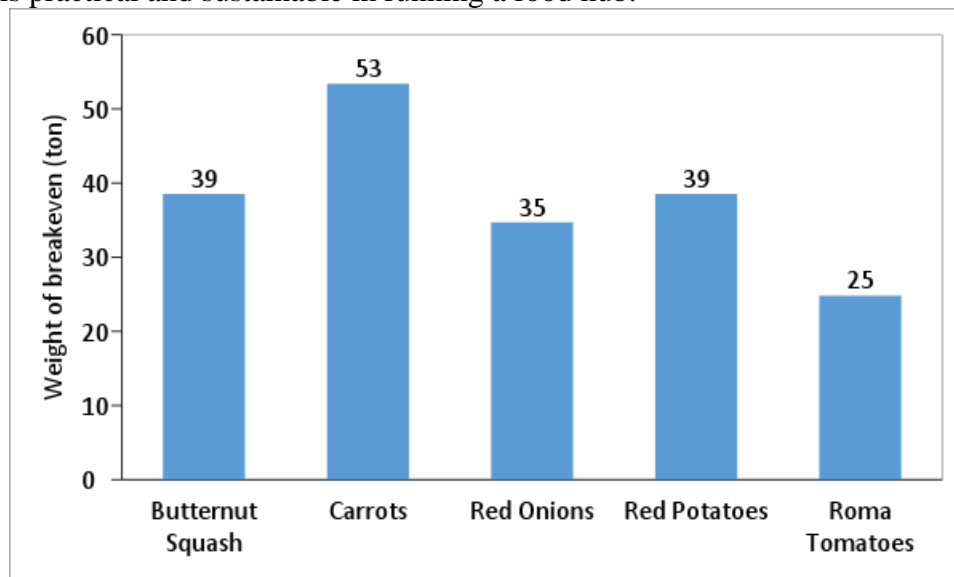


Figure 6- Breakeven weight measured by a single crop

To determine the weight of break even, all these crops are assumed to be sold at the same weight, “y” pound per week. Thus, the total revenue per week is the sum of the multiplication of revenue per weight per crop and their weight, which is  $(0.18+0.13+0.2+0.18+0.28) * y$  USD per

week. The number is supposed to compensate for the fixed cost, \$1,528 per week, leading to a sale of 7 tons per crop per week.

To make sure that 7 tons of crops can be collected weekly, we compare the productivity of an acre of corn. In a cropping period, the production of corn is roughly 60 pounds per bushel times 173 bushels per acre, which is 10 kilo-pounds per acre (5 tons per acre). This means that 7 acres of crops per week is enough to cover sales.

### **Conclusion**

Our group has determined that the food hub needs to sell 2,100 pounds of produce per week to break even and sell \$1,500 worth of produce per day to make a profit. Considering that on average every customer eats around 11lb of food, this is a large amount of food. Therefore, a food hub will only be successful if it has a large customer base that is interested in buying local food because there aren't enough local food restaurants in the Champaign-Urbana area to justify the consumption of a large amount of produce. In addition, many assumptions were made throughout this project that need to be addressed. Although our team assumed the food hub would operate year-round, most local produce in Illinois is produced and traded only in limited months and thus this could prove to be a limitation in factoring total revenue since prices fluctuate throughout the year and do not remain stagnant. When Ms. Simeziane visited our poster on the day of our presentation, she suggested that the food hub had a better chance of getting off the ground if it merged with an existing supply chain because there are many food distribution competitors, such as Sysco. However, we do believe the food hub has potential and we have no doubt that the Land Connection will be successful in its endeavors.

### **Research Limitation and Recommendation for Future**

Given the duration of this project, we got limited reply from farmers and chefs. The estimates that result from this project should give the Land Connection a big picture of starting a food hub. If there's opportunity in the future, we highly suggest future researchers to look deeper into the costs of operating a food hub and prices of crops that could be sold from food hubs. In addition, we think it should also explore other options for its potential customer base, such as other institutions like the university or hospitals. Future research should also evaluate the amount of carbon pollution created from a food hub during storage and compare the amount of emission created currently during transportation for non-local food. One of the limitations of this project was only considering produce, where there are other areas of research such as meat and poultry.

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