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FACTORS AFFECTING RESTAURANT PURCHASE OF LOCALLY GROWN FOOD: A BINARY LOGIT ANALYSIS

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FACTORS AFFECTING RESTAURANT PURCHASE OF LOCALLY GROWN FOOD:
A BINARY LOGIT ANALYSIS

BY

AMANDA LYNNE MCLEOD
B.A. Economics, Westfield State University, 2016

THESIS

Submitted to the University of New Hampshire in Partial Fulfillment of the Degree
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On April 23, 2018

Original approval signatures are on file with the University of New Hampshire Graduate School

DEDICATION

To my family and friends
For all of their love and support

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I would like to thank my advisor, John Halstead, for providing me with the opportunity to earn my master's degree under his guidance and expertise. Through this process, I have been able to conduct meaningful research and develop skills that will help me in the years to come. I am grateful for all of his support and for making my time at UNH very enjoyable.

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ABSTRACT

Factors Affecting Restaurant Purchase of Locally Grown Food: A Binary Logit Analysis

By

Amanda Lynne McLeod

University of New Hampshire, May 2018

This thesis uses primary survey data to identify and characterize the various types of New Hampshire food service establishments currently sourcing local food products ("local" being grown or raised in New England) and to assess the potential for increasing intermediate purchase of locally grown food products. Results from a recent direct-to-consumer survey revealed that consumers in northern New England have a negative propensity to consume produce that is purchased directly from growers or farmers markets, but consumers had a positive propensity to consume local and organically grown items overall. In other words, consumers in New England would like options for consuming local besides purchasing directly from farmers. Increasing local sourcing to intermediate channels, such as food service establishments, may help lower the opportunity cost of buying local food products for consumers.

Currently, there is an information gap between New Hampshire restaurants and local food producers. This study examines which variables contribute to the likelihood that a New Hampshire food service establishment will make a local food purchase. The implementation of a state-wide survey is used to help examine various restaurant characteristics, perceptions, and practices that affect purchasing decisions for local food products. Based on previous research, it is hypothesized that small-midsized restaurants (serving less than 1,750 meals per week) will be more likely to source local food products. The data set is drawn from a survey of New

Hampshire establishments with help from hospitality associations, state agencies, and individual restaurateur contacts.

In the binary logistic regression model, a threshold parameter for the dependent variable is used. The dependent variable represents one of two values: $y=1$ when the respondent's percentage of monthly local food purchases is $\geq 41\%$, and $y=0$ when the respondent's percentage of monthly local food purchases is $< 41\%$. The threshold parameter is based on the average percentage of monthly purchases of locally grown food products among foodservice establishments found by the Food Processing Center study. This screening process prevents establishments purchasing small percentages of local food from being classified as local buyers; therefore, the model identifies characteristics of only the major purchasers in the market.

The model estimates revealed a negative propensity to consume local for restaurants serving less than 750 meals per week. The results also implied that restaurants that have been making food purchasing decisions longer than two years have a negative propensity to buy local. The significant negative coefficients on "length of autonomy" may be capturing the aversion to changing time withstanding business practices. The composite variables, *Impacts*, and *Production* were found to have a significant and positive effect on the propensity to buy local. Advocating the importance of personally knowing who and where their food came from may help increase intermediate purchase of locally grown food products.

CHAPTER I

INTRODUCTION

Purpose

The purpose of this study is to identify New Hampshire food service establishments that are currently sourcing local food products (Defining “local” as being grown or raised in New England). This project is associated with a USDA funded project, “Sustaining and Enhancing Local Agriculture in Rural Areas: Assessing Key Producer and Consumer Issues in Northern New England” (Halstead, 2013). Results from the recent direct-to-consumer study revealed that consumers in Maine, Vermont, and New Hampshire have a negative propensity to consume produce that is purchased directly from growers or farmers’ markets, but consumers had a positive propensity to consume local, organic and non-blemished items, overall (Werner et al. 2017). In other words, consumers in New England would like options for consuming local besides purchasing directly from farmers. Increasing local sourcing to intermediate channels, such as food service establishments, may help lower the opportunity cost of buying local food products.

Currently, there is an information gap between New Hampshire restaurants and local food producers. This study takes an empirical approach to examine which variables contribute to the likelihood that a New Hampshire food service establishment will make local food purchases. The implementation of the state-wide survey helps examine various restaurant characteristics, perceptions, and practices that affect purchasing decisions for local food products. The results may help inform future policy initiatives, such as the New England 50/60 Food Vision (Donahue et al. 2014), provide missing information on purchasing trends, as well as strategies for

expansion in the local food economy. Due to commonly cited obstacles, such as quantity and availability, it is hypothesized that smaller-midsized restaurants will be more likely to source local food products (Gregoire et al. 2005; The Food Processing Center [FPC], 2003; Curtis & Cowee, 2009). Therefore, this paper will be testing if New Hampshire food service establishments that serve less than 1,750 meals per week are more likely to buy local.

Brief Overview of Local Agriculture

Local agriculture is a major part of the U.S. food industry and has recently been the subject of increased research. The number of farmers markets have increased by 150% from 1994 to 2006 (Brown & Miller, 2008) and local food sales accounted for 4.8 billion dollars spent in 2008 (Low & Vogel, 2011). Of those sales, \$2.7 billion were made through intermediary channels, such as restaurants and supermarkets (Low & Vogel, 2011). In previous reports and research efforts, these marketing channels were largely ignored despite being a large part of local food distribution.

Evidence shows that local food distribution adds social capital to a community. A survey of mid-Atlantic farmers revealed that farmers markets helped develop a sense of community among consumers by providing a place for social activity (Oberholtzer & Grow, 2003). Additionally, there is evidence to support an increase in satisfaction and value to customers who are purchasing local food indirectly. A survey of McDonald's patrons located in Switzerland revealed that customers valued the franchise brand more highly due to its use of local food products (Vieregge, 2007), and they would have frequented McDonald's more often had they been aware of the use of local food products. Some customers were even willing to pay ten percent more for the local attribute.

The majority of research on local food distribution in the U.S. has been focused on the Midwest. A 2003 Colorado study conducted phone interviews to investigate marketing and restaurant purchasing habits. The results revealed that restaurants did not realize that local producers could provide equivalent or higher quality goods, or that it was even an option for their business (Starr et al. 2003). Other research has found that local food products can directly benefit restaurants because it leads to an improved customer perception if advertised (Brain et al. 2015). Using local food in restaurants also benefits farmers by having more of the final price paid by the consumer go directly to their profits. In short, it would be to the mutual benefit of local food producers and restaurants if they were better connected.

What is “Local?”

In 2007, the local food movement coined the term “locavore” defined as a consumer who tries to only eat food grown within a 100-mile radius (Oxford University Press USA, 2007). Locally grown food can reach consumers through a number of different ways, including farmers’ markets, Community Supported Agriculture (CSA’s), farm stands, U-pick areas, and intermediate establishments. Intermediate markets range from restaurants, grocery stores, cafeterias, caterers, food hubs, and other regional food distributors. According to Low et al. (2015), local food systems refer to place-specific clusters of agricultural producers, along with consumers and institutions involved with producing, processing, distributing, and selling foods. The U.S. Congress considers food that travels 400 miles or less, or that is sold within the state where it is grown, to be locally and/or regionally sourced agriculture (Martinez et al. 2010). A recent New Hampshire consumer study found that the majority of residents defined “local” as grown or produced within a 50-mile radius (Pyburn et al. 2016).

In other words, the definition of “local” is up for interpretation, but at the very least, can be associated with specific regions or similar geographic areas. Since the definition of “local food” remains ambiguous, focusing on the two different types of local markets can help direct empirical research (Martinez et al. 2010). As noted previously, transactions in local food markets can be made directly or indirectly; the focus of this study pertaining to the latter. For the purpose of this study, “local” is defined as grown or raised within New England. This definition is attributed to the New England 50/60 Food Vision in an effort to help facilitate the expansion of local food production in the Northeast.

Intermediate Markets

Local food products may be distributed to a variety of intermediate buyers including, but not limited to: grocery stores, food service establishments, food hubs, gas stations, retail stores, and other various state or federal institutions. Distribution to grocers, however, may pose an extra challenge as many grocery stores require a price look-up code (PLU), universal product code (UPC), and produce must meet certain grading standards (Moldovan, 2016). Despite these challenges, the expansion of indirect food sales in large grocers has been on the rise (Martinez et al. 2010). Retailers such as Wal-Mart, Safeway, and Publix have all announced plans to increase support for locally grown produce (Martinez et al. 2010). In the Northeast, Hannaford Supermarkets have created an entire branding initiative to support local producers from Maine, New Hampshire, Vermont, Massachusetts, and New York. Identifying the specific needs of each individual buyer can be time-consuming for producers, but is imperative to developing long-term business relationships.

It is unclear which intermediate channel may have the greatest marketing potential. Restaurants and other food service establishments have the ability to offer greater flexibility when it comes to local food sourcing. Unlike grocery stores, restaurants are able to change their menus based on the seasonal or weekly availability of local food options (Moldovan, 2016; WSDA, 2010b). On the other hand, restaurants rely more heavily on timely deliveries and adequate supply, whereas grocery stores have the ability to redirect consumers to other readily available food products if a local distributor falls short on their order. A pilot study conducted as part of this project revealed similar preferences for local agriculture among restaurants located along the seacoast of New Hampshire. Additionally, local distributors felt that restaurant chefs were better equipped to take advantage of the diverse variety of local food than the average consumer. Overall, local food purchases may provide restaurants with a diverse variety of products, higher quality products, and a competitive edge through product differentiation, as more and more market segments enter into food retail.

Policies Supporting Local and Regional Food Systems

Empirical research has found that expanding local food systems can increase employment and income within that community (Martinez et al. 2010). As a result, a number of state and federal policies have been passed to support the local food movement. Most notably, the Agricultural Act of 2014 (2014 Farm Bill, Pub.L. 113-79) includes major changes to help support local and regional food systems via federal policy (Low et al. 2015). Numerous changes and expansions have been enacted on the 2014 Farm Bill since its approval, including the Farmers' Market Promotion Program (FMPP, Sec. 10003), Specialty Crop Block Grants (SCBG, Sec. 10010), the Value-Added Producer Grant (Sec. 6203), as well as the Rural Business

Development Grant program (Sec. 6012; Low et al. 2015). Changes to the 2014 Farm Bill were designed to help market local food through direct to consumer outlets, indirect channels, funding for projects related to locally and regionally marketed food and to help farmers develop farm-based "value-added" products (Low et al. 2015).

At the state level, other local food friendly initiatives have been proposed as well. For example, the *New England Food Vision* encompasses a vision for the region to build the capacity to produce 50% of their own food by 2060 and increase the amount of food-producing land from 5% to 15% (Donahue et al. 2014). The vision also calls for policy changes concerning federal agriculture subsidies, expanding farm-to-plate-programs, increasing protection over farmland and forests, promotion of farmland access and training programs, and stronger environmental regulations that protect and preserve the natural environment (Donahue et al. 2014). While the *New England Food Vision* may not be a direct law or policy, it does reflect the changing demands and attitudes of New England consumers towards local and regional food.

In New Hampshire, the 2014 Granite State Farm to Plate Food Policy and Principles Bill was passed as the State's first farm-to-table program in an effort to

Encourage and support local food producers, farming, and fisheries, including businesses engaged in agriculture, the raising and care of livestock, dairy, fishing, foraging, and aquaculture, agritourism, horticulture, orchard management, maple syrup production and the associated local and regional businesses that process, purchase, distribute, and sell such food throughout the state (Sec 425:2-a).

Similarly, Vermont's Farm to Plate Initiative was signed in 2009 in an effort to "increase economic development in Vermont's farm and food sector, create jobs in the farm and food economy, and improve access to healthy local food for all Vermonters" (Kahler et al. 2013; Sec. 35. 10 V.S.A chapter 15A § 330). To date, however, limited research has been conducted to identify the most prosperous marketing channels for local producers, how funds may be

allocated, and demand for additional food distribution centers. More empirical research is needed to help inform and direct these state policies into specific courses of action.

Research Questions and Approach

This research aims to gain an empirical understanding of factors that affect a New Hampshire food service establishment's decision to purchase local food products. The research goals of this thesis are as follows:

1. Identify factors that impact a New Hampshire restaurant's ability and decision to purchase local food products through a binary logistic analysis
2. Uncover restaurant purchasing trends, perceptions, and restraints to local sourcing in New Hampshire
3. Propose strategies for increasing indirect purchases of locally grown food products in Northern New England

To address these research goals, this thesis used a state-wide survey informed by a pilot study of New Hampshire's Seacoast. The pilot study was conducted to gain insight on what would be considered valuable information for farmers, local food distributors, and restaurant owners and/or chefs. The pilot study, along with the previous literature, helped inform the state-wide survey. The survey of New Hampshire food service establishments gathered data about restaurant perspectives on local sourcing and barriers to increasing purchases from local producers. Combining results from the pilot study and NH food service survey has helped bridge existing information gaps between producers and indirect buyers. This research also provides missing information on purchasing trends, and may help steer strategies for expansion of the local food economy in the Northeast.

Research Impacts

This research will help develop a better understanding of the obstacles and barriers to local sourcing in intermediate channels. The pilot study will aid in highlighting key distributor perceptions and how those perceptions match up with buyers of local food products.

Understanding where the gaps in information lays are key to reducing market inefficiency.

Further, the state-wide survey results will provide pertinent information on perceptions of local food sourcing and impacts beyond the transaction. Identifying food and supplier related attributes can help inform marketing strategies for distributors and producers. Qualitative input from respondents will also help steer possible solutions to bridge the gap between producer and buyer.

Overall, the logistic regression results will identify significant factors in purchasing decisions made by New Hampshire food service establishments. This research will extend the previous literature by instituting a screening process. The dependent variable represents one of two values: $y=1$ when the respondent's percentage of monthly local food purchases is $\geq 41\%$, and $y=0$ when the respondent's percentage of monthly local food purchases is $< 41\%$. This process will help prevent establishments purchasing small percentages of local food from being classified as local buyers; therefore, the model identifies characteristics of only the major purchasers in the market. Additionally, an ordered logit model will help identify significant factors at 5 different percentage levels of local sourcing. These results will be compared with the binary model to see how significant factors vary over different threshold parameters.

Overview

This thesis will include four additional chapters. Chapter II will include a comprehensive literature review, highlighting previous methods, and the pilot study. Chapter III entails the experimental design, methodology, and conceptual model to be used in this research. Results of the survey will be outlined in Chapter IV and discussed further in Chapter V. Chapter V will also encompass solutions to local sourcing, key themes, and suggestions for further research. Overall, the findings presented in this thesis will aim to assess the demand dynamics of local agriculture in food service establishments of New Hampshire.

CHAPTER II

Previous Studies

Literature Review

Exploring how foodservice operations perceive the costs and benefits of sourcing local food and identifying the obstacles is imperative to bridge the information gap between farmer and restaurant. Various methods have been used to procure information on buyers' and producers' knowledge of sourcing opportunities. Some of the top strategies have been surveys (Ortiz, 2010; FPC, 2003; Curtis & Cowee, 2009; Gregoire et al. 2005; Schneider & Francis, 2005; Smith II et al. 2013; Starr et al., 2003; Inwood et al., 2008; Moldovan, 2016), interviews (Sharma et al., 2009; Inwood et al. 2008; Starr et al. 2003), focus-groups (Zepeda & Leviten-Reid, 2004), and pre- and post-assessments (Brain et al. 2015).

Ortiz (2010) used a short questionnaire to gather information on what influences a customer's willingness to pay a premium price for promoted, locally sourced menu options. On one or more of six trial days, 44% of the participants selected the local menu option and indicated a willingness to pay a premium price for locally sourced menu choices. The Food Processing Center (2003) surveyed members of the Chefs Collaboration organization who had the greatest buying authority to help identify: 1) attributes important to food service establishments, 2) challenges and obstacles associated with purchasing locally grown food, and 3) locally grown food products with the greatest potential for success in the foodservice market. According to this study, purchasing locally grown food can be a profitable asset for food service establishments and respondents preferred to purchase directly from farmers. How a product was grown or raised, freshness, and quality were all highly ranked qualities among purchasing

decisions. As for obstacles, availability and delivery of products were highlighted as key issues for sourcing local ingredients. Interestingly, 38% of the respondents reported that they would increase their local food purchases if a greater variety or quantity was provided and 33% said they would increase their purchase if only a larger variety were available.

Curtis and Cowee (2009) used a mail and telephone survey to evaluate preferences and attitudes towards purchasing local food products for Nevada restaurants. The findings revealed that chefs typically bought locally sourced products due to concerns over quality, taste, and freshness. One obstacle cited by 75% of the respondents who did not make local purchases at all, was an unawareness of what their local options were. The authors used a logit model to examine the effects of restaurant demographics and food attribute preferences on the decision to purchase locally produced foods (Curtis & Cowee, 2009). Independent variables representing gourmet restaurants, the level of chef autonomy in purchasing decisions, location, restaurant ownership, and a dummy variable representing restaurants that serve more than 250 meals per day were included in the model. The model results implied that chefs who were more concerned with production issues, knowledge of the farmer, as well as chefs representing gourmet and independently-owned restaurants were more likely to purchase local foods (Curtis & Cowee, 2009).

An Iowa study surveyed local producers to identify perceived benefits and obstacles of marketing local food to intermediate channels (Gregoire et al. 2005). The study revealed that only 25% of producers were currently selling to food service operations while 44% had never sold to one at all. Some reasons cited were that buyers were not receptive to the exchange and/or the farmers could not keep up with the quantity and year-round demand. Moreover, a lack of knowledge for purchasers *and* suppliers has impeded local sourcing to intermediate operations.

Schneider and Francis (2005) focused on the potential of the local food system in Washington County, Nebraska by surveying farmers and consumers. The results revealed that there was a very low farmer interest for providing to local markets even though there was a high level of interest in purchasing local food directly and indirectly by consumers. Consumers also reported a willingness to pay a price premium for these local foods. Sharma et al. (2009) used face-to-face interviews with 10 restaurateurs in the Midwestern United States to assess whether the use of locally produced products imposed an extra cost on independent restaurants more than nonlocal products. According to this study, there was no significant difference in the cost of using local ingredients, however, higher costs were associated with delivery and transportation of local foods.

Inwood et al. (2008) examined 1) the characteristics of chefs and restaurants that have adopted local foods, 2) local food attributes valued by restaurants, 3) how restaurants function as opinion leaders promoting local foods, 4) network linkages between culinary and production organizations, and 5) barriers to more widespread adoption of local foods in the culinary community. Quantitative and qualitative data were collected from interviews with individuals from 71 restaurants throughout the state of Ohio. The results imply that distribution problems and a lack of convenience were identified as significant limiting factors for the use of local products in Ohio restaurants.

Starr et al. (2003) used telephone surveys to explore methods in which farmers could be connected with food service buyers in Colorado. The results imply that price was not a major factor in purchasing decisions, while quality was among the top priorities of intermediate buyers. On the other hand, many were not aware that local farmers could provide a comparable or higher quality product and service. Another avenue of research used a focus-group study to investigate

shoppers' beliefs and behaviors in regard to local foods in Madison, Wisconsin (Zepeda & Leviten-Reid, 2004). One significant finding of this study was the fact that one group was not concerned with local food labels, but were concerned with all of the product qualities that local foods typically carry. Moreover, the authors found that one outcome for farmers and intermediate sellers is to develop better marketing strategies for local food promotions that cater to consumer concerns.

Brain et al. (2015) studied the impacts of the Utah Farm-Chef-Fork Program. This program aimed to connect producers and restaurants through workshops, mingles, farm and restaurant tours, and other local-sourcing food events via pre-and post-assessments (Brain et al. 2015). Much to the program's success, 71.4% indicated that they would increase the percentage of restaurant ingredients sourced locally as a result of the program's workshop with only 28.6% stating that they would not (Brain et al. 2015). Market activities such as contacting a local farm for the first time, knowing the best time of day to make a new contact, knowing what farms in the area sell locally, and understanding the needs of local farmers were a central focus of this study. The post-assessment revealed that participants' confidence in performing these series of marketing activities increased significantly from the confidence scores on the pretest (Brain et al. 2015).

Smith II et al. (2013) used data from their 2012 Farm-To-Hospital survey of Hospital Food Service Directors in the Northeastern U.S. and from the U.S Department of Agriculture in order to identify factors that influence a hospital's decision to adopt a "farm-to-hospital program" (FTH). An online regional survey was sent out in 2012, to a random sample of 160 food and nutrition service directors of hospitals in the Northeast. Secondary data from the U.S. Department of Agriculture's (USDA) Atlas of rural and Small-Town America produced by the

Economic Research Service were obtained to identify agriculture and county characteristics of the areas in which the hospitals are located and how they may affect a hospital's propensity to adopt a FTH program. According to the results, the authors found that the Healthy Food in Healthcare Pledge, the number of meals prepared daily at a hospital, the percent of farms participating in Community Supported Agriculture, and a hospital's county classification have the greatest impact on influencing a hospital's decision to adopt a FTH program (Smith II et al. 2013).

O'Hara and Benson (2017) used a two-tier probit and OLS model in order to explore how local food purchases by schools are influenced by local agricultural conditions and production using data from the 2015 Farm to School Census. The results from the first tier probit model implied that the value of local direct-to-consumer (DTC) agriculture, along with the number of students, had a positive impact on the probability of a School Food Authority (SFA) making local food purchases. Additionally, the authors found that the doubling of local DTC agricultural and local dairy production increased the likelihood that a SFA purchased local milk products. In the second tier OLS regression, the results implied that the population of the county that the SFA is located in and the number of students enrolled both had a positive impact on local DTC agricultural sales. All in all, the results suggest that more prosperous school districts have the greatest opportunity for increasing local sourcing.

Ralston et al. (2017) examined the characteristics of school districts serving local food using 2013 Farm to School Census data. Additional school district data were merged from the National Center of Education Statistics' Common Core of Public Data and State and county attributes from the USDA's Economic Research Service Food Environment Atlas. This study found that school districts with enrollment above 5,000, urban districts, and districts that were in

counties with a higher density of farmers' markets were more likely to serve local foods daily. Districts with a higher per capita income, a higher level of college attendance and those in States with more legislated policies supporting farm-to-school programs were also more likely to serve local foods (Ralston et al. 2017). In short, school location, size, proximity to farmers' markets, farm-to-school policies, and educational attainment may be key drivers of local food sourcing in school cafeterias.

Lastly, a Missouri study collected a total of 115 surveys completed by various indirect buyers in the food industry including restaurants, grocery stores, distributors, healthcare facilities, government institutions, academic institutions, as well as other intermediate buyers (Moldovan, 2016). The data were split into two main buyer classifications: institutional and intermediated. Institutional buyers were defined as an organization devoted to the promotion of a particular program such as schools, universities, hospitals, and prisons while intermediated buyers were defined as entities that were providing a service to the community, such as restaurants, grocery stores, and catering services (Moldovan, 2016). The results implied that institutions were 22% less likely to purchase local products than intermediated buyers, overall.

Among the previous literature, there appears to be a number of common themes. First, a lack of knowledge on where and what local producers were available was cited as a common reason for intermediated buyers not making local food purchases (FPC, 2003; Curtis & Cowee, 2009; Gregoire et al. 2005; Starr et al. 2003). Second, the bulk of the available research has been predominantly conducted in the Midwestern United States, leaving an information void on intermediate markets in the Northeast. Last, size, location, farm-to-institution policies and other various sociodemographic characteristics also appear to play a significant role in an intermediate establishment's willingness and ability to source locally (O'Hara & Benson, 2017; Smith et al.

2013; and Ralston et al. 2017). With these key findings in mind, this study will aim to apply similar techniques to assess the current state of local agriculture in New Hampshire restaurants.

Pilot Study

In order to investigate the role that restaurants play in distributing local food to consumers in the New England Region, a pilot study was conducted in the Seacoast Region of New Hampshire. The Seacoast is a part of Rockingham and Stafford County. Rockingham county alone supports a population of 301,777 people with a median household income of \$87,960 (City Data, 2017). Additionally, the region is home to 658 farms as of 2012, where crop sales accounted for \$12,679,000 and \$27,964 on average per farm (City Data, 2017). The area is home to 283 full-service restaurants. Unlike Midwestern states, New Hampshire is limited by a much shorter growing season and the types of crops that can be grown. Despite these obstacles, the local food movement has been gaining strength, especially in areas such as Portsmouth, NH.

According to the 2012 Agricultural census data, 51.4% of New Hampshire land is dedicated to woodland, 24.9% to croplands, 14.8% as other uses, and 8.9% as Pastureland (Vilsack & Clark, 2014). Due to the mountainous topography of the state, the expansion of farms may be difficult at best, however, little research has been conducted to examine this possibility and the linkages between the local and regional food systems. The main goal of this pilot study is to highlight the perceptions and barriers between producers and restaurants in the Seacoast region of New Hampshire.

A series of preliminary interviews were conducted with outlets actively involved with local food distribution, including Maine's Farm Fresh, Unity Food Hub, UNH Extension, New Hampshire's Three Rivers Alliance, and Farm to Restaurant Connection. These preliminary

interviews provided insight on the supply side of the market and how the food network typically operates throughout New England. An interesting takeaway from these preliminary interviews was the fact that local food distributors felt that they could compete with national suppliers in terms of price, quality, and quantity. Interview questions were shaped by these findings in order to identify consistency or inconsistency of perceptions on the consumer side. Previous surveys conducted by the Food Processing Center (2003), Ortiz (2010), and Starr et al. (2003) were also reviewed in structuring for the survey questions. The definition of local, as it applies to local food, was left up to the survey respondents for this particular portion of the research.

An inventory list of all restaurants along New Hampshire's seacoast was used as a primary contact list to randomly select interview subjects. Contacts were grouped as either Fast Food, Casual Dining, or Fine Dining before requesting their participation in the study. In order to appropriately reflect the Seacoast market as a whole, an equal number of respondents from each group were contacted for participation. Selected subjects were then contacted and asked if an Owner or Kitchen Manager would be willing to participate in a 20-30-minute interview. The survey answers were recorded manually and later compiled into an excel sheet.

Pilot Study Results

In total, 16 restaurants along the Seacoast participated in the study. Of those restaurants, 9 self-identified as Casual/Family, 1 as Fine Dining, 3 as Pub Fare, and 2 as Seafood. The top three reasons for making local food purchases were 1) Support for the local economy and farmers, 2) Freshness, and 3) Locally sourced menu options were desired by patrons. Additionally, 8 interviewees cited *quality* as their number one concern when making purchases and 3 considered *price* as their top concern. Among the independently owned restaurants,

availability was cited by 7 restaurants as the main obstacle to sourcing local food products, whereas franchises were more concerned with consistency across restaurant locations. Other topics of concern included customer service, seasonality, lack of farmers' markets in the area, communication, and price increases during the offseason.

The main finding of interest, however, was the fact that 15 of the 16 restaurateurs interviewed perceived local food as a “profitable” asset to their business despite any obstacles that they may have encountered during the purchasing process. In regard to contacting new suppliers, 25% of interviewees were actively seeking out new local suppliers, 37% relied on “word of mouth” to find new suppliers when needed, 13% waited for the farmers to approach them, 13% went to farmer’s markets when given the opportunity, and 12% were not seeking out any new suppliers at all. As for the percentage of local food being purchased, the surveyed restaurants were typically either at one end of the spectrum or the other. Eight of the restaurants estimated that 35% or less of their budget was spent on local food sources while the other half estimated that at least 50% or more of their budget was spent on local suppliers.

One product that a number of restaurants would like to purchase locally more often was meat, particularly red meat. Unlike certain fruits and vegetables, meat can be sourced year-round. The main obstacle to sourcing local beef, however, was the cost. Lastly, 14 restaurants stated that their menus featured “seasonal” items which can offer greater flexibility when doing business with local farmers. All in all, these results provided some helpful insight on the perceptions and barriers to local sourcing within the Seacoast region.

CHAPTER III

Methods

Objectives

The overall goal of this thesis is to examine the various food service demographics, perceptions, and their effect on the propensity towards purchasing local food products. Specifically, we will aim to identify the characteristics of NH restaurants that have adopted local foods and obstacles to ones that have not. This research will help stakeholders understand the current use of local foods by restaurants and how to better manage the food system to further enhance the use of locally grown foods. This thesis hypothesizes that restaurants serving less than 1,750 meals per week are more likely to buy local.

Following the specific work of Smith II et al. (2013), O'Hara and Benson (2017), Moldovan (2016), The Food Processing Center (2003), Curtis and Cowee (2009), and questions inspired from the pilot study, the logit model below is specified to examine the propensity of a NH restaurant towards purchasing locally grown food. The model includes explanatory variables such as buyer classification, supplier attributes, perceptions of food-related attributes, buyer autonomy, and other restaurant demographics.

$$\begin{aligned} \text{BUY_LOCAL} (0, 1) = & \beta_0 + \beta_1 \text{BUS_TYPE} + \beta_2 \text{MEALS750} + \beta_3 \text{MEALS1250} + \\ & \beta_4 \text{MEALS1750} + \beta_5 \text{MODERATE_AUTONOMY} + \beta_6 \text{COMELETE_AUTONOMY} + \\ & \beta_7 \text{STORE_LOCATIONS} + \beta_8 \text{SUPPLIER_ATTRIBUTES} + \beta_9 \text{PRODUCTION} + \\ & \beta_{10} \text{PURCHASING_VOLUME} + \beta_{11} \text{AUTO_LENGTH} + \beta_{12} \text{FOOD_ATTRIBUTES} + \\ & \beta_{13} \text{CHALLENGES} + \beta_{14} \text{IMPACTS} + \epsilon \end{aligned}$$

The conceptual model, variables, and hypotheses are later defined.

An ordered and binary logit model was estimated. The dependent variable for the binary model represents one of two values: $y=1$ when the respondent's percentage of monthly local food purchases is $\geq 41\%$, and $y=0$ when the respondent's percentage of monthly local food purchases is $< 41\%$. The ordered logit model is used to analyze the marginal effects for each level of local sourcing. The levels are defined as, Level 1 (0-20% local sourcing), Level 2 (21-40% local sourcing), Level 3 (41-60% local sourcing), Level 4 (61-80% local sourcing), and Level 5 (81-100% local sourcing).

Survey Design

In order to gather the data necessary for analysis, an online survey was issued to food service establishments across New Hampshire via Qualtrics survey software. Currently, there are 3,063 eating and drinking establishments operating in New Hampshire (New Hampshire Lodging & Restaurant Association [NHLRA], 2017). The survey questions and design were shaped by previous literature, a pilot study of NH Seacoast restaurants, and collaboration with NH chefs active in local sourcing. The pilot study of New Hampshire's Seacoast was conducted to help investigate the role that restaurants play in distributing local food to consumers in the region. The area is home to 283 full-service restaurants, of which 16 participated in face-to-face interviews during the summer of 2016.

The questions for the pilot study were shaped by preliminary interviews with outlets distributing local food products, including Maine's Farm Fresh, Unity Food Hub, UNH Extension, New Hampshire's Three Rivers Alliance, and the Farm to Restaurant Connection. These preliminary interviews provided insight on the supplier's side of the market and how the food network operates in New England. An interesting takeaway from these preliminary

interviews was the fact that local food distributors felt that they could compete with national suppliers in terms of price, quality, and quantity while intermediate establishments cited supply and price as two limiting factors. Interview questions were shaped by these findings in order to identify consistency or inconsistency of perceptions among restaurateurs.

The state-wide survey contains 25 questions (Appendix A) pertaining to food service establishment demographics, purchasing power, perceptions of local food, obstacles related to sourcing local food, and marketing local menu options. The project was approved by the University of New Hampshire's Internal Review Board (IRB) (September 12, 2017; Appendix B). The survey was developed using Qualtrics software. An email blast was sent out through the New Hampshire Restaurant and Lodging Association to 370 of their members. The email blast only yielded 10 responses, therefore an additional 1,145 email addresses were extracted from New Hampshire's Licensing Verification Site Facility Search to conduct another survey launch. One caveat of this process is that the website only includes NH restaurants that have an active liquor license. Data collection began on October 12, 2017, and ended in March 2018. The goal was to obtain at least 300 completed surveys for analysis. STATA statistical software was used to obtain descriptive statistics and estimate the regression models.

Conceptual Model

A binary choice of the i th individual is represented by a random variable, y_i , that takes on the value of 1 if local sourcing occurs and 0 if local sourcing does not occur. Where P_i is the probability that y_i takes on the value 1, and then $1 - P_i$ is the probability that that y_i is 0. This can be written using the probability function for y_i as

$$F(y_i) = P_i^{y_i}(1 - P_i)^{1-y_i} \quad y_i = 0,1$$

and

$$y_i = \begin{cases} 1 & \text{with probability } p \\ 0 & \text{with probability } 1 - p \end{cases}$$

In this case, $y=1$ when the respondent's percentage of monthly local food purchases is $\geq 41\%$ of total food purchases and $y=0$ when the respondent's percentage of monthly local food purchases is $< 41\%$ of total food purchases. The threshold parameter of 41% is based on the average percentage of monthly purchases of locally grown food products among foodservice establishments found by the Food Processing Center survey (2003). This screening process prevents establishments purchasing small percentages of local food from being classified as local buyers; therefore, the model identifies characteristics of only the major purchasers in the market.

A logistic regression model is outlined below. Linear probability models are bounded by the probabilities 0 and 1, but linear functions are unbounded by nature, therefore it is important to transform the probability so that it is no longer bounded (Allison, 2012). According to Allison (2012), transforming the probability to an odds ratio removes the upper bound and taking the logarithm of the odds removes the lower bound. For k explanatory variables and $i=1, \dots, T$ individuals, the logistic model is

$$\log \left[\frac{p_i}{1 - p_i} \right] = \alpha + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_k x_{ik}$$

Where p_i is the probability that y_i takes on the value 1, and then $1 - p_i$ is the probability that y_i is 0. Solving the logit equation for p_i

$$p_i = \exp \frac{(\alpha + \beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_k x_{ik})}{(1 + \exp(\alpha + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_k x_{ik}))}$$

Exp(x) is the exponential function, equal to e^x , where e is the exponential constant equivalent to 2.71828 (Allison, 2012). Using the property $\log(e^x) = x$, we can further simplify the last equation:

$$p_i = 1 / (1 + \exp(\alpha + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_k x_{ik}))$$

The estimated β coefficient of the equation, however, does not directly represent the marginal effects of the independent variables of the probability that a buyer makes local purchases. The marginal effect of an increase in a regressor x_i on the probability of selecting y_i is:

$$\frac{\partial P_{ij}}{\partial x_{ri}} = \beta p_i (1 - p_i)$$

If the explanatory variable is discrete, $\partial p_i / \partial x_{ij}$ does not exist and the discrete explanatory variable will be obtained by evaluating P_i at alternative values of x_{ij} taking on values of 1 and 0.

The marginal effect of a discrete variable is expressed as:

$$\frac{\partial p_i}{\partial x_{ij}} = P(x_{ij} = 1) - P(x_{ij} = 0)$$

Ordered logit Theory

The conceptual theory for an ordered logistic model differs slightly. Ordered outcomes are modeled to arise sequentially as a latent variable, y^* , crosses progressively higher thresholds (Cameron & Trivedi, 2009). For this model, y^* is an unobserved measure of local sourcing levels. For individual i , we specify

$$y^* = x_i' \beta + u_i$$

where a normalization is that the regressors x do not include the intercept. For very low local sourcing y^* , local sourcing is 0-20%; for $y^* > \alpha_1$, local sourcing increases to 21-40%; for

$y^* > \alpha_2$, local sourcing increases to 41-60%; for $y^* > \alpha_3$, local sourcing increases further to 61-80%; for $y^* > \alpha_4$, local sourcing finally increases to 81-100%.

For an m -alternative ordered model, we define

$$y_i = j \text{ if } \alpha_j - y_i^* \leq \alpha_j, \quad j = 1, \dots, m$$

where $\alpha_0 = -\infty$ and $\alpha_m = \infty$. Then

$$\begin{aligned} \Pr(y_i = j) &= \Pr(\alpha_{j-1} < y_i^* \leq \alpha_j) \\ &= \Pr(\alpha_{j-1} < x_i' \beta + u_i \leq \alpha_j) \\ &= \Pr(\alpha_{j-1} - x_i' \beta < u_i \leq \alpha_j - x_i' \beta) \\ &= F(\alpha_j - x_i' \beta) - F(\alpha_{j-1} - x_i' \beta) \end{aligned}$$

where F is the cumulative distribution function (c.d.f) of u_i . The regression parameters, β and $m-1$ threshold parameters $\alpha_1, \dots, \alpha_{m-1}$, are obtained by maximizing the log-likelihood with $p_{ij} = \Pr(y_i = j)$ as previously defined (Cameron & Trivedi, 2009).

For the order logit model, u is logistically distributed with $F(z) = \frac{e^z}{1+e^z}$. The sign of the regression parameters, β , can be immediately interpreted as the predicted probability of a respondent operating in each local sourcing level, and cumulative probabilities can be predicted as well.

In Stata statistical software, the ordered logit regression model assumes the outcome variable is a latent variable (Liu, 2010). It is expressed as:

$$\ln(Yj') = \text{logit} [\pi(x)] = \ln \left(\frac{\pi_j(x)}{1 - \pi_j(x)} \right) = \alpha_j + (-\beta_1 X_1 - \beta_2 X_2 - \dots - \beta_p X_p)$$

where $\pi_j(x) = \Pr(Y \leq j | x_1, x_2, \dots, x_p)$, which is the probability of being at or below category j , given a set of predictors (Liu, 2010). For this model, α_j are the cut points, and $\beta_1, \beta_2 \dots \beta_p$ are logit coefficients.

Variable Definitions

As mentioned previously, the logistic model is

$$\begin{aligned} \text{BUY_LOCAL} (0,1) = & \beta_0 + \beta_1 \text{BUS_TYPE} + \beta_2 \text{MEALS750} + \beta_3 \text{MEALS1250} + \\ & \beta_4 \text{MEALS1750} + \beta_5 \text{MODERATE_AUTONOMY} + \beta_6 \text{COMELETE_AUTONOMY} + \\ & \beta_7 \text{STORE_LOCATIONS} + \beta_8 \text{SUPPLIER_ATTRIBUTES} + \beta_9 \text{PRODUCTION} + \\ & \beta_{10} \text{PURCHASING_VOLUME} + \beta_{11} \text{AUTO_LENGTH} + \beta_{12} \text{FOOD_ATTRIBUTES} + \\ & \beta_{13} \text{CHALLENGES} + \beta_{14} \text{IMPACTS} + \epsilon \end{aligned}$$

Respondents from each food service establishment were asked if they had purchased locally produced food products within the past calendar year (Defining “local” as being grown or raised in New England). Respondents were then further asked what percentage of their food product purchases were locally sourced, ranging on a scale of 0-20%, 21-40%, 41-60%, 61-80%, and 81-100%. The reported responses were transformed into a binary dependent variable for the model. The variable *BUY_LOCAL* represents one of two values: $y=1$ when the respondent’s percentage of monthly local food purchases is $\geq 41\%$; $y=0$ when the respondent’s percentage of monthly local food purchases is $< 41\%$. The threshold parameter of 41% is based on the average percentage of monthly purchases of locally grown food products among foodservice establishments found by the Food Processing Center (2003). The remaining explanatory variables were chosen based on the previous literature and pilot study.

One of the fourteen explanatory variables in the model is continuous, eight are discrete and five are composite variables based on factor analysis. *Food Attributes* is a composite variable based on food-related attributes. Respondents were asked to rank the importance of eleven different food characteristics when making purchases for their establishment. The range on each question was 1-5 (1 being Not Important; 5 being Very Important), making the overall

range of the composite variable 4-20. Of the eleven attributes, four were selected for analysis: 1) Product's brand 2) Product's Quality, 3) Personally know who raised or grew product, and 4) Product is Nutritious and healthy. These four attributes were chosen based on direct and indirect buyers' reasons for making local food purchases. Zepeda (2004) found that direct consumers most often cited freshness, flavor, longer lasting, personal relationships, and benefits to health as reasons for consuming local foods. Similarly, The Food Processing Center (2003) found that chefs associated local foods with being of higher quality, fresher, positive relationships with producers, and meeting customer requests.

Production includes questions based on production methods (Curtis & Cowee, 2009). Respondents were asked to rank the importance of 1) Knowing how a product was grown, 2) If the product was New England grown or raised, and 3) Ability to process and package products according to their needs. The range on each question was 1-5 (1 being Not Important; 5 being Very Important), making the overall range of the composite variable 3-15.

The third composite variable, *Supplier Attributes*, is based on questions related to perceptions of the supplier. Respondents were asked to rank the importance of the following characteristics when making purchasing decisions for their establishment: 1) Guaranteed consistent delivery, 2) Ability to provide promotional samples, 3) Ability to develop a long-term business relationship, and 4) Product knowledge, making the overall range of the composite variable 4-20. The two composite variables, *Supplier Attributes*, and *Production* are based on the logistic model proposed by Curtis and Cowee (2009).

Challenges and *Impacts* controlled for perceptions of local sourcing related obstacles and the broader impacts of local food production. The range on each question was 1-5 (1 being Strongly Disagree; 5 being Strongly Agree). Respondents were asked if they agreed or disagreed

that 1) Inconsistent quality, 2) Price 3) Lack of availability, and 4) Inconsistent deliveries impeded their ability to source locally, making the overall range of the composite variable 4-20 for *Challenges*. For *Impacts*, respondents were asked if they agreed or disagreed that local food production 1) Reduces the carbon footprint, 2) Helps sustain the environment, and 3) Helps support the local economy, for a maximum composite score of 15.

The variables are further defined in Table 1.

Table 1. Variable Definitions

VARIABLE	DEFINITION
BUS TYPE:	Indicator variable representing the type of ownership of the establishment; Chain or franchise (=1), Independent (=2), Corporate (=3), and Other (=4)
MEALS (750):	Average number of meals served per week for each establishment; =0 if the establishment serves \geq 750 meals per week and =1 if the establishment serves $<$ 750 meals per week
MEALS (1250):	Average number of meals served per week for each establishment; =0 if the establishment serves \geq 1250 meals per week and =1 if the establishment serves $<$ 1250 meals per week
MEALS (1750):	Average number of meals served per week for each establishment; =0 if the establishment serves \geq 1750 meals per week and =1 if the establishment serves $<$ 1750 meals per week
STORE LOCATIONS:	Continuous variable representing the number of store locations the establishment owns and operates.
MODERATE AUTONOMY	Dummy variable representing the level of autonomy; =1 if mostly autonomous and =0 all else
COMPLETE AUTONOMY	A dummy variable representing the level of autonomy; =1 if completely autonomous and =0 all else
SUPPLIER ATTRIBUTES	Composite variable comprised of questions based on the buyer's perception of important supplier related attributes, including 1) Guaranteed consistent delivery, 2) Ability to provide promotional samples, 3) Ability to develop a long-term business relationship, and 4) Product knowledge. The range on each question is 1-5 (1 being Not Important; 5 being Very Important), making the overall range of the composite variable 4-20.
PRODUCTION	Composite variable comprised of questions based on the buyer's perception of important production related attributes, including 1) Knowing how a product was grown, 2) If the product was New England grown or raised, and 3) Ability to process and package products according to their needs. The range on each question is 1-5 (1 being Not Important; 5 being Very Important), making the overall range of the composite variable 3-15.
PURCHASING VOLUME	Represents total annual purchasing volume, in dollars, of fresh fruits and vegetables for the establishment ranging on a scale from less than \$5,000 to Greater than \$500,000
AUTONOMY LENGTH	Represents the number of years the respondent has had their indicated level of autonomy. Less than 2 years (=1), 2 to 5 years (=2), 5 to 7 years (=3), 8 to 10 years (=4), and Greater than 10 years (=5).
FOOD ATTRIBUTES	Composite variable comprised of questions based on the buyer's perception of food-related attributes, including 1) Product's brand 2) Product's Quality, 3) Personally know who raised or grew product, and 4) Product is Nutritious and healthy. The range on each question is 1-5 (1 being Not Important; 5 being Very Important), making the overall range of the composite variable 4-20.
CHALLENGES	Composite variable comprised of questions based on the buyer's perception of local sourcing related challenges, including 1) Inconsistent quality, 2) Price, 3) Lack of availability, 4) Inconsistent delivery. The range on each question is 1-5 (1 Strongly Disagree; 5 being Strongly Agree), making the overall range of the composite variable 4-20.
IMPACTS	Composite variable comprised of questions based on the buyer's perception of broader local sourcing impacts, including 1) Reducing the carbon footprint, 2) Help sustain the environment, and 3) Help support the local economy. The range on each question is 1-5 (1 Strongly Disagree; 5 being Strongly Agree), making the overall range of the composite variable 3-15.

Hypotheses

As mentioned previously, this thesis will be testing if restaurants that serve less than 1,750 meals per week are more likely to buy local. This number is based on the findings of Curtis and Cowee (2009) where restaurants serving over 1,750 meals per week were classified as "large restaurants" and found to negatively impact a restaurant's likelihood of purchasing locally. It is hypothesized that restaurants serving less than 1,750 meals per week (small-midsized establishments) will not require the consistent and large volumes of food that local distributors may have difficulty supplying, and will, therefore, be more likely to source a greater percentage from local suppliers.

Table 2 shows the predicted signs on each of the models' variables. Following the work of Curtis and Cowee (2009) and Starr et al. (2003), Variables such as *Bus Type*, *Store Locations*, *Autonomy*, and *Autonomy Length* are all predicted to have statistically significant and positive impacts on the likelihood of a food service establishment purchasing local food products. Independently owned establishments do not typically have to abide by product uniformity, and subsequently may be more likely to choose their food from local suppliers, whereas as franchises or corporations often do not have that luxury. Establishments with greater autonomy are predicted to source a higher percentage of local food products because they are able to have greater input on purchasing decisions as well.

The composite variables, *Food Attributes*, and *Production* are predicted to have positive marginal effects. More specifically, if respondents indicate a mean score equal or greater to 8, then they may be more apt to source locally as they value attributes and production methods that are often associated with local food and local sourcing. *Supplier Attributes* is hypothesized to

have a negative sign as local food suppliers may not be able to have the same, long-standing relationship with buyers and guaranteed consistent supply that restaurants require for business.

Store Locations and *Purchasing Volume* are predicted to have negative marginal effects on the propensity towards local food purchasing. According to Starr et al. (2013), food service establishments that serve greater than 250 meals per day on average are less likely to source locally. In other words, the greater volume of fruits and vegetables an establishment purchases annually, the less likely they may be to buy from a local distributor due to obstacles such as seasonality, volume, and pricing.

Table 2. Prediction of signs on independent variables in logit regression model

Independent Variable	Expected sign
Bus Type	
Independent	+
Chain/Franchise	-
Corporate	-
Meals 750 (<750=1)	+
Meals 1250 (<1250=1)	+
Meals 1750 (<1750=1)	+
Moderate Autonomy	+
Complete Autonomy	+
Challenges	-
Impacts	+
Store Locations	-
Autonomy	+
Supplier Attributes	-
Production	+
Purchasing Volume	-
Auto Length	+
Food Attributes	+

Other results presented will include: an overview of survey statistics, response percentages for biggest obstacles, most preferred food supplier versus where the majority of food

is actually sourced from, how respondents would like to be notified about the availability of local food sources, mean supplier-related ratings, local food sourcing challenge ratings, and mean local food attribute ratings. Response ratings on how New Hampshire food service establishments define “local” and what type of food products they are most interested in purchasing from local distributors will be reported as well. Other qualitative themes such as proposed solutions may help steer the concluding discussion on how to help connect more New England farmers with New Hampshire restaurants.

CHAPTER IV
Results

Descriptive Results

A sample of 145 food service establishments completed the survey online or in person. 109 were deemed usable for analysis. Of the usable surveys, 81% were independent, 3.6% were a part of a chain or franchise, 7.2% were corporate, and 6.3% identified as Other. The distribution of food service segments is shown in Table 3.

Table 3. Food service establishment segments

Segment Type	Frequency	Percent
Upscale Full-Service Restaurant	14	12.8%
Casual/Family Full-Service Restaurant	50	45.8%
Limited Service (Fast Food) Restaurant	11	10%
Steakhouse/Seafood Restaurant	5	4.5%
Hotel Restaurant	3	2.7%
Cafeteria	3	2.7%
Caterer	1	.9%
Farm to Table Restaurant	2	1.8%
Pub or Brewery	6	5.5%
Other	14	12.8%

Of the 109 respondents, 20.1% were currently purchasing $\geq 41\%$ of their total monthly purchases from local sources and the remaining 79.1% were purchasing $< 41\%$ from local sources at the time of the survey.

Food service establishments may make purchases from an assortment of different food suppliers. Table 4 lists the total number of respondents making purchases from each type of supplier. The most frequent source was from a National food supplier, but nearly one-third of respondents indicated that they made food purchases directly from a farmer or Regional foodservice distributor. When respondents were asked where they would *prefer* to make the

majority of their food purchases, if given freedom of choice, almost half of the respondents indicated that they would like to purchase directly from a farmer (Table 5).

Table 4. Purchases made from various food suppliers (Buyers could select all that apply).

Supplier Type	Frequency	Percent
Direct from a farmer	40	36.6%
Direct from a farmers' co-op	14	12.8%
Farmer's market	13	11.9%
National food service distributor	54	49.5%
Regional food service distributor	40	36.6%
Food Hub	10	9.1%
Local manufacturer or processor	26	23.8%
Other	7	6.4%

Table 5. Where restaurants would like to purchase the majority of their food

Supplier Type	Frequency	Percent
Direct from a farmer	48	44%
Direct from a farmers' co-op	15	13.7%
Farmer's market	3	2.7%
National food service distributor	10	9.1%
Regional food service distributor	15	13.7%
Food Hub	2	1.8%
Local manufacturer or processor	9	8.2%
Other	4	3.6%

For the purpose of this study, "local" was defined as raised or grown within New England, but respondents were also asked how they personally define "local". Responses were split into 4 main categories. Of those that answered, 26.6% considered local as being grown or produced within New England, 25.6% within 50 miles, 19.2% within New Hampshire, and 17.4% within 100 miles (Table 6). This contrasts with previous studies in which Northeast

consumers have defined local as food purchased within a 50 to 100-mile radius from where it is grown (Pyburn et al. 2016). The recent direct-to-consumer study found that participants defined local as produce grown within a 50-mile radius of their domicile (Werner et al. 2017).

Table 6. Defining “Local”

“Local” Definition	Frequency	Percent
Within 50 miles	28	25.6%
Within 100 miles	19	17.4%
Within 200 miles	5	4.5%
Within 400 miles	2	1.8%
Within New England	29	26.6%
Within New Hampshire	21	19.2%
Other	5	4.5%

Additionally, respondents were asked which local food products they would be most interested in purchasing. According to the survey, 73.2% of respondents indicated that they would be interested in purchasing locally produced vegetables, 50.4% in fresh-cut produce, 48.6% in local cheese, and 47.7% for local beef. Buyers were least interested in purchasing local grains, wine, and yogurt. Table 7 outlines interest in local food products overall.

Table 7. Types of food respondents are most interested in purchasing locally

Local Product	Frequency	Percent
Baked goods/bread	31	28.4%
Beer	44	40.3%
Beef	52	47.7%
Cheese	53	48.6%
Eggs	47	43.1%
Grains	12	11%
Herbs	33	30.2%
Fluid Milk	19	17.4%
Fresh cut produce	55	50.4%
Fruit	48	44%
Vegetables	80	73.2%
Pork	35	32.1%
Poultry	39	35.7%
Root Crops	34	31.1%
Seafood	48	44%
Wine	15	13.7%
Yogurt	13	11.9%

Buyers were further asked to rank the importance of a number of characteristics when making purchasing decisions for their establishment. The range on each question is 1-5 (1 being Not Important; 5 being Very Important). Among the attributes, 100% cited taste as an important or very important factor, 98.1% for quality, 74.3% for product's cost, and 66.9% for a product's marketability. Table 8 outlines the frequencies and percentages for important or very important food-related attributes.

Table 8. Important or Very important food-related attributes

Attribute	Frequency	Percent
Product's Quality	107	98.1%
Product's Taste	108	99%
Product's Marketability	73	66.9%
Product is Nutritious and Healthy	56	51.3%
Product's Cost	81	74.3%
Product is New Hampshire Grown	25	22.9%
Product is New England Grown	34	31.1%
Ease of Preparation	44	40.3%
Product's Brand	22	20.1%
Personally know who raised or grew product	25	22.9%
Know how Product was raised or grown	36	33%

In addition to food-related attributes, supplier-related characteristics were also ranked on a scale of 1 to 5. Buyers were asked to rank the importance of factors such as having the ability to develop a long-term business relationship, ability to provide additional services such as promotion samples, staff training, and package products according to each buyer's needs. Of the ten attributes, 97.2% of respondents cited guaranteed consistent supply and guaranteed consistent quality as important or very important factors. Buyers were least concerned with the ability to provide kitchen/staff training and promotional samples. Table 9 lists percentages for important or very important supplier related attributes.

Table 9. Important or Very important supplier-related attributes

Attribute	Frequency	Percent
Guaranteed consistent supply	106	97.2%
Guaranteed consistent quality	106	97.2%
How product is delivered	80	73.3%
Suggestions for menu application	22	20.1%
Food safety	99	90.8%
Ability to process and package according to our needs	61	55.9%
Provides wait/kitchen staff training	14	12.8%
Promotion samples	23	21.1%
Product knowledge	79	72.4%
Ability to develop long-term business relationship	91	83.4%

Buyers were asked if they have ever promoted the use of locally grown food on their menus or other promotional material. Approximately 74.3% of buyers had promoted their use of locally sourced products at one time or another. Different mediums may be used for advertisement purposes. Buyers were asked to rate the effectiveness of different forms of advertisement on a scale of 1-5 with 1 being Not at All Effective and 5 being Extremely Effective. The top form of advertisement was word of mouth; 87.1% of buyers cited this as a very effective or extremely effective form of advertisement. On the other hand, 0% of buyers cited newspaper advertisements as an effective means of promoting their local food use. Table 10 lists the percentages for very effective or extremely effective forms of advertisement.

Table 10. Very effective or extremely effective forms of advertisement

Promotion Technique	Frequency	Percent
Menu	79	71.4%
Sampling Tables	50	45.8%
Wait Staff	86	78.8%
Word of Mouth	96	88%
TV/Radio Advertising	47	43.1%
Newspaper Advertising	0	0%
Website	72	66%
Social Media	94	86.2%
Other	14	12.8%

Buyers were asked if they Strongly Agreed or Strongly Disagreed that certain challenges impacted their ability to source local food products. Buyers' perceptions of local food production and broader impacts were evaluated as well. Buyers cited the seasonal availability of fruits and vegetables as the number one challenge to purchasing local food products. None of the other selected challenges approached the same frequency as the issue of seasonality. Table 11 presents challenges that buyers agreed or strongly agreed to have an impact on their ability to source locally. Table 12 presents the features most important to local sourcing. These characteristics include perceived broader impacts associated with local food production and purchasing. According to these results, 96% of surveyed buyers agreed or strongly agreed that local sourcing helps keep local farmers in business and 92.6% felt that it helps support the local economy.

Table 11. Challenges to sourcing local food products

Challenge Type	Frequency	Percent
Lack of Availability	79	72.4%
Seasonal Availability of fruits	82	75.2%
Season Availability of vegetables	83	76.1%
Low Quality	0	0%
Inconsistent Quality	35	32.1%
Price	67	61.4%
Inconsistent Delivery Times	45	41.2%
Lack of farmers' markets	27	24.7%
Negative relationship with farmers	4	3.6%
Lack of food safety certification	21	19.2%
Packaging Issues	9	8.2%
Additional food preparation required	12	11%
Undeveloped relationship with farmers	40	36.6%
Lack of commitment by farmers	26	23.8%
Lack of interest by farmers	15	13.7%
Other	3	2.7%

Table 12. Broader impacts associated with local food production and purchasing

Broader Impacts	Frequency	Percent
Locally produced food products taste better	79	70.4%
They are safe to eat	75	68.8%
They reduce the carbon footprint	79	72.4%
They help sustain the environment	76	69.7%
They help support the local economy	101	92.6%
They help keep local farmers in business	105	96.3%
They help local farmers expand their operations	90	82.5%
Locally sourced menu options attract a higher number of customers	66	60.5%
There is a growing preference for local menu options among customers	74	67.8%
Other	3	2.7%

Lastly, buyers were asked how they would like to be notified about the weekly or monthly availability of local food products. An overwhelming majority stated that they would like to be notified via an online newsletter. Figure 1 details the responses.

Notification of Available Local Foods

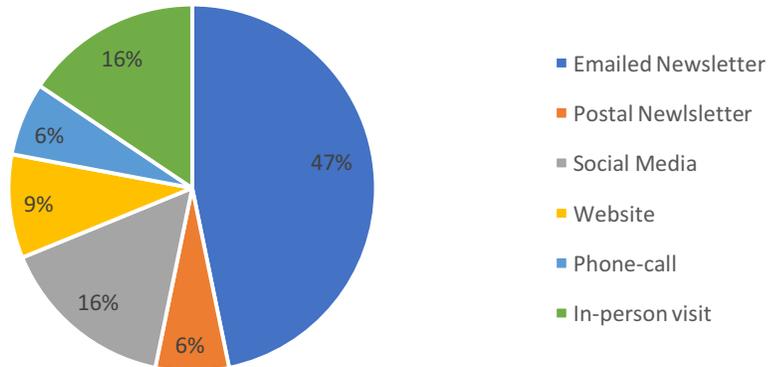


Figure 1. Percent of buyers who would like to be notified about the availability of local food products. Buyers could select all that apply

Qualitative Results

Respondents were asked a series of open response questions related to possible strategies for increasing local sourcing (n=77), why they have and continue to source locally (n=92), or why they have not sourced locally (n=11). A number of common themes were found for each topic. The top three reasons for sourcing local food products include: 1) higher quality, 2) supporting local businesses, and 3) supporting local farmers. Additional respondents cited freshness, customer preferences, sustainable practice, and knowing who and where food came from as reasons for purchasing local food products. Figure 2 presents the responses in closer detail.

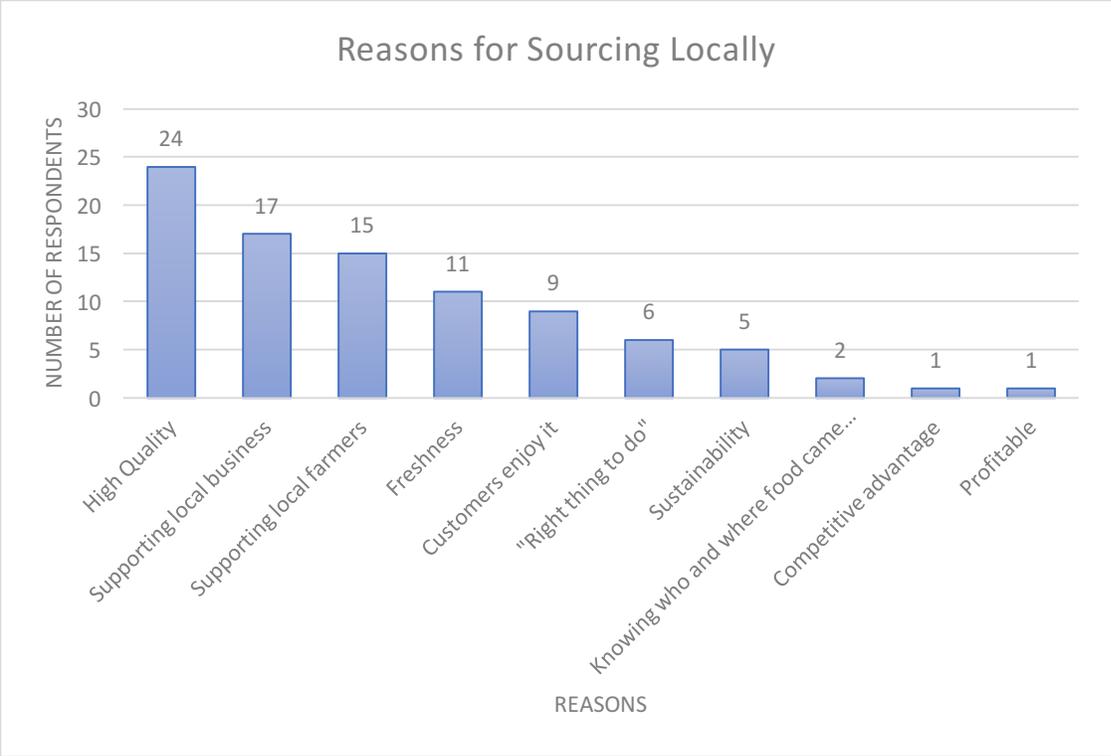


Figure 2. Reasons for Making Local Food Purchases

Of those respondents who are not making local food purchases at all, availability and cost were cited most frequently as barriers. Figure 3 displays common reasons for not making local food purchases. All respondents were asked to propose solutions to help connect more farmers with food service establishments. Providing better networking opportunities and distribution systems were among the top solutions. Other solutions included: partnerships between farmers and distributors, better advertising, easier certification process for farmers, establishing food hubs, supplying a larger volume, indoor warehouse to extend growing season, and increasing number of farmers. Figure 4 illustrates solutions proposed by New Hampshire food service establishments.

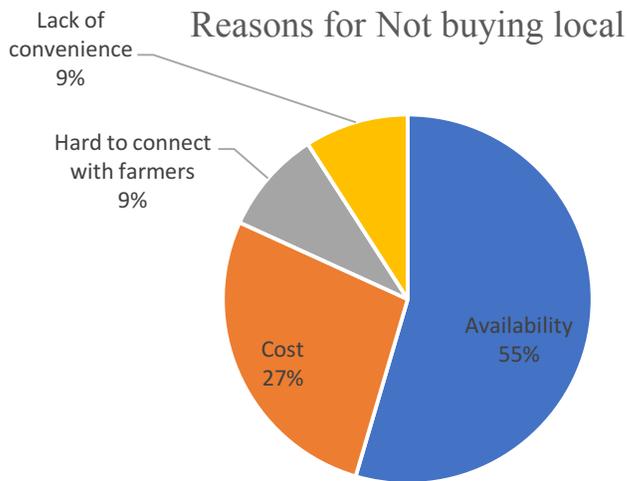


Figure 3. Reasons for Not Buying Locally

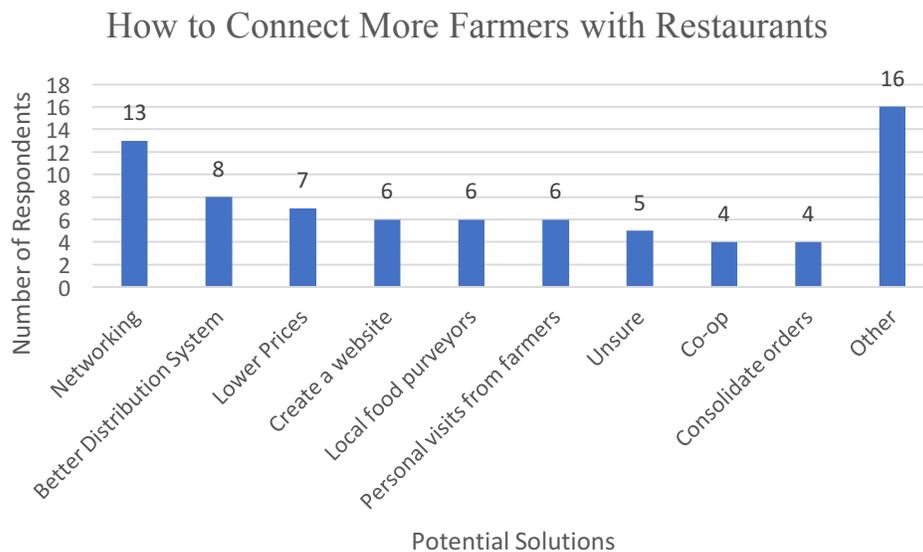


Figure 4. Proposed Solutions for increasing Local Sourcing

Logit Model Results

Parameter estimates from the logistic model were used to calculate the probability of a buyer’s willingness to purchase at least 41% of their food from local sources. The model

summary statistics are shown in Table 13. Table 14 lists the logit model statistics. The chi-squared results imply that the model is statistically significant as a whole. According to the Hosmer-Lemeshow chi-squared value, there is no evidence of poor fit, which also implies that the model is correctly specified. Estimated coefficients and marginal effects were obtained using STATA statistical software package (Table 15).

Of the 109 respondents, 22 (20.1%) were buying local (as defined by the threshold parameter, BUY LOCAL=1 if local percentage \geq 41%), and the remaining 87 respondents (79.8%) were not (BUY LOCAL=0 when local percentage $<$ 41%). The coefficients for meals ($<$ 750), *Autonomy Length*, Level of Autonomy (*Moderately Autonomous*), and the composite variable for *Production* were statistically significant at the 5% level. The estimated coefficient for *Impacts* was positive and statistically significant at the 10% level. The length of autonomy and number of meals served per week ($<$ 750) had negative marginal effects. The variable of interest, meals ($<$ 1750), was not statistically significant at any level.

According to the results, buyers who served less than 750 meals per week were 19% less likely to buy local than restaurants who served greater than 750 meals per week, all else constant. Buyers who indicated an autonomy length of 5 to 7 years were 26.8% less likely to buy local than buyers with an autonomy length less than two years, all else constant. Buyers who indicated an autonomy length of 8 to 10 years were 30.5% less likely and buyers with autonomy length greater than 10 years were 28.8% less likely to buy local than buyers with an autonomy length less than two years, all else constant.

Table 13. Summary Statistics

VARIABLE	OBSERVATIONS	MEAN	STD. DEV.	MIN	MAX
MEALS (<750)	109	.504	.502	0	1
MEALS (<1250)	109	.735	.443	0	1
MEALS (<1750)	109	.794	.405	0	1
AUTONOMY	109				
1		.025	.158	0	1
2		.017	.130	0	1
3		.128	.335	0	1
4		.076	.267	0	1
5		.683	.467	0	1
STORE LOCATIONS	109	2.34	9.30	1	100
SUPPLIER ATT.	109	13.55	4.58	4	20
PRODUCTION	109	9.03	3.375	3	15
VOLUME	108	4.8	2.00	1	12
AUTO_LENGTH	109				
1		.145	.353	0	1
2		.136	.345	0	1
3		.094	.293	0	1
4		.094	.293	0	1
5		.4615	.500	0	1
FOOD ATTRIBUTES	108	15.24	5.25	5	25
IMPACTS	109	11.30	3.85	3	15
CHALLENGES	109	12.829	4.22	4	20
BUSINESS TYPE	109				
1		.034	.182	0	1
2		.769	.423	0	1
3		.068	.253	0	1
4		.059	.238	0	1

Table 14. Logit Model Statistics

Model Statistics	
Chi Squared	39.80***
Prob > Chi Squared	0.0035
McFadden Pseudo R-squared	0.3771
Number of Observations	106
Hosmer-Lemeshow chi2(8)	11.74
Prob > Chi Squared	0.1632

*** Chi-square significant at p<.01

N=106 due to missing values in the remaining 3 surveys

Table 15. Estimated coefficients and marginal effects accompanied with p-values of independent variables on the willingness to purchase local food products for binary logit model

VARIABLE	COEFFICIENT	P-VALUE	MARGINAL EFFECT	P-VALUE	ODDS RATIO
MEALS (<750)	-2.278	.021	-.190	.003***	.102
MEALS (<1250)	-.624	.714	-.061	.719	.545
MEALS (<1750)	-1.42	.405	.126	.349	4.13
MODERATE AUTONOMY	3.185	.067	.381	.033**	24.17
COMPLETE AUTONOMY	.754	.513	.069	.482	2.12
STORE LOCATIONS	-.168	.517	-.016	.514	.845
SUPPLIER ATTRIBUTES	.014	.929	.001	.929	1.01
PRODUCTION VOLUME	.463	.064	.044	.046**	1.59
AUTONOMY LENGTH					
2 (2 TO 4 YRS)	-.607	.582	-.076	.580	.544
3 (5 TO 7 YRS)	-2.437	.101	-.268	.045**	.087
4 (8 TO 10 YRS)	-2.952	.099	-.305	.025**	.052
5 (>10 YRS)	-2.695	.017	-.288	.006***	.067
FOOD ATTRIBUTES	-.011	.949	-.001	.949	.988
IMPACTS	.488	.067	.047	.055*	1.62
CHALLENGES	-.036	.819	-.003	.819	.964
BUSINESS TYPE	-1.478	.371	-.163	.462	.227
2	.302	.884	.039	.884	1.35
3	.711	.728	.092	.722	2.03
4					
CONSTANT	-10.624	.014	---	---	---

** Chi-square significant at p<.05

* Chi- square significant at p<.10

The marginal effects implied that buyers who indicated that they were mostly autonomous were 38.1% more likely to purchase locally than restaurants with minimal autonomy, ceteris paribus. Mostly autonomous restaurants accounted for 12% (n=13) of total respondents. An additional one unit increase in the composite score for *Production* increases the

probability of buying local by 4.4%, all else constant. When there is no perceived value in local production techniques, buyers are only 4.4% more likely to make local food purchases, but at a maximum score of 15, they are 52.8% more likely to purchase locally. An additional one unit increase in the composite score for *Impacts* increases the probability of buying local by 4.7%, all else constant. When there are no perceived broader impacts of local food production, buyers are only 4.7% more likely to make local food purchases, ceteris paribus. If a buyer strongly agreed that local food had a positive impact on the local economy, the environment, and reducing the carbon footprint for a maximum composite score of 15, then they are 56.4% more likely to purchase local food, ceteris paribus. Figure 5 compares the marginal effects of the two composite variables.

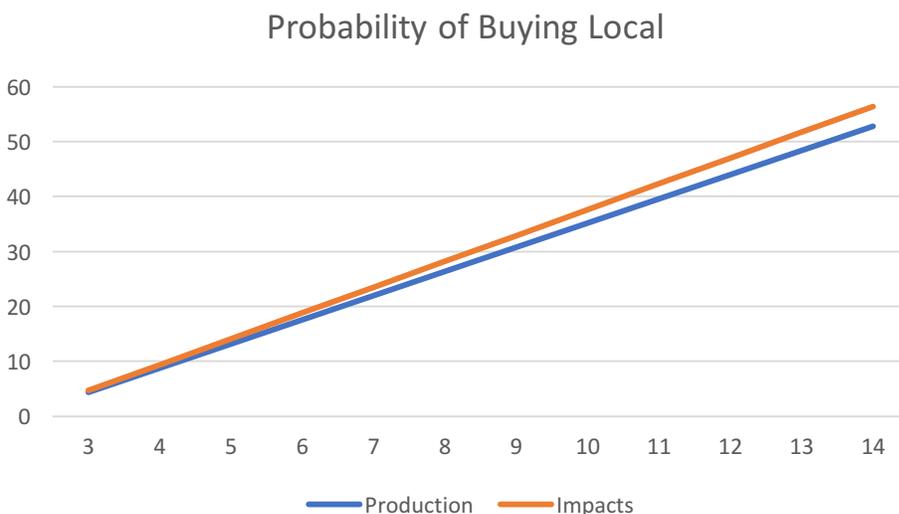


Figure 5. Comparing the marginal effects of Impacts and Production

Odds Ratio

The odds ratio in logistic regression can be interpreted as the effect of a one unit change in X in the predicted odds ratio with the other variables in the model held constant (Allison,

2012). Table 15 also includes the odds ratio estimates. The odds ratio of .102 for *Meals (<750)* implies that the odds of buying local for a restaurant serving less than 750 meals per week is 89.7% lower than the odds for a restaurant serving more than 750 meals, all else constant. The odds ratio of 1.59 for *Production* implies that there is a 59% increase in the odds of buying local for every one-unit increase in the composite variable score, all else constant. For *Impacts*, there is a 62.9% increase in the odds of buying local for every one-unit increase in the composite variable score, all else constant.

For restaurants who have been making purchasing decisions for 5 to 7 years, the odds of buying local are 45.6% lower than the odds for restaurants making purchasing decisions less than 2 years. For restaurants who have been making purchasing decisions for 8 to 10 years, the odds of buying local are 94.78% lower than the odds for restaurants making purchasing decisions less than 2 years. Further, for restaurants who have been making purchasing decisions for more than 10 years, the odds of buying local are 93.3% lower than the odds for restaurants making purchasing decisions less than 2 years. Lastly, the level of autonomy appears to play a positive role in the odds of buying local. The results imply that the odds of buying local for restaurants that are mostly autonomous are 24.17 times higher than restaurants with minimal autonomy.

Attributes by Restaurant Size and Length of Autonomy

Attributes categorized by restaurant size were examined in order to explore if perceptions or practices changed with the number of meals served per week. In total, 30 restaurants served less than 1,750 meals per week, 28 restaurants served less than 1,250 meals per week, and 51 restaurants served less than 750 meals per week. Differences in business type were fairly consistent across restaurant size (Figure 6). Similar trends for the level of autonomy across were

uncovered, but restaurants serving less than 750 meals per week were the majority of completely autonomous establishments (Figure 7). Additionally, the majority of restaurants serving less than 750 meals per week have been making purchasing decisions greater than 10 years (Figure 8).

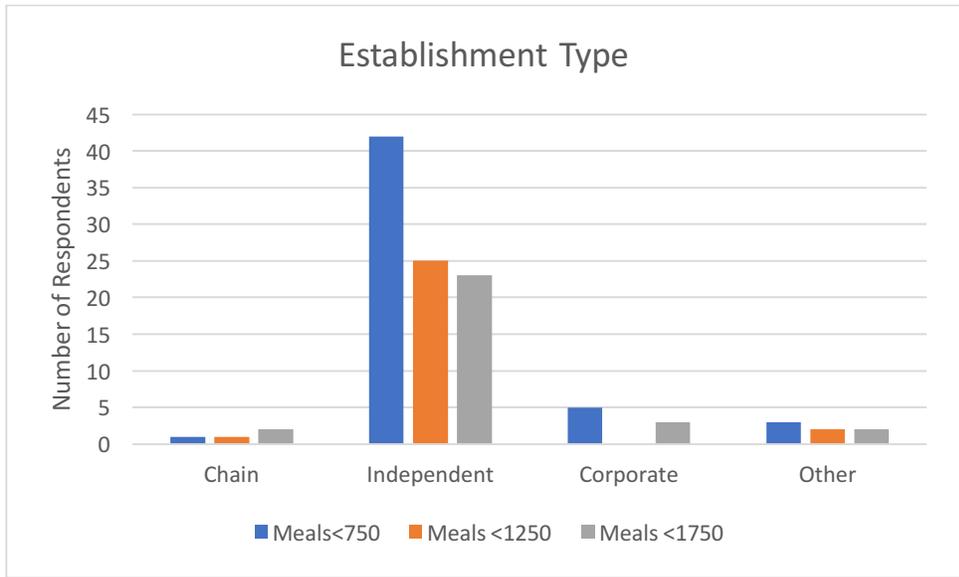


Figure 6. Business Type by Restaurant Size

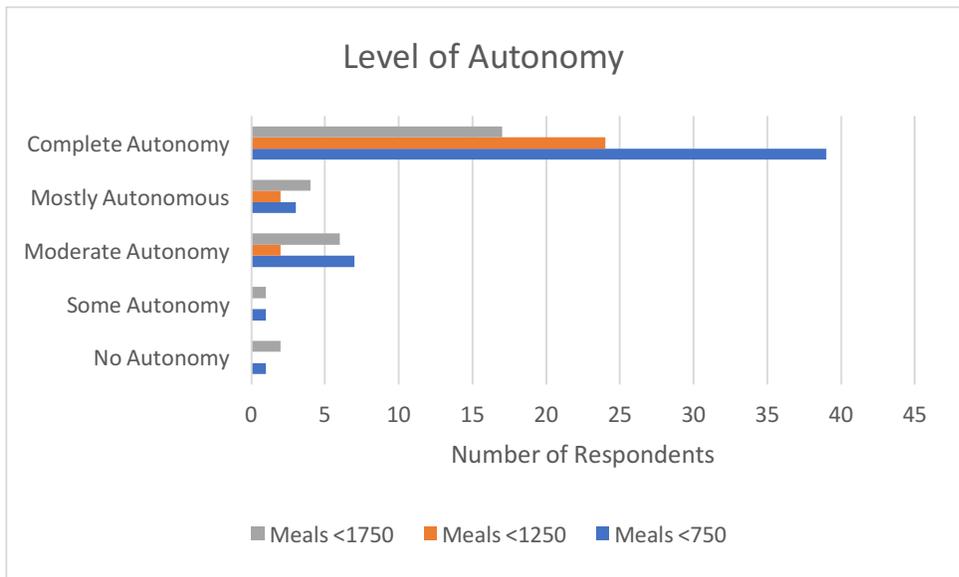


Figure 7. Level of Autonomy by Restaurant Size

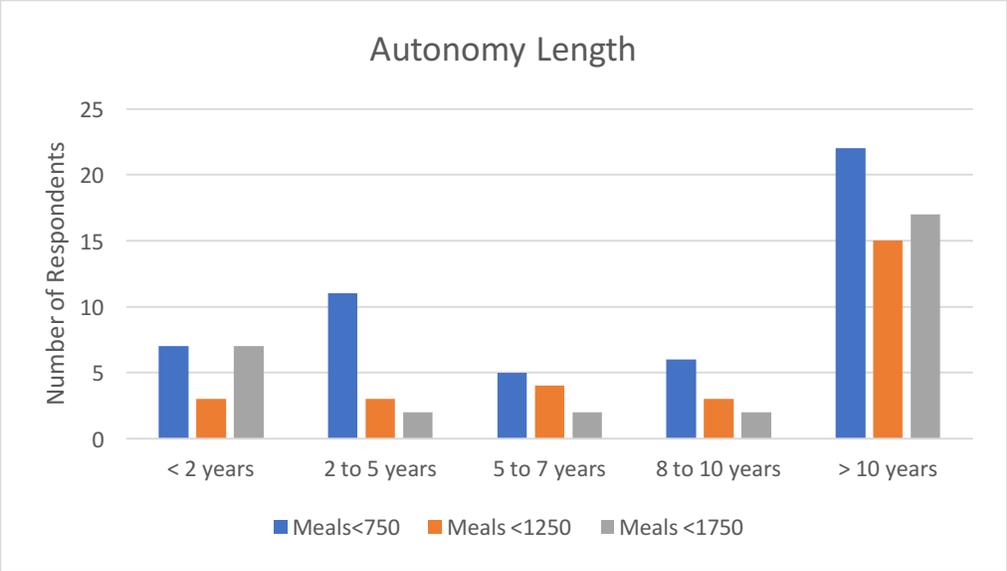


Figure 8. Length of Autonomy by Restaurant Size

As for differences in composite variable scores, no major differences were found across restaurant size. According to the results, the average composite scores for the 5 different variables remained fairly consistent across each category (Figure 9). For each variable, the mean scores were at least within one point of each other. Moreover, these results imply that there are no major differences in business practices or perceptions according to the size of the establishment.

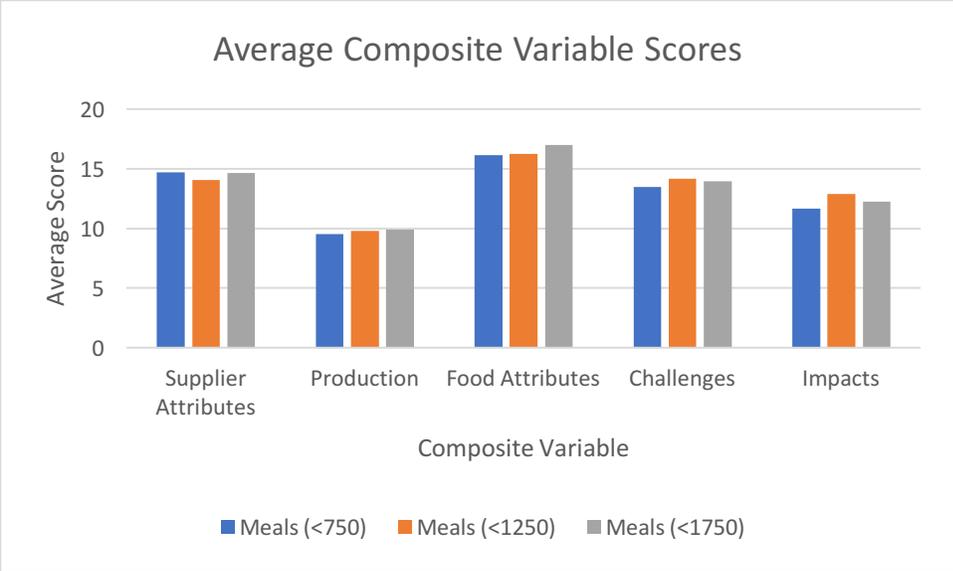


Figure 9. Mean Composite Variable Scores by Restaurant Size

Similar trends were uncovered across length of autonomy. In other words, the number of years making purchasing decisions does not change perceptions or business practices significantly. According to the results, 17 restaurants have been making purchasing decisions less than 2 years, 17 restaurants have been making purchasing decisions 2 to 4 years, 11 restaurants have been making purchasing decisions 5 to 7 years, 11 restaurants have been making purchasing decisions 8 to 10 years, and 54 restaurants have been making purchasing decisions greater than 10 years. From each group, the majority of respondents were independent restaurants (Figure 10).

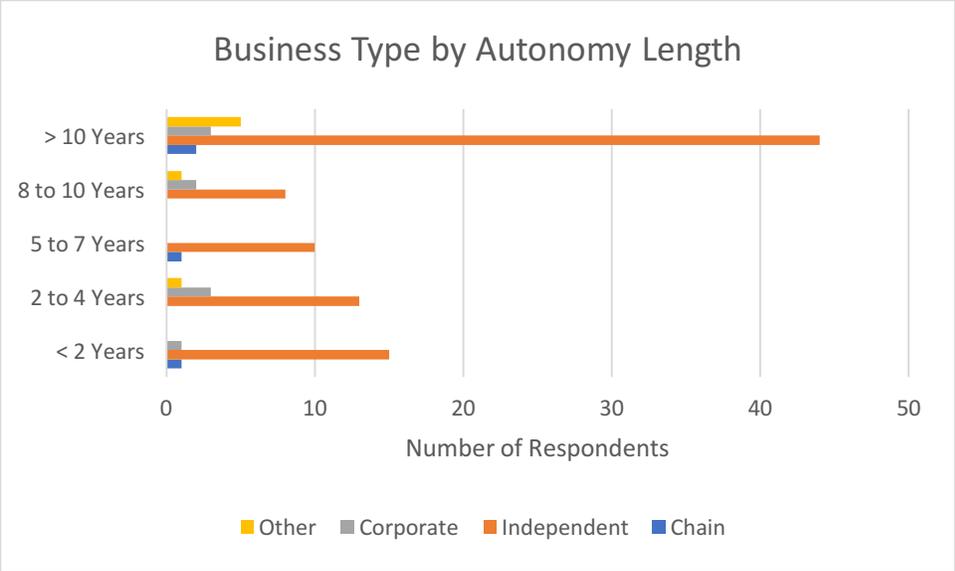


Figure 10. Business Type categorized by Autonomy Length

The majority of restaurants who have been making purchasing decisions greater than 10 years predominately had complete autonomy over their purchasing decisions (Figure 11). No discernable differences were found among the mean composite variable scores by length of autonomy as well (Figure 12). All in all, the results imply that there is no strong correlation between restaurant size or autonomy length with establishment attributes or perceptions of local food.

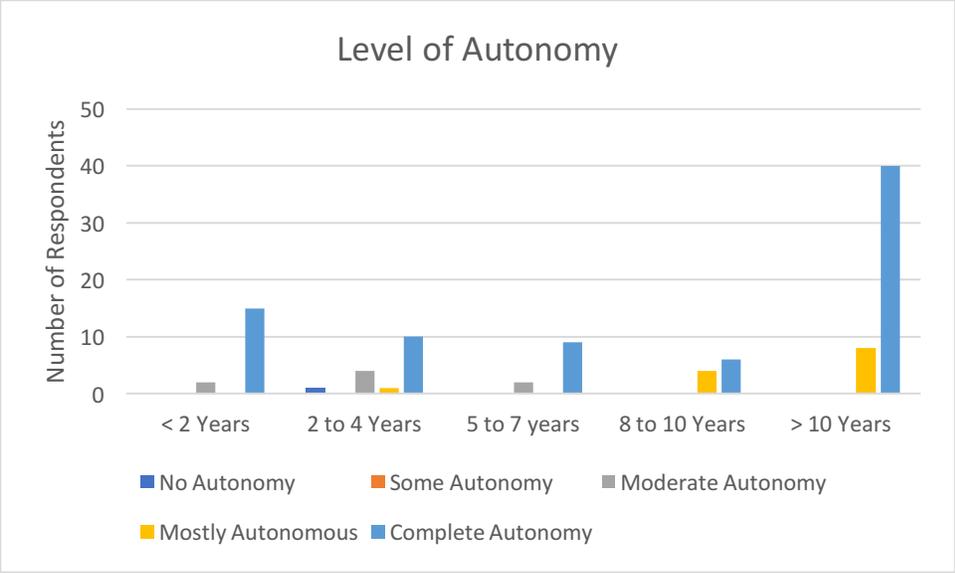


Figure 11. Level of Autonomy by Length of Autonomy

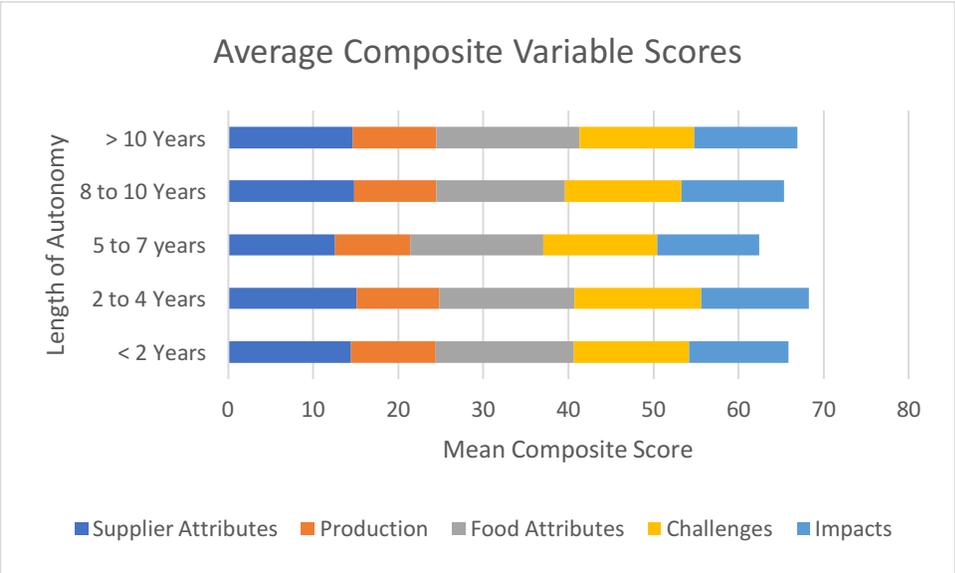


Figure 12. Average Composite Variable Scores by Length of Autonomy

Ordered Logit Results

Table 16 lists the estimated coefficients and odds ratios for the ordered logit regression. According to the results, for a one unit increase in *Production*, we may expect a .589 increase in the log odds of being in a higher level of local sourcing, all else constant. Similarly, for a one unit increase in *Production*, the odds of the highest level of local sourcing versus the lower levels is 1.8 times greater, given that the other variables in the model are held constant. Because of the proportional odds assumption, the same increase, 1.8 times per one unit increase, is found between the 5 levels of local sourcing. None of the other variables were statistically significant at any level for this model.

Threshold parameters, or cut points, indicate where the latent variable is cut to make the five groups that we observe in the data. In other words, Stata sets the constants to zero and estimates the cut points for separating the five levels of local sourcing. The threshold parameters of 3.088, 4.161, 5.900, and 7.423 reveal the following (Table 16). Since there are five possible values for Y, the values for Y are

$$Y_i = 1 \text{ if } Y_i^* \text{ is } \leq 3.088$$

$$Y_i = 2 \text{ if } 3.088 \leq Y_i^* \leq 4.161$$

$$Y_i = 3 \text{ if } 4.161 \leq Y_i^* \leq 5.900$$

$$Y_i = 4 \text{ if } 5.900 \leq Y_i^* \leq 7.423$$

$$Y_i = 5 \text{ if } Y_i^* \geq 7.423$$

According to the results, however, the threshold parameters do not appear to be statistically different from each other, so the five categories should be collapsed into fewer categories.

Table 16. Ordered logit results

VARIABLE	COEFFICIENT	STANDARD ERROR	P VALUE	ODDS RATIO	P VALUE
MEALS (<750)	-.049	.49	.920	.951	.920
MEALS (<1250)	-.374	1.07	.727	.687	.727
MEALS (<1750)	.358	1.111	.747	1.431	.747
MODERATE AUTONOMY	.610	.776	.432	1.840	.432
STORE LOCATIONS	-.119	.127	.349	.887	.349
SUPPLIER ATTRIBUTES	-.064	.093	.487	.937	.487
PRODUCTION VOLUME	.589	.136	.000***	1.80	.000***
AUTONOMY LENGTH					
2	.214	.783	.784	1.239	.784
3	-1.378	.874	.115	.252	.115
4	-.428	.910	.638	.651	.638
5	-.273	.635	.667	.760	.667
FOOD ATTRIBUTES	-.068	.084	.419	.933	.419
IMPACTS	.079	.099	.426	1.082	.426
CHALLENGES	-.001	.084	.990	.998	.990
BUSINESS TYPE					
2	-1.682	1.450	.246	.185	.246
3	-1.570	1.639	.338	.208	.338
4	-1.851	1.672	.268	.157	.268
CUT 1	3.088	2.431			
CUT 2	4.161	2.444			
CUT 3	5.900	2.478			
CUT 4	7.423	2.531			

** Chi-square significant at $p < .05$

* Chi-square significant at $p < .10$

N=106 due to missing values in the remaining 3 surveys

Predicted probabilities can be predicted for each level of local sourcing. Table 17 presents the marginal effects for the 5 categories of local sourcing for each statistically significant variable. According to the results, the probability of sourcing 0-20% from local

sources increases by 14.6% per one unit increase in the composite score for *Production*. As the level of local sourcing increases, the marginal effect of *Production* decreases. The probability of 41-60% local sourcing increases by 8.4% per unit increase in *Production*. Further, the probability of 61-80% local sourcing increases by 2.8% per one unit increase and the probability of 81-100% local sourcing increases even less, at .9% per one unit increase. For *Autonomy Length*, the probability of 0-20% local sourcing is 32.8% more likely for restaurants that have been making purchasing decisions for 5-7 years than restaurants with less than 2 years of purchasing decisions. The probability of 41-60% local sourcing decreases by 16.9% for restaurants that have been making purchasing decisions for 5-7 years than restaurants with less than 2 years of purchasing decisions.

The probability of 0-20% local sourcing is 32.2% higher for independent restaurants, but 18.6% lower for the probability of 41-60% local sourcing. The probability of 41-60% local sourcing decreases by 21% for restaurants defined as “other”.

Table 17. Marginal Effects for statistically significant variables at each sourcing level

	ME for 0- 20%	P Value	ME for 21- 40%	P Value	ME for 41-60%	P Value	ME for 61- 80%	P Value	ME for 81- 100%	P Value
Production	.146	.000***	.023	.153	.084	.001***	.028	.007***	.009	.066*
Auto Length- 3 (5 to 7 years)	.328	.084*	-.093	.981	-.169	.100*	-.049	.186	-.015	.787
Bus type- 2 (Independent)	.322	.068*	.074	.600	-.186	.002**	-.148	.427	-.016	.787
Bus Type-4 (other)	.364	.172	.066	.656	-.210	.085*	-.155	.414	-.064	.539

CHAPTER V

Discussions and Conclusions

Discussion of Results

The results of this research imply that small-midsized restaurants, as defined by Curtis and Cowee (2009), have a negative propensity to purchase local food products. Specifically, restaurants serving less than 750 meals per week are 19% less likely to purchase local food products. A closer look at the raw data, however, revealed that 74% (n=51) of buyers serving less than 750 meals per week sourced at least 11% of their food products from local sources. Only 1.9% of respondents sourced greater than or equal to the threshold parameter of 41%. Moreover, the implementation of a threshold parameter for the dependent variable may have caused the results to deviate from the previous literature. Upon closer inspection, it is clear that small-midsized restaurants do source a small percentage from local producers or suppliers.

As for the level of autonomy, buyers who identified as *mostly autonomous* were 38% more likely to buy local than buyers with minimal autonomy. This may be helpful to farmers or suppliers looking to identify new buyers by focusing on restaurants that have more flexibility in purchasing decisions. In this case, independent restaurants may offer the greatest flexibility and therefore may have a greater opportunity for increased local food sourcing. According to the ordered logit model, independent restaurants may be more likely to increase local purchases up to 40%.

On the other hand, the results of this research imply that respondents that have been making purchasing decisions greater than 2 years may be less likely to purchase locally. This

may be due to the fact that they already have established business agreements with other suppliers, and are consequently averse to change. On the other hand, the ordered logit results suggest that restaurant owners and/or chefs that have been making purchasing decisions less than five years will be more likely to purchase locally up to 20%. Beyond 20%, the propensity of crossing into higher thresholds for local sourcing becomes negative. For farmers or suppliers, it may be in their best interest to contact newly established and independent restaurants to promote higher levels of local sourcing.

The two composite variables, *Impacts*, and *Production* tell an interesting story as well. The more a buyer values the broader impacts or production techniques, the more likely they will be to seek out local food sources for their business. A buyer who values the broader impacts of local food a great deal is 56.4% more likely to buy local. Similarly, if a buyer highly values local production methods, then they are 52.8% more likely to purchase locally. The ordered logit results parcel out the marginal effect of *Production* even further. According to the second model, the magnitude of impact for *Production* diminishes as the buyer crosses into higher levels of local sourcing. Moreover, the results imply that there is room for market expansion if greater advertising on the broader impacts is implemented, especially for increasing intermediate purchase of local foods between 0 and 20%. During the pilot study, a number of respondents felt that sourcing local food was simply “the right thing to do”, therefore implementing advertising techniques that focus on this perceived moral obligation may help increase indirect purchases. Overall, buyers may be more likely to purchase from local suppliers if they feel as though they are socially or economically benefiting their community and environment.

It is also important to highlight that when buyers were asked where they would *prefer* to purchase their food, 44% stated that they would like to buy directly from a farmer. Buying from

a farmers' co-op or regional distributor were tied for the second most preferred option at 13.7%. Unlike direct consumers, it appears as though indirect buyers would rather purchase from farmers despite the opportunity cost. This stated preference may be due to the fact that indirect consumers can pass off the additional opportunity costs to their customers in the form of price premiums for locally sourced menu options. Local sourcing in restaurants may be one effective way of meeting the demand for local and reducing restraints to purchasing for direct consumers. In fact, 67.8% of buyers agreed or strongly agreed that there was a growing preference for local menu options among customers.

Solutions

Other selling points for local sourcing included: 1) Higher quality, 2) Supporting local businesses, and 3) Supporting local farmers. The top challenges included the seasonal availability of fruits and vegetables and price for New Hampshire restaurants. Respondents were most interested in purchasing vegetables, fruit, cheese, and beef from local sources. The seasonal availability of local fruits and vegetables may inhibit year-round sourcing, but other measures could be taken to increase local purchases during the growing season. The most frequently cited solution by buyers was to set up a better networking environment to help connect them with farmers. Introducing a program similar to Utah's Chef-Fork program in New Hampshire may facilitate a better-connected food network. Research has found that holding workshops is effective in providing information that will strengthen farmer and restaurant relationships (Brain et al. 2015).

A second solution is to set up a better distribution system. The pilot study revealed that restaurants owners and chefs found it difficult to have to deal with multiple sources when it came

to making purchases and planning for deliveries. For example, one buyer stated that “they could not keep their refrigerator open 7 days a week for multiple deliveries”. According to the NH survey, at least 41% of buyers felt that inconsistent deliveries impacted their ability to purchase locally. Inconsistent deliveries are not a unique issue to New Hampshire. Previous studies have also found this obstacle as a major constraint (Inwood et al. 2008; FPC, 2003; Moldovan, 2016). Consolidating deliveries has the potential to lower transportation costs as well since “price” affected 61% of buyers and their ability to purchase locally.

It is interesting to highlight the fact that even though many buyers cited availability and distribution as obstacles to local sourcing, there was a very low interest in purchasing from food hubs. Specifically, only 13.7% of buyers were interested in buying from a regional food distributor, and 1.8% from a food hub. It is unclear why interest in food hubs is so low, but it is hypothesized that buyers are unaware that food hubs can provide urban buyers with products at a competitive price and quantity.

In 2014, the Kearsage Food Hub opened to help 30 local producers collectively sell their products to restaurants and institutions in Carroll county (Rudalevife, 2016). New Hampshire is also home to the Colebrook-based North Country Farmers Co-op which distributes produce to restaurants, hotels, schools, and hospitals along the Co-op's 250-mile pickup and delivery route (Rudalevife, 2016). Additionally, the Three Rivers Alliance has recently partnered with New Hampshire Community Seafood to adopt local seafood into their distribution outfit (Rudalevife, 2016). Holding informational workshops on the offerings of current New Hampshire food hubs and co-ops may help close this information gap and increase intermediate purchase of local foods.

Caveats of the Research

The sample size (109) is one factor, that despite mitigation attempts, could not be increased within the given time frame. Given a longer data collection period and repeated sampling, the study may have yielded a higher response rate. Additionally, some of the email addresses gleaned from the NH Liquor Commission website may have been obsolete or inactive during the time of data collection. In most cases, a specific contact name was not associated with each email address, therefore is hard to tell exactly which restaurant personnel was reached. Other limitations may stem from self-selection bias. Those who opted to complete the survey may have already been invested or interested in local sourcing.

The spatial distribution of respondents remained fairly consistent with county population size. Rockingham and Hillsborough are the two most populated counties in New Hampshire and the greatest number of respondents came from these two areas. Coos, Sullivan, and Belknap county yielded the fewest respondents, but roughly 350,000 fewer people live in these areas in comparison to Rockingham and Hillsborough. Due to the lack of information on restaurant demographics and distribution, it is assumed that lower populated areas also have fewer eating and drinking establishments.

Conclusion

In this study, we investigate the potential role of New Hampshire restaurants for increasing intermediate purchase of locally grown food products. Using primary survey data, we estimate a binary and ordered logistic model to identify characteristics of major local food buyers. This model expanded the previous literature through the use of a threshold parameter to define major local buyers in the Northeast market as well investigating five successive sourcing

levels. Furthermore, the model estimates revealed a negative propensity to consume local for restaurants serving less than 750 meals per week. The results also implied that restaurant owners and/or chefs that have been making food purchasing decisions longer than two years have a negative propensity to buy local. The significant negative coefficients on “length of autonomy” may be capturing the aversion to changing time withstanding business practices.

The composite variables, *Impacts*, and *Production* were found to have a significant and positive effect on the propensity to buy local. The coefficient on the valuation of attributes related to broader impacts of local food techniques may be capturing a moral obligation to purchase locally grown food products. In other words, restaurateurs may feel that it is their responsibility to help support the communities that they are serving. The positive coefficient on *Production* may be highlighting similar consumer awareness. Advocating the importance of personally knowing who and where their food came from may help increase the intermediate purchase of locally grown food products.

The summary statistics tell an interesting qualitative story as well. According to the survey results, there is little interest in making purchases from food hubs, but there is considerable interest in purchasing directly from farms. Additional responses, however, noted that making purchases from multiple suppliers can cost buyers valuable time and therefore impede their ability to source locally. Moreover, the lack of knowledge of available local suppliers may be responsible for the information gap between New Hampshire restaurants and local food producers. Further research is needed to investigate the effect of informational workshops with regional distributors and food hubs. Facilitating the distribution of information regarding the availability of local food products may help increase local sourcing through

intermediate channels. In doing so, indirect buyers and producers can help lower the opportunity cost of consuming local for direct consumers.

LIST OF REFERENCES

Allison, Paul D. (2012). *Logistic Regression Using SAS®: Theory and Application, Second Edition*. Cary, NC: SAS Institute Inc.

Amit S., Gregoire, M. B., & Strohbehn, C. (2009). Assessing Costs of Using Local Foods in Independent Restaurants. *Journal of Foodservice Business Research*, 12(1), 55-71.

Barham, J., Tropp, D., Enterline, K., Farbman, J., Fisk, J., & Kiraly, S. (2012). *Regional Food Hub Resource Guide*. Washington, D.C.: U.S. Department of Agriculture, Agricultural Marketing Service.

Brain, R., Curtis, K. & Hall, K. (2015). Utah Farm-Chef-Fork: Building Sustainable Local Food Connections. *Journal of Food Distribution Research* 46(1), 1-10.

Brown, C., & Miller, S. (2008). The Impacts of Local Markets: A Review of Research on Farmers Markets and Community Supported Agriculture (CSA). *American Journal of Agricultural Economics*. (5th ed., Vol. 90, 1298-1302.

Cameron, A. C., & Trivedi, P. K. (2010). *Microeconometrics Using Stata* (1st ed.). Texas (United States): Stata Press Publication, pp 526-28.

Chite, R.M. (2014) *The 2014 Farm Bill* (P.L. 113-79): Summary and Side-by-Side, R43076. Congressional Research Service.

City Data. Rockingham County, New Hampshire (NH). Rockingham County, New Hampshire detailed profile - houses, real estate, cost of living, wages, work, agriculture, ancestries, and more. N.p., 2017. Web. 08 May 2017.

Curtis, K. R., & Cowee, M. W. (2009). Direct Marketing Local Food to Chefs: Chef Preferences and Perceived Obstacles. *Journal of Food Distribution Research*, 40 (2), 26-36.

Donahue, B., Burke, J., Anderson, M., Beal, A., Kelly, T., Lapping, M., Ramer, H., Libby, R., & Berlin, L. (2014). *A New England Food Vision*. Durham, NH: Food Solutions New England, University of New Hampshire.

Food Processing Center. (2003). Approaching Foodservice Establishments With Locally Grown Products. Reports from the Food Processing Center, University of Nebraska-Lincoln. 1.

Guptill, A. & Wilkins, J.L. (2002). Buying into the food system: Trends in food retailing in the US and implications for local foods. *Agriculture and Human Values*, 19 (1), 39-51.

Halstead, J. M. (2013). *Sustaining and Enhancing Local Agriculture in Rural Areas: Assessing Key Producer and Consumer Issues in Northern New England*. United States Department of Agriculture/ Agriculture and Food Research Initiative Proposal. Approved (2013).

Inwood, S. M., Sharp, J.S., Moore, R. H., & Stinner, D.H. (2009). Restaurants, Chefs and Local Foods: Insights Drawn from Application of a Diffusion of Innovation Framework. *Agriculture and Human Values*, 26, 177-91.

Johnson, R. (2016). *The Role of Local and Regional Food Systems in U.S. Farm Policy*. Congressional Research Service.

Kahler, E., Perkins, K., Sawyer, S., Pipino, H., & St. Onge, J. (2013). *Farm to Plate Strategic Plan* (Rep.). Vermont.

Ralston, K., Beaulieu, E., Hyman, J., Benson, M., Smith, M., (2017). *Daily Access to Local Foods for School Meals: Key Drivers*, EIB-168, U.S. Department of Agriculture, Economic Research Service.

Rushing, J. & Ruehle, J. (2013). *Buying into the Local Food Movement*. NY. A.T. Kearney, Inc.

Low, S. A., Adalja, A., Beaulieu, E., Key, N., Martinez, S., Melton, A., Perez, A., Ralston, K., Stewart, H., Suttles, S., Vogel, S., & Jablonski, B.R. (2015). *Trends in U.S. Local and Regional Food Systems*, AP068, U.S. Department of Agriculture, Economic Research Service.

Low, S. A. & Vogel, S. J. (2011). *Direct and Intermediated Marketing of Local Foods in the United States* (Report No. 128). USDA-ERS Economic Research

Liu, Xing. (2010). "Ordinal Regression Analysis: Fitting the Continuation Ratio Model to Educational Data Using Stata". NE Conference Proceedings 2010. 35.
http://digitalcommons.uconn.edu/nera_2010/35

Martinez, S., Hand, M., Da Pra, M., Pollack, S., Ralston, K., Smith, T., & Newman, C. (2010). *Local food systems: Concepts, impacts, and issues*. Economic Research (Report No. 97). Washington, DC: Economic Research Service, U.S. Department of Agriculture. Retrieved from http://www.ers.usda.gov/media/122868/err97_1_.pdf.

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

Moldovan, J. M. (2016). *Institutional Versus Intermediated Buyers: Barriers And Requirements of Buying Local Food Products*. MSU Graduate Theses. 3036. Retrieved from <http://bearworks.missouristate.edu/theses/3036>.

Natural Resources Defense Council (NRDC). (2007). *Food miles: How far your food travels has serious consequences for your health and the climate*. Retrieved from <https://food-hub.org/files/resources/Food%20Miles.pdf>.

New Hampshire Lodging and Restaurant Association (NHLRA). (2017). *New Hampshire Restaurant Industry at a Glance*. Retrieved from http://www.restaurant.org/Downloads/PDFs/State-Statistics/2016/NH_Restaurants2016.

Oberholtzer, L. & Grow, S. (2003). *Overview and Characteristics of Producer-only Markets in the Mid-Atlantic Region: A Survey of Market Managers*. Arlington, VA: Henry A. Wallace Center for Agricultural & Environmental Policy at Winrock International.

O'Hara, J. K., & Benson, M. (2017). *Local Food Production and Farm to School Expenditures*. Retrieved from <http://purl.umn.edu/252669>.

Ortiz, A. (2010). *Customers' Willingness to Pay Premium for Locally Sourced Menu Items*. Graduate Theses and Dissertations. Paper 11314.

Oxford University Press. (2007). *Oxford Word of The Year 2007: Locavore*. Retrieved from <https://blog.oup.com/2007/11/locavore/>.

Pyburn, M., Puzacke, K., Halstead, J.M. and Huang, J.C. 2016. Sustaining and enhancing local and organic agriculture: assessing consumer issues in New Hampshire. *Agroecology and Sustainable Food Systems*,40(1), pp.69-95.

Rudalevige, C. B. (2016). Food Hubs in New Hampshire are all Over the Map-Literally. Retrieved from <http://ediblenewhampshire.ediblecommunities.com/food-thought/food-hubs-new-hampshire-are-all-over-map-literally>

Schneider, M. L. & Francis, C. A., (2005). Marketing locally produced foods: Consumer and farmer opinions in Washington County, Nebraska. *Agronomy and Horticulture—Faculty Publications*. Paper 529.

Schneider, M. L. & Francis, C. A., (2005). Marketing locally produced foods: Consumer and farmer opinions in Washington County, Nebraska. *Agronomy and Horticulture—Faculty Publications*. Paper 529.

Starr, A., Card, A., Benepe, C., Auld, G., Lamm, D., Smith, K., & Wilken, K. (2003). Sustaining local agriculture: Barriers and opportunities to direct marketing between farms and restaurants in Colorado. *Agriculture and Human Values*, 20, 301-21.

USA Data. "Rockingham County, NH." Data USA. N.p., n.d. Web. 08 May 2017.

U.S. Department of Agriculture. (2014). *Agricultural Act of 2014: Highlights and Implications*. Economic Research Service. Retrieved from <http://www.ers.usda.gov/agricultural-act-of-2014-highlights-and-implications.aspx>.

U.S. Department of Agriculture. (2016). *Executive Briefing: 2015 Local Food Marketing Practices Survey*. Issue brief. U.S. Department of Agriculture's National Agricultural Statistics Service (NASS). Retrieved from https://www.agcensus.usda.gov/Publications/2012/Online_Resources/Local_Food/pdf/LocalFoodsBriefingPresentation_FINAL.pdf.

Vieregge, M., Scanlon, N., & Huss, J. (2007). Marketing Locally Grown Food Products in Globally Branded Restaurants: Do Customers Care? (2nd ed., Vol. 10, pp. 67-82, Publication). *Journal of Foodservice Business Research*. doi:10.1300/J369v10n02_05

Vilsack, T., & Clark, C. Z. (2014). *2012 Census of Agriculture: United States Summary and State Data* (Vol. 1, Rep.). United States Department of Agriculture.

Werner, S. L., Halstead, J. M., Lemos, S. R., & Huang, J. (2017). *The Local-Organic Premium for Agricultural Produce: A Northern New England Case Study*. Working paper. Print. Selected paper prepared for presentation at the 2017 The Southern Regional Science Association (SRSA) Annual Meeting, Memphis, Tennessee.

WSDA. (2010b). Selling Directly to Restaurants and Grocery Stores. *Small farm and Direct Marketing Handbook*. Retrieved from https://foodhub.org/files/resources/WSDA_SellingDirectlyToRestaurantsAndGroceryStores.pdf

Zepeda, L. & Leviten-Reid, C. (2004). Consumers' View on Local Food. *Journal of Food Distribution Research* 35, no. 3: 1-6. Retrieved from <http://purl.umn.edu/27554>.

Appendices

Appendix A. Survey questions

A recent consumer survey conducted by the University of New Hampshire (funded by the United States Department of Agriculture) found that consumers in Maine, Vermont, and New Hampshire would like options for consuming local produce other than purchasing directly from growers or farmers markets. In other words, intermediate channels such as restaurants or grocery stores may be a better marketing strategy in terms of meeting consumer demand and lowering the opportunity cost of supporting local agriculture.

Currently, there is an information gap between New Hampshire restaurants and local food producers. This survey examines various restaurant characteristics, perceptions, and practices that affect purchasing decisions for local and non-local food products. The results will help inform future policy initiatives and provide missing information on purchasing trends, as well as strategies for expansion in the local and regional food economy.

Your honest and detailed responses are greatly appreciated. By clicking the link below and filling out this survey, you will be giving consent for your data to be stored and used for all analytical purposes as a part of a UNH Master's thesis and other possible publications that pertain to the subject matter. All information will be held confidential and reported in the aggregate. The survey includes 25 questions and should take approximately 15-20 minutes.

https://unh.az1.qualtrics.com/jfe/form/SV_eycxW0m4JfZl6Jf

Please feel free to reach out with any questions or issues with the survey link,
Amanda McLeod
Alm1052@wildcats.unh.edu

1. Is your foodservice establishment a chain/franchise, corporate, or independently owned?
(Select **ONE**)?

- 1. Chain/franchise
- 2. Independent
- 3. Corporate
- 4. Other: _____

2. What foodservice segment would your establishment most identify with (Select **ONE**)?

- 1. Upscale Full-Service Restaurant**
- 2. Casual/Family Full Service Restaurant
- 3. Limited Service (Fast Food) Restaurant**
- 4. Steakhouse/Seafood Restaurant
- 5. Hotel Restaurant**
- 6. Cafeteria
- 7. Caterer**
- 8. Farm to Table Restaurant
- 9. Pub or Brewery**
- 10. Other: _____

3. On average, how many meals do you serve weekly at your current location?
_____ meals/week

1D. What is the maximum seating capacity of patrons in your establishment? _____
Patrons

4. Which county of New Hampshire does the establishment of your current location reside in?

- 1. Belknap
- 2. Carroll
- 3. Cheshire
- 4. Coos
- 5. Grafton
- 6. Merrimack
- 7. Hillsborough
- 8. Rockingham
- 9. Strafford
- 10. Sullivan

5. What is your title or position (Select **ONE**)

- Chef
- Executive Chef
- Food Service Director
- Manger
- Owner
- Other _____

6. How many food service locations does your establishment own and operate?
_____ Locations

7. How much autonomy do you have in selecting food suppliers? (Select **ONE**)

- No Autonomy
- Not Very Autonomous
- Some Autonomy
- Mostly Autonomous
- Complete Autonomy

8. How long have you had this level of Autonomy?

- Less than 2 years
- 2 to 4 years
- 5 to 7 years
- 8 to 10 years
- Greater than 10 years

9. At what distance from your establishment would *you* consider a food source to be “local”?
(Select **ONE**)

- Within 50 miles
- Within 100 miles
- Within 200 miles
- Within 400 miles
- Within the region of New England
- Within the state of New Hampshire
- Other _____

10. Has your establishment bought any locally produced food products within the past calendar year (Defining "local" as being grown or raised within the region of New England)?

- Yes
- No → **Go to question 10C**

10B. How long has your establishment been purchasing local food products? (Defining "local" as being grown or raised within the region of New England)

- Less than 2 years
- 2 to 4 years
- 5 to 7 years
- 8 to 10 years
- Greater than 10 years

10C. Where does your establishment currently purchase the **majority** of its food products? Please rank the following suppliers in order of most used (Most used supplier as number 1).

<input type="text"/> Direct from a farmer (not from a farmer's market) (1)	<input type="text"/> From a farmer's market (5)
<input type="text"/> Direct from a farmer's co-op (not from a farmer's market) (2)	<input type="text"/> From a local manufacturer or processor (6)
<input type="text"/> From a national food service distributor (3)	<input type="text"/> From a food hub (7)
<input type="text"/> Other: _____ (4)	<input type="text"/> From a regional food service distributor (8)

11. What percentage of your establishment's monthly food purchases are pre-processed or canned?

<input type="radio"/> 0 to 10%	<input type="radio"/> 11 to 20%	<input type="radio"/> 21 to 30%	<input type="radio"/> 31 to 40%	<input type="radio"/> 41 to 50%
<input type="radio"/> 51 to 60%	<input type="radio"/> 61 to 70%	<input type="radio"/> 71 to 80%	<input type="radio"/> 81 to 90%	<input type="radio"/> 91 to 100%

12. What percentage of your establishment's monthly food purchases are locally grown or raised (Defining "local" as being grown or raised within the region of New England)?

<input type="radio"/> 0 to 10%	<input type="radio"/> 11 to 20%	<input type="radio"/> 21 to 30%	<input type="radio"/> 31 to 40%	<input type="radio"/> 41 to 50%
<input type="radio"/> 51 to 60%	<input type="radio"/> 61 to 70%	<input type="radio"/> 71 to 80%	<input type="radio"/> 81 to 90%	<input type="radio"/> 91 to 100%

13. How important are the following characteristics in selecting food products for your establishment? Please **circle** on a scale of 1 to 5 with 1 being Not Important and 5 as Very Important.

Attribute	Not Important	Slightly Important	Moderately Important	Important	Very Important
Product's Quality	1	2	3	5	5

Product's Taste	1	2	3	4	5
Product's Marketability	1	2	3	4	5
Product is Nutritious and Healthy	1	2	3	4	5
Product's Cost	1	2	3	4	5
Product is New Hampshire grown	1	2	3	4	5
Product is new England Grown	1	2	3	4	5
Ease of preparation	1	2	3	4	5
Product's Brand	1	2	3	4	5
Personally know who raised or grew product	1	2	3	4	5
Know how product was raised or grown	1	2	3	4	5

14. If given freedom of choice, where would you **prefer** to source food products from for your establishment? Please rank the following suppliers in order of preference (Most preferred supplier as number 1).

- _____ Direct from a farmer (not from a farmers' market)
- _____ Direct from a farmer's co-op (not from a farmers' market)
- _____ From a farmers' market
- _____ From a national foodservice distributor
- _____ From a regional foodservice distributor (Food Hub)
- _____ From a food broker
- _____ From a local manufacturer or processor
- _____ Other (please list) _____

15. How important are the following **supplier-related** characteristics when making purchasing decisions for your establishment? Please **circle** on a scale of 1 to 5 with 1 as Not Important and 5 as Very Important

Attribute	Not at all Important	Slightly Important	Moderately Important	Important	Very Important
Guaranteed consistent supply	1	2	3	4	5
Guaranteed consistent quality	1	2	3	4	5
How product is delivered	1	2	3	4	5
Suggestions for menu application	1	2	3	4	5
Food Safety	1	2	3	4	5
Ability to process and package products according to our needs	1	2	3	4	5
Provides wait/kitchen staff training	1	2	3	4	5
Promotion samples	1	2	3	4	5
Product knowledge	1	2	3	4	5
Ability to develop a long-term business relationship	1	2	3	4	5

16. Has your establishment ever promoted the use of the locally grown food on your menu or in your promotional material (Defining "local" as being grown or raised within the region of New England)?

- Yes
- No → Go to Question 17

If "No" on question 16, please skip to question 17B

17. How effective do you feel each of the following forms of advertisement are in promoting locally grown food in your establishment? Please **circle** your interest on a scale of 1 to 5 with 1 as Not At All Effective and 5 as Extremely Effective.

	Not at all Effective	Not very Effective	Moderately Effective	Very Effective	Extremely Effective
Menu	1	2	3	4	5
Sampling Tables	1	2	3	4	5
Wait Staff	1	2	3	4	5
Word of Mouth	1	2	3	4	5
TV/Radio Advertising	1	2	3	4	5
Newspaper Advertising	1	2	3	4	5
Website	1	2	3	4	5
Social Media (Facebook, Twitter, Instagram, etc.)	1	2	3	4	5
Other _____	1	2	3	4	5

17B. How would you like to be notified regarding the seasonal, monthly, or weekly availability of local foods? (Select **ALL** that Apply)

<input type="checkbox"/> Emailed newsletter	<input type="checkbox"/> Postal newsletter	<input type="checkbox"/> Social Media (Facebook, Twitter, or Instagram etc.)	<input type="checkbox"/> Website forum
<input type="checkbox"/> Phone call	<input type="checkbox"/> In-person	<input type="checkbox"/> Other _____	

18. What issue do you perceive as the biggest obstacle to overcome in regard to purchasing local food products? Please rank the following obstacles in order of which you perceive as the biggest to overcome (Most difficult obstacle as number 1).

- _____ Lack of Availability (1)
- _____ Inconsistent Quality (2)
- _____ Price (3)
- _____ Inconsistent Deliveries (4)
- _____ Lack of Farmer's markets (5)
- _____ Lack of Food Safety Certification (6)
- _____ Packaging Issues (7)
- _____ Additional Food Preparation Required (8)
- _____ Low Quality (9)
- _____ I do not perceive any issues with sourcing locally (10)
- _____ Limited supply due to short growing season (11)
- _____ Other _____ (12)

19. Do you **Agree** or **Disagree** that the following challenges impact your ability to source local food products (Defining "local" as being grown or raised within the region of New England)?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Lack of availability	1	2	3	4	5
Seasonal Availability of fruits	1	2	3	4	5
Seasonal Availability of vegetables	1	2	3	4	5
Low quality	1	2	3	4	5
Inconsistent quality	1	2	3	4	5
Price	1	2	3	4	5
Inconsistent delivery times	1	2	3	4	5
Lack of farmers' markets	1	2	3	4	5
Negative relationship with farmers	1	2	3	4	5
Lack of food safety certification	1	2	3	4	5
Packaging issues	1	2	3	4	5
Additional food preparation required	1	2	3	4	5
Undeveloped relationship with farmers	1	2	3	4	5
Lack of commitment by farmers	1	2	3	4	5
Lack of interest by farmers	1	2	3	4	5
Other: _____	1	2	3	4	5

20. Do you **Agree** or **Disagree** that the following characteristics are associated with purchasing local food products?

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Locally Produced food products taste better	1	2	3	4	5
They are safe to eat	1	2	3	4	5
They reduce carbon footprints	1	2	3	4	5
They help sustain the environment	1	2	3	4	5
They help support the local economy	1	2	3	4	5
They help keep local farmers in business	1	2	3	4	5
They help local farmers expand their operations	1	2	3	4	5
Locally sourced menu options attract a higher number of customers	1	2	3	4	5
There is a growing preference for local menu options among customers	1	2	3	4	5
Other	1	2	3	4	5

21. What is your establishment's **total** annual purchasing expenditures on fresh fruits and vegetables? (Select **ONE**)

<input type="radio"/> Less than \$5,000	<input type="radio"/> \$5,001 to \$10,000	<input type="radio"/> \$10,001 to \$20,000
<input type="radio"/> \$20,001 to \$40,000	<input type="radio"/> \$40,001 to \$100,000	<input type="radio"/> \$100,001 to \$150,000
<input type="radio"/> \$150,001 to \$200,000	<input type="radio"/> \$200,001 to \$250,000	<input type="radio"/> \$250,001 to \$300,000
<input type="radio"/> \$300,001 to \$400,000	<input type="radio"/> \$400,001 to \$500,000	<input type="radio"/> Greater than \$500,000

22. What specific foods would you be most interested in purchasing through a New England Food Hub or other local distributor in New England? (Select your Top **FIVE** choices)

Products	
<input type="checkbox"/> Baked goods/bread	<input type="checkbox"/> Fresh cut produce
<input type="checkbox"/> Beer	<input type="checkbox"/> Fresh fruit
<input type="checkbox"/> Beef	<input type="checkbox"/> Fresh vegetables
<input type="checkbox"/> Cheese	<input type="checkbox"/> Pork
<input type="checkbox"/> Cider/juice	<input type="checkbox"/> Poultry
<input type="checkbox"/> Eggs Yogurt	<input type="checkbox"/> Root crops
<input type="checkbox"/> Grains	<input type="checkbox"/> Seafood
<input type="checkbox"/> Herbs	<input type="checkbox"/> Wine
<input type="checkbox"/> Fluid milk	<input type="checkbox"/> Yogurt
<input type="checkbox"/> Other: _____	

23. If you have not purchased any local food products within the past calendar year, why have you not done so?

23B. If you have purchased local food products within the past calendar year, why have you done so and why do you continue to do so?

24. What solutions would you propose to help connect more local farmers to food service establishments?

25. Please state any additional comments, concerns, or questions that you may have that were not addressed in this survey.

Thank you!

Appendix B. IRB Approval Letter

University of New Hampshire

Research Integrity Services, Service Building
51 College Road, Durham, NH 03824-3585
Fax: 603-862-3564

12-Sep-2017

McLeod, Amanda
Natural Resources Dept, James Hall
140 Madbury Rd
Durham, 03824

IRB #: 6514

Study: Perception and Purchasing of Local Agricultural Products by Restaurants in the Seacoast Area

Study Approval Date: 18-Jul-2016

Modification Approval Date: 12-Sep-2017

Modification: Changes in PI & Addition of Survey

The Institutional Review Board for the Protection of Human Subjects in Research (IRB) has reviewed and approved your modification to this study, as indicated above. Further changes in your study must be submitted to the IRB for review and approval prior to implementation.

Researchers who conduct studies involving human subjects have responsibilities as outlined in the document, *Responsibilities of Directors of Research Studies Involving Human Subjects*. This document is available at <http://unh.edu/research/irb-application-resources> or from me.

If you have questions or concerns about your study or this approval, please feel free to contact me at 603-862-2003 or Julie.simpson@unh.edu. Please refer to the IRB # above in all correspondence related to this study.

For the IRB,



Julie F. Simpson