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Does E-Commerce Help Farmers' Markets? Measuring the Impact of MarketMaker

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Abstract

MarketMaker is one of the most extensive collections of electronic searchable food industry related data engines in the country with over 17,500 profiles of food related enterprises, including more than 7,600 agricultural producers and 1,295 farmers markets. This study examined the impact of MarketMaker on participating farmers' markets. Our findings indicate that about half of the farmers markets have experienced benefits from their participation in the form of new contacts, new customers and vendors, and increase in sales. Through the analysis of factors that affect the increase in farmers' markets sales due to MarketMaker we identified that the components needed for the more successful use of MarketMaker include an established MarketMaker program, an established farmers' market and an active user-manager.

Keywords: e-commerce, direct marketing, supply chain, effectiveness, economic impact, nonparametric methods

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Introduction

Agricultural producers' use of computers and the Internet has increased dramatically in recent years. In 2015, 70% of US farms had Internet access and 73% had access to a computer, compared to 29% and 47% in 1999, respectively (USDA-NASS 2015). Among these farms, 43% used computers for farm business, 19% purchased agricultural inputs over the Internet, and 16% used the Internet to conduct marketing activities. Many aspects of computer and internet use in agriculture may be attributed to e-commerce, defined as the use of the Internet to market, buy and sell goods and services, exchange information via Internet, and create and maintain web-based relationships between participant entities (Fruhling and Digman 2000). For example, Park and Mishra (2003) using data from the 2000 Agricultural Resource Management Survey (ARMS), found that 83% of US farmers used the internet for price tracking, 56% used it to access agricultural information services, and some (unreported percentage) used the Internet to keep records and transmit data to clients. Similarly, Smith et al. (2004), in a study of 517 farmers in the Great Plains states of Kansas, Iowa, Nebraska, and Oklahoma found that 62% of surveyed farmers used the internet to obtain information on commodity markets, 54% used it to gather technical information on inputs, 36% to retrieve financial information, 73% to collect weather information, and 37% to obtain information on agricultural policy.

On the other hand, the use of the internet to buy and sell agricultural products has been less common. As mentioned before, in 2013 only 16% of US farmers used internet to purchase farm inputs. Quality and service concerns have been identified as potential reasons for this unwilligness to buy online (Briggeman and Whitacre 2008). Batte and Ernst (2007) indicated that the difference in purchase prices between in-store and electronic purchases was not significant. At the same time, there is some evidence indicating higher rates of adoption and use of computers and internet among agribusiness firms such as input and service providers. Ehmke et al. (2001) showed that as early as in 2000, 79% of surveyed agribusinesses comprising farm equipment and service companies in Ohio had Internet access and 16% were selling via the Internet. Thus, until recently, the growth of e-commerce in agriculture has been heavily focused on the exchange of information and much less on direct electronic transactions.

Based on its demonstrated impact in industrial retail markets (e.g., Elia et al. 2007), e-commerce is believed to have the potential to increase profitability in agricultural markets by increasing sales, as well as decreasing costs through greater efficiency of operations and lower search costs. Gains in efficiency could result from the reduction of inventory levels, transportation costs, information costs, and order and delivery times (Batte and Ernst 2007; Montealegre et al. 2007). Moreover, the creation of electronic markets that are expected to be more transparent and competitive than physical markets, may attract more consumers and thus increase demand and improve the firm's strategic position with customers seeking specific niche products or having geographical restrictions (Batte and Ernst 2007; Montealegre et al. 2007).

However, due to a relatively new and infant state of e-commerce in agriculture, its impact has not been widely measured and documented. To the best of our knowledge, among numerous agricultural e-commerce platforms, only MarketMaker has received some attention from researchers. For example, Fox (2009) reported that 63% of Ohio registered users including producers, farmers' markets and wineries believed that the MarketMaker site was helping keep more food dollars in the regional economy. Cho and Tobias (2009) found that the average

increase in annual sales attributed to MarketMaker among 374 New York farmers was between $225 and $790. Additionally, 12% of the respondents in their study reported receiving marketing contacts through MarketMaker and using the MarketMaker directory to contact other food industry business partners. Zapata et al. (2011) reported that according to a national survey results, participation in MarketMaker allowed producers to increase their annual sales by about $121. The number of contacts received, new customers gained, and increase in annual sales due to participation in the site were positively related to self-registration on the MarketMaker site, time since registration, and monthly time devoted to the website. Thus, previous studies measured the impact of MarketMaker mostly focusing on changes in sales of participating farmers, which, given the negligible costs of using the site, could approximate its impact on profitability.

An interesting aspect of agricultural e-commerce in general and MarketMaker in particular that has not been analyzed in the previous literature is its impact on direct marketing outlets, such as farmers' markets. As an alternative marketing channel, e-commerce may have a substitute relationship with farmers' markets. However, given the fact that most e-commerce venues in agriculture so far have focused on information exchange rather than actual transactions, e-commerce efforts may have a complementary effect through providing information, visibility and awareness to new and existing farmers' markets. Farmers' markets represent a large and rapidly expanding user category of MarketMaker and other e-commerce platforms. Results from the US Census of Agriculture indicate that the value of agricultural products sold directly to individuals for human consumption more than tripled from 1992 to 2012, going from $404 million to $1,310 million. The number of farms selling products directly to the consumer also increased in the same period from 86,432 to 144,530 farms (USDA-NASS 2014). The number of farmers' markets increased from 2,410 in 1996, to 4,385 in 2006, to 8,476 in 2015 (USDA-AMS 2015). Some of the main factors affecting the increase in importance of direct marketing are the consumer's growing interest in fresh products and farm recreation, and the difficult financial situation of small farmers that is compelling them to look for alternative venues to market their products.

The goal of this study was to explore the impact of e-commerce on direct marketing venues through examination of the impact of MarketMaker on farmers' markets. The areas of interaction and impact were first presented in a logic model. The logic model was used to identify measurable metrics that were gauged using a survey of farmer's market managers participating in MarketMaker. The impact of MarketMaker was first measured through market managers' perceived increase in the number of business contacts, number of customers, number of vendors and increase in sales. Parametric and nonparametric methods were used to estimate the average values of these effects. The impact was further analyzed using an interval-censored logistic regression to estimate which factors helped increase farmers' markets' annual sales attributed to MarketMaker. The findings of this study will shed light on the interaction of e-commerce and conventional types of direct marketing in agriculture and can be used for further development and enhancement of these efforts.

MarketMaker and Farmers' Markets

MarketMaker is an interactive e-commerce tool that provides geo-coded food marketing information to food entrepreneurs and customers. The site was created in 2000 by a team of University of Illinois Extension personnel with the intention of building an electronic infrastructure that would easily connect Illinois food producing farmers with economically viable new markets and aiding in the development of quality driven food supply chains. Since then at least twenty other states have joined this project. In the last five years, Iowa, Nebraska, Kentucky, New York, Georgia, Mississippi, Michigan, Ohio, Indiana, South Carolina, Colorado, Arkansas, Florida, Pennsylvania, Louisiana, and Washington DC have launched MarketMaker state sites (Figure 1). At the time of this study in 2011, the MarketMaker sites included nearly 17,500 profiles of food related enterprises including 7,698 producers and 1,295 farmers markets. The site received about one million hits per month from over 86,000 food industry entrepreneurs.

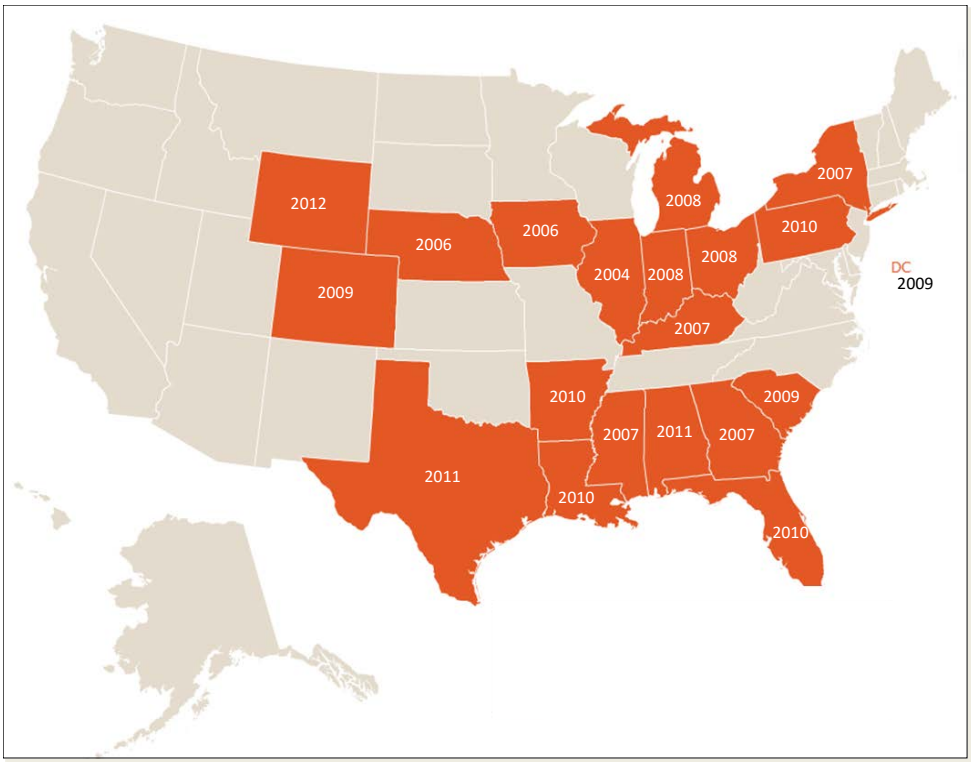

Figure 1. MarketMaker launch year by state.
Source. Adapted from the MarketMaker portal

As an electronic farm directory/food marketing tool, MarketMaker could be compared to a number of similar websites, namely Local Harvest, Farm Locator, Eat Well Guide, Rural Bounty, Local Farm Link, Chef Collaborative, Agricultural Business, Green People, Pick Your Own, Farm Bureau, USDA and various state locally grown promotion websites and local food directories. Differently from food marketing websites, such as Local Harvest, MarketMaker did not have a selling feature, meaning that one could not purchase products directly through the website. In contrast to farm directory websites, such as Farm Locator, Rural Bounty, Chef Collaborative, Agricultural Business and Pick Your Own, MarketMaker provided the benefit of

geo-mapping the information about consumers, producers, and retail outlets. For example, MarketMaker provided the ability to map consumer data related to six different demographic characteristics. Thus, for farmers, it provided information to help better target consumers and identify potential businesses with which to collaborate. For consumers and intermediaries—households, processors, handlers, retail, and wholesale companies—MarketMaker provided information to inform decisions about where to purchase products or how to identify upstream opportunities for adding value before final sale.

Farmers' markets are a special type of MarketMaker users that could take advantage of the site in their quest to grow new and expand existing farmers' markets. In many situations, the binding constraint for the initiation and/or development of farmers' markets is the number of producers willing and able to supply the products. Farmers' market managers could use MarketMaker to identify and manage the number of vendors participating in these markets. On the other hand, for the long-term success of the farmers' market, it is essential that the market is supported and well attended by a sufficient number of consumers. In this case, access to demographic and geocoded data about consumers' incomes and food preferences available through MarketMaker could help identify the best location and combination of suitable products that would best serve the needs of consumers. MarketMaker allows social media efforts as well as potential to link directly with farmers' markets thereby increasing awareness among consumers and producers about new and existing farmers' markets and their offerings.

The impact and interaction of MarketMaker with the farmers' markets is shown using a logic model in Figure 2 (see Appendix).[1] This logic model describes the linkages among project inputs, activities, outputs and outcomes. MarketMaker inputs on the national and state levels include human resources, adequate technological expertise to support program requirements, and availability of related public and private data (i.e. National Census and independent studies) as well as funds to support planned activities (i.e. training, promotion, networking, etc.). These inputs are used to conduct a series of activities such as development, updating and improvement of the content, usability and functionality of the site. MarketMaker purchases, gathers, manages, and distributes relevant existing data (i.e. socio-demographic characteristics, consumers' preferences, etc.) to farmers' market managers looking for specific vendors capable of providing specific niche products at the market. MarketMaker conducts training and promotional sessions at national, state and regional levels in order to create awareness and prepare farmers' market managers as well as participating vendors to successfully participate in MarketMaker. The adequate combination of inputs and activities will lead to accomplishment of desired outputs, which include signup and participation of new producers and farmers' markets in the MarketMaker program, as well as maintaining a comprehensive and up-to-date database of program participants. The outcomes of the program in the short term include creation of initial web presence for some farmers' markets, additional web presence for others, as well as increased interest among consumers and producers in participating in farmers' markets and MarketMaker. The intermediate-term outcomes are observed in the number of new contacts (e-mail, phone calls) generated through MarketMaker, the number of additional vendors through MarketMaker

[1] Logic models are frequently used as project planning and evaluation tools. A detailed description of logic models development and use can be found in W.K. Kellogg Foundation (2004). Applications of logic models in the academic literature are found in areas such as research and development (Jordan and Mortensen 1997), and industrial modernization (Torvatn 1999).

and changes in their composition, the number of additional customers found through MarketMaker, as well as the number of new business partnerships formed through MarketMaker. In the long-term, MarketMaker portends to increase participation of both producers and consumers in farmers' markets which will help insure success and sustainability of farmers' markets. This outcome can be measured by evaluating the changes in total sales, changes in prices received and quantities sold, as well as changes in the costs of operation of farmers' markets and ultimately profitability.

Farmers' Market Use of MarketMaker

The data on the metrics developed using the logic model described above were collected in a survey conducted in May – June 2011, in which farmers' market managers were asked about their perceptions regarding the impact of MarketMaker. The survey was distributed by email to all 1,295 farmers' market managers registered on MarketMaker websites in fifteen participant states at that time: Arkansas, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Louisiana, Michigan, Mississippi, Nebraska, New York, Ohio, South Carolina, and Washington DC. The overall response rate of the survey was 10.2% (common for online surveys according to Hamilton 2003) and it generated 132 usable observations. The sample frame size, number of respondents, and response rates by MarketMaker participant state is shown in Table 1.[2] The states with the highest response rate were Louisiana (17.5%) and Ohio (14.9%), and those with the lowest response rate were Nebraska (3.0%) and Illinois (7.3%).

In order to simplify the respondent's task and to encourage a response, most of the demographic and business information, as well as outcome measures (e.g., number of new contacts found through MarketMaker) were collected using a discrete number of categories, hence the calculation of the mean value of these variables required the use of special statistical techniques (Bhat 1994; Carpio et al. 2008; Stewart 1983).[3] Results demonstrate that the parametric estimate of the mean of the demographic and business information variables were contained in the interval formed by the lower and upper nonparametric estimates of the mean, which confirms the robustness of these findings. Thus we focus mainly on the estimated parametric mean in our discussion.

[2] Low response rates have traditionally been linked to lack of representativeness and bias in surveys results. However, several recent empirical studies analyzing the links between low response rates and low survey accuracy suggest a very weak or non-existent relation between the two (Keeter et al. 2000; Curtis et al. 2000; Brick et al. 2003; Keeter et al. 2006; Holbrook et al. 2008). Since MarketMaker does not collect data about the characteristics of participating users, it is not possible to compare the characteristics of our sample with that of the population of interest to explore the non-response bias.

[3] For specific estimation details please refer to Zapata et al. (2011) and Zapata (2012).

Table 1. Survey sample frame size; number of respondents; and response rate by state.

State	Sample Frame Size	Number of Respondents	Response Rate
Arkansas	38	4	10.53
Colorado	85	9	10.59
District of Columbia	7	1	14.29
Florida	101	7	6.93
Georgia	96	12	12.50
Illinois	219	16	7.31
Indiana	49	7	14.29
Iowa	115	14	12.17
Louisiana	40	7	17.50
Michigan	115	11	9.57
Mississippi	47	6	12.77
Nebraska	33	1	3.03
New York	209	18	8.61
Ohio	101	15	14.85
South Carolina	40	4	10.00
Total	**1,295**	**132**	**10.19**

Table 2 shows that the average age of farmer's market manager responding to this survey was fifty-one years and nearly 73% were female. Regarding characteristics of their farmers' market, survey respondents indicated that operations generate, on average, about $135,820 in total annual sales and the average annual costs are about $10,680. Survey results also revealed that, on average, participating farmers' markets have been in operation for 8.5 years and most of them (63%) operate once a week.

Table 3 demonstrates that most of the farmers' market managers responding to the survey (66%) indicated they had registered on the site by themselves, 8% indicated that they were registered by someone else, and 26% did not know how they became registered in MarketMaker. This finding may be explained by the fact that in some states farmers' market lists provided by State Departments of Agriculture were used to initially populate the MarketMaker database. On average, respondents have been registered on the site for 18.8 months. About 34% of respondents have been registered for less than twelve months, 34% have been registered between twelve and twenty-four months, and 31% have been registered for more than twenty-four months (Table 3).

Table 2. Description and summary statistics of respondents characteristics

Variable Name (Units)	Category	Category Proportion	Mean	
			Nonparametric lower and upper bounds	Parametric
Gender	1=Female	72.53		0.73
	0=Male	27.47		
Age				51.00
Total annual sales ($1,000)	Less than 10	29.90	(97.63, 214.84)	135.82
	10 to 50	27.84		
	50 to 100	12.37		
	100 to 250	16.49		
	250 to 500	6.19		
	500 to 1,000	3.09		
	Over 1,000	4.12		
Annual cost of operation ($1000)	Less than 1	28.43	(7.82, 17.73)	10.68
	1 to 5	27.45		
	5 to 10	19.61		
	10 to 20	6.86		
	20 to 50	9.80		
	More than 50	7.84		
Years of operation	Less than 2	7.69	(6.43, 12.43)	8.54
	2 to 3	14.42		
	3 to 4	12.50		
	4 to 10	29.81		
	10 to 15	15.38		
	More than 15	20.19		
Time of operation	Daily	1.92		
	2 to 3 times a week	11.54		
	Once a week	63.46		
	Once a month	1.92		
	2 to 4 months a year	5.77		
	5 to 8 months a year	11.54		
	8 to 12 months a year	3.85		

Table 3. Registration and time spent on MarketMaker.

Variable Name (Units)	Category	Category Proportion	Mean	
			Nonparametric lower and upper bounds	Parametric
Registration type	Self-registered	65.75		
	registered by someone else	8.22		
	don't know	26.03		
Time registered on MarketMaker (Months)	Less than 1	4.29	(14.32, 24.81)	18.84
	1 to 6	18.57		
	7 to 12	11.43		
	12 to 24	34.29		
	24 to 36	20.00		
	36 to 48	8.57		
	More than 48	2.86		
Time spend on MarketMaker activities (Minutes/month)	Less than 30	76.81	(30.88, 85.75)	50.04
	30 to 60	13.04		
	61 to 120	2.90		
	121 to 300	2.90		
	301 to 600	1.45		
	More than 600	2.90		
Overall satisfaction	Very satisfied	8.22		
	Satisfied	28.77		
	Neutral	60.27		
	Dissatisfied	1.37		
	Very dissatisfied	1.37		

With respect to the time devoted to the website, farmers' market managers registered on MarketMaker spend about fifty minutes per month managing their account, with nearly 77% of the respondents devoting less than thirty minutes per month on MarketMaker related activities (Table 3). Participants were also asked about their overall satisfaction with MarketMaker. Survey results demonstrate that 37% of farmers' market managers were very satisfied or satisfied with MarketMaker, 60% had a neutral perception, and 2.7% were very dissatisfied or dissatisfied with MarketMaker. Farmers' market managers report various degrees of intensity with respect to the use of MarketMaker features (Table 4). The features that were most commonly used (sometimes and frequently) are the "log on to check or update profile" (22% of users), and "search for new vendors" (23%). Less commonly used features included "search for products" and "reach out to customers," which were used sometimes or frequently by about 19% and 14% of users, respectively.

Table 4. MarketMaker features and their rate of use by participants.

Feature	Never	Rarely	Sometimes	Frequently
Log on to Check or Update Profile	0.39	0.40	0.20	0.02
Search for Products	0.50	0.31	0.15	0.04
Search for new vendors	0.54	0.23	0.19	0.04
Reach out to customers	0.55	0.32	0.12	0.02
Other	0.78	0.13	0.04	0.04

Table 5 describes survey findings regarding the outcomes of farmers' market participation in MarketMaker. All the outcomes are highly censored with large proportions of responders reporting zero outcomes. Moreover, all the outcomes but the change in sales variable are discrete (i.e., counts). Thus, the normal distribution assumption required for parametric mean estimation is likely to be violated for these data. Therefore, we evaluate and discuss these findings in terms of the lower and upper bounds of their nonparametric means which are robust to any distributional misspecifications. Respondents indicated that since registration, as a result of their participation with MarketMaker, they have been contacted, on average, about 0.8 to 2.1 times by customers and vendors.[4] However, 69% of farmers' market managers in our sample have not yet received any contacts due to MarketMaker. In terms of the number of new vendors gained, respondents indicated that their participation in MarketMaker has helped them obtain an average of 0.4 to 1.2 new vendors (76% indicated that they have not yet gained new vendors through the site). Participants also reported that as a result of their participation with MarketMaker they have gained, on average, 1.2 to 5.0 new customers, (63% of the respondents have not yet obtained new customers).

The average annual increase in sales due to participation in MarketMaker was estimated to be between 0.72% to 6.42% (43% of the participants have not yet experienced any increase in annual sales). Relative to the average annual sales of $135,820, these figures indicate average increase in annual sales between $977 to $8,720 per farmers' market. It is important to note that the increase in sales in the farmers' market is likely due to the combined effect of attracting new vendors and new customers.

[4] These values likely represent a lower bound of actual MarketMaker contacts due to attribution bias, since with the lack of interaction (especially between new customers and farmers' market managers) new contacts rarely communicate their source of information.

Table 5. Farmers' market managers' perceived effect of participating in MarketMaker.

Variable Name	Category	Category Proportion	Nonparametric Mean lower and upper bounds
Marketing contacts	0	69.33	(0.77, 2.13)
	1 to 5	24.00	
	6 to 10	4.00	
	11 to 20	2.67	
New vendors	0	76.40	(0.42, 1.21)
	1 to 4	19.10	
	5 to 10	4.49	
New customers or buyers	0	63.41	(1.22, 5.00)
	1 to 10	31.71	
	11 to 25	2.44	
	26 to 50	2.44	
Increase in annual sales	0%	42.86	(0.72, 6.42)
	1% to 10%	50.00	
	10% to 19%	7.14	

Note. Marketing contacts, new vendors and new customers refer to the total contacts, vendors and customers gained since the Farmers' Market became registered on the MarketMaker website.

Among farmers' markets that believe they have experienced increase in sales, most (50% of the whole sample) believed sales went up in the range of 1% – 10%, and some (7% of the whole sample) believed sales went up by 10%-19%. In the remainder of this study we focus on the impact of the MarketMaker on farmers' markets sales and examine the factors that affect this impact. Since sales measure some of the longer term outcomes, they would encompass several shorter term outcomes discussed in this section and thus represent a more comprehensive measure of MarketMaker impact.

Factors Affecting the Impact of MarketMaker on Farmers' Market Sales

Estimation Methods

The choice of the estimation procedure for assessing the factors that affect the impact of MarketMaker on farmers' market sales was driven by the nature of the dependent variable. The data on changes in sales of farmers' markets due to MarketMaker was collected in discrete interval format as shown in Table 5. Since the OLS estimation of this type of data results in asymptotic bias (Stewart 1983), we followed a maximum likelihood procedure developed by Bhat (1994) to compute a continuous and reliable value for changes in sales. This approach is suitable for data collected within broad intervals.

Denoting the true (but unobserved) value of the variable of interest for the i[th] individual as y_i and the boundary values for the k[th] interval selected as A_{k-1} and A_k, the probability that y_i is in the k[th] interval is given by:

$$(1) \quad \mathrm{P}\left(\mathrm{A_{k\text{-}1}} \leq \mathrm{y_i} \leq \mathrm{A_k}\right) = \mathrm{F(A_k)\text{-}F(A_{k\text{-}1})} \qquad \mathrm{i} = 1,2,\ldots.\mathrm{N},$$

where F(.) is the underlying probability distribution of variable *y* (Day 2007; Turnbull 1976).

The probability of observing a particular set of responses in a random sample of N individuals from the population of interest is then given by the likelihood function:

$$(2) \quad \mathrm{L} = \prod_{\mathrm{i=1}}^{\mathrm{N}} \mathrm{F(A_k)\text{-}F(A_{k\text{-}1})}.$$

In order to express the likelihood function in terms of the interval options available to the respondent, we create a dummy variable d_{ik} which indicates whether an individual chooses the k[th] interval among K options. Using this indicator variable and the generic likelihood function in (equation 2) the resulting log-likelihood function is:

$$(3) \quad \ln L = \sum_{i=1}^{N} ln \sum_{k=1}^{K} d_{ik}[\mathrm{F}(A_k) - \mathrm{F}(A_{k-1})].$$

The parametric procedure assumes that the variable y follows a normal distribution with mean μ and variance σ^2. Consequently, the log-likelihood function can be written as:

$$(4) \quad \ln L = \sum_{i=1}^{N} ln \sum_{k=1}^{K} d_{ik}[\Phi\left(\frac{A_k-\mu}{\sigma}\right) - \Phi(\frac{A_{k-1}-\mu}{\sigma})],$$

where F(.) in equation 3 has been replaced by the cumulative standard normal $\Phi(.)$. Parameter estimates for μ and σ can then be obtained by using maximum likelihood estimation procedures. Moreover, the parameter μ can be modeled as a function of explanatory variables. In particular, the parameter μ can be expressed as $\mu = \boldsymbol{X_i}\boldsymbol{\beta}$, where $\boldsymbol{X_i}$ is a vector of explanatory variables (including 1 for the intercept) and $\boldsymbol{\beta}$ the corresponding vector of parameters.

In the context of this study, the variable of interest "change in sales of farmers' markets due to MarketMaker" (*y*) is also censored since a high proportion of respondents reported a 0% change in sales due to Market Maker. Following the logic of the traditional Tobit model, the expected value of change in sales, considering that they are higher or equal to zero, is given by

$E[y] = \Phi\left(\frac{\boldsymbol{X_i}\boldsymbol{\beta}}{\sigma}\right)\boldsymbol{X_i}\boldsymbol{\beta} + \sigma\varphi\left(\frac{\boldsymbol{X_i}\boldsymbol{\beta}}{\sigma}\right)$, where $\varphi(.)$ is the standard normal density function. The marginal effects on this mean values are given by $\frac{\partial E[y]}{\partial \boldsymbol{X_i}} = \boldsymbol{\beta}\Phi\left(\frac{\boldsymbol{X_i}\boldsymbol{\beta}}{\sigma}\right)$ (Greene 2003). The

asymptotic covariance matrix of both the coefficient estimates and the marginal effects was approximated using the non-parametric bootstrapping procedure outlined by Wooldridge (2002, p. 379). A total of 1,000 replications were used to generate standard errors.

Since very little is known about factors that affect the use and impact of e-commerce in agriculture (i.e., the vector $\boldsymbol{X_i}$), we built our hypotheses in this study based on the logic model developed for MarketMaker evaluation. The outcome that we focused on was farmers' market sales due to MarketMaker. This outcome is affected by inputs, activities and outputs. As Figure 2 (see Appendix) indicates, these inputs, activities and outputs were differentiated at the national, state and individual level. At the national level the impact of MarketMaker could differ across the country due to the regional differences in the farmers' markets and the consumer interest in their products, however the regional effects (e.g., North vs. South) could not be hypothesized a priori. States differed widely in terms of MarketMaker activity. As shown in Figure 1, some states have participated in MarketMaker since 2000, while others were very new to this tool. We hypothesized that the length of presence of MarketMaker in the state would have a positive effect on its impact (especially longer term impact such as sales) due to the larger amount of inputs and activities devoted to the project over time.

At the individual level, user characteristics hypothesized to affect the impact of MarketMaker included farmers' market total annual sales, years in operation, the age and gender of the farmers' market manager, and intensity of MarketMaker use. Total farmers' market sales were included to represent the size of the business, which could have a positive effect on the impact of MarketMaker since the costs of learning and implementing e-commerce tools could be spread out across a larger scale of operation. On the other hand, e-commerce could be very effective in identifying niche markets for smaller users, thus the expected relationship between the size of the farmers' market and the impact of MarketMaker was ambiguous. The years in operation variable was included to explore the effect of MarketMaker helping to establish new operations (among the markets that are less than four years old) or expanding existing operations among the older markets. The age of the farmers' market manager was used as a proxy for the level of technical ability. We expected younger managers to be more technologically adept and be able to take a better advantage of MarketMaker. The expected relationship between sales and gender was ambiguous. The extent of participation was deemed an important determinant for MarketMaker impact. "Frequent" users (those who spend more than thirty minutes a month) were expected to gain more benefits from MarketMaker than "passive" users. Variable definitions and the results of the estimation are shown in Table 6.

Estimation Results

The results of the estimation shown in Table 6 demonstrate the impact of the independent variables on the percentage increase in farmers' markets annual sales attributed to MarketMaker. The unconditional mean percentage increase in annual sales was estimated at 4.04% which is within the estimated nonparametric lower and upper bounds of the mean reported in Table 5.

Three out of seven variables included in the model were statistically significant at the 10% level. As expected, years of MarketMaker presence in the state were positively related to its impact. For each additional year of MarketMaker presence in the state, the farmers' market sales attributed to MarketMaker increased by 0.46%. This result differentiates the experience of the farmers' markets in the states with established MarketMaker programs from the newer program participants and demonstrates program's potential for new users. Our second finding is that MarketMaker has larger impacts on established farmers' markets. The increase in sales for

established farmers' markets (more than four years in operation) was 1.71% greater than that for the newer ones. This finding suggests that MarketMaker impact on farmers' markets is larger in terms of expanding existing capacity than in helping create a new one. By far the largest determinant of MarketMaker impact was the type of user. Frequent users (those who spend more than thirty minutes per month on their MarketMaker activities) experienced an almost 3.78% larger increase in sales compared to passive users. This result indicates that in order to see the impact of MarketMaker on their operations, users have to invest time and effort in making the program work for them. It also demonstrates the payoff users can expect for their time investment. Overall these findings outline the components needed for the more successful use of MarketMaker by the farmers' markets: an established program, an established market and an active user-manager. With these components in place, MarketMaker can help significantly increase sales at participating farmers' markets.

Table 6. Interval-censored analysis of the factors affecting farmers' market sales attributed to MarketMaker.

Variable	Parameter Estimate	Standard Error	Marginal Effect	Standard Error
Intercept	-0.076	3.613		
Region (South=1, Mid-west=0)	0.058	1.875	0.044	0.073
Years in operation (Less than 4 years =0, More than 4 years =1)[a]	2.247*	1.616	1.714*	1.224
Total sales (Less than $50,000 =0, More than $50,000 =1)	1.301	1.500	0.992	1.167
MM type of user (Frequent user =1, Passive-user=0)	4.950***	1.913	3.776***	1.511
Manager gender (Female=1, Male =0)	-1.339	1.525	-1.0211	1.173
Manager age (Years)	-0.038	0.059	-0.029	0.045
Years of MM presence in the state	0.608*	0.386	0.463*	0.296
Sigma	4.152***	0.813		

Notes. N=56. Dependent variable is percentage increase in sales attributed to MM with the following observed intervals: no increase in sales (24 obs.), 0.01% - 9.99% (28 obs.), 10% - 19% (4 obs.).
[a] Significance levels of 0.01, 0.05 and 0.10 are indicated by ***, ** and *, respectively.

Summary and Conclusions

The goal of this study was to estimate the impact of MarketMaker on farmers' markets. The impact was measured on several levels. First we identified the perceived outcomes through the survey of farmers' market managers. Second we analyzed factors that affect the increase in farmers' markets sales due to MarketMaker participation.

Our survey respondents indicated that as a result of their participation with MarketMaker, farmers' market managers have been contacted, on average, about 0.8 to 2.1 times by customers and vendors and obtained an average of 0.4 to 1.2 new vendors and 1.2 to 5.0 new customers. The average annual increase in sales due to participation in MarketMaker was estimated at about 4.04%, or $5,487.13 per farmers' market. While only about a third of the sample gained new

vendors and contacts, about half of the sample reported increase in sales, suggesting that MarketMaker has been effective in promoting existing farmers' markets.

Through the analysis of factors that affect the increase in farmers' markets sales due to MarketMaker, we identified the components needed for the more successful use of MarketMaker by the farmers' markets, namely, an established MarketMaker program, an established farmers' market and an active user-manager. Thus our findings suggest that the program works when people use it and demonstrate program potential for new users. The fact that more established farmers' markets are able to achieve higher increase in sales than the new ones suggests that MarketMaker is more effective in expanding existing, rather than helping create new capacity. Finally, higher sales among more active users indicate that in order to see the impact of MarketMaker on their operation, users have to invest time and effort in making the program work for them. With these components in place, MarketMaker can help increase sales at participating farmers' markets. Given MarketMaker's relative infancy, our findings establish a track record and demonstrate potential among the more successful users of the program as well as the factors needed for the program to succeed.

Finally, several limitations of this study have to be mentioned along with suggestions for future research. This study focused on the impact of MarketMaker on a single segment of its users, the farmers' markets. Evaluation of the full impact of MarketMaker would require the evaluation of effect on all of its users (which would include farmers, consumers, intermediaries, etc.) and comparing the combined benefits that they receive from the site to the costs of developing and delivering the platform.Given the declining survey response rates observed in the recent literature, future studies will likely face similar challenges that we encountered in this study associated with the low response rates. MarketMaker administrators could help address these challenges and enable evaluation of the non-response bias in the data by collecting basic demographic information of its users. As MarketMaker evaluation studies are moving forward, future studies could use our results as a benchmark to assess changes in its impact over time. Furthermore, broader studies could evaluate the competitive performance of MarketMaker relative to the other e-commerce tools.

References

Batte, M.T., and S. Ernst. 2007. "Net gains from net purchases? Farmers' preferences for online and local input purchases." *Agricultural and Resource Economics Review* 36(1): 84–94.

Bhat, C.R. 1994. "Imputing a continuous income variable from grouped and missing income observations." *Economics Letters* 46: 311–319.

Briggeman, B., and B. Whitacre. 2008. "Farming and the internet: Factors affecting input purchases online and reasons for non-adoption." Paper presented at the annual meetings of the Southern Agricultural Economics Association, Dallas, TX.

Carpio, C.E., M.K. Wohlgenant, and C.D. Safley. 2008. "Relative importance of factors affecting customers' decisions to buy pick-our-own versus pre-harvested fruit at North Carolina farms." *Journal of Agricultural and Applied Economics* 40(3): 983–997.

Cho, K.M., and D.J. Tobias. 2009. "Impact assessment of direct marketing of small- and mid-sized producers through food industry electronic infrastructure MarketMaker." Paper presented at the National MarketMaker Annual Partnership Meeting, Broomfield, CO. November 3–4.

Day, B. 2007. "Distribution-free estimation with interval-censored contingent valuation data: Troubles with Turnbull?" *Environmental and Resource Economics* 37(4): 777–795.

Ehmke, C., S. Ernst, J. Hopkins, and L. Tweeten. 2001. "The market for e-commerce services in agriculture." Paper presented at the annual meetings of the Agricultural and Applied Economics Association, Chicago, IL. May 15.

Elia, E., L.A. Lefebvre and E. Lefebvre. 2007. "Focus of B-to-B e-commerce initiatives and related benefits in manufacturing small- and medium-sized enterprises." *Information Systems and E-Business Management* 5(1): 1–23.

Fox, J.L. 2009. "Exploring and improving marketing practices and regional market access for Ohio's food producing farmers." Paper presented at the National MarketMaker Annual Partnership Meeting. Broomfield, CO. November 3-4.

Fruhling, A.L., and L.A. Digman. 2000. "The impact of electronic commerce on business-level strategies." *Journal of Electronic Commerce Research* 1(1): 13–22.

Greene, W. H. 2003. Econometric Analysis. Pearson Education, Inc., Upper Saddle River, NJ.

Jordan, G.B., and J.C. Mortensen. 1997. "Measuring the performance of research and technology programs: A balanced scorecard approach." *Journal of Technology Transfer* 22(2): 13–20.

Montealegre, F., S. Thompson, and J.S. Eales. 2007. "An empirical analysis of the determinants of success of food and agribusiness e-commerce firms." *International Food and Agribusiness Management Review* 10(1): 61–81.

Park, T., and A. Mishra. 2003. "Internet usage by farmers: Evidence from a national survey." Paper presented at the annual meetings of the Agricultural and Applied Economics Association, Montreal, Canada. July 27–30.

Smith, A., W.R. Goe, M. Kemey, and C.J. Morrison Paul. 2004. "Computer and internet use by Great Plains farmers." *Journal of Agricultural and Resource Economics* 29(3): 481–500.

Stewart, M.B. 1983. "On least square estimation when the dependent variable is grouped." *Review of Economic Studies* 50(4): 737–753.

Torvatn, H. 1999. "Using program theory models in evaluation of industrial modernization programs: Three case studies." *Evaluation and Program Planning* 22(1): 73–82.

Turnbull, B.W. 1976. "The empirical distribution function with arbitrarily grouped, censored and truncated data." *Journal of the Royal Statistical Society* Series *B* 38(3):290–95.

USDA-NASS. 2015. "Farm Computer Usage and Ownership 2015." http://usda.mannlib.cornell.edu/usda/current/FarmComp/FarmComp-08-19-2015.pdf [accessed February 2016].

USDA-AMS. 2015. "Farmers Markets and Direct-to-Consumer Marketing." http://www.ams.usda.gov/services/local-regional/farmers-markets-and-direct-consumer-marketing [assessed February 2016].

USDA-NASS. 2014. "2012 Census of agriculture." http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume1, Chapter1US/usv1.pdf [accessed February 2016].

W.K. Kellogg Foundation. 2004. "Using logic models to bring together planning, evaluation, and action: Logic model development guide." http://www.wkkf.org/knowledge-center/resources/2006/02/WK-Kellogg-Foundation-Logic-Model-Development-Guide.aspx [accessed August 2011].

Wooldridge, J. M. 2002. Econometric Analysis of Cross Section and Panel Data. MIT Press, Cambridge, USA.

Zapata, S.D., C.E. Carpio, O. Isengildina-Massa, and R.D. Lamie, 2011. "Do internet-based promotion efforts work? Evaluating MarketMaker." *Journal of Agribusiness* 29(1): 159–180.

Zapata, S.D. 2012. "The economic impact of the services provided by an electronic trade platform: the case of MarketMaker." In *Three essays on contingent valuation*. Ph.D. dissertation. Clemson University.

Appendix

Figure 2. MarketMaker Logic Model for Farmers' Markets

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Caribbean Food Import Demand: An Application of the CBS Differential Demand System

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Abstract

This study uses a Central Bureau Statistics (CBS) demand system to estimate food import demand parameters for the Caribbean region. The analysis is based on food import data for 1961–2009 from the FAO-STAT database. The study determined that for the defined period the Caribbean food import demand was price inelastic, and that tourism arrivals and real income growth were not statistically significant in determining food import demand. However, per capita agricultural production was found to be statistically significant in determining Caribbean food import demand over the study period.

Keywords: Caribbean; Central Bureau Statistics demand system; food import demand; price elasticity; scale elasticity

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Introduction

The Caribbean region comprises a diverse set of countries, including the small island nations of the Organization of the Eastern Caribbean States (OECS) and Barbados, the larger island nations of Haiti, Trinidad and Tobago, Dominican Republic, Cuba and Jamaica, the continental countries of Guyana, Belize and Suriname, and several dependent territories and special municipalities. As small, open economies[1], they are easily affected by global events, and tend to rely on the United States, the European Union, China and Taiwan for trade, economic assistance and financial investment. The region also has a history of high levels of international migration. Several countries in the region hold membership in the Caribbean Community (CARICOM) and the Organization of the Eastern Caribbean States (OECS); these organizations were established in 1973 and 1981, respectively, in order to enhance the economic leverage and effectiveness of member states in their integration efforts with the global economy. Among other objectives, they promote socio-economic development and functional cooperation among members, and coordinate policy formulation within the region. Table 1 lists the member and associate states of both organizations, along with the other countries and territories of the Caribbean region.

With the exception of Belize, Guyana, and Suriname, most Caribbean countries are net food importers that have grown increasingly dependent on food imports over time. Increased incomes and population, urbanization, lifestyle changes, expansion of the tourism sector, the decline in agriculture and low domestic capacity for food production in general have been identified as contributing factors (Caribbean Community 2010; Gonzalez 2011). Imported foods account for much of the caloric intake in the region, and particularly for subgroups such as CARICOM. For some food categories—staples[2] in particular—the gap between domestic consumption and production is quite significant, with consumption two to nearly four times greater than production (Mendoza and Machado 2009). The vulnerability posed by this gap was apparent during the global food price escalations in 2007/2008: across the Caribbean, food price increases directly impacted domestic inflation rates[3] but had no discernible impacts on food import levels, signaling an inelastic demand for food imports to the region (Mendoza and Machado 2009). Food import bills across the region increased sharply in 2008, with CARICOM spending close to US $4 billion on food imports in that year alone (IICA 2010). It is worth noting that as a subgroup of Caribbean countries, issues faced by CARICOM members are consistent with those that affect the region in general.

Given geographical proximity, the United States is a major supplier of food products to the Caribbean with an estimated market share of 58%, and the region is the 7th largest export market for US consumer-oriented foods (Gonzalez and Nishiura 2013). In 2009, approximately 87% of the wheat imported into the CARICOM was sourced from the United States, in addition to 98% of maize imports and 79% of poultry imports (Agritrade 2011). Overall, the strong appeal of US

[1] Open economies are those that readily engage in international trade and global financial transactions. Proxies most widely used in economic literature to reference small size include a country's population size and its share of world trade. Despite a high degree of openness, small states usually represent very small shares of world trade (WTO, 2002), and are price takers in international markets.

[2] In the context of the Caribbean diet, staples comprise such food items as corn, potatoes, rice, wheat, cereals and pulses, and are the dominant portion of the diet. Wheat is not grown in the region and must be imported.

[3] The effect of price increases on the Caribbean consumer price index is expected given the importance of food imports in the consumption basket on which the index is based.

products among the Caribbean population and the expansion of the tourism sector are additional factors that fuel the demand for US products (Gonzalez 2014).

Table 1. The CARICOM, the OECS, and other Caribbean countries and territories

(a) Member and Associate States of the CARICOM and the OECS[4]	**(b) Other**
Antigua and Barbuda*	Cuba
Anguilla*	Dominican Republic
The Bahamas	Aruba, Curacao, Sint Maarten, Bonaire,
Barbados	Saint Eustatius, and Saba[5]
Belize	Guadeloupe, Martinique, St. Barthélemy,
Bermuda	and St. Martin[6]
British Virgin Islands*	Puerto Rico
Cayman Islands[a]	United States Virgin Islands
Dominica*	
Grenada*	
Guyana	
Haiti	
Jamaica	
Montserrat*	
St. Lucia*	
St. Kitts and Nevis*	
St. Vincent and the Grenadines*	
Suriname	
Trinidad and Tobago	
Turks and Caicos	

Given the preceding context, the objectives of this study are to characterize the trends in food imports to the Caribbean and to estimate agricultural food import demand parameters. Our analysis is based on data for 1961-2009 from the FAO-STAT database. The Central Bureau Statistics (CBS) demand system by Keller and Van Driel (1985) is used to estimate the food import demand parameters, and is specified as a set of partial-differential equations. Aside from one study that looked at Caribbean import demand for starchy staple foods (Dameus et al. 2001), we are unaware of other studies that analyze Caribbean food import demand across several food product categories. Research that addresses this deficit could allow for better understanding of food import demand in the region, particularly in light of its importance as an export market for US consumer oriented foods.

[4] The countries listed in part (a) comprise the Caribbean Community (CARICOM). Anguilla, Bermuda, the British Virgin Islands, the Cayman Islands, and the Turks and Caicos Islands are associate member states of CARICOM. Although not it is considered part of the Caribbean geographically, Bermuda acquired membership in July 2003, and is therefore listed. The Organization of the Eastern Caribbean States (OECS) subgroup is denoted by an asterisk. Anguilla and the British Virgin Islands are associate member states of the OECS. Anguilla, Bermuda, the British Virgin Islands, the Cayman Islands, Montserrat and the Turks & Caicos Islands are also British Overseas Territories.
[5] This group comprises the Dutch Caribbean. The first three islands are constituent countries of the Kingdom of the Netherlands. The last three islands are characterized as special municipalities of the Netherlands.
[6] This group comprises the French Overseas Territories.

Changing Dynamics in the Caribbean Economy

The past fifty years have been a period of remarkable socio-economic change in the region. Within this time frame, most countries achieved independence and became more deeply integrated with the global economy, albeit via a system of protected integration that ensured Caribbean agricultural exports preferential access to European markets (Lewis 2002). For decades, the sugar and banana industries were the primary foreign exchange earners for some countries and received higher preferential marketing prices under the Lomé Convention[7]. Despite the benefits afforded by preferential access, it tended to disincentivize production of more highly valued, non-traditional agricultural commodities for export markets (ECLAC 2010). It also reinforced and encouraged production and export of a narrow range of primary commodities by most of the countries in the region. Caribbean agricultural trade therefore remained relatively undiversified, with agricultural production more export oriented and poorly aligned with domestic food and manufacturing production (Hornbeck 2008).

In 2006, the challenges of globalization and the emergence of a single European (EU) market led to trade reforms away from quotas to a tariff-only system, thereby exposing Caribbean economies to greater global competition. With the loss of preferential market access, an inability to effectively compete in global markets became apparent: production constraints imposed by small size significantly limited the possibilities for exploiting economies of scale, resulting in higher costs for exported goods and reduced competitiveness of the sugar and banana industries. Significant economic and employment losses were recorded in several countries, particularly those that relied on earnings from sugar and banana exports.

In the years following these events, some regional governments have opted to pursue economic diversification strategies oriented more toward service sectors such as financial services and tourism. The tourism sector expanded significantly over the past thirty years and, except in the immediate aftermath of the September 2001 terrorist attacks and the 2008 global recession, recorded solid growth during the 2000s due to foreign direct investment inflows and steady growth in key advanced economies. Tourism has assumed greater economic importance in many Caribbean countries, as reflected in its contribution to GDP, employment and foreign exchange earnings, in particular, at the regional level and in individual countries. At the regional level, tourism revenues comprised about 16.6% of GDP between 1980 and 2008. At national levels, the tourism sector's importance is even more pronounced: in 2008, for example, its share in GDP ranged from 4.4% in Suriname to 73.5% in Antigua and Barbuda. Similar trends were evident for its share in total employment: from 4% in Suriname to 80.6% in Antigua and Barbuda (WTTC 2009; ECLAC 2010). The World Travel and Tourism Council (WTTC) estimated that travel and tourism contributed about US $26.2 billion dollars of visitor export earnings to Caribbean economies in 2011 (WTTC 2011). Economic trends such as these could be expected to positively affect levels of food imports to the Caribbean (Gonzalez 2011).

In contrast, the contribution of the agricultural sector to GDP has declined over time for the region as a whole (Agritrade 2011; Bourne 2008). On the supply side, productivity constraints

[7] The Lomé Convention provided a framework of cooperation between the European Community (EC) and the developing African, Caribbean and Pacific (ACP) Countries. It provided for duty free entry of agricultural exports into the EC. It also offered preferential access based on a quota system.

due to small scale operations, limited public and private investment, labor shortfalls and natural disasters are key factors that have contributed to low food production capacity. In addition, the divergence between the commodity composition of domestic food demand and that of domestic food supply, and a lack of price competitiveness in export and domestic markets are other issues that further exacerbate weak performance of the sector in many Caribbean countries (Bourne 2008). With respect to lack of price competitiveness in domestic markets, imported food products are often significantly cheaper than domestic production in some countries (Agritrade 2011).

In tandem, the aforementioned conditions appear to have contributed to the region's dependency on food imports over time. Import data from the Food and Agriculture Organization (FAO) for 1961-2009 show the trends in Caribbean food imports across several product categories (Figures 1 and 2). These include dairy, animal products, fruits and vegetables, oils, staples and a miscellaneous foods category, which includes beverages and spices. Imports increased across all food categories over time, with the largest increases recorded for the staples and miscellaneous foods categories. The staples and miscellaneous foods categories show the largest increases in import quantities over time (Figure 1). Consequently, import values also increase over time, and particularly for the miscellaneous foods category that comprises more high-value consumer food products (Figure 2).

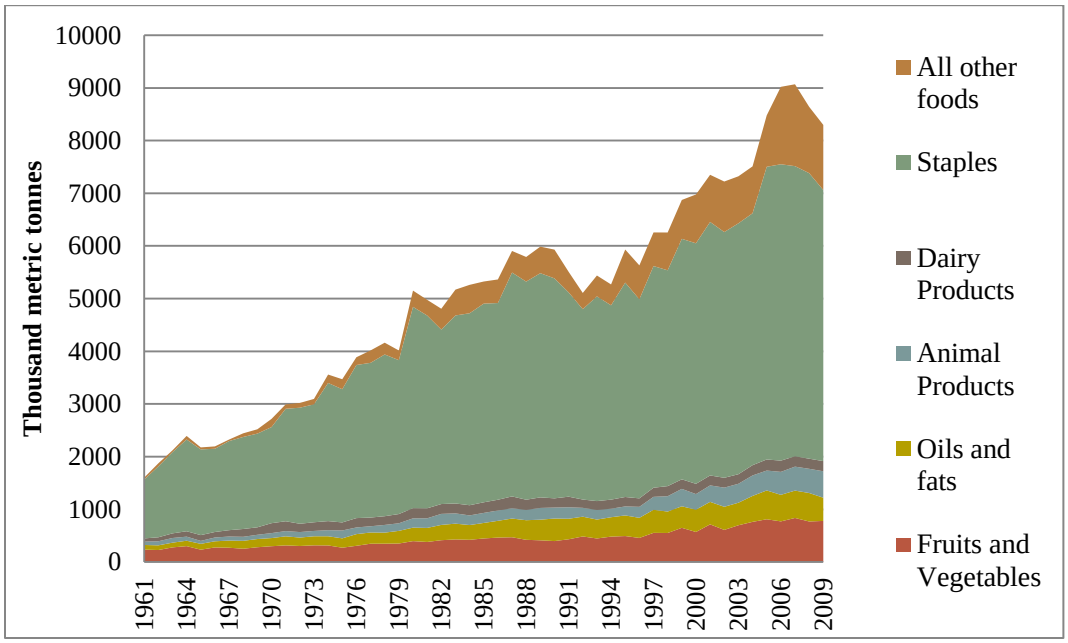

Figure 1. Quantity of food imported to the Caribbean region by category, 1961–2009.

Source: Food and Agriculture Organization of the United Nations (FAO). 2011. TradeSTAT

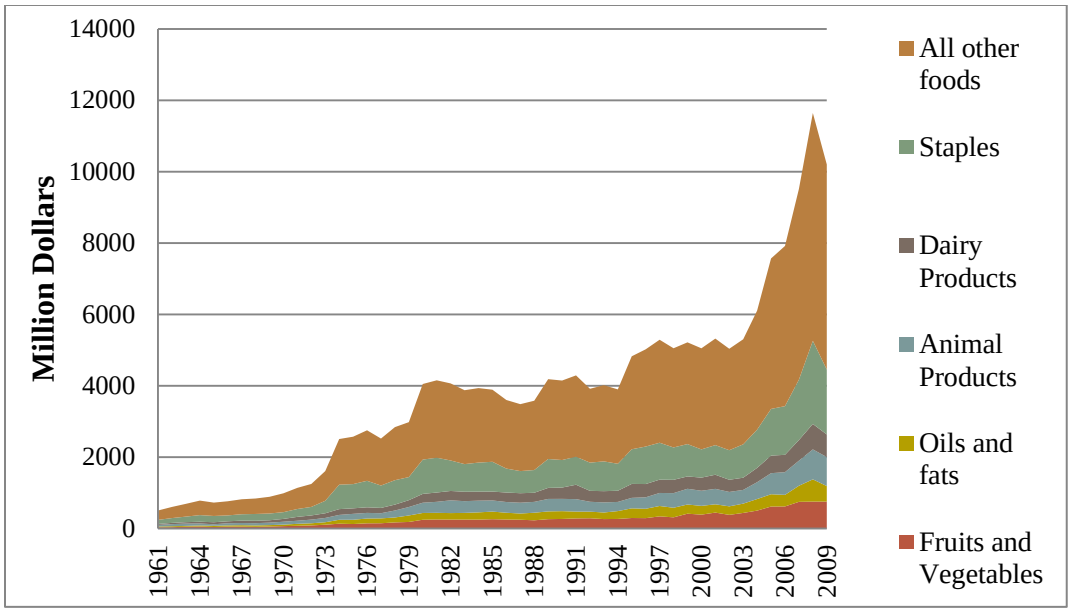

Figure 2. Value of Caribbean food imports by category, current dollars, 1961–2009.

Source: Food and Agriculture Organization of the United Nations (FAO). 2011. TradeSTAT

Import Demand Analysis via System-Wide Approach

Studies that have analyzed import demand at a disaggregated level in a system-wide approach are fairly common in recent literature. A number of these studies have considered the import demand for one commodity but either by product types or product form (DeVoretz 1982; Muhammad, Jones and Hahn 2007; Schmitz and Seale 2002; Goodwin, Harper and Schnepf 2003). Other studies have considered demand for a product based on source country, product type, and/ or product form for the same commodity (Jones, Hahn and Davis 2003; Muhammad and Jones 2009; Muhammad and Jones 2011; Jones, Muhammad and Mathews 2013).

A number of demand studies have also analyzed consumption patterns within a particular industry. Demand studies within the meat industry abound. It is typical to include broad categories such as beef, pork, and poultry. These aggregate demand studies assume that meat types from all sources are homogeneous with single prices (for example: Eales and Unnevehr 1988; Lusk et al. 2001; Taljaard and Schalkwyk 2004; Henneberry and Hwang 2007; Holt and Balagtas 2009). Other studies have looked at source of origin in order to isolate quality or other attributes that origin may offer (Mutondo and Henneberry 2007; Jones, Hahn and Davis 2003; Muhammad and Jones 2011). However, in the case of import demand studies, if consumers (or importers) are indifferent to the exporting country, this allows for aggregation across exporting sources in the analysis indicating that no additional information is obtained by further disaggregation (Asche, Bremnes and Wessells 1999).

Demand studies covering the food and agriculture sector are also common. Huang (1988) applied the inverse demand system to thirteen aggregate food categories and non-food sectors from 1947 to 1983. His study was aimed at exploring the interdependent nature of food price variations in

response to quantity changes. Janda, McCluskey and Rausser (2000) estimated the Czech Republic food import demand during the transition period of the 1990s and looked at eight crop and livestock food commodities. Blanciforti and Green (1993) incorporated habit formation in an Almost Ideal Demand System (AIDS) model to make the model dynamic. For the Caribbean specifically and differentiating by import source (US and the rest of the world), Dameus et al. (2001) estimated import demand elasticities for several starchy staple foods (wheat, corn, rice and fresh potatoes) using a Restricted Source Differentiated Almost Ideal Demand System (RSAIDS).

All of the aforementioned models were designed to capture the demand for food and aggregate commodity groups. It is not uncommon to extend the basic demand systems model to capture demographic and other demand shifters (Alston, Chalfant and Piggott 2001). Common extensions include seasonal dummy variables and time trend variables (Arnade and Pick 1998). In most studies, the importance of these variables are evaluated based on the statistical significance of the parameter estimates. Other studies have extended their model to look at the impact of advertising (Brester and Schroeder 1995; Coulibaly and Brorsen 1999); advertising and health, (Kinnucan et al. 1997); and disease risk in demand (Burton and Young 1996; Burton, Young and Cromb 1999).

Methodology

Demand-Model Structure

The Central Bureau of Statistics (CBS) differential demand system derived by Keller and Van Driel (1985) is chosen to estimate Caribbean agricultural import demand parameters. Differential demand systems with price effects (CBS and Rotterdam) better explain consumers' purchase allocation decisions compared with models containing variable price effects (Almost Ideal Demand System (AIDS) and National Bureau of Research (NBR) (Fousekis and Revell 2000). In addition, the CBS model combines attractive features from both the AIDS and the Rotterdam models, in that it combines the non-linear expenditure effects of the Almost Ideal Demand System (AIDS) (Deaton and Muellbauer 1980b) and the price effect of the Rotterdam model (Theil 1966; Barten 1969).

The Rotterdam model meets negativity conditions on the Slutsky matrix required for a downward sloping demand curve if its price coefficients are negative, semi-definite.

The CBS demand system starts with a set of partial-differential equations:

$$(1)\quad w_i \cdot \left[\partial \ln(q_i) - \sum_j w_j \partial \ln(q_j) \right] = \sum_j c_{i,j} \partial \ln(p_j) + b_i \left[\partial \ln(x) - \sum_j w_j \partial \ln(p_j) \right]$$

where ln(.) is the natural-logarithm; q_i and p_i are the quantity and price of the i^{th} good, x is the total group expenditure, and w_i is the budget share for the i^{th} good, defined as $w_i = \frac{p_i q_i}{x}$. The terms $c_{i,j}$ and b_i are coefficients. In order for the system of equations to be consistent with theory, the following restrictions on the coefficients must hold:

(2) $$\sum_i c_{i,j} = \sum_j c_{i,j} = \sum_i b_i = 0,$$

(3) $$c_{ij} = c_{ji}, \forall i, j$$

Homogeneity of degree 0, consistent with the budget constraint, and Slutsky symmetry conditions are satisfied by Equations 2 and 3. Demand elasticities are derived from model coefficients and the budget shares:

(4) $$\varepsilon_{i,j} = \frac{c_{i,j} - b_i w_j - w_i w_j}{w_i}$$ (price elasticities)

(5) $$\varepsilon_{i,x} = 1 + \frac{b_i}{w_i}$$ (expenditure elasticities)

Although the CBS demand system is based on consumer demand theory, we use unit values which we characterize as wholesale demand value to capture Caribbean agricultural import demand. Given the analytic parallel between consumer demand and derived demand, use of the CBS model in a derived demand context is simply a matter of interpretation. The CBS model, like other differential demand systems, starts with a set of differential-in-logarithms equations. The budget constraint in log-differential form is expressed as:

(6) $$\partial \ln(x) = \sum_i w_i \partial \ln(p_i) + \sum_i w_i \partial \ln(q_i)$$

From equation (6) we define the Divisia price (P) and quantity (Q) indices respectively as:

(7) $$\partial P = \sum_i w_i \partial \ln(p_i)$$

(8) $$\partial Q = \sum_i w_i \partial \ln(q_i)$$

Rearranging equation (6), and substituting in equation (7) and (8) yields:

(9) $$\partial \ln(x) - \sum_i w_i \partial \ln(p_i) = \sum_i w_i \partial \ln(q_i) = \partial \ln(x) - \partial P = \partial Q$$

Equation (1) can then be re-specified as:

(10) $$w_i \cdot \left[\partial \ln(q_i) - \partial Q\right] = \sum_j c_{i,j} \partial \ln(p_j) + b_i \partial Q$$

In a production context, the Divisia can be thought of as a measure of total Caribbean food import expenditures. Equation (10) implies that the change in demand for each Caribbean imported food category is driven by the changes in all Caribbean imported foods and the overall size of the Caribbean agricultural industry. In a derived demand context, b_i is referred to as a scale coefficient rather than an expenditure coefficient. By construction, the endogenous variables of the CBS demand system sum to 0 in every time period, which makes the error terms

sum to 0 as well. As such, to avoid singularity, an equation is dropped in the estimation process and retrieved at the end of the process since the estimates will be invariant to the dropped equation. In our case, we dropped the rest of the food products (ROFP) equation.

The standard CBS model is extended to include differenced variables that capture tourism arrivals, real per capita income, and value of Caribbean agricultural production. Differential demand systems offer the advantage of incorporating taste shifts into differential models much more easily than other common specifications (Alston et al. 2000). Also, transforming the data into period-to-period differences also help to address issues of stationarity. The aim is to capture the extent to which these shift variables influence overall Caribbean food import demand. One of the attractive features of the CBS demand system is that it is linear in its parameters. There is often a concern for violating Closure Under Unit Scaling (or CUUS) when incorporating shift variables such as demographics into singular expenditure systems (Lewbel 1985; Pollak and Wales 1981). However, CUUS is maintained when the incorporated parameters do not depend on the data's scaling, especially the scaling of the data related to the shift variables themselves (Alston, Chalfant and Piggott 2001; Piggott and Marsh 2004). In this case, the tourism, GDP and value of production variables are invariant to data scaling. Hypothesis tests based on the likelihood ratio test are used to capture the impact of these variables. The likelihood ratio (LR) test was used to determine if the model, with the new variable, was significantly different from the restricted model and was given as:

$$(11) \quad LR = -2[L(\tilde{\beta}, \tilde{\sigma}^2) - L(\hat{\beta}, \hat{\sigma}^2)] \sim X^2_m$$

where $L(\tilde{\beta}, \tilde{\sigma}^2)$ is the maximum of the log likelihood function when the restriction is imposed, $L(\hat{\beta}, \hat{\sigma}^2)$ is the maximum of the log likelihood function when the restrictions are not imposed and *m* is the number of restrictions.

Data

The data consist of Caribbean food import data from five broad food categories—dairy products, animal products, fruits and vegetables, oils, staples and a miscellaneous rest-of-food products (ROFP). The latter category classifies imported food items that do not fit into the previous categories, and includes beverages and spices. Dairy products comprise all dried, condensed and evaporated milk, cheese from whole milk, butter from cow's milk and eggs from poultry. Animal products comprise all meats, fresh or frozen and sausages from cattle, hogs, poultry, sheep and goats. The fruits and vegetables category consists of all of the major fruits and vegetable that are imported in fresh, frozen, peeled, dried or concentrate forms. The oils comprise olive oils, and other boiled and hydrogenated oils from vegetables. Finally, staples comprise corn, potatoes, rice, wheat, cereals and pulses.

Annual import quantities and expenditures used for developing the base model for each category, as well as the value of agricultural production and Caribbean population, were obtained from the Food and Agricultural Organization (FAO) of the United Nations Trade Statistics Division. All expenditures are in U.S dollars and all quantities are expressed in tons. Per-unit values ($/ton) for each food category was calculated. Caribbean agricultural production, tourism growth and per capita income growth were used as demand shifters in the extended model to evaluate their

impact on Caribbean food import demand. The value of agricultural production and Caribbean population were also obtained from the FAO. Per capita income (in 2005 dollars) was obtained the USDA-Economic Research Service International Macroeconomic Data Set. Tourism arrivals data was obtained from the World Tourism Organization (2011) and the Caribbean Tourism Organization (2011).

Ideally, data on quantities consumed and prices of domestically produced goods for each of the above categories are preferable. However, data on consumption of the good produced domestically are often not available, and in our case was unavailable for the Caribbean. Moreover, Emran and Alam (1999) developed a theoretically consistent test for weak separability and applied it to the case of consumer goods imports of Bangladesh and found that the null hypotheses for weak separability of non-tradeables from consumer goods imports was accepted, thus giving some credence to exclusion of domestically produced consumption from import demand study. In addition, a number of studies have assumed weak separability of consumer goods imports from non-tradeables and estimated import demand separately (Henneberry and Hwang 2007); Schmitz and Seale 2002; Muhammad and Jones 2011; Jones, Muhammad and Mathews 2013).

Results

Descriptive statistics for model variables are presented in Table 2. Both expenditure and quantity of Caribbean imports of all the food categories have steadily increased since 1961. For the period 1961 to 2009, the Caribbean spent an average of 2 billion nominal dollars per year on imported food. Expenditure on staples varied widely with a high of over $2 billion in 2008 to as little as $100 million in 1961 and averaging 740 million dollars per annum. Average Caribbean import expenditure on oils ($186 million) has been the least, though it has expanded rapidly from as low as $23 million dollars to over $600 million in 2008. In 2009, overall Caribbean food import expenditure saw a 10 percent year over year reduction from that of 2008.

Staples accounted for the largest expenditure share of food imports by the Caribbean (38.6%), whereas oils accounted for the smallest expenditure share (9.1%) of food imports. Animal products, dairy products, fruits and vegetables and the rest of the food products categories all ranged between 10% and 20% of the food expenditure share. While the share of expenditure on most food groups have remained fairly stable, the share of staples declined steadily from a high of more than 50% to just above 30% in 2009. At the same time, the share of rest of food products (ROFP) steadily increased from as low as 4% to as high as 23.5% in 2009. This suggests that Caribbean consumers are expanding the range of food products they consume to capture a more diverse set of food groups. Moreover, while the staple food category commanded the largest share of expenditure, it accounted for the lowest unit value ($197.6 per ton) of food imported by the Caribbean. Animal products were by far the most expensive product imported into the Caribbean with an average unit value of $1,322.4 per ton.

Estimated conditional price and share demand coefficients are reported in Table 3. As expected, all compensated own price coefficients were negative and, for the most part, compensated cross price effects were positive. Based on the estimated price and share demand coefficients along with the average budget shares for the sample period, own and cross price elasticities and scale or expenditure elasticities were calculated. These estimates are presented in Table 4. The standard errors are asymptotic estimates generated in SAS using the estimate procedure.

Table 2. Descriptive statistics for Caribbean food imports, 1961-2009.

Commodity Group	Mean	Standard Deviation	Minimum	Maximum
	Annual Budget Share (%)			
Dairy Products	13.2	2.0	10.1	18.3
Animal Products	14.4	1.8	10.7	19.0
Fruits and Vegetables	12.9	1.3	9.7	15.2
Oils	9.1	1.0	6.4	11.8
Staples	38.6	6.4	27.8	53.6
Rest of Food Products (ROFP)	12.0	5.9	3.6	23.5
	Annual Unit Price ($/ton)			
Dairy Products	531.8	208.4	112.5	934.7
Animal Products	1,322.4	343.3	712.3	1,826.9
Fruits and Vegetables	522.8	213.6	153.6	984.9
Oils	558.0	195.7	249.9	1,152.0
Staples	197.6	71.4	100.4	429.5
Rest of Food Products (ROFP)	583.7	151.4	272.4	1,044.6
	Annual Quantity (1,000 tons)			
Dairy Products	450.0	173.7	227.4	836.1
Animal Products	203.1	117.6	56.1	502.2
Fruits and Vegetables	450.0	173.7	227.4	836.1
Oils	301.3	136.2	88.1	547.3
Staples	3,439.1	1,259.1	1,116.6	5,625.7
Rest of Food Products (ROFP)	464.7	396.5	29.3	1,554.1
	Annual Expenditure ($ Million)			
Dairy Products	260.42	161.79	26.46	713.72
Animal Products	289.08	195.31	43.09	838.89
Fruits and Vegetables	265.70	192.51	36.13	757.51
Oils	186.03	124.21	23.04	623.05
Staples	740.21	454.72	114.08	2328.16
Rest of Food Products (ROFP)	314.08	328.68	15.71	1290.66

The conditional own price elasticities represent both the substitution and the income effects of price changes and are conditional on total Caribbean expenditure on agricultural imports. The own-price elasticities for all imported products had the expected negative sign and were all statistically significant. The own-price elasticities range between -0.251 and -0.902; this indicates that the Caribbean region's demand for imported food is price inelastic. This is particularly the case with the staples, oils, and rest of food products (ROFP) categories. This finding appears consistent with Mendoza and Machado (2009), who suggested demand inelasticity for wheat and other major food imports given an observed unresponsiveness to rising international prices between 2006 and 2008. In their study of starchy foods (specifically, wheat, corn, rice and fresh potatoes) imported by the Caribbean, Dameus et al. (2001) reported own-price inelastic responses for rice sourced from the United States, and for wheat and rice sourced from the rest of the world. The region's demand for US wheat imports was found to be own-price unitary elastic.

Table 3. Estimated conditional CBS price and scale coefficients for Caribbean food imports.

	Dairy	Animal Products	Fruits and Vegetables	Oils	Staples	ROFP	Scale Coefficient
Dairy	**-0.051*** **	0.023	0.005	0.004	0.004	0.002	-0.013
	(0.018)	(0.014)	(0.015)	(0.009)	(0.012)	(0.007)	(0.026)
Animal		**-0.072*** **	0.039**	0.019*	-0.006	0.012	-0.017
Products		**(0.022)**	(0.015)	(0.010)	(0.015)	(0.009)	(0.034)
Fruits and			**-0.100*** **	-0.009	0.028**	0.016**	-0.008
Vegetables			**(0.026)**	(0.012)	(0.012)	(0.007)	(0.028)
Oils				**-0.015**	0.007	0.001	-0.053***
				(0.010)	(0.008)	(0.005)	(0.016)
Staples					**-0.003**	0.009	-0.019
					(0.020)	(0.012)	(0.045)
ROFP						**-1.077**	-0.013
						(2.307)	(0.026)

Note. Asymptotic standard errors are in parentheses. ***Significance level < 0.01; **Significance level < 0.05; *Significance level < 0.10

Table 4. Uncompensated price and scale elasticities for a CBS model of Caribbean food imports.

	Dairy	Animal Products	Fruits and vegetables	Oils	Staples	ROFP	Scale Elasticities
Dairy	**-0.519*** **	0.033	-0.091	-0.061	-0.355***	-0.103*	0.900***
	(0.135)	(0.107)	(0.117)	(0.070)	(0.089)	(0.057)	(0.201)
Animal	0.030	**-0.644*** **	0.141	0.040	-0.428***	-0.039	0.884***
Products	(0.098)	**(0.153)**	(0.106)	(0.067)	(0.103)	(0.061)	(0.234)
Fruits and	-0.093	0.157	**-0.902*** **	-0.164*	-0.170*	0.004	0.940***
Vegtables	(0.119)	(0.119)	**(0.202)**	(0.090)	(0.094)	(0.057)	(0.215)
Oils	-0.089	0.064	-0.233*	**-0.251** **	-0.306***	-0.108**	0.413**
	(0.101)	(0.107)	(0.127)	**(0.106)**	(0.085)	(0.053)	(0.180)
Staples	-0.121***	-0.159***	-0.057*	-0.072***	**-0.393*** **	-0.097***	0.950***
	(0.031)	(0.038)	(0.031)	(0.020)	**(0.051)**	(0.032)	(0.117)
ROFP	0.112	-0.037	0.300**	-0.058	-0.287	**-0.340** **	1.916***
	(0.155)	(0.188)	(0.146)	(0.100)	(0.256)	**(0.145)**	(0.433)

Note. Asymptotic standard errors are in parentheses.; ***Significance level < 0.01; **Significance level < 0.05 *Significance level < 0.10

The imported fruits and vegetables, animal products and dairy categories were less inelastic than the staples, rest of food products (ROFP) and oils categories. The fruit and vegetables category

was the least inelastic to price changes, with an own-price elasticity of -0.902, implying that a 10% increase in imported price of fruits and vegetables would decrease the quantity of imported fruits and vegetables demanded by 9%. The magnitudes of response in these categories appear to suggest that Caribbean consumers would likely replace these imported foods with locally sourced substitutes when faced with higher food import prices. This appears less likely to be the case with some staple foods, oils and items from the ROFP category, particularly if these products are not produced in the region and must be imported.

As noted earlier, the cross price elasticities are conditional on total expenditure of agricultural products imported by the Caribbean and account for both substitution effects and expenditure effects of price changes. The cross-price effect varied for most of the commodities. Positive cross price elasticities suggest some degree of substitution between imports of the different commodities, while negative cross price elasticities suggest that the expenditure effect of price changes outweigh the pure substitution effects. Cross elasticities were negative and small and statistically significant for several of the categories, particularly staples.

The scale/expenditure elasticity measures the degree by which the amount of the different groups of imported agricultural products demanded change when the overall demand for food products by the Caribbean changes. This scale elasticity is also the elasticity of the total imported agricultural products expenditure. The scale elasticities are presented in Table 4. The scale elasticities for all commodities were positive and significant. The rest of food products (ROFP) category had the largest scale elasticity of demand of 1.916, which implies that given a 10% increase in the overall food import demand by the Caribbean, the import demand for the rest of food products (ROFP) would increase by 19%. Oils showed the smallest increase in demand, 4.1%, given a 10 percent increase in the overall Caribbean food import demand.

Extensions to the standard CBS model included the addition of differenced variables of tourism arrivals, real per capita income and per capita value of Caribbean agricultural production. Treated as import demand shifters, they are included to capture the extent to which these variables influenced overall Caribbean food import demand. Table 5 shows the hypothesis tests based on the likelihood ratio test. Of these, only the per capita value of agricultural production, which declined from a high of $300 dollars in the late 1960s to less than $200 in 2009, was seen to be highly significant in determining the overall Caribbean food import demand. All three variables combined (tourism arrival, real per capita income and per capita value of Caribbean agricultural production) were found to be statistically significant in determining Caribbean food import demand. Based on the impact of the individual variables, one can conclude that the combined effect of the three variables was largely driven by the decline in the per capita value of domestic agricultural production.

Table 5. Likelihood ratio tests of the significance of tourism, income and agriculture for Caribbean food imports

		Log-Likelihood Value	LR-Statistics	P[X2< LR]=0.95	P-value
	Unrestricted	*Restricted*			
Tourism	863.699	859.620	8.157	11.070(5)	0.148
Real Per Capita Income	860.577	859.620	1.912	11.070(5)	0.861
Per Capita Ag. Production Value	866.500	859.620	13.759	11.070(5)	0.017
All Combined	871.952	859.620	24.664	24.996(15)	0.055

Summary and Conclusions

The goals of this study were to characterize the trends in food imports to the Caribbean and to estimate agricultural food import demand parameters. The analysis is based on data for 1961-2009 from the FAO-STAT database, and a Central Bureau Statistics (CBS) demand system was used to estimate the demand parameters.

We found increased levels of imports over time across six defined categories (dairy, animal products, fruits and vegetables, oils, staples and miscellaneous foods), with the largest increases recorded for staples and miscellaneous foods. The Caribbean region's demand for food imports is price inelastic, and overall food import demand over the study period was significantly influenced by the per capita value of agricultural production. The fact that Caribbean's demand for food imports is price inelastic is important. Assuming a lack of competition, increased prices for imported food may benefit food exporters in source countries although, clearly, for the Caribbean region, this would also imply significantly increased expenditures. Indeed, the latter was the case during the global food price escalations of 2007/2008, following which many countries reported significantly higher expenditures on food imports. Foods in the staples category – one of the most price-insensitive imported food groups – showed large price increases during the past decade. For Caribbean countries with an average per capita real income of less than one-tenth of that of the United States, these price increases raise concern given the region's significant dependence on imported food overall.

The per capita value of agricultural production was determined as the indicator that significantly influenced the Caribbean's overall food import demand over the study period. The per capita value of agricultural production declined from a high of $300 dollars in the late 1960s, to less than $200 in 2009. Over the same period, Caribbean agriculture as a share of GDP declined from an average high of 8% to below 3% in 2009. Much of this can be attributed to the shifting role of the agricultural sector in many Caribbean countries: economies that were once based on export-oriented crops such as sugar, bananas and cotton have significantly reduced or ceased production in recent years, while service oriented sectors have assumed more economic importance. Amidst these changes, regional population continued to grow, and increased at an average of about 4% annually between 1961 and 2009. In light of these developments, there continues to be a heavy dependence on imported food products. Therefore, evaluations of Caribbean food import demand in various contexts—differentiating by source, for specific product categories, countries or subgroups—remain areas for much needed research.

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References

Agritrade. 2011. *Caribbean: Agricultural trade policy debates and developments*. Executive Brief. Technical Centre for Agricultural and Rural Cooperation (ACP-EU) (CTA). The Netherlands. http://agritrade.cta.int/Agriculture/Topics/EPAs/Caribbean-Agricultural-trade-policy-debates-and-developments [accessed December 2014].

Alston, J. M., J.A. Chalfant, and N.E. Piggott. 2001. "Incorporating Demand Shifters in the Almost Ideal Demand System." *Economic Letters* 70(1): 73–78.

Alston, J. M., J. A. Chalfant, and N. E. Piggott. 2000. "The Incidence of the Costs and Benefits of Generic Advertising". *American Journal of Agricultural Economics* 82(3): 665–671.

Arnade, C., and D. Pick. 1998. "Seasonality and Unit Roots: The Demand for Fruits". *Agricultural Economics* 18(1): 53–62.

Asche, F., H. Bremnes, and C.R. Wessells. 1999. "Product Aggregation, Market Integration and Relationships between Prices: An Application to World Salmon Markets". *American Journal of Agricultural Economics* 81(3): 568–581.

Barten, A.P. 1969. "Maximum Likelihood Estimation of a Complete Demand System of Equations." *European Economic Review* 1(1): 7–73.

Blanciforti, L and R. Green. 1983. "An Almost Ideal Demand System Incorporating Habits: An Analysis of Expenditures on Food and Aggregate Commodity Groups." *The Review of Economics and Statistics* 65(3): 511–515.

Brester, G.W. and T.C. Schroeder. 1995. "The Impacts of Brand and Generic Advertising on Meat Demand." *American Journal of Agricultural Economics* 77(4): 969–79.

Burton, M. and T. Young. 1996: "The Impact of BSE on the Demand for Beef and Other Meats in Great Britain" *Applied Economics* 28(6): 687–693.

Burton, M., T. Young and R. Cromb. 1999. "Meat Consumer's Long-Term Response to Perceived Risks Associated with BSE in Great Britain." *Cahiers, d'Economie-et-Sociologie-Rurales* 50: 7–19.

Bourne, C. 2008. "Perspectives on Enhancing Sustainable Growth and Development of Caribbean Agriculture." Keynote Address, 44th Meeting Caribbean Food Crops Society, Miami, FL. http://www.caricom.org/jsp/speeches/44food_crops_society_bourne.jsp [accessed January 12, 2012].

Caribbean Community. 2010. Regional Food and Nutrition Security Policy. http://www.caricom.org /jsp/community_organs/regional_food_nutrition_security_ policyoct2010.pdf [accessed October 2012].

Caribbean Tourism Organization. 2011. http://www.onecaribbean.org/[accessed October 2011.]

Coulibaly, N. and B.W. Brorsen. 1999. "Explaining the Differences between Two Previous Meat Generic Advertising Studies." *Agribusiness an International Journal* 15: 501–16.

Dameus, A., D. Tilley, and W. Brorsen. 2001. "Caribbean Demand of US And Rest-Of-The-World Starchy Food (Wheat, Rice, Corn and Fresh Potatoes): A Restricted Source Differentiated Almost Ideal Demand System." *Lecturas de Economía* 55: 141–160.

Deaton, A. S., and J. Muellbauer. 1980a. "An Almost Ideal Demand System." *American Economic Review* 70(3): 312–26.

Deaton, A. S., and J. Muellbauer. 1980b. *Economics and Consumer Behavior*. Cambridge: Cambridge University Press, New York.

DeVoretz, D. 1982. "An Econometric Demand Model for Canadian Salmon." *Canadian Journal of Agricultural Economics* 30(1):49–60.

Eales, J. S., and L. J. Unnevehr. 1988. "Demand for Beef and Chicken Products: Separability and Structural Change." *American Journal of Agricultural Economics* 70(3): 521–532.

Economic Commission on Latin America and the Caribbean (ECLAC). 2010. *The Tourism Sector and the Global Economic Crisis: Development Implications for the Caribbean*.

Emran, S and I. Alam. 1999. Weak Separability of Non-Tradeables from Consumer Good Imports: A Simple Test with Evidence from Bangladesh. *Economics Letters* 63(2): 225–234.

Food and Agriculture Organization of the United Nations (FAO). 2011. TradeSTAT. http://faostat.fao.org/ (accessed October 12th, 2011)

Fousekis, P and B.J. Revell. 2000. "Meat Demand in the UK: A Differential Approach". *Journal of Agricultural and Applied Economics* 31(1): 11–19.

Gonzalez, O. 2011. *Tourism Increases Demand for US Foods*. Miami, FL: USDA-Foreign Agricultural Service, GAIN Report Number CB1101.

Gonzalez, O. and K. Nishiura. 2013. *Caribbean Environment for U.S. Agricultural Exports*. Miami, FL: USDA-Foreign Agricultural Service, GAIN Report Number CB1303.

Gonzalez, O. 2014. *Caribbean Basin Exporter Guide*. Miami, FL: USDA- Foreign Agricultural Service, GAIN Report Number CB1401.

Goodwin, B.K., Harper, D. and R. Schnepf. 2003. "Short-Run Demand Relationships in the U.S. Fats and Oils Complex." *Journal of Agricultural and Applied Economics* 35(1): 171–184.

Henneberry, S.R., and S. Hwang. 2007. "Meat Demand in South Korea: An Application of the Restricted Source-Differentiated Almost Ideal Demand System Model." *Journal of Agricultural and Applied Economics* 39(1): 47–60.

Holt, M. T., and J.V. Balagtas. 2009. "Estimating Structural Change with Smooth Transition Regressions: An Application to Meat Demand." *American Journal of Agricultural Economics* 91(5): 1424–1431.

Hornbeck, J. F. 2008. *CARICOM: Challenges and Opportunities for Caribbean Economic Integration.* CRS Report for Congress. Order Code RL34308. Congressional Research Service. Washington D.C.

Huang, K.S. 1988: "An Inverse Demand System for U.S. Composite Foods" *American Journal of Agricultural Economics* 70(4): 902–909.

Inter-American Institute for Cooperation on Agriculture (IICA). 2010. *Annual Report 2009: IICA's Contribution to the Development of Agriculture and Rural Communities in the Caribbean Region.* San José, Costa Rica.

Janda, K. and J. McCluskey and G.C. Rausser. 2000. "Food Import Demand in the Czech Republic." *Journal of Agricultural Economics* 51(1): 22-44.

Jones, K., A. Muhammad, and K. Mathews. 2013: "Source-Differentiated Analysis of Exchange Rate Effects on U.S. Beef Imports." *International Journal of Trade and Global Markets* 6(4): 406–420.

Jones, K.G., W.F. Hahn, and C.G. Davis. 2003: "Demand for U.S. Lamb and Mutton by Country of Origin: A Two-Stage Differential Approach." Selected Paper, American Agricultural Economics Association Meeting, Canada, July 27-30, 2003.

Keller, W. J. and J. Van Driel. 1985. "Differential Consumer Demand Systems." *European Economic Review* 27: 375–390.

Kinnucan, H.W., H. Xiao, C.J. Hsia, and J.D. Jackson. 1997. "Effects of Health Information and Generic Advertising on U.S. Meat Demand." *American Journal of Agricultural Economics* 79: 13-23.

Lewbel, A. 1985. "A Unified Approach to Incorporating Demographic or Other Effects into Demand Systems." *Review of Economic Studies* 52: 1–18.

Lewis, V. 2002. "Globalization and the Caribbean". Paper presented at the conference on Globalization, Governance and Integration, Department of Behavioral Sciences, Faculty of Social Science, University of the West Indies.

Lusk, J.L., T.L. Marsh, T.C. Schroeder, and J.A. Fox. 2001. "Wholesale Demand for USDAQuality Graded Boxed Beef and Effects of Seasonality. *Journal of Agricultural and Resource Economics*. 26(1): 91–106.

Mendoza, A. and R. Machado. 2009. *The Escalation in World Food Prices and Its Implications for the Caribbean.* Economic Commission for Latin America and the Caribbean, Caribbean Development Report, Volume II.

Muhammad, A., and K.G. Jones. 2009. "An Assessment of Dynamic Behavior in the U.S. Catfish Market: An Application of the Generalized Dynamic Rotterdam Model." *Journal of Agricultural and Applied Economics* 41(4): 745–759.

Muhammad, A., and K.G. Jones. 2011. "Source-Based Preferences and U.S. Salmon Imports." *Marine Resource Economics* 26: 191–209.

Muhammad, A., and K.G. Jones. 2009. "An Assessment of Dynamic Behavior in the U.S. Catfish Market: An Application of the Generalized Dynamic Rotterdam Model." *Journal of Agricultural and Applied Economics* 41(4): 745–759.

Muhammad, A., and K.G. Jones. 2011. "Source-Based Preferences and U.S. Salmon Imports." *Marine Resource Economics* 26: 191–209.

Muhammad, A., K. Jones, and W.F. Hahn. 2007. ''The Impact of Domestic and Import Prices on U.S. Lamb Imports: A Production System Approach.'' *Agricultural and Resource Economics Review* 36(2):293–303.

Mutondo, J. and S. Henneberry. 2007. "A Source Differentiated Analysis of U.S. Meat Demand." Journal of Agricultural and Resource Economics 32(3): 515-533.

Piggott, N.E. and T.L. Marsh. 2004. "Does Food Safety Information Impact US Meat Demand?" *American Journal of Agricultural Economics*. 86(1):154-174.

Pollak, R. A., and T.J. Wales. 1981. "Demographic Variables in Demand Analysis." *Econometrica* 49(6): 1533–1551.

Schmitz, T., and J. Seale. 2002. "Import Demand for Disaggregated Fresh Fruits in Japan." *Journal of Agricultural and Applied Economics* 34(3): 585–602.

Taljaard, A and V. Schalkwyk. 2004. "The Demand for Meat in South Africa: An Almost Ideal Estimation." *Agrekon* 43(4): 430-443.

Theil, H. 1996. *Applied Economic Forecasting*. Amsterdam: North-Holland.

USDA-Economic Research Service International Macroeconomic Data Set. Internet site: http://www.ers.usda.gov/data-products/international-macroeconomic-data-set.aspx [accessed October 1, 2011].

World Trade Organization (WTO). 2002. *Small Economies: A Literature Review*. Committee on Trade and Development.

World Tourism Organization. http://statistics.unwto.org/ [accessed October 9, 2011].

World Travel and Tourism Council (WTTC). 2009. *Travel and Tourism Economic Impact 2009: Caribbean*. London.

World Travel and Tourism Council (WTTC). 2011. *Travel and Tourism Economic Impact 2011: Caribbean*. London.

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Consumer Willingness to Pay for Tennessee Beef

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Abstract

This study examines willingness to pay (WTP) for beef produced in Tennessee among consumers in five metropolitan areas. Consumers who prefer grain-fed, flavorful beef are willing to pay more for Tennessee beef steaks, while price conscious consumers and those who shop at big box stores are willing to pay less. Consumers who value freshness, safety, and natural products are willing to pay more for Tennessee ground beef. Preferences for grass-fed beef, lower prices, and ease of preparation influence the types of outlets where consumers anticipate purchasing Tennessee beef products.

Keywords: willingness to pay, local, beef, shopping outlets

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Introduction

The beef cattle industry generates more cash receipts than any other farm commodity in Tennessee (Tennessee Department of Agriculture 2015). However, most beef cattle in Tennessee leave the state to be finished (Lewis et al. 2015). If Tennessee farmers could finish and harvest their cattle in the state and market directly to consumers, they could capture some of the value-added from these activities. Additional finishing and harvesting activities in Tennessee could also positively impact the state's economy. However, finishing cattle in the state can be relatively costly. Hence, farmers wishing to sell beef finished and harvested in Tennessee would likely need a price premium for this product to be profitable. Consumer willingness to pay (WTP) a premium for beef products raised and harvested in Tennessee ("Tennessee beef") is unknown. Similarly, little is understood about the types of retail outlets where Tennessee consumers would anticipate purchasing Tennessee beef. Prior research of consumer preferences and willingness to pay for local beef in other geographic areas provides important insights for this study. On the other hand, research examining the types of outlets where consumers might anticipate purchasing local beef and factors influencing these perceptions is sparse. A better understanding of consumer expectations is important, in part, because obtaining product placement in retail groceries, big box stores, and supermarkets may be problematic for small volume beef producers.

The focus of this study is on consumer preferences for Tennessee beef and the retail channels through which consumers would expect to purchase Tennessee beef. More specifically, the objectives of this research are to: 1) estimate consumer willingness-to-pay (WTP) for two Tennessee beef products (ground beef and ribeye steak); 2) identify demographic characteristics, consumer attitudes, and socioeconomic factors influencing WTP for these products; 3) determine the types of retail locations where Tennessee beef consumers would expect to purchase Tennessee beef; and 4) ascertain demographic characteristics, attitudes, and socioeconomic factors associated with these expectations.

Previous Research

Studies of Willingness to Pay for Locally Produced Beef

While there are no recent analyses of consumer preferences for Tennessee beef, there are a number of studies examining consumer preferences for locally produced beef products. For example, Mennecke et al. (2007) used a contingent choice experiment to estimate the preferences of a national sample of respondents for a number of beef steak attributes, including local production. They found that the region of origin, was the most important attribute, followed by animal breed, traceability, animal feed and beef quality. The least important attributes were the use of growth promoters, the cost of the cut, farm ownership and whether or not the steak was guaranteed tender. Chang et al. (2013) used a contingent choice experiment to find WTP a premium of $0.48 per pound for locally produced ground beef among consumers in northern South Dakota.

Adalja et al. (2015) used hypothetical and non-hypothetical contingent choice analysis of Maryland residents to estimate WTP a premium of $2.72 per pound for beef raised within 100

miles and $2.39 per pound for beef raised within 400 miles. Adalja et al. noted that respondents view local and grass-fed beef products as substitutes. They also found that buying club shoppers were willing to pay less for locally produced ground beef than other consumers. Evans et al. (2011) also found a link between preferences for grass-fed and locally produced beef. They used an in-store experimental auction to estimate WTP for grass-fed beef in the Appalachian region and found that local production increased WTP for grass-fed beef. They also found that participants who ranked "locally produced" had stronger preferences for grass-fed beef.

Maynard, Burdine, and Meyer (2003) conducted a sensory evaluation and contingent valuation exercise to estimate WTP for locally produced meat products in Kentucky. They found that 64% of respondents were willing to pay a premium of 20% for locally produced ground beef, while 52% were willing to pay a premium of 20% for steak. They found that respondent perceptions of the convenience and quality of locally produced meat, WTP for source verification, shopping at a specialty meat store, and whether the household had at least one member older than twenty-four influenced WTP a premium for local ground beef. Respondent willingness to make an extra stop for local beef, having purchased food directly from a farmer, number of household members younger than six years old, and being single had a positive influence on WTP a premium for local steak. Maynard, Burdine, and Meyer's results suggest that the influence of demographics, shopping habits, and attitudes on WTP a premium for locally produced beef can be quite different for ground beef or steak.

Froehlich, Carlberg, and Ward (2009) found positive WTP among Canadian consumers for a hypothetical local brand of steak and that WTP for the locally branded steaks was higher among males. Wolf and Thulin (2000) evaluated purchase interest to predict the consumer profiles of individuals who would purchase a locally branded beef product in California. Their study found that the target consumers for locally branded beef were older, married, higher dual-income households.

Perkins (2012) found that, while consumers in the Southeastern United States interpreted "locally produced" beef to mean anything from being produced within twenty-five miles to being produced in the United States, the definition most commonly chosen (25% of the respondents), was that the product originated in their own state. Perkins also found that respondents who considered no added growth hormones and supporting local producers to be important and who believed that locally produced food is superior in reduced transportation and environmental sustainability were willing to pay more for locally produced beef. Females and those who believed food safety concerns to be exaggerated were less willing to pay for local beef.

Demographic and Socioeconomic Characteristics and WTP for Locally Produced Foods

The broader literature examining consumer preferences for local foods provides insight into the likely influence of consumer demographics on demand for locally produced beef products. However, given the wide range of products studied, it is perhaps not surprising that the evidence is inconsistent and sometimes contradictory. For example, while older consumers have been found to be less likely to perceive locally produced food favorably or to purchase locally produced food (Willis et al. 2013; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee

2011), James, Rickard, and Rossman (2009) find that consumers over sixty years old were more likely to purchase locally produced applesauce.

A number of studies establish a positive relationship between educational attainment and preferences for local foods (Brown 2003; Willis et al. 2013; Govindasamy et al. 2012; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee 2011). However, other studies find no association between education and WTP for local food (Loureiro and Hine 2002; Brooker et al. 1988; Jekanowski, Williams, and Schiek 2000).

Some research concludes that higher income households are willing to pay more for local foods (Willis et al. 2013; Brown 2003; Nganje, Hughner, and Lee 2011). On the other hand, Loureiro and Hine (2002) found that wealthier consumers were not willing to pay a premium for locally grown potatoes and Hu, Woods, and Bastin (2009) found that lower income consumers were more likely to pay a premium for locally produced blueberry jam.

Some research suggests that females are more likely to purchase local food (Willis et al. 2013; Adams and Adams 2008; James, Rickard, and Rossman 2009; Jekanowski, Williams, and Schiek 2000). However, other studies found no significant differences between gender and WTP for local food (Hanagriff, Rhoades, and Wilmeth 2008; Loureiro and Hine 2002).

Evidence on the relationship between household size and households with children on WTP for local food is also mixed. Willis et al. (2013) found that WTP for locally produced food was lower in larger households. However, results from Jekanowski, Williams, and Schiek (2000) found no relationship between household and WTP for local food. Maynard, Burdine, and Meyer (2003) found a higher WTP for local food in households with children. In contrast, Loureiro and Hine (2002) found no correlation between WTP for local potatoes and households with children.

Brown (2003) reported that respondents with a background in farming were more likely to pay a premium for local food. In contrast, James, Rickard, and Rossman (2009) found that increased knowledge about agriculture decreased WTP for local food. Studies have failed to find a rural-urban distinction in consumer preferences for locally produced foods (Jekanowski, Williams, and Schiek 2000; Brown 2003).

Consumer Attitudes and WTP for Locally Produced Foods

Consumers may be more willing to pay a premium for locally produced food if they are concerned about food miles, food quality, or because they want to support local farmers and businesses. Martinez et al. (2010) found that perceived quality and freshness influence WTP for local foods, and that consumers are more likely to be willing to pay a premium for local foods if they perceive these products are of higher quality, have less environmental impact, or provide more support for local farmers. Govindasamy et al. (2012) found that consumers have increased their consumption of locally produced specialty greens or herbs due to concerns over food miles.

Some studies conclude that opinions about the quality of local foods affect WTP for local food products (Brooker et al 1988; Jekanowski, Williams, and Schiek 2000). Respondents in a consumer intercept survey conducted by Darby et al. (2006) stated that the freshness of local

berries was the main reason for preferring locally produced berries. Valuing support of local businesses may also motivate consumers to purchase local foods (Darby et al. 2006; Carpio and Isengildina-Massa 2013).

Consumer Selection of Retail Outlets for Beef

Previous studies have examined consumer choice of shopping outlets for beef (Lusk and Cevellos 2004; Grannis, Thilmany, and Sparling 2001; Medina and Ward 1999). In a study of consumer perceptions of purchasing natural beef from a producer-owned outlet, Lusk and Cevallos (2004) found that high prices at specialty shops decreased the likelihood of shopping at these outlets. On the other hand, Medina and Ward (1999) found that price had very little impact on outlet choice. Similarly, evidence regarding the impact of gender on specialty store shopping is mixed. Lusk and Cevellos (2004) found that women were more likely to shop for beef at specialty stores, while Grannis, Thilmany, and Sparling (2001) found that males were more likely to shop at specialty meat shops or natural food stores. Grannis, Thilmany, and Sparling (2001) and Medina and Ward (1999) found that respondents with higher incomes were more likely to shop for meat products at specialty stores. Grannnis, Thilmany, and Sparling (2001) found that respondents placing greater importance on local production were more likely to shop at natural food stores. Rossini et al. (2014) found that the likelihood that an Argentine beef consumer shops at a supermarket or a butcher is influenced by a number of factors, including age and educational attainment of the head of the household, amount of beef purchased by the household, and preferred payment method.

Several studies found that where a consumer shops may influence their purchase of local foods and willingness to pay a premium for these products. Local foods tend to be more readily available in independent retail stores than in larger supermarkets or wholesale chains (Abatekassa and Peterson 2011). Darby et al. (2006) found that consumers intercepted in a grocery store were willing to pay a premium for local berries, while individuals intercepted in direct markets (e.g., a farmers market) were willing to pay higher premiums than for berry purchases in grocery stores. In contrast, Jekanowski, Williams, and Schiek (2000) found that the number of visits to farmer markets was not associated with consumer purchases of locally produced agricultural products.

Conceptual Framework

Previous studies provide insight into consumer preferences for locally produced foods, including beef, and the types of retail outlets where consumers purchase beef. However, analyzing the existence of a potential market for Tennessee beef would seem to require estimating WTP a premium for Tennessee beef, identifying consumer characteristics associated with a preference for Tennessee beef for targeted marketing efforts, and, given the possibility of limited access of small-volume beef producers to certain types of retail outlets, consumer characteristics associated with differences in willingness to shop for locally produced beef across outlet types. Two models are developed to address these issues, the first estimates WTP for Tennessee beef and the effects of various consumer characteristics on WTP and the second examines factors influencing where those who are willing to purchase Tennessee beef anticipate shopping for it.

Beef Purchase Choices

Respondents were asked to choose between two products, one of which was described as being produced in Tennessee while the other was not. The hypothetical decision facing respondents was between a base product (boneless ribeye steak or a package of 85% / 15% ground beef) at a base price and a Tennessee-produced version of the same product at a higher price. Text preceding the hypothetical choice question informed respondents that the base and Tennessee beef products were identical in all respects except for the price and the place where the product was produced. Respondents were also given the option to select neither product. In the contingent valuation approach used, the prices of the base and Tennessee beef products are provided to respondents, who select either or neither product (Hanemann 1984). Responses are structured as a binary variable, with respondents who chose the base product being counted as zeroes, and those who chose the Tennessee product counted as ones. Respondents indicating they would choose neither product were excluded from the choice modeling between the Tennessee and base beef products. While each respondent was offered a single price for both the base and Tennessee products, there were four price levels for each (steak and ground beef) of the Tennessee products, with the price levels randomly distributed across the sample.

McFadden's (1974) random utility model is used to quantify the utility a consumer receives from choosing to purchase an item or choosing to forgo its purchase. In this case, respondents chose between purchasing a beef product with no information on where the product was produced or paying a premium to purchase a Tennessee beef product. Let U_{iTN} represent the *ith* consumer's utility from choosing the Tennessee beef alternative (*TN*) and U_{iC} be the utility from choosing conventional beef or the base product. The *ith* consumer will choose *TN* if

$$(1)\quad U_{iTN} > U_{iC}.$$

If consumer preferences are influenced by demographic and other non-price factors ($\boldsymbol{X}_i$) as well as price (*P*), then the decision in (1) is

$$(2)\quad U_{iTN}(X_i, P) > U_{iC}(X_i, P).$$

The probability of choosing the alternative, in our case, Tennessee beef (*TN* = 1), is therefore (Greene 2011)

$$(3)\quad \Pr[TN_i = 1] = \Phi\left(\alpha + \boldsymbol{\beta}'\boldsymbol{X}_i + \beta_p P_i\right),$$

where α and β_P are parameters, $\boldsymbol{\beta}$ is a vector of parameters on non-price variables, $\boldsymbol{X}_i$ is a matrix of demographic and other non-price variables, and Φ is the standard normal cumulative distribution function. WTP for the Tennessee beef product by the *ith* individual is

$$(4)\quad \widehat{WTP}_{iTN} = -\frac{\alpha + \boldsymbol{\beta}'\boldsymbol{X}_i}{\beta_p}.$$

The labels and descriptions of the explanatory variables that constitute $\boldsymbol{X}_i$ are summarized in Table 1 (see Appendix). These variables include demographic characteristics, prior shopping

patterns, respondent rankings of importance of product attributes, and price of the Tennessee beef product.

Outlet Choices

Consumers also have preferences over the outlets where they shop. Respondents who chose Tennessee beef in the contingent valuation question were asked if they would "likely shop for Tennessee beef" at a variety of retail outlets (grocery store, big box store, warehouse store, gourmet/organic market, butcher shop, farmer's market, farmer, mail order service, and other). Respondents answered "yes", "no", or "don't know" for each type of outlet. Thus, respondents could indicate that they would shop for Tennessee beef at none, one, or more than one of these outlets. Because it can be difficult for small volume producers to enter into large supermarket chain or big box market channels, we focus on farmer's markets (*FMMKT*), direct from farmer (*FARMER*), butcher shops (*BUTCHER*), and gourmet shops (*GOURMET*).

Consumer *i* shops for Tennessee beef at outlet *m* (*GOURMET, BUTCHER, FMMKT, FARMER*) if the utility from doing so exceeds the utility of not shopping at that particular type of outlet for Tennessee beef. The outlets where consumers would shop for Tennessee beef is assumed to contribute to consumer *i*'s utility, as

$$(5)\quad U_{iM} = f(\boldsymbol{\psi}' Z_{im}),\ m = 1, \ldots, M$$

where consumer *i* will choose alternative *m* if

$$(6)\quad U_{im} \geq U_{in}.$$

The utility derived from shopping for Tennessee beef at a selected outlet is U_m. U_n is the utility derived from not shopping for Tennessee beef at that outlet. The explanatory variables ($\boldsymbol{Z_m}$) hypothesized to influence shopping location include respondent demographics, past shopping patterns, attitudes about products, as well as preferred product form (i.e., frozen or thawed) (Table 2 in Appendix).

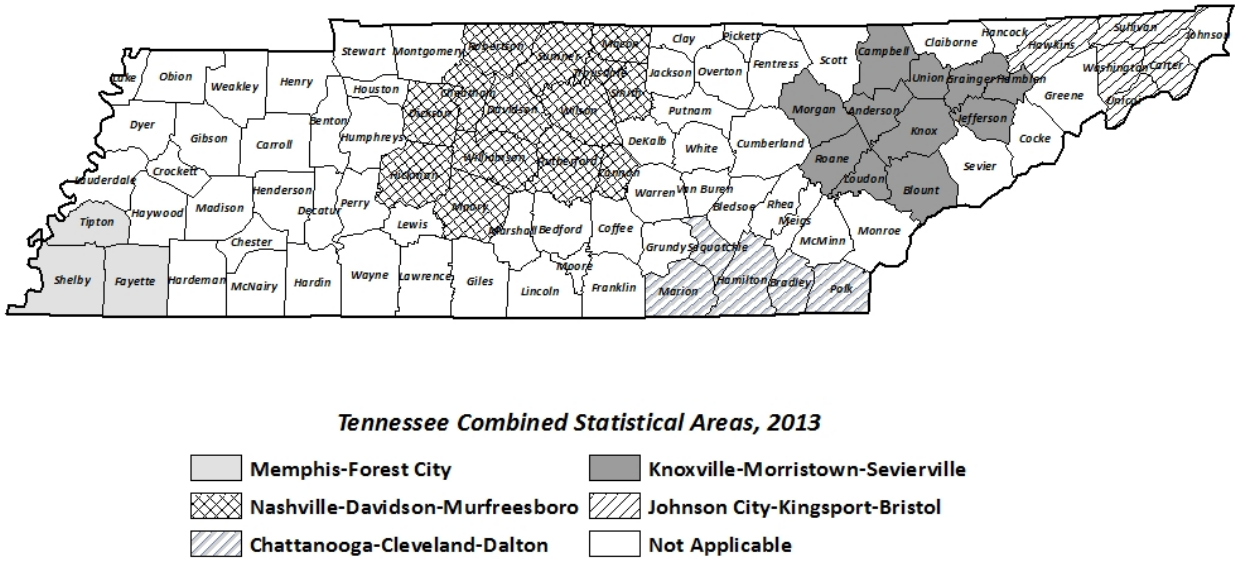
Methods and Procedures

Data Collection

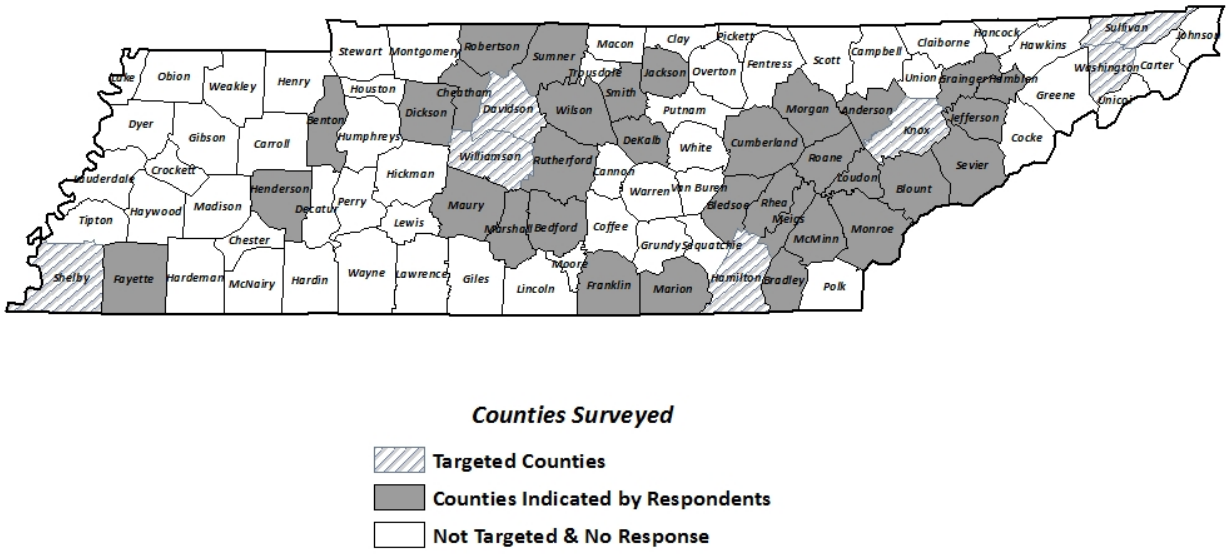
The survey was conducted by telephone in June and July 2013.[1] A random sample of individuals with landline or wireless phones was drawn from selected counties in five Combined Statistical Areas in Tennessee (Memphis, Nashville, Chattanooga, Knoxville, and Tri-Cities) (Figure 1a). The landline sample consists of telephone numbers for households in the five metropolitan areas. The wireless sample consists of wireless customers whose contracts are based in the study areas. The counties respondents stated they actually resided in are shown in Figure 1(b). A total of 1,209 surveys were completed. Using American Association of Public Opinion formulas, the response rate overall was 28.7 % and 23.3 % for the landline and wireless

[1] Enumerators trained to read from telephone scripts were employed through the UT Human Dimensions Laboratory.

sampling frames, respectively. The cooperation rate for the landline-sampling frame was 68.2 %, and the wireless cooperation rate was 54.3 %. It should be noted that of the 1,209 surveys completed, 931 of these respondents indicated they or others in their household consume beef.



(a) Targeted Combined Statistical Areas, Tennessee



b) Counties of Residence Indicated by Respondents

Figure 1. Targeted and Response Areas for Tennessee Beef Survey (2013).

Respondents were screened to verify that they were at least 18 years old and involved in planning meals or shopping for the household. Initial contacts in the wireless sampling frame were screened to ensure that only Tennessee households were included in the survey.

A comparison of demographic characteristics between the survey respondents and US Census Bureau estimates for 2012 at the state and county levels revealed some notable differences (Census Bureau 2012). These include gender, with 59.0% females among the respondents compared with 51.3% for the State and a range of 51.1% in Washington County to 52.3% in Shelby County. Also education level, with a higher percentage of respondents holding Bachelor's degrees (41.0% compared to 24.3% for Tennessee and a range of 27.8 % in Hamilton County to 35.0% in Davidson County). The percent of survey respondents 65 and older (31.2 %) is considerably higher than the Census data for the state (14.2 %) and the selected counties (ranged from 10.8 % in Shelby County to 16.0 % in Washington County). To adjust for these differences, observations are weighted with ω_i= 1/median county age. Many households contacted were unwilling to reveal their income level (68.4%). Missing income values were imputed with 2012 county median household income values from the Census Bureau's American Community Survey (Census Bureau 2012). A dummy variable is included in the regression to account for any differences between the actual respondent incomes and imputed values.

Respondents were asked questions about household beef consumption, including questions about the number of meals served at home per week in which beef was served, where they typically purchased beef, and their consumption of ground beef, steak, and other cuts of beef in the past month. Non-beef consuming households (i.e., those that did not have a household member who consumed beef or did not consume ground beef, steak or another beef cut at home within the past month) were excluded from the choice experiment.

Of the 931 beef consuming households, 702 responded to questions about steak, ground beef, or other beef cuts consumption. If the respondent indicated that his or her household consumed steak but not ground beef in the past month, they were asked a set of questions regarding steak. If they indicated that their household consumed ground beef but not steak, they were directed to questions about ground beef. If the respondent indicated that the household consumed other cuts of beef in the past month but not ground beef or steak or if they consumed both products, then they were randomly assigned to either the steak or ground beef choice question (see Figure 2). A total of 676 responded to the choice questions for steak or for ground beef, with 362 answering the steak choice question and 314 answering the ground beef choice question.

Beef-consuming household respondents were subsequently asked about the importance of various attributes when purchasing steak or ground beef (freshness, flavor, tenderness for steak (texture for ground beef), juiciness, color, leanness, price, and ease of preparation). They were also asked about the importance of humane treatment of the animal and whether the animal was naturally raised, locally produced, and grass- or grain-fed.

Before asking the contingent valuation question about the choice to purchase Tennessee beef, survey enumerators read a brief description of the Tennessee beef product. The ribeye steak example is below:

TENNESSEE beef means the animals must have been born, raised, and finished within the borders of the State of Tennessee. I'm now going to ask you to choose between TWO Choice-grade, 12-ounce, Boneless Ribeye Steaks. Before making your decision, consider your household's budget for food, keeping in mind that if you spend more on steak, you'll have less money to spend on other food products. Both steaks are the same weight and have IDENTICAL freshness, cut, color, marbling, meat texture, fat, tenderness, juiciness, and flavor.

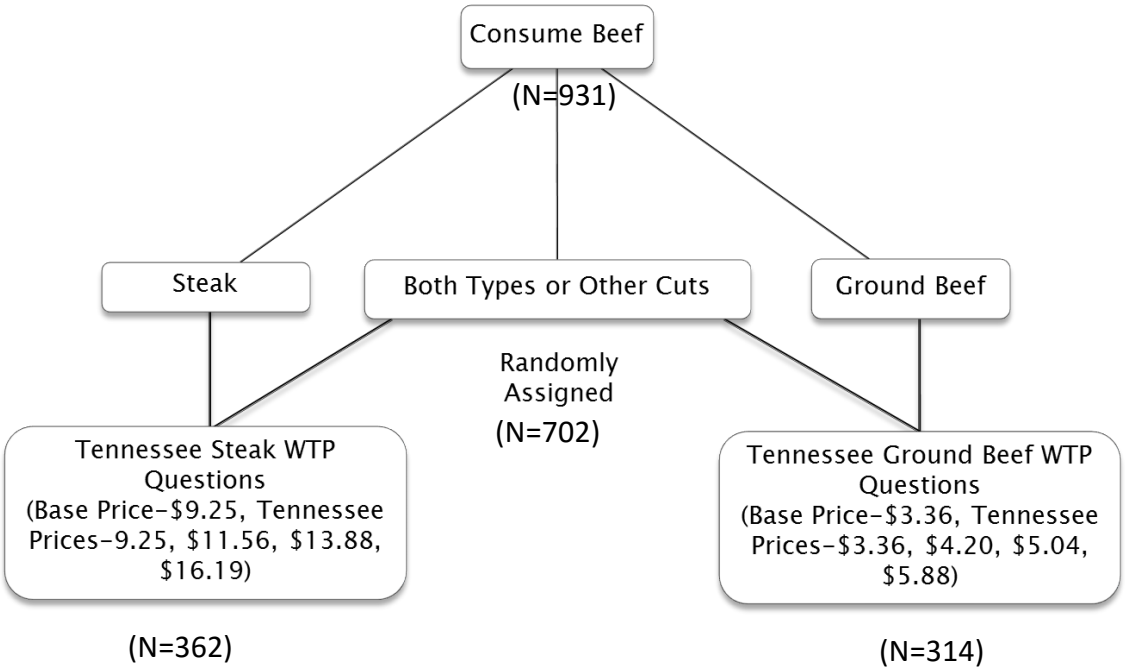


Figure 2. Assignment of respondents to steak or ground beef questions

A similar description was read for the 85% lean /15% fat ground beef option, with the local and nonlocal products being identical in leanness, freshness, color, meat texture, juiciness, and flavor.

Respondents were then asked to choose between a base product, a Tennessee beef product, or neither. The base ribeye price was $9.25 per pound. The base ground beef price was $3.36 per pound. Respondents were randomly assigned to four price levels for the Tennessee beef product. Steak prices were $9.25, $11.56, $13.88, and $16.19 per pound. Ground beef prices were $3.36, $4.20, $5.04, and $5.88 per pound. The price options for each product were based on USDA Agricultural Marketing Service retail beef price reports, USDA Weekly Retail Beef Feature Activity, at the time the survey was being developed (USDA/AMS 2012). The survey also included a series of questions asking respondents who indicated they would purchase Tennessee beef whether they would shop for Tennessee beef at different outlets and about their product form preferences. The final section of the survey included questions about respondent opinions and demographic characteristics, including gender, age, education, household income, and residence location.

Willingness to Pay Model Estimation

The WTP probit regression is estimated with maximum likelihood. For continuous variables, the marginal effect of variable *k* on the purchase decision is

$$(7) \quad \frac{\partial \Pr[TN_i=1]}{\partial X_k} = \phi(\alpha + \boldsymbol{\beta' X_i} + \beta_p P_i)\beta_k,$$

where ϕ is the standard normal density function. For binary explanatory variables, the marginal effect for X_k is calculated as:

$$(8) \quad \frac{\partial \Pr[TN_i=1]}{\partial X_k} = \Pr[TN_i = 1|X, X_k = 1] - \Pr[TN_i = 1|X, X_k = 0].$$

Outlet Model Estimation

The choice to shop at a particular outlet is estimated by multiple equations allowing correlation between the disturbances. For an *m*-equation multivariate probit model:

$$(9) \quad y^*_{im} = \psi' Z_{im} + \epsilon_{im}, \quad m = 1, ..., M$$

$$(10) \quad y^*_{im} = 1 \text{ if } y^*_{im} > 0 \text{ and 0 otherwise.}$$

The random disturbances $\boldsymbol{\epsilon_{im}}$, *m* =1,...,*M* are error terms distributed as multivariate normal, each with a mean of zero and covariance matrix $\boldsymbol{V}$. The method of estimation is by simulated maximum likelihood (Cappellari and Jenkins 2003). In the case where *M* = 4, the log-likelihood function for a sample of *N* independent observations of the multivariate probit is

$$(11) \quad \ln L = \sum_{i=1}^{N} \omega_i \ln \Phi_4[\boldsymbol{K_{i1}\psi_1' Z_{i1}}, \ldots, \boldsymbol{K_{i4}\psi_4' Z_{i4_i}} \mid \boldsymbol{V}]$$

where ω_i is a weight for observation *i* = 1, . . . ,*N*, and $\Phi_4(\bullet)$ is the quadrivariate standard normal distribution, and $\boldsymbol{V_{mn}} = 1$ if *m*=*n* or $\boldsymbol{K_{im}K_{in}\,\rho_{mn}}$ otherwise. Note that $\boldsymbol{K_{ik}} = 2y_{ik} - 1$ for each *i*, *k*=1,…,4. The marginal probability of shopping at a particular outlet is calculated as $\Pr(y_1) = \Pr(\epsilon_1 < \boldsymbol{\psi_1' Z_{i1}}) = \Phi_1(\boldsymbol{\psi_1' Z_{i1}})$. The joint probability that all the values are 1 (e.g., the consumer would purchase Tennessee beef at any one of the four retail outlets) is

$$(12) \quad \begin{aligned} \Pr(y_1, y_2, y_3, y_4) &= \Pr(\epsilon_1 < \boldsymbol{\psi_1' Z_1}, \epsilon_2 < \boldsymbol{\psi_2' Z_2}, \epsilon_3 < \boldsymbol{\psi_3' Z_3}, \epsilon_4 < \boldsymbol{\psi_4' Z_4}) \\ &= \Pr(\epsilon_4 < \boldsymbol{\psi_4' Z_4} | \epsilon_3 < \boldsymbol{\psi_3' Z_3}, \epsilon_2 < \boldsymbol{\psi_2' Z_2}, \epsilon_1 < \boldsymbol{\psi_1' Z_1}) \\ &\quad \times \Pr(\epsilon_3 < \boldsymbol{\psi_3' Z_3} | \epsilon_2 < \boldsymbol{\psi_2' Z_2}, \epsilon_1 < \boldsymbol{\psi_1' Z_1}) \\ &\quad \times \Pr(\epsilon_2 < \boldsymbol{\psi_2' Z_2} | \epsilon_1 < \boldsymbol{\psi_1' Z_1}) \times \Pr(\epsilon_1 < \boldsymbol{\psi_1' Z_1}). \end{aligned}$$

Results

About 22% of the respondents indicated they were not in beef consuming households. These individuals were excluded from the analysis. The most commonly cited reasons for not being a beef consumer were health concerns, followed by being vegetarian, and taste (Table 3).

Of the 362 who answered the steak choice question, a total of 264 provided responses to all the questions needed to estimate the steak probit model. Of the 314 who answered the ground beef choice question, a total of 245 provided responses to all the questions needed to estimate the ground beef probit model. About 42.4% of consumers were willing to pay the premium to purchase the Tennessee steak, while 36.3% were willing to pay a premium for Tennessee ground beef (Table 1). Figure 3 shows the response to price levels for Tennessee beef. Probit regression estimates for Tennessee steak and ground beef are shown in Table 4 (see Appendix). Both models are significant overall (LR test H_0: $\beta=0$ for all covariates, $p<.0001$). The steak model correctly classifies 77.7% of the observations. The ground beef model correctly classifies 80% of the respondent choices. The pseudo-R^2 is 0.338 for the steak choice model and 0.343 for the ground beef choice model.

Table 3. Reasons provided for household members not eating beef

Reason	**Percent Indicating Reason** (N=266)
Health Concerns	45.86%
Vegetarian	34.59%
Taste	15.79%
Cost	7.52%
Safety Concerns	7.52%
Religious	3.01%

The coefficients on price and the marginal effects of price are negative and significant. For each $1/pound increase in price, the probability of choosing Tennessee steak declines by 0.085. The probability of choosing Tennessee ground beef declines by 0.192 for each $1/pound increase in price.

Older consumers are less likely to choose Tennessee steak. This result is contrary to Wolf and Thulin (2000), but consistent with studies finding that older consumers are less likely to perceive local foods favorably (Willis et al. 2013; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee 2011). For each year increase in age, the likelihood of choosing Tennessee steak decreases by 0.005. Age does not influence the likelihood of choosing Tennessee ground beef. Unlike several prior studies (Froelich, Carlberg, and Ward 2013; Perkin 2012; Willis et al. 2013; Adams and Adams 2008; James, Rickard, and Rossman 2009; Jekanowski, Williams, and Schiek 2000), gender was not found to influence the likelihood of choosing Tennessee beef. Hannagriff, Rhoades, and Wilmeth (2008) also found no significant differences in attribute values placed on local beef. While multiple studies have linked education level and preferences for local foods (Brown 2003; Mennecke et al. 2006; Willis et al. 2013; Govindasamy et al. 2012; Hu, Woods, and Bastin 2009; Nganje, Hughner, and Lee 2011; Perkins 2012), education was not found to influence the likelihood of choosing Tennessee beef. Neither household size, farm background,

nor frequency of meals serving beef influence the likelihood of choosing Tennessee beef products.

Though several studies found that higher incomes positively influenced WTP a premium for local foods (Willis et al. 2013; Brown 2003; Nganje, Hughner, and Lee 2011), the results from this study suggest non-linear effects of income on the likelihood of choosing Tennessee beef. Specifically, moderate household incomes (INC3 —between $50,000 and $70,000 — negatively influence the likelihood of choosing the Tennessee steak product.

Households with children aged less than six are more likely to choose Tennessee ground beef. However, these households are no more or less likely to choose Tennessee steak than those without children in this age range.

Households that shop for beef at large retail stores and butcher shops are less likely to choose Tennessee steak. However households that shopped for beef at a butcher shop in the previous year are more likely to choose Tennessee ground beef. Households that shop for beef at farmers markets or directly from a farmer are no more or less likely to choose Tennessee beef than those households that do not. Consumers who place greater value on freshness, natural production, and food safety are more likely to choose Tennessee ground beef. Consumers who place greater value on tenderness and lower price are less likely to choose Tennessee steak. Consumers who place greater value on flavor and grain-fed beef products are more likely to choose Tennessee steak.

The mean estimated WTP for Tennessee steak is $14.31, a premium of 54.7% ($5.06 above the base of $9.25). The mean estimated WTP for Tennessee ground beef is $5.02, a premium of 49.4% ($1.66 per pound above the base of $3.36). T-tests indicate that each of these premiums are different from zero. Adjala et al. (2012) found a willingness to pay of $2.71 per pound for ground beef raised within 100 miles. Lim and Hu (2013) concluded that consumers would pay a $2.48 per pound premium (above a base price of $21.00 per pound) for steak with a Canadian provincial label. Chang et al. (2013) found a $0.71 to $1.29 premium when moving from Omaha Steaks to South Dakota Certified. Maynard, Burdine, and Meyer found a $1.20 per pound premium for a regional brand (Prairie Prime) and a $1.12 premium for Canada AAA steak above the $8.49 price for a generic steak.

Maynard, Burdine, and Meyer (2003) found that 64% would pay a 20% premium for ground beef but only 15% would pay a 40% premium for local ground beef, while 52% would pay a 20% premium for steak but only 20% would pay a 40% premium for locally produced steak. As shown in Figure 3, 31% of respondents are willing to pay a 25 % premium for Tennessee ground beef but only 7.8 % are willing to pay a 50% premium. For Tennessee steak, 38 % would pay a 25% premium, while 31 % would pay a 50% premium.

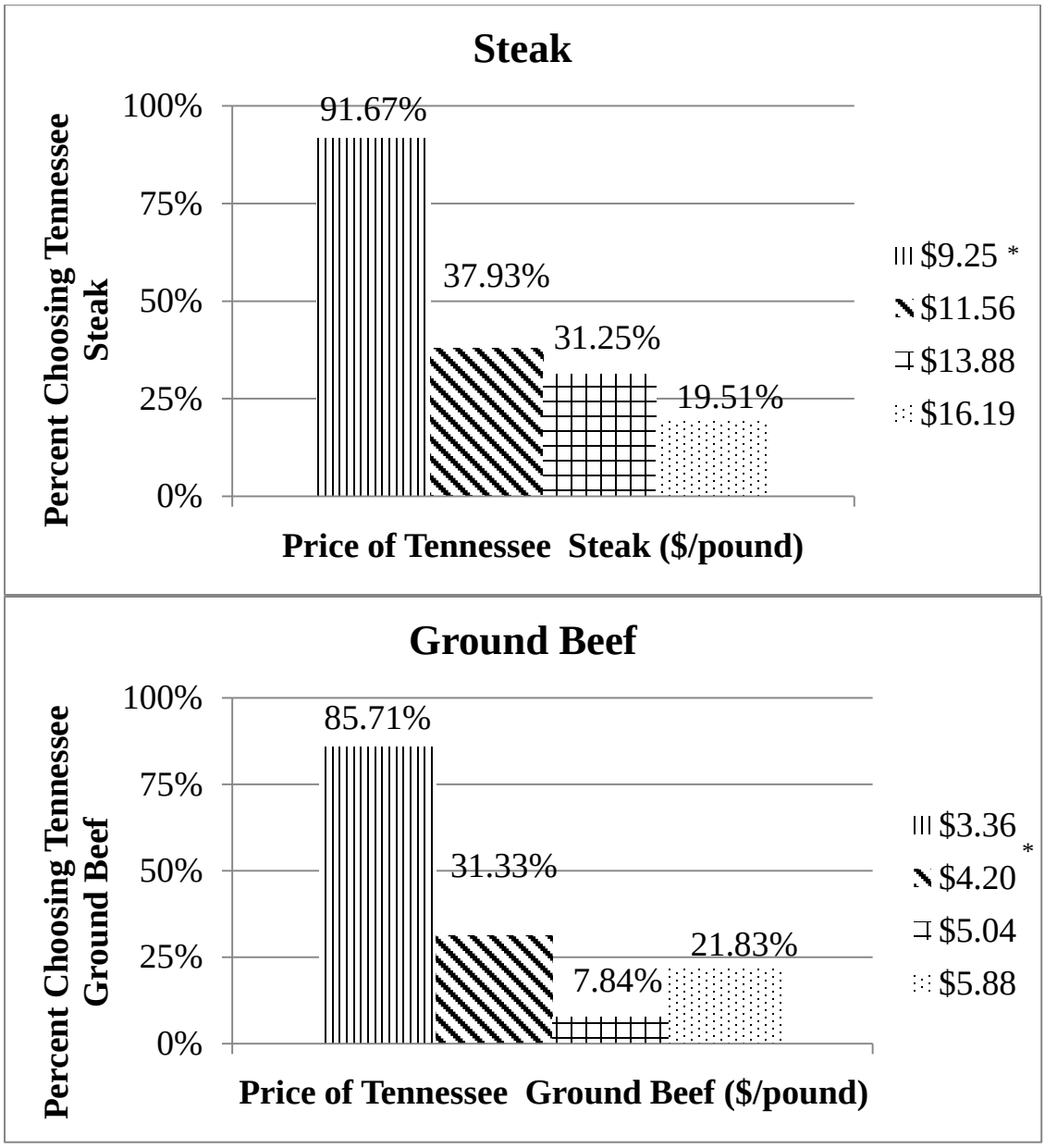


Figure 3. Choice of Tennessee Beef Across Varying Prices
Note. *=Price of Base Product

When comparing the results of this study to previous studies, it is important to note that 22 % of the respondents were excluded from the choice experiment because their household did not either (i) have at least one person who consumed beef or (ii) purchase either steak, ground beef, or other cuts of beef in the past month. If those respondents are included, and their WTP a premium for Tennessee beef is assumed to be equal to $0, mean WTP becomes $11.16 (a $1.91 or 21% premium) for Tennessee steak and $3.92 (a $0.56 or 17% premium) for Tennessee ground beef.

The number of respondents who chose Tennessee beef and answered all of the questions needed for the multivariate probit analysis is 189. Of the respondents who would choose Tennessee beef, about 44% would shop for the product at a gourmet store, 41.8 % at a butcher shop, 35.5% at a farmer's market, and 44.9% directly from a farmer (Table 2, see Appendix). These estimates are interesting in light of the numbers of these respondents who had purchased beef at these outlets in the past year (30 % from a gourmet store; 12.7% from a butcher; 7.6% from a farmers market; and 8.2% directly from a farmer). These results suggest that these outlets could potentially increase the numbers of consumers shopping for beef and even beef sales volumes, by stocking Tennessee beef products.

The results of the multivariate probit regression of respondent expectations about the types of retail outlets at which they would shop for Tennessee beef are presented in Table 5 (see Appendix). Unlike previous studies (Lusk and Cevellos 2004; Grannis, Thilmany, and Sparling, 2001) gender was not found to influence likelihood of shopping for Tennessee beef at any of the four types of retail outlets studied. Similarly, age and education were not found to influence the probability of shopping for Tennessee beef at the outlet types. Households with moderate incomes (*INC2, INC3*) are not more or less likely to shop for Tennessee beef at any of the outlet types. However, lower income households (*INC1*) are more likely to shop for Tennessee beef at farmers markets. These results are contrary to Medina and Ward (1999), who found that higher incomes were associated with shopping for beef at specialty stores. Respondents from rural areas or small towns (*URB1*) are more likely to expect to shop for Tennessee beef at gourmet stores. Respondents who have previously shopped for beef at a particular type of outlet were more likely to anticipate shopping for Tennessee beef at that type of outlet, with the direct-from-farmer outlet having the strongest association.

Respondents who place greater importance on product (*PRICE*) are less likely to anticipate shopping at gourmet stores. This result mirrors the finding by Lusk and Cevallos (2004) that high prices at specialty shops decreased the likelihood of shopping at these outlets. Respondents who value grass-fed beef (*GRASS*) are more likely to shop for Tennessee beef at butcher shops, farmers markets, and directly from farmers. Respondents who place a greater priority on ease of preparation (*EASE*) are less likely to shop for Tennessee beef at gourmet markets, farmer's markets and directly from farmers. Respondents who consider it more important to help support farm incomes than to keep food prices low (*FARMERINC*) are more likely to anticipate shopping for Tennessee beef directly from a farmer. The importance respondents placed on humane treatment of cattle (*HUMANE*), freshness of the product (*FRESH*), or the product being natural (*NATURAL*) is not associated with the likelihood of shopping for Tennessee beef at any of the outlets. Respondents who are willing to purchase frozen beef (*FROZEN*) are more likely to shop for Tennessee beef at gourmet stores, while respondents who are willing to purchase thawed beef (*THAW*) are more likely to shop for Tennessee beef at butcher shops, farmers markets, and directly from farmers.

The predicted probability of anticipating shopping for Tennessee beef at all outlets is 0.194, while the probability of shopping for Tennessee beef at none of the four outlets is 0.337. The marginal probability of anticipating shopping for Tennessee beef at a gourmet market is 0.422, 0.417 at a butcher, 0.361 at a farmers market, and 0.445 directly from a farmer.

Conclusions

In states such as Tennessee, where finishing beef can be cost prohibitive, increasing the number of cattle that are finished in state may depend upon the extent to which consumers are willing to pay a premium for locally produced beef. The results of this study suggest that Tennessee consumers are willing to pay premiums for steak and ground beef from cattle raised and finished in Tennessee. Price conscious shoppers who purchase beef at low cost retailers (i.e., big box stores) are less willing to choose Tennessee steak over a non-branded alternative. However, consumers who value grain-fed, flavorful beef products are more likely to choose Tennessee steak, suggesting that one possible motivation for consuming a Tennessee steak would be a preference for flavorful, grain-fed beef. Consumers who value freshness, safety, and natural production are more likely to choose Tennessee ground beef than a non-branded alternative. Differences in the effects of demographic and attitudinal variables on willingness to pay a premium for the Tennessee products suggest that target markets for the two products could be quite different. Hence, a one size fits all marketing approach might not be as effective as separately targeting consumers of each beef product.

While some studies have examined where consumers might purchase beef, little research has focused on the demographic and attitudinal factors that may influence where shoppers would expect to purchase locally produced beef. Knowledge of where target consumers might anticipate purchasing Tennessee beef is important given that barriers to entry for locally produced beef can be quite high in large grocery and supermarket chains and that a relatively small percentage of consumers shop at farmers markets or directly from farmers relative to gourmet markets or butcher shops.

Not surprisingly, where consumers currently or have previously shopped for beef is a key predictor of where consumers anticipate shopping for Tennessee beef. Along these same lines, price-conscious consumers are less likely to shop for Tennessee beef at gourmet markets. There appears to be a link between a desire for a grass-fed product and retail outlet, as those with a preference for grass-fed beef are more likely to shop for Tennessee beef at butcher shops, farmers markets, and directly from farmers. Respondents who place greater weight on ease of preparation are less likely to shop for Tennessee beef at gourmet markets, farmer's markets and directly from farmers. This result suggests that the extra effort required to shop at a retail outlet different from the outlet where the consumer purchases the bulk of their groceries may present a hurdle for marketing locally produced beef products. However, the percentage of respondents asserting that they would shop for Tennessee beef at gourmet stores, butcher shops, farmers markets, and directly from farmers is greater than the percentage who had actually shopped for beef at these types of outlets in the past year, suggesting that consumers might be willing to change their shopping patterns to purchase Tennessee beef. Future research might examine factors that could influence consumers to switch or supplement shopping outlets to obtain local beef, including the types of marketing efforts needed to increase product awareness and purchase convenience by consumers. Neither concerns about humane treatment of animals, natural products, nor freshness influence the type of outlet where consumers would anticipate purchasing Tennessee beef. However, those who are concerned about supporting farmer incomes are more likely to shop for Tennessee beef directly from farmers. Interestingly, the product form that consumers would be willing to purchase Tennessee beef in also influences the types of retail

outlets at which consumers would anticipate shopping for Tennessee beef. While a frozen product might sell well at gourmet stores, a thawed product might sell better at butcher shops and farmers markets.

This study has several limitations that could be addressed in future research. First, Tennessee has a lengthy border with three of its metropolitan areas being near those borders (Memphis, Chattanooga, and Tri-Cities). Given the proximity of these metro areas to the state's borders, further research should examine the effect of labeling locally produced beef as Tennessee beef on consumers from neighboring states. Second, additional product attributes, such as humane treatment, natural, or grass-fed certification, could be included to examine the relative importance of, and possible interactions between, a Tennessee beef label and other beef certification and labeling programs. A third way in which this research could be extended is to include demand by institutional markets for Tennessee branded beef, particularly restaurants focusing on locally sourced foods.

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References

Abatekassa, G., and H.C. Peterson. 2011. "Market Access for Local Food through the Conventional Food Supply Chain." *International Food and Agribusiness Management Review* 14 (1): 63–82.

Adalja, A., J. Hanson, C. Towe, and E. Tselepidakis. 2015. "An Examination of Consumer Willingness to Pay for Local Products." *Agricultural and Resource Economics Review* 43(3): 253–274.

Adams, D.C., and A.E. Adams. 2008. "Availability, Attitudes, and Willingness to Pay for Local Foods: Results of a Preliminary Survey." Paper presented at American Agricultural Economics Association annual meeting, Orlando FL, July 27–29.

Brooker, J.R., D.B. Eastwood, C.L. Stout, and R.H. Orr. 1988. "Branding Locally Grown Produce in Supermarkets." *Journal of Food Distribution Research* 19(1): 51–60.

Brown, C. 2003. "Consumers' Preferences for Locally Produced Food: A Study in Southeast Missouri." *American Journal of Alternative Agriculture* 18(4): 213–24.

Cappellari, L. and S. Jenkins. 2003. "Multivariate Probit Regression Using Simulated Maximum Likelihood." *STATA Journal* 3(3): 278–294.

Carpio, C.E., and O. Isengildina-Massa. 2013. "Does Government Sponsored Advertising Increase Social Welfare? A Theoretical and Empirical Investigation." Paper presented at Agricultural and Applied Economics Association annual meeting, Washington DC, August 4-6.

Census Bureau. 2012. Tennessee and County Quick Facts. http://www.census.gov/quickfacts/table/PST045215/47.

Chang, K., P. Xu, K. Underwood, C. Maen, and G. Langelett. 2013. "Consumers' Willingness to Pay for Locally Produced Ground Beef: A Case Study of the Rural Northern Great Plains," *Journal of International Food and Agribusiness Marketing* 25(1): 42–67.

Darby, K., M.T. Batte, S.C Ernst, and B.E. Roe. 2006. "Willingness to Pay for Locally Produced Foods: A Customer Intercept Study of Direct Market and Grocery Store Shoppers." Paper presented at American Agricultural Economics annual meeting, Long Beach CA, July 23–26.

Evans, J., G. D'Souza, A. Collins, C. Brown, M. Sperow. 2011. "Determining Consumer Perceptions of and Willingness to Pay for Appalachian Grass-Fed Beef: An Experimental Economics Approach." *Agricultural and Resource Economics Review* 40(2): 233–250.

Froehlich, E., J. Carlberg, and C. Ward. 2009. "Willingness-to-Pay for Fresh Brand Name Beef," *Canadian Journal of Agricultural Economics* 57(1): 119–137.

Govindasamy, R., V. Purduri, K. Kelley, and J.E. Simon. 2012. "Influence of Consumer Demographics on the Demand for Locally Grown Ethnic Greens and Herbs because of Food Miles Concerns: A Logit Model Analysis." *Journal of Food Distribution Research* 43(1): 116–117.

Grannis, J., D. Thilmany, and E. Sparling. 2001. "Shopping for Meat: Empirical Demand Estimation for Natural Beef Across Store Choices." Paper presented at Western Agricultural Economics Association annual meeting Logan UT, July.

Greene, W.H. 2011. "*Econometric Analysis"* 7th edition. Upper Saddle River NJ: Prentice Hall.

Hanagriff, R.D., R.D. Rhoades, and D. Wilmeth. 2008. "Consumer Preferences in Purchasing Beef and the Values They Attribute to Branded Products." Paper presented at Southern Agricultural Economics Association annual meeting, Atlanta GA, 31 January–3 February.

Hanemann, W.M. 1984. "Welfare Evaluations in CV Experiments with Discrete Responses." *American Journal of Agricultural Economics* 66 (3): 332–341.

Hu, W., T.A. Woods, and S. Bastin. 2009. "Consumer Acceptance and Willingness to Pay for Blueberry Products with Nonconventional Attributes." *Journal of Agricultural and Applied Economics* 41 (1): 47–60.

James, J.S., B.J. Rickard, and W.J. Rossman. 2009. "Product Differentiation and Market Segmentation in Applesauce: Using a choice Experiment to Assess the Value of Organic, Local, and Nutrition Attributes." *Agricultural and Resource Economics Review* 38 (3): 357–370.

Jekanowski, M.D., D.R. Williams II, and W.A Schiek. 2000. "Consumers' Willingness to Purchase Locally Produced Agricultural Products: An Analysis of an Indiana Survey." *Agricultural and Resource Economics Review* 29 (1): 43–53.

Lewis, K.E., A.P. Griffith, C.N. Boyer, and J. Rhinehart. 2015. "Returns to Retained Ownership through Finishing for Beef Cattle Originating from Tennessee," paper presented at Southern Agricultural Economics Association 2015 Annual Meeting, Atlanta, GA, January 31-February 3, 2015. http://ageconsearch.umn.edu/bitstream/196620/2/TN%20%20Retained%20Ownership.%202015%20SAEA%20Annual%20Meeting.pdf.

Lim, K. and W. Hu. 2013. "How local is local? Consumer Preference for Steaks with Different Food Mile Implications." Selected Paper Presented at 2013 Southern Agricultural Economics Association Annual Meeting, February 2-5, 2013, Orlando, Florida.

Loureiro, M. L., and S.E. Hine. 2002. "Discovering Niche Markets: A Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic, and GMO–Free Products." *Journal of Agricultural and Applied Economics* 34 (3): 477–487.

Lusk, J.L. and E. Cevallos. 2004. "Factors Influencing Demand for a Producer-Owned Beef Retail Outlet." *Journal of Agricultural and Applied Economics* 36 (1): 97–111.

Martinez, S., M. Hand, M. Da Pra, S. Pollack, K. Ralston, T. Smith, S. Vogel, S. Clark, L. Lohr, S. Low, and C. Newman. 2010. "Local Food Systems: Concepts, Impacts, and Issues." Washington DC: U.S. Department of Agriculture, ERS Econ. Res. Rep. 96, May.

Maynard, L. J., K.H. Burdine, and A.L. Meyer. 2003. "Market Potential for Locally Produced Meat Products." *Journal of Food Distribution Research* 34 (2): 26–37.

McFadden, D. 1974. "Conditional Logit Analysis of Qualitative Choice Behavior." In P. Zarembka, ed. Frontiers in Econometrics. New York: Academic Press, pp. 105–142.

Medina, S. and R.W. Ward. 1999. "A Model of Retail Outlet Selection for Beef." *International Food and Agribusiness Management Review* 2 (2): 195–219.

Mennecke, B., A. Townsend, D.J. Hayes, and S. Lonergan. 2007. "A Study of the Factors that Influence Consumer Attitudes Toward Beef Products Using the Conjoint Market Analysis Tool." Working paper, Center for Agricultural and Rural Development, Iowa State University.

Nganje, W.E., R.S. Hughner, and N.E. Lee. 2011. "State-Branded Programs and Consumer Preference for Locally Grown Produce." *Agricultural and Resource Economics Review* 40 (1): 20–32.

Perkins, S. 2012. Assessing the Demand For Locally Produced Natural Beef. M.S. Thesis. University of Georgia, Athens, Georgia.

Rossini, G., R.G. Arncibia, and E.D. Guiguet. 2014. Argentine Beef Demand and Household Choices of Retail Channels. *International Journal on Food System Dynamics* 5(1): 1–10.

Tennessee Department of Agriculture. 2015. "Tennessee Agriculture 2014: Departmental Report & Statistical Summary." http://www.tn.gov/assets/entities/agriculture/attachments/annualreport14.pdf.

United States Census Bureau. 2015. "State and County Quickfacts." http://quickfacts.census.gov/qfd/states/47000.html. [accessed November 15, 2015.

United States Department of Agriculture Agricultural Marketing Service. 2012. *USDA Weekly Retail Beef Feature Activity*. http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=22846 [accessed August 15, 2013].

United States Department of Agriculture Economic Research Service. 2015. Feed Grains: Yearbook Tables. http://ers.usda.gov/data-products/feed-grains-database/feed-grains-yearbook-tables.aspx [accessed April 28, 2015].

Willis, D.B., C.E. Carpio, K.A. Boys, and E.D. Young. 2013. "Consumer Willingness to Pay for Locally Grown Produce Designed to Support Local Food Bands and Enhance Locally Grown Producer Markets." Paper presented at Agricultural and Applied Economics Association, Washington DC, August 4–6.

Wolf, M., and A. J. Thulin. 2000. "A Target Consumer Profile and Positioning For Promotion of a New Locally Branded Beef Product." *Journal of Food Distribution Research* 31(1): 193–197.

Appendix

Table 1. Names, definitions, and sample means for the variables included in the probit models of Tennessee steak and ground beef choice

Variable Name	Variable Definition	Mean for Steak (N=264)	Mean for G. Beef (N=245)
Dependent Variables			
STK or GBCHOICE	1 if choose TN steak or TN ground beef, 0 otherwise	0.424	0.363
Explanatory Variables			
STK or GBPRICE	TN steak price/pound, $9.25, $11.56, $13.88, $16.19; TN ground beef price/pound $3.36, $4.20, $5.04, $5.88	13.042	4.575
AGE	Age of respondent in years	52.918	51.796
FEMALE	1 if female, 0 otherwise	0.524	0.611
COLLEGE	1 if respondent graduated from college, 0 if not	0.501	0.394
INC1-INC4	*INC1*=1 if household income in 2012 ≤$40K, 0 otherwise	0.102	0.135
	INC2=1 if household income in 2012 is $40K-$50K, 0 otherwise	0.484	0.532
	INC3= if household income in 2012 is $50K-$70K, 0 otherwise	0.090	0.087
	INC4= 1 if household income in 2012>$70K, 0 otherwise (omitted category)	0.324	0.246
DUMMYINC	1 if observ. based on county median household income, 0 otherwise	0.491	0.546
URB1-URB3	*URB1* =1 if 1 rural/small town, 0 otherwise	0.343	0.334
	URB2=1 if suburban, 0 otherwise	0.427	0.410
	URB3=1 if metro, 0 otherwise (omitted category)	0.230	0.255
HHSIZE	Household size	2.980	2.652
CHLDLT6	1 if child< 6 years of age in household, 0 otherwise	0.096	0.129
FRMBK	1 if from farm background, 0 otherwise	0.400	0.359
BEEFMEALS	1 if beef served at home>3 times/week, 0 otherwise	0.449	0.335
WAREH	1 if shopped for beef at warehouse in past yr, 0 otherwise	0.367	0.260
BIGBOX	“ ” at big box store, “ ”	0.477	0.411
GOURM	“ ” at gourmet store, “ ”	0.255	0.213
BUTCH	“ ” at butcher, “ ”	0.133	0.099
FMMKT	“ ” at farmers’ market, “ ”	0.059	0.067
FARMER	“ ” directly from farmer, “ ”	0.055	0.043
LEAN	Importance of leanness when purchasing 1=not, …,3=very	2.450	2.611
FRESH	Importance of freshness “…”	2.899	2.925
TEND/TEXT	Importance of tenderness /texture “ ”	2.797	2.421
JUICY	Importance of juiciness “…”	2.720	2.480
FLAV	Importance of flavor “…”	2.902	2.848
COLOR	Importance of color “…”	2.696	2.776
PRICE	Importance of price “…”	2.458	2.444
NATUR	Importance of natural label “…”	2.331	2.347
GRASS	Importance of grass-fed label “…”	1.938	1.872
GRAIN	Importance of grain fed label “…”	1.917	1.839
HUMANE	Importance of humanely treated label “…”	2.489	2.506
SAFE	Importance of keeping food prices low vs safety/nutrition,1=food prices, 2=same, 3=safety /nutrition	2.405	2.429
WTAGE	1/median age of household in the county	0.026	0.027

Table 2. Definitions and sample means for the variables included in the multivariate probit model for types of outlets where respondent would shop for Tennessee beef

Variable Name	Variable Definition	Mean (N=189)
GOURMET	1 if would anticipate purchasing Tennessee beef at gourmet stores, 0 otherwise	0.435
BUTCHER	1 if would " " at butcher shops, 0 otherwise	0.418
FARMMKT	1 if would " " at farmers markets, 0 otherwise	0.355
FARMER	1 if would " " at farms directly, 0 otherwise	0.449
AGE	Age of respondent in years	50.393
FEMALE	1 if female, 0 otherwise	0.556
COLLEGE	1 if respondent graduated from college education, 0 if not	0.434
INC1-INC4	*INC1*=1 if household income in 2012 ≤$40K, 0 otherwise	0.092
	INC2=1 if household income in 2012 is $40K-$50K, 0 otherwise	0.511
	INC3= if household income in 2012 is $50K-$70K, 0 otherwise	0.075
	INC4= 1 if household income in 2012>$70K, 0 otherwise (omitted category)	0.321
DUMMYINC	1 if observ. based on county median household income, 0 otherwise	
URB –URB3	*URB1* =1 if 1 if rural or small town, 0 otherwise	0.343
	URB2=1 if suburban, 0 otherwise	0.405
	URB3=1 if metro, otherwise (omitted category)	0.251
$OUTLET_j$	1 if purchase beef at outlet type *j* in past year, 0 otherwise, j=Gourmet stores	0.302
	Butcher shops	0.127
	Farmers markets	0.076
	Farm direct	0.082
FRESH	Importance of freshness "…"	2.933
PRICE	Importance of price when purchasing beef, 1=not, 2=somewhat, 3=very	2.372
NATUR	Importance of natural label "…"	2.530
EASE	Importance of ease of preparation "…"	2.279
GRASS	Importance of grass-fed label "…"	2.113
HUMANE	Importance of humanely treated label "…"	2.628
FARMERINC	1 if consider supporting farmer incomes more important than keeping food prices low, 0 otherwise	0.446
FROZEN	1 if would purchase Tennessee beef if frozen, 0 otherwise	0.633
THAW	1 if would purchase Tennessee beef if frozen then thawed, 0 otherwise	0.309
WTAGE	1/median age of household in the county	0.026

Table 4. Estimated probit models for steak and ground beef choice (ME = marginal effect)

	Steak (N=264)				**Ground Beef** (N=245)				
Variable	**Coeff**	**SE**	**ME**	**SE**	**Coeff**	**SE**	**ME**	**SE**	
INTERCEPT	5.719	1.832***			-2.201	1.535			
STK or GBPRICE	-0.335	0.043***	-0.085	0.007***	-0.795	0.130***	-0.192	0.024	***
AGE	-0.020	0.008**	-0.005	0.002**	0.004	0.008	0.001	0.002	
FEMALE	-0.143	0.202	-0.036	0.051	0.179	0.228	0.043	0.055	
COLLEGE	-0.089	0.205	-0.023	0.052	-0.024	0.269	-0.006	0.065	
INC1	0.021	0.410	0.005	0.104	-0.192	0.400	-0.046	0.096	
INC2	0.216	0.357	0.055	0.091	0.458	0.443	0.111	0.107	
INC3	-0.605	0.353*	-0.154	0.088*	0.322	0.425	0.078	0.103	
DUMMYINC	-0.084	0.314	-0.021	0.080	-0.436	0.395	-0.105	0.095	
URB1	0.116	0.266	0.029	0.068	0.181	0.269	0.044	0.065	
URB2	-0.170	0.262	-0.043	0.066	-0.185	0.257	-0.045	0.062	
HHSIZE	-0.053	0.082	-0.013	0.021	-0.093	0.103	-0.022	0.025	
CHLDLT6	-0.054	0.425	-0.014	0.108	0.834	0.389**	0.201	0.092	*
FRMBK	0.254	0.213	0.065	0.054	0.157	0.217	0.038	0.052	
BEEFMEALS	0.120	0.203	0.030	0.052	0.002	0.221	0.001	0.053	
WAREH	-0.034	0.234	-0.009	0.059	-0.206	0.256	-0.050	0.062	
BIGBOX	-0.373	0.225*	-0.095	0.056*	-0.328	0.224	-0.079	0.054	
GOURM	0.322	0.258	0.082	0.065	0.183	0.292	0.044	0.070	
BUTCH	-0.587	0.288**	-0.149	0.073**	0.670	0.344*	0.162	0.082	*
FMMKT	-0.403	0.422	-0.102	0.106	0.349	0.459	0.084	0.111	
FARMER	0.305	0.426	0.078	0.107	0.048	0.574	0.012	0.139	
LEAN	-0.076	0.158	-0.019	0.040	-0.022	0.181	-0.005	0.044	
FRESH	-0.452	0.306	-0.115	0.077	0.884	0.425**	0.214	0.101	**
EASE	-0.109	0.136	-0.028	0.035	0.012	0.151	0.003	0.036	
TEND	-0.448	0.273	-0.114	0.069	0.054	0.174	0.013	0.042	
JUICY	0.321	0.238	0.082	0.060	0.042	0.188	0.010	0.045	
FLAV	0.525	0.307*	0.133	0.077*	0.163	0.307	0.039	0.074	
COLOR	-0.089	0.191	-0.023	0.049	-0.250	0.207	-0.060	0.049	
PRICE	-0.379	0.158**	-0.096	0.039	-0.156	0.181	-0.038	0.043	
NATUR	0.097	0.155	0.025	0.039	0.356	0.178**	0.086	0.042	**
GRASS	-0.039	0.200	-0.010	0.051	0.184	0.212	0.044	0.051	
GRAIN	0.474	0.205**	0.120	0.052**	0.096	0.209	0.023	0.050	
HUMANE	0.248	0.157	0.063	0.040	0.238	0.174	0.057	0.042	
SAFE	-0.075	0.167	-0.019	0.042	0.405	0.181**	0.098	0.043	**
LLR Test (33 df)	100.06***				88.78***				
% Correctly Class.	77.65%				80.00%				
Pseudo R^2	0.338				0.343				

[a] *** Indicates significant at 99%, ** at 95%, and * at 90% confidence levels.

Table 5. Multivariate probit parameter estimates for choice of outlets where would likely purchase Tennessee Beef

	Gourmet Stores		Butcher Shops		Farmers Markets		Farmer Direct	
Variable	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
INTERCEPT	-2.325	1.285 *	-1.252	1.137	-0.803	1.191	-0.943	1.225
AGE	-0.004	0.007	0.002	0.280	0.0005	0.006	0.001	0.006
FEMALE	0.046	0.225	-0.095	0.216	-0.067	0.236	-0.136	0.208
COLLEGE	0.068	0.221	-0.023	0.215	-0.270	0.220	0.129	0.206
URB1	0.840	0.304 ***	-0.192	0.280	-0.068	0.258	0.125	0.281
URB2	0.442	0.280	0.053	0.255	0.201	0.265	0.351	0.257
INC1	0.700	0.437	0.643	0.387 *	0.828	0.341 **	0.365	0.327
INC2	0.518	0.393	-0.416	0.420	-0.177	0.410	-0.078	0.402
INC3	0.650	0.483	-1.120	0.445 **	-0.556	0.515	-0.141	0.389
DUMMYINC	-0.436	0.377	0.320	0.387	-0.019	0.388	-0.030	0.368
$OUTLET_M$	1.288	0.248 ***	1.397	0.292 ***	1.105	0.327 ***	1.589	0.356 ***
PRICE	-0.277	0.149 *	0.104	0.155	0.076	0.154	-0.104	0.151
GRASS	0.167	0.142	0.262	0.140 *	0.261	0.145 *	0.222	0.118 *
EASE	-0.251	0.111 **	-0.113	0.087	-0.346	0.114 ***	-0.169	0.086 **
FARMERINC	0.078	0.219	0.249	0.209	0.261	0.213	0.381	0.203 *
HUMANE	0.137	0.210	-0.114	0.178	-0.114	0.188	-0.006	0.174
NATURAL	0.071	0.199	-0.132	0.181	0.019	0.196	0.269	0.180
FRESH	0.315	0.318	0.210	0.309	0.032	0.300	-0.137	0.344
FROZEN	0.889	0.265 ***	0.192	0.228	0.366	0.252	0.207	0.231
THAW	-0.002	0.231	0.576	0.223 **	0.898	0.239 ***	0.395	0.219 *
ρ_{21}	0.826	0.061 ***						
ρ_{31}	0.787	0.088 ***						
ρ_{41}	0.695	0.088 ***						
ρ_{32}	0.666	0.083 ***						
ρ_{42}	0.788	0.053 ***						
ρ_{43}	0.838	0.055 ***						
LLR[b] Test (H0: $\beta_1=0=\beta_2=0\ldots$) w/76 df		242.03 ***						
LLR Test (H0: $\rho_{21}=0=\rho_{22}=0\ldots$) w/6 df		768.18 ***						
N=189								

Note. [a] *** Indicates significant at 99%, ** at 95%, and * at 90% confidence levels.
[b] LLR=Likelihood Ratio Test.

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Consumer Responses to Multiple and Superfluous Labels in the Case of Eggs

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Abstract

Food labels convey various information about credence attributes. An increasing number of labels and the existence of superfluous labels lead to questions on how consumers value different number of co-presented labels. Average respondents to our national survey about eggs were willing to pay a premium for all considered attribute labels, but their valuations depended on how many other labels were presented simultaneously. For example, certified organic label lost value as it was presented with more labels. On average, respondents also valued labels that conveyed no additional information, even after being presented with their superfluity.

Keywords: choice experiment, credence attributes, eggs, labeling, number of labels, superfluous label

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Introduction

Food markets have become increasingly differentiated because of consumers' concerns about health consciousness, food safety, animal welfare, and environmental issues. Consequently, various labels have been developed to inform consumers, particularly about credence attributes. The egg market is a good example of this general trend. Organic egg sales have grown rapidly in recent years (Anderson 2009; Oberholtzer et al. 2006). Labels such as "Vegetarian-fed" and "Omega-3" appear on egg cartons, and there are an increasing number of labels regarding the treatment of laying hens, such as "certified humane" and "cage-free".

An inundation of labels in the marketplace, however, casts doubt on their effectiveness, which is disconcerting to producers and others along the supply chain who bear the cost of labeling. Studies have found that consumers spend a limited amount of time on labels and do not pay the same attention to all the information presented (Caswell and Padberg 1992; Verbeke and Ward 2006), leading to a query about how consumers use the information presented in multiple labels in their purchases. Previous studies of product attributes provide some insights. Some findings suggest that the value associated with more than one attribute is smaller than the sum of values of each label in isolation (e.g., Nilsson et al. 2006). Gao and Schroeder (2009) found that consumers' willingness to pay (WTP) decreased when the number of attributes increased from three to four, then increased when the number increased from four to five, but the ranking of attributes' relative importance did not change. In contrast, Hensher (2006) found that the weighted average WTP was not significantly influenced by the number of attributes if all other study design dimensions were considered. Thus, how consumers value a labeled attribute when it is presented with different numbers of labels and whether all labels are subject to the same effect remain uncertain.

In some instances, labels do not provide additional information about the product because another label already implies the presence of a given attribute; for example, hormones are not administered to pigs and egg-laying hens in the United States, which means that all eggs and pork products in the market are naturally hormone-free. Yet some pork and egg products are labeled as hormone-free, but others are not. Similarly, certified organic products are required to be hormone-free and antibiotics-free, which are indicated on some food products in addition to the organic certification, but not on others. In the case of eggs, besides the aforementioned case of the hormone-free label, a cage-free label appearing with an organic label is another example of redundancy. According to the Organic Production and Handling Standards (USDA 2012a), certified organic eggs are produced by hens living in a cage-free environment, which indicates that organic eggs are cage-free by definition. Yet, some suppliers affix both labels on the cartons, whereas others may only label it as organic. The use of redundant labeling seems only sensible if consumers place value on these superfluous labels.

This study uses a survey on US consumers' preferences towards various labels of eggs to examine the effects of the co-presence of multiple labels, including superfluous labels. The goal of this study is threefold: (1) to assess how consumers' valuation of selected attributes varies when other labels are co-presented, (2) to compute the WTP of selected attributes and attribute combinations, and (3) to determine how consumers value labels that do not provide new pieces of information about product attributes. A survey with a choice experiment was developed for

the study and administered online to randomly selected individuals nationwide. The responses are analyzed using a random parameter logit model accounting for the heterogeneity in consumers' preferences. The conclusion discusses how our findings can be used to inform egg producers regarding effective labeling strategies.

Literature Review

Several studies that investigated consumer preferences on egg attributes found that many consumers are willing to pay a premium for most labeled credence attributes, including certified organic eggs (Anderson 2009), omega-3 eggs (Asselin 2005), and eggs produced using methods believed to enhance animal welfare (Heng et al. 2013). The majority of respondents in a Spanish study preferred local products and were willing to pay a higher premium for the combination of organic and local claims than each claim singly (Gracia et al. 2014).

Questions remain regarding consumer preferences for attributes in the context of multiple labels. Consumers increasingly desire transparency and more information about how their food is produced, and the development of information tracking and delivery technology helps provide that information (Tonsor and Wolf 2011). Yet, consumers can spend only a limited amount of time using available information to make purchase decisions, and sometimes they may choose not to be "fully" informed to avoid information overload (Caswell and Padberg 1992; Berning et al. 2008). This dilemma makes it more practical to evaluate consumer preferences on groups of labels that are presented jointly and how preferences on each label associated with particular information vary in conjunction with the others. Gao and Schroeder (2009) revealed that US beef consumer WTP decreased then increased as additional attribute information was provided. In estimating consumer WTP for travel time savings, Hensher (2006) varied the number of attributes evaluated by subjects by aggregating groups of attributes into subcategories. He concluded that no significant differences occurred in WTP when subjects were presented with a different number of attributes if the other dimensions of the experimental design were fixed, including number of choice sets, number of alternatives, number of levels of each attribute, and the range of levels. Given the contradictory findings in the literature, our study will investigate how consumers value attribute labels in the presence of other labels by allowing the utility associated with each attribute to vary by the number of labels presented in each alternative.

To our knowledge, only one study about eggs (Heng 2015) explored the issues with labels that do not provide unique pieces of information. The claim "no hormones added" cannot be used on the labels of poultry products unless it is accompanied by a statement that says "Federal regulations prohibit the use of hormones" (USDA 2013), but the hormone-free label can be affixed on egg products without the statement and may mislead consumers that other eggs have added hormones. Also, because organic and cage-free claims are not certified by the same organization, the combined usage of the organic and cage-free claims is unregulated, as are labels providing superfluous information such as "antibiotic-free" or "natural." In investigating consumer responses to redundant labeling, we hypothesized that respondents would not value such labels or would value them less after being informed of their superfluity.

Survey and Methods

Survey Instrument

The survey consisted of screening questions, general questions, demographic questions, and a choice experiment. The screening questions narrowed the respondents to individuals with recent experience in purchasing eggs. The general questions collected information on shopping behavior and attitudes toward and perceptions of food product labeling, and the demographic questions collected information such as gender, age, education, household annual income, and geographic areas of residence.

Choice experiments have been widely applied to investigate consumer preferences and estimate marginal values of attributes (Louviere and Hensher 1983; Loureiro and Umberger 2005; Hu et al. 2004). Our choice experiment was designed to estimate how consumers choose products with various credence attribute labels using eggs. Besides the credence attribute labels, egg products varied in price, color of egg shell, and packaging, to make the choice scenarios comparable to those in the marketplace. Each egg product consisting of a dozen eggs was pictured in color to visually provide information on shell color (white or brown) and package materials (paper, plastic, or Styrofoam) with a verbal description of these attributes accompanying the image (e.g., "White, Paper").

The labels on the product indicating price and credence attributes were listed underneath the product image. Three price levels ($2.09, $2.49, and $2.89) were specified, with the mid-level of price referencing the national average retail price of white omega-3 enhanced eggs reported by the USDA during the week of June 1, 2012, when the survey was developed (USDA 2012b). The lower and higher levels of price were set at 40-cent intervals from the mid-price level. Four types of credence attribute labels representing the most prevalent attributes in the egg market (Anderson 2009; Heng et al. 2013; Gracia et al. 2014; Heng and Peterson 2014) were included for respondent consideration: production process (certified organic, omega-3, no label), animal welfare (cage-free, no label), additives (hormone-free, no label), and origin (from your state, from outside your state).

The levels of attributes are summarized in Table 1. With all possible levels for the entire set of attributes, a full factorial design included 432 (=3×2×3×2×2×2×3) product profiles, and a macro in SAS 9.2 suggested 72 profiles for a fractional factorial design, which yielded a D-efficiency score over 99%. The profiles were grouped into 24 choice scenarios with three products each, which were blocked into three sets of eight choice scenarios to minimize response fatigue. For each scenario, respondents were asked to choose from three products with different attributes and a "Not buy any of the three" option.

Concise and relevant information regarding each attribute were provided prior to the choice scenarios, and the full statement can be found in the Appendix. To examine their informed reactions to the cases of labeling redundancy, we presented to the respondents in a statement that all egg laying hens in the United States are not given hormones, and certified organic eggs are produced by hens living in a cage-free environment.

Table 1. Attributes of the choice experiment[a]

Attributes	Levels
Price	$2.09, $2.49, $2.89
Color of shell	Brown (*Brown*), White
Packaging materials	Paper (*Paper*), Styrofoam (*Styro*), Plastic
Process labeling	Organic (*Organic*), Omega-3 (*Omega*), Not labeled
Animal welfare labeling	Cage-free (*Cagefree*), Not labeled
Additive labeling	Hormone-free (*NoHorm*), Not labeled
Origin labeling	From your state (*Ownstate*), From outside your state

Note. [a]The italicized terms are names of variables specified in the random parameter logit model.

Model Specification

A random parameters logit (RPL) model was used to analyze the choice responses to circumvent the independence of irrelevant alternatives assumption of the standard multinomial logit model and accommodate the heterogeneity of preferences within the population (Hensher and Greene 2001; McFadden and Train 2000). When presented with different alternatives associated with different combination of attributes in choice experiments, individuals are assumed to choose the alternative providing the highest level of utility. The utility of an individual *i* derived from choosing alternative *j* can be written as:

$$(1)\quad U_{ij} = \beta_i X_{ij} + \varepsilon_{ij}$$

where X_{ij} represents observed attributes of the alternative *j* and characteristics of the individual *i*, β_i is a vector consist of variable coefficients representing individual's taste, and ε_{ij} is an independent and identically distributed extreme value error term. The researchers can specify the probability density of the coefficient vector $f(\beta|\theta)$, where θ is the parameter vector that describes this distribution of β across individuals. Following Hensher and Greene (2001), the probability of individual *i* choosing alternative *j* is an integral of standard logit probabilities over the parameter densities:

$$(2)\quad P_{ij}(\theta) = \int \left(\frac{e^{X_{ij}\beta_i}}{\sum_{k=0}^{J} e^{X_{ik}\beta_i}}\right) f(\beta_i|\theta)\, d\beta_i.$$

To capture the effects of other labels presented jointly, the utility function was specified with interaction terms between the labeled credence attribute and the number of co-presented labels, in addition to prices, product labels, and visible attributes of egg products. To examine the redundant case of cage-free and organic joint labels, another interaction term between the two labels was included. Thus, the individual's utility for choosing one of three egg products or "none of these three" option associated with price, attributes, and labels can be written as:

$$(3)\quad U_{ij} = \beta_{0j} + \beta_1 Price_j + \beta_{2i} Organic_j + \beta_3 N_j \times Organic_j + \beta_{4i} Cagefree_j + \beta_5 N_j \times Cagefree_j + \beta_6 Organic_j \times Cagefree_j + \beta_{7i} NoHorm_j + \beta_8 N_j \times NoHorm_j + \beta_{9i} Omega_j + \beta_{10} N_j \times Omega_j + \beta_{11i} Ownstate_j + \beta_{12} N_j \times Ownstate_j + \beta_{13} Brown_j + \beta_{14} Paper_j + \beta_{15} Styro_j + \varepsilon_{ij}$$

where *Organic*, *Cagefree*, *NoHorm*, *Omega*, and *Ownstate* are dummy variables representing egg attribute labels, with the value of 1 indicating their presence, and N_j represents the number of credence attribute labels affixed on the alternative j (N_j = 1, …,4). *Brown*, *Paper*, and *Styro* are dummy variables representing visible attributes of shell color and package materials. Because this was not a branded design, a single intercept was specified for all egg products. The utility function was normalized by setting the value for the opt-out option to zero.

The statistical significance of the coefficients on the interaction terms involving N_j imply that consumers indeed adjust their valuation of labels by how many other labels are presented along with the label. Many possible functional relationships besides linear can be expected between the number of labels and labeled attributes, and several non-linear specifications were explored. But these specifications were costly in terms of degrees of freedom, and most of them failed to reach convergence in estimation. The linear specification, despite its limitation, would illustrate how generally preferences change in response to the number of labels rather than the precise patterns of the changes. The coefficients on *NoHorm* and the interaction term *Organic* × *Cagefree* indicate how consumers value labels with superfluous information.

Because identification of parameters can be difficult and may cause failure of reaching convergence in a reasonable number of iterations in the random parameter logit models (Train and Weeks 2005), the intercept, price, packing material, and all interaction term coefficients were specified as fixed across individuals to simplify the computation. The fixed price allows a straightforward interpretation of the attribute WTPs, which would be distributed in the same way as the coefficients. All other parameters were specified as random with normal distribution, and individual-specific label coefficients (*Organic*, *Cagefree*, *NoHorm, Omega, and Ownstate*) were described as functions of individual characteristics, which can be written as:

$$(4)\quad \beta_{ki} = \beta_k + \delta_k' z_i + \sigma_k v_i,$$

where β_k is the population mean for the *k*th attribute label coefficient, δ and σ are parameters, z_i is a vector of observed individual characteristics and attitudes towards labeling, and v_i is an iid error term.

Definitions and descriptive statistics of the variables of individual characteristics and attitudes in our analysis are reported in Table 2. Our selected respondent characteristics included gender (a binary variable *Female* equaling one for female), age (*Age* in years), educational attainment (a binary variable *BPlus* equaling one for holding a bachelor's degree or higher), household income (*Income* in 10,000 US dollars), and respondents' attitudes toward labeling. In addition, respondents' attitudes and perceptions can also be used to explain heterogeneous preferences. Two variables regarding respondents' attitudes towards labeling were generated from three items

using 5-point Likert scales. An index variable (*CONF*) equals the average of individual responses to two similar questions (items a and b in Table 3), measuring respondents' confidence on labeling information. A Cronbach's α test was conducted, and a score of 0.86 indicates the internal consistency (Cortina 1993). A variable (*MORE*) using responses to an individual item (item c in Table 3), measures respondents' favorable perception of numerous labels. A higher value of *CONF* indicates greater attention given to the labeled content, and a higher value of *MORE* represents appreciation for many labels.

Table 2. Descriptive statistics of the heterogeneity-in-means variables

Variable	Definition	Mean	St. dev.	Min	Max
Age	Midpoint of age ranges 18-24, 25-34, 35-44, 45-54, 55-64, 65-84	51.14	16.83	21.00	74.50
Bplus	1 if bachelor's degree or higher; 0 otherwise	0.43	0.49	0.00	1.00
CONF	Level of confidence on labeled information on a 5-point scale (see Table 3)	3.78	0.98	1.00	5.00
Fem	1 if female; 0 otherwise	0.58	0.49	0.00	1.00
Income	Midpoint of annual household income ranges in $10,000: 0.5-1, 1-2.4999, 2.5-4.9999, 5-7.4999, 7.5-9.9999, 10-19.9999, 20-50	9.24	8.43	0.75	35.00
MORE	Perception on number of labels on a 5-point scale (see Table 3)	2.66	1.10	1.00	5.00

Table 3. Variables and items associated with attitudes on labeling

Variable / Questions	Average Score	Agree or Strongly Agree
Please indicate the levels at which you agree or disagree with the following statements.		
(1=strongly disagree…5=strongly agree)		
Confidence on information conveyed by labels *(CONF)* (*α*= 0.86)		
a. Labels help me identify valuable attributes.	3.86	72.70
b. Labels provide reliable information about products.	3.69	64.80
Preferences toward a greater number of labels *(MORE)*		
c. The product with more labels is more valuable.	2.66	21.22

Generally, WTP for the *k*th attribute by individual *i* (WTP_{ki}) can be estimated as a negative ratio between the attribute and price parameters, where the attribute parameter is individual-specific (β_{ki}) whereas the price parameter (β_1) is fixed across individuals. To consider the impact of consumer reactions in the presence of multiple labels, the calculation of WTP was adjusted as:

$$(5)\ WTP^{*}_{ki} = -\frac{\beta_{ki} + \beta_{k+1}}{\beta_1}, \qquad k = 2,4,7,9,11$$

where β_{k+1} represents the interaction term coefficient of *k*th attribute and number of total presented labels *N*, according to equation (3), or the marginal value of specific attribute when one additional label is presented alongside.

In addition, consumer *i*'s WTP for different label combinations WTP_i^c can be calculated similarly and represented by:

$$(6)\ WTP_i^c = -\sum_k \left(\frac{\beta_{ki} + N \times \beta_{k+1}}{\beta_1}\right).$$

For example, consumer's preference on the combination of certified organic label (k = 2) and locally produced label (k = 11) can be calculated as $-\left(\frac{\beta_{2i}+2\times\beta_3}{\beta_1} + \frac{\beta_{11,i}+2\times\beta_{12}}{\beta_1}\right)$. For label combinations including a certified organic label in conjunction with a cage-free label, the coefficient of interaction term was included for WTP calculation; that is, individual *i*'s WTP on the egg product with two labels that certified organic and cage-free was calculated as

$$-\left(\frac{\beta_{2i} + 2 \times \beta_3}{\beta_1} + \frac{\beta_{4i} + 2 \times \beta_5}{\beta_1} + \frac{\beta_6}{\beta_1}\right).$$

Results and Discussion

The survey was administered online by Research Now to a random, nationwide sample that was stratified by gender, age, region, and household income. After a pre-test, the survey was launched in June 2012 and returned 608 completed responses. The average completion time was about 19 minutes; the responses completed less than five minutes were discarded to prevent responses from individuals that skimmed over questions, leaving us with a total of 589 responses.

Our sample consisted of high proportions of female and highly educated respondents. These sample characteristics are not unlike other survey work on food purchases, because the female is the food buyer in majority of households, and people with higher educational attainment may be more likely to express their viewpoints. According to Table 2, the mean age (51.1 years) of our respondents (above 18 years old) as well as the mean household income level ($92,400) were higher than the national levels, where the mean age of population above 18 years old was 46.7 years and median household income was $50,502 in 2010 (U.S. Census Bureau 2011; 2012). These sample characteristics should be noted in interpretations of estimated results. Regarding the attitude variables, the means of *CONF* and *MORE* were 3.78 and 2.66, respectively, indicating that average consumers were confident in labeled information and not in favor of more labels.

Model Parameter Estimates

A random parameter logit model was estimated by maximum simulated likelihood using 100 Halton draws using NLOGIT 4.0 (Greene 2007). The estimates of the mean and standard deviations of the structural parameter densities are presented in Table 4. As Bonferroni correction is a common approach in multiple testing to reduce Type I error, the significance of coefficients that were determined by Bonferroni corrected p-values are also presented (Abdi 2007).[1] As expected, the intercept was positive and the coefficient for *Price* was negative and statistically significant, suggesting that egg purchases generate utility, whereas higher prices generate disutility.

Regarding credence attributes, the coefficient means were positive for *Organic* and *NoHorm* and statistically significant at the 1% level. The coefficient means were negative for *Cage-free* and positive for *Omega* and *Ownstate*, yet they were not statistically different from zero. The interaction terms with the number of credence attribute labels captured the impacts of number of co-presented attributes on consumers' valuation of egg attributes, and only those for certified organic and cage-free were statistically significant at 5% level. Yet, the estimated coefficients of credence attributes and the interaction terms did not remain significant after Bonferroni correction.

For the certified organic label, its marginal utility with each additional label presented is -0.33 and the mean of the *Organic* coefficient is 1.47, so consumers value the organic label when presented singly with the mean utility of 1.14. Therefore, although average respondents preferred eggs with a certified organic or hormone-free label, the certified organic label loses its value the most rapidly when it is presented with other labels. This could be because consumers may not clearly understand the information carried by the label, and when more specific attribute labels of interest become available, the importance of the organic label diminishes. Several studies have shown that consumers have lack understanding about the concept of organic produce. For example, Campbell et al. (2014) found 40% of respondents believed that organic produce has higher nutritional value than conventionally grown food. Onozaka et al. (2010) reported that 80% of US respondents in their sample misperceived local food as organic. Because the organic claim is usually more costly due to input costs and certification processes, organic producers should carefully evaluate decisions of affixing additional labels to avoid decreasing the label's significance.

In contrast, although average respondents valued the cage-free label the least (the mean utility of -0.21) when it presented alone, the value of the cage-free label increased as it was presented with more labels. Such findings suggest that this label alone lacks general appeal as other labels such as certified organic, but its message becomes more salient when contrasted with other labeled messages. The results allude to its effectiveness in the current marketplace where multiple labels are commonly observed. The changes in the values of the hormone-free and own-state labels from the number of co-presented labels were statistically not different from zero.

Another important aspect of the result pertained to the consumer valuation of redundant labels. The results indicated respondents value superfluous labels even after they were informed about

[1] We thank an anonymous reviewer for offering this suggestion.

the nature of such labels. The mean utility value of a singly presented, hormone-free label was 1.18, which was the highest among the five attributes. A positive and statistically significant coefficient of the interaction term *Organic*×*Cagefree* further proved that consumers value the joint labeling of egg products with the certified organic and cage-free labels, validating the use of the cage-free label, which is redundant in this case.

The heterogeneity-in-mean parameters capture the effects of demographics on attribute parameters. As shown in several studies (Govindasamy and Italia 1999; Krystallis and Chryssohoidis 2005; Bertheau 2013), younger respondents, on average, valued organic label more than older respondents. On the other hand, the older respondents, along with female respondents, cared more about the origin of the product and preferred eggs from within state. The result that lower-income respondents valued the cage-free label more is contrary to previous studies (e.g., Andersen 2011), which could be attributed to the relatively higher average income in the sample. The valuation of the hormone-free label were lower among older and more educated respondents, which also contradict some findings regarding hormone-free attributes in other food products (e.g., Alfnes 2004). However, because the hormone-free label is meaningless for egg products, older and more educated respondents could know or accept that fact better than their counterparts. Furthermore, respondents in favor of more labels placed a higher average value on the hormone-free label, which suggests these consumers indeed preferred more labels to less labels regardless of their informational content. In contrast, respondents who placed more confidence on labeling information tended to value the omega-3-labeled eggs more than their counterparts.

Regarding non-credence attributes, respondents did not value brown shell eggs on average, which is consistent with Heng et al. (2013) but different from some previous study results (Chang et al. 2010; Fearne and Lavelle 1996). This difference could be attributed a common association of brown shells with organic or cage-free eggs in the market (Chang et al. 2010) and whether the studies explicitly accounted for these attributes. It may also indicate wider acceptance of the fact the brown color does not mean more nutrition and difference in the shell color is solely due to the breeds. An average respondent preferred paper to plastic packaging may indicates that environmental concerns play a role in deciding what to buy. Previous studies also indicated that paper packaging is considered to be more environmental friendly and preferred by egg consumers who care about packaging materials (Satimanon and Weatherspoon 2010; Mintel Academic 2011).

Willingness-to-Pay Estimates

Individual WTP estimates for single attribute labels were simulated according to equation (5), and the estimated results for each attribute are reported in Table 5. On average, respondents were willing to pay a $0.39 in premium for dozen eggs with the certified organic label, and 96% of respondents were willing to pay a positive premium for this label. This result is consistent with previous studies indicating organic eggs were generally perceived as healthier, whereas the magnitude of premium for organic eggs is estimated to be smaller in our study (Chang et al. 2010). Average respondents were willing to pay a $0.42 premium for own-state products, with 90% of respondents willing to pay a positive premium. Consumer preferences for local products have been supported by many previous studies (Darby et al. 2006; Bernard et al. 2011), and the

literature has shown the WTP for local origin is consistently higher than for organic production methods (Gracia et al. 2014; Loureiro and Hine 2002; Hu et al. 2004). Nearly 80% of respondents were also willing to pay a positive premium for omega-3 eggs, which is consistent with the study by Asselin (2005). In contrast, less than two out of three (64%) of respondents were willing to pay a premium for eggs with a single cage-free label, with an average premium of $0.08, which is lower than previous estimates (Chang et al. 2010). Our estimated individual WTPs are comparable with those based on revealed preferences data, suggesting that hypothetical bias from the use of stated preferences data is likely small, if any. For example, Satimanon and Weatherspoon (2010) found the premium for specialty eggs ranged between $0.28 and $1.98 per dozen by US consumers, and Chang et al. (2010) found US consumers were willing to pay a premium of $1 premium a dozen of cage-free eggs and $1.5 for a dozen of organic eggs using scanner data.

Most respondents (96%) were still willing to pay a premium averaging $0.28 per dozen for eggs with a hormone-free label even after being presented that US laying hens are not allowed to be treated with or consume growth hormones. The statement offered on redundant labels evidently did not reduce consumers' evaluation of the hormone-free label, which may reflect respondents' strong demand for assurance regarding the use of additives. In our sample, over half (52%) of respondents stated that no additives is a somewhat or extremely important factor associated with eggs, compared with 23.5% for nutrient enhancement and 43% for animal welfare. It is also possible that several, perhaps many, respondents did not fully acknowledge the statement.

Respondent preferences can be further examined by their attitudes toward the content and number of labels. First, the WTP statistics were computed separately for respondents who were confident about the labeled information ($CONF > 3$) and those who were not ($CONF \leq 3$) (Table 5, middle section). The respondents describing themselves as relying on labels to identify valuable attributes on average were willing to pay a higher premium on all credence attribute labels than their counterparts, except for the hormone-free label. This suggests that people who focus on labeling information may be more knowledgeable about labeling content and discredit redundant labels more. When divided by their attitude toward the number of labels ($MORE > 3$ and their counterparts $MORE \leq 3$), respondents with a belief that a greater number of labels is better placed a higher premium on most of labels including the hormone-free label, except the *Ownstate* label (Table 5, bottom section). This could be attributed to the choice design where the origin label (from your state or from outside your state) was affixed to every alternative, so having the *Ownstate* label did not increase the number of labels presented. In sum, although average consumers would like to pay a positive premium for the hormone-free label due to general concern about additives, consumers who focus on labeling information would like to pay less than their counterparts, whereas consumers who focus on the number of labels would like to pay more than their counterparts, but they were only 20.7% of our sample.

To further study consumer valuation on the presence of multiple labels, the WTPs for different label combinations presented on egg products were calculated according to equation (6) and are presented in Table 6. Estimated results were grouped by the number of co-presented labels in descending order by average WTPs within each group. Results show that in the case of two labels, respondents value the combination of the organic and own-state labels the most on average, followed by the combination of hormone-free and own-state. As more labels were

jointly presented, the valuation of products with the cage-free label increased considerably; for example, the top four valued three-label products as well as four-label products have a cage-free label, whereas the WTP for multiple-label products with other labels have no obvious pattern. Moreover, the highest WTP for each combination size increased from $0.65 for two labels to $0.96 for three labels and $1.01 for four labels, but then decreased to $0.85 for five labels, suggesting marginal values of additional labels can be negative in the presence of too many labels.

Conclusions

Product differentiation has become a common strategy for suppliers, so it is important to understand how consumers value differentiated attributes and associated labels. This study examined consumer valuation of egg attributes in cases of multiple and superfluous labels and yielded practical implications that call for detailed assessment of specific labeling strategies to ensure their effectiveness in enhancing product value. On average, respondents were willing to pay a positive premium for each credence attribute label included in this study when those labels were presented as a single label. Consumer's valuation on each label changed in different ways when respondents were presented with several labels jointly, and producers should take such information into consideration because certified claim might be costly. Moreover, superfluous labels were still valued even after respondents were informed of their redundancy. Such findings suggest that consumers could be misled by redundant labels and provide additional premium for producers, which would justify the cost of affixing such labels.

Stated values for label combinations increased with the number of co-presented labels at a decreasing rate, peaking at four labels, then diminished dramatically. Combined, these results illustrate consumer prowess in recognizing pieces of information that are relevant to them and the limited scope of information that consumers can process. Labeling strategies should be evaluated carefully in terms of both quantity and content.

The stated preferences approach is subject to hypothetical bias, although our premium estimates were comparable to existing estimates based on revealed preference data. Future studies are encouraged to use tools such as cheap talk scripts to reduce potential bias. Also, our data did not allow us to fully capture the likely nonlinear pattern in the attribute values as the number of co-presented labels changed. Lastly, although we assume all respondents were informed with the meaning of labels through the statement before the choice experiments, future studies are encouraged to use test questions or split sample approach with different presented information to assess if they are truly aware of all the information provided.

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References

Abdi, H. 2007. "The Bonferonni and Sidak Corrections for Multiple Comparisons." In N. Salkind (Ed). *Encyclopedia of Measurement and Statistics*. Thousand Oaks, California: Sage.

Alfnes, F. 2004. "Stated Preferences for Imported and Hormone-Treated Beef: Application of a Mixed Logit Model." *European Review of Agriculture Economics* 31: 19–37.

Anderson, K.E. 2009. "Overview of Natural and Organic Egg Production: Looking back to the future." *Journal of Applied Poultry Research* 18: 348–354.

Andersen, L.M. 2011. "Animal Welfare and Eggs-Cheap Talk or Money on the Counter?" *Journal of Agricultural Economics* 62(3): 565–584.

Asselin, A.M. 2005. "Eggcentric Behavior-Consumer Characteristics that Demonstrate Greater Willingness to Pay for Functionality." *American Journal of Agricultural Economics* 87(5): 1339–1344.

Bernard, J.C., J.D. Pesek Jr. and K.A. Onken. 2011. Willingness to Pay for Locally Grown, Organic and Natural Foods: Implications for Producers and State-Sponsored Agricultural Marketing Programs. http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5095566. [accessed May 20, 2013].

Berning, J.P., H.H. Chouinard and J.J. McCluskey. 2008. "Consumer Preferences for Detailed versus Summary Formats of Nutrition Information on Grocery Store Shelf Labels." *Journal of Agricultural and Food Industrial Organization* 6(1):1–19.

Bertheau, Y. 2013. "*Genetically Modified and Non-Genetically Modified Food Supply Chains: Co-Existence and Traceability."* Blackwell Publishing Ltd. doi: 10.1002/9781118373781.

Campbell, B.L., H. Khachatryan, B.K. Behe, J. Dennis and C. Hall. 2014. "U.S. and Canadian Consumer Perception of Local and Organic Terminology." *International Food and Agribusiness Management Review*. 17(2): 21–40.

Caswell, J.A. and D.I. Padberg. 1992. "Toward a More Comprehensive Theory of Food Labels." *American Journal of Agricultural Economics* 74(2): 460–468.

Chang, J.B, J.L. Lusk and F.B. Norwood. 2010. "The Price of Happy Hens: A Hedonic Analysis of Retail Egg Prices." *Journal of Agricultural and Resource Economics* 35(3): 406–423.

Cortina, J.M. 1993. "What is Coefficient Alpha? An Examination of Theory and Applications." *Journal of Applied Psychology* 78: 98–104.

Darby, K., M.T. Batte, S. Ernst and B. Roe. 2006. Willingness to Pay for Locally Produced Foods: A Customer Intercept Study of Direct Market and Grocery Store Shoppers. http://ageconsearch.umn.edu/bitstream/21336/1/sp06da03.pdf [accessed March 2, 2013].

Fearne, A. and D. Lavelle. 1996. "Perceptions of Food Quality and the Power of Marketing Communication: Results of Consumer Research on a Branded- Egg Concept." *Journal of Product and Brand Management* 5(2): 29–42.

Gao, Z. and T.C. Schroeder. 2009. "Effects of Label Information on Consumer Willingness-to-Pay for Food Attributes." *American Journal of Agricultural Economics* 91(3): 795–809.

Govindasamy, R. and J. Italia. 1999. "Predicting Willingness to Pay a Premium for Organically Grown Fresh Produce." *Journal of Food Distribution Research* 30(2): 44–53.

Gracia, A., J. Barreiro-Hurle and B. Lopez-Galan. 2014. "Are Local and Organic Claims Complements or Substitutes? A Consumer Preferences Study for Eggs." *Journal of Agricultural Economics* 65(1): 49-67.

Greene, W.H. 2007. NLOGIT Version 4.0: Reference Guide. Plainview, NY: Econometric Software, Inc.

Heng, Y. 2015. "Three Essays on Differentiated Products and Heterogeneous Consumer Preferences: the Case of Table Eggs." Unpublished Doctoral Diss., Kansas State University, Manhattan, KS.

Heng, Y. and H.H. Peterson. 2014. "Estimating Demand for Differentiated Eggs Using Scanner Data." Paper presented at the Agricultural and Applied Economics Association annual meeting, Minneapolis, Minnesota, July 27–29.

Heng, Y., H.H. Peterson and X. Li. 2013. "Consumer Attitudes toward Farm-Animal Welfare: The Case of Laying Hens." *Journal of Agricultural and Resource Economics* 38(3): 418–434.

Hensher, D.A. 2006. "Revealing Differences in Willingness to Pay due to the Dimensionality of Stated Choice Designs: An Initial Assessment." *Environmental & Resource Economics* 34: 7–44.

Hensher, D.A. and W.H. Greene, 2001. "The Mixed Logit Model: The State of Practice and Warning for the Unwary." www.stern.nyu.edu/~wgreene/MixedLogitSOP.pdf [accessed March 20, 2012].

Hu, W., A. Hunnemeyer, M. Veeman, W, Adamowicz and L. Srivastava. 2004. "Trading Off Health, Environmental and Genetic Modified Attributes in Food." *European Review of Agricultural Economics* 31: 389–408.

Krystallis, A. and G. Chryssohoidis. 2005. "Consumers' Willingness to Pay for Organic Food: Factors That Affect It and Variation Per Organic Product Type." *British Food Journal* 107(5): 320–343.

Loureiro, M.L. and S. Hine. 2002. "Discovering Niche Markets: A Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic, and GMO-free Products." *Journal of Agricultural and Applied Economics* 34(3): 477–487.

Loureiro, M.L. and W.J. Umberger. 2005. "Assessing Consumer Preferences for Country-of-Origin Labeling." *Journal of Agricultural and Applied Economics* 37(1): 49–63.

Louviere, J. and D. Hensher. 1983. "Using Discrete Choice Models with Experimental Design Data to Forecast Consumer Demand for a Unique Cultural Event." *Journal of Consumer Research* 10(3): 348–361.

McFadden, D. and K. Train. 2000. "Mixed MNL Models for Discrete Response." *Journal of Applied Econometrics* 15: 447–470.

Mintel Academic. 2011. "Eggs-US-May 2011." Mintel Reports Database. http://academic.mintel.com/display/543044/ [accessed January 2016].

Nilsson T., K. Foster and J.L. Lusk 2006. "Marketing Opportunities for Certified Pork Chops." *Canadian Journal of Agricultural Economics* 54(4): 567–583.

Oberholtzer, L., C. Greene and E. Lopez. 2006. Organic Poultry and Eggs Capture High Price Premiums and Growing Share of Specialty Markets. http://www.ers.usda.gov/media/ 866670/ ldpm15001_002.pdf [accessed March 11, 2012].

Onozaka, Y., G. Nurse and D.T. McFadden. 2010. "Local Food Consumers: How Motivations and Perceptions Translate to Buying Behavior." *Choices*. 25(1): 1–6.

Satimanon, T. and D.D. Weatherspoon. 2010. "Hedonic Analysis of Sustainable Food Products." *International Food and Agribusiness Management Review.* 13(4): 57–74.

Tonsor, G.T. and C.A. Wolf. 2011. "On Mandatory Labeling of Animal Welfare Attributes." *Food Policy* 36: 430–437.

Train, K. and M. Weeks. 2005. "Discrete Choice Models in Preference Space and Willingness-to-Pay Space." In Applications of Simulation Methods in Environmental and Resource Economics edited by R. Scarpa and A. Alberini, pp. 1–16. Dordrecht: Springer.

U.S. Census Bureau. 2012. Household Income for States: 2010 and 2011. https://www.census.gov/prod/2012pubs/acsbr11-02.pdf .[accessed March 1, 2014].

U.S. Census Bureau. 2011. Age and Sex Composition: 2010. https://www.census.gov/prod/cen2010/briefs/c2010br-03.pdf [accessed March 1, 2014].

U.S. Department of Agriculture. 2012a. Organic Production and Handling Standards http://www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELDEV3004445 [accessed May 20, 2014].

U.S. Department of Agriculture. 2012b. USDA Weekly Retail Shell Egg and Egg Products Feature Activity, June 1 http://search.ams.usda.gov/MNDMS/2012/06/PY20120601WRETAILEGG.pdf. [accessed March 20, 2014].

U.S. Department of Agriculture. 2013. Meat and Poultry Labeling Terms http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/food-labeling/meat-and-poultry-labeling-terms (Retrieved March 20, 2013).

Verbeke, W. and R. Ward. 2006. "Consumer Interest in Information Cues Denoting Quality, Traceability and Origin: An Application of Ordered Probit Models to Beef Labels." *Food Quality and Preference* 17: 453-467.

Appendix

Statement that Appeared Before the Choice Scenarios

In the following, you will be asked to make choices as if you would in an actual shopping situation. Suppose in a typical grocery shopping trip, you need to purchase eggs. Foods are produced in various ways, and here is some terminology used to describe ways to distinguish how eggs are produced.

Color: almost all commercial eggshells are *white* or *brown*, which depend on the breed of hens.

Packaging: some eggs are sold in *paper cartons*, some are in *plastic cartons*, and others are sold in *Styrofoam cartons.*

Additional Attributes:

Eggs are produced nationwide. Some eggs sold in the market are produced in your state, that is to say, these eggs *are from your state.* Some eggs are produced in states other than your state are *from outside your state.*

Certified organic eggs are produced by hens living in a cage-free environment and are fed organic grains without pesticides, fertilizer or animal byproducts, and this label is regulated by the U.S Department of Agriculture.

Omega-3 eggs are produced by hens that are fed a diet enhanced with omega-3 essential fatty acids, which has been showed that may help reducing the risk of heart disease by some studies.

Most eggs **without these labels** can be assumed to be produced by hens fed conventional diets which include feed ingredients, such as corn and soybean meal, fish meals and meat meals, and major minerals (e.g. Ca and P), and non-nutritive additives.

Many eggs are produced by hens that are confined in battery cages (i.e., *caged*) all the time. *Cage-free* eggs are produced by hens that are able to move freely in barns or warehouses.

Egg laying hens in the US are not given hormones. Some egg cartons say that the eggs are *hormone-free;* however, this is true for all eggs in the market.

Table 4. Estimated random parameter logit parameter distributions

Variables	Coefficient		Std. error
Intercept (fixed)	6.84	***†	0.24
Price (fixed)	-2.46	***†	0.09
Organic (random)	1.47	***	0.50
Standard deviation	0.92	***†	0.07
Heterogeneity-in-mean			
Fem	0.10		0.13
Age	-0.01	***	0.00
Bplus	-0.02		0.13
Income	0.00		0.01
CONF	0.08		0.06
MORE	-0.00		0.06
N×*Organic* (fixed)	-0.33	**	0.13
Cagefree (random)	-0.57		0.49
Standard deviation	0.86	***†	0.08
Heterogeneity-in-mean			
Fem	0.18		0.12
Age	0.00		0.00
Bplus	0.04		0.12
Income	-0.02	**	0.01
CONF	0.01		0.07
MORE	0.02		0.06
N×*Cagefree* (fixed)	0.36	***	0.13
Organic×*Cagefree* (fixed)	0.22	*	0.12
NoHorm(random)	1.29	***	0.48
Standard deviation	0.66	***†	0.09
Heterogeneity-in-mean			
Fem	0.03		0.11
Age	-0.01	***	0.00
Bplus	-0.23	**	0.11
Income	0.01		0.01
CONF	-0.07		0.06
MORE	0.09	*	0.05
N×*Hormone* (fixed)	-0.11		0.13

Table 4. *Cont*.

Variables	Coefficient		Std. Error
Omega (random)	0.24		0.57
Standard deviation	0.79	***†	0.14
Heterogeneity-in-mean			
Fem	-0.19		0.14
Age	-0.00		0.00
Bplus	0.16		0.14
Income	0.01		0.01
CONF	0.14	*	0.07
MORE	0.00		0.06
N×*Omega* (fixed)	-0.21		0.14
Ownstate(random)	0.56		0.41
Standard deviation	1.02	***†	0.08
Heterogeneity-in-mean			
Fem	0.24	*	0.13
Age	0.01	***†	0.00
Bplus	-0.19		0.13
Income	-0.01		0.01
CONF	0.05		0.07
MORE	-0.08		0.06
N×*Ownstate*(fixed)	-0.06		0.07
Brown (random)	-0.88	***†	0.10
Standard deviation	1.78	***†	0.10
Paper (fixed)	0.80	***†	0.06
Styro (fixed)	0.00		0.06
Number of observations	4,712		
Log likelihood function	-4393.39		
McFadden Pseudo R-squared	0.33		
Akaike Information Criterion	1.89		

Note. Single, double, and triple asterisks (*, **, ***) represent significance at the 10%, 5%, and 1% level using Wald tests. A dagger (†) represents significance at the 5% level after Bonferroni correction. Bonferroni corrected significance level of p-value is 0.002 at 10% and 0.001 at 5%.

Table 5. Statistics of simulated specific WTP distributions

Labels	Mean	St. Dev.	Max	Min	Prob (>0)
All sample (n = 589)					
Organic	0.39	0.26	1.29	-0.29	0.96
Omega	0.15	0.18	0.84	-0.40	0.79
Cagefree	0.08	0.22	0.86	-0.93	0.64
NoHorm	0.28	0.16	0.79	-0.27	0.96
Ownstate	0.42	0.30	1.27	-0.38	0.90
Sub-samples by confidence on information conveyed by labels					
$CONF > 3$ $(n = 455)$					
Organic	0.41	0.26	1.29	-0.29	0.96
Omega	0.17	0.18	0.84	-0.40	0.83
Cagefree	0.10	0.22	0.86	-0.93	0.66
NoHorm	0.28	0.16	0.79	-0.27	0.97
Ownstate	0.44	0.31	1.27	-0.38	0.91
$CONF \leq 3 (n = 134)$					
Organic	0.34	0.25	1.02	-0.23	0.94
Omega	0.07	0.17	0.61	-0.30	0.64
Cagefree	0.02	0.21	0.71	-0.53	0.57
NoHorm	0.29	0.17	0.75	-0.12	0.95
Ownstate	0.36	0.28	1.08	-0.31	0.90
Sub-samples by preferences toward a greater number of labels					
$MORE > 3$ $(n = 122)$					
Organic	0.48	0.28	1.22	-0.16	0.99
Omega	0.25	0.19	0.65	-0.35	0.96
Cagefree	0.14	0.24	0.89	-0.47	0.89
NoHorm	0.30	0.16	0.62	-0.24	0.99
Ownstate	0.38	0.30	1.17	-0.23	0.95
$MORE \leq 3 (n = 467)$					
Organic	0.39	0.26	1.27	-0.29	0.99
Omega	0.14	0.19	0.95	-0.36	0.96
Cagefree	0.08	0.22	0.72	-0.93	0.90
NoHorm	0.27	0.17	0.85	-0.28	0.99
Ownstate	0.43	0.31	1.29	-0.44	0.95

Table 6. Statistics of simulated label combination WTP distributions

	Labels					Statistics ($/dozen)				
Combination	*Organic*	*Omega*	*Cagefree*	*NoHorm*	*Ownstate*	**Mean**	**StdDev**	**Max**	**Min**	**Prob>0**
Two labels	×				×	0.65	0.38	1.62	-0.58	0.97
				×	×	0.64	0.34	1.51	-0.48	0.98
			×		×	0.62	0.40	1.67	-0.86	0.94
	×		×			0.57	0.36	1.72	-0.71	0.95
	×			×		0.50	0.33	1.56	-0.68	0.95
			×	×		0.47	0.29	1.61	-0.74	0.95
		×			×	0.46	0.35	1.35	-0.67	0.90
	×	×				0.32	0.31	1.23	-0.79	0.87
		×		×		0.30	0.25	1.06	-0.56	0.90
		×	×			0.29	0.30	1.21	-0.67	0.86
Three labels	×		×		×	0.96	0.48	2.09	-0.79	0.97
			×	×	×	0.94	0.44	2.07	-0.69	0.98
	×		×	×		0.79	0.43	2.29	-0.65	0.97
		×	×		×	0.72	0.45	1.76	-0.62	0.94
	×			×	×	0.69	0.42	1.75	-0.98	0.96
	×	×	×			0.56	0.42	1.75	-0.68	0.92
		×	×	×		0.55	0.36	1.56	-0.62	0.94
		×		×	×	0.54	0.39	1.54	-0.69	0.93
	×	×			×	0.47	0.41	1.58	-0.97	0.87
	×	×		×		0.30	0.37	1.48	-0.94	0.80
Four labels	×		×	×	×	1.01	0.52	2.50	-1.03	0.96
		×	×	×	×	0.91	0.49	1.98	-0.72	0.96
	×	×	×		×	0.84	0.52	2.01	-1.01	0.94
	×	×	×	×		0.65	0.48	2.13	-1.00	0.93
	×	×		×	×	0.38	0.46	1.45	-1.46	0.80
Five labels	×	×	×	×	×	0.85	0.56	2.17	-1.40	0.93

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Health Consciousness and Consumer Preferences for Holiday Turkey Attributes

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Abstract

An online survey of 620 respondents was utilized to elicit consumer preferences for six holiday turkey attributes (price, weight, antibiotic free, local, pasture access, and brand) related to aspects of food purchasing, including healthfulness, food safety, and treatment of animals. To explore possible relationships in consumer perceptions of holiday turkey attributes and lifestyle factors, respondents were asked about their health consciousness. Those who indicated they would consume turkey for one or more holiday meal were generally rated more health conscious. Price was the most important attribute and the preference share for price was negatively correlated with health consciousness.

Keywords: best-worst scaling, consumer preference, health conscious, holidays, maximum-difference scaling, turkey

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Introduction

Consumer-focused media during the winter holiday season in the United States, typically recognized as lasting from Thanksgiving Day through New Year's Day, is often focused on food consumption. Food is a large part of the holiday season festivities, including holiday parties focused around large meals, gifting of food items, and indulgent desserts. Given the season of indulgence, or overindulgence, it is not surprising that a major focus on weight loss, exercise, and health follows with the establishment of New Year's resolutions. Thus, a significant portion of the discussion surrounding, and resulting from, the holiday season relates to decisions which impact health and well-being.

There are a number of factors involved in holiday eating decisions that make them unique from food choices the rest of the year, including: vacation or holiday time off of work and away from the usual routine/schedule, visiting with friends and family, hectic and stressful travel plans, and traditional winter holiday meals. Highly palatable foods, which are often high in fat and/or sugar, are more available during the holiday season (Stevenson et al. 2013). Previous research has found that the amount of "unhealthy" food purchased increases during the holiday season and remains elevated for a few weeks thereafter (Pope et al. 2014). Other work has highlighted significant increases in bodyweight, body fat percentage, blood pressure, and resting heart rate in healthy adults during the holiday season (Stevenson et al. 2013). As the holiday which is celebrated primarily with a large meal, the health implications of Thanksgiving, in terms of weight gain, have long been assumed in the popular press. In addition, past research did find evidence of weight gain over the Thanksgiving holiday in college students (Hull et al. 2006).

In recent years, a large literature has been devoted to US consumption patterns and shopper preferences for product attributes, which range from product pricing to social or environmental sustainability aspects of food production (Olynk et al. 2010; Tonsor et al. 2009; Briggeman and Lusk 2011). While production processes employed in the production of meat, eggs, and dairy products are one area of concern for US shoppers, the safety, nutritional quality, and social or environmental impacts of that food product are also increasingly important. Turkey is a popular holiday entrée, particularly for Thanksgiving. Of the 200 million turkeys consumed in the United States every year, more than 20% are consumed on Thanksgiving and over 10% are consumed on Christmas (National Turkey Federation 2015). In fact, a National Turkey Federation survey found 88% of Americans eat turkey on Thanksgiving (National Turkey Federation 2015). However, the research on consumer demand for whole turkeys is sparse, likely due, at least in part, to the infrequent purchasing of whole turkeys by consumers.

In addition to impacting eating decisions, factors like parties, travel, and plentiful sweets may influence other decisions that ultimately impact health, such as exercising. Stevenson et al. (2013) studied physical activity and concluded that the holiday season may indeed have negative health impacts and that future studies on weight loss or maintenance should focus on the holiday season. Assessments of policies for improving consumption patterns (Powell et al. 2013), eating behaviors on weekends versus weekdays (Haines et al. 2003), and eating at holiday gatherings have contributed to spirited conversations which link health outcomes to consumer decision making. Measuring health outcomes necessarily links consumption behaviors with other lifestyle factors, such as exercise and health consciousness.

Turkey is generally considered a healthy protein option that, along with other poultry and fish, is frequently recommended as an alternative to other meats. Thus, it is logical to study preferences for turkey attributes during the holiday season. Turkey is suggested by some economists to be a "loss leader" during the Thanksgiving season (DeGraba 2006). This suggests consumers may be making purchasing decisions based on low turkey prices. However, price is unlikely to be the sole factor in turkey selection and meal decision making. The number of people served is directly related to turkey weight (size). Furthermore, attributes such as being raised locally, in a system with pasture access or that prohibits the use of antibiotics, or being marketed under a brand name may also influence consumer purchasing decisions. Many of these factors are perceived to be related to product healthfulness, regardless of whether scientific evidence exists to support those sentiments. Furthermore, socially minded consumers place significant emphasis on factors like local production and supporting local economies. Understanding relative consumer ranking of these attributes in terms of importance is key for turkey retailers and producers, and perhaps informs the production and marketing of other holiday fare.

The primary objective of this work is to identify the relative ranking in importance of six holiday turkey attributes, namely price, weight, antibiotic free, local, pasture access, and brand. Due to the popularity of turkey as a holiday entrée, a secondary goal of this paper is to analyze possible linkages between self-reported health consciousness and turkey purchasing preferences. Linking the importance of key turkey attributes, which may be perceived to be related to healthfulness, food safety, animal welfare and potentially other factors to health-related behaviors during the holidays and year-round can aid in understanding consumer demand. While there has been extensive research on desired meat product attributes, little is known about holiday meat (including turkey) purchases with respect to consumer demand for specific attributes.

Methodology

Data Collection

An online survey was administered between November 17–19, 2014 to obtain information regarding US consumer plans for holiday shopping, spending, and meal planning, as well as socio-demographic characteristics. Survey respondents were asked a series of questions about their plans for the upcoming holiday season. Specifically, questions focused on holiday meal planning, including what type of meat or protein was being served. The week of November 17 was targeted to allow respondents to complete the survey, which focused on holiday spending and meal planning intentions, immediately preceding the holiday season. Survey respondents were obtained through the use of a large proprietary opt-in panel database by Lightspeed, GMI.[1] The sample was targeted to be representative of the US population in terms of gender, income, education, and geographical region of residence. Regions of residence were defined as in the Census Bureau Regions and Divisions.[2] Respondents were required to be 18 years of age or older to participate. A total of 620 respondents completed the survey.

[1] Lightspeed, GMI is a leading provider of online access panels for global market research; Lightspeed, GMI has millions of highly profiled and engaged panelists from countries around the world.

[2] The four regions included were Northeast, South, Midwest, and West. Regions were defined, according to the U.S. Census Bureau.

In addition to general demographic questions, this analysis also sought to evaluate respondent health intentions during the holiday season. Three holiday health intentions were evaluated by asking participants to respond to statements, including: *I will make a New Year's resolution to lose weight, I will maintain my workout schedule during the holiday season, I will be vigilant about my weight during the holiday season,* and *I watch what I eat during the holiday season.* In addition to the holiday-specific, health-related statements, the health consciousness scale, consisting of nine statements, from Gould (1988) was also utilized. The nine statements included in the scale (Gould, 1988) were: *I reflect about my health a lot, I'm very self-conscious about my health, I'm generally attentive to my inner feelings about my health, I'm constantly examining my health, I'm alert to changes in my health, I'm usually aware of my health, I'm aware of the state of my health as I go through the day, I notice how I feel physically as I go through the day,* and *I'm very involved in my health.* Both the holiday health intentions (three in total) and the health consciousness statements (nine in total) asked respondents to select an option from a five point scale, specifically "Please indicate how well the statements describe you." Following Gould (1988), the response options consisted of:

1 – It describes you very well,
2 – It describes you fairly well,
3 – It describes you fifty-fifty,
4 – It describes you a little, or
5 – This statement does not describe you at all.

Experimental Design and Econometric Analysis

Respondents were also presented with a best-worst scaling question to assess their preferences among six holiday turkey attributes: price, weight, antibiotic free, local, pasture access, and brand. Likert-scale or ranking-type questions have been used to gather information on the importance of product attributes. One issue with Likert-scale answers, however, is that participants can classify all attributes as important (or unimportant) or may assign all attributes equal importance. Maximum difference scaling, also called best-worst scaling, is considered superior to asking consumers to rate an attribute because it forces respondents to make tradeoffs that more closely reflect actual choices (Lusk and Briggeman 2009; Flynn et al. 2007).

Price was included as an attribute and was expected to be important to the majority of consumers, especially in light of the fact that many stores market holiday turkeys based on low prices. Given the focus on turkey prices by supermarkets, in an effort to solicit additional holiday shopping in their stores, price-based decision making for holiday turkeys was hypothesized to be a main focus for at least some segment of consumers. Furthermore, price was expected to be negatively correlated with at least some of the other attributes included as shoppers were forced to make tradeoffs of price for other turkey attributes. Turkey weight was included as an attribute of interest mainly because consumers' choose a turkey (or turkey product) based on the number of people served. Given the attention to brand in the marketing of holiday turkeys, brand was also included as an attribute of interest in this analysis. Well-known turkey brands are often used as loss leaders (DeGraba 2006). Likewise, branding fresh meats can serve to differentiate the product in the minds of consumers where the brand signals quality to the consumer (Grunert et al. 2004).

Pasture access was included because at least some consumers perceive pastured poultry to be healthier (Sossidou et al. 2011). Likewise, given the media attention and concern over antibiotic use in food animals, it was possible that some consumers perceive meats coming from animals raised in antibiotic free production systems to be healthier as well. In recent years, local meat production has garnered increased attention from consumers. Thus, "local" was included as an attribute in the maximum difference scaling question. Media campaigns often mention strategies for procuring locally raised holiday turkeys, which are marketed as a specialty item and often sold at prices far above the promotional prices marketed by retail supermarkets. Previous research has found that consumers are willing to pay a premium for locally produced meat (Maynard et al. 2003) and want to purchase products produced in their own state (Jekanowski et al. 2000). Together, the six attributes studied represent factors likely to enter the decision making process of consumers when shopping for holiday turkey.

Respondents who indicated that they planned to consume turkey over the holiday season 2014 were shown sets of three turkey attributes and asked to choose the attribute that was most important (best) to them as well as which was the least important (worst). Survey participants were each shown a total of 10 scenarios (or choice occasions). Following the experimental design, each attribute could potentially be selected by each respondent between zero and five times. The scenarios presented included six attributes (*j*). Here $J = 6$ indexes the attributes and there are a total of $J * (J - 1) = 30$ potential combinations of best-worst rankings that could have been chosen by each respondent. The respondents' choices of the most important and least important turkey attributes were used to determine each attribute's location along a continuum of importance when selecting a turkey. The location of the value attribute on the scale of importance for turkey purchasing is represented by λ_j. Thus, the level of importance, which is unobservable to researchers, for respondent (consumer) *i* is:

$$(1)\ I_{ij} = \lambda_j + \varepsilon_{ij}$$

where ε_{ij} denotes a random error term. The probability that the consumer i chooses attribute j as the most important attribute and attribute k as the least important attribute is the probability that the difference between I_{ij} and I_{ik} is greater than all $J * (J - 1) - 1 = 29$ potential differences available from the choices presented to each survey respondent. Assuming the error term is independently and identically distributed type I extreme value, the probability of choosing a given most important-least important combination takes the multinomial logit form (Lusk and Briggeman 2009) represented by:

$$(2)\ Prob(j = best \cap k = worst) = \frac{e^{\lambda_j - \lambda_k}}{\sum_{l=1}^{J}\sum_{m=1}^{J} e^{\lambda_j - \lambda_k - J}}$$

Maximum likelihood estimation (MLE) is used to estimate the parameter λ_j which represents how important turkey attribute j is relative to the least important turkey attribute. The least important attribute is not known ex ante, but is determined through analysis of responses and its value must be normalized to zero to prevent the "dummy variable trap" (Lusk and Briggeman 2009).

Heterogeneity of preferences is discrete in latent class models (LCM) (Train 2003), making the LCM particularly insightful for evaluating preferences for a retail product. Respondents are sorted into a specified number of classes or segments with homogeneous preferences within each class and heterogeneous preferences between classes (Boxall and Adamowicz 2002). Incorporating heterogeneity in this discrete fashion is useful in this application because classes of similar consumers can be identified and their preferences characterized as a single "consumer segment." During the estimation process, individuals are assigned to a latent class and simultaneously parameters for each class are estimated (Swait 1994). Each respondent's choices were assumed to be independent within a class (Wolf and Tonsor 2013). Given that the respondent belongs to a specific latent class, denoted as *s*, the conditional probability of choices is represented as:

$$(3)\ (Prob(j = best\ \cap k = worst)|s) = \frac{e^{\lambda_{js} - \lambda_{ks}}}{\sum_{l=1}^{J}\sum_{m=1}^{J} e^{\lambda_{js} - \lambda_{ks} - J}}$$

where the λ_{js} and λ_{ks} parameters are class specific (Ouma et al. 2007). These classes are unobservable and the probability of membership in a class takes the multinomial logit form

$$(4)\ Prob(s) = \frac{e^{(\theta_s Zk)}}{\sum_{s=1}^{S} e^{\theta_s Zk}}$$

where Zk is a set of hypothesized drivers of class membership and $\theta_s$is a parameter vector that is normalized to zero that characterizes the impact the drivers have on class membership (Ouma et al. 2007). Parameter estimates are not intuitive to interpret, so shares of preferences are calculated to facilitate the ease of interpretation. The shares of preferences are calculated as:

$$(5)\ share_j = \frac{e^{\hat{\lambda}_j}}{\sum_{k=1}^{J} e^{\hat{\lambda}_k}}$$

Preference shares provide a more intuitive means of analyzing relationships between the attributes explored than the coefficient estimates (Wolf and Tonsor 2013). The shares must sum to one across the six attributes. The calculated preference share for each attribute is the forecasted probability that each attribute is chosen as the most important (Wolf and Tonsor 2013).

A random parameters logit (RPL), model was also specified to allow for continuous heterogeneity among individuals, following Lusk and Briggeman (2009). Individual-specific preference shares were calculated using individual-specific parameter estimates from the RPL model. Individual preference shares were used to analyze relationships (correlations) between preference shares and demographics, as well as other factors of interest, including the respondent's other holiday intentions or reported behaviors. Estimations were performed in NLOGIT 5.0.

Results and Discussion

Table 1 presents the demographics of all 620 respondents as well as the subsamples who indicated that they would or would not consume turkey at a 2014 holiday meal. Seventeen

percent of respondents were from the Northeast, while 37 % resided in the South, 24% resided in the Midwest, and 22% resided in the West. The survey mean household size was 2.54 persons while the US average household size was 2.61 (U.S. Census Bureau 2014). In total, 74% of respondents indicated they would be having turkey at a holiday meal in 2014. The mean age of respondents who indicated they would have turkey at a holiday meal was 47.5 years old.

Table 1. Respondent Demographics

Demographic Variable	**All Respondents** n=620	**Reportedly having turkey at a 2014 Holiday meal** n=461	**Reportedly *not* having turkey at a 2014 Holiday meal** n=159
	Respondents Reporting in %		
Male	47.8	47.5	50
Education			
Did not graduate from high school	1	1	2
Graduated from high school, Did not attend college	20	20	21
Attended College, No Degree Earned	28	27	31
Attended College, Associates or Trade Degree	15	15	13
Attended College, Bachelor's Degree Earned	24	24	24
Graduate or Adv. Degree (M.S., PhD., Law)	11	11	9
Other	1	2	0
Annual Household Pretax Income			
Less than $20,000	19	17	26
$20,000 - $39,999	31	33	26
$40,000 - $59,999	19	18	21
$60,000-$79,999	13	14	9
$80,000-$99,999	8	8	9
$100,000-$119,999	3	3	4
$120,000 or more	7	7	5
Region of Residence			
Northeast	17	18	13
South	37	36	38
Midwest	24	24	24
West	22	22	25
Serving Turkey at any Holiday Meal in 2014	74	100	0

Generally speaking, the mean level of responses was lower for the health consciousness statements than in the holiday health intention statements (Table 2). For reference, lower number responses on the five point scale were indicative of higher levels of agreement that the statement described the respondent. In terms of the health consciousness statements, the highest levels of agreement were for *I'm usually aware of my health* and *I notice how I feel physically as I go through the day* whereas relatively higher means were observed for the statement, *I'm constantly examining my health.* Perhaps of more interest for the present study are responses to holiday health intentions, which reveal the highest levels of agreement for *I will make a New Year's*

Resolution to lose weight. Likewise, respondents who indicated having turkey for at least one holiday meal had statistically lower mean scores, indicating more agreement, than respondents not having turkey for seven of the nine health consciousness statements. For two of the three holiday behavior statements turkey consumers had statistically significant and lower scores than non-turkey consumers. Thus, holiday turkey consumers appear to be more health conscious in general, and during the holiday season, than non-turkey consumers during the holidays.

Table 2. Mean of health consciousness and holiday health intentions responses[1]

Health Consciousness[2]	**Mean of All Respondents** n=620	**Mean of Holiday Turkey Consumers** n=461	**Mean of Non-Holiday Turkey Consumers** n=159[3]
I reflect about my health a lot.	2.62	2.57[a]	2.77[b]
I'm very self-conscious about my health.	2.70	2.63[a]	2.87[b]
I'm generally attentive to my inner feelings about my health.	2.52	2.47[a]	2.67[b]
I'm constantly examining my health.	2.90	2.85[a]	3.03[a]
I'm alert to changes in my health.	2.34	2.26[a]	2.58[b]
I'm usually aware of my health.	2.19	2.12[a]	2.38[b]
I'm aware of the state of my health as I go through the day.	2.41	2.35[a]	2.59[b]
I notice how I feel physically as I go through the day.	2.21	2.18[a]	2.31[a]
I'm very involved in my health.	2.39	2.31[a]	2.64[b]
Holiday Health Intentions			
I will make a New Year's Resolution to lose weight.	3.61	3.54[a]	3.83[b]
I will be vigilant about my weight during the holiday season.	3.12	3.03[a]	3.38[b]
I watch what I eat during the holiday season.	3.18	3.14[a]	3.31[a]

Note. [1]Both the holiday health intentions (8 in total) and the health consciousness statements (9 in total) asked respondents to select an option from a 5 point scale, specifically "Please indicate how well the statements describe you"; the options consisted of: 1 – It describes you very well, 2 – It describes you fairly well, 3 – It describes you fifty-fifty, 4 – It describes you a little, 5 – This statement does not describe you at all.
[2]The health consciousness statements were taken from Gould (1988).
[3]Superscripts with differing letters indicate statistically significant differences in the mean value at the 0.10 level. Thus, superscripts not differing between turkey consumers and non-turkey consumers indicates mean values did not differ significantly at the 0.10 level.

Out of the 620 respondents, a total of 461 respondents indicated they were planning to consume turkey over the holiday season in 2014. Those 461 respondents who indicated they would consume turkey participated in the best-worst scaling question to elicit relative preferences for the six turkey attributes. Table 3 (see Appendix) displays the LCM and RPL parameter estimates. The LCM model is useful in determining "consumer segments" which can be particularly insightful when evaluating a retail product. With respect to the LCM results, a model with four classes was

found to be best suited to this application.[3] Several candidate covariates were analyzed to determine whether any were useful when characterizing class membership. Those covariates were the mean of the holiday health intention statements for each respondent, age, gender being female, and income. Only the mean of the health intentions statements showed significant differences across classes. Class 1, labeled the "bargain hunters" class, contained 33.3% of respondents with price being the most important attribute accounting for 55% of the preference share. The second most important attribute was weight which accounted for 25% of the preference share followed by brand with 13% of preference share. Thus, 93% of preference share was devoted to price, weight and brand with only 7% of the preference share devoted to attributes that could be considered animal welfare or socially responsible production attributes. Class 2, dubbed the "price conscious" class, contained 29.1% of respondents and the most important attribute was also price which accounted for 61% of preference share. For these respondents, brand was the least important attribute with only 4% of the preference share. Respondents in this class did not appear to be brand loyal. Class 3, the "I want it all" class, contained 19.2% of respondents and the most important attribute was brand with 20% of the preference share and the least important was price with 13% of the preference share. Class 4, labeled the "no antibiotics" class, contained 18.4% of respondents and the most important attribute was antibiotic free with 67% of preference share. For this class, the remaining attributes accounted for 9% or less of preference share each. However, the "no antibiotics" class did not place a high value on other attributes, such as pasture access or locally produced, presumed to be seen as more socially responsible or animal welfare friendly by consumers. Looking across classes, price was the most important attribute for respondents in classes 1 and 2. Thus, price was the most important attribute for a total of 62% of respondents.

While in the LCM model heterogeneity is discrete, thereby aiding in the development of "consumer segments", the RPL model allows for continuous heterogeneity and facilitates the estimation of individual-specific preference shares. Considering the RPL results, respondents overall rated price more important in selecting a turkey than all other options with a preference share of about 41%. The second most important attribute in holiday turkey selection, with a preference share of approximately 22% was the weight of the turkey. Thus, the top two attributes of those analyzed, summing to a total of 63% of the preference shares were the price and overall size, or weight, of the turkey. Amongst the remaining four attributes studied, antibiotic free and brand were each about 11% of the share of preference, and, the smallest two shares of preference were for the attribute for local production (approximately 8%) and pasture raised turkey (approximately 7%).

In addition to the relative ranking and size of preference shares, the relationships between the sizes of preference shares were investigated by examining the correlations (and associated significance) between preference shares for turkey using individual-specific parameter estimates from the RPL model. The size of the preference share for price was negatively correlated to the size of the preference shares for all other attributes investigated. Preference share for weight was negatively correlated with the size of the preference share for price and antibiotic free, but positively correlated with the size of share for brand. Perhaps the size of the preference shares

[3] The Bayesian Information Criterion (BIC) is frequently used to evaluate the fit of LCM models (Boxall and Adamowicz 2002; Wolf and Tonsor 2013). The BIC indicated a five class model was the best fit. However, the five class model yielded a class with a small membership (approaching 10 %) and provided little improvement in the BIC when compared to the four class model.

for antibiotic free and pasture access were positively correlated. Additionally, the size of the preference shares for local production, turkeys raised with pasture access, and brand were all positively correlated with each other. The relationships between the sizes of preference shares are insightful to help determine which attributes tended to increase or decrease as other attribute shares were altered. However, additional insight is possible by looking at correlations between the size of preference shares and other demographic, holiday planning, or health-related factors.

Relationships between the size of the shares of preference for turkey attributes and demographics were also investigated using correlations. Reporting an older age was positively correlated with the size of the preference share for price, but negatively correlated with preference for the turkey attributes of local, pasture access, and brand. Only one significant correlation between gender and preference shares was found. Being female was positively correlated to preference for antibiotic free production. With respect to income, many significant relationships were found. Having high household income, defined as household incomes reported over $80,000 annually, was negatively correlated to the size of the preference share for price. This was likely a reflection of less relative importance being placed on price when purchasing holiday turkeys by those individuals with higher incomes. In addition, income was positively correlated with the preference shares for brand, pasture access, and locally raised.

Linking responses about health to preferences for turkey attributes enables additional insight into how responses about health or holiday health-related intentions may relate to the relative value of importance they place on turkey attributes. Table 4 displays correlations between holiday health intentions and health consciousness statements and the size of the individual-specific preference shares for the six turkey attributes investigated. The relative importance placed on turkey price was significantly and negatively correlated with the level of agreement with each of the nine statements about health consciousness. That is, the more health conscious the respondent, the lower the relative importance placed on price when selecting a holiday turkey. In contrast, higher shares of preference for antibiotic free production, pasture access, and turkey brand were correlated with higher levels of agreement with the health consciousness statements. In other words, the larger the size of the preference share devoted to antibiotic free production, pasture, and brand the more agreement with the health consciousness statements. As might be expected, the share of preference devoted to turkey weight was negatively correlated with the level of agreement with the statement *I'm very self-conscious about my health* which indicates that those who preferred a heavier turkey tended to be less health conscious. One potential explanation for why only one health consciousness statement was significantly correlated with the preference share for turkey weight is that an individual shops for a holiday turkey that will likely be serving many people. Thus, respondents were making choices not reflective of only their own health consciousness, but also a number of family members or guests. Perhaps the complexity of planning, shopping for, cooking, and serving a holiday meal (or a meal for a large group) overshadowed individual personal values (including health consciousness). It is interesting to observe that within this sample, those consuming turkeys had higher mean levels of health consciousness than non-turkey consumers (Table 2). Thus, respondents represented (n=461) in the maximum difference analysis devoted to turkey attributes were already more health conscious.

Table 4. Correlations between value attributes and self-reported health awareness and holiday health intentions (n=461)

	Price	Weight	Antibiotic Free	Local	Pasture	Brand
I reflect about my health a lot.	-0.2685*	-0.0841	0.2741*	0.0543	0.2314*	0.1869*
I'm very self-conscious about my health.	-0.2268*	-0.1160*	0.2426*	0.0792	0.1812*	0.1936*
I'm generally attentive to my inner feelings about my health.	-0.2274*	-0.0430	0.2240*	0.0752	0.1561*	0.1184*
I'm constantly examining my health.	-0.2290*	-0.0206	0.1704*	0.1073*	0.2134*	0.1513*
I'm alert to changes in my health.	-0.1205*	-0.0137	0.1190*	0.0209	0.0886*	0.0617
I'm usually aware of my health.	-0.2090*	0.0063	0.2038*	0.0239	0.1442*	0.0714
I'm aware of the state of my health as I go through the day.	-0.2211*	-0.0288	0.1909*	0.1102*	0.1602*	0.1136*
I notice how I feel physically as I go through the day.	-0.2150*	0.0085	0.1764*	0.0826	0.1441*	0.1044*
I'm very involved in my health.	-0.2282*	-0.0066	0.1903*	0.0502	0.1990*	0.1443*
Correlations between value attributes and self-reported holiday health intentions						
I will make a NYR to lose weight.	-0.1007*	0.0467	0.0002	0.0376	0.1473*	0.1539*
I will be vigilant about my weight gain during the holiday season.	-0.2303*	0.0445	0.1154*	0.1159*	0.2264*	0.1683*
I watch what I eat during the holiday season.	-0.2120*	0.0131	0.0995*	0.0866*	0.2658*	0.21457*

Note. *Denotes statistical significance at the 5% level or less.
In order to facilitate interpretation of Table 4, the scale of agreement/disagreement was transformed to agreement at "1" to disagreement at "5". Thus a higher number response is indicative of increasing agreement with each statement. Interpretation of agreement with each statement relative to the preference share devoted to each attribute survey is more intuitive than the scale provided to survey respondents. This transformation does not alter the direction or magnitude of the relationships.

Also of note is that a higher share of turkey price preference was negatively correlated with agreeing with the three holiday health intentions shown. Thus, those individuals who intended to make healthier decisions during the holidays tended to have lower preference shares devoted to price. On the other hand, the level of agreement with the holiday health intentions as the preference shares devoted to antibiotic free, pasture, and brand had a positive relationship. This can be interpreted as those individuals who reportedly intended to be healthier during the holiday season had higher preference shares devoted those attributes. It is probable that some consumers link healthiness to turkey attributes, such as antibiotic free and pasture access. A potential explanation for the relationship between brand and health consciousness is that consumers gain trust in brands that they perceive are safe, wholesome, and thus healthy.

Conclusions and Implications

This analysis presented US consumers who planned on serving turkey during the holiday season with a maximum difference choice experiment aimed at determining the relative importance of six holiday turkey attributes. Of the six turkey attributes included, weight and price accounted for nearly two-thirds of the preference share in the RPL model. Turkey producers and retailers in the United States are frequently offering price-based specials and deals and are aware of the consumers' focus on price when shopping for holiday turkeys. While price is prioritized by a majority of consumers, there may be opportunities for adding value for segments of consumers who are shopping for other turkey attributes.

When the LCM was examined, price was the most important attribute for a total of 62% of respondents. Conducted at the beginning of the holiday season, this study also explored the importance of turkey attributes with self-reported health consciousness and holiday specific health outcomes/intentions. Health consciousness was negatively related to the preference share devoted to price and positively related to the preference shares devoted to antibiotic free production, pasture access, and brand. Although previous research indicated the holiday season consumption patterns should be studied separately from food consumption and purchasing patterns at other times of the year, the current study shows that even during the holiday season, consumers are still concerned about their health. Thus, while quantity and mix of foods may change during the holiday season, consumers are likely still making decisions based on the relative importance they place on food attributes. In this case, health conscious consumers had higher preference shares for attributes such as antibiotic free, pasture, and brand when surveyed about consuming turkey during a holiday meal. Retailers, marketers, and turkey producers alike may consider segmenting the market while taking into account this relationship between health consciousness and holiday food shopping.

The holidays are a special time of year for both consumers and retailers. Future studies might examine the potential to identify consumer segments based on those that cook from scratch, purchase items partially or fully prepared, or purchase a ready-made meal. Identifying these consumer types would further assist retailers in designing holiday promotions to meet the demands of the food-focused consumers, especially those concerned about their health.

References

Boxall, P. C., and W. L. Adamowicz. 2002. "Understanding heterogeneous preferences in random utility models: a latent class approach." *Environmental and Resource Economics*, *23*(4): 421–446.

Briggeman, B. C., and J. L. Lusk. 2011. Preferences for fairness and equity in the food system. *European Review of Agricultural Economics* 38(1): 1–29.

DeGraba, P. 2006. "The loss leader is a turkey: Targeted discounts from multi-product competitors." *International Journal of Iindustrial Organization* 24(3): 613–628.

Flynn, T. N., J.J.Louviere, T. J. Peters, and J. Coast. 2007. "Best–worst scaling: what it can do for health care research and how to do it." *Journal of Health Economics* 26(1): 171–189.

Gould, S. J. 1988. "Consumer attitudes toward health and health care: A differential perspective." *Journal of Consumer Affairs* 22(1): 96–118.

Grunert, K. G., L. Bredahl, and K. Brunsø. 2004. Consumer perception of meat quality and implications for product development in the meat sector—a review. *Meat Science* 66(2): 259–272.

Haines, P. S., M. Y. Hama, D. K. Guilkey, and B. M. Popkin. 2003. "Weekend eating in the United States is linked with greater energy, fat, and alcohol intake." *Obesity Research* 11(8): 945–949.

Hull, H. R., C. N. Hester and D.A. Fields. 2006. "The effect of the holiday season on body weight and composition in college students." *Nutrition & Metabolism* 3(44): 1-7.

Jekanowski, M. D., D. R. Williams, and W. A. Schiek. 2000. "Consumers' willingness to purchase locally produced agricultural products: an analysis of an Indiana survey." *Agricultural and Resource Economics Review* 29(1): 43-53.

Lusk, J. L., and B.C. Briggeman. 2009. "Food Values." *American Journal of Agricultural Economics* 91(1):184–196.

Maynard, L. J., K. H. Burdine, and A. L. Meyer, 2003. "Market potential for locally produced meat products." *Journal of Food Distribution Research* 34(2):26–37.

National Turkey Federation. 2015. "Turkey History and Trivia." http://www.eatturkey.com/why-turkey/history.

Olynk, N. J., G. T. Tonsor, and C. A. Wolf. 2010. Verifying credence attributes in livestock production. *Journal of Agricultural and Applied Economics* 42(03): 439–452.

Ouma, E., A. Abdulai, and A. Drucker. 2007. "Measuring heterogeneous preferences for cattle traits among cattle-keeping households in East Africa." *American Journal of Agricultural Economics* 89(4): 1005–1019.

Pope, L., A. S. Hanks, D. R. Just and B. Wansink. 2014. "New year's res-illusions: food shopping in the new year competes with healthy intentions." *PloSone* 9(12): 1–7.

Powell, L. M., J. F. Chriqui, T. Khan, R. Wada, and F. J. Chaloupka. 2013. "Assessing the potential effectiveness of food and beverage taxes and subsidies for improving public health: a systematic review of prices, demand and body weight outcomes." *Obesity Reviews* 14(2):110-128.

Sossidou, E. N., A. Dal Bosco, H.A. Elson, and C.M.G.A. Fontes. 2011. "Pasture-based systems for poultry production: implications and perspectives." *World's Poultry Science Journal* 67(1): 47-58.

Stevenson, J. L., S. Krishnan, M.A. Stoner, Z. Goktas, J.A. Cooper. 2013. "Effects of exercise during the holiday season on changes in body weight, body composition and blood pressure." *European Journal of Clinical Nutrition* 67(9):944-949.

Swait, J. 1994. "A structural equation model of latent segmentation and product choice for cross-sectional revealed preference choice data." *Journal of Retailing and Consumer Services* 1(2): 77–89.

Train, K. E. 2003. *Discrete Choice Methods with Simulation*. Cambridge University Press.

Tonsor, G. T., C. Wolf, and N. Olynk. 2009. "Consumer voting and demand behavior regarding swine gestation crates." *Food Policy* 34(6): 492–498.

U.S. Census Bureau. 2014. "State and Country Quick Facts." http://quickfacts.census.gov/qfd/states/00000.html.

Wolf, C. A., and G. T. Tonsor. 2013. "Dairy farmer policy preferences." *Journal of Agricultural and Resource Economics* 38(2):220–234.

Table 3. RPL and LCM results and derived preference shares

	RPL			LCM							
				Coefficients				Share of Preference			
Turkey Attributes	Coefficient	Standard Deviation	Shares of Preferences	Class 1	Class 2	Class 3	Class 4	Class 1 "Bargain Hunters"	Class 2 "Price Conscious"	Class 3 "I Want It All"	Class 4 "No Antibiotics"
Price	1.2875*	2.1011*	0.4126	1.4022*	2.6288*	-0.4241*	0.1101				
	(.09396)	(.11305)		(.1138)	(.1932)	(.1264)	(.1288)	55%	61%	13%	7%
Weight	.6386*	1.1569*	0.2157	0.6192*	1.0508*	-0.1035	0.0427				
	(.06551)	(.06910)		(.0954)	(.1095)	(.1168)	(.1537)	25%	12%	18%	6%
Antibiotic Free	-.01606	1.9529*	0.1121	-2.3009*	0.9717*	-0.2059	2.4433*				
	(.09293)	(.09380)		(.1425)	(.1223)	(.1208)	(.2667)	1%	12%	16%	67%
Local	-.3397*	1.2272*	0.0811	-1.3284*	0.3540*	-0.0765	-0.1247				
	(.06427)	(.07731)		(.1407)	(.1246)	(.1045)	(.1063)	4%	6%	19%	5%
Pasture	-.5660*	1.2829*	0.0647	-2.0896*	0.0920	-0.3831*	0.4792*				
	(.06244)	(.07670)		(.1447)	(.0898)	(.1115)	(.1121)	2%	5%	14%	9%
Brand	0.000		0.1139	0.000	0.000	0.000	0.000	13%	4%	20%	6%
Constant				-.4193	.1997	1.611*					
				(.5999)	(.60172)	(.6068)					
Mean of Holiday Health Intentions				.2992	.0795	-.5427*					
				(.1597)	(.1720)	(.1856)					
Class Probability				.333	.291	.192	.184				

Note. * denotes statistical significance at the 5% level or less

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Purchasing Locally Produced Fresh Vegetables: National Franchise vs. Locally Owned and Operated Restaurants

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Abstract

The objective of this study is to examine purchasing practices of restaurants and food service institutions in relation to locally produced fresh vegetables. The sample for the study included managers of seventy-five restaurants and dining centers out of a total of nearly 600 food service outlets in a mid-size metropolitan city in Midwest region of the United States with a population of about 400,000. The study findings showed differences between national/regional chains and the local independently owned restaurants. Although managers across the board expressed willingness to buy local, actual purchasing decisions were largely driven by freshness, quality and availability. Price was not as critical a factor as others including variety and selection. The results suggested that local vegetable producers should use regularity, quality, and freshness to differentiate themselves. As a producer of small volume of fresh vegetables, local farmers have much higher probability of success if they supply to locally and independently owned restaurants. These restaurants use small volume of vegetables in broader variety.

Keywords: locally produced, chain restaurants, locally owned restaurants

Introduction

The fresh produce market in the United States, particularly fresh vegetables, has been experiencing significant changes, driven primarily by consumer demand and the availability of the products. Consumption of fresh fruits and vegetables (F&V) grew by 26.4% from 1970 to 2012. More importantly, the share of fresh F&V was 50% of total fruits and vegetable consumption in 2012, up from 45% in 1970. The national per capita disappearance/consumption of fresh vegetables, excluding potatoes, grew by 69% from 1970 to 2012, reaching 156 lbs. in 2012. According to Cook (2011), fresh produce consumption was positively correlated with income and education levels of the households. More variety of fresh vegetable items and increased share of branded items are some of other factors behind the increasing trend in the fresh vegetable consumption (Govindasamy and Thornbury 2006.) Per household expenditures on fresh vegetables in 2014 were more than 24% higher than that in 2005. The estimated per household expenditure on fresh vegetables bought at grocery stores in 2014 was $240 (Bureau of Labor 2015).

The retail side of fresh produce market including fresh vegetables is dominated by general line grocery stores including supermarkets such as Wal-Mart, Price Cutter, and Dillon's, and other independently owned stores. According to Cook (2012), the supermarkets and other retailers sold fresh fruits and vegetables worth $69.2 billion dollars in 2010. The other significant retail sector includes food service sector comprising local and national chain restaurants, independent restaurants, dining halls at educational institutions and hospitals contributing more than $50 billion in produce sale in 2010 (Cook 2012). Farmers' markets and other direct sales accounted for a very small portion of the total fresh vegetables sold estimated at less than $2 billion in 2010. Local production of fresh fruits and vegetables marketed directly to the grocery stores and food service sector is a recently emerging phenomenon.

By eliminating the middleman, the goal of the direct marketing is to increase farmers' share in consumers' dollar. Value of locally produced food sold through both direct-to-consumers (DTC) including farmers market and intermediated channels has been growing in recent years. In 2012, local food sales totaled more than $6 billion (Low et al. 2015). Nationwide nearly 8% of the farms marketed foods locally with 70% of them used only DTC including farmers markets and community supported agriculture (CSA). More than 80% of farms marketing locally had gross cash income of less than $75,000 annually. Smaller farms are more likely to target local buyers including independent restaurants compared to large commercial farms. According to the USDA 2007 Census of Agriculture, farms using direct marketing increased by 17% compared to 2002 census (over 136,000 farms utilized the marketing strategy), and direct marketing sales value increased by almost 32%. Although the change between 2007 and 2012 census was not as robust, the number of farms using direct marketing still grew by 5.5%. A number of factors on the demand side have caused the buyers to source locally produced food either directly from farmers or through intermediaries.

The influence of current food shopping trends—local food, support for local farmers and agribusinesses, and fresh quality produce and meat—are considered to be behind the strong surge of farmers who utilize direct marketing. (LeRoux et al. 2009; Mark et al. 2009) In addition to farmers markets, road-side markets and u-pick markets, producers have found direct sales to the local restaurants, food service institutions, and schools profitable marketing strategies (USDA

2001). In various studies, buyers of fresh fruits and vegetables at restaurants and food service institutions have reported a favorable attitude toward local production (Strohbehn and Gregoire 2003; Cottingham et al. 2000). However, quality, price, and services are primary consideration in seeking local food suppliers (Bergstrom et al. 2005).

While examining the perceived attitude of food service directors in Midwest schools, Strohbehn and Gregoire (2003) have reported several perceived benefits to purchasing locally including ability to purchase smaller quantities and fresher food, support to local economy, and good public relation. Similarly, the reported barriers to local purchases were lack of year round supply, inadequate quantity, and inconsistent quality (Strohbehn and Gregoire 2003; Cottingham et al. 2000). Perceived benefits and obstacles to buying locally produced food, however, are likely to vary across types of food service institutions. There are many sub-sectors within the broad sector of hotel, restaurant and institutional (HRI) market, including fast food to fine dining restaurants, health care, schools, and business. Vendor selection decisions vary across these sub-sectors depending on ownership type, menu, capacity of the restaurant, and compliance with Federal and State agencies. For example, locally owned and operated restaurants may have a different set of purchase practices and programs regarding locally produced food compared to a restaurant owned and operated under national franchise.

Objectives

The objective of this study was to examine purchasing practices of restaurants and food service institutions in relation to locally produced fresh vegetables. A comparative analysis was conducted to highlight key differences between these two types of restaurants. The study examined 1) factors affecting the purchase decisions of locally grown fresh vegetables; 2) willingness to buy locally grown produce; 3) key attributes desired while supplying locally grown produce to these restaurants; and 4) perceived attitude of buyers toward locally produced food. The study was sponsored by Missouri Department of Natural Resources (MDNR) to support Renewable Energy-Sustainable Food Feasibility Project.

Method

A survey was conducted among the managers of restaurants and dining centers. Samples were drawn from restaurants and dining centers belonging to national or regional chains, and the locally and independent owned. The sample for the study included managers of seventy-five restaurants and dining centers out of a total of nearly 600 food service outlets in a mid-size metropolitan city in Midwest with a population of about 400,000. The questionnaire consisted of five sections: 1) Characteristics of food service facilities including ownership (independent locally owned and operated vs. national franchise); capacity in terms of seats and customer served, 2) usage of fresh vegetables, sources of supply and prices paid, 3) existing practices of purchasing locally produced fresh vegetables, 4) attributes desired while selecting vendors to supply locally produced food, and 5) perception and attitude of restaurant managers toward locally produced food. Samples were drawn from a large metro area in Midwest with a population of more than 400,000 covering five counties. Restaurants and dining centers within the metropolitan were divided into chain and independent restaurants. Initial list of the restaurants were obtained from the Missouri Restaurant Association. The list was augmented

with the information from listings in local yellow pages. A random sample of 100 independent restaurants and 100 chain restaurants were contacted by telephone and requested for a personal interview.

Results

Out of the 200 initial restaurants contacted, we obtained a total of seventy-five completed surveys by managers at restaurants and dining facilities. Completed surveys included forty-seven from independent and locally owned restaurants, and twenty-eight from national franchises or chain restaurants. The self reported categories of the surveyed restaurants included fast food and carryout (21); casual dining (43); fine dining (10) and ethnic restaurants (10). Other self reported categories were Italian, bar and grill, pizza, etc.

The capacity of the surveyed restaurants in terms of number of seats and customers served per week varied across two types of restaurants. Fifty two percent of the chain restaurants had more than 200 seats while only 22% of the independently owned restaurants had more than 200 seats. The average overall capacity was 100 to 150 seats (Table 1). Similarly, 69% of the chain restaurants served more than 2000 customers per week compared to only 31% for independent locally owned restaurants. Overall, only 37% of the restaurants served more than 2000 customers per week. The average meal served per week was 2792 (Table 1).

Table 1. Descriptive statistics of variables used in the logit model

Variable	Description of Variable	Mean	Std. Dev
BUY_LOCAL	1= buys fresh vegetables produced locally; 0 = otherwise	0.243	0.432
Explanatory Variables:			
RES_TYPE	1= Chain Restaurants (part of the national or regional chain); 0 = otherwise (independently and locally owned)	0.637	0.487
RES_LOC*	1 = located downtown ; 0 = otherwise	0.284	0.454
SEATS*	Number of seats(capacity measure)	183	259
MEALS	Number of meals served per week (capacity measure)	2892	5646
FRES_VEG	Fresh vegetables as percent of total vegetables	74.479	30.756
FREQ_VEG	Varieties of vegetables used	6.466	2.506

Note. Asterisk implies that the variable was dropped during estimation to avoid multicollinearity

Fresh vegetables accounted for more than 80% of the total vegetable usage for about 60% of the restaurants. This percentage was higher for independent locally owned restaurants (54%) than that for chain restaurants (46%). While the basic salad mix with iceberg lettuce, tomatoes, onion, romaine lettuce and cabbage were leading fresh vegetables in terms of the average use per week, tomatoes, bell peppers, romaine lettuce, and cucumbers were leaders in terms of number of restaurants using them at least once a week. There was a significant difference between chain and independent restaurants in terms of variety of vegetables used. The chain restaurants were more likely to use few vegetables in larger quantity such as lettuce, tomatoes, and basic salad mix. The independent and locally owned restaurants used a wider variety of vegetables. Nearly

65% of the restaurants did not use any organic fresh vegetable and only 7% used organic vegetables to meet more than 75% of their fresh vegetables requirements.

None of the chain restaurants used farmers markets and local grocery stores as suppliers of their fresh vegetables compared to independent and locally owned restaurants who reported to have used farmers markets and local grocery stores for twenty-eight and twenty-six different items of fresh vegetables, respectively. Nearly 100% of the chain restaurants were supplied fresh vegetables by distributors such as Sysco compared to 75% of independent restaurants. Further, only a quarter of the restaurants reported to have bought fresh vegetables locally. Only 4% of the chain restaurants bought fresh vegetables locally that did not include farmers market and local grocery stores while 37% of independent restaurants bought locally.

Predicted probability of purchasing locally produced fresh vegetables: A logit model (Long 1997; Green 1995) was used to estimate the probability of restaurants purchasing locally produced fresh vegetables. The model is defined as

$$(1)\quad \mathbf{Y}^*_i = \boldsymbol{\beta}'\mathbf{X}_i + \boldsymbol{\alpha}_i$$

Values for $\mathbf{Y}^*$ are 0 and 1. Value of 0 indicates that the surveyed restaurants do not purchase locally produced fresh vegetables and 1 indicates otherwise. The parameters for the model were estimated using maximum likelihood estimation via LIMDEP 8.0 (Greene 2002). The descriptive statistics of variables used in the models including the mean and standard deviation are shown in Table 1.

The explanatory variables included type of the restaurants surveyed (*RES_TYPE*), location of the restaurants (*RES_LOC*), capacity of restaurants in terms of seats (*SEATS*), and meals served per week (*MEALS*), fresh vegetables as a percentage of total vegetables used in the restaurants (*FRESH_VEG*), and variety of fresh vegetables used (*FREQ_VEG*).

Estimated coefficients are reported in Table 2. The overall significance level of the model was 99% with a chi-square value of 23.36. The predictability of the model was at approximately 80% and with McFadden R squared value of 27%. Also, two independent variables were individually significant at 95% or more. National or regional chain restaurants were less likely to buy locally produced fresh vegetables compared to independently and locally owned restaurants (β=-3.009; p-value = 0.0065). The higher the proportion of the fresh vegetables in the total vegetable usage in a restaurant higher was the probably of buying locally (β=0.0271; p-value=0.0461). Number of meals did not show any statistically significant effect on the decision to buy local. The likely effect may already have been absorbed by the variable representing restaurant type. Type of restaurants and number of meals per week are likely to be correlated. Often national and regional chains serve larger number of meals per week compared to local and independently owned restaurants.

Table 2. Logit Model Estimation: probability of buying locally produced fresh vegetables

Variables	Coefficient	t-ratio
Constant	-5.6465	-3.511
RES_TYPE*	-3.0087	-2.723
RES_LOC	0.9342	1.306
MEALS	0.0011	0.792
FRES_VEG*	0.0271	1.994
FREQ_VEG	-0.0373	-1.259
Log Likelihood Function	-30.763	
Restricted Log Likelihood	-42.448	
Chi Squared*	23.36	
McFadden's R^2	0.27	
Percent of correct Prediction	78.667%	

Note. *Indicates significant at less than 5%

Important attributes desired while purchasing fresh vegetables: Restaurant managers were asked to evaluate five important attributes in making fresh vegetable purchase decisions including availability in season; selection and variety; freshness; quality; and price. They responded by selecting one of the three different levels of importance: very, somewhat, and not important (Table 3). Freshness and quality were more important attributes for both chain and independent restaurants compared to variety and price. While nearly 70% of chain restaurant managers reported price to be "very important", only 56% of the independent and local restaurants reported so. No statistically significant differences were observed between chain and local restaurants, except for selection of menu items and variety of fresh vegetables used in making dishes. This may be related to menu diversity, as local restaurants have more menu variety whereas national chains have more fixed menus. Although the study did not examine menu variety specifically, number of meals served can be used as a proxy to address this aspect. The average chain restaurant in the study served more meals per day than an independent restaurant, hence less variety to achieve cost efficiency through economy of scale.

Willing to buy fresh vegetables produced locally: Managers of the sample restaurants were asked whether they were "more willing," "indifferent," "less willing," or "unsure" about buying locally produced fresh vegetables. Although no statistically significant differences are observed between chain and local restaurants, a little more than half of the restaurants were "more willing" to buy fresh vegetables sold in local farmers markets or grown in local farms or greenhouse (Table 4). This percentage was higher for independent restaurants than for chain restaurants. More than half of the independent restaurants were "more willing" to buy organically grown fresh vegetables, while more than half of the chain restaurants were either indifferent or less willing. The difference between chain and independent restaurants was even more apparent when the respondents were asked about buying fresh vegetables grown using sustainable practices.

Centralized buying practices at chain restaurants where managers at the individual restaurant level have very limited say in purchase decisions may explain such disparity.

Table 3. Important consideration while making fresh vegetable purchase decisions as reported by restaurant managers

	Not Important	Somewhat Important	Very Important	Total
1) Availability in the season (chi-square: 1.84)				
Chain restaurant	6 (23.10%)	7 (26.90%)	13 (50.00%)	26 (100%)
Independent locally owned restaurant	5 (11.10%)	13 (28.90%)	27 (60.00%)	45 (100%)
2) Selection or variety (chi-square: 7.41)**				
Chain restaurant	5 (19.20%)	12 (46.20%)	9 (34.60%)	26 (100%)
Independent locally owned restaurant	2 (4.40%)	14 (31.10%)	29 (64.40%)	45 (100%)
3) Freshness (ripeness/maturity) (chisquare:0.24)				
Chain restaurant	0.00 (0.00%)	1 (3.80%)	25 (96.20%)	26 (100%)
Independent locally owned restaurant	0 (0.00%)	3 (6.70%)	42 (93.30%)	45 (100%)
4) Quality (Chi-square:2.31)				
Chain restaurant	0 (0.00%)	1 (3.80%)	25 (96.20%)	26 (100%)
Independent locally owned restaurant	1 (2.20%)	0 (0.00%)	44 (97.80%)	45 (100%)
5) Price per relative unit (Chi-square:1.65)				
Chain restaurant	0 (0.00%)	8 (30.80%)	18 (69.20%)	26 (100%)
Independent locally owned restaurant	1 (2.20%)	19 (42.20%)	25 (55.60%)	45 (100%)

Note. **Significant at less than 5%

Table 4. Restaurant managers' willingness to buy locally produced fresh vegetables and those produced using organic and sustainable practices

	Unsure	Less willing	Indifferent	More willing	Total
1) Sold in local farmers market (Chi-square: 5.12)					
Chain restaurant	4	1	11	10	26
	15.40%	3.80%	42.30%	38.50%	100%
Independent locally owned restaurant	6	3	8	28	45
	13.30%	6.70%	17.80%	62.20%	100%
2) Grown on local farms or greenhouse (Chi-square: 5.81)					
Chain restaurant	4	2	10	10	26
	15.40%	7.70%	38.50%	38.50%	100%
Independent locally owned restaurant	2	5	10	28	45
	4.40%	11.10%	22.20%	62.20%	100%
3) Organically grown (Chi-square: 3.01)					
Chain restaurant	4	2	11	9	26
	15.40%	7.70%	42.30%	34.60%	100%
Independent locally owned restaurant	3	2	17	23	45
	6.70%	4.40%	37.80%	51.10%	100%
4) Grown using sustainable practices (Chi-square: 1.99)					
Chain restaurant	5	2	9	10	26
	19.20%	7.70%	34.60%	38.50%	100%
Independent locally owned restaurant	4	3	15	23	45
	8.90%	6.70%	33.30%	51.10%	100%

Attitude toward locally produced fresh vegetables: Restaurant managers' attitude toward local purchase is likely to be influenced by their perception of locally grown fresh vegetables such as taste, safety, environmental impact, and promotion of local economy and local farmers (Table 5). Managers were asked as to how they perceived various aspects of locally produced fresh vegetables including taste, impact on the environment and contribution to local economy using a five-scale measurement of attitude. Independent and locally owned restaurants were more likely to "agree" or "strongly agree" than the managers of chain restaurants that locally grown fresh vegetables were generally taste better and safe to eat. The differences were statistically different at 10%. Additionally, managers of independent restaurants tended to "agree" or "strongly agree" that locally produced fresh vegetables were favorable to environment and local economy.

Table 5. Restaurant managers' attitude toward locally produced fresh vegetables

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total
1) Locally grown fresh vegetables taste better (Chi-square:7.69*)						
Chain restaurant	3 11.50%	2 7.70%	11 42.30%	9 34.60%	1 3.80%	26 100%
Independent locally owned restaurant	7 15.90%	5 11.40%	8 18.20%	14 31.80%	10 22.70%	44 100%
2) They are safe to eat (Chi-square:7.26)						
Chain restaurant	4 15.40%	2 7.70%	10 38.50%	10 38.50%	0 0.00%	26 100%
Independent locally owned restaurant	6 13.60%	7 15.90%	12 27.30%	11 25.00%	8 18.20%	44 100%
3) They reduce carbon foot print (Chi-square:2.80)						
Chain restaurant	4 15.40%	3 11.50%	9 34.60%	9 34.60%	1 3.80%	26 100%
Independent locally owned restaurant	5 11.40%	8 18.20%	14 31.80%	11 25.00%	6 13.60%	44 100%
4) They help sustain the environment (Chi-square:2.05)						
Chain restaurant	5 19.20%	3 11.50%	6 23.10%	9 34.60%	3 11.50%	26 100%
Independent locally owned restaurant	4 9.10%	8 18.20%	11 25.00%	14 31.80%	7 15.90%	44 100%
5) They promote local farmers (Chi-square:5.09)						
Chain restaurant	9 34.60%	2 7.70%	1 3.80%	5 19.20%	9 34.60%	26 100%
Independent locally owned restaurant	14 31.80%	4 9.10%	0 0.00%	3 6.80%	23 52.30%	44 100%
6) They promote local economy (Chi-square: 2.99)						
Chain restaurants	9 34.60%	2 7.70%	1 3.80%	6 23.10%	8 30.80%	26 100%
Independent locally owned restaurants	15 34.10%	2 4.50%	1 2.30%	5 11.40%	21 47.70%	44 100%

Note. *Significant at 10%

Conclusions and Implications

The study findings show differential preferences between national/regional chains and the local independently owned restaurants for the locally produced fresh vegetables. Although managers across the board expressed willingness to buy local, actual purchasing decisions were largely driven by freshness, quality and availability. Price was not as critical a factor as others including

variety and selection. In addition to factors considered in this study, the lower demand for local fresh vegetables among national and regional chain restaurants compared to local and independent restaurants could also be attributed to more stringent food safety requirements and higher level of perceived barriers including lack of consistent supply and "not knowing" where to source from. Policies and programs addressing perceived barriers should be put in place to enhance participation of chain restaurants in the locally produced market.

The results suggest that local vegetable producers should use regularity, quality, and freshness to differentiate themselves. Regularity of supply would require investment in season extending technology including high tunnel and greenhouse. As a producer of small volume of fresh vegetables local farmers have much higher probability of success if they supply to locally and independently owned restaurants. These restaurants use small volume of vegetables in broader variety. Additionally, small variety growers may need to recast their business models as the industry seem to be moving towards fewer vegetables delivered round the year.

References

Andreatta, S. and W. Wickliffe. 2002. Managing Farmer and Consumer Expectations: Study of North Carolina Farmers Market. *Human Organization* 61(2): 167-176.

Bergstrom, K., C. Soler, and H. Shanahan. 2005. Professional food purchasers' practice in using environmental information. *British Food Journal* 107(5): 306-319.

Brown, A. 2002. Farmers' Market Research 1940-2000: "An Inventory and Review." *American Journal of Alternative Agriculture.* [accessed through interlibrary loan from Truman State University].

Bureau of Labor Statistics. 2015. Consumer Expenditure Survey. http://www.bls.gov/cex/

Cook R. 2011. "Tracking Demographics and U.S. Fruit and Vegetable Consumption Patterns." Department of Agriculture and Resource Economics. University of California, Davis.

Cook, R. 2012. "Trends in the Marketing of Fresh Produce and Fresh-cut Products. Department of Agriculure and Resource Economics." University of California, Davis.

Cottingham, J., J. Hovland, J. Lenon, T. Roper, and C. Techtmann. 2000. "Direct marketing of farm produce and home goods." Madison, WI University of Wisconsin Cooperative Extension Service, A3602.

Greene, W. 2002. "Limdep version 8. Econometric Software, Inc." Plainview, New York.

LeRoux, M., T. Schmit, M. Roth, and D. Streeter. 2009. Evaluating Marketing Channel Options for Small-Scale Fruit and Vegetable Producers. Working Paper, Department of Applied Economics and Management, Cornell University, Ithaca, New York. April.

Low, S., A. Adalja, E. Beaulieu, N. Key, S. Martinez, A. Melton, A. Perez, K. Ralston, H. Stewart, S. Suttles, S. Vogel, and B. B.R. Jablonski. 2015.*Trends in U.S. Local and Regional Food Systems*, U.S. Department of Agriculture, Economic Research Service, Washington, D.C. AP-068. January. http://www.ers.usda.gov/media/1763057/ap068.pdf.

Mark, T., A. Adhikari, J. Detre, and A. Mishra. 2009. Linkage between Direct Marketing and Farm Income: A Double-Hurdle Approach. Presentation at the American Agricultural Economics Association Meeting in Milwaukee, WI. July.

Strohbehn, C. and Gregoire, M. B. 2003. Case Studies of Local Food Purchasing by Central Iowa Restaurants and Institutions. *Journal of Food Science* 14(1): 53–64.

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Narrowing the Gap: Preference and Awareness of Florida Strawberries

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Abstract

Consumers may prefer local food but do not always purchase it. A mixed methods research design was used to determine if there were differences between consumers' preferences for Florida strawberries and their awareness of the state's strawberry season. Using focus groups, researchers found that consumers preferred to purchase Florida strawberries but did not seek them out. In addition, consumers had limited knowledge of Florida's strawberry season. Five hundred Floridians were surveyed to understand their knowledge of and preferences for Florida berries. Findings indicate that food distributors should use advertisements that reinforce the positive attributes of Florida produce, along with information on the growing season, in order to increase awareness and promote sales of Florida strawberries.

Keywords: strawberries, local food, attitude-behavior gap, marketing

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Introduction

In recent years, there has been a substantial increase in consumer demand for locally-grown food (Becot, Conner, Nelson, Buckwater, and Erickson 2014; Conner, Colasanti, Ross, and Smalley 2010; Jefferson-Moore, Robbins, Johnson, and Bradford 2014). Some studies indicate this increase was driven by the perception that locally-grown food is healthier (The Hartman Group 2008). Other studies found that consumers purchased locally-grown food to support the economy and provide environmental benefits (Zepeda and Leviten-Reid 2004). As consumers continue to seek high quality, healthy food (Verbeke 2005), it is important to expand local markets (Zepeda and Li 2006). Global competition has also resulted in the promotion of U.S. products through state branding programs, such as Fresh from Florida (Zepeda and Li 2009). These programs increased in number from 23 in 1995 to 48 in 2010 (Onken and Bernard 2010), following a $200 million investment of state and federal funds in 2001 (Patterson 2006). In fact, research has suggested that producers should use state logos to reinforce positive perceptions of local produce (Hinson and Bruchaus 2008).

Although consumers may indicate a preference for "local" food, they do not universally have the same definition for this term (Conner et al. 2010). In fact, there is no standard definition for local food in the U.S. (Zepeda and Li 2006). Consumers often interpret the ambiguous local definition differently depending on the product (Rumble and Roper 2014). In most cases, however; consumers prefer food to be produced as close to their location as possible (Rumble and Roper 2014). Research has determined that consumers prefer local and national food to imported products, due to their belief that local and national foods are of higher quality and are fresher (Becot et al. 2014; Chambers, Lobb, Butler, Harvey, and Traill 2007; Jefferson-Moore et al. 2014). This perception of superiority of domestic products may stem from consumer ethnocentricity (Lantz and Loeb 1996; Lee and Ganesh 1999; Stoltman, Lim, and Morgan 1991). Sumner (1906, in Balabanis and Diamantopoulos 2004) initially described consumer ethnocentricity as people viewing their own group as the center of everything and judging all other groups in comparison to their own.

Generally, people hold favorable attitudes toward their own group and unfavorable attitudes toward others. Consumer ethnocentricity has been documented in a number of country-of origin studies where it negatively influenced consumers' perceptions of imported food products (Chryssochoidis, Krystallis, and Perreas 2006), elicited consumer enthusiasm about purchasing domestic food (Chambers et al. 2007), and created higher perceived value of domestic products by consumers (Perrea, Mamalis, Melfou, Papanagiotou, and Krystallis 2015).

Unfortunately, studies have shown an attitude-behavior gap among consumers meaning, for example, they do not always purchase local produce even though they may prefer it (Chambers et al. 2007; Yue and Tong 2009; Zepeda and Levitan-Reid 2004). Chambers et al. (2007) found that, even though consumers had positive perceptions of local food, they rarely purchased local products on a regular basis. Consumers were often excited about local food production but did not put forth extra effort to find it in grocery stores (Chambers et al. 2007). Higher prices and lack of availability were identified as barriers to purchasing local food (Becot et al. 2014; Chambers et al. 2007). Additional literature has found that the origin location of low-involvement products, such as bread and coffee, is not very important to consumers (Ahmed et al. 2004; Lin and Chen 2006). However, Verbeke and Roosen (2009) suggested that adding

additional quality marks to labels (i.e., county-of-origin), will help to increase the product's value to consumers.

In Florida, local agricultural sales (Florida grown/raised products) have contributed to the state's economy, at a value of $8.3 billion dollars in 2011 (Hodges and Stevens 2013). Florida is home to more than 47,000 farms and almost 300 commodities (Florida Department of Agriculture and Consumer Services [FDACS] 2013). It is the number one producer of oranges, and the number two producer of strawberries in the United States (FDACS 2013), yielding 200 million pounds a season (Mossler 2012). In fact, Florida is the primary strawberry producing state in the United States during winter months (Boriss, Brunke, Kreith, and Morgan 2012). In 2012, strawberry sales added more than $300 million to Florida's economy (FDACS 2013).

American's consumption of fresh strawberries has increased in recent years, reaching an all-time high of 7.9 pounds per person in 2013 (Perez and Plattner 2014). Along with the increase in consumption, there has also been an increase in strawberry prices. On average, fresh strawberries cost 12% more during 2014 than in 2013 (Perez and Plattner 2014). Strawberries tend to have a short shelf-life, which causes their prices to fluctuate more than other produce, depending on the season. Growers' prices for strawberries almost doubled between the months of December and February, which is the peak of Florida's strawberry season (Plattner, Perez, and Thornsbury 2014).

Even though consumption of fresh strawberries has increased, overall domestic production increased by only three percent in 2013. California, Florida, and Oregon were the top producers of strawberries in the U.S. in 2012, and California production increased by two percent, while Oregon's production decreased by two percent. In that same year, however; Florida's production increased by 11%. While, overall domestic strawberry production has only marginally increased, there has been an increase in strawberries imported into the United States from Canada and Mexico (Perez and Plattner 2014). Imported product has typically been sold during the off-season for domestic strawberries (Boriss et al. 2012), but the net trade in strawberries decreased to 20 million pounds in 2011 from 120 million pounds in 2008 (Wu, Guan, and Whidden 2012). Even though only 9% of the average annual share of total strawberry volume in the United States came from imported strawberries from 2010 to 2012 (Plattner et al. 2014), an estimated 36% of all imported strawberries arrived in the United States while Florida strawberries were still in season (Boriss et al. 2012). Additionally, strawberries imported from Mexico reached 350 million pounds in 2012, which is nearly double Florida's production. Despite the state's increased production of strawberries (Perez and Plattner 2014), Florida's market share of strawberries has dropped, likely due to the rise in imports (Ohlemeier 2013). Florida farmers must find way to market their strawberries against cheaper imports in a more competitive market (Shope 2013).

Consumers have indicated their desire to purchase local produce (Becot et al. 2014; Conner et al. 2010; Jefferson-Moore et al. 2014; Rumble and Roper 2014; Zepeda and Levitan- Reid 2004), but their behavior has not always reflected this attitude (Chambers et al. 2007; Zepeda and Levitan-Reid 2004; Yue and Tong 2009). For Florida strawberries, this attitude-behavior gap may be even wider because the product is only available for a few months during the year and is often sold at the same time as imported strawberries. Even when Florida consumers prefer

Florida strawberries, they will have a difficult time purchasing the product if they do not understand its seasonal availability, which is limited to the winter months.

Producers and distributors may be faced with the challenge of promoting Florida strawberries to consumers who are not entirely knowledgeable about the product. In order to effectively market Florida strawberries to the state's consumers, a baseline understanding of consumer preferences for and awareness of Florida strawberries will be necessary.

Purpose and Objectives

The purpose of this study was to explore Florida consumers' strawberry purchasing preferences along with their awareness of the Florida strawberry season, in order to develop marketing campaigns to promote Florida strawberries when they are in season. The research objectives were as follows: (1) explore consumers' purchasing preferences for Florida strawberries; and (2) describe consumers' awareness of Florida's strawberry season.

Methods

This study used mixed methods research, including both quantitative and qualitative research approaches "for the purposes of breadth and depth of understanding and corroboration" (Johnson, Onwuegbuzie, and Turner 2007, 123). The individual weaknesses associated with qualitative and quantitative methods can be offset by employing a mixed methods design (Creswell and Plano Clark 2011). A number of studies focusing on agricultural issues have recently used a mixed methods design (Epler, Drape, Broyles, and Rudd 2013; Walker 2010; Witt, Doerfert, Ulmer, Burris, and Lan 2013). Additionally, a literature review on consumer perceptions of local food found that 10% of the studies conducted between 2000 and 2013 in the United States and in Europe used a mixed methods research design (Feldman and Hamm 2015).

This study used an exploratory sequential design (Creswell and Plano Clark 2011)—a two-step process that prioritized the qualitative phase over the quantitative phase (Creswell and Plano Clark 2011). The initial data collected were qualitative, and a quantitative phase followed to help generalize the exploratory results (Creswell and Plano Clark 2011). Additionally, the quantitative instrument was developed to assess the overall prevalence of themes identified in the qualitative phase (Creswell and Plano Clark 2011). During analysis, the quantitative data were analyzed to see how they added to the qualitative results and made them more generalizable to Florida strawberry consumers (Creswell and Plano Clark 2011).

Qualitative Phase

Qualitative methods are useful to explore a research issue, and researchers require a complex understanding of the problem (Creswell 2013). Even though there is existing literature on consumers' preferences for local food (Becot et al. 2014; Conner et al. 2010; Jefferson-Moore et al. 2014; Rumble and Roper 2014; Zepeda and Levitan-Reid 2004), there is no literature related to the Florida strawberry market specifically. Because Florida strawberries are only in season for a short amount of time, and possess no tangible differences from competitors, greater insight into Florida consumers' purchasing preferences and awareness was necessary before further data could be collected.

The first phase of the mixed methods research design used focus groups to generate qualitative data. Focus groups allow participants to compare and contrast ideas and thoughts through guided group discussions and can be used to elicit honest answers when conducted appropriately (Morgan 1998). One of the limitations associated with focus groups is social desirability bias among participants. Participants will try to present what they perceive as socially desirable answers within the group (Maccoby and Maccoby 1954). This type of bias can lead to an overrepresentation of certain responses in a focus group (Zerbe and Paulhus 1987). The purpose of the focus groups was to assess consumers' preference for purchasing Florida strawberries along with their awareness of the product. Focus group participants were recruited by an external marketing firm, which contacted participants through random digit dialing, and offered a monetary incentive to encourage participation. Fifty participants took part in focus groups in a north Florida city. Each group had an average of eight participants; the recommended size of focus groups is six to twelve participants (Krueger 1998). Each participant was assigned a pseudonym for confidentiality throughout the analysis.

Table 1 shows participant demographics. The majority of participants were White (66%), female (60%); earned an income between $30,001 and $60,000 (56%); and were over the age of 50 (68%). Member checking was used as a validation measure by having participants confirm the summary of the discussion (Creswell 2007). Emergent themes from the focus groups were identified using a constant comparative method of analysis (Glaser 1965) in MAXQDA software. These themes were used to complete study objectives one and two, and guide question development for the quantitative portion of the study.

Table 1. Demographic characteristics of focus group participants

Characteristic	*n*
Sex	
Female	20
Male	30
Race/Ethnicity*	
Hispanic	3
Black or African American	16
White	33
Income*	
Less than $30,000	9
$30,001-$45,000	18
$45,001-$60,000	10
$60,001-$80,000	7
$80,001-$100,000	1
$100,001-$125,000	3
Age	
18-29	3
30-39	8
40-49	5
50-59	17
60+	17

*__Note.__ Indicates one person declined to answer this question.

Quantitative Phase

Themes identified in the qualitative phase were used to guide the questions developed for the quantitative instrument (Creswell and Plano Clark 2011; Morgan 1998). A survey, based on results from the focus groups, was developed for administration to Florida consumers 18 years and older who purchased strawberries (Creswell and Plano Clark 2011). Questions, generated from the focus groups, asked respondents to describe the importance of strawberry characteristics for their purchasing intentions, using a five-point scale with the ordinal labels of not at all important, slightly important, fairly important, highly important, and extremely important. Respondents also answered questions about their preference for purchasing Florida-grown products with the scaling: never, rarely, sometimes, most of the time, and always. Another question asked respondents if they preferred Florida versus California strawberries, given the choice. The respondents who selected Florida strawberries were then asked to select the characteristics of the strawberries that influenced their decision, using a multiple response question. Finally, respondents were asked if they were aware of Florida's strawberry season. Those who said yes then selected the months that corresponded to the start and end of Florida's strawberry season.

The survey was reviewed by a panel of experts for face and content validity. An online survey company, Qualtrics, distributed the survey and used non-probability sampling to recruit respondents. This sampling is often used by public opinion researchers (Baker et al. 2013) and has been shown to be comparable or even better than probability samples (Twyman 2008; Vavreck and Rivers 2008). Quota sampling was used to reduce bias (Baker et al. 2013), and respondents were matched to the 2010 U.S. Census results for gender, race/ethnicity, and age in Florida. A screening question at the beginning of the survey asked if respondents had purchased strawberries in the past year. As fewer men, racial minorities, and younger consumers qualified to participate in the survey, the quota had to be adjusted to increase the number of middle-age, white women. The instrument was distributed to 1,812 respondents in Florida, and 500 met the set quota. Respondent demographics are in Table 2. The majority of respondents were female (62%), White (85%), over the age of 40 (63%), and had an annual income below $60,000 (68%).

Quantitative data were analyzed using SPSS 21.0.

Table 2. Demographic characteristics of survey respondents

Characteristic	*n*	%
Sex		
Female	310	62
Male	190	38
Race/Ethnicity*		
Hispanic	59	10
American Indian or Alaskan	19	2
Black or African American	45	9
Asian or Pacific Islander	25	5
White	425	85
Other	10	2
Income		
Less than $30,000	155	31
$30,000-$39,999	75	15
$40,000-$49,999	60	12
$50,000-$59,999	50	10
$60,000-$69,999	40	8
$70,000-$79,999	40	8
$80,000-$89,999	15	3
$90,000-$99,999	25	5
more than $100,000	40	8
Age		
18-29	85	17
30-39	100	20
40-49	130	26
50-59	95	19
60+	90	18

***Note.** Indicates respondents could answer more than one option.

Results

Objective 1: *Explore Consumers' Purchasing Preferences for Florida Strawberries.*

Qualitative Phase

Consumers' purchasing preferences for Florida strawberries were initially explored through focus group questions. The following themes were identified as affecting consumers' strawberry preferences: location of origin, price, and freshness.

Location of origin. When participants were asked if they cared about what country their produce came from, many replied that they did not care or did not pay attention. When asked, "So, how do you feel about strawberries that are grown in other countries? Does that affect your [purchasing] decisions at all?" Amber replied, "It doesn't affect my decisions." Similarly, Susan said, "I don't care where they are grown. It doesn't matter." Participants also reported that they

did not look on labels to see where the strawberries were grown. Rose explained, "Usually I just buy whatever. OK, there are strawberries. I'll get these. I don't even look at what country they're from, to tell you the truth. I just buy them, if that's what I'm looking for." Some participants, like Jon, did not think the strawberry packages had the location of origin on them, "Usually if you buy [strawberries] out of the store, they don't really tell you where they actually come from, but I don't think that makes a big deal."

Participants were also asked specifically if they would purchase strawberries grown in Florida. Ken stated, "I would never turn Florida strawberries down." This sentiment was reflected in all the focus groups, and participants agreed that they would prefer to purchase Florida-grown strawberries over imported products, primarily for their freshness. Janet said, "But during the winter especially, Florida's fruits and vegetables are the freshest because we don't have hard winters." Supporting the local economy and local farmers was also identified as a reason for buying Florida strawberries, "Hopefully, you'd think that would help the economy here in the state," Leonard said. Angela had a similar thought, "I want to be loyal to Florida growers, and be a part of it."

Price. Price of the strawberries came up often during the focus groups. Participants said they preferred to purchase Florida strawberries during the growing season because of the lower prices. Karen claimed, "If there are plenty of them [strawberries], the prices are lower and, because they're in season, they're moving them quicker so they don't go bad or get soft." Similarly, Elliot said, "You want to buy what's in season for the freshness and the price. Because the less it has to travel, the less it's going to cost." Not only did the participants prefer to purchase strawberries during Florida's growing season due to lower prices, they also assumed the lower-cost strawberries were from Florida. Ken explained, "I'm thinking…when the price comes down and [strawberries are] in season, I assume that I'm getting Florida because they're not shipping them from California or somewhere else and paying freight on them." Some people indicated they were willing to pay more for Florida-grown strawberries than for imported strawberries. Seth said, "Well, if I had a choice between a strawberry that was grown in Honduras that was a dollar cheaper, versus a strawberry that was grown in Florida that was a little more expensive, I would prefer to pay the extra money for the one that was grown in the States."

Price was also identified as a determining factor for many of the participants when selecting strawberries. A number of participants said they often chose the cheaper product if it was the same quality as other imported products. Leslie said, "I mean, I'm a budget shopper so if it's from overseas, but it's at the better price, I am going to get it." Christi indicated similar purchasing intentions, "I mean, if I saw one strawberry package from Mexico and one from Florida, and the Mexico package is cheaper and they looked just as good as the Florida, I would go with the cheaper one."

Freshness. Freshness was a major theme that emerged from the focus groups. Participants felt that Florida strawberries would be fresher because they would travel fewer miles and be in season. Rachelle best described this by saying, "Well, you don't have that time between when [the strawberries] leave the field and the time they get to your refrigerator or your kitchen; they're fresher." Similarly, Katie said, "And it [Florida strawberries] is local and it probably is fresher because it is right here in town; instead of traveling from somewhere and they have to put

in a cold case and maybe it is not as fresh. We know it is coming right from our place. So, it may be fresher than…coming from another city."

Participants also said that they would not buy strawberries if they were not in season. According to Ben, "When it's [strawberries] out of season, I prefer to stay away from it. I want to buy my fruits in season." Overall, participants preferred Florida-grown strawberries over imported products for the freshness. Seth said, "The ones that I've bought locally are much fresher. They taste better. The ones that I've bought from overseas, I think they're usually picked over- [and] under-ripe."

Quantitative Phase

During the quantitative portion of the study, respondents were asked to indicate their preferences for strawberry purchases. The previously identified themes of freshness, seasonality, and price were included in a question about the importance of strawberry characteristics, along with other strawberry attributes. Table 3 shows that 73% of respondents identified freshness as extremely important when making strawberry purchasing decisions and confirmed the focus group findings.

Table 3. Importance of strawberry purchasing preferences

	Not at all Important		**Slightly Important**		**Fairly Important**		**Highly Important**		**Extremely Important**	
Characteristic	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Freshness	1	0	1	0	18	4	115	23	365	73
Taste	2	0	0	0	13	3	136	27	349	70
Nutrition	10	2	31	6	89	18	181	36	189	38
In Season	15	3	31	6	97	19	189	38	168	34
Price	13	3	29	6	154	31	170	34	134	27
Support Local Farmers	32	6	56	11	134	27	152	30	126	25
Convenience	42	8	77	16	185	37	116	23	80	16

The majority of respondents (72%) considered whether the strawberries were in season as highly or extremely important. About one-third of the respondents (34%) said price was an extremely important factor for their strawberry purchasing decision. In fact, f*reshness* and *in season* were the two highest rated characteristics for importance, followed by nutrition (38% of respondents said this was extremely important). Price was rated as the fourth most important attribute, and the rest of the characteristics had less than one-third of the respondents reporting they were extremely important.

Table 4 shows how respondents used the growing location on strawberry packages to make their purchasing decisions. The majority (60%) reported that sometimes or most of the time they looked on the labels to see where strawberries were grown. Similarly, 53% of respondents indicated that sometimes or most of the time they made their purchasing decisions based on where the strawberries were grown.

Table 4. Strawberry Purchases Based on Growing Location

	Never		Rarely		Sometimes		Mostly		Always	
Characteristic	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
I look on the label to see where strawberries are grown	35	7	58	12	135	27	163	33	109	22
I make purchases based on where the label says the strawberries are grown	56	11	106	21	152	30	117	23	69	14

The survey asked respondents if they would rather purchase strawberries grown in Florida or in California. The overwhelming majority selected Florida-grown strawberries (83%). Only 14% of the respondents reported not having a preference. The people who selected Florida were asked why they preferred those strawberries. Table 5 shows that the majority selected freshness (91%), supporting Florida's economy (83%), and taste (79%) as the reasons for preferring Florida-grown strawberries.

Table 5. Reasons for choosing Florida

Characteristic	***n***	**%**
Freshness	378	91
Support Florida's Economy	344	83
Taste	328	79
Quality	286	69
Food Miles Traveled	232	56
Safety	203	49
Nutritional Value	170	41
Other	8	2

Objective 2: *Describe Consumers' Awareness of Florida's Strawberry Season.*

Qualitative Phase

During the focus groups, participants demonstrated confusion regarding Florida's strawberry season, and many indicated they rarely saw advertisements for Florida-grown strawberries. Out of the six focus groups, one group was completely unaware that Florida even produced strawberries. In a few of the focus groups, one person may have been aware of Florida's strawberry season, but the majority said they were not. There were a variety of responses regarding timing and duration of Florida's strawberry season. Even though Florida strawberries are in season during the winter, Christi said, "I look forward to every April and May for strawberry season." Other people, like Wayne, explained they preferred to purchase the strawberries during the summer when he believed they were in season, "Usually in the summer I'll buy them once a week or every other week, because like I said I like to snack on them when I'm watching TV or whatever. But in the off season, I'll get them maybe once a month."

During the focus groups, participants were asked to give their opinions on the design of several billboards promoting Florida strawberries. One of these billboards said the strawberries were "In season now, all winter long!" Even though the information was accurate, some participants

rejected the fact that Florida strawberries were in season during winter months. Rudy said, "This is constraining the marketing season for these Florida strawberries. I don't know if you mean to do that when you say, "In Season Now" or "All Winter Long" you are suggesting that they are only available for a certain amount of time."

Rudy's quote reflected a general feeling among the participants that Florida strawberries were available all of the time. Angela suggested altering the billboard, "Or you could say, 'Florida Strawberries; Fresh All Year Long.'" The participants also had trouble believing winter strawberries would taste good. Rudy continued to explain, "So, if they're trying to sell me strawberries in winter, they're going to have to give me more information to convince me that winter strawberries are as flavorful as summer strawberries."

The participants were also asked if they had ever seen any advertising for Florida strawberries. The majority said no. Some said that grocery stores may have a sign up next to the strawberries with *Fresh from Florida* on it. Many participants also indicated that they rarely saw where the strawberries were grown on the labels or were not looking for that information. Ashley said, "Because most strawberries sometimes don't have a label and, if there is, it is very small and you are just looking for the price and how fresh it is."

Quantitative Phase

The survey asked respondents if they knew when strawberries were in season in Florida. Sixty percent (n = 300) reported that they were familiar with the Florida strawberry season. Those respondents (60%) were then asked to select the start and end month of the season. Only 13% (n = 39) correctly selected December as the start month, and 28% (n = 84) correctly selected April as the end month. One-third of all respondents thought the season started in February (37%, n = 111). Even though the greatest number of respondents correctly selected April, 29% (n = 87) believed the season lasted through May and June.

Discussion

The qualitative portion of this study found that participants had a general preference toward Florida strawberries, but their reported purchasing behaviors did not always align with their attitudes. Similarly, participants were not aware of Florida's growing season, likely making it even more difficult for them to purchase Florida strawberries. The survey was developed to see if these results were generalizable to Florida strawberry consumers and, indeed, the survey data are relatively consistent with that derived from the focus groups.

Results from the focus groups and the survey data show that consumers have a clear preference toward Florida-grown strawberries. During the focus groups, participants indicated they preferred local strawberries because of their freshness and higher quality when compared to imported strawberries, however; these preferences could be the result of social desirability bias. The survey yielded similar results, allowing the data to be more generalizable to Florida residents who purchased strawberries. These findings were consistent with previous research concluding that consumers preferred to purchase local food (Conner et al. 2010; Rumble and Roper 2014; Zepeda and Levitan-Reid 2004). Consumer ethnocentricity likely influenced the consumers' preferences for food grown in their own state (Chambers et al. 2007; Perrea et al. 2015).

Price was also mentioned in relation to purchasing preferences. Many participants in the focus groups indicated that local food was cheaper because it traveled fewer miles and their purchases were likely supporting local farmers. However, participants indicated that, if the local strawberries were more expensive than the imported strawberries, they would purchase the imported product. Price being a barrier to purchasing local food is consistent with previous research on this topic (Chambers et al. 2007). The survey also showed that Florida consumers considered price to be important in their purchasing decisions, as well as the number of food miles traveled.

Even though the consumers in this study displayed a preference toward Florida strawberries, the focus groups showed that they did not always think about where their food was coming from or often simply did not care. This finding contradicts other statements from focus group participants indicating that they would prefer Florida-grown strawberries. This contradiction may be because the origin of the strawberries is not a top consumer priority when they are selecting strawberries in the store. Another possible explanation for participants' lack of concern about purchasing imported strawberries is that this product is mostly grown in the United States. Had the participants been asked about the growing location of a product that is typically imported from outside the U.S., like bananas, their concern for the growing location may have been greater. The focus group results support previous research, and demonstrate an attitude-behavior gap among consumers (Chambers et al. 2007; Yue and Tong 2009; Zepeda and Levitan-Reid 2004).

The survey did have some conflicting results. For example, the majority of respondents reported looking at strawberry labels to see where the fruit was grown and said that they often made purchasing decisions based on the growing location. A possible explanation for this contradiction was that the focus groups elicited more honest responses from the participants (Morgan 1998). Additionally, the focus group participants and survey respondents did not share the same demographic characteristics. Participants in the focus groups were older and earned lower incomes compared to the survey respondents. These differences may account for the focus group participants' lesser degree of concern about the growing location of their food.

This study found that consumers have varying levels of awareness about Florida strawberries. Participants in one of the focus groups even indicated that they were not aware that strawberries were grown in Florida. Furthermore, a few participants may have known when the Florida strawberry season occurs, but the majority reported they did not. Even when presented with advertisements for the Florida strawberry season, some participants immediately rejected the information. This rejection of information could be the result of cognitive dissonance, which is discomfort felt when an individual is presented with information counter to his/her beliefs (Festinger 1957; Gass and Seiter 2003).

Many participants made suggestions to change the billboards to state that strawberries were available year round, likely as an attempt to reduce cognitive discomfort. A number of participants also reported that they mostly purchased strawberries during April, May, or during the summer months. Consumers may envision strawberries as a summer food, making it difficult for them to believe that the fruit is freshest during Florida's winter months
Additionally, strawberry prices peak during the winter months (Plattner et al. 2014), which could cause consumers to assume that, due to higher prices, strawberries are not in season. The cheaper

prices in the summer may contribute to the increase in consumption during those months as well. This reported preference for purchasing strawberries in the summer conflicts with consumers' preference to purchase Florida strawberries for their freshness. Unfortunately, consumers likely do not realize they are purchasing Florida strawberries during the off-season months, since many stated that they did not look at source of origin information.

The survey found that the majority of Florida consumers believed they knew about Florida's strawberry season, but only a small portion could correctly identify the start and end months of the season. These results were consistent with the findings of the focus groups and show that consumers are not aware of Florida's strawberry growing season.

Recommendations

There is an apparent gap between Florida consumers' preference for Florida strawberries and their awareness about the availability of those strawberries. Findings from this research illustrate that the growing location of strawberries is important to consumers, but they are not always seeking out this information while in the grocery store. This finding is important for food distributors so they can improve marketing of locally grown products. In order to compel consumers to think more about the growing location of their produce, producers and distributors should make the growing location on their label easier to identify by using a state brand, such as *Fresh from Florida*. This brand identification will help consumers to identify the product as locally grown and allow them to easily purchase their preferred products. The additional label information will also add greater consumer value to the product (Verbeke and Roosen 2005).

A major issue identified by this study was that consumers did not know when Florida-grown strawberries were in season, but they stated that they preferred to purchase Florida strawberries. Distributors and producers should examine target audience knowledge when developing communication campaigns for Florida strawberries or other commodities. Participants experienced cognitive dissonance when presented with the correct growing months for strawberries in Florida. Advertisements should promote desirable qualities of the product like freshness and quality, along with the months of the growing season, to reduce dissonance and increase the likelihood that consumer purchases will align with their stated preferences (Oshikawa 1969).

Awareness of the Florida strawberry growing season may also be increased through interactive promotional and educational opportunities. Cooking demonstrations using strawberries during the winter at local grocery stores, events, and community centers could help teach consumers when Florida strawberries are in season, while allowing them to experience the fresh product at the same time. Children and their parents could also be educated about the Florida strawberry season by incorporating product seasonality into school curricula, school garden programs, and school cafeteria promotions. These types of programs will raise general awareness of Florida products and serve to strengthen the *Fresh from Florida* brand. Also, repetitive use of the state brand will help to reinforce consumer ethnocentricity and create a greater perceived value of Florida strawberries (Perrea et al. 2015).

Future research should explore the types of consumer information that would help consumers reduce cognitive discomfort and increase ethnocentricity when presented with information on Florida's strawberry season. Messages should focus on the positive qualities of Florida strawberries, as well as their growing season. This will help promote Florida strawberries during winter months when product imports are present in the market. Another research opportunity would include examining consumers' knowledge and preferences for strawberries at the point of purchase. Observing consumer behavior in the grocery store could allow researchers to determine if people actually use the produce labels and/or look for growing location information. This study could be replicated in other states whose major agricultural commodities are subject to competition from imports. Additionally, this study could be expanded to a larger region of the U.S. to determine whether consumers in other areas of the country have similar preferences for and knowledge of Florida strawberries. Gaining more knowledge on consumers' attitudes and behavior toward buying Florida strawberries will allow distributors and producers to better market their products locally and regionally.

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References

Ahmed, Z.U., J. P. Johnson, X.Yang, C. K. Fatt, H. S. Teng, and L. C. Boon. 2004. "Does Country of Origin Matter for Low-Involvement Products?" *International Marketing Review* 21(1): 102 – 120.

Baker, R., J. M. Brick, N. A. Bates, M. Battaglia, M. P. Couper, J. A. Dever, and R. Tourangeau. 2013. "Report of the AAPOR Task Force on Non-Probability Sampling." American Association for Public Opinion Research.

Balabanis, G., and A. Diamantopoulos. 2004. "Domestic Country Bias, Country-of-Origin Effects, and Consumer Ethnocentrism: a Multidimensional Unfolding Approach." *Journal of the Academy of Marketing Science* 32(1): 80–95.

Becot, F., D. Conner, A. Nelson, E. Buckwalter, and D. Erickson. 2014. "Institutional Demand for Locally-Grown Food in Vermont: Marketing Implication for Producers and Distributors." *Journal of Food Distribution Research* 45 (2): 99–117.

Boriss, H., H. Brunke, M. Kreith, and K. Morgan. 2012. "Commodity Strawberry Profile." http://www.agmrc.org/commodities-products/fruits/strawberries/.

Chambers, S., A. Lobb, L. Butler, K. Harvey, and W. B. Traill. 2007. "Local, National and Imported Foods: A Qualitative Study." *Appetite* 49(1): 208–213.

Chryssochoidis, G., A. Krystallis, and P. Perreas. 2006. "Ethnocentric Beliefs and Country-of-Origin (COO) Effect." *European Journal of Marketing* 41(11/12): 1518–1544.

Conner, D., K. Colasanti, R. B. Ross, and S. B. Smalley. 2010. "Locally Grown Foods and Farmers Markets: Consumer Attitudes and Behaviors." *Sustainability* 2: 742–756.

Creswell, J. W. 2007. Qualitative Inquiry and Research Design: Choosing Among Five Approaches (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Creswell, J. W. 2013. Qualitative Inquiry and Research Design: Choosing Among Five Approaches (3rd ed.). Thousand Oaks, CA: SAGE Publications.

Creswell, J. W., and V. L. Plano Clark. 2011. Designing and Conducting Mixed Methods Research (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Epler, C. M., T. A. Drape, T. W. Broyles, and R. D. Rudd. 2013. "Influence of Collaborative Reflection and Think-Aloud Protocols on Pre-Service Teachers' Reflection: A Mixed Methods Approach." *Journal of Agricultural Education* 54(1): 47–59.

Feldman, C., and U. Hamm. 2015. "Consumers' Perceptions and Preferences for Local Food: A Review." *Food Quality and Preference* 40: 152–164.

Festinger, L. 1957. *A Theory of Cognitive Dissonance*. Stanford, CA: Stanford University Press.

Florida Department of Agriculture and Consumer Services. 2013. *Florida Agriculture by the Numbers*. https://www.nass.usda.gov/Statistics_by_State/Florida/Publications/Annual_Statistical_Bulletin/FL_Agriculture_Book/2013/2013%20FL%20Ag%20by%20the%20Numbers.pdf.

Gass, R. H., and J. S. Seiter. 2003. *Persuasion, Social Influence, and Compliance Gaining* (2nd ed.). Boston, MA: Allyn and Bacon.

Glaser, B. G. 1965. "The Constant Comparative Method of Qualitative Analysis." *Social Problems* 12(4):436–445.

The Hartman Group. 2008. "Consumer Understanding of Buying Local." *Pulse Report*, February

Hinson, A., and M. N. Bruchhaus. 2008. "Consumer Preference for Local Strawberries." *Journal of Food Distribution Research* 39 (3): 56-66.

Hodges, A. W., and T. J. Stevens. 2013. "Local Food Systems in Florida: Consumer Characteristics and Economic Impacts." Unpublished manuscript, Food and Resource Economics Department, University of Florida.

Jefferson-Moore, K. Y., R. D. Robbins, D. Johnson, and J. Bradford. 2014. "Consumer Preference for Local Food Products in North Carolina." *Journal of Food Distribution Research* 45(1):41–46.

Johnson, R. B., A. J. Onwuegbuzie, and L. A. Turner. 2007. “Toward a Definition of Mixed Methods Research.” *Journal of Mixed Methods Research* 1(2): 112–133.

Krueger, R. A. 1998. “Analyzing and Reporting Focus Group Results.” Thousand Oaks, CA: SAGE Publications.

Lantz, G., and S. Loeb. 1996. “Country of Origin and Ethnocentrism: An Analysis of Canadian and American Preferences Using Social Identity Theory.” in K.P. Corfman and J. Lynch, ed. *Advances in Consumer Research*. Provo, UT: 374–378.

Lee, D., and G. Ganesh. 1999. “Effects of Partitioned Country Image in the Context of Brand Image and Familiarity.” *International Marketing Review* 16(1): 18–39.

Lin, L., and C. Chen. 2006. "The Influence of the Country-Of-Origin Image, Product Knowledge and Product Involvement on Consumer Purchase Decisions: An Empirical Study of Insurance and Catering Services in Taiwan." *Journal of Consumer Marketing* 23(5): 248 – 265.

Maccoby, E. E., and N. Maccoby. 1954. "The Interview: A Tool of Social Science," in G. Lindzey, ed. *Handbook of Social Psychology*, Vol. 1, Cambridge, MA: Addison-Wesley, 449–487.

Morgan, D. L. 1998. *The Focus Group Guidebook*. Thousand Oaks, CA: SAGE Publications.

Mossler, M. 2012. “Florida Crop/Pest Management Profiles: Strawberry.” http://edis.ifas.ufl.edu/pi037.

Ohlemeier, D. 2013. “Florida Battles Mexican Strawberries.” *The Packer*. http://www.thepacker.com/ commodity-fruits/strawberries/Florida-battles-Mexican-strawberries-234089101.html.

Onken, K. A., and J. C. Bernard. 2010. “Catching the "Local" Bug: A Look at State Agricultural Marketing Programs.” *Choices* 25(1).

Oshikawa, S. 1969. “Can Cognitive Dissonance Theory Explain Consumer Behavior*?” Journal of Marketing* 33(4): 44–49.

Patterson, P. M. 2006. “State-Grown Promotion Programs: Fresher, Better?” *Choices* 21(1): 41–46.

Perez, A., and K. Plattner. “Fruit and Tree Nuts Outlook.” 2014. USDA, Economic Research Service, FTS-357. http://www.ers.usda.gov/publications/fts-fruit-and-tree-nuts-outlook/fts-357.aspx.

Perrea, T., S. Mamalis, K. Melfou, P. Papanagiotou, and A. Krystallis. 2015. "Exploring the Moderating Role of Consumer Ethnocentrism on Consumer Value Perceptions Towards Own-Country Geographic Indication Foods." Paper presented at the EAAE Seminar in Parma, Italy, 14–15 April.

Plattner, K., A. Perez, and S. Thornsbury. 2014. "Evolving U.S. Fruit Markets and Seasonal Grower Price Patterns." Washington DC: U.S. Department of Agriculture, Economic Research Service.

Rumble, J. N., and C. G. Roper. 2014. "Talking Local: Florida Consumers' Flexibility with the Term Local." IFAS Extension, AEC515, University of Florida.

Shope, R. 2013. "Walmart's Sale of Mexican Strawberries Angers Florida Growers." *Tampa Bay Times*. http://www.tampabay.com/news/business/agriculture/walmarts-sale-of-mexican-strawberries-angers-florida-growers/1274042.

Stoltman, J. J., Y. K. Lim, and F. W. Morgan. 1991. "The Effect of Country of Origin, Product Familiarity and Ethnocentrism on the Acceptance of Foreign Products." Paper presented at the Academy of Marketing Winter Educators Conference.

Twyman, J. 2008. "Getting it Right: YouGov and Online Survey Research in Britain." *Journal of Elections, Public Opinions and Parties* 18:343–354.

Vavreck, L., and D. Rivers. 2008. "The 2006 Cooperative Congressional Election Study." *Journal of Elections, Public Opinion and Parties* 18(4):355–366.

Verbeke, W. 2005. "Consumer Acceptance of Functional Foods: Socio-Demographic, Cognitive and Attitudinal Determinants." *Food Quality and Preference* 16(1):45–57.

Verbeke, W., and J. Roosen. 2009. "Market Differentiation Potential of Country-of-Origin, Quality, and Traceability Labeling." *The Estey Centre Journal of International Law and Trade Policy* 10(1): 20–35.

Walker, N. J. 2010. "An Examination of Integration of Academic and Vocational Subject Matter in the Aquaculture Classroom." *Journal of Agricultural Education* 41(2): 54–64

Witt, C., D. L. Doerfert, J. D. Ulmer, S. Burris, and W. Lan. 2013. "An Investigation of School Contentedness Among Agricultural Education Students." *Journal of Agricultural Education* 54(2): 186–204.

Wu, F., Z. Guan, and A. Whidden. 2012. "Strawberry Industry Overview and Outlook." Unpublished manuscript, Gulf Coast Research and Education Center, University of Florida.

Yue, C., and C. Tong. 2009. "Organic or Local? Investigating Consumer Preference for Fresh Produce Using a Choice Experiment with Real Economic Incentives." *HortScience* 44(2): 366–371.

Zepeda, L., and C. Leviten-Reid. 2004. “Consumers' Views on Local Food.” *Journal of Food Distribution Research* 35(3): 1–6.

Zepeda, L., and J. Li. 2006. “Who Buys Local Food?” *Journal of Food Distribution Research* 37(3): 1–11.

Zerbe, W. J., and D. L. Paulhus. 1987. "Socially Desirable Responding in Organizational Behavior: A Reconception," *Academy of Management Review* 12(April): 250–264.

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Product Liability Insurance Use Among Tennessee Fruit and Vegetable Farmers

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Abstract

Product liability insurance can help farmers manage product liability risk and gain access to additional market outlets. Data from a survey of Tennessee fruit and vegetable producers were used to evaluate differences between product liability insurance users and non-users, barriers associated with the use of this type of insurance, along with insurance coverage amounts and costs. Findings suggest that primary occupation, percentage of income from farming, size of fruit and vegetable operation, and market outlets used may influence the decision to purchase product liability insurance. Barriers to use include perceived costs of product liability insurance and limited understanding of liability insurance policies.

Keywords: insurance, liability, Tennessee fruit and vegetable farmers, marketing

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Introduction

Fruit and vegetable producers are subject to an array of risks, from those typically associated with producing and marketing agricultural products (e.g., production and price risk), to risks associated with product liability (Cook 2011). Between 2003 and 2012, fruits and vegetables were linked to 26% of foodborne illness cases reported to the United States (US) Centers for Disease Control and Prevention; more than any other food group (DeWaal et al. 2015). In addition, produce recalls frequently make headlines in national news media outlets, increasing the food safety concerns of U.S. consumers (Goetz 2012; Grossman 2015). The resulting costs are large, and include health-related costs, the loss of productivity from missed workdays and, in severe cases, even death (Buzby and Roberts 2009). For example, the average annual economic burden associated with foodborne illness in the United States linked to fifteen major pathogens was recently estimated to be $15.5 billion (Hoffmann, Maculloch and Batz 2015).

In response to widespread concerns and demand for a safer food supply, the focus of public and private initiatives to reduce the incidence of foodborne illnesses has shifted from response-based mechanisms to prevention. For example, the Food Safety Modernization Act imposes new quality assurance and safety measures across the entire food supply chain (U.S. FDA 2011). Voluntary action by participants along the food supply chain has also become more common, such as the adoption of voluntary food safety standards and agreement to submit to audits that verify compliance by members of the California Leafy Green Handler Marketing Agreement (Palma et al. 2010).

While preventive food safety measures mitigate the risk of foodborne illnesses, producers may still face risks in the form of legal actions from consumers seeking financial compensation for damages suffered as a result of contracting a foodborne illness (Connally 2009). Mahdu (2015) reviewed the outcomes of 511 foodborne illness lawsuits between 1979 and 2014, finding that compensation to successful plaintiffs ranged from $151 to $6.2 million. These amounts do not include court costs and legal fees, which can be sizable in their own right and are typically incurred by defendants regardless of the outcome of the lawsuit (Henson and Hooker 2001).

Enhancements in traceability systems, which allow products to be tracked from their point of production to the final consumer, may increase the likelihood of a producer being held accountable for injuries suffered as a result of foodborne illness (Aung and Chang 2014).

One way for producers to mitigate these risks is to purchase product liability insurance. However, results from a survey of small– and medium-sized specialty crop producers in the southeastern US conducted in 2013 suggest that, although product liability risk seems to be a concern for these producers, their understanding of product liability insurance policies is limited (Boys 2013). Boys' results also suggest that a large percentage of specialty crop farmers perceive product liability insurance as a tool to manage product liability, as well as improve market access and strengthen a firm's reputation among potential buyers.

Since the competitiveness and profitability of small– and medium-sized fruit and vegetable producers is, to some extent, tied to their ability to cope with potential risks and access favorable markets, the objectives of this study are to understand the: (1) differences in the characteristics of

those fruit and vegetable producers (e.g. farm operators) who use product liability insurance and those of who do not; (2) common product liability coverage amounts carried by fruit and vegetable producers; (3) the annual cost of product liability insurance coverage for fruit and vegetable producers; (4) sources used to obtain information about product liability insurance products; and (5) perceived barriers to using product liability insurance.

This information may help producers make more informed decisions regarding the use of product liability insurance and help Extension personnel design educational programs to help producers better manage product liability risk. The findings may also help insurance companies market product liability insurance to fruit and vegetable producers.

Methods

The data used in this study were obtained from a survey of Tennessee fruit and vegetable producers conducted in 2013. Development of the survey questionnaire was informed by two focus group sessions with fruit and vegetable producers conducted in two Tennessee counties (Williamson and Bledsoe counties) in 2012. The survey list frame consisted of 495 fruit and vegetable producers listed in the Tennessee Department of Agriculture's Pick Tennessee Products program. A cover letter explaining the purpose of the study, a copy of the questionnaire, and a prepaid return envelope were mailed on April 1, 2013. No incentives for completing the survey were offered to potential respondents. Postcard reminders were sent out on April 19, 2013. A final mailing containing a new cover letter, a second copy of the questionnaire, and another prepaid return envelope was sent to producers who had not yet returned the survey on April 29, 2013.

A total of 163 surveys were completed and returned. Out of these 163 surveys, 18 were from producers who either no longer produced and/or sold fruits and/or vegetables, or farmers who produced fruits and vegetables only for personal consumption. These observations were eliminated, resulting in 145 usable responses and an overall response rate of 30%.

Given the likelihood of limited producer understanding of product liability insurance (Boys 2013), the first page of the questionnaire introduced the concepts of product liability risk and product liability insurance. Product liability risk was described as: "*Liability risks* in that consumers can take legal actions against producers demanding monetary compensation claiming the food they purchased made them sick." As for product liability insurance, respondents were informed that: "Product liability insurance may help protect producers by limiting their possible exposure to risks associated with consumers' claims of injury caused by harmful or contaminated products." The questionnaire included questions about producer risk perceptions; familiarity with and use of risk management tools including *product liability insurance;* cost and coverage of insurance products providing product liability coverage; reasons for not using product liability insurance; sources of information about product liability insurance; and general farm operator and farm business characteristics.[1] Farm business and operator characteristics of product liability insurance users and non-users were compared using independent sample t-tests.

[1] The survey questionnaire is available from the authors upon request.

Results

The survey sample was generally representative of fruit and vegetable producers in Tennessee. Given that the 2012 Census of Agriculture does not report statistics for producers in the "fruit and vegetable" category, but rather reports statistics for the vegetable and fruit categories separately, the survey sample characteristics are compared with population characteristics for both fruit and vegetable categories separately to evaluate if the sample used in this study is representative of the population. The age distribution of survey respondents generally mirrors the age distribution of vegetable and fruit producers in Tennessee, with a larger representation of those farmers in the 25–34 and the 55–64 age categories in the survey sample (Figure 1).

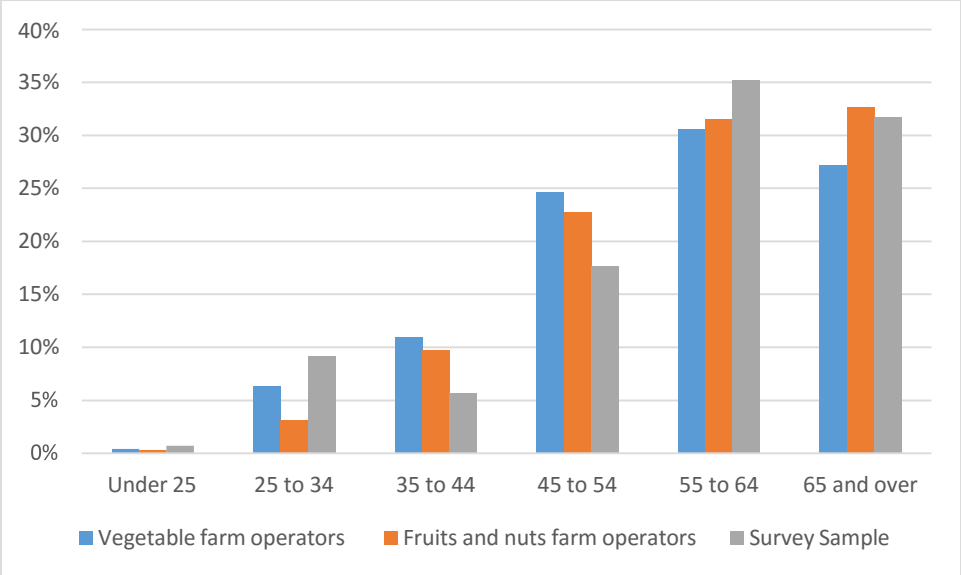

Figure 1. Comparison of age distribution of survey sample and Tennessee fruit and vegetable farmers as reported in the 2012 census of agriculture.

Further, the average age of the respondents was fifty-eight years, which is close to the average age of farmers (i.e., fifty-nine) in Tennessee (USDA/NASS 2012). Similar to the sample age distribution, the sample distribution of acreage in fruits and vegetables generally follows the acreage distribution of vegetable farms and orchards[2] in Tennessee. However, the survey sample seems to over-represent fruit and vegetable farms in the five to twenty-five acre range and under-represent farms in the 0.1 to 4.9 acre range (Figure 2).

[2] Farm size categories are presented only for orchards, not for the "all fruits" category.

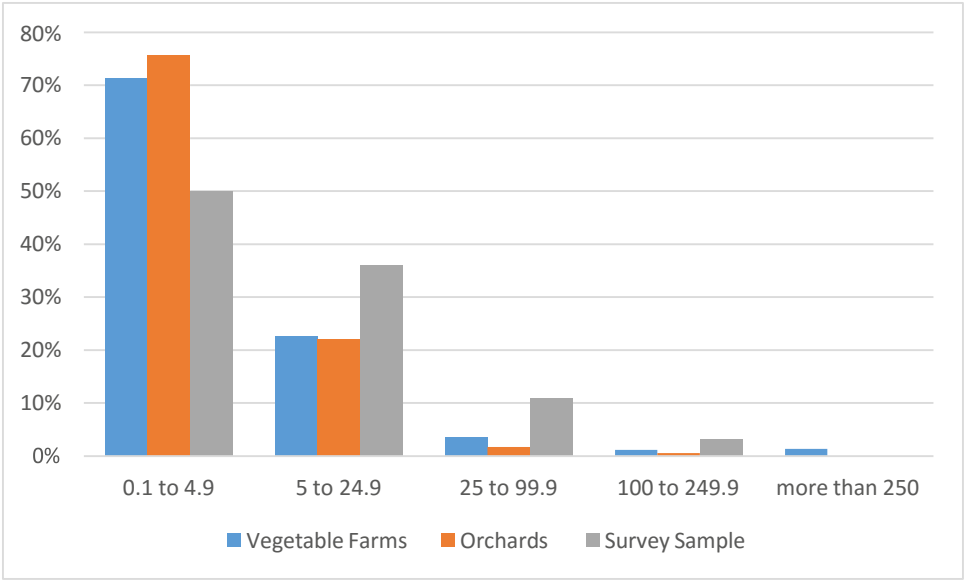

Figure 2. Comparison of acreage on fruits and vegetables distribution of survey sample and Tennessee fruit and vegetable farmers as reported in the 2012 census of agriculture.

Adopters and Non-Adopters

The percentage of survey respondents who indicated they had an insurance policy providing product liability coverage (i.e., adopters) in 2013 was 28% (40); while 55% (80) of respondents indicated they did not have this type of insurance policy; 8% (11) did not know if their insurance policy provided product liability coverage; and 10% (14) did not answer the question (Table 1). Of the 40 producers who believed that they had product liability coverage, slightly less than half (18) indicated that it was required by a market outlet they currently used to sell their produce. Most of the respondents who indicated their market outlet required them to carry a product liability insurance policy (i.e., 11 out of 18 respondents) were selling produce only through direct-to-consumer outlets—specifically farmers markets, road side stands, and/or on-farm sales. The remainder of the respondents who indicated their market outlet required a product liability insurance policy sold their products through direct-to-consumer outlets in combination with other outlets such as wholesale brokers, grocery stores, food cooperatives, and restaurants. Although it is likely that many producers make the decision to use product liability insurance because the market outlets they use to sell their produce require they carry such a policy, these results suggest that a substantial percentage of farmers—55% of respondents who believed that they have product liability coverage—use product liability insurance even if the market outlets they use to sell their produce do not require it.

Tennessee fruit and vegetable producers who used product liability insurance coverage were more likely to farm full time, manage more acreage in fruits and vegetables, have a larger percentage of sales made through intermediate market channels (i.e., grower cooperatives, wholesale buyers/brokers/packers, and other farmers), have higher household incomes, and a larger percentage of income from farming than non-adopters. Nearly two-thirds (64%) of respondents who used product liability insurance were full-time farmers while only one-third

(33%) of respondents who did not use product liability insurance were full-time farmers. This difference was significant at the 1% level (Table 1). Similarly, the percentage of adopters with at least half of their household income from farming (53%) was significantly greater than the percentage of non-adopters with over half of their income coming from farming (22%) (Table 1). These results suggest that farmers who are more dependent on farming as a primary source of income are more likely to purchase product liability insurance to manage product liability risk.

Table 1. Variable means for product liability insurance Adopters and Non-Adopters.

		Mean		
		Alla (n=145)	Adopters[b] (n=40)	Non-Adopters (n=80)
Farmer Characteristics:				
Age of farmer		57.59	56.35	58.47
		(13.46)c	(12.65)	(14.23)
Years of experience farming		23.77	25.90	22.09
		(16.45)	(15.42)	(16.88)
Years selling fruits or vegetables	*	14.51	16.63	13.04
		(12.79)	(12.90)	(12.25)
Attained bachelors or graduate degree (%)		49.31	50.00	52.50
		(50.17)	(50.64)	(50.25)
Full-time farmer (%)	***	43.97	64.10	32.91
		(49.81)	(48.59)	(47.29)
Generates at least 50% of household income farming (%)	***	30.88	52.63	21.33
		(46.37)	(50.60)	(41.24)
At least $75,000 in total household income (%)	***	40.74	59.46	34.67
		(49.32)	(49.77)	(47.91)
Farm Characteristics:				
Size of farming operation (acres)	*	104.22	189.52	71.03
		(367.94)	(600.36)	(217.48)
Size of fruit and vegetable operation (acres)	***	13.54	26.44	7.74
		(29.46)	(49.52)	(10.36)
Fresh market sales of fruits and vegetables (% Gross Annual Sales)	*	57.10	51.22	62.11
		(39.19)	(37.31)	(39.27)
Market Outlets:				
Direct sales to consumers (% of total sales)	**	89.66	83.52	93.31
		(24.33)	(28.00)	(20.17)
Sales to intermediaries (% of total sales)	***	5.22	11.54	1.85
		(17.06)	(24.71)	(9.97)
Sales to retail outlets (% of total sales)		5.12	4.94	4.84
		(15.95)	(12.18)	(17.06)

Note. [a]Of the 145 respondents, 11 did not know if their insurance policy provided product liability coverage, and 14 did not answer the product liability insurance use question. [b]Variable means in columns two (adopters) and three (non-adopters) were compared using independent sample t-tests. [c]Standard deviation of each variable is in parenthesis. *, ** and *** denote significant differences in means at the 10%, 5%, and 1% levels respectively.

The percentage of adopters with household income of at least $75,000 (59%) was significantly higher than the percentage of non-adopters with the same income level (35%) (Table 1). The

difference in fruit and vegetable acres farmed between adopters (26 acres) and non-adopters (8 acres) was significant at the 1% level (Table 1). Producers with higher incomes and more acres in fruit and vegetable production may have more assets at risk and greater exposure to product liability risk and, therefore, may be more likely to adopt measures to protect themselves against this type of risk.

The percentage of sales to intermediaries (i.e., grower cooperatives, wholesale buyers/ brokers/ packers, and other farmers) by product liability insurance adopters (12%) was about 10% higher than the percentage of sales made through this same outlet by non-adopters (2%) (Table 1). Although the average percentage of sales made by respondents to intermediaries was small (5%), this finding suggests that producers selling through intermediate market channels may be more likely to purchase product liability insurance. This finding may be due to the fact that some intermediate market outlets require producers to carry product liability insurance, and producers may choose to purchase product liability insurance as a marketing strategy to access these outlets (Boys 2013).

Characteristics of Product Liability Insurance Coverage and Reasons for Non-Adoption

Coverage amounts reported by adopters of product liability insurance ranged from less than $100,000 (12%) to between $3 million and $3.9 million (9%), with coverage between $1million and $1.9 million being the most common (41%) (Table 2). The most common annual cost of product liability insurance (i.e., the premium) reported by adopters was between $1,000 and $2,000 (38%), followed by an annual cost of coverage of less than $1,000 (32%) (Table 2). The cost of between $100,000 and $1 million of product liability coverage was between $1,000 and $3,000. The cost of policies covering $3 million or more started at $2,000 per year, but went as high as $5,000 or more per year. In practice, the cost of product liability insurance is determined not only by the coverage amount, but also by the producer's estimated annual gross sales (Spilker 2015). Thus, the costs of insurance policies providing the same amount of product liability coverage can vary from one farm to another.

About 33% of product liability insurance adopters rated their level of understanding of their product liability insurance policy below four on a scale of one to seven, where one is little or no understanding and seven signifies great understanding. Only about 19% of adopters claimed to have a great understanding of their insurance policies (i.e., a seven). These results suggest that there may be a considerable number of producers who have product liability insurance but have limited understanding of the product they purchased. These findings expand on results from Boys (2013) that suggest all specialty crop producers, and not only adopters of product liability insurance, are generally uninformed about the need for this insurance and the coverage they carry or have to carry for this type of liability. Most product liability insurance adopters (95%) learned about product liability insurance policies through insurance agents. After insurance agents, other farmers (27%) and Extension/University sources (24%) were the most popular sources of information among product liability insurance users (Table 3).

Table 2. Percentage of Adopters by product liability insurance coverage; amount and annual cost

	Annual Cost						
Coverage[b]	**Under $1,000**	**$1,000 to $1,999**	**$2,000 to $2,999**	**$3,000 to $3,999**	**$4,000 to $4,999**	**$5,000 and up**	**Total**
Under $100,000	3.00[c] 75.00%[d] 27.27%[e]	1.00 25.00% 7.69%%	0	0	0	0	4.00 100.00% 11.76%[g]
$100,000 to $299,000	1.00 25.00% 9.09%	3.00 75.00% 23.08%	0	0	0	0	4.00 100.00% 11.76%
$300,000 to $599,000	0	3.00 75.00% 23.08%	1.00 25.00% 50.00%	0	0	0	4.00 100.00% 11.76%
$600,000 to $999,000	1.00 50.00% 9.09%	1.00 50.00% 7.69%	0	0	0	0	2.00 100.00% 5.88%
$1- to $1.9 million	6.00 42.86% 54.55%	4.00 28.57% 30.77%	0	1.00 7.14% 33.33%	2.00 14.29% 100%	1.00 7.14% 33.33%	14.00 100.00% 41.18%
$2- to $2.9 million	0	1.00 33.33% 7.69%		1.00 33.33% 33.33%	0	1.00 33.33% 33.33%	3.00 100.00% 8.82%
$3- to $3.9 million	0	0	1.00 33.33% 50.00%	1.00 33.33% 33.33%	0	1.00 33.33% 33.33%	3.00 100% 8.82%
Total	11.00 32.35%[f] 100.00%	13.00 38.24% 100.00%	2.00 5.88% 100.00%	3.00 8.82% 100.00%	2.00 5.88% 100.00%	3.00 8.82% 100.00%	34.00 100.00% 100.00%

Note.[a]Only respondents who indicated having product liability coverage provided information about cost. There were 34 respondents who answered the question about product liability annual cost. [b]Only respondents who indicated having product liability coverage provided information about coverage. There were 34 respondents who answered the question about coverage level.[c]Number of respondents in each coverage and annual cost category.[d]Percentage of observations from first row category in first column category. [e]Percentage of observations from first column category in first row category. [f]Percentage of total observations in the first column category. [g]Percentage of total observations in the first row category.

When asked to choose the primary reason for not using product liability insurance, 34% of the producers without product liability coverage considered it to be too expensive (Table 4). This rationale was the most frequently chosen, followed by 19% of producers who felt coverage was not necessary given their current marketing and production practices. This latter finding is consistent with previous research that suggests that some specialty crop farmers believe having product liability insurance is not necessary due to their good on-farm handling practices (Boys 2013).

Table 3. Percentage of adopters by sources of information.

Information Source	**Percentage**[ab]
Insurance Agent	94.60
Other Farmers	27.03
Extension/University Sources	24.32
Farm Manager or Consultant	5.41
Social Networks (e.g., Facebook, Twitter)	2.70
Popular Press	2.70
Other ("Research, Internet")	2.70

[a]Percentages do not add to 100% because adopters could select more than one source of information. [b]Only respondents who indicated having product liability coverage provided information about product liability insurance information sources. There were 37 respondents who answered the question about information sources.

Table 4. Percentage of respondents by adoption barrier.

	Percentage
Economic	
Affordability of insurance	33.84
At scale of current operation, cost is prohibitive	16.42
Perceptions	
Low risk marketing and/or production activities	19.40
Personal choice	7.46
Lack of Information	
Insurance (e.g. availability, providers)	17.91
Product liability risk	5.97

Conclusion

Data from a survey of Tennessee fruit and vegetable farmers were used to generate insights about the use of product liability insurance among fruit and vegetable producers and the characteristics of farms and operators who use product liability insurance. Findings suggest that producers purchasing product liability insurance manage larger fruit and vegetable operations, have higher household incomes, earn a larger percentage of household income from farming, and are more likely to sell their produce through intermediate market outlets. Survey responses suggest that some users of product liability insurance are likely motivated by the opportunity to access market outlets requiring such insurance, while others choose to purchase product liability insurance for other reasons. On the other hand, responses suggest that one of the major barriers to the use of product liability insurance is the perceived cost. The cost of product liability insurance is a function of both the amount of coverage and the farm's annual gross sales. Therefore, although the most common cost stated by producers is $1,000, cost varies across coverage amounts and farms. A producer considering the purchase of product liability insurance should

evaluate both the costs and benefits associated with this risk management tool. The benefits associated with the adoption of product liability insurance include the possibility of increased sales as a result of expanded access to market outlets requiring suppliers to carry product liability insurance, as well as a limitation on exposure to product liability risk. For example, producers should determine whether they are growing high risk produce (e.g. fresh produce that is highly susceptible to contamination), and compare their expected profits with and without product liability insurance to a scenario where there is a loss associated with a lawsuit for illness or death caused by contaminated products originating on their farm.

The low to moderate level of understanding of insurance policies reported by product liability insurance users, coupled with the number of producers who do not use product liability insurance because they do not have enough information about it, suggests an opportunity for University Extension and insurance companies to provide information to specialty crop farmers about product liability risk and the purpose and cost of product liability insurance.

References

Aung, M. M., and Y. S. Chang. 2014. "Traceability in a Food Supply Chain: Safety and Quality Perspectives." *Food Control* 39:172-184.

Boys, K. A. 2013. "Food Product Liability Insurance: Implications for the Marketing of Specialty Crops." *Choices* 28(4). http://www.choicesmagazine.org/magazine/pdf/cmsarticle_338.pdf . [accessed June 23, 2015].

Buzby, J. C., and T. Roberts. 2009. "The Economics of Enteric Infections: Human Foodborne Disease Costs." *Gastroenterology* 136(6):1851-1862.

Connally, E. H. 2009. "Good Food Safety Practices: Managing Risks to Reduce or Avoid Legal Liability." Food Safety and Technology. FST-32, University of Hawaii, College of Agriculture and Human Resources.

Cook, R. L. 2011. "Fundamental Forces Affecting U.S. Fresh Produce Growers and Marketers." *Choices* 26(4). http://www.choicesmagazine.org/magazine/pdf/cmsarticle_202.pdf. [accessed May 5, 2015].

DeWaal, S., N. Fischer, M. Glassman, A. Coronaton, and E. Martinez. 2015. "All Over The Map: A 10-Year Review of State Outbreak Reporting." Center for Science in the Public Interest, June. http://cspinet.org/reports/all-over-the-map-report-2015.pdf. [accessed June 26, 2015].

Goetz, G. 2012. "Farm Linked to Cantaloupe Outbreak is Likely Source of One, Possibly Two More Outbreaks." *Food Safety News*. http://www.foodsafetynews.com/2012/09/farm-linked-to-cantaloupe-outbreak-is-likely-source-of-1-and-maybe-2-more-outbreaks/ #.VaVPXPlVhHw. [accessed July 14, 2015].

Grossman, E. 2015. "What a Massive Spinach Recall Teaches Us About Food Safety." *Time*, April 7, 2015. http://time.com/3774505/food-safety-spinach-recall. [accessed June 23, 2015.

Henson, S., and N.H. Hooker. 2001. "Private Sector Management of Food Safety: Public Regulation and the Role of Private Controls." *International Food and Agribusiness Management Review* 4:7-17.

Hoffmann, S., B. Maculloch, and M. Batz. 2015. *Economic Burden of Major Foodborne Illnesses Acquired in the United States.* Washington, DC: U.S. Dep artment of Agriculture, Economic Information Bulletin 140, Economic Research Service. http://www.ers.usda.gov/media/1837791/eib140.pdf. [accessed February 16, 2016].

Mahdu, O. 2015. "Penalties for Foodborne Illness: Jury Decisions and Awards in Food Illness Lawsuits." MS thesis, Virginia Polytechnic Institute and State University.

Palma, M.A., L.A. Ribera, M. Paggi, and R. Knutson. 2010. "Food Safety Standards for the U.S. Fresh Produce Industry." *Policy Issues* 18:1–6. http://ageconsearch.umn.edu/ bitstream/ 93684/2/Issue%208.pdf . [accessed March 10, 2015].

Spilker, L. Campbell Risk Management, Insurance Agent. Personal Communication. September 30, 2015.

U.S. Department of Agriculture, National Agricultural Statistics Service. 2012. Agricultural Statistics 2012.Washington DC. https://www.nass.usda.gov/Publications/Ag_Statistics/ 2012/2012_Ag_Stat.pdf. [accessed March 1, 2016].

U.S. Food and Drug Administration. 2011. FDA Food Safety Modernization Act. Washington, DC, January. http://www.fda.gov/Food/GuidanceRegulation/FSMA/default.htm. [accessed December 8, 2014].

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Making Sense of the Dollars Spent at Farmers' Markets

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Abstract

The habits, preferences and demographics of consumers at farmers' markets are topics of interest as the number of markets burgeon across North America. This study, using a survey (via interview), researches five markets near Vancouver, British Columbia, focusing on factors associated with spending. The results reveal that spending is significantly related to frequency of shopping, type of products purchased, preferences about buying organic, parking habits, and demographics such as age, education level, ethnicity, family composition and home ownership. The study also shows that Vancouver-area farmers' market shoppers are not significantly different from those elsewhere—they too tend to be older, well-educated and disproportionately Caucasian. Results yield valuable practical strategies for market managers.

Keywords: Farmers' market; economics; consumer behavior; agriculture; urban fringe

Introduction

The level of interest in consuming local food and supporting those who grow food locally is intensifying across North America. Evidence of this can be seen in the dramatic growth in recent decades in the number of farmers' markets and in the number of customers patronizing them. In the United States the number of markets increased from 1,755 in 1994 to 3,706 in 2004 and then grew to 8,268 in 2014 (USDA 2015). In 2011 alone, 1,043 markets were established nationwide (Zezima 2011).

This growth has been paralleled in other countries, including Canada (Bukenya et al. 2007). This study focuses on Vancouver, British Columbia, and its surrounding environs. The B.C. Association of Farmers' Markets had ten new markets join in the 2010 season alone (Shore 2010) and now stands at 125 market members as of 2014 (BCAFM nd). The Vancouver area has also seen this type of growth and more markets are being considered by city council—a 2013 staff report proposed doubling the number of markets from eleven to twenty-two by 2020 (Daflos 2013). Between 2010 and 2013, the number of markets had already doubled and saw an estimated 20,000 visitors each week.

While established markets are becoming a fixture in the local food economy, the rigorous study of farmers markets, particularly farmers' markets consumers in Canada, has lagged behind. Most studies of consumer behavior and demographics originate in the US, from markets in Michigan (Conner et al. 2010), New Jersey (Govindassamy et al. 2002), California (McGarry Wolf et al. 2005), Nevada/Utah (Gumirakiza et al. 2014) and Alabama (Onianwa et al. 2006, Bukenya et al. 2007). It is uncertain whether Canadian (particularly Vancouver-area) consumers differ systematically from the findings of these studies. Given that Vancouver regularly receives attention for being considered an epicenter for local food consumption (Smith and Mackinnon 2007; Jerven 2015), and even has a year-round farmers' market, it is tempting to hypothesize that its farmers' markets may have more loyal consumers who spend more at the markets and who cut more broadly across demographic groups than has been observed at markets in other cities. Thus, one purpose of this study is to test this hypothesis and discern whether Vancouver-area farmers' markets patrons are detectably different from consumers in other studies.

Another motivation for the current study is to augment the literature which uses person-level data collection methods. To study consumers, both market managers as well as researchers usually run surveys of shoppers using the "dot" method. In this data-gathering procedure, shoppers are given small stickers which they attach to boards to indicate specific information such as amount spent, frequency of visit and reasons for buying local produce (Lev et al. 2007; Ragland et al. 2011; Connell et al. 2006; Vecchio 2009).This method of surveying has the benefit of high response rates, but the main deficiency is the data from one question cannot be linked to the data from another question. Thus, these surveys cannot answer questions such as, "Do people who value parking spend more?" or "Do people spend more if they are more highly-educated?" The current study seeks to address this weakness of dot surveys by providing data on a random sample of shoppers which is analyzed for patterns.

This paper focuses on the dollars spent at farmers' markets and how various demographic and other factors are associated with spending. The rest of the paper is laid out as follows: In section two a review of past literature focuses on consumer profiles identified in other studies while

section three details the current study's methodology, including study area, data collection and analysis procedures. Section four provides the results of the analysis and regression models, an analysis of some market attributes, and also includes a comparison of the current study with the findings of past studies. Section five concludes with implications for governments, researchers and market managers.

Literature Review

The study of farmers' markets has been expanding in the past two decades, just as the number of markets has expanded. Journal articles, government reports, and other forms of research on many aspects of markets have been published, from the ability of a farmers' market to be an incubator for entrepreneurs (Gerbasi 2006) to how cities grow and develop around long-standing markets (Yao nd). Several studies have also looked at consumer habits and demographics. The current study follows in this tradition, but this on-going line of work continues to hold value because there are differences between locations (Vecchio 2009) and over time (McGarry Wolf et al. 2005).

Consumer Profiles at Farmers' Markets

Consumer studies of farmers' market shoppers tend to center around a fairly stock set of questions which include dollars spent, goods bought, frequency of visiting markets, willingness-to-pay for local goods, the attributes of markets, and demographics. The amount spent at markets differs across locations, but generally tends to hover around $20 (USD) per visit (Lyon et al. 2009; Pascucci et al. 2011; Alonso and O'Neill 2011; Ragland et al. 2011; Connell 2012; Gumirakiza et al. 2014; Gallardo et al. 2015). Managers use many media for advertising the existence of markets, but surveys show that the way in which shoppers learned about a market still tends to be either passing by the market (perhaps in conjunction with seeing a roadside sign) or through word of mouth (Ragland et al. 2011; Onianwa et al. 2006; Govindassamy et al. 2002).

In numerous surveys, the demographic picture that emerges of North American farmers' market shoppers is rich, well-educated and most-often female (Vecchio 2009; Smithers et al. 2008). At New Jersey farmers' markets, Govindassamy et al. (2002) found shoppers were relatively wealthy with 45% having incomes above $60,000 (USD). In addition, they found 83% of shoppers were female, the majority of respondents were at least 51 years old, and most (62%) had graduated college. McGarry Wolf et al. (2005) examined farmers' market shoppers in San Luis Obispo, CA, and also found that they were significantly more likely to be female, married, and have completed post-graduate education, compared to the general population. Onianwa et al. (2006) found similar results when studying Alabama farmers' markets. In their work, 72% of shoppers were female, 80% had more than a high school education, 70% were married, and 90% earned more than $25,000 (USD) annually.

Internationally, the picture is fairly consistent with the profile found in the United States. Lyon et al. (2009) found Scottish consumers to be older (with a noticeable lack of shoppers in their 20s and 30s), while Murphy (2011) observed most consumers were women (68%) from pre-dominantly well-off households. Connell et al. (2006) conducted research on farmers' markets in

British Columbia, Canada and found that 69% of respondents were female and the average household annual income was $63,913 (CAD) ($72,483 USD).[1]

Not many studies include ethnicity as a variable in the surveys. Those that do however, show that the racial make-up of shoppers is not always a perfect reflection of the population of the area. Govindassamy et al. (2002) found 84% of shoppers were white in New Jersey. The 2005 US census shows New Jersey is 76% white (RPRI 2006). In Alabama, Onianwa et al. (2006) recorded 49% of their sample as white. Madison and Jefferson counties (in which their two markets were located) contain 68% and 53% white residents respectively in the 2010 US census (IndexMundi nd). In Alabama, Bukenya et al. (2007) did a telephone survey of food shoppers and analyzed which factors led to shopping at farmers' markets. They found race to be a significant variable with white shoppers 2.3% more likely than non-white shoppers to patronize farmers' markets. Gallardo et al. (2015) found 81% of the customers in their study to be Caucasian. Given the paucity of published data on the racial composition of farmers' market consumers, the current study makes a significant contribution.

Willingness-to-Pay for Local Food

Besides general consumer demographic characteristics and shopping habits, another area of exploration in farmers' market literature is centered on the perception of price at the markets compared to grocery stores, and whether shoppers are willing to pay more for local or direct-sales produce.

On the first question—perception of price levels at farmers' markets—Murphy (2011) discovered that higher prices at farmers' markets was the top negative influence on attending them, but noted that the effect was still moderate overall, and smaller still for frequent customers. In Bukenya et al. (2007), a model was employed to determine significant factors that lead to farmers' market or grocery store shopping. Those who said that price is a very important factor are 12% more likely to shop at a grocery store compared to those who gave another category.

It is conceivable that customers who aren't very price sensitive are more attracted to farmers' markets. In Feagan et al. (2004), 66% of shoppers believed the farmers' markets produce would be the same price or more expensive than elsewhere, but only 7% said price was a motivating factor in their decision to go to a market. In general, it appears that though prices are generally believed to be higher at farmers' markets, consumers are willing to pay those prices for locally-sourced products which are perceived to be of higher quality.

The second question – whether consumers are willing to pay more for locally-grown products – is a burgeoning area of research, but most studies find the answer is a decisive yes (Feldmann and Hamm 2015). Thilmany et al. (2008) found that the willingness-to-pay for a locally-sourced melon depended significantly on the "perceived economic support of agriculture" and the "relationship with land and environmental benefit."

[1] All currency exchange rate calculatons were performed using Bank of Canada's historical annual average data for the year in question (Bank of Canada nd).

Loureiro and Hine (2002) discovered the willingness-to-pay price premium for a local potato to be about 10% more than the price premium for either organic or GMO-free. Contrasting a general population mail survey with a farmers' market dot survey, Lev and Stephenson (1998) found the price premium the general population is willing to pay for local products is 6%, whereas farmers' market shoppers average a 29% price premium. In a similar vein, Darby et al. (2008) showed that while both direct-market shoppers and grocery store shoppers had a positive willingness-to-pay for a local product, the direct-market shoppers displayed nearly twice the price premium. Finally, Carpio and Isengildina-Massa (2009), calculated that South Carolinians are willing to pay an average price premium of 27% for locally-grown produce and 23% for local animal products.

Methodology

Study Area

The area under investigation is the Lower Mainland of British Columbia, Canada. Vancouver, the economic and political epicenter, is Canada's third-largest city based on population, containing 2.4 million residents in the metropolitan area (Statistics Canada 2011a). The City of Vancouver, which is home to two of the five markets under consideration in the current study, covers just 114 square kilometers. This gives it a population density of 5,249 people per square kilometer, making Vancouver the most densely-populated Canadian municipality, and the fourth most densely-populated city over 250,000 residents in North America, behind New York City, San Francisco, and Mexico City (Statistics Canada 2011b). This fact is relevant because farmers' markets often appeal to the nearby community who can access the market on foot (Stegelin 1992).

The other municipalities under consideration—Surrey, Langley and Abbotsford—represent the suburban segment of farmers' markets. Surrey, being the closest to Vancouver, is the largest with 484,000 people (in 2011) and a rapid transit link to downtown Vancouver (BC Stats 2014). In fact, the farmers' market is located adjacent to a Skytrain station in central Surrey. Langley, located east of Surrey, had a total population in 2011 of 133,000 (BC Stats 2014), and Abbotsford, the eastern-most municipality—located approximately an hour's drive outside of Vancouver—had 138,000 residents in 2011 (BC Stats 2014).

Awareness of the benefits of supporting local agriculture is high in the Lower Mainland and the area is considered on the cutting edge of food system planning (Fodor 2011). The Province of British Columbia has long been recognized as a leader in the protection of farmland through its agricultural land zoning policy, the Agricultural Land Reserve (ALR). The ALR however has not been particularly successful at keeping land under urban development pressure in *active* agriculture (Stobbe et al. 2009). As a result, governments on several levels and the non-profit sector are vigorously promoting the growth of the local food system—of which, farmers' markets are a small but crucial component—in the hopes of increasing the financial viability and sustainability of farming in the region (Curran and Stobbe 2010).

Survey Methodology

The current study uses a survey of farmers' markets' consumers that was conducted between June and September, 2011, at five farmers' markets in or near Metro Vancouver that represent a cross-section of urban and suburban markets. The markets are the Kitsilano Farmers' Market and the Trout Lake Farmers' Market in Vancouver, plus the Surrey Urban Farmers' Market, the Langley Community Farmers' Market, and the Abbotsford Farm and Country Market. The dates of surveying correspond to the height of the local growing season and to the highest period of demand typically seen at farmers' markets.

The survey was administered in-person, asking a variety of questions from products bought, to the importance of amenities at the market, to demographics. (See Appendix 1 for a list of variables collected). Researchers invited participation from shoppers randomly as they exited the market, similar to other studies in the literature (Pascucci et al. 2011; Gumirakiza et al. 2014). The survey took approximately ten minutes to complete, and garnered a good response rate with approximately 75% of shoppers approached completing the survey (Siebring 2013, Smithers et al. 2008).[2] The sample has roughly equal numbers of surveys completed at each of the markets. This is more reflective of the cost of sampling rather than the markets' sizes. (The Vancouver markets are larger but were the most costly to sample in terms of surveyor wages and mileage costs.)

The results of a survey such as this rest upon achieving a balanced sample which reflects the underlying population of shoppers at farmers' markets. A completely randomized, scientific sample was not possible, but steps were taken to attain as representative a sample as possible through inviting participation randomly. Surveying was done on multiple days throughout the season[3] and at various times of operation. Surveying was conducted by the author and a research assistant. Surveyors either stood at multiple exit points (when working together) or at random exit points (when working alone).

Analysis Methodology

All data were managed with Microsoft Excel, spatial analysis was conducted with ArcGIS, and all regressions and other tests were run with STATA 10. Regressions followed a conventional Ordinary Least Square (OLS) design and models were created to explain various aspects of consumer's behavior and characteristics. OLS was chosen because the key variable of interest (spending at farmers' markets) is quantitative, and the models do not exhibit high degrees of multicollinearity which can make OLS unreliable.[4]

[2] The most common reason given for not wanting to participate in the survey was a time constraint on the part of the shopper. This may have led to non-response bias with retired people and people without children being over-sampled. However, without data on non-respondents there is no way to test this conjecture.

[3] The surveying was done during five different trips to the Surrey market, four trips to Langley, three trips to Abbotsford and two different trips to each of the Vancouver markets.

[4] The two models presented both have Variance Inflation Factors (VIFs) that are well below levels where concern may arise (O'Brien 2007). The two models have average VIFs of 1.31 and 1.37 respectively, with no VIF over 1.84 or 1.88.

To analyze the principal variable of interest—spending—two models are presented. The first model uses unadjusted spending, as reported by survey respondents. Due to the skewed nature of this variable (see Figure 1), a log-spending model was also calculated. The independent variables included in the modeling procedure have all been included in similar studies or have theoretical reasons for being considered (see Appendix 1). The final models were estimated using a step-wise approach, maximizing adjusted R^2 (Verbeek 2012, 66). The significance level chosen for the step-wise approach was 0.25. The sample sizes of the final models differ due to the fact some respondents declined to answer a specific question (e.g. two refused to answer "What is your age?" and another two refused to answer "Do you own or rent your dwelling?").

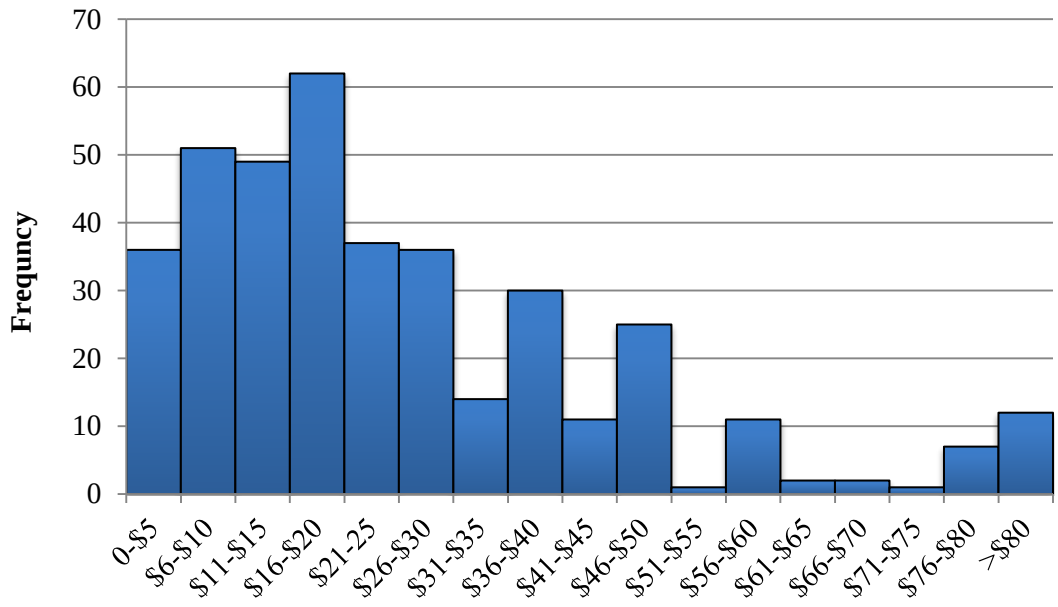

Figure 1. Histogram of dollars spent (n=390)

Results

Descriptive Statistics

Ultimately, 390 surveys were completed with a roughly equal split between the five locations: 74 from Kitsilano, 76 from Trout Lake, 77 from Surrey, 86 from Langley, and 77 from Abbotsford. The survey revealed that shoppers at farmers' markets spend $28.30 (CAD) ($27.99 USD) on average each visit, but this amount is highly variable with a median of $20 (Figure 1).

Shoppers at these farmers' markets are generally not there because they are looking for cheap food. Nearly 54% of respondents expected farmers' market products to be more expensive than grocery stores (with a further 30% saying they expected them to be priced about the same). When asked how much more (in percentage terms) they would be willing to pay for farmers' market products compared to grocery stores, the answers varied between 100% more to 15% less (Figure 2). The average was approximately 25% more.

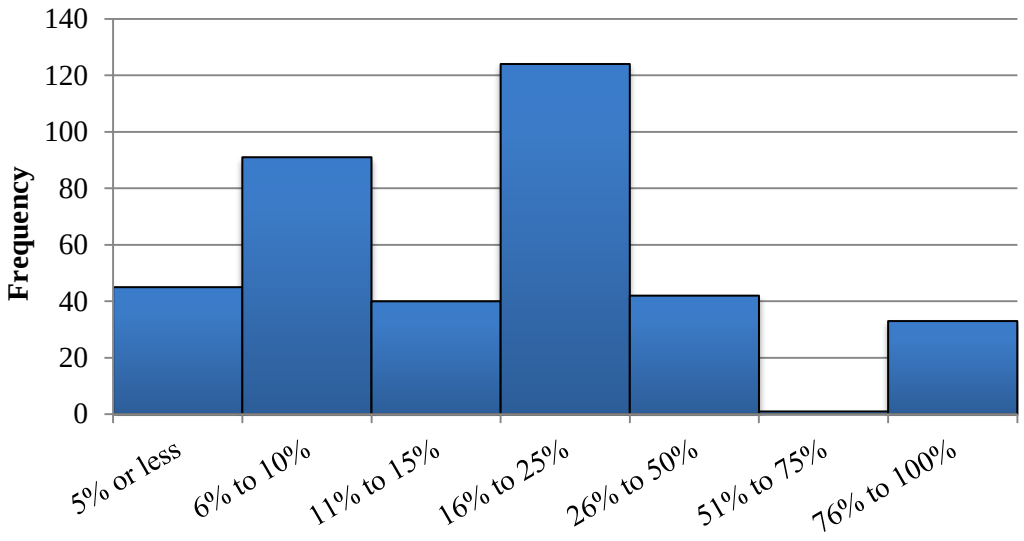

Figure 2. Histogram of willingness-to-pay (in percentage) for farmer's market products over grocery stores

In terms of products purchased, the majority of shoppers bought produce (fruit, vegetables or mushrooms), with a sizable minority also buying baked goods (Figure 3). The other categories were all purchased less commonly. These categories include dairy or cheese, meat, fish or eggs, food or beverages, artisan or processed foods (such as honey, preserves or spices), flowers or plants, and other goods (such as crafts or clothes).

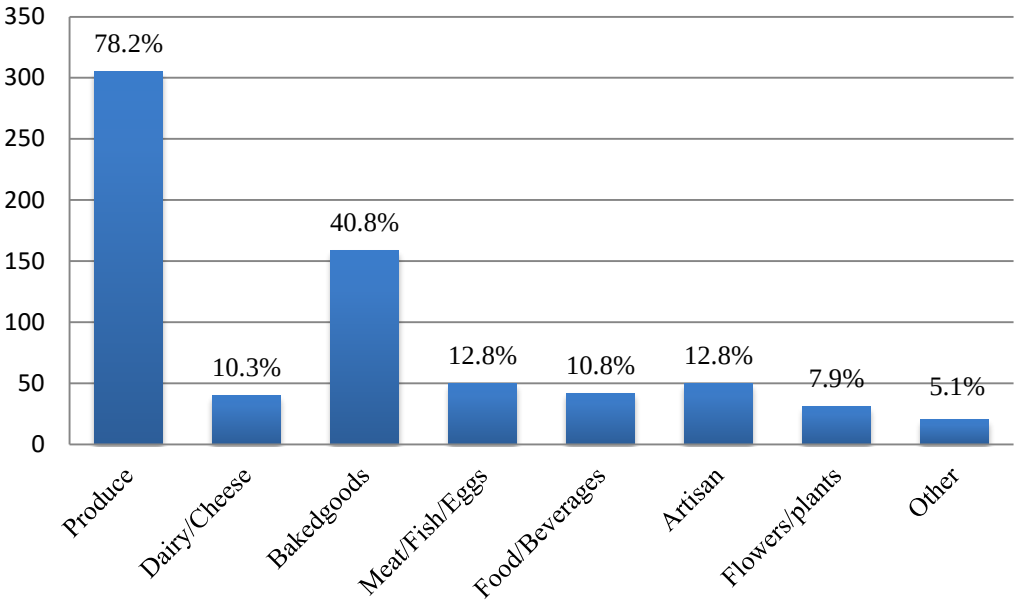

Figure 3. Bar graph of products purchased at the markets

Shopper tend to plan their visits. Of the 390 respondents, 321 (82.6%) planned their visit to the market that day, which means only 17% stopped in spontaneously after seeing a sign or the market itself. Predictably, a much great proportion of first-time shoppers had unplanned visits

compared to repeat shoppers. About a third of the respondents were weekly visitors to the farmers' markets and 23% were first-time visitors that day (Table 1).

The presence of parking is a feature that seems to be highly valued by some and not at all by others. Just over a quarter of respondents classified it as "extremely important"—meaning they would not come to the market without parking. Whereas 39% classify it as "not important"—meaning they do not use parking, choosing instead to walk, bike, or take public transit to the market. This is a variable that shows considerable disparities between the urban markets (which tend to be near public transit hubs and near areas of high population density) and suburban markets (Table 1).

Table 1. Summary of frequency and parking, by market

	Kitsilano	**Trout Lake**	**Surrey**	**Langley**	**Abbotsford**	**Total**
Frequency of visiting						
First time	12.6%	11.5%	31.0%	29.9%	14.9%	**22.3%**
1-3 visits per season	19.0%	25.4%	12.7%	20.6%	22.2%	**16.2%**
Monthly	17.5%	30.0%	27.5%	5.0%	20.0%	**10.3%**
Bi-weekly	22.5%	21.1%	9.9%	19.7%	26.8%	**18.2%**
Weekly	21.7%	17.8%	18.6%	24.0%	17.8%	**33.1%**
Importance of Parking						
Extremely important	12.3%	15.8%	14.3%	45.3%	41.6%	**26.5%**
Moderately important	23.3%	15.8%	13.0%	33.7%	29.9%	**23.4%**
Slightly important	6.8%	17.1%	10.4%	10.5%	10.4%	**11.1%**
Not important	57.5%	51.3%	62.3%	10.5%	18.2%	**39.1%**

The demographics of the respondents show it is a group with varied ages, with a mean age of 48 years (Figure 4). When broken down by frequency of shopping at the market, there is a significant difference in ages. First time shoppers' average age was 43.6 years, one to three visits per season shoppers' average age was 46.9, monthly shoppers' was 47.8, biweekly shoppers' was 49.5, and weekly shoppers averaged 50.8 years. When tested using ANOVA, these groups are different (p-value 0.0101) and a Fisher's Least Significant Difference Test reveals that first time shoppers are significantly younger than biweekly and weekly shoppers at the 5% level. This analysis suggests that committed, regular shoppers at farmers' markets tend to be slightly older than less-regular shoppers. It is also possible that people become more committed shoppers as they age.

In terms of gender, the sample was largely women (81%). This likely overstates the gender bias at these markets though because when male-female couples were approached, the woman tended to respond to the survey with the male partner giving input (Siebring 2013).

The survey respondents tended to have home gardens with 59% growing some vegetables or herbs in either a kitchen garden or a container garden. Vegetarians and vegans were not common – over 85% of the sample consumes animal products.

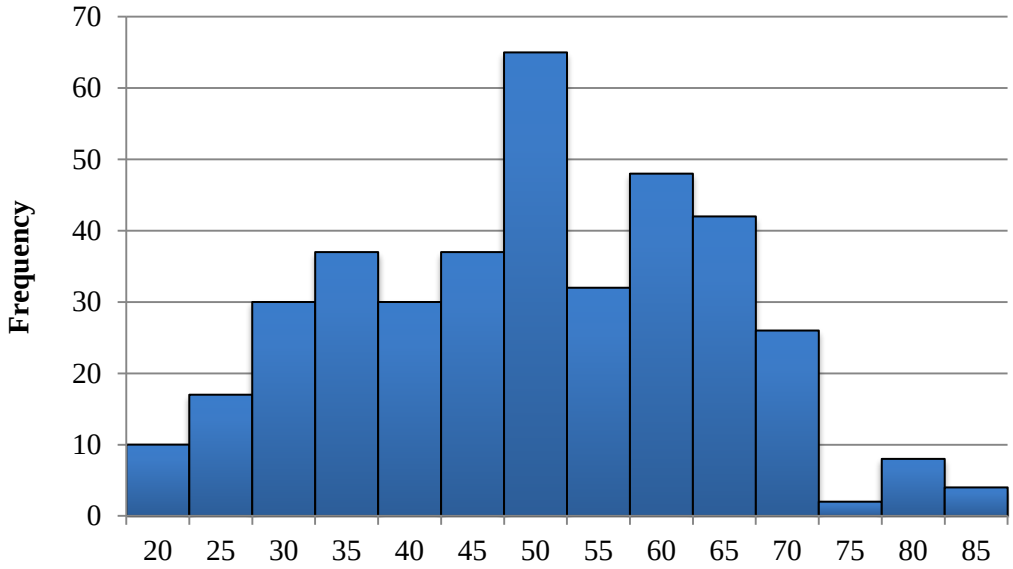

Figure 4. Histogram of Ages

The survey respondents tended to have home gardens with 59% growing some vegetables or herbs in either a kitchen garden or a container garden. Vegetarians and vegans were not common –over 85% of the sample consumes animal products.

The survey respondents were well-educated: more than 75% of them had an undergraduate degree, trade or technical certification, or higher. As is evident in Table 2, shoppers at farmers' markets are consistently and significantly more educated than the underlying populations according to census data. This is particularly striking looking at the rates of educational attainment in Vancouver.

In terms of home ownership, 68% of the sample owned their own home (Table 2). Comparing the results market-by-market to census data, Trout Lake, Langley and Abbotsford shoppers were significantly more likely to own their homes compared to the average rates for those areas, while Surrey shoppers were significantly less likely to own their homes (Statistics Canada 2006). The lower rates of home ownership in Surrey may reflect the fact that the market is adjacent to a public transit hub and more renters use public transit than home owners (Berube et al. 2006).

Distance from the market was calculated (via a GIS program) by recording the postal codes of the respondents. The average distance was 7.9 km and the median was 4.8 km. There was considerable variation—the standard deviation was 8.8 km—with a minimum value of 200 meters and a maximum of almost 65 km.

Table 2. Comparison to census data for education levels and home ownership rates, by municipality (Statistics Canada 2006)

	Grade and high school	Some college, trade/ technical	Undergraduate degree or trade/technical	Graduate school or professional degree	Home ownership rates
Trout Lake	5.3%***	11.8%**	52.6%***	30.3%***	61.8%**
Kitsilano	1.4%***	2.7%***	51.4%***	44.6%***	52.7%
Census (Vancouver)	*35.6%*	*21.5%*	*28.9%*	*13.7%*	*48.1%*
Surrey	20.8%***	15.6%*	52%***	11.7%*	53.2%***
Census	*47.1%*	*23.8%*	*22.4%*	*6.7%*	*75.2%*
Langley	10.5%***	11.6%***	65.1%***	14%***	88.2%*
Census	*43.9%*	*25.7%*	*24.7%*	*5.7%*	*79.9%*
Abbotsford	10.5%***	13.1%*	52.8%***	23.9% ***	82.9%**
Census	*51.3%*	*22.3%*	*20.7%*	*5.7%*	*72.7%*
Total	**10.5%**	**13.0%**	**52.7%**	**23.8%**	**68.3%**

Note. T-tests performed to compare sample proportion to census parameter. *** denotes 1% significance level, ** denotes 5% level, and * denotes 10% level.

Regression Models on Spending

The number of dollars spent at a farmers market is a key variable of interest for market managers, producers, and those interested in questions of policy. Appendix 2 shows two regression models—one for the money spent in dollars and, because of the moderate skew in the distribution of the dollars spent (Figure 1), a natural logarithm was included as well.[5] The adjusted R^2s for the models are 41% and 42% –a respectable level for social science research which is inherently complex and multidimensional (Frost 2013).

The regression shows that many factors are significantly related to dollars spent. Location plays a role as Langley shoppers spent $13.47 less than the base case of Vancouver shoppers (at Trout Lake or Kitsilano), while Surrey shoppers spent $10.63 less and Abbotsford shoppers spent $10.89 less. Compared to all other frequency-of-attendance categories, weekly shoppers spent $8.83 more; thus, the more loyal a shopper is, the more they tend to spend. Not surprisingly, when shoppers buy additional products their overall spending increased.

The model shows that those who say they always buy organic products spent $15.26 more than the other categories of organic buying (usually, often, seldom or never). When looking at how the consumers learned of the market's existence, those who reported word-of-mouth or social media spent $4.01 more than those who learned about it through other means. In terms of parking, those who said parking is "extremely important" spent $6.99 more and those who said "moderately important" spent $6.50 more than those who value parking only marginally or not at all. This could imply that people who drive to the market buy more because they have an easier time transporting their purchases back home.

[5] As one can observe in Appendix 2, the models are very similar in terms of the number of variables and their magnitude. Therefore, the rest of the discussion will proceed to focus on the original values.

Demographically, this models shows that certain categories of people systematically spend more than others. As is logical, the number of people living in the household is related to spending. For every additional adult in the household, the shopper spent an increased $2.15. People who own their own homes spent $6.41 more than renters. Higher education also led to higher spending— those with graduate education or professional degrees spent $11.18 more and those with undergraduate degrees or trade/technical certification spent $5.65 more compared to all other levels of education. The home ownership and education results may point to a wealth effect as home ownership and education are generally correlated with higher incomes.

Race also proved to be a significant factor in explaining spending. Those identifying an Asian ethnicity spent $8.15 less than those with a Caucasian/European ethnicity, while Middle-Eastern or African ethnicities spent $20.33 more on average. The "other" ethnicity category, which included people of First Nations background, spent $35.25 more, but this result should be used with caution as the sample size of the "other" category was very small. More research is needed on the racial make-up of farmers' market consumers before any conclusions can be drawn.

The distance variable was weakly significant but did not have a large effect on spending (just $0.22 per km). This is likely because the parking variable already accounted for the ease of transporting groceries home. Considering just those who replied that parking is not important to them (usually because they did not drive to the market), distance remains weakly significant (p-value of 0.093) but the effect is still not large (just a $0.33 decline for every additional km travelled). It seems like distance from the market is not tied strongly to spending. More broadly speaking, the implication of examining distance in this study is that farmers' markets are not principally attracting nearby neighbours but cast a much wider net.

Attribute and Amenity Analysis

Many past studies have asked shoppers about which amenities or attributes of farmers' markets they place value upon or attracted them to the market (McGarry Wolf et al. 2005; Thilmany et al. 2008; Connell et al. 2008; Lyon et al. 2009; Conner et al. 2010; and Ragland et al. 2011). The current survey asked respondents to rank the importance of eleven attributes or amenities on a four-point scale (1–being not important, 2–slightly important, 3–moderately important, and 4–very important). These amenities were analyzed several ways, including being included in the regression analysis. As displayed in Appendix 2, only a few of the categories remained in the final models, and only one of these was (borderline) significant (p-value of 0.083) in the log spending model. People who said the characteristic of being locally produced (to support small/local businesses) was "very important" to them tended to spend $1.19 more. The fact that values for amenities and attributes don't explain variation in spending is interesting because it suggests that once demographics and other factors are taken into account, the relative importance placed on market amenities alone doesn't determine spending.

Following the methodology of Connell et al. (2008), another way to look at the attribute and amenity data is to rank which characteristics were rated as most important (Table 3). When the attributes are ranked in this way, it is interesting to note that food attributes—those attributes which deal directly with the food itself, such as freshness and taste –are generally considered the most important. Process attributes—how the food is grown or produced—tend to rank next, and

market attributes—specific qualities of the market, such as the sociability, convenience or cleanliness of the market—tend to rank lowest. When these attributes are ranked by frequency of shopping at the market (Table 4), the same general patterns hold, with the availability of artisan products and the ability to interact with farmers ranking the lowest.

Table 3. Attribute and amenity ranking

Ranked Attributes	Average	Attribute/amenity type
Taste of produce or food	3.93	Food attribute
Freshness of produce or food	3.92	Food attribute
Supporting local business	3.81	Process attribute
Benefits local environment	3.71	Process attribute
Cleanliness/appearance of market	3.50	Market attribute
Variety of produce or food	3.38	Food attribute
Convenience	3.27	Market attribute
Organic availability	3.17	Process attribute
Social aspect of market	3.08	Market attribute
Ability to interact with farmers	2.86	Market attribute
Artisan goods' availability	2.72	Market attribute

Table 4. Ordered attributes by frequency of shopping

Weekly (n=129)	Twice Monthly (n=71)	Monthly (n=40)	1-3 Times Season (n=63)	First Time (n=87)
3.91 Freshness	3.94 Freshness	3.88 Taste	3.97 Taste	3.94 Freshness
3.89 Taste 3.89	3.94 Taste	3.83 Freshness	3.92 Freshness	3.94 Taste
3.74 Local Bus.	3.84 Local Bus.	3.68 Local Bus.	3.79 Local Env.	3.89 Local Bus.
3.71 Local Env.	3.70 Local Env.	3.55 Local Env.	3.77 Local Bus.	3.72 Local Env.
3.60 Cleanliness	3.56 Cleanliness	3.38 Cleanliness	3.43 Variety	3.49 Cleanliness
3.39 Variety	3.30 Variety	3.35 Convenience	3.41 Cleanliness	3.41 Variety
3.29 Convenience	3.06 Social	3.31 Variety	3.36 Organic	3.35 Convenience
3.14 Social	3.06 Convenience	2.75 Organic	3.26 Convenience	3.33 Organic
3.11 Organic	2.99 Organic	2.73 Social	2.96 Social	3.22 Social
2.84 Artisan	2.94 Farmers	2.61 Farmers	2.82 Artisan	3.08 Farmers
2.75 Farmers	2.92 Artisan	2.39 Artisan	2.68 Farmers	2.59 Artisan

Comparisons with Past Studies

It is an advantage to the current work that studies on farmers' markets consumers have been relatively uniform in the areas investigated. It is possible to compare the current results to those past results to determine if they are systematically different from the norm.

The current study revealed that shoppers at farmers' markets near Vancouver, Canada spent on average $28.30 (CAD) ($27.99 USD). This is consistent with the range found in other studies. Ontario farmers' market shoppers spent $27.46 (CAD) ($29.27 USD) (Smithers et al. 2008), Canadians on average spent $32.06 (CAD) ($36.61 USD) (Connell 2009), Alabama shoppers spent $22.20 (USD) (Onianwa et al. 2006), Washington D.C. shoppers spent $23.93 (USD) (Vecchio 2009), Nevada/Utah shoppers spent $24.78 (USD) (Gumirakiza et al. 2014), Washington state shopers spent $21.65 (USD) (Gallardo et al. 2015), and Italians on average spent €19.63 ($26.73 USD) (Pascucci et al. 2011).

One third of the respondents in this survey reported being weekly shoppers and almost a quarter were first-time shoppers. Other studies of farmers' market consumers have found similar patterns, with variation (Table 5).

Table 5. Comparison with past studies on frequency of shopping

	Vancouver	**Ontario**	**Canada**	**New Jersey**	**Washington DC**	**Scotland**	**Italy**
First-time	*22%*	6%	25%[a]	5%	29%	17%	11%
One to three visits/season	*16%*		-	-		-	
Monthly	*10%*		-	24%		39%[b]	
Biweekly	*18%*		27%	21%		-	
Weekly	*33%*	52%	48%	50%	30%	45%[b]	25%

Notes. [a] Connell (2009) used a category of "infrequent" to mean first-time or very infrequent attendance. [b] Lyon et al (2009) used categories of first time at the market, visited the market a few times, and visited the market many times. A dash in a category means that category was not included in that survey, a blank means the result was not reported in the paper.
Sources. Vancouver (Current study); Ontario (Smithers et al. 2008); Canada (Connell 2009); New Jersey (Govindassamy et al. 2002); Washington DC (Ragland et al. 2011); Scotland (Lyon et al. 2009); Italy (Pascucci et al. 2011).

The average age of shoppers in this study is 48. Previous studies have found the average Alabama shopper is 41.4 years old (Onianwa et al. 2006), the average Nevada/Utah shopper is 42 (Gumirakiza et al. 2014), the average Washington state shopper is 47.2 (Gallardo et al. 2015), and the average Italian shopper is 55 (Pascucci et al. 2011). In Scotland, there was a noticeable lack of younger people under 20 years and from 21 to 30 years in all the markets. Most consumers were in their 40s, 50s, and 60s, with smaller proportions in their 30s and 70s (Lyon et al. 2009). This mirrors the current study's results.

Education is a demographic feature that has been well-studied at farmers' markets and the current study's results are consistent with other findings. As Table 2 shows, 52.7% of the current sample had an undergraduate degree or completed technical or trade school, and a further 23.8% had attained a graduate degree or professional degree or had attended graduate school. Some other studies have found:

- 62% of New Jersey shoppers had graduated from college (Govindassamy et al. 2002)
- 80.2% of Alabama shoppers had more than a high school education (Onianwa et al. 2006)
- 37% of Italian shoppers had university degrees, compared to the Italian average of just 10% in the 2001 census (Pascucci et al. 2011)
- The average shopper in Utah/Nevada had a college-degree, and when clustered based on spending, those who spent the most had significantly more education than the medium or low spenders (Gumirakiza et al. 2014)
- 76% of Washington state shoppers had at least some college education (Gallardo et al. 2015)

Unfortunately, other studies often do not break post-secondary education into undergraduate and graduate so it impossible to compare specific statistics. But the overall picture is clear: farmers' market patrons are much more highly educated than the general population and Vancouver extends this pattern.

Ethnic background of shoppers is not a well-studied variable at farmers' markets. As discussed in the literature review, some studies have shown that white shoppers are disproportionately represented at farmers' markets (Govindassamy et al. 2002). In their work in Michigan, Conner et al. (2010) found that there was a preponderance of white and higher-class values at the farmers' markets.

In the current survey, 91.2% of the respondents were white (Caucasian or European descent) while 5.3% identified as Asian ethnicity, and just 3.5% fell into a different category. Just over 80% of respondents were born in Canada. This is markedly disproportionate with the ethnic make-up of the underlying population where visible minorities make up 51% of Vancouver's population (Ministry of Attorney General BC 2008), 52.6% of Surrey (Statistics Canada 2011c), and 22.8% of Abbotsford's (Ministry of Attorney General BC 2008). The reasons for these disparities were not a focus of the current work and remain an area for future investigation.

Conclusion

This work adds to the literature on farmers' market shoppers and specifically furnishes information about which factors are correlated with higher spending. The most important factors associated with higher spending include the frequency of visiting the market, if the consumer sets out to always buy organic, if they value the availability of parking, if they own their home, and if they are highly educated. These results can provide insights for various groups including market managers and local policy-makers as well as scholars of consumer behavior.

Market managers can devise from this work many practical tips and strategies for managing their markets more effectively. For instance, since a large proportion (about a quarter) of visitors are still first-timers at the markets, the importance of clear and appealing signage may still hold relevance (particularly in Surrey and Langley) as well as other marketing strategies – including

the prominent use of social media, as this is positively associated with increased spending. Since families with children tend to spend more, markets should consider being family-friendly with activities to keep children engaged such as free samples, live child-friendly entertainment or a portable petting zoo from a local farm.

Another practical result of this study for market managers relates to the ethnic make-up of farmers' markets in this area. Though it is not well-understood why non-Caucasians are not coming to farmers' markets, there exists the possibility of increasing sales and visits by targeting these groups to increase awareness of the market and to welcome them to shop there. More than 80% of the study's sample was born in Canada, so targeting immigrant communities may also be beneficial. More research which examines the racial make-up of the vendors may help shed light on the attendance rates of various racial groups.

One issue that perennially arises for many farmers' markets is securing adequate parking. Since half of shoppers reported parking to be "moderately" or "extremely" important, it is an issue that both market managers and city policy-makers cannot ignore if they wish to maintain or enhance their commitment to the local food system. A temptation may be to de-emphasize parking while making other options for transit more conspicuous such as biking and walking. While this may have air quality and public health benefits, this study shows that shoppers who do not drive also purchase less (in dollars) from the market, likely because they are constrained by how much they can carry. Parking is particularly important to the Langley and Abbotsford markets.

This study has added to the consumer behavior literature to help understand the purchasing habits and motivations of shoppers. However, several questions remain unanswered and will be left for future research. These include the reason for the skewed ethnic make-up of farmers' market shoppers, and how shoppers' perceived WTP is related to their actual WTP as displayed by their shopping behavior. Another area of future research could explore how and if casual shoppers become regular shoppers over time. One result from this study suggests that younger shoppers attend the market less often than older shoppers. Is it that markets are failing to "keep" their younger customers, or is it typical for younger people in general to not be stable repeat customers for this type of business?

Finally, the relationship between wealth, education, and shopping at farmers' markets is not clear. Though farmers' market consumers are undoubtedly better educated than the general population (as demonstrated by this study and many others), it is not evident whether education has a direct effect (i.e. more educated people understand the benefits that farmers' markets may have on the local agricultural economy) or whether it is an indirect effect (i.e. wealthy people tend to shop at farmers' markets and wealth is correlated with education). If it is the former, this could represent an opportunity for market managers and policy makers to encourage farmers' market shopping by launching public education campaigns which seek to bolster the public's knowledge of the environmental and economic sustainability of the local food system.

This study has sought to augment the literature on farmers' market consumers, particularly in the Canadian and Vancouver-area contexts. Though Vancouver is known as a hotbed of local food consumption, this study revealed that it is not substantially different in many aspects from other cities' farmers' market shoppers, including age, frequency of attending farmers' markets, the amount spent there, and education levels.

References

Alonso, A.D. and M.A. O'Neill. 2011. "A Comparative Study of Farmers' Markets Visitors' Needs and Wants: The case of Alabama." *International Journal of Consumer Studies* 35: 290-299.

Bank of Canada, nd. Average Annual Exchange Rates. http://www.bankofcanada.ca/rates/exchange/annual-average-exchange-rates/ [accessed April 2016].

BCAFM, nd. British Columbia Association of Farmers' Markets. http://met.bcfarmersmarket.org/market-search [accessed July 10, 2014].

BC Stats. 2014. "Population Estimates, Census Metropolitan Areas." Province of British Columbia. http://www.bcstats.gov.bc.ca/StatisticsBySubject/Demography/PopulationEstimates.aspx [accessed May 8, 2014].

Berube, A., E. Deakin, and S. Raphael. 2006. "Socioeconomic Differences in Household Automobile Ownership Rates: Implications for evacuation policy." Working paper, Goldman School of Public Policy, University of California Berkeley. http://socrates.berkeley.edu/~raphael/BerubeDeakenRaphael.pdf [accessed May 8, 2014].

Bukenya, J.O., M.L. Mukiibi, J.J. Molnar, and A.T. Siaway. 2007. "Consumer Purchasing Behaviors and Attitudes toward Shopping at Public Markets." *Journal of Food Distribution Research* 38(2): 12-21.

Carpio, C.E. and O. Isengildina-Massa. 2009. "Consumer Willingness to Pay for Locally Grown Products: The case of South Carolina." *Agribusiness* 25(3): 412-426.

Connell, D.J. 2012. "Economic and Social Benefits Assessment." School of Environmental Planning, University of Northern British Columbia, in partnership with the British Columbia Association of Farmers' Markets. http://www.bcfarmersmarket.org/resources/subpage/economic-and-social-benefits-study.

Connell, D.J. 2009. "The National Farmers' Market Impact Study 2009." Farmers' Markets Canada and Agriculture and Agri-Food Canada. http://www.farmersmarketscanada.ca/Documents/FMC%20FINAL%20Brochure%202009-ENG.pdf.

Connell, D.J., J. Smithers, and A. Joseph. 2008. "Farmers' markets and the 'good food' value chain: a preliminary study." *Local Environment* 13(3): 169-185.

Connell, D.J., T. Taggart, K. Hillman, and A. Humphrey. 2006. "Economic and Community Impacts of Farmers Markets in British Columbia." School of Environmental Planning, University of Northern British Columbia, in partnership with the British Columbia Association of Farmers' Markets.

Conner, D., K. Colassanti, R.B. Ross and S.B. Smalley. 2010. "Locally Grown Foods and Farmers Markets: Consumer attitude and behaviors." *Sustainability* 2: 742-756.

Curran, D. and T. Stobbe. 2010. "Local Government Policy Options to Protect Agricultural Land and Improve the Viability of Farming in Metro Vancouver." Metro Vancouver Report, http://www.metrovancouver.org/planning/development/agriculture/AgricultureDocs/Local_Government_Policy_Options_to_Protect_Agricultural_Land.pdf.

Daflos, P. 2013. "Plan to double Vancouver farmers markets causes concerns." CTV News British Columbia.

Darby, K., M.T. Batte, S. Ernst, and B. Roe. 2008. "Decomposing Local: A conjoint analysis of locally produced foods." *American Journal of Agricultural Economics* 90(2): 476-486.

Feagan, R., D. Morris and K. Krug. 2004. "Niagara Region Farmers' Markets: Local Food Systems and Sustainability Consideration." *Local Environment* 9(3): 235-254.

Feldmann, C. and U. Hamm. 2015. "Consumers' Perceptions and Preferences for Local Food: A review." *Food Quality and Preference* 40: 152-164.

Fodor, Z. 2011. "People Systems in Support of Food Systems: The Neighbourhood Food Network Movement in Vancouver, Canada." Master's Thesis, The School of Community and Regional Planning, The University of British Columbia. https://www.planning.org/resources/ontheradar/food/pdf/fodorpaper.pdf [accessed May 12, 2014].

Frost, J. 2013. "Regression Analysis: How Do I Interpret R-squared and Assess the Goodness-of-Fit?" The Minitab Blog. http://blog.minitab.com/blog/adventures-in-statistics/regression-analysis-how-do-i-interpret-r-squared-and-assess-the-goodness-of-fit [accessed May 21, 2015].

Gallardo, R.K., A. Olanie, R. Ordónez, and M. Ostrom. 2015. "The Use of Electronic Payment Machines at Farmers Markets: Results from a Choice Experiment Study." *International Food and Agribusiness Management Review* 18(1): 79-103.

Gerbasi, G.T. 2006. "Athens Farmers' Market: Evolving Dynamics and Hidden Benefits to a Southeast Ohio Rural Community." *Focus on Geography* 49(2): 1-6.

Govindassamy, R., J. Italia, and A. Adelaja. 2002. "Farmers' Markets: Consumer Trends, Preferences and Characteristics." *Journal of Extension* 40(1).

Gumirakiza, J.D., K. R. Curtis, and R. Bosworth. 2014. "Who Attends Farmers' Markets and Why? Understanding Consumers and their Motivations." *International Food and Agribusiness Management Review* 17(2): 65-81.

Index Mundi, nd. http://www.indexmundi.com/facts/united-states/quick-facts/alabama/white-population-percentage#map [accessed May 13, 2015].

Jerven, T. 2015. "Vancouver Named One of the World's Best Food Cities." Vancitybuzz. http://www.vancitybuzz.com/2015/04/vancouver-world-best-food-cities/

Lev, L. and G. Stephenson. 1998. "Analyzing Three Farmer's Markets in Corvallis and Albany, Oregon." Oregon Small Farms Technical Report (Number 2), Oregon State University Extension Service.

Lev, L., G. Stephenson, and L. Brewer. 2007. "Practical Research Methods to Enhance Farmers Markets." *Remaking the North American Food System: Strategies for Sustainability*. C.C. Hinrichs and T. Lyson, eds. Lincoln, Nebraska: University of Lincoln Press, pp. 84-98.

Loureiro, M.L. and S. Hine. 2002. "Discovering Niche Markets: A Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic, and GMO-Free Products." *Journal of Agricultural and Applied Economics* 34(3): 477-487.

Lyon, P., V. Collie, E.B. Kvarnbrink and A. Colquhoun. 2009. "Shopping at the Farmers' Market: Consumers and their perspectives." *Journal of Food Service* 20: 21-30.

McGarry Wolf, M., A. Spittler, and J. Ahern. 2005. "A Profile of Farmers' Market Consumers and the Perceived Advantages of Produce Sold at Farmers' Markets." *Journal of Food Distribution Research* 36(1): 192-201.

Ministry of Attorney General BC. 2008. "The Diversity of Visible Minorities and Ethnic Origins in BC." Multiculturalism and Immigration Branch. http://www.welcomebc.ca/_welcome_bc/media/Media-Gallery/docs/communities/visible_minorities_ethnic_origins.pdf.

Murphy, A. 2011. "Farmers Markets as Retail Space." *International Journal of Retail and Distribution Management* 39(8).

O'Brien, R.M. 2007. "A Caution Regarding Rules of Thumb for Variance Inflation Factors." *Quality and Quantity* 41(5): 673-690.

Onianwa, O., M. Mojica, and G. Wheelock. 2006. "Consumer Characteristics and Views Regarding Farmers Markets: An Examination of On-Site Survey Data of Alabama Consumers." *Journal of Food Distribution Research* 37(1): 119-125.

Pascucci, S., C. Cicatiello, S. Franco, B. Pancino, and D. Marino. 2011. "Back to the Future? Understanding Change in Food Habits of Farmers' Market Customers." *International Food and Agribusiness Management Review* 14(4): 105-126.

Ragland, E., V. Lakins, and C. Coleman. 2011. "Results of Dot Survey: USDA Outdoor Farmers Market Washington, DC." Marketing Services Division, USDA Agricultural Marketing Service.

Rural Policy Research Institute (RPRI). 2006. "Demographic and Economic Profile, New Jersey." University of Missouri-Columbia. http://www.rupri.org/Forms/NewJersey.pdf.

Siebring, B. 2013. Research Assistant. Personal Communication with author, August 2013.

Shore, R. 2010. "Farmers Markets: A bond between farmers and the people." *Vancouver Sun*, May.

Smith, A. and J.B. MacKinnon. 2007. *The 100-Mile Diet: A Year of Local Eating*. Canada: Random House.

Smithers, J., J. Lamarche, and A.E. Joseph. 2008. "Unpacking the Terms of Engagement with Local Food at the Farmers' Market: Insights from Ontario." *Journal of Rural Studies* 24: 337-350.

Statistics Canada. 2006. "Cumulative Profile, Lower Mainland - Southwest, 2006 Census of Population (Provinces, Census Divisions, Municipalities)." http://estat.statcan.gc.ca/cgi-win/cnsmcgi.exe?Lang=E&EST-Fi=EStat\English\SC_RR-eng.htm. [accessed August 17, 2012].

Statistics Canada. 2011a. "StatsCan 2011 Census for Vancouver CMA." 2011 Census. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau.cfm?LANG=Eng&T=303&SR=1&S=51&O=A&RPP=9999&PR=0&CMA=933 [accessed February 9 2012].

Statistics Canada. 2011b. "Population and Dwelling Counts for Canada and Census Subdivisions (Municipalities) with 5,000-Plus Population, 2011 and 2006 Censuses." http://www12. statcan. gc.ca/census-recensement/2011/dp-pd/hlt-fst/pd-pl/Table-Tableau .cfm? LANG =Eng&T=307&SR=1&S=10&O=D [accessed May 14, 2015].

Statistics Canada. 2011c. "NHS Profile Surrey." National Household Survey 2011. http://www 12.statcan .gc.ca/nhs-enm/2011/dp-pd/prof/details/page.cfm?Lang=E& Geo 1=CSD & Code1=5915004&Data=Count&SearchText=Surrey&SearchType=Begins&SearchPR=5 9&A1=All&B1=All&Custom=&TABID=1 [accessed May 26, 2015].

Stegelin, F. 1992. "Establishing and Operating a Community Farmers' Market." University of Kentucky Cooperative Extension, AEC-77, September. http://www.ams.usda.gov/ AMSv1.0/getfile?dDocName=STELPRDC5062524.

Stobbe, T., G. Cotteleer, and G. Cornelis van Kooten. 2009. "Hobby Farms and Protection of Farmland in British Columbia." *Canadian Journal of Regional Science* 32(3): 393-410.

Thilmany, Dawn, Craig A. Bond and Jennifer K. Bond, 2008. "Going Local: Exploring consumer behavior and motivations for direct food purchases." *American Journal of Agricultural Economics* 90(5):1303-1309.

U.S. Department of Agriculture. 2015. "Farmers Markets and Local Food Marketing." Agricultural Marketing Service. http://www.ams.usda.gov/AMSv1.0/ams.fetch Template Data.do?template=TemplateS&leftNav=WholesaleandFarmersMarkets&page=WFMFar mersMarketGrowth&description=Farmers+Market+Growth [accessed May 28, 2015].

Vecchio, R. 2009. "European and United States Farmers' Markets: Similarities, differences and potential developments." Paper presented at EAAE Seminar, Chania, Greece, September.

Verbeek, M. 2012. *A Guide to Modern Econometrics*. West Sussex, UK: John Wiley & Sons.

Yao, G., nd. "Country in the City: How urban forces shaped permanent farmers markets and how farmers markets shape urban form."

Zezima, K. 2011. "As Farmers' Markets Go Mainstream, Some Fear a Glut." *New York Times*, 20-August.http://www.nytimes.com/2011/08/21/us/21farmers.html?_r=0.

Appendix 1

Table A1 List of variables collected, coding, and hypothesized sign in regression model for spending (if theory exists)

Qualitative Variables	Description of Coding	Hypothesized Sign
Location: Kitsilano, Trout Lake, Langley, Surrey and Abbotsford	1 if respondent from that market, 0 otherwise	
Frequency: first-time visitor, visits one to three times per season, monthly visitor, bi-weekly visitor, weekly visitor	1 if respondent reports the given frequency, 0 otherwise	+ for more frequent visitor
Planned visit that day	1 if visit to market was planned, 0 otherwise	+
Products purchased: produce (fruit, vegetables or mushrooms); baked goods; meat, fish or eggs; dairy or cheese; food or beverages; artisan or processed goods; flowers or plants; other	1 if purchased product category, 0 otherwise Note 1: food or beverages refers to food truck sales at the markets; artisan or processed goods refers to processed food products (i.e. honey, preserves, spices); and other refers to all else including clothes, jewelry and soap	
Organic purchase frequency: always, usually, often, seldom, and never	1 if respondent reports given frequency of choosing organic products, 0 otherwise	+ for stronger organic preferences
Expectations of farmers' market prices compared to grocery stores: expects FM is more expensive; expects FM is same price; expects FM is less expensive	1 if respondent reports given expectation, 0 otherwise	
Market attributes: freshness of produce or other food; taste of produce or other food; variety of produce or other food; availability of organically grown produce or other food; locally produced (for environmental reasons); locally produced (to support local businesses); ability to interact with farmers; availability of artisan or other processed goods; social atmosphere; convenience; cleanliness/appearance	Rated on a scale of 1 to 4, with 1 indicating "not important", 2 indicating "slightly important", 3 indicating "moderately important" and 4 indicating "very important"	+ for stronger preferences for attributes of farmers' market
How they learned of farmers' market: word of mouth or social media; mass media; roadside signage or passing by	1 if respondent reported given way they learned of market's existence, 0 otherwise	
Importance of parking: very important, moderately important, slightly important, or not important	1 if respondent reported given category of importance for parking, 0 otherwise	
Garden	1 if respondent has home garden, 0 otherwise	– for having a garden
Gender	1 if a woman, 0 if a man	
Own home	1 if respondent owns their home, 0 if a renter	+ (proxy for income)

Table A1. List of variables collected-*Continued*

Primary shopper	1 if primary shopper, 0 otherwise	
Eats meat (i.e. not vegetarian or vegan)	1 if respondent eats meat, 0 if otherwise	
Education level: high school; some college or trade/technical school; undergraduate degree or trade/technical completed; some graduate education or graduate/professional degree	1 if respondent has attained the given level of formal education, 0 otherwise	+ for higher education levels (proxy for income)
Ethnicity: Caucasian, Asian, African or Middle Eastern, other	1 if respondent reported given ethnicity, 0 otherwise	
Born in Canada	1 if born in Canada, 0 if otherwise	
Quantitative Variable	**Units of measurement**	**Hypothesized sign**
Spent ($)	Dollars spent at the market that day	
WTP (%)	The average premium (expressed as a percentage of the price) that a respondent is willing to spend on farmers' market goods over conventional grocery store equivalents	+
Age	Age of respondent (years)	
Adults (number in household)	Number of adults living in respondent's household	+
Children (number in household)	Number of children (18 years or less) living in respondent's household	+
Distance to market (km)	Respondents reported postal codes allowing researchers to calculate distances with GIS	–

Appendix 2

Table A2. Regressions with spending and log spending as dependent variables (n=367, n=352)

	Spending Model		Log Spending Model	
Variable	**Coefficient**	**P-Value**	**Coefficient**	**P-value**
Abbotsford	-10.8876***	0.001	-0.3488***	0.002
Langley	-13.4695***	0.000	-0.3779***	0.000
Surrey	-10.6303***	0.001	-0.4749***	0.000
First-time visitor	-4.6195	0.118		
Twice monthly visitor			0.2220**	0.025
Monthly visitor			0.1995	0.104
Weekly visitor	8.8302***	0.000	0.3649***	0.000
Planned visit that day			0.2700***	0.007
Bought produce (fruit, veg. or mushrooms)	8.5793***	0.002	0.4114***	0.000
Bought baked goods	5.1932**	0.024	0.1844**	0.011
Bought meat, fish or eggs	11.8786***	0.000	0.2934***	0.004
Bought dairy or cheese	8.1734**	0.023	0.2509**	0.027
Bought food or beverages	13.7059***	0.000	0.3742***	0.001
Bought artisan or processed goods	7.3887**	0.023	0.2811***	0.006
Bought flowers or plants	10.1386***	0.010	0.2676**	0.029
Bought other products	15.5707***	0.006	0.5706***	0.001
Buys organic always	15.2613***	0.000	0.2694**	0.031
Buys organic often			-0.1118	0.219
Buys organic seldom			-0.1320	0.176
Variety rated as “very important”	3.0561	0.183		
Artisans rated as “very important”	-3.1033	0.217		
Freshness rated as “very important”			0.1816	0.182
Supporting local business rated as “very important”			0.1727*	0.083
Ability to interact with farmers rated as “very important”			-0.1094	0.148
Convenience rated as “very important”			-0.0895	0.178
Learned of market by word-of-mouth or social media	4.0055*	0.071	6.4975	
Parking extremely important	6.9898**	0.020	0.1891**	0.045
Parking moderately important	6.4975**	0.021	0.2043**	0.025
Age	0.0991	0.248		
Adults (number in the household)	2.1472*	0.061	0.1090***	0.003
Children (number in the household)	2.3906	0.123		
Own home	6.4059**	0.013	0.1817**	0.023
Eats meat (non-vegetarian)	3.6603	0.232	0.2254**	0.025
Graduate/professional degree or some graduate education	11.1775***	0.001	0.2369**	0.022
Undergraduate degree or trade/technical school	5.6510**	0.042	0.1207	0.171
Asian ethnicity	-8.1534*	0.093	-0.2659*	0.075
Middle-Eastern or African ethnicity	20.3303***	0.006	0.5170**	0.025
Other ethnicity	35.2547***	0.003	0.7456**	0.045
Distance (via road)	0.2243*	0.075	0.0076*	0.066
Constant term	-14.2702	0.045	1.2998	0.000
Adjusted R^2	0.4122		0.4210	

Note. *** denotes 1% significance level, ** denotes 5% level, and * denotes 10% level