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# Effect of Nutrition Merchandising and Consumer Preferences on Willingness to Pay for Local Tomatoes and Strawberries in Kentucky and Ohio

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EFFECT OF NUTRITION MERCHANDISING AND CONSUMER PREFERENCES  
ON WILLINGNESS TO PAY FOR LOCAL TOMATOES AND STRAWBERRIES  
IN KENTUCKY AND OHIO

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THESIS

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A thesis submitted in partial fulfillment of the requirements for  
the degree of Master of Science in Agricultural Economics in  
the College of Agriculture at the University of Kentucky

By

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Lexington, Kentucky

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2012

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## ABSTRACT OF THESIS

### EFFECT OF NUTRITION MERCHANDISING AND CONSUMER PREFERENCES ON WILLINGNESS TO PAY FOR LOCAL TOMATOES AND STRAWBERRIES IN KENTUCKY AND OHIO

This project investigates the impacts of nutrition merchandising on consumers' willingness to pay for local tomatoes and strawberries. The data come from survey of Kentucky and Ohio residents in June 2011. Two thousand one hundred twelve individuals from Kentucky and Ohio were surveyed, to find out the impact of self-awareness of health benefits and health benefits information on their willingness to pay. The consumers were offered one of the three survey versions. The versions varied by how much nutrition information was provided to the consumer related to both strawberries and tomatoes – otherwise identical. A had the most, B had text only, and C omitted any nutritional benefits. This nutrition preamble was offered just before doing a payment card willingness-to-pay experiment. Standard demographic data were also included. The goal of the study was to see if and in what way the provision (or non-provision) of this information, as well as consumers' own knowledge of nutritional benefits of local foods, their beliefs and lifestyle influenced their willingness to pay for these local products.

**KEYWORDS:** Local produce, nutrition merchandising, willingness to pay, health benefits, payment card

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Lyudmyla Kompaniyets

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## **Chapter 1: Introduction**

### **1.1 Consumer Climate**

Interest in the local foods has grown rapidly in the past few years. This has been caused by the fact that consumers put more weight on the origin of food that they purchase. There are benefits that are traditionally attributed to local foods, such as quality, health, nutrition, support for local economy and for the environment. However, it is still unclear how consumers value the benefits associated with local foods and incorporate them into their purchasing decision. It is also unclear, whether consumers are generally willing to pay more for local produce compared to conventional products.

Nutrition associated with local foods is a credence attribute (Darby & Kami, 1973) that cannot be observed by external appearance of the product. Consumers need to look at nutritional labels and signals that would help them to capture the nutritional content of the good. It remains unclear, how nutritional information affects consumers and their willingness to pay for the local produce. Consumers' prior knowledge of nutrition is another factor that plays a role in their purchasing decisions. The knowledge baseline is different for all consumers: some are more knowledgeable about nutritional benefits of the goods they purchase, while others do not possess specific knowledge of nutritional benefits of the goods.

All of these factors must be considered while building marketing strategies. Recently, a lot of merchandizing effort has gone into marketing the nutritional benefits of local produce. However, so far the marketing strategies are not very targeted, due to the lack of

well-developed connection between the local products and nutrition. This study can contribute to effective targeting of marketing strategies and educational programs.

## **1.2 Research Question**

Demand for local foods is continuing to increase every year due to the increased awareness of the nutritional characteristics and health benefits of local foods.

Past researches have tried to understand the local food consumer, but very little literature is available on objective nutritional benefits of local foods, as well as the link between local foods and the nutrition merchandising. This study attempts to make a connection of the value that consumers place on a local product, with their knowledge, beliefs, attitudes, behaviors and the nutritional information provided to them.

Knowledge of such patterns in consumer preferences can make a contribution to local foods production by providing a connection between supply and demand. It will help to understand the local food consumer, and the interaction between the value he puts on local produce and the provided information about its nutritional benefits. The results of this study may be used to develop targeted strategic educational programs. It may also be used to elaborate nutrition merchandising strategies.

## **1.3 Objectives of the study**

The study is based on the results of the survey carried out among residents of Kentucky and Ohio. Particularly we focused on two questions that asked respondents how much they would be willing to pay for fresh local tomatoes and local strawberries. Each respondent was presented with one of the three versions of the survey. These versions

differed by the amount of nutrition information provided in them. Version A contained text and a graph, version B contained only text, and version C contained no information. Respondents were also asked other questions about their lifestyle, beliefs and perceptions, prior knowledge of nutritional benefits of local produce, as well as standard demographic data.

The first objective of the study is to measure consumers' WTP for local tomatoes and strawberries, and factors that influence it. Such factors may include consumers' beliefs and perceptions about local produce, their lifestyle, and personal characteristics (e.g. age, income).

The second objective of the research is to find out, how nutrition information influences consumers' WTP for local tomatoes and strawberries. Also, the goal of the study is to define the interaction between consumers' prior knowledge of nutritional benefits and the new information, and their joint impact on consumers' WTP.

#### **1.4 Thesis Structure**

This thesis is organized as follows: Chapter 2 reviews relevant information and related literature of the objects being studied; Chapter 3 discusses the research methodology used to identify consumer preference in this study; Chapter 4 explains the survey design and data collection; Chapter 5 analyzes the empirical results; Chapter 6 concludes and makes recommendations. Appendices and references are listed at the end.

## Chapter 2: Literature Review

### 2.1 Local Fruit and Vegetables

#### *2.1.1 Background of Long-distance and Local Foods*

The system of long-distance food supply has now become the norm in much of the United States and the rest of the world. As recently as the 1950s most fruits and vegetables consumed in a particular state were produced locally. Long-distance shipping was impractical and expensive. However, the practicing of long-distance food shipment developed in the late 20<sup>th</sup> century with the development of technology and decreasing gasoline prices.

But, as with many trends that carry serious social and ecological consequences, the long-distance food habit is slowly beginning to weaken, under the influence of a local foods movement (Halweil, 2002). Grocery chains, such as Whole Foods or Bi-Lo, offer a variety of locally grown products.

State-funded programs, aimed at promoting agricultural products produced within the state, are growing in popularity (Carpio, 2009). Forty-four state departments of agriculture administer programs that are aimed at stimulating demand for foods that are produced within the state's boundaries through state-sponsored labeling and promotion activities (Batte et al, 2010). States tend to view such programs as a relatively inexpensive means to stimulate economic activity, especially in rural areas. Examples of some popular state programs include: "Kentucky Proud", "Ohio Proud", "Jersey Fresh", and "Virginia's Finest". The whole list of such programs is provided in Table 2.1. Such

programs rely heavily on the use of standardized logos or slogans, which are displayed on packaging and advertised on radio or television. The main functions of state promotion programs are: expanding consumer awareness of state-grown products, motivating them to buy local produce, and expanding existing markets domestically or internationally (Jekanowski, 2000). Previous research suggests that some of these state branding and promotion programs have been successful.

Table 2.1 State promotion programs in the USA

<b>State</b>	<b>Name of state-sponsored marketing program</b>	<b>Year Established</b>
Alabama	Alabama A+/ Buy Alabama's Best	2004
Alaska	Alaska Grown	1985
Arizona	Arizona Grown	1993
Arkansas	Naturally Arkansas	2002
California	CA Grown – Be Californian, Buy California Grown	2002
Colorado	Colorado Proud	1991
Connecticut	Connecticut Grown/ The Local Flavor	1986
Delaware	Grown Fresh With Care in Delaware	2007
Florida	Fresh From Florida	1990
Georgia	Georgia Grown/ Bring Georgia Home	2001
Hawaii	Hawaii's Seal of Quality	2006
Idaho	Idaho Preferred	2002
Illinois	Illinois Product/ Where Fresh Is	1987
Indiana	Premium Indiana Forest Products	2006
Iowa	Choose Iowa	2008
Kansas	Simply Kansas	2008
Kentucky	Kentucky Proud/ Nothing Else Is Close	1990
Louisiana	Certified Product of Louisiana	2001
Maine	Get Real. Get Maine.	2001
Maryland	Maryland's Best	2002
Massachusetts	Massachusetts Grown ... and Fresher!	n/a
Michigan	Select Michigan	2003
Minnesota	Minnesota Grown/ Tastes 2,000 Miles Fresher	1988
Mississippi	Make Mine Mississippi	1999
Missouri	AgriMissouri	1985
Montana	Montana Department of Agriculture Certified Organic	2007
Nebraska	Our Best to You	2006
Nevada	Nevada Grown	2002

Table 2.1 (continued)

<b>State</b>	<b>Name of state-sponsored marketing program</b>	<b>Year Established</b>
New Hampshire	New Hampshire's Own	2004
New Jersey	Jersey Fresh/ As Fresh as Fresh Gets	1983
New Mexico	Taste the Tradition/ Grown With Tradition	2000
New York	Pride of New York / Our Pride is Inside	1996
North Carolina	Gotta Be NC/ Goodness Grows in NC	1985
North Dakota	Pride of Dakota	1985
Ohio	Ohio Proud	1993
Oklahoma	Oklahoma Grown / Made in Oklahoma	1991
Oregon	Brand Oregon	2004
Pennsylvania	Pennsylvania Preferred/ Keep Pennsylvania Growing	2004
Rhode Island	Farm Fresh/ Rhode Island	2004
South Carolina	Certified SC Grown	2007
South Dakota	South Dakota Flavor	2002
Tennessee	Pick Tennessee/ Tennessee Farm Fresh	2008
Texas	Go Texan/ Pick the Best, Pick Texas	1999
Utah	Utah's Own	2002
Vermont	Buy Local, Buy Vermont	1980
Virginia	Virginia Grown	1989
Washington	From the Heart of Washington/ Our Farms to Your Table	2001
West Virginia	West Virginia Grown	1987
Wisconsin	Something Special From Wisconsin/ Savor Wisconsin/ Eat Local Wisconsin	1983
Wyoming	Wyoming First / Made in Wyoming	n/a

Note: State promotions programs statistics are taken from the respective state promotion program websites

For example, the “Jersey Fresh” program has been found to provide a \$32 return for fruit and vegetable growers for every dollar invested in the program (Govindasamy et al., 2003). A study conducted by the University of Kentucky in 2008 found that every dollar invested in Kentucky Proud generated up to \$4.70 in new farm income (Walker et al., 2010).

### ***2.1.2 Definition of “Local”***

“Local” is defined in various ways depending on geographic location, a common metric being a 100-mile radius from one’s home or within the state boundary (Mariola, 2008; Thompson et al, 2008; Adams and Salois, 2010; Martinez et al., 2010). In comparing locally grown products to those grown far away, a researcher calculates “the distance food travels from where it is grown to where it is ultimately purchased or consumed by the end user” (Pirog and Benjamin, 2003).

However, there is no general consensus on a definition in terms of the distance between production and consumption. Definitions related to distance may vary by regions, companies, consumers and local food markets. According to the 2008 Food, Conservation and Energy Act adopted by the US Congress, the total distance that a product can be shipped and still be considered “local” is less than 400 miles from its origin, or within the state in which it is produced (Martinez et al, 2010). The New Oxford American Dictionary (NOAD) defines a “locavore” as a local resident who tries to eat only food grown or produced within a 100-mile radius. However, the 100-mile radius measure is not a standard for local markets.

Distances that are perceived to constitute local may vary by region. Population density is important, because what is considered local in a sparsely populated area may be quite different from what constitutes local in a heavily populated region. This is often referred to as “flexible localism”, where “local” changes definition depending on the ability to source supplies within a short distance (Martinez et al., 2010)

However, the concept of “local” has grown to be not only about distance or origin of a product. There are many attributes that are associated with locally produced food. Such attributes are described in the next section.

### ***2.1.3 Benefits of Local Foods***

All of the above suggests that demand for niche products (organic, local, natural) has grown over the past years (Dimitri and Greene). Consumers value locally produced foods because they perceive the products to be better than conventional products. Thus, motives for “buying local” include perceived quality and freshness of local food, as well as nutritional value and methods of raising a product (Weatherall et al, 2003; Zepeda and Li, 2006). Access to local food has positive effect on consumers’ health, and has been observed to reduce obesity levels (Berning, 2012). This preference may translate to a willingness to pay a premium price for that product.

Several studies have pointed out that local foods have a higher nutrient content than foods that travel long distance. According to previous horticulture research, some types of locally produced berry and vegetable crops possess unique nutritional characteristics that are not present in conventional produce (Archbold et al, 2010; Archbold, 2010). A similar study on horticultural crops has found out that postharvest handling procedures, including storage, reduce nutritional quality of fruit and vegetables (Lee and Kader, 2000). More generally, local foods are fresher, and freshly picked foods have been found to contain more nutrients than less fresh foods (Lea, 2005). However, there is still a lack of literature on specific nutritional advantages of the local foods. Freshness seems to be the main cause in the nutrient content difference of local and conventional foods and the



specific connection between travel distance and nutrient content has not yet been established (Martinez, 2010).

Studies show that local food markets have impact on economic development and environmental quality. There is substantial evidence for the claim that the presence of various channels for the local exchange of foods enhances health, food-security, and well-being for individuals, communities, and ecological systems (Allen (ed.), 1993; Kloppenburg et al., 1996; Lyson and Green, 1999). For example, sustainable production practices, often employed in local food production, may reduce use of synthetic chemicals and energy-based fertilizers, are environmentally friendly, and limit chemical and pesticide residue on food (Martinez et al, 2010). Proximity also means that food travels less distance, which implies that less fuel is spent on shipment (Zepeda and Li, 2006). Local sourcing of fruit and vegetables is recommended for reducing environmental impacts associated with transport energy consumption. In fact, several studies have shown that importing apples resulted in 7 times higher carbon dioxide emissions than purchasing local apples (Jones, 2002). This characteristic of local food production is attractive to consumers who value high-quality foods produced with low environmental impact.

Empirical research has found that expanding local food systems in a community can increase employment and income in that community (Martinez et al, 2010). This creates an incentive for consumers to purchase local foods, to show that they are supportive of small scale agriculture and local rural communities (Hughes et al, 2008; Hinrichs, 2000; Sage, 2003). Local foods production is claimed to support the local communities and helps to keep decision-making power within the community rather than losing it through

dependence on external sources of food (Anderson and Cook, 2000). All of these benefits are drivers of consumers' willingness to pay for local foods.

Some researchers, however, deny the existence of all of the benefits of local foods. According to Lusk (Lusk and Norwood, 2012), consumers who are willing to pay higher price for locally produced foods, are buying overpriced goods that do not in fact contain the benefits that are traditionally associated with them.

There is a need for further research about specific benefits of local foods. This study will contribute to the debate by providing evidence about consumers' valuation of benefits of fresh local produce.

## **2.2 Consumer Willingness to Pay for Local Fruit and Vegetables**

Willingness to pay can be defined as “the amount of money represented by the difference between consumers' surplus before and after adding or improving a given food product attribute” (Rodriguez 2008). According to Lancaster Demand Theory (Lancaster 1966) a product may be viewed as a combination of attributes, and consumers derive utility from the attributes that a product possesses.

### ***2.2.1 Factors Affecting Consumer WTP***

Many recent studies have focused on finding determinants of consumers' willingness to pay for food products and their attributes (Jekanowski et al., 2000; Carpio, 2009; Loureiro, 2001; Krystallis and Chryssohoidis, 2005; Gao and Schroeder, 2009; Hu,

Woods and Bastin, 2011). It is possible to divide the factors affecting WTP into three major groups: demographics, beliefs or perceptions and knowledge of the product attributes.

**Demographic factors.** Demographic factors that may affect consumers' willingness to pay for a product may include age, sex, income, employment status, education, ethnicity, children, residential area, length of stay in the particular state etc. Socio-demographic characteristics of individuals that may influence their willingness to pay for local tomatoes and strawberries are hypothesized to be similar to those influencing consumer expenditures on fruits and vegetables in general (Nayga, 1995) and the factors included in other studies of consumer preferences for local products (e.g. Jekanowski et al., 2000; Carpio, 2009).

A study of WTP for state-grown products in South Carolina has found that age and income were positively correlated with consumers' willingness to pay for local produce. Neither the number of years in the state, nor the number of members in the household were found to be statistically significant. No statistical difference has been found between male and female consumers for local attribute in produce (Carpio, 2009). Another study that investigated willingness to purchase locally grown food products in Indiana (Jekanowski et al., 2000) showed that the willingness to purchase local food products increased with higher income and length of time the consumer has resided in the state. Education, on the other hand, had a negative effect on consumers' willingness to purchase local goods.

Females have been found more likely than males to purchase food produced locally. Neither family size, nor type of community (rural, small town, urban) was significant to the likelihood of purchasing locally grown items (Jekanowski et al, 2000).

**Consumers' beliefs, perceptions and lifestyle.** Besides demographic characteristics, a consumer's beliefs or lifestyle may influence his or her willingness to pay for a particular product. For example, a person who leads a healthy lifestyle may be willing to pay more for healthy foods.

Among factors affecting consumers' willingness to pay, it is possible to distinguish consumers' concerns about such characteristics of local foods as quality, nutrition, freshness and benefits for the environment of community. These characteristics are sometimes categorized into "private" and "public" good attributes (Williamson et al., 2012). Private attributes include benefits that are "privately appropriable in nature" (convenience, taste, quality, etc.), while public attributes include benefits for the environment or community (environmentally friendly, locally produced, supporting local economy, etc.) (Norse et al, 2010).

A number of WTP studies have found consumer perception of the quality of local produce to be a significant driver of consumers' willingness to pay for the local attribute (e.g. Jekanowski, 2000; Wolf et al., 2005; Darby et al., 2006; Carpio, 2008). Consumers of Missouri and Ohio have been found to primarily pay for the freshness of locally grown produce (Brown, 2000; Darby et al., 2006). Zumwalt (2001) found taste, quality, nutrition, and price as most important of the "private" attributes among residents of

Nebraska, Iowa, Missouri and Wisconsin. Freshness, quality and price were rated highest among residents of California (Wolf et al., 2005).

The study of WTP for Colorado-grown products has found that consumers' concerns about nutrition were the only statistically significant factor of WTP for the local attribute. Although wealthier and more educated consumers were willing to pay a premium for organic and GMO-free potatoes, they were not willing to pay more for Colorado-grown potatoes, unless accompanied by higher levels of quality (Loureiro, 2001). This implies that local attribute has a strong link with the quality attribute of a product.

Number of visits to farmers' markets was found to be unrelated to WTP for local products (Jekanowski et al, 2000). However, attitude towards cooking was found to significantly influence local buying behavior: people who enjoy cooking were found to buy more local foods (Zepeda, 2006). We may also expect people who regularly purchase fresh fruit and vegetables to be more willing to pay for local fresh produce.

Community Supported Agriculture involves direct sales of produce from a local farmer to consumers. Farmers are guaranteed a reliable income, because members of CSA pay for fresh fruit and vegetables in advance. The results of surveys of CSA members in the USA have shown that most of them have changed their diet towards fresher foods (Lea, 2005).

Another important group of factors in consumers' decision to pay more for local produce is the "public attributes" of the product: locally grown, environmentally friendly and supporting local economy. Consumers of California have been found to rate locally grown, environmentally friendly attributes as next highest to quality (Wolf et al., 2005).

A study of consumer perceptions in UK has found that consumers give high priority to

environmental benefits of foods, which may be translated into higher WTP for these foods (Weatherall et al., 2003).

Another attribute in this group is the so-called “hometown pride” (Scarpa, 2005). The concept of “hometown pride” (also called hometown bias, social function or ideological component) implies that people are willing to use consumption as a means to realize their social ideology (Darby et al., 2006). In some studies support for local farmers has been found as extremely important and positively correlated with WTP (Zumwalt, 2001; Toler et al., 2008). Consumers whose main motivation for buying local products was to support local farmers or state economy were willing to pay a higher premium relative to consumers, whose decision was driven by quality and price (Carpio, 2008). Estimating the social function and its effect on the willingness to pay for local produce may be helpful in determining the correct marketing strategy.

**Consumers’ knowledge of health benefits.** It is logical to assume that along with consumers’ characteristics and perceptions of product traits, their knowledge of a product’s intangible benefits (such as health or nutritional value) may be an important driver of WTP (Ehmke et al, 2008; Lusk and Parker, 2009; Lusk and Briggeman, 2009).

However, one must distinguish between consumers’ prior knowledge of health benefits and the information given exogenously (Hu et al, 2011). It is not yet clear whether exposure to exogenous information (e.g. TV or radio ads, nutrition labels, etc.) and consumers’ prior knowledge of health benefits have a different effect on their WTP and what is their joint impact.

Both private marketers and public organizations attempt to understand consumer response to exogenous information about health and nutrition benefits of a product (Bond, Thilmany and Bond, 2008). Food labels contain a wide variety of nutrient and health claims, depending on what information is allowed according to government regulations. Previous findings give mixed results regarding consumer behavior and nutrition, health and production process information. While some studies found significant effect of front-label health claims on WTP (Roe, Levy, and Derby, 1999; Wansink, Sonka, and Hasler, 2003), other studies suggest that front-label claims did not affect consumer preferences (Keller et al., 1997; Mitra et al., 1999; Williams, 2005).

Little attention has been given to consumers' prior knowledge of health benefits, and its interaction with exogenous information exposure. In the study of WTP for blueberry products (Hu et al., 2011) consumers' prior awareness of the health benefits has been found to have a positive impact on WTP. Another finding of this study was that consumers' exposure to health benefits information may have positive effect on their willingness to pay for some products. However, when both sources of information are available to consumers, in other words, when health benefits information is given while consumers already know some of the benefits, their joint impact (although still positive) may be smaller (Hu et al., 2011). This implies that advertising of health information may not be as useful for consumers who are already aware of the health benefits of a product.

### ***2.2.2 Method of WTP Elicitation***

There are two general ways of estimating the economic values of attributes of goods: using revealed preferences and stated preferences.

**Revealed Preferences.** The concept of “Revealed Preferences” (RP) was pioneered by American economist Paul Samuelson. His first mention of the concept is in his paper (Samuelson 1938), where he initially calls it as “selected over”. According to Samuelson, preferences of consumers can be revealed by their purchasing habits. In his work Samuelson presented the Weak Axiom of Revealed Preferences:”If an individual selects batch one over batch two, he does not at the same time select two over one”. The concept of revealed preferences was later extended by Houthakker (Houthakker, 1950), who presented his Strong Axiom of Revealed Preferences. Samuelson (1953) later summed up all of the consumer theory in the Fundamental Theorem of Consumption Theory. RP conditions were later tested on different sorts of data, including individual household consumption data.

The advocates of Revealed Preference Approach say that the Strong Axiom of Revealed Preferences provides a necessary and sufficient condition for observed choices to be consistent with utility maximization, as well as provides a useful tool for empirical, nonparametric analysis of consumer choices (Varian, 2005). One of the critiques of RP approach is that unlike in the two-good world, in the real world it is impossible to observe what good or set of goods or behavioral options were discarded in preference of purchasing the chosen good.

Revealed Preferences approach is often used to measure demand for food products. One of the first ones to look at the household data was Koo (1963). Later followed similar studies that used revealed preference approach (Dobell, 1965; Manser and McDonald, 1988; Famulari, 1995). Recent studies in the area of food consumption field have used scanner data, which reveal the actual consumer behavior (Zhang, 2006; Glaser, 1999;



Jones, 2006; Huffman, 2005; Schulz, 2010). Scanner data have also been used by some recent studies that focused on the impact of nutrition information on consumers (Kiesel, 2010; Shiratori, 2011).

**Stated Preferences.** In our study we are concerned with the “Stated Preferences” (SP) approach for eliciting WTP.

While revealed preference analysis tries to elicit individuals’ willingness to pay from observing their behavior in real life, stated preference techniques use hypothetical questions, like a market research interview (Varian 2005). Stated preference approach involves the use of surveys or questionnaires to establish people’s hypothetical willingness to pay for a particular product or its attribute.

The stated preference approach is believed to have an advantage over revealed preferences approach because an SP researcher has more control over information provision than an RP researcher. Stated preferences techniques ask respondents to rate, rank or choose between different hypothetical product scenarios, which contain different attribute mixes (Abley, 2000). These scenarios can be defined in great detail to make inferences about individuals’ willingness to pay for goods or specific attributes of goods. Stated preference approach is more flexible than revealed preference and can be potentially applied in different valuation contexts (Varian, 2005).

One of the major critiques of the stated preference approach is that it may produce results that are different from those in real life. It is often unclear how individuals make their choices during experiments (Abley, 2000). Individuals do not have to back up their choices with real commitments when they answer the survey questions, which leads to

inconsistencies with their actual behavior in real-life situations (Wardman, 1991). However, SP approach has its advantages, and it is a less expensive, less effort- and time-consuming method that yields results that are often consistent with RP approach. Ideally, SP method is used to obtain preliminary results that can be further confirmed or rejected by the RP method.

**Direct method: contingent valuation.** Within the stated preferences approach it is important to distinguish contingent valuation and conjoint analysis (choice modeling). In contingent valuation consumers are asked directly about their WTP (“How much are you willing to pay?” or “Are you willing to pay \$X?”). Conjoint analysis (choice modeling) uses a variety of procedures to infer WTP from sets of ratings of alternative options suggested to consumers (Pearce, 2002).

The elicitation technique used in contingent valuation (CV) studies is of four major types: payment card, the bidding game, open-ended and dichotomous choice approach (Boyle et al, 1996).

The open-ended question asks the respondents the maximum amount they are willing to pay for a good or a service. In the bidding game a respondent is suggested a random bid out of a series of predetermined bids. The respondent is asked to accept or reject the bid, and the game continues until “the highest possible response is recorded” (Mitchell and Carson, 1989). The bidding game is the oldest elicitation technique. The second oldest technique is the payment card (e.g. Loureiro, 2002; Hu et al, 2011). Payment card approach contains a range of WTP values for a good, from which the individuals must choose their maximum WTP amount. Dichotomous choice approach can be single-

bounded or double-bounded. In single-bounded DC respondents have to say yes or no to a single WTP amount or bid (e.g. Giraud, 2005). In the double-bounded DC approach the respondents are asked to say yes or no to a bid, and then to accept or decline a higher/lower bid (Pearce, 2002; Venkatachalam, 2003).

Payment card method and dichotomous choice formats are the most recommended techniques (Pearce, 2002). Payment card is more informative and cheaper to implement than dichotomous choice. It is also believed to be superior to bidding games and open-ended questions. Dichotomous choice encourages truth-telling and facilitates respondents to complete the valuation process (Pearce, 2002; Venkatachalam, 2003). The disadvantage of dichotomous choice format is that it may elicit the respondents' maximum willingness to pay, not the actual willingness to pay. Payment card's disadvantage is its vulnerability to range and center biases (Venkatachalam, 2003).

The payment card approach for WTP elicitation was developed by Mitchell and Carson to evaluate WTP in environmental and resource projects (1989). Many studies have used the payment card method to measure individuals' WTP for public goods (e.g. Brox et al., 2003; Collins et al., 2007; Gayathri et al., 2009), but Hu et al. (2006) and Hu (2006) adopted this approach in the context of food products. In modern payment card approach values of possible price intervals are usually listed directly under the WTP question rather than on separate cards. Hu et al. (2011) also used a modified payment card approach, where respondents were offered an option to indicate that they do not wish to purchase the product, which allowed to capture zero prices, as opposed to referring zero prices from the data. Respondents were given a reference price interval showing the market price ranges for the good (Hu et al., 2011).

**Indirect method: conjoint analysis.** Conjoint analysis (choice modelling) is an indirect method of WTP elicitation. It is based on the idea that a good can be described in terms of its attributes or characteristics. Conjoint analysis differs from contingent valuation in that consumers are asked to provide rankings or ratings, rather than values for goods. An advantage of such approach is that it may help to avoid protest votes, because people may find it easier to rank alternatives, rather than specify amounts in money terms (Pearce, 2002).

The four main approaches used in conjoint analysis include: choice experiments, contingent ranking, contingent rating and paired comparisons.

In choice experiments respondents are presented with a baseline scenario, which corresponds to status quo, and several (usually two) alternative options, in which specified attributes are changed in quantity. The attributes usually include a money value. Usually the options given are “A, B or neither” (Pearce, 2002).

Contingent ranking presents the individual with several options that differ in the attribute availability. Individuals are asked to rank the given options in terms of desirability (Pearce, 2002).

Contingent rating offers the respondents a scenario and asks them to rate it on a scale (e.g. from 1 to 10). Then respondents are presented with another scenario and asked to rate it.

Pairwise comparisons present the same options as the choice experiments, but respondents must also indicate their strength of preference for their choice (Pearce, 2002).

Conjoint analysis has been frequently used in transportation, and environmental valuation literature (Adamowicz et al., 1998; Louviere, 2000). In addition, conjoint analysis is often used in marketing studies that investigate consumers' willingness to pay for specific food attributes, such as organic, locally grown, nutritional etc (Baker, 1999; Batte and Hu, 2010; Wirth et al., 2011).

## **Chapter 3: Research Methodology**

The purpose of this chapter is to explain in detail the methodology used in data collection and analysis. The first section of this chapter describes how the survey questionnaire was designed and explains how the data was collected. Section 3.2 details the bivariate tobit choice model and willingness to pay analysis which serve as the theoretical framework of this study.

### **3.1 Survey Design and Implementation**

#### ***3.1.1 Context of the survey***

The New Crop Opportunity Center initiated a project examining various nutritional differences across local produce varieties and local distribution systems. Dr. Doug Archbold, professor in the University of Kentucky Horticulture Department and the principle investigator for this project, provided preliminary results from this project to be included in the Fresh Food and Health Food Consumer Survey. This information provided consumers being asked about willingness to pay for selected local products with some general health benefits, but also a research perspective on local varieties or production.

Tomatoes and strawberries have been chosen by the investigators because they are representative fresh produce items commonly grown in Kentucky and Ohio that possess unique nutritional characteristics, as suggested by related previous research (Archbold, 2010). According to this research carried out Dr. Archbold, nutritional benefits (such as lycopene in tomatoes and vitamin C antioxidant in strawberries) are directly associated

with local varieties and production practices. Thus, vine-ripened tomatoes must be sold locally, because they have much shorter life than tomatoes that were picked green. However, this kind of tomatoes contains significantly higher amounts of lycopene than tomatoes that can withstand long storage time and long-distance shipment. Also the investigators chose the varieties of strawberries commonly grown in KY and OH and ranked them according to vitamin C they contained. All of this information is contained in the preamble to the WTP questions.

### ***3.1.2 Survey design***

The data are taken from a web-based survey “Fresh Food and Health Food Consumer Survey” administered by MarketTools, Inc. using their Zoomerang software. Two thousand adult residents of Kentucky and Ohio were targeted in the survey during June 2011 to assess consumer preferences concerning local fresh and healthy food products. The survey was developed according to best practices (Dillman, 2007). A total of 1,040 from Kentucky and 1,072 from Ohio were eventually completed. This survey was part of the Kentucky Food Consumer Survey series conducted periodically by the University of Kentucky Department of Ag Economics.

The choice of consumer focus limited to Kentucky and Ohio was conditioned by the necessity to connect potential local food producers in this region and their corresponding local consumer community. With this objective in mind, it would not make much sense to do a national survey, because a local survey would be more helpful for understanding the local market conditions. The states of Ohio and Kentucky were chosen as a result of a

project collaboration between Ohio State University and the University of Kentucky Food Systems Innovation Center. Several questions in the survey that contain state-specific language differ for respondents from Kentucky vs respondents from Ohio.

Respondents were offered one of the three survey versions, which differed by the amount of nutritional information provided in a preamble to the payment card examining WTP in two experiments; one for tomatoes and another for strawberries. The versions varied by how much nutrition information was provided to the consumer related to both strawberries and tomatoes, otherwise they were identical. A total of six versions of the survey were distributed – three versions by degree of nutrition information to each of the two states. Regarding the nutrition information specifically, Version A has the most extensive information (a text and a graph) included as a preamble to the willingness-to-pay question, version B has text only, and version C omits any nutritional information. All versions were randomly assigned to respondents. In total, 687 respondents got version A, 730 respondents were presented with version B, and 695 individuals filled out version C. The nutrition preamble contains information related to research made by investigators at Department of Horticulture at University of Kentucky, as well as from studies connected with the American Cancer Society and the Food and Drug Administration.

Version A of the survey may be found in Appendix A.

The preamble contained in version A is presented below. Version B provided the same information, but without the graphics.



## Fresh Tomatoes

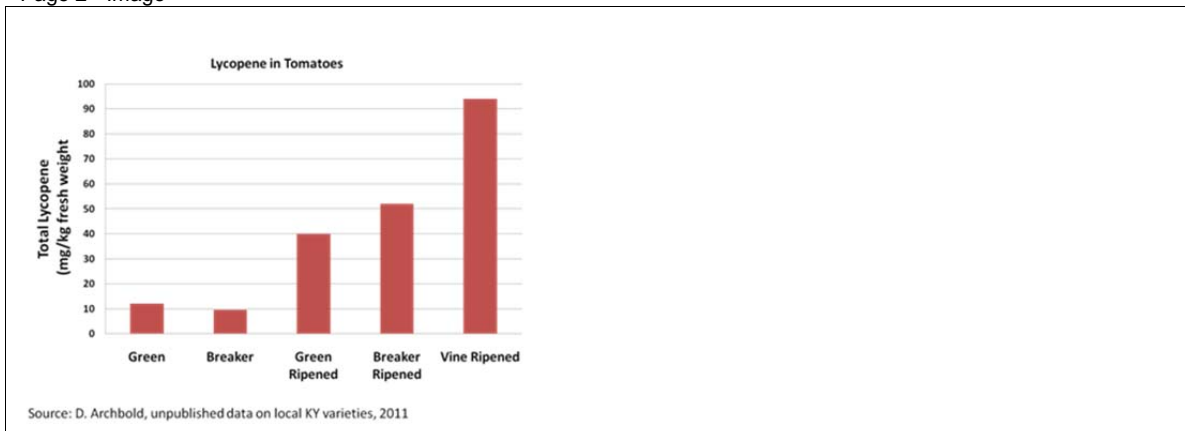
Please read the background text on nutrition carefully

Fresh tomatoes are rich in lycopene. The following quote about lycopene comes from the American Cancer Society - "Proponents claim that lycopene may lower the risk of heart disease; macular degenerative disease, an age-related illness that can lead to blindness; and lipid oxidation, the damage to normal fat molecules that can cause inflammation and disease. It is also said to lower LDL ("bad" cholesterol), enhance the body's defenses, and protect enzymes, DNA, and cellular fats."

The FDA currently restricts specific health claims associated with lycopene, citing current research to be inconclusive.

A study from the University of Kentucky shows that lycopene depends substantially on when the tomato is harvested. Tomatoes artificially ripened from the "green" or "breaker" stages have less lycopene than tomatoes left to fully ripen on the vine.

Page 2 - Image

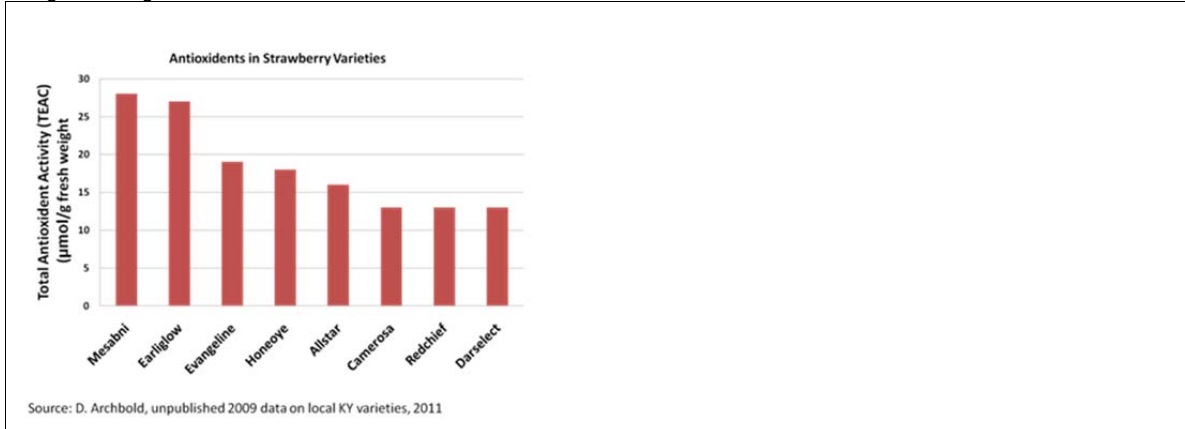


## Strawberry Health Benefits

Strawberries can be good for vision. Three or more servings of fruit per day may lower your risk of age-related macular degeneration (ARMD). A research study in Archives of Ophthalmology reported a 36% lower incidence of ARMD compared with persons consuming 1.5 servings of fruit daily.

One serving of strawberries provide 136% of the daily value of vitamin C.

Strawberries, as noted by Kentucky researchers looking at local varieties, are high in antioxidants and thus help prevent damage in all of the body's organ systems.



Before being presented with the preamble, respondents were asked about their awareness of particular health benefits of strawberries and tomatoes:

My understanding of the specific health benefits associated with fresh tomatoes is:

- I don't know
- I assume it's the same as most fresh fruits
- I know the specific health benefits

My understanding of the specific health benefits associated with fresh strawberries is:

- I don't know
- I assume it's the same as most fresh fruits
- I know the specific health benefits

These questions meant to discover the consumers' prior familiarity with health benefits of local fresh tomatoes and strawberries. The importance of these questions is that they help to understand the impact of new nutritional information on those consumers who are and those who are not aware of particular health benefits of tomatoes or strawberries.

The questions that are of particular interest to this study are the ones asking about consumers' WTP for local fresh tomatoes and strawberries.

The WTP questions (also contained in Appendix A) are presented below:

What is the maximum price you would be willing to pay for:

One (1) pound of fresh local tomatoes fully ripened on the vine

For comparison purpose, 1 pound of tomatoes is typically sold for between \$1.50 and \$2.50 per pound in a grocery store.

Please indicate your choice (and price willing to pay) below:

- I do not wish to buy this product
- \$1.00
- \$1.20
- \$1.40
- \$1.60
- \$1.80
- \$2.00
- \$2.20
- \$2.40
- \$2.60
- \$2.80
- \$3.00
- more than \$3.00

What is the maximum price you would be willing to pay for:

One (1) pint of fresh local strawberries

For comparison purpose, 1 pint of strawberries is typically sold for between \$1.50 and \$3.00 per pint in a grocery store.

Please indicate your choice (and price willing to pay) below:

- I do not wish to buy this product
- \$1.00
- \$1.25
- \$1.50
- \$1.75
- \$2.00
- \$2.25
- \$2.50
- \$2.75
- \$3.00
- \$3.25
- \$3.50
- \$3.75
- \$4.00

- \$4.25
- \$4.50
- \$4.75
- \$5.00
- More than \$5.00

The price intervals that consumers were offered as answer options to WTP questions were based on prices in local retail stores at that time period (June 2011).

In the survey, respondents were asked to provide standard demographic information, such as age, gender, race, number of children, educational attainment, average annual income, area of residence, and length of their residence in the state. Some questions contained “Prefer not to say” option, that allowed respondents not to answer the question. Survey-takers were also asked about their beliefs and perceptions concerning local and fresh fruit, as well as their shopping and eating habits. All questions of the survey can be found in Appendix A.

Even though online surveying has been critiqued for selection bias and authenticity of the sample population (Lindhjem and Navrud, 2011b), this is an efficient method regarding time, cost and accuracy. In addition to similar or better response rates for internet-based surveys (Hu et al, 2010; Smyth, Dillman, Christian, & O’Neill, 2010), some studies found that socio-demographic characteristics of respondents were not statistically different from a paper-based survey (Fleming & Bowden, 2009) or face-to-face interview (Lindhjem & Navrud, 2011a). It may be argued that certain segments of population (mostly rural, low-income residents with no easy web access) could be underrepresented in the data, because of the web-based character of the survey. However, we believe that most primary food shoppers do have internet access, and the general trends have been successfully captured within this segment by means of this survey mechanism.

In order to confirm clarity and operability of the web instrument, a pilot test was conducted with twenty five individuals. These individuals gave their feedback concerning accuracy and clear understanding of the questions. The pretest was timed, in order to inform the actual survey respondents about the approximate time length of the survey (8 minutes). The standard survey process and content was approved by the University of Kentucky Internal Review Board.

### **3.2 Hypotheses**

Based on previous findings and survey questions, we have formulated several hypotheses about factors that may affect consumers' WTP for local foods. The hypotheses are presented below.

- 1) The more nutritional information is provided to consumers – the higher is their willingness to pay for local produce
- 2) Prior knowledge of nutritional benefits of local foods contributes to higher willingness to pay for the local foods
- 3) While both new nutritional information and consumers' prior knowledge of nutritional benefits are positively correlated with the consumers' WTP for local produce, their joint impact is smaller. This may be explained by the fact that consumers who already possess some nutritional knowledge do not benefit so much from the new nutritional information provided to them.
- 4) Consumers' beliefs and perceptions of benefits associated with local foods have an impact on their WTP:

- If consumers believe that local foods are healthy, they are willing to pay a premium for a local product.
- Consumers who believe that local foods are of high quality are also willing to pay a higher price for them.
- If consumers think that local foods are environmentally friendly, they are willing to pay more for a local product.
- Consumers who believe that purchasing local products supports local economy, are willing to pay more for the local foods.

5) Consumers' lifestyle has an impact on their WTP for the local foods:

- Consumers who purchase and / or cook fresh produce frequently are more likely to be willing to pay a premium for the local foods.
- Consumers who own a separate freezer are probably less likely to pay a premium for the local foods. This is because such consumers are probably price-sensitive and tend to buy in bulk.
- Consumers who eat fast food frequently are likely to be willing to pay less for fresh produce.
- Individuals who are familiar with the CSA (Community Supported Agriculture) model are likely to be willing to pay a premium for fresh fruit and vegetables.

6) Demographic characteristics have an impact on consumers' WTP for local foods. We hypothesize that consumers with higher income, higher education level, who live in

urban areas, have children, are main shoppers in the household, and have lived in the state for a longer period of time, will be willing to pay a higher price for the local products.

### 3.3 Choice Model

Based on the research question and the data available, several models have been used to estimate the relationship between consumers' WTP for local tomatoes and strawberries and other factors, such as consumers' characteristics, perceptions, lifestyle, and nutrition knowledge.

OLS model has been used to initially estimate the effects of different factors on WTP:

$$y_i = x_i' \beta + e_i \quad i = 1, 2, \dots, n$$

Where  $y_i$  is a vector of dependent variable values that correspond to each individual's answer to the WTP question presented in the survey (see section 3.1.2.);  $x_i$  is a vector of independent variable values,  $\beta$  is the vector of unknown parameters to be estimated, and  $e_i$  is the error term.

However, given the nature of the data and the fact that we have two dependent variables (WTP for local tomatoes and WTP for local strawberries) that are likely to be interrelated, it seemed plausible to estimate SUR OLS (seemingly unrelated regressions) model that would allow us to capture the interaction between the two regressions:

$$\begin{cases} y_{1i}^* = x_{1i}' \beta_1 + \varepsilon_{1i} \\ y_{2i}^* = x_{2i}' \beta_2 + \varepsilon_{2i} \end{cases}$$

where  $y^*$  is the unobserved dependent variable.

The dependent variable (WTP for local tomatoes/strawberries) has the lower limit (“0”), which corresponds to the “I do not wish to buy this product” answer in the survey. The next available answer option in the survey is “\$1.00”. This means that zeroes in the data for these two variables (WTP for local tomatoes and WTP for local strawberries) may in reality be a range of numbers from negative up to 1 (not inclusive). This creates the need to use a model that accounts for the existence of a lower limit in the data. Such a model is Tobit model.

The traditional univariate Tobit model is the censored normal regression model:

$$y_i^* = x_i' \beta + e_i \quad i = 1, 2, \dots, n$$

Where  $\beta$  is  $K \times 1$  column vector of unknown parameters,  $x_i$  is a  $1 \times K$  row vector of explanatory variable values, and  $\varepsilon_i$  are residuals that are independently and normally distributed with zero mean and a common variance  $\sigma^2$  (Fahs et al, 2001).

The dependent variable (WTP for strawberries/tomatoes) is censored from below at zero. This is conditioned by the fact that our sample has zeroes and positive values.

$$y = \begin{cases} y^* & \text{if } y^* > 0 \\ 0 & \text{if } y^* \leq 0 \end{cases}$$

Where  $y^*$  is the unobserved dependent variable, and  $y$  is the observed dependent variable.

The likelihood function for this model is:



$$L = \prod_{y_i=0} [1 - F\left(\frac{x_i\beta}{\sigma}\right)] \prod_{y_i>0} [\sigma^{-1} f\left(\frac{y_i - x_i\beta}{\sigma}\right)]$$

Where F and f are the cumulative distribution and density functions of the standard normal distributions, respectively.

Considering the nature of the data and the possible interrelation of the two regressions, we may hypothesize that Bivariate Tobit is the most appropriate model to be used. Bivariate Tobit is a system of two seemingly unrelated univariate Tobit models.

Bivariate Tobit model is a two-equation model in which errors are assumed to have zero mean, to be independent across individuals and homoscedastic.

$$\begin{cases} y_{1i}^* = x'_{1i}\beta_1 + \varepsilon_{1i} \\ y_{2i}^* = x'_{2i}\beta_2 + \varepsilon_{2i} \end{cases}$$

For a given individual, the errors are correlated across equations (Raymond et al, 2008):

$$E(\varepsilon_{1i} \varepsilon_{2i}|X) = \sigma_{12}, \text{ and } \sigma_{12} \neq 0$$

The main concern is to estimate the two parameter vectors  $\beta_1$  and  $\beta_2$  in the two-equation model derived from a latent variable model (Amemiya, 1979; Lee, 1993). We assume that explanatory variables satisfy the conditions of exogeneity, such that  $E(x_{1i}, \varepsilon_{1i})=0$  and  $E(x_{2i}, \varepsilon_{2i})=0$ . Another assumption is that covariance of error terms across equations is  $\text{cov}(\varepsilon_{1i}, \varepsilon_{2i}) = \sigma_{12}I_N$ .

The three types of marginal effects in the Tobit model are:

- a) Marginal effects for the latent variable – these are coefficients:

$$\frac{dE(y^*)}{dx} = \beta$$

For example, these are the marginal effects on the desired ambulatory expenditures.

- b) Marginal effects for the truncated sample (with only positive amounts omitting zeroes)

$$\frac{dE(y|y > 0)}{dx} = \left[ 1 - \frac{x'\beta}{\sigma} * \lambda * \left( \frac{x'\beta}{\sigma} \right)^2 \right] \beta$$

For example, these are marginal effects on the actual ambulatory expenditures for those who have them.

- c) Marginal effects for the censored sample (Tobit model)

$$\frac{dE(y)}{dx} = \beta \Phi\left(\frac{x'\beta}{\sigma}\right)$$

The marginal effects show the highest impact of the independent variables for the latent variable, less impact for the censored sample, and even less impact for the truncated sample.

## **Chapter 4: Data Description**

The first section of Chapter 4 presents the comparison of the sample to the state population and description of variables. Section 4.2 presents descriptive statistics of the sample.

### **4.1 Description of Variables and Demographic Characteristics of the Representative Sample**

Descriptive statistics for the sample, with comparisons to the 2010 American Community Survey (US Census Bureau, 2010), are reported in Table 4.1. Results suggest that our sample somewhat under-represented non-white and male residents. Respondents in the youngest age category were somewhat underrepresented in both states, and consumers older than 35 years were modestly over-represented. Since the survey was done by internet and sample only included individuals who are older than 18 years old, the average age was higher for the sample than for the census. Respondents with education level of high school and lower were slightly underrepresented in the sample, while those with higher educational attainment were overrepresented. This may be explained by the computerized nature of the survey and the fact that people with higher education level also have more access to computer and internet. Income distribution appears to be slightly biased compared to the state distribution, because respondents with higher income seems to be somewhat underrepresented in the sample. Still, we judge the sample to be a reasonable representation of the population of the two states.

Table 4.1 Demographic Characteristics of Representative Sample

Variable	Kentucky		Ohio	
	Sample	State	Sample	State
Number of respondents	1,040	4,339,367	1,072	11,536,504
Male (%)	30.5	49.2	31.8	48.8
White (%)	93.1	87.8	92.4	82.7
Age distribution (%)				
Under 18	0.3	23.6	-	23.7
18-24	3.4	9.5	4	9.5
25-34	11.8	13.0	10.6	12.2
35-44	15.7	13.3	15.2	12.8
45-54	27.4	14.8	24.3	15.1
55-64	25.3	12.4	26.6	12.6
Over 64	15.7	13.3	19.1	14.1
Education (%)				
Less than 9 <sup>th</sup> grade	0.6	3.3	0.3	7.7
Some high school	2.1	8.6	1.8	10.4
High school graduate	25.0	35.2	23.4	34.3
Some college	26.0	20.5	26.1	20.2
Associate degree	11.4	7.8	12.4	6.8
Bachelor's degree	20.2	15.7	22.7	12.4
Graduate/professional degree	14.3	8.9	13.2	8.1
Rather not say	0.4		0.2	
Annual household income (%)				
Under 15,000	8.7	11.7	8.3	14.7
15,000-24,999	11.0	11.0	9.6	12.7
25,000-34,999	12.8	11.5	12.5	11.7
35,000-49,999	17.0	15.3	15.2	15.3
50,000-74,999	19.7	20.0	20.6	18.8
75,000-99,999	11.8	13.4	12.5	11.5
100,000-149,999	6.3	11.4	7.5	10.0
150,000-199,999	1.5	3.1	2	2.9
200,000 and up	0.9	2.6	0.9	2.4
Rather not say	10.4		10.9	

Note 1: State population statistics are based on the 1-year estimates of the 2010 American Community Survey (U.S. Census Bureau).

Note 2: State statistics on education attainment is based on population over 25 y.o., while the sample contains respondents of 18 y.o. and older.

Description of variables utilized in the WTP model and the survey, along with the descriptive statistics are presented in Tables 4.2 and 4.3 respectively.

Table 4.2 Description of variables

Variable	Definition
Willingness to pay for local tomatoes	Continuous variable; price that consumers are willing to pay for local tomatoes
Willingness to pay for local strawberries	Continuous variable; price that consumers are willing to pay for local strawberries
Awareness of health benefits of local tomatoes:	
- Don't know	Dummy variable; don't know=1
- Same as other fruits	Dummy variable; assume same as other fruits=1
- Know	Dummy variable; know=1
Awareness of health benefits of local strawberries	
- Don't know	Dummy variable; don't know=1
- Same as other fruits	Dummy variable; assume same as other fruits=1
- Know	Dummy variable; know=1
Male	Dummy variable; male=1
AGE	Continuous variable; actual age
Shopper	Dummy variable; Does at least half of household food shopping=1
Children under 18	Dummy variable; Has children under 18=1
Education	Continuous variable; years of education
Annual Household Income	Continuous variable; annual household income in \$10,000
Employed (includes full-time, part-time, self-employed)	Dummy variable; 1 if employed full-time, part-time or self-employed
White	Dummy variable; white=1
Urban	Dummy variable; city resident=1
Suburban	Dummy variable; suburbs resident=1
Rural	Dummy variable; small town/farm/countryside resident =1
Lived in Kentucky/Ohio	Continuous variable; years lived in Kentucky/Ohio
How often do you purchase fresh tomatoes?	Continuous variable; tomato purchase frequency per month
How often do you purchase fresh strawberries?	Continuous variable; strawberry purchase frequency per year
How familiar are you with the Community Supported Agriculture (CSA) marketing model?	Categorical variable; 1=Never hear of it; 2=May have heard of it, but not sure what it means; 3=I'm very familiar with it, but have not been associated with one; 4=I have formerly been associated with one; 5=I am currently or preparing to become a member
How often do you prepare fresh food at home?	Count variable; times per month
Do you have a freezer?	Dummy variable; yes=1
Do you purchase fresh organic fruits or vegetables?	Categorical variable; 1=Almost never; 2= Yes, if they are on sale or close to the same price as regular products; 3=Yes, and will pay a small premium above comparable regular products; 4=Yes, I almost always will choose an organic option if it is available
Questions about consumers' beliefs:	
Please provide your general opinion below to the following statements	Categorical variables; 1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree
How often do you eat fastfood?	Count variable; number of fastfood meals per month
Version 1	Dummy variable; 1 if individual was presented with Version A
Version2	Dummy variable; 1 if individual was presented with Version B

## 4.2 Descriptive Statistics

The average age of the sample is 52 years old, and average annual income is \$56,700. With education levels ranging from high school to graduate or professional degrees, average number of years of education is 14. The sample contains mostly individuals of Caucasian race, and female respondents prevail over male. The average number of years spent in the state of origin is 13.96, which means that the sample mostly contains people who have been living in the same state for years. All residential areas are represented in the sample, but most of the population is suburban or rural.

Additional details of the sample are presented in Table 4.4. The table contains percent frequencies of consumers' awareness of health benefits of tomatoes and strawberries, as well as their willingness to pay for local tomatoes and strawberries. As it follows, most consumers assume that health benefits of fresh tomatoes and strawberries are the same as those of most fresh fruits (47% and 55% respectively). Fewer respondents stated that they know the exact health benefits of local tomatoes and strawberries (39% and 30%). Very small percentage of respondents (around 13%) said that they are not aware of health benefits of local tomatoes and strawberries.

With prices ranging from \$0 to \$3.5 for one pound of local fresh vine-ripened tomatoes, the average price that consumers were willing to pay for local tomatoes was \$1.83. While the prices that consumers were willing to pay for a pound of local fresh strawberries ranged from \$0 to \$5.5, the average willingness to pay for \$2.19. A more detailed distribution of prices that consumers were willing to pay for local tomatoes and strawberries is presented in Table 4.4.

Table 4.3 Descriptive Statistics

Variable	Unit	Mean	Stand. Dev.	Min	Max
Male	Yes/No	0.31	0.46	0	1
AGE	YEARS	51.92	15.15	10	75
Shopper	Yes/No	0.93	0.25	0	1
Children under 18	Yes/No	0.29	0.45	0	1
Education	years	14.4	2.72	7	20
Annual Household Income	\$10,000	5.67	3.86	0.7	25
Employed	Yes/No	0.51	0.49	0	1
White	Yes/No	0.92	0.27	0	1
Residential area					
Urban	Yes/No	0.18	0.38	0	1
Suburban	Yes/No	0.42	0.49	0	1
Rural	Yes/No	0.4	0.49	0	1
Lived in Kentucky/Ohio	years	13.96	3.19	0.5	15
Willingness to pay for local tomatoes	dollars	1.83	0.75	0	3.5
Willingness to pay for local strawberries	dollars	2.19	0.88	0	5.5
Awareness of health benefits of local tomatoes:					
- Don't know	Yes/No	0.12	0.33	0	1
- Same as other fruits	Yes/No	0.47	0.5	0	1
- Know	Yes/No	0.39	0.49	0	1
Awareness of health benefits of local strawberries					
- Don't know	Yes/No	0.13	0.34	0	1
- Same as other fruits	Yes/No	0.55	0.5	0	1
- Know	Yes/No	0.3	0.46	0	1
How often do you purchase fresh tomatoes?	Per month	2.01	1.7	0	6
How often do you purchase fresh strawberries?	Per month	4.84	2.85	0	8
Q7 How familiar are you with the Community Supported Agriculture (CSA) marketing model?	Category	1.54	0.75	1	5
How often do you prepare fresh food at home?	Per month	5.96	3.03	0	8.5
Do you have a freezer?	category	2.44	0.56	1	3
Do you purchase fresh organic fruits or vegetables?	category	1.76	0.78	1	4
Food grown in my local community is healthier	category	3.72	0.82	1	5
I buy food locally to improve my family's lifestyle	category	3.43	0.89	1	5
We can save lots of energy resources by producing our food nearby	category	3.95	0.84	1	5
Producing food locally significantly improves our local economy	category	4.15	0.79	1	5
Buying food locally keeps small farmers in business.	category	4.19	0.77	1	5
How often do you eat fastfood?	Per month	5.06	6.93	0.5	40
Version 1	Yes/No	0.33	0.47	0	1
Version2	Yes/No	0.35	0.48	0	1

Table 4.4 Percent Frequencies of Respondents' Knowledge of Nutritional Benefits and  
WTP for Local Foods

Question	Frequency	Percent Frequency
Awareness of the health benefits of fresh tomatoes		
I don't know		
I assume its as most fresh fruits	260	12.47
I know	999	47.91
	826	39.62
Awareness of the health benefits of fresh strawberries		
I don't know	281	13.52
I assume its as most fresh fruits	1158	55.7
I know	640	30.78
Willingness to pay for local tomatoes		
1) I do not wish to buy	139	6.58
2) \$1.00	178	8.43
3) \$1.20	104	4.92
4) \$1.40	140	6.63
5) \$1.60	246	11.65
6) \$1.80	191	9.04
7) \$2.00	553	26.18
8) \$2.20	62	2.94
9) \$2.40	104	4.92
10) \$2.60	121	5.73
11) \$2.80	63	2.98
12) \$3.00	188	8.90
13) More than \$3.00	23	1.09
Willingness to pay for local strawberries		
1) I do not wish to buy	85	4.02
2) \$1.00	105	4.97
3) \$1.25	75	3.55
4) \$1.50	253	11.98
5) \$1.75	185	8.76
6) \$2.00	414	19.60
7) \$2.25	107	5.07
8) \$2.50	335	15.86
9) \$2.75	68	3.22
10) \$3.00	252	11.93
11) \$3.25	59	2.79
12) \$3.50	60	2.84
13) \$3.75	19	0.90
14) \$4.00	65	3.08
15) \$4.25	2	0.09
16) \$4.50	15	0.71
17) \$4.75	2	0.09
18) \$5.00	7	0.33
19) More than \$5.00	4	0.19



## **Chapter 5: Empirical results**

This chapter presents survey results and analysis in four sections. Section 5.1 describes variables corresponding to specific hypotheses, as well as the differences and similarities of the different models used in estimating WTP for tomatoes and strawberries. Section 5.2 describes Kentucky and Ohio consumers' willingness to pay for local tomatoes. Section 5.3 illustrates the consumers' willingness to pay for local strawberries and finds differences and similarities in consumer preferences for local tomatoes and local strawberries.

### **5.1 Overview of Different Models**

Table 5.1 presents the variables used in the model that represent specific hypotheses for local tomato and strawberry WTP.

The empirical estimation of models using the data is presented in Tables 5.2 and 5.3. In general the marginal effects for a particular variable are similar across all models. SUR OLS and simple OLS yield marginal effects that are similar in magnitude and significance. Using univariate Tobit model to estimate the WTP for local tomatoes and WTP for local strawberries has proved to be plausible, as sigma factors are significant at 1% level in both cases. Also, in Bivariate Tobit case,  $\rho$  is significant at 1% level, which justifies our decision to use Bivariate Tobit as the choice model.

Wald chi2 statistic of Bivariate Tobit model is 410.69, which is significant at 1% level. This justifies our decision to use Bivariate Tobit model for the given data.

Table 5.1 Variables representing hypotheses about consumers' WTP for local food

<b>Variable</b>	<b>Expected sign</b>
<b>Demographic factors</b>	
Male	?
AGE	?
Shopper (6)	+
Children under 18 (6)	+
Education (6)	+
Annual Household Income (6)	+
Employed (6)	+
White	?
Urban (6)	+
Suburban	?
KY	?
Lived in Kentucky/Ohio (6)	+
<b>Lifestyle</b>	
How often do you purchase fresh tomatoes/strawberries? (5)	+
Q9 How often do you prepare fresh food at home? (5)	+
Q10 Do you have a freezer? (5)	+
Q11 Do you purchase fresh organic fruits or vegetables? (5)	+
How often do you eat fastfood? (5)	-
Q7 How familiar are you with the Community Supported Agriculture (CSA) marketing model? (5)	+
<b>Beliefs and perceptions</b>	
Q17a Food grown in my local community is healthier (4)	+
Q17b I buy food locally to improve my family's lifestyle (4)	+
Q17c We can save lots of energy resources by producing our food nearby (4)	+
Q17e Producing food locally significantly improves our local economy (4)	+
Q18b Buying food locally keeps small farmers in business. (4)	+
<b>Knowledge about nutritional benefits</b>	
Version A (1)	+
Version B (1)	+
Assume as most fresh fruits (2)	-
Don't know about benefits (2)	-
<i>Interaction effects</i>	
Assume as most * Version A (3)	+
Assume as most * Version B (3)	+
Don't know * Version A (3)	+
Don't know * Version B (3)	+

(.) corresponds to hypothesis stated in Section 3.2.

At this point we have only been able to calculate Bivariate Tobit coefficients. Marginal effects calculation presents problems, and is difficult to accomplish using the available software. Our future research will focus on calculating the Bivariate Tobit marginal

effects. This will be possible after the installation of the new software (LimDep 10) in July 2012. So far we will interpret marginal effects estimated from univariate Tobit coefficients, assuming that they are very close to the marginal effects of the Bivariate Tobit, due to the similarity between the estimated coefficients.

## **5.2 Willingness to Pay for Local Tomatoes**

The coefficients and marginal effects of different factors of WTP for local tomatoes are presented in Table 5.2. Among demographic variables, age and income are significant. With every additional year of age an individual is willing to pay 0.27 less for local tomatoes. Income is positively correlated with consumers' WTP. With every additional \$10,000 of annual income an individual is willing to pay additional 2.48 cents for locally grown tomatoes.

Lifestyle seems to have an impact on consumers' preferences and WTP. Fresh tomato purchase frequency is a strong driver of WTP. In fact, consumers who purchase tomatoes an additional time per week are ready to pay a premium of 9.25 cents for local tomatoes. Moreover, people who generally purchase fresh organic fruit or vegetables are willing to pay a premium of 10.85 for local tomatoes. Individuals who stated that they are familiar with the CSA marketing model appeared to be willing to pay 4.75 cents more for local tomatoes than those who were not familiar with it. Owning a separate freezer also has an impact on people's WTP for local fresh tomatoes. Respondents who stated that they own a separate freezer, were willing to pay 6.55 cents less for local fresh tomatoes. This may be explained by the fact that they have an opportunity to freeze their fresh vegetables, so they may not necessarily be ready to pay more for local fresh vegetables.

We have not observed a great impact of consumers' beliefs and perceptions on their WTP. Neither their view of local food as healthy, high-quality or environmentally friendly, are significant.

Table 5.2 Factors Affecting Willingness to Pay for Local Tomatoes

Variable	OLS coefficients	SUR OLS	Univariate Tobit coefficients	Bivariate Tobit coefficients	Univariate Tobit marginal effects
<b>Demographic factors</b>					
Male	0.0022 (0.0352)	0.0043 (0.0349)	0.00419 (0.0372)	0.0053 (0.0371)	0.00416 (0.0371)
AGE	-0.003 ** (0.0012)	-0.003 ** (0.0012)	-0.00273 ** (0.0013)	-0.0027 ** (0.0013)	-0.00272 ** (0.0013)
Shopper	0.1035 (0.0635)	0.1012 (0.063)	0.1066 (0.0675)	0.1058 (0.0672)	0.106 (0.0668)
Children under 18	-0.0366 (0.0365)	-0.0352 (0.0361)	-0.0356 (0.0386)	-0.034 (0.0374)	-0.0354 (0.0374)
Education	0.0062 (0.0062)	0.0056 (0.0061)	0.00563 (0.0065)	0.0051 (0.0065)	0.0056 (0.0065)
Annual Household Income	0.024 *** (0.0044)	0.0243 *** (0.0044)	0.0245 *** (0.0047)	0.0248 *** (0.0047)	0.0243 *** (0.0047)
Employed	0.0465 (0.0333)	0.0473 (0.033)	0.0423 (0.0352)	0.0427 (0.0351)	0.042 (0.035)
White	-0.0281 (0.0596)	-0.0296 (0.0591)	-0.0426 (0.063)	-0.044 (0.0627)	-0.0423 (0.0627)
Urban	-0.0398 (0.0442)	-0.0407 (0.0439)	-0.046 (0.0469)	-0.0451 (0.0467)	-0.0457 (0.0466)
Suburban	-0.0541 (0.0355)	-0.055 (0.0352)	-0.0591 (0.0376)	-0.0593 (0.0375)	-0.0588 (0.0374)
KY	-0.023 (0.0313)	-0.0214 (0.0311)	-0.0245 (0.0332)	-0.0232 (0.033)	-0.0243 (0.033)
Lived in Kentucky/Ohio	0.0057 (0.0049)	0.0057 (0.0049)	0.00624 (0.0052)	0.0062 (0.0052)	0.0062 (0.0052)
<b>Lifestyle</b>					
How often do you purchase fresh tomatoes?	0.0841 *** (0.0097)	0.0769 *** (0.0085)	0.0923 *** (0.1027)	0.0836 *** (0.009)	0.0917 *** (0.0102)
How often do you prepare fresh food at home?	-0.0016 (0.0057)	-0.0012 (0.0057)	-0.0005 (0.0061)	-0.0003 (0.006)	-0.0005 (0.0061)
Do you have a freezer?	-0.0648 ** (0.0322)	-0.0659 ** (0.0319)	-0.066 * (0.0341)	-0.0665 ** (0.034)	-0.0656 * (0.0339)
Do you purchase fresh organic fruits or vegetables?	0.1082 *** (0.0223)	0.1084 *** (0.0221)	0.1092 *** (0.0236)	0.1097 *** (0.0235)	0.1085 *** (0.0235)
How often do you eat fastfood?	-0.0026 (0.0022)	-0.0025 (0.0022)	-0.00298 (0.0024)	-0.0028 (0.0024)	-0.00296 (0.0024)
How familiar are you with the Community Supported Agriculture (CSA) marketing model?	0.0468 ** (0.0217)	0.0461 ** (0.0215)	0.0478 ** (0.023)	0.0471 * (0.0228)	0.0475 ** (0.0228)

\* - significance on 10% level; \*\* - significance on 5% level; \*\*\* - significance on 1% level

Table 5.2 (continued)

Variable	OLS coefficients	SUR OLS	Univariate Tobit coefficients	Bivariate Tobit coefficients	Univariate Tobit marginal effects
<b>Beliefs and perceptions</b>					
Food grown in my local community is healthier	-0.00009 (0.026)	-0.0006 (0.0258)	-0.00144 (0.0275)	-0.0023 (0.0294)	-0.00143 (0.0273)
I buy food locally to improve my family's lifestyle	-0.0268 (0.0233)	-0.0269 (0.0231)	-0.0269 (0.0247)	-0.0265 (0.0245)	-0.0267 (0.0245)
We can save lots of energy resources by producing our food nearby	0.0268 (0.0251)	0.0249 (0.0249)	0.0313 (0.0266)	0.028 (0.0265)	0.0311 (0.0264)
Producing food locally significantly improves our local economy	0.0675 ** (0.0291)	0.0693 ** (0.0288)	0.0722 ** (0.0308)	0.0749 ** (0.0306)	0.0717 ** (0.0306)
Buying food locally keeps small farmers in business.	0.0719 *** (0.0277)	0.0715 *** (0.0274)	0.0735 ** (0.0293)	0.073 ** (0.0292)	0.073 ** (0.0291)
<b>Knowledge about nutritional benefits</b>					
Version A	0.1043 * (0.062)	0.1078 * (0.0586)	0.1075 * (0.0656)	0.1083 * (0.1083)	0.1068 * (0.0652)
Version B	0.0012 (0.0617)	0.0168 (0.0581)	0.0013 (0.0653)	0.0184 (0.0184)	0.0013 (0.0649)
Assume as most fresh fruits	0.0056 (0.06)	0.0081 (0.0548)	0.0104 (0.0635)	0.0032 (0.0582)	0.0103 (0.0631)
Don't know about benefits	-0.1506 * (0.0869)	-0.1512 * (0.0792)	-0.1731 ** (0.0924)	-0.1761 ** (0.0846)	-0.172 ** (0.0915)
<i>Interaction effects</i>					
Assume as most * Version A	-0.0949 (0.0818)	-0.0879 (0.0746)	-0.1049 (0.0866)	-0.0957 (0.0792)	-0.1041 (0.0858)
Assume as most * Version B	-0.0806 (0.08)	-0.1014 (0.0726)	-0.0892 (0.0847)	-0.1131 (0.0771)	-0.0886 (0.0839)
Don't know * Version A	-0.1345 (0.1191)	-0.183 * (0.1086)	-0.1524 (0.127)	-0.1944 (0.1162)	-0.1511 (0.1255)
Don't know * Version B	0.0973 (0.1232)	0.0503 (0.112)	0.1041 (0.1311)	0.055 (0.1198)	0.1035 (0.1305)
Intercept	0.6716 *** 0.1778	0.7004 *** 0.1746	0.586 *** 0.0119	0.612 *** 0.1862	
Sigma			0.73 ***	0.727 ***	

\* - significance on 10% level; \*\* - significance on 5% level; \*\*\* - significance on 1% level

However, the so-called “hometown pride” appeared to be positively correlated with WTP for local tomatoes.

The use of nutritional information and prior knowledge gave somewhat inconsistent results. People who were presented with version A of the survey (full version with text and a graph) were willing to pay 10.68 cents more for local tomatoes than those who got

version C (no information). However, WTP of those who were presented with version B (only text) was not significantly different from the WTP of the individuals who got version C.

Prior knowledge of nutritional benefits had some impact on respondents' WTP. Consumers who admitted they did not know of nutritional benefits of local tomatoes were willing to pay 17.2 cents less than those who stated they knew specific nutritional benefits of local tomatoes.

### **5.3 Willingness to Pay for Local Strawberries**

It seems that WTP for local strawberries is influenced by the same factors as WTP for local tomatoes. An exception in the residential area: people who live in the suburbs were found to be willing to pay 12.12 cents less for local strawberries than rural residents. The results of the models estimating the effect of different factors on consumers' WTP for local strawberries are presented in Table 5.3.

Age and income are important drivers for consumers' WTP for local strawberries. Every year of age has been found to reduce consumers' WTP for local strawberries by 0.72 cents. However, income was found to be positively correlated with consumers' WTP: with every additional \$10,000 of income an individual was willing to pay 3.77 cents more for local strawberries.

Fresh strawberry purchase frequency significantly affects WTP for local strawberries: with every additional time per year of strawberry purchase an individual is ready to pay

6.06 cents more for local strawberries. Generally, if consumers purchase fresh organic fruit or vegetables, they are willing to pay 17.31 cents more for local strawberries.

Table 5.3 Factors Affecting Willingness to Pay for Local Strawberries

Variable	OLS coefficients	SUR OLS	Univariate Tobit coefficients	Bivariate Tobit coefficients	Univariate Tobit marginal effects
<b>Demographic factors</b>					
Male	0.0265 (0.0407)	0.0218 (0.0404)	0.0299 (0.042)	0.0246 (0.0421)	0.0298 (0.0419)
AGE	-0.0072 *** (0.0014)	-0.0071 *** (0.0014)	-0.0074 *** (0.0014)	-0.0072 *** (0.0014)	-0.0073 *** (0.0014)
Shopper	0.0106 (0.0731)	0.0083 (0.0725)	0.01743 (0.0756)	0.0147 (0.0757)	0.01736 (0.0753)
Children under 18	0.0519 (0.042)	0.0633 (0.0417)	0.0501 (0.0434)	0.0633 (0.0434)	0.0499 (0.0432)
Education	0.0076 (0.0071)	0.0079 (0.007)	0.00714 (0.0073)	0.0075 (0.0073)	0.00711 (0.0073)
Annual Household Income	0.0358 *** (0.0051)	0.0371 *** (0.0051)	0.0363 *** (0.0053)	0.0377 *** (0.0053)	0.0362 *** (0.0053)
Employed	0.0039 (0.0383)	0.0026 (0.038)	0.00234 (0.0395)	-0.0001 (0.0396)	0.00233 (0.0394)
White	-0.086 (0.0686)	-0.0881 (0.0681)	-0.0971 (0.0707)	-0.0997 (0.0708)	-0.0968 (0.0705)
Urban	0.0715 (0.0509)	0.0702 (0.0505)	0.0721 (0.0525)	0.0712 (0.0712)	0.0718 (0.0524)
Suburban	-0.1152 *** (0.041)	-0.1073 *** (0.0407)	-0.1217 *** (0.0423)	-0.1138 ** (0.0424)	-0.1212 *** (0.0422)
KY	0.0479 (0.0361)	0.0456 (0.0358)	0.0481 (0.0373)	0.0456 (0.0374)	0.0479 (0.0372)
Lived in Kentucky/Ohio	0.0014 (0.0056)	0.0012 (0.0056)	0.00157 (0.0058)	0.0014 (0.0058)	0.00156 (0.0058)
<b>Lifestyle</b>					
How often do you purchase fresh strawberries?	0.0711 *** (0.0071)	0.0554 *** (0.0062)	0.0776 *** (0.0074)	0.0606 *** (0.0065)	0.0773 *** (0.0074)
How often do you prepare fresh food at home?	-0.0074 (0.0067)	-0.004 (0.0066)	-0.007 (0.0069)	-0.0032 (0.0069)	-0.007 (0.0069)
Do you have a freezer?	-0.1069 *** (0.0371)	-0.1058 *** (0.0368)	-0.1035 *** (0.0383)	-0.1029 *** (0.0383)	-0.103 *** (0.0381)
Do you purchase fresh organic fruits or vegetables?	0.1678 *** (0.0257)	0.1708 *** (0.0255)	0.1696 *** (0.0265)	0.1731 *** (0.0265)	0.1689 *** (0.0264)
How often do you eat fastfood?	0.0041 (0.0026)	0.0044 * (0.0026)	0.00423 (0.0027)	0.0046 * (0.0027)	0.00421 (0.0026)
How familiar are you with the Community Supported Agriculture (CSA) marketing model?	0.0791 *** (0.0249)	0.0781 *** (0.0247)	0.0792 *** (0.0257)	0.0783 *** (0.0257)	0.0789 *** (0.0256)

Table 5.3 (continued)

Variable	OLS coefficients	SUR OLS	Univariate Tobit coefficients	Bivariate Tobit coefficients	Univariate Tobit marginal effects
<b>Beliefs and perceptions</b>					
Food grown in my local community is healthier	0.0128 (0.0299)	0.0125 (0.0297)	0.0134 (0.0309)	0.0137 (0.0309)	0.0133 (0.0308)
I buy food locally to improve my family's lifestyle	-0.0126 (0.0269)	-0.01 (0.0266)	-0.0155 (0.0277)	-0.0119 (0.0277)	-0.0154 (0.0286)
We can save lots of energy resources by producing our food nearby	-0.0188 (0.0288)	-0.0198 (0.0286)	-0.0182 (0.0298)	-0.0199 (0.0298)	-0.0181 (0.0296)
Producing food locally significantly improves our local economy	0.0646 * (0.0334)	0.0679 ** (0.0331)	0.0681 ** (0.0344)	0.0726 ** (0.0345)	0.0679 ** (0.0343)
Buying food locally keeps small farmers in business.	0.0412 (0.0319)	0.0419 (0.0316)	0.0434 (0.0329)	0.0441 (0.033)	0.0433 (0.0328)
<b>Knowledge about nutritional benefits</b>					
Version A	-0.0501 (0.0807)	-0.0012 (0.0758)	-0.0444 (0.0832)	-0.0018 (0.0789)	-0.0442 (0.0828)
Version B	-0.1158 (0.0807)	-0.0629 (0.0751)	-0.116 (0.0829)	-0.0625 (0.0782)	-0.1155 (0.0825)
Assume as most fresh fruits	-0.0206 (0.0731)	-0.0322 (0.0668)	-0.0111 (0.0753)	-0.0263 (0.0685)	-0.0111 (0.075)
Don't know about benefits	-0.2413 ** (0.1063)	-0.1978 ** (0.097)	-0.2559 ** (0.1101)	-0.2131 ** (0.1014)	-0.2545 ** (0.1092)
<i>Interaction effects</i>					
Assume as most * Version A	0.0599 (0.0984)	0.0053 (0.0898)	0.0505 (0.1014)	0.0022 (0.0935)	0.0503 (0.101)
Assume as most * Version B	0.0688 (0.0973)	0.0129 (0.0884)	0.0646 (0.1003)	0.0079 (0.092)	0.0643 (0.1)
Don't know * Version A	0.0601 (0.141)	-0.0498 (0.1286)	0.0439 (0.1461)	0.0635 (0.1348)	0.0438 (0.1457)
Don't know * Version B	0.4083 *** (0.1433)	0.2568** (0.1304)	0.4281*** (0.1483)	0.2709 *** (0.1365)	0.4272 *** (0.1482)
Intercept	1.2889 *** 0.2063	1.3007 *** 0.2025	1.2327 *** 0.2131	1.24 ***	
Sigma			0.82 ***	0.822 ***	
Rho				0.967 ***	

Owning a separate freezer resulted in the reduction of WTP for local strawberries by 10.29 cents. Just like in the case of tomatoes, the individuals' familiarity with the CSA was found to positively affect their WTP for local strawberries.



Among consumers' beliefs and perceptions, "hometown pride" was the only significant factor of WTP. This, if a person believes that producing food locally significantly improves the local economy, he is willing to pay a higher price for local strawberries. Unlike in the case of local tomatoes, "Buying food locally keeps small farmers in business" variable was not significant: there was found no evidence that if an individual believes that buying local would keep small farmers in business, his WTP for local strawberries would increase.

Knowledge of nutritional benefits and new information was found to affect consumers' WTP for local strawberries in a different way from their WTP for local tomatoes. Similarly, individuals who do not know about health benefits of local strawberries are willing to pay 25.45 cents less than those who are aware of specific health benefits. However, individuals who did not know the nutritional benefits and were also presented with version B (partial information), were willing to pay 4.27 cents more for local strawberries than respondents who knew specific nutritional benefits of local strawberries and were presented with version C (no information). This signifies the importance of using nutritional information, especially for the population unaware of nutritional benefits of local produce. No other variables related to prior or new knowledge of health benefits were significant.

## **Chapter 6: Conclusions and Recommendations**

### **6.1 Conclusions**

The thesis examines how consumers in Kentucky and Ohio value locally produced food, specifically tomatoes and strawberries.

Given that most previous studies of local produce focused on consumers' characteristics and perceptions of local foods, this study gives a different perspective in understanding the consumer, by studying the link between the demand for local food and nutrition merchandising. In addition, this study attempts to find out how prior knowledge of nutritional benefits and its interaction with the new information affects consumers' WTP for local foods. Using the payment card method, this analysis is able to study the consumer and their WTP for local tomatoes and strawberries.

This study indicates that consumer preferences are similar for local tomatoes and strawberries. Using Bivariate Tobit model has helped to jointly assess the factors influencing consumers' WTP for these two local products. Empirical results have shown that younger people with higher income, who purchase fresh vegetables regularly, are ready to pay a higher price for local tomatoes and strawberries. On the other hand, people who own a freezer are likely to be willing to pay less for fresh local produce. Involvement in Community Supported Agriculture has proved to have a positive impact on WTP. Consumers' beliefs and perceptions have not had a strong impact on WTP in this case. Only "hometown pride" was shown to have an impact on the price that consumers are willing to pay for local produce. Nutrition information that consumers were presented with gave somewhat different results in the case of tomatoes and that of

strawberries. In both cases the consumers who did not know about nutritional benefits of local foods, were willing to pay less for it than those who possesses such information. In the case of tomatoes, version A (full information) turned out to be significant and positive. This means, that respondent who received version A were willing to pay more for local tomatoes than those who received version C (no information). In the case of strawberries, version A was not significant. However, in case of strawberries, respondents who did not know about nutritional benefits of local produce and received version B (partial information), were willing to pay more for local strawberries. This leads to a conclusion that nutrition information potentially has an impact on willingness to pay for local foods, but this influence may need further research. These findings are broadly applicable to other local products, such as dairy or meat.

## **6.2 Impacts of Knowing Consumer Preferences and WTP**

### ***6.2.1 Economic and Marketing Impacts***

The demand for local produce is expected to continue to increase along with the awareness of the nutritional and health benefits of eating local food. Given that the perception of local produce is now associated with higher quality, nutrition, freshness, environmental and economic benefits, this study is important to understanding current consumer preferences when it comes to local horticulture products.

Using the findings of this study, economic gains could be captured by the local food industry. This study highlighted that consumers have different levels of knowledge of

nutritional benefits of local foods, as well as different perceptions of local produce, and it identified the characteristics of consumers who would be willing to pay a premium. Moreover, fruit and vegetable breeders may find this study helpful in understanding the demand for specific nutritional characteristics of fruit and vegetables. These results therefore have potential to benefit producers, distributors, and retailers by improving their product marketing, consumer targeting (through understanding of market segmentation), and understanding of growth opportunities.

Producers and retailers should note that some consumers are willing to pay a premium for locally-grown horticultural products. One obvious marketing strategy for producers is to develop a labeling system that allows the product to be identified as “Kentucky-grown” or “Ohio-grown” to attract consumers, and to provide information about nutritional benefits of locally grown foods.

### ***6.2.2 Policy Implications***

Policy makers seek to structure the market in a way that provides economic incentives for producers to match their practices to consumer demand. By knowing general and specific consumer preferences, government policy makers can make sure that both consumers and producers will be better off.

If policy makers want to promote fruit and vegetables in people’s diet, they may accomplish it in two ways: by introducing programs to increase people’s knowledge about nutritional benefits of local foods or by using labels that carry the information about the local product and its nutrient profile. The choice of one of these options may

depend on the results of the cost-benefit analysis that will take into account consumers' WTP and the cost of the promotional program.

Therefore, with a proper campaign to introduce and promote local products, consumers will benefit from the ability to identify products that suit to their preferences. Society will also benefit from greater transparency in its food supply.

### **6.3 Limitations and Further Research**

One of the limitations of this study is the choice of only two products. They were chosen somewhat arbitrarily, and may not necessarily be representative of other products. Therefore, it is recommended to extent the study beyond the scope of two products to cover a wider range of products.

Another limitation may be the arbitrariness of nutrition information. Nutrition information is a complicated variable that may need more careful development. Consumers have different nutritional needs, and every product has a different nutrient profile. Besides, there are numerous ways of presenting nutrition information, and the ways used in the survey were arbitrary. Future research may concentrate on different kinds of ways of presenting nutritional information, which may be helpful in capturing the real value of nutrition information. Incorporating nutritional information into marketing label may help consumers to validate or debunk myths associated with local foods.

One more limitation is the web-based nature of the survey. It may be argued that some layers of population were underrepresented, particularly those that have no access to computers and internet. On the other hand, the purpose of this study was to survey the main active shoppers, and in this case we may argue that the sample was representative of this particular population. However, future research may concentrate on carrying out the mixed-mode survey, which combines surveying individuals online and in person.

Future research may also include carrying out a revealed preference experiment, in order to confirm the findings of the present stated preference experiment. Also, the survey may cover a more extensive region, or even be carried out nationally, which would be helpful in getting a better understanding of consumers' demand for local foods.

## Appendices

### Appendix A: Fresh Food and Health Food Consumer Survey



## Fresh Food and Health Food Consumer Survey (A-KY)

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### Fresh Food and Health

Kentucky Food Consumer Survey

Page 1 - Heading

Fresh Produce Willingness-to-Pay

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Page 1 - Heading

To the survey participant:

You are being provided an opportunity to give feedback on a variety of Kentucky food products. Your input will help Kentucky growers and food marketers better design and position their products in Kentucky.

The Kentucky Food Consumer Survey is targeting households around the Commonwealth to provide opinions on these products. The benefits associated with completing this survey are restricted to those determined by Zoomerang and the associated ZoomPoints. We hope to receive completed questionnaires from about 1,000 people, so your answers are important to us. Of course, you have a choice about whether or not to complete the survey/questionnaire, but if you do participate, you are free to skip any questions or discontinue at any time.

The survey/questionnaire will take about 8 minutes to complete.

There are no known risks to participating in this study. Your response to the survey is anonymous which means no names will appear or be used on research documents, or be used in presentations or publications. The research team will not know that any information you provided came from you, nor even whether you participated in the study. If you have questions about the study, please feel free to ask; my contact information is given below. If you have complaints, suggestions, or questions about your rights as a research volunteer, contact the staff in the University of Kentucky Office of Research Integrity at 859-257-9428 or toll-free at 1-866-400-9426.

Dr. Tim Woods, Department of Agricultural Economics, University of Kentucky, Lexington, KY  
40546. Tim.woods@uky.edu

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Page 1 - Heading

Fresh Tomatoes

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My understanding of the specific health benefits associated with fresh tomatoes is:

- I don't know
- I assume it's the same as most fresh fruits
- I know the specific health benefits

## Fresh Tomatoes

Please read the background text on nutrition carefully

Fresh tomatoes are rich in lycopene. The following quote about lycopene comes from the American Cancer Society - "Proponents claim that lycopene may lower the risk of heart disease; macular degenerative disease, an age-related illness that can lead to blindness; and lipid oxidation, the damage to normal fat molecules that can cause inflammation and disease. It is also said to lower LDL ("bad" cholesterol), enhance the body's defenses, and protect enzymes, DNA, and cellular fats."

The FDA currently restricts specific health claims associated with lycopene, citing current research to be inconclusive.

A study from the University of Kentucky shows that lycopene depends substantially on when the tomato is harvested. Tomatoes artificially ripened from the "green" or "breaker" stages have less lycopene than tomatoes left to fully ripen on the vine.



What is the maximum price you would be willing to pay for:

One (1) pound of fresh local tomatoes fully ripened on the vine

For comparison purpose, 1 pound of tomatoes is typically sold for between \$1.50 and \$2.50 per pound in a grocery store.

Please indicate your choice (and price willing to pay) below:



- I do not wish to buy this product
- \$1.00
- \$1.20
- \$1.40
- \$1.60
- \$1.80
- \$2.00
- \$2.20
- \$2.40
- \$2.60
- \$2.80
- \$3.00
- more than \$3.00

Page 3 - Question 3 - Choice - One Answer (Drop Down)

[Mandatory]

How often do you purchase fresh tomatoes?

- never
- less than once per month
- 1-2 times per month
- 3-4 times per month
- 5 times or more per month

Page 4 - Heading

Fresh Strawberries

Page 4 - Question 4 - Choice - One Answer (Bullets)

My understanding of the specific health benefits associated with fresh strawberries is:

- I don't know
- I assume it's the same as most fresh fruits
- I know the specific health benefits

Page 4 - Question 5 - Choice - One Answer (Drop Down)

[Mandatory]

How frequently do you purchase fresh strawberries during a year?

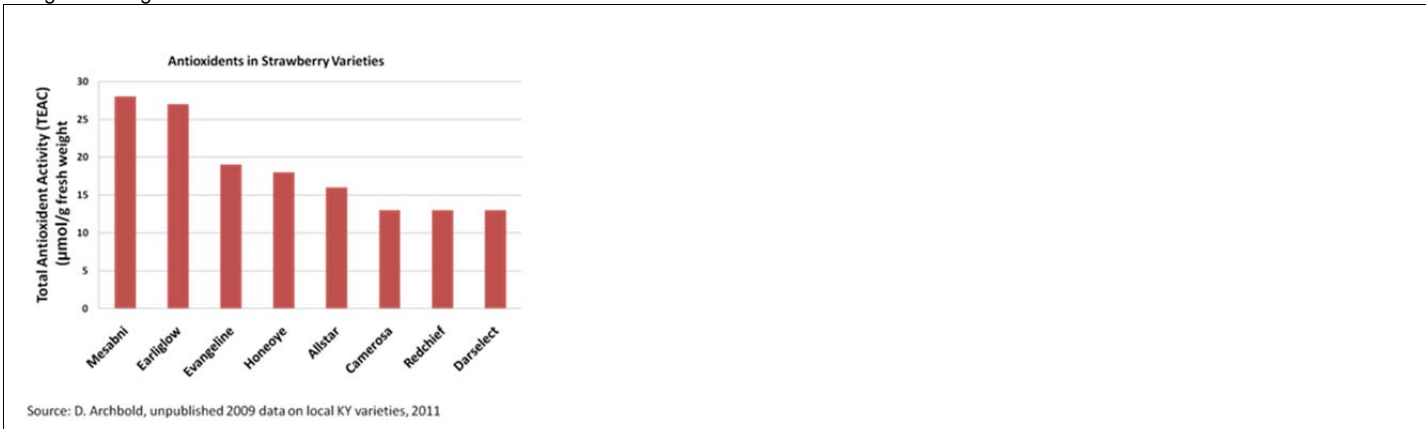
- never
- less than once per year
- 1-2 times per year
- 3-4 times per year
- 5-6 times per year
- 7 or more times per year

### Strawberry Health Benefits

Strawberries can be good for vision. Three or more servings of fruit per day may lower your risk of age-related macular degeneration (ARMD). A research study in Archives of Ophthalmology reported a 36% lower incidence of ARMD compared with persons consuming 1.5 servings of fruit daily.

One serving of strawberries provide 136% of the daily value of vitamin C.

Strawberries, as noted by Kentucky researchers looking at local varieties, are high in antioxidants and thus help prevent damage in all of the body's organ systems.



What is the maximum price you would be willing to pay for:

One (1) pint of fresh local strawberries

For comparison purpose, 1 pint of strawberries is typically sold for between \$1.50 and \$3.00 per pint in a grocery store.

Please indicate your choice (and price willing to pay) below:

- I do not wish to buy this product
- \$1.00
- \$1.25
- \$1.50
- \$1.75
- \$2.00
- \$2.25
- \$2.50
- \$2.75
- \$3.00
- \$3.25
- \$3.50
- \$3.75
- \$4.00
- \$4.25
- \$4.50

- \$4.75
- \$5.00
- More than \$5.00

Page 5 - Question 7 - Choice - One Answer (Bullets)

[Mandatory]

How familiar are you with the Community Supported Agriculture (CSA) marketing model? The category which best applies is -

- Never heard of it
- May have heard of it, but not sure what it means
- I'm very familiar with it, but have not been associated with one
- I have formerly been associated with one
- I am currently or preparing to become a member

Page 5 - Question 8 - Rating Scale - Matrix

If a CSA gives you the chance to be "more involved with your food", how do you feel about the following?

	strongly disagree	disagree	neutral	agree	strongly agree
Being able to talk to "my farmer" regularly gives me more confidence in the food I'm buying	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
It's important to go "pitch in" and help grow my own food	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
This helps small farmers stay in business and compete with "corporate agriculture"	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Knowing where all my food comes from is very important	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Page 5 - Heading

Preparing fresh food means utilizing fresh ingredients (meats, dairy, produce) as part of a recipe that may or may not involve cooking.

Page 5 - Question 9 - Choice - One Answer (Bullets)

How often do you prepare fresh food at home?

- I don't prepare fresh food much at all
- 1-2 times per month
- 3-4 times per month
- 5-6 times per month
- 7 or more times per month

Page 5 - Question 10 - Choice - One Answer (Bullets)

Do you have a freezer?

- No
- Yes, only as part of our refrigerator unit
- Yes, as an independent unit

Do you purchase fresh organic fruits or vegetables?

- Almost never
- Yes, if they are on sale or close to the same price as regular products
- Yes, and will pay a small premium above comparable regular products
- Yes, I almost always will choose an organic option if it is available

Just a few questions related to wine and health. How often have you purchased wine for home consumption within the last 12 months?

- I have not purchased wine for home consumption
- 1-2
- 3-4
- 5-6
- 7-8
- 9+

How often have you purchased wine at a restaurant or other food establishment during the past 12 months?

- I have not purchased wine
- 1-2
- 3-4
- 5-6
- 7-8
- 9+

Have you tried what you know to be a local Kentucky wine within the past 12 months?

- No
- not sure
- Yes

Please indicate to your best knowledge about what percent of your total wine purchases during the past 12 months came from each of these establishments below (add to 100%):

- on site winer \_\_\_\_\_
- independent liquor stor \_\_\_\_\_
- grocery affiliated liquor store (Kroger, etc \_\_\_\_\_
- Club store affiliated liquor store (Sam's Club, et \_\_\_\_\_
- pharmacy (Walgreens, Rite-Aid, et \_\_\_\_\_
- O t h e r \_\_\_\_\_

Red wine is known to contain high levels of antioxidants that can prevent oxygen damage in all of the body's organ systems.

How important is the potential health impact in your variety of wine choice (white, rose, red)?

<b>Not a major factor</b>	<b>Somewhat of a factor</b>	<b>An important factor</b>	<b>The most important factor</b>	<b>The only reason I drink wine</b>
<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Please provide your general opinion below to the following statements

	<b>strongly disagree</b>	<b>d i s a g r e e</b>	<b>n e u t r a l</b>	<b>a g r e e</b>	<b>strongly agree</b>
Food grown in my local community is healthier	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
I buy food locally to improve my family's lifestyle	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
We can save lots of energy resources by producing our food nearby	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
I must have my fresh salad year 'round.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Producing food locally significantly improves our local economy	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Local fruits and vegetables are readily available where I buy groceries	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
I have helped organize groups or meetings in my community related to food systems and/or supplies.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Please provide your general opinion below to the following statements

	<b>strongly disagree</b>	<b>d i s a g r e e</b>	<b>n e u t r a l</b>	<b>a g r e e</b>	<b>strongly agree</b>
I am actively involved in discussions of food policy issues	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Buying food locally keeps small farmers in business.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
It's important to be involved in organizations that support local food production	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Most of America's food is grown by large farm corporations	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
I think all children should learn to grow their own food	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
School lunches must include locally produced foods, even when they cost a little more	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

This is a very brief (7 question) survey to see how well you can judge the calories in foods served by fast food restaurants. Please provide your "best guess" in answering each question. Your responses will remain anonymous. We'll use the responses to help Kentucky families choose wisely.

Which of the following items served at McDonald's do you think has the fewest calories per serving?

- Angus Mushroom and Swiss Burger
- Large French Fries with 3 Ketchup Packets
- Filet O Fish
- Quarter Pounder with Cheese
- Chicken Selects Premium Breast Strips with BBQ Sauce

Which of the following side items served at KFC has the fewest calories per serving?

- Cole slaw
- Macaroni and Cheese
- Potato Wedges
- Mashed Potatoes with Gravy
- Potato Salad

Which of these menu items would you most likely order from Pizza Hut?

- Cheese Pan Pizza (2 slices of a 12" pizza)
- All Natural Pepperoni Thin N Crispy Pizza (2 slices of a 12" pizza)
- Veggie Lovers Pan Pizza (2 slices of a 12" pizza)
- Supreme Thin N Crispy Pizza (2 slices of a 12" pizza)
- 6" Personal Pan Veggie Lovers Pizza

Which of these menu items would you most likely order from Pizza Hut if the calories were included on the menu?

- Cheese Pan Pizza (2 slices of a 12" pizza), 480 calories
- All Natural Pepperoni Thin N Crispy Pizza (2 slices of a 12" pizza), 420 calories
- Veggie Lovers Pan Pizza (2 slices of a 12" pizza), 460 calories
- Supreme Thin N Crispy Pizza (2 slices of a 12" pizza), 480 calories
- 6" Personal Pan Veggie Lovers Pizza, 550 calories

How often do you eat food from a fast food or chain restaurant?

- Once per month or less

- Three to five times per month
- Three to five times per week
- Five to seven times per week
- 7 or more times per week

Page 10 - Question 24 - Choice - One Answer (Bullets)

[Mandatory]

A moderately active 150 pound U.S. adult needs the following number of calories per day to maintain current weight:

- 1200 calories
- 1500 calories
- 2000 calories
- 3500 calories
- 5000 calories

Page 10 - Question 25 - Choice - One Answer (Bullets)

Which of the following statements best describes your opinion about whether restaurants with 20 or more locations should include calories on menus?

- I strongly support including calorie information on menus
- I support including calorie information on menus
- I have no opinion regarding calorie information on menus
- I oppose including calorie information on menus
- I strongly oppose including calorie information on menus

Page 11 - Heading

About you and your household

The next questions are for classification purposes only. They will only be used to group your answers with others like yourself.

Page 11 - Question 26 - Choice - One Answer (Bullets)

Please indicate your gender.

- Male
- Female

Page 11 - Question 27 - Choice - One Answer (Drop Down)

Please select the category that includes your age.

- 17 or younger
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65 or older

Page 11 - Question 28 - Yes or No

Do you do at least half of the food shopping for your household?

- Yes
- No

Page 11 - Question 29 - Yes or No

[Mandatory]

Do you currently have children under the age of 18 living in your household?

- Yes
- No

Page 11 - Question 30 - Choice - One Answer (Drop Down)

How many children under the age of 18 live in your household?

- 1
- 2
- 3
- 4
- 5
- 6 or more

Page 12 - Question 31 - Choice - One Answer (Bullets)

[Mandatory]

What best describes your level of education?

- Less than 9th grade
- Some high school
- High school graduate or equivalent
- Some college
- Associate degree
- Bachelor's degree
- Graduate or professional degree
- Prefer not to answer

Page 12 - Question 32 - Choice - One Answer (Drop Down)

[Mandatory]

Which one of the following ranges includes your total yearly household income before taxes?

- Under \$15,000
- \$15,000 to \$24,999
- \$25,000 to \$34,999
- \$35,000 to \$49,999
- \$50,000 to \$74,999
- \$75,000 to \$99,999
- \$100,000 to \$149,999
- \$150,000 to \$199,999
- \$200,000 and up
- Prefer not to answer



Page 12 - Question 33 - Choice - One Answer (Drop Down)

Which one of the following best describes you?

- White/Caucasian
- Spanish/Hispanic/Latino
- Black/African American
- Asian
- Pacific Islander
- Native American
- Other
- Prefer not to answer

Page 12 - Question 34 - Choice - One Answer (Drop Down)

[Mandatory]

Which one of the following best describes your employment status?

- Employed full time
- Employed part time
- Self-employed
- Not employed, but looking for work
- Not employed and not looking for work
- Retired
- Student
- Homemaker
- Prefer not to answer

Page 13 - Question 35 - Choice - One Answer (Bullets)

[Mandatory]

Which of the following best describes where you currently live?

- City
- Suburb
- Small town
- Countryside (but not a farm)
- Farm

Page 13 - Question 36 - Open Ended - One Line

[Mandatory]

In which county do you live?

Page 13 - Question 37 - Choice - One Answer (Bullets)

How many years have you lived in Kentucky?

- less than 1
- 1-4 years
- 5-9 years
- 10 or more years

Thank You Page

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Standard

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### SIGNATURE OF STUDENT

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