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Home Cooking and Willingness to Pay: Local Blueberry Pancake, Muffin, and Banana Bread Mixes in a Take-and-Bake Experiment

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HOME COOKING TRIAL AND WILLINGNESS TO PAY: LOCAL
BLUEBERRY PANCAKE, MUFFIN, AND BANANA BREAD MIXES IN A
TAKE-AND-BAKE EXPERIMENT

THESIS

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

By

Yves Tshikunga Ilunga

Lexington, Kentucky

Director: Dr. Timothy A. Woods, Professor of Agricultural Economics

2016

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ABSTRACT OF THESIS

Home Cooking Trial and Willingness to Pay: Local Blueberry Pancake, Muffin, and Banana Bread Mixes in a Take-and-Bake Experiment

This study explores measurable factors that influence consumer willingness to pay (WTP) for locally produced blueberry mixes: pancake mix, muffin mix and banana bread mix. The innovative aspect of this study is that the experiment took place at participants' home. The post-preparation survey used a payment card approach to elicit WTP for each product tried as well as for the hypothetical third product not tried. A total of 101 out of 102 participants (99.01%) completed the process and returned the survey. Participants were instructed to prepare the products at home, sample the prepared product, and then evaluate the product and process. Sensory and preparation experience attributes for each recipe were considered as potential variables influencing overall WTP, including previous cooking experience for similar products, watching the Food Channel, and related shopping choices.

A survey, along with two of the three recipes – a dry mix to be combined with locally grown frozen fruit - was distributed to potential consumers at diverse locations of study. The average WTP for the blueberry pancake mix was \$3.45, muffin mix was \$3.25, and the banana bread was \$3.39. The estimated regression of the Censored Tobit model of WTP suggests that the estimate of banana bread mix is significant. Four other estimates of Place, Gender, Age and Income also are significant depending on the product. The positive sign of some estimates of Trial, Blueberry Baking Experience, Education, Income, Gender, and Watching the Food Network showed that these factors have positive effect on WTP for some products. The paper develops the WTP models and also examines the experience versus the hypothetical effects on stated WTP. The results provide some measure of market opportunity, suggest positioning strategies, and also suggest strong returns to home trial marketing incentives for these products.

KEYWORDS: Willingness-to-Pay for Blueberry Mixes, Local Foods, Survey Experiment, Take-and-Bake Experiment, Value added, Payment Card, Trial.

Yves Tshikunga Ilunga

November 18, 2016

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I dedicate this work to my wife Claire W. Mampunza and my children Bryan, Samuella and Joanna, for their support and sacrifice throughout my master study.

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Chapter I. Introduction

Agricultural production is a known pathway to reducing rural poverty. However, it is essential to note that in itself agricultural production cannot solely eliminate poverty (Grewal and al, 2012). Instead, it needs to be combined with other strategic plans in order to create enough opportunities for sufficient rural employment and income generation (Dethier and Effenberger, 2012). Processed agricultural products provide a high potential for enhancing economies based on agriculture. Through diversification of an agricultural products, improvements to the local economy can become tangible (Marsden and Smith, 2005).

Recently, the World Bank reported that U.S value-added agriculture was \$198,562 million (World Bank, 2013) and this sector is predicted to continue to grow after a period of stagnation due to the economic crisis of 2008. In 2014, the United States Department of Agriculture created a strategic plan for the next four years (USDA, 2014). One of the goals of this plan was the increase in agricultural opportunities by ensuring a robust safety net, creating new markets, and supporting a competitive agricultural system. By aiding in supporting a competitive agricultural system, the program is also designed for the development of value added agriculture. Many aspects of development are included in these programs such as quality and safety guarantees (Hu, Woods and Bastin, 2009), while strengthening and expanding markets for American agriculture by improving the quality and variety of foods available to consumers (USDA, 2015). Also, the USDA is engaged in programs to support producers in promoting local and regional foods by grading and labeling. Value added strategies will also allow producers to capture a greater share of

consumers' food budgets. This marketing concept relies on consumers' expectations of products, including characteristics such as packaging, texture, color, and diversity.

The sale of agricultural products marketed through local markets has grown in recent years from almost 6,000 farmers' markets in 2010 to 8,284 in 2014 (USDA, 2014). In 2016, National grocers stores reported that near 26.8% of Americans eat locally grown foods more often than they eat organic foods (NGA, 2016). Based on this strengthening trend of consumer demand, small scale producers, generally known as "local producers" through producer organizations and cooperatives, have developed strategies to not only increase their production but also to market it throughout the year. One of the strategies they have adopted is the development of value added products. The purpose of this development is so that local producers can maintain their presence in the market. Despite having generally higher per unit costs, local producers can successfully compete with large producers if they emphasize their product's unique characteristics or services as being grown and processed locally (Brain et al, 2015). Figure 1 illustrates how agricultural value added production has evolved with time.

This study is of market prospectuses of three new value added blueberry products: Blueberry Pancake Mix, Blueberry Muffin Mix and Blueberry Banana Bread Mix, conducted for the benefit of the Kentucky Blueberry Growers' Association. To simplify future references, Blueberry Banana Bread Mix will be referred to as Banana Bread Mix. The first contribution of this research is to provide insight into consumer perceptions of processed value added local products. Only a few past research studies in horticulture have focused on processed blueberry products (Hu and al, 2012), while much of these studies

have focused on fresh items. The second contribution of this study is to provide insight into perceptions of semi-processed products.

The objective of this study is to determine whether consumer willingness to pay for Blueberry Muffin Mix, Blueberry Pancake Mix, and Banana Bread Mix will be based upon product characteristics and consumer socio-demographic characters. The second objective is to determine whether taking this product home for a “trial” will enhance overall WTP.

The research in this paper will take into consideration the growing interest in blueberries by consumers and the attention that consumers devote to local agricultural products. Also, it will explore the need for Kentucky blueberry growers to increase production, to extend market conditions for blueberries, and to diversify the range of products suggested to consumers. The result of this research will allow Kentucky Blueberry Growers to make decisions to better launch new products in the market and allow them to extend the sale of blueberries throughout the calendar year. Additionally, the results of this study will allow policy makers to appreciate the need for producers to promote their products. It is important to note that the scope of this study is centered on home cooking and evaluation of products taken home through random selection of survey participants. The results of this study provide needed data for producers to improve their product and allow marketing corporations to accurately identify potential markets for them.

This study will also help the Kentucky Blueberry Growers Association to assess market demand. The WTP measures will help them determine if a product is likely to be profitable (although costs of production are not known at this time), and what segment of the population may be particularly willing to pay more. This study will help position the

product in the market place. Though the concept of the Take-and-bake experiential survey this study will help to see what the trends are with cooking at home. And for this set of products particularly, does the “trial” concept help or hurt WTP, and what might be the subsequent merchandising strategies targeting sampling and trial.

Chapter II. Thesis Background

II.1. U.S. Blueberry Cultivation Through History

According to the USDA Plants Database, all species of blueberries cultivated around the world are from the *Vaccinium* family. The high bush blueberry, which is cultivated mostly in the Northern Hemisphere, is called *Vaccinium corymbosum* or *Vaccinium ashei*. The other type of blueberry cultivated in the Southern Hemisphere, also known as the southern blueberry, is sometimes called “Rabbiteye Blueberry” (USDA, 2014). Another species found in North America, especially in the state of Maine and Eastern Canada, is *Vaccinium angustifolium*, or the lower bush blueberry. In some cases, this is referred to as the “wild” blueberry.

A significant number of public services such as cooperatives, producers’ associations, and university agricultural extension agencies have promoted guidelines throughout the years in the U.S. for best practices for growing the blueberry crop. The guidelines provided by these agencies have served, and continue to serve, farmers and individuals interested in blueberry crop production throughout the country.

Blueberries are one of the most recently domesticated plants in the world. The earliest inhabitants of North America used blueberries both fresh and dried. They utilized them mainly for their therapeutic benefits. According to the New Jersey government, Elizabeth White (1871-1954) was the first person to cultivate the blueberry as a domestic plant. With the help of local woodsmen, she made a selection of species and identified those with large bushes, tasty, aromatic berries, and fine texture. Her goal was to perpetuate the most desirable blueberry characteristics by cultivating plump, juicy, flavorful fruit.

White reported her work to an early botanist of the USDA, Frederick Coville, detailing her experiments with high bush blueberry plants. Today, nearly one hundred years later, the work of these two people has led to worldwide businesses that generate billions of dollars each year.

II.2. Blueberry Industry in the U.S

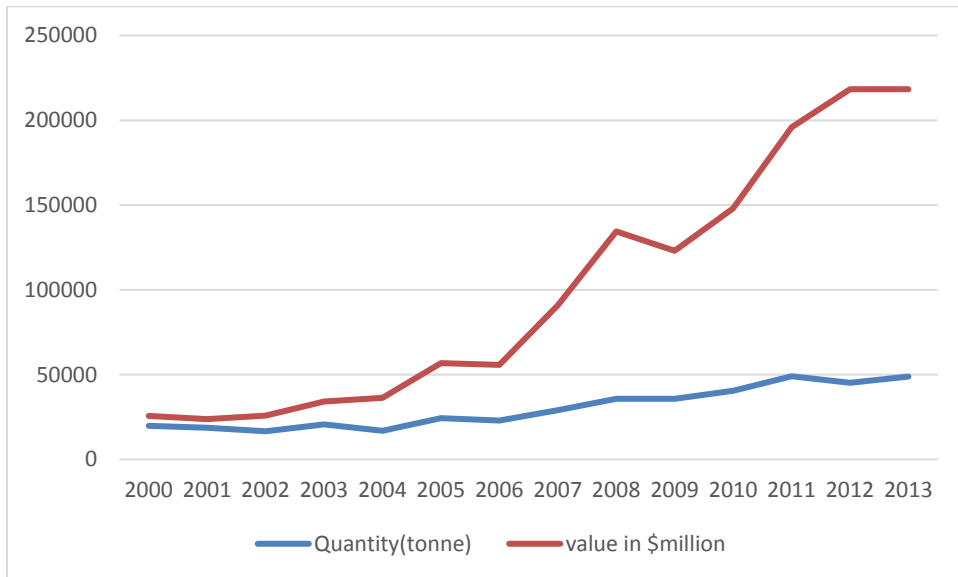
Despite climatic requirements, fresh blueberries are available all year long in the U.S. According to the USDA, American grown blueberries are available in the U.S from March through September. These months correspond to the warmer months in the U.S. so blueberries are essentially available in the early spring and summer (USDA, Fresh Fruit and Vegetable Shipments, 2015). Crop growth starts in the southern U.S. in the early spring and moves northward and westward, providing a bountiful supply of fresh high bush blueberries. Chile, one of the two top blueberry producers in the Southern Hemisphere, has the ability to provide blueberries to the U.S. from November through April, during the cold months in the U.S. when blueberry production ceases.

The blueberry industry is doing very well in the world in general and in the United States in particular. According to the World Bank, the U.S is one of the world's largest producers of blueberries. The U.S is also the largest exporter and importer of blueberries in the world (FAOSTAT, 2015). The U.S., along with Canada, has 67% of the world's blueberry acreage. The high bush type is the most popular species cultivated in the world and the U.S, though the lower bush type is also cultivated in the U.S. Wild blueberries are still being harvested in the U.S. as well. According to the U.S High Bush Blueberry Council (USHBC,2016) in North America, the expansion of blueberry production continues in the

U.S. Figure 2.1 illustrates the expansion of acreage dedicated to the blueberry in the U.S over the past 15 years. It is important to mention here that HBBC utilizes a marketing order that invests funds to enhance demand for blueberries generally, while many compelling recipes and products are developed. The marketing order does not specifically invest to develop products that emphasize a local sourcing. In the past three years acreage dedicated to blueberries has steadily increased with 82,630 acres being dedicated to blueberry production in the U.S. In 2014, total production of blueberries yielded 5.67 million pounds of blueberries, which was an increase by 5 percent compared to the 5.40 million pounds yielded in 2013. This represented a value of \$605,950,000 in 2013.

Acreages of U.S blueberry production increased from 76,400 acres in 2012 to 81,040 acres in 2013 and again to 84,150 acres in 2014. This continuous increase of acreage in blueberry production shows that producers continue to maintain a high interest in this commodity. Blueberry production has also showed steady increase over the past three years, from 467,750 million pounds in 2012, to 543,570 million pounds in 2013 and to 576,230 million pounds in 2014. New techniques and technologies have allowed producers to improve production over the past few years. Price per pound reached the highest amount in 2012 with \$1.70 dollars per pound, while it decreased to \$1.40 dollars per pound in 2013 and \$1.460 dollars per pound in 2014 for fresh blueberries. The number above illustrates how progress in the production of blueberries has been made in the last few years.

Figure 2.1 U.S. Blueberry Production (tons) and Value (in U.S \$ million)



Source: FAOSTAT, 2016

Figure 2.1 shows how production has doubled over the first 14 years of this century, but the most important aspect of this increase is in the value of blueberries. In the figure above, we can observe how the value of blueberries has continually increased through the years. According to the data used in this figure, the value of blueberries was slightly above the quantity produced in 2000. Nevertheless, the value of production doubled five years later, which is 3.5 times more than it was in 2000.

The blueberry industry has experienced an increase in consumption per capita in the past ten years. This positive trend has allowed an increasing number of new products to enter into the market each year. In 2012 alone, USHBC reported that near 1400 new product entered market. Consumers have become educated about the wonderful health benefits of blueberries and, consequently, the past four years have seen the largest crops and record demand. The good news is that the industry has kept pace with demand and

now processed blueberries (frozen, liquid, dried etc.) are in plentiful supply. The market configuration of blueberries has changed over the years. About half of the total production is destined to the fresh market sector and the remaining blueberries go to food processing. In the past endeavors, the fresh market was the main beneficiary of all blueberry production. Today, blueberries are further processed into dried, liquid, and other formats for food industry use (Williamson and Lyrene, 2004). The health benefits of blueberries, combined with the creation of a number of derivative blueberry products, were responsible for this growth (Seeram, 2008). Studies have shown a positive relationship between the demand for blueberries and the health information of blueberries (Shukitt-Hale, 2012).

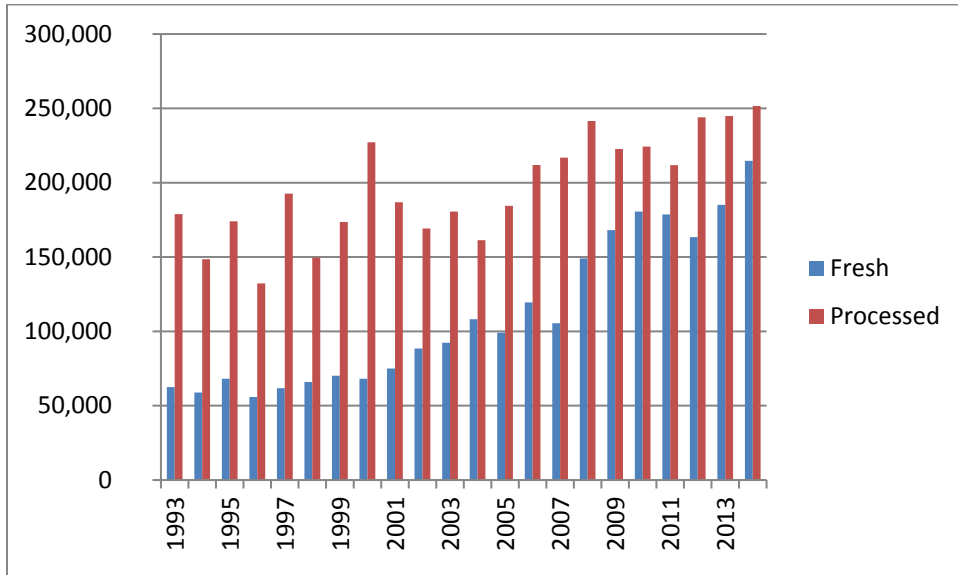
Table 2.1 illustrates the top blueberry producing states in the U.S. Even though the state of Kentucky is not among the top blueberry producers in the U.S., this crop continues to draw interest for both producers and policy makers. Both continue to explore ways to improve this industry for the benefit of Kentucky producers.

Table 2.1 Top 10 Blueberry Producing States in the U.S in 2014

| States | Million lb. | Percent of US Production | Fresh million lb. | Percent of US Fresh | Frozen million lb. | Percent of US Frozen |
|----------------|-------------|--------------------------|-------------------|---------------------|--------------------|----------------------|
| Georgia | 96 | 17.5 | 56 | 58 | 40 | 42 |
| Michigan | 91 | 16.6 | 44.2 | 48 | 47.3 | 52 |
| Washington | 90 | 16.4 | 26 | 29 | 64 | 71 |
| Oregon | 85 | 15.5 | 38 | 45 | 47 | 55 |
| New Jersey | 55 | 10 | 50 | 91 | 5 | 9 |
| North Carolina | 48 | 8.7 | 37 | 77 | 11 | 23 |
| California | 47.5 | 8.6 | 39 | 82 | 8 | 17 |
| Florida | 17 | 3.1 | 17 | 100 | 0 | 0 |
| Mississippi | 9 | 1.6 | 4.5 | 50 | 4.7 | 52 |
| Indiana | 2.5 | 0.5 | 1.5 | 60 | 1 | 40 |
| Other areas | 8.4 | 1.5 | 8.2 | 100 | 0 | 0 |
| USA Total | 549.4 | 100 | 321.4 | 56 | 228 | 41 |

Source: USDA, 2014

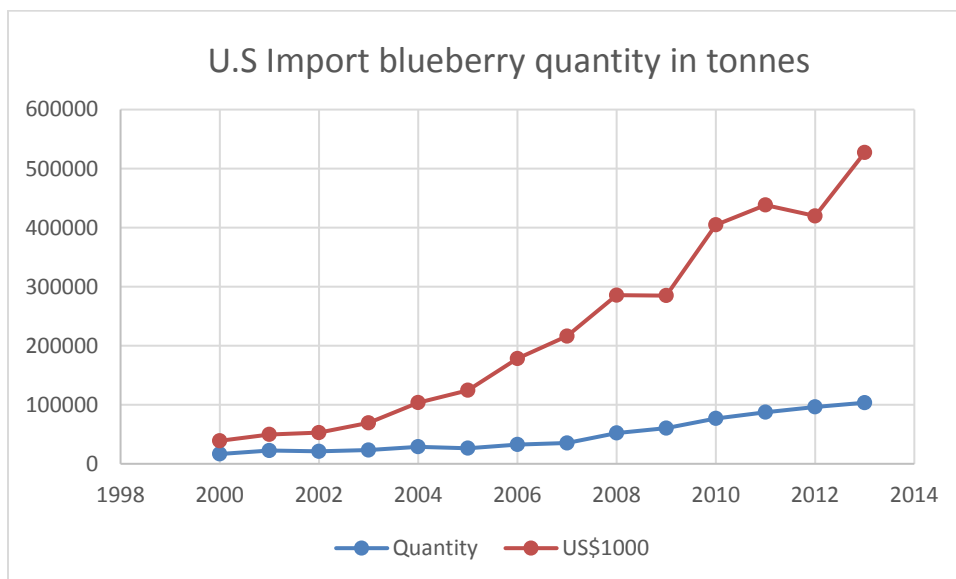
Figure 2.2 U.S. Total Production of Fresh and Processed Blueberries: 14 top producers of blueberries (unit in 1,000 pounds)



Source: USDA, ERS 2016

The data used in Figure 2.3 is from the top 14 major state producers of blueberries. As defined by the USDA, processed blueberries are all blueberries transformed to dry ingredient, liquid, or any form other than natural fruit, including all blueberry fruits (fresh, packed, or frozen). Thus, quantities of value added blueberries provided to the market are higher than unpacked blueberry fruit provided to the market. Figure 2.3 also shows that the quantity of processed blueberry products in the market has continuously increased since 1993. The positive trend highlighted in Figure 2.3 illustrates the growing consumer demand for blueberry products.

Figure 2.3 U.S. Blueberry Imports (quantity in tons and value in US \$1,000)



Source: FAOSTAT, 2016

To supply the domestic market when blueberry production is in the off season, the U.S. market turns to the Southern Hemisphere. With \$419,794,000 and \$527,233,000 worth of blueberries imported respectively in 2012 and 2013, the U.S. is the largest importer of blueberries in the world (FAOSTAT, 2016). These numbers illustrate how large is this

market. However, most of these imports are coming from large scale companies that have low production costs, with minimum charges for transportation. Chile is the main supplier of blueberries to the United States. Figure 2.4 highlights how the importation of blueberries has grown over the years.

The U.S. blueberry industry continues to exhibit stable growth. From growers to retailers, this crop has produced a continuously growing demand in the domestic market and in the international market.

II.3. Kentucky Blueberry Industry

Compared to the longer U.S. Blueberry story, Kentucky's blueberry story really began in 1995. In that year, a couple from Michigan moved to Kentucky, bringing with them more blueberry bushes than were being grown in the entire state (Ernst, 2002). Since that time, blueberries have drawn the attention of farmers around the state. From a few acres of farms in the late 1990's, the state of Kentucky now counts nearly 316 blueberry farms according to USDA Census of agriculture 2012. These numbers look promising compared to what the State of Kentucky had two decades ago. This number will continue to increase in the future since the blueberry crop continues to attract new farmers. Most blueberry farmers in Kentucky grow the high bush species. Horticulturalists have noticed that this type of blueberry (high bush) is better suited to Kentucky's climate.

Even though blueberry production is still small in Kentucky, compared to the top producers in the country, the state of Kentucky, through the Department of Agriculture, has created mechanisms and strategies on multiple levels to encourage local producers to

develop this crop. The creation and promotion of the Kentucky Proud label has largely contributed to the promotion of local products, including Kentucky blueberries.

II.4. Kentucky Blueberry Growers Association

In the state of Kentucky, there exist several different blueberry growers' associations. The Kentucky Blueberry Growers Association is one of the most important groups of blueberry producers in Kentucky. This organization is a for-profit organization that was created in 2002. The motivation was to create an organized base for blueberry growers in Kentucky. This association is also a place where people can ask questions, share information, resources, and experiences. The original idea was to create this association in order to help Kentucky based growers with valuable information on grants, markets, and supplies. However, it now has members from surrounding states as well. The association counts more than 200 members within Kentucky and surrounding states.

II.5. Local Food System Development

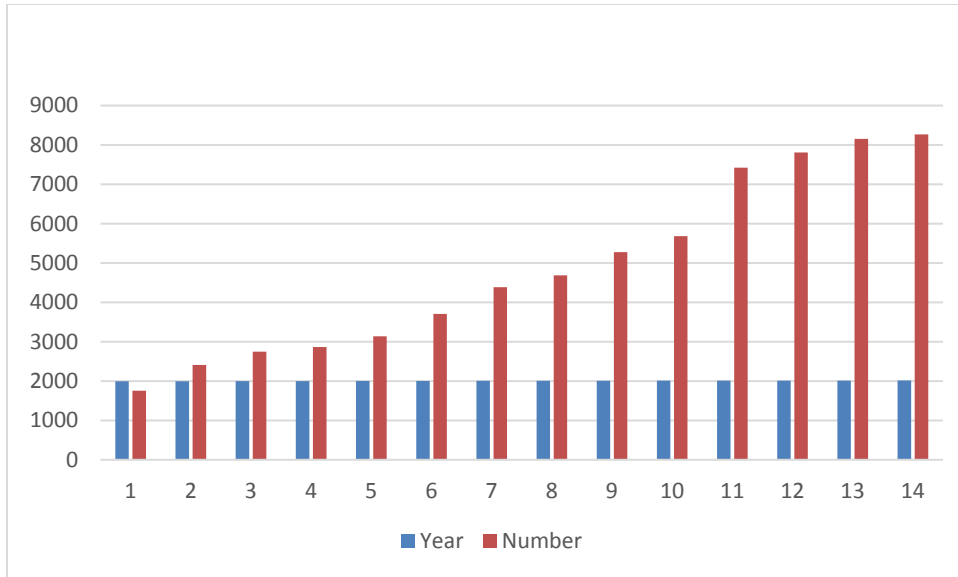
The State of Kentucky, through its Department of Agriculture, has promoted the mission to keep local agriculture producers competitive in the market by promoting and assisting farmers, agricultural businesses, and commodity groups through promotion and marketing of their products by expanding existing markets, as well as developing domestic and international markets. This idea was made possible through diverse initiatives such as farmers' markets, farm to school programs, community supported agriculture, "locally grown" products and the "Kentucky Proud" program. The goal of these programs was to encourage the Kentucky population to consume locally grown products that would benefit

local businesses. So far, the program has successfully promoted locally produced blueberries in the state of Kentucky.

Farmers' markets: The State of Kentucky counted 159 farmers' markets and more than 2,500 vendors selling fruits, vegetables, and other agriculture products. Many consumers understand the importance of buying local food through farmers' markets. They are not only encouraging local producers, but they are also buying fresh and healthy foods for their own families. Farmers' markets have become an important sales outlet for agricultural producers. The local farmers' market in Kentucky is a model initiated and promoted by the USDA. The growth of this market shows how interest in locally grown products has increased in Kentucky and the U.S.

In the state of Kentucky, the Department of Agriculture defined farmers' markets as location(s) where two or more producers gather on set days and times to sell products that they grow or produce directly to consumers.

Figure 2.4 Farmers Market Evolution in U.S



Source: USDA, 2016

The number of farmers' markets has increased over the years. According to the USDA, the number of farmers' markets was 1,755 in 1994; 3,706 in 2004 and 8,284 in 2014. These increased is a demonstration that U.S consumers' attention on local foods has increased for the last few years. These numbers may also suggest a strong support of local economy.

"Kentucky Proud" is another marketing tool used to convey to the consumer the freshness and locally grown aspect which the Kentucky Department of Agriculture has created for the promotion of locally grown products. This concept is defined as every agricultural product born, raised, grown, manufactured, or processed in the State of Kentucky. This program encourages the Kentucky consumer to look for the logo when purchasing foods.

The “Kentucky Proud” program has ties with the “Appalachia Proud” program in the 37 eligible counties in Eastern Kentucky. The “Kentucky Proud Homegrown by Heroes” label provides name recognition to farmers who have served in the military.

Chapter III. Literature Review

This chapter discusses past studies on WTP of local products in U.S, the literature on consumer preferences and value added products.

Over the past few years, since the concept of local food has emerged, much research has been dedicated to the local food movement. While the increase in the demand for blueberry crops due to its health attributes in the market has drawn the attention of researchers in the past few years, the majority of these articles explored local food in general (Breider et al, 2006; Gracia et al, 2012; Carpio et al, 2008; Hu et al, 2011; Hu et al 2006; Jekanowski et al, 2000; Darby et al, 2006; Ernst and Woods, 2004; Schneider and Francis; 2005; Willis et al, 2013). These selected articles have been dedicated to agricultural products locally grown in the United States, and have explored diverse aspects of their development. There have been just a few articles dedicated to agricultural value added products in general and blueberry products in particular.

The majority of the studies that we mentioned above have measured consumers' preferences and willingness to pay. Some have partially been in contact with customers (Carpio et al, 2009). All of them have limited study either to estimates of consumer Willingness to Pay, or have given the opportunity to the consumer himself to estimate (Hu et al, 2011). Despite the positive view on proposed products that these studies suggested to consumers, they have never explored the idea of giving the consumer the opportunity to try the product at his leisure. Perhaps the outcome of these studies could have been different if the real product was actively involved in the study.

In a study in Iowa, Ortiz (2010) measured consumer willingness to pay of a locally sourced restaurant menu. This study used an experimental approach by giving participants money to simulate a restaurant experience of choosing between locally sourced menu items and regular menu items. The study was limited to one dining facility in the same location.

In the two decades since the concept of local food gained attention from consumers, the demand for local food has increased. This fact is driven by the belief that local foods are healthier, more sustainable, and supportive of local economies. Local producers have taken advantage of this consumer belief as evidenced by the increased quantities of blueberry crops produced. The direct correlation to this fact is reflected in the expansion of structures that serve to promote local foods.

III.1. Payment Card Approach on WTP Studies

There exist a consistent number of studies using a payment card approach to measure consumer willingness to pay in the literature. Those studies state the advantage and the limitation of this approach. The payment card approach which consists of narrowing down the range of values within which consumer's WTP falls was first initiated by Mitchel and Carson (1989) to capture individuals' WTP for public environment. Champ and Bishop (2006) already discussed the efficacy of a payment card approach in a survey for the public good. They found in their study that a higher number of participants, 93%, without difficulty were available to respond to the payment card section.

As we described in the paragraph above, originally the payment card approach was used to evaluate WTP for a public good. Hu et al. (2006) adopted this method for food studies, since then, many more studies in agricultural economics have adopted this

approach, among them Yang et al. (2013), Ryan and Watson (2009), Hu et al. (2011), Yu et al. (2014). This list is not exhaustive. In these studies, whether they used the original or a modified payment card approach, they expressed satisfaction with the usefulness of this approach in their respective studies.

III.2. Consumer Preference and State Marketing Programs

There exists an abundance of literature on marketing locally grown agricultural products. In 2010, the USDA published a report on local food systems. This article provided insight into how agricultural products were managed from production to consumption in the U.S. The article also pointed out some important steps that products should follow in the marketing process. A study found that food producers and businesses experienced an increase in demand of local food. This study also concluded that the growth was expected to continue. Brown and Miller, (2008), found that new models of marketing alongside include CSAs, and Farmers' Markets contributed positively to the promotion of local food. Pinchot, (2014), found a significant increase in direct marketing for food locally grown in Minnesota. Thilmany and Bond, (2009), attribute the success of local food to the freshness factor desired by most households; Brown, (2003) found that both freshness and quality are the top attribute that motivate consumers when buying local food.

A significant number of research studies have been devoted to marketing agricultural locally grown products and diverse programs that some states in the U.S have implemented to promote local food. Carpio and Insegild-Massa, (2010), evaluated regional promotion campaigns on quantities and prices for locally grown products versus out of state products. In addition to their study, they assessed the change in demand for branded

products due to regional campaigns using a contingent valuation technique. This study was dedicated to South Carolina's agricultural locally grown products and measured the impact of a state program related to the promotion of local products. They evaluated consumer willingness to pay for agricultural products, which included animal products grown in South Carolina, versus products grown out of the state. They concluded that the state campaign promotion increased consumer willingness to pay for agricultural products grown in South Carolina by 3.4%. It increased consumer surplus by about three million dollars, and the return on investment was 618% for South Carolina.

A marketing strategy was adopted by the Kentucky Department of Agriculture that invested in the development of local products under the "Kentucky Proud" program and has generated a significant return for the economy. In its report of evaluating the ADB investments in Kentucky Agriculture in 2015, the KDA reported that during the period from 2007 to 2013, for every one dollar invested in the promotion program there was a return of \$2.03 in farm income (KADB, 2013). The estimated total farm income generated as a result of the projects funded during the period of 2007-2014 is approximately \$85.9 million. Marketing projects generated \$28.9 million in estimated total farm income and \$3.07 return per dollar invested by KADB.

III.3. Value Added Products

The literature devoted to agricultural value added products, especially blueberry products, is limited. However, Hu et al. conducted two research studies in 2009 and 2011 on value added blueberry products. In one of these studies they used a payment card approach to measure willingness to pay for local blueberry products. The researchers found

that the attributes of the blueberry products, combined with the demographic effect of consumers, have a significant impact on the WTP for the blueberry products. In addition, the WTP mean price of proposed blueberry products did not deviate far from the actual market price of the similar products.

Meas et al (2015), studied consumer preferences for local and organic food attributes. The research was conducted in the states of Kentucky and Ohio. The results of the study reveal that consumers were willing to pay more for locally produced products than for the products from the bordering state. They also measured the substitution effect between locally grown products and organic products. In this study, it was determined that there was an existing substitution effect of organic product in relation to locally grown products. In this survey experiment, the state-proud logo was marked on each product to show its origin. The evidence of this study reveals how the local product label has a positive impact on consumer preference.

Ortiz, 2010, in a study devoted to the evaluation of consumers' willingness to pay for locally sourced menu items in restaurants, found that a consumer's motivation to pay a premium for a locally sourced menu was based upon some considerations such as the support of the local economy, much better quality of product, and environmental concerns. The study focused on the selected restaurant label "Educational Restaurant". The proposed menu consisted of local food and ingredients compared to non- local food and ingredients. Hu et al, 2009 and 2011, in two similar studies found that local attributes combined with health information of blueberry products have a positive impact on consumer willingness to-pay for local blueberry products.

There exist significant contrasts among consumer groups in their incentive for buying local foods. In common are the consumers' two principal criteria for buying foods: freshness and quality Roininen et al, (2006). Beyond preferences and incentives, location also plays an important role for local food. Consumers are informed that foods they are buying are produced and sold locally. Direct markets provide consumers who shop in this market the value of freshness and quality attributes of foods in contrast to those who do not. Another contrast is these consumers are less concerned by the convenience of location and price of the product.

III.4. Marketing Local Foods

Currently, most small businesses in general, and especially small farmers, have turned to local government for marketing concerns. This is the only way that these businesses can hope to compete with multinational corporations. This system works to make it commonplace to find the same types of products in the same aisle even in big box stores. For instance, in the city of Lexington where this study took place, the grocery store chain "Kroger" has advertised a "local food" section on the T.V. and in the store for the entire summer of 2016. This advertisement is a compelling argument to its customers that it is more supportive of the local economy than other grocery stores in the city. The explanation may be that the "local food" campaign has gained a large audience, causing big box stores to try to send a message to consumers that they are also supportive of local /and or small business. Small scale businesses from counties near large cities also benefit from this kind of promotion of their products.

Chapter IV. Survey Design and Data

This study was conducted to determine Willingness to pay for three blueberry products at the same time: Blueberry Pancake Mix (BBPNCK), Blueberry Muffin Mix (BBMM), and Blueberry Banana Bread Mix (BBBAN). These three products were given to the participants in the form of frozen berries and dry ingredients, simulating take-and-bake products they might encounter in a grocery freezer section. First, the idea was to give the participants actual products to try at home which would allow them to sample the product and the cooking process in a familiar environment. In the descriptive manual distributed along with the survey, it was clearly stated that participants should not complete the form (survey) before tasting the product. Second, after cooking the products one at a time and completing the entire tasting process, they are then instructed to respond to the questions.

This “take and bake” marketing approach is centered on the choice to pay or not to pay, including the amount set on the payment card, for the blueberry products that they made and tasted. This approach is valuable in terms of participant availability. It avoided the gathering of participants in the same area, and it allowed participants to experience cooking by themselves. It also allowed them the flexibility to cook based on the freedom in their schedule. Based on the facts explained here, we can be certain that the information provided by participants in this study should reflect their true intentions to buy the product in the future.

IV.1. Survey Design

The Survey was designed to capture a maximum amount of information from participants. It has two parts: product attributes and socio-demographic information of the participant. The first part of the survey had questions about the product itself (attributes). These questions pertained to packaging, level of difficulty of use of the product, ease of preparation (baking), popularity of the product, consumer expectations of the product, overall product concept, comparison to similar products, participants past experience with similar products, and the viewing frequency of the Food Network (cooking channel). The second part of the survey had questions about socio-demographic information of the participants. This method of conducting the survey helps to impart a better explanation of consumer choices. Another question in the survey, besides willingness to pay, was the commitment to buy the product once on the market.

IV.2. Data and survey

The complexity of the value added blueberry products study dictated the way that this survey was conducted. The Kentucky Blueberry Growers Association (KBGA) prepared the samples of each recipe and the distribution to participants was managed by the Food System Innovation Center of the University of Kentucky (FSIC). A number of 102 persons were randomly selected in three different locations in Lexington, Kentucky: Good Foods Café and Market (GFC), which is a food co-op grocery store, Panagia Pantovasilissa Greek Orthodox Church, whose members were actively involved in local community fund raising, and University of Kentucky employees through a recruitment flyer preceding the distribution of the survey. A survey was distributed on a strictly

volunteer basis in all three places on August 27, 2014. The survey contained procedures and directions for how to cook the product. Two out of the three products and the survey forms were voluntarily distributed per each participant. Responders were given two weeks to complete the process and return the form. A compensation of \$20 was given to all participants who mailed in the completed survey. 101 out of 102 respondents returned the survey on time. The participants were asked to complete trial feedback surveys for two out of three products, and then WTP for all three.

The survey questionnaire was initially developed as a result of focus group discussions and was pre-tested prior to implementation. It contained three sections, each designed to be completed within 10 minutes by each respondent after cooking and sampling the product. Also, the instruction was given that the respondent should cook one product at a time per day, and then complete the survey. The first section collected information about the product's presentation, such as frequency of purchasing fresh blueberries, watching The Food Channel, and overall how the recipe turned out. The second section asked questions about participants' future intentions of buying or not buying the product. Finally, the last section collected information about participants' household size, income, education level, gender, and age. Participants were aware that the take-and-bake survey experience was intended to provide marketing information to assist Kentucky blueberry growers in the launching of prospective products. Table 4.1 provides descriptive statistics for each of the variables included in this study.

A significant number of experiment choices, and/ or willingness-to-pay studies, have been found to use different techniques to measure consumers' WTP. Malhorta, (2004), divided experiments into laboratory experiments and field experiments. Both

techniques are used in WTP. The laboratory experiment, according to him, consists of giving individuals an amount of money, asking that they spend it on a specific selection of goods. In this experience, the goods and price are systematically varied. He defined the field experiment as an experiment carried out in the participant's natural everyday environment. The experiment used in this study was inspired by field experiments. This methodology, including the take home-and-bake aspect, has the advantage of giving the products to participants to try first, then asking for the amount that they are willing to pay for the same product or its improved version in the future.

Table 4.1 Sample Statistical Characteristics

| Variables | Full Sample | | Pancake Mix | | Muffin Mix | | Banana Bread Mix | | Description |
|------------------|--------------------|---------|--------------------|---------|-------------------|---------|-------------------------|---------|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | |
| LocGroc | 0.24 | 0.43 | 0.23 | 0.42 | 0.25 | 0.43 | 0.21 | 0.41 | Dummy variable; 1 for participant recruited at the Good Food Co-op and otherwise recruited at Panagia or FSIC |
| BBEXP | 0.75 | 0.43 | 0.81 | 0.40 | 0.84 | 0.34 | 0.77 | 0.42 | Dummy variable; 1 for consistent previous experience on blueberry products |
| FOODNET | 0.75 | 0.43 | 0.38 | 0.49 | 0.40 | 0.49 | 0.45 | 0.50 | Dummy variable; 1 for watching food channel |
| MALE | 0.20 | 0.40 | 0.82 | 0.40 | 0.17 | 0.38 | 0.20 | 0.40 | Dummy variable; 1 for male |
| AGE | 43.50 | 13.09 | 42.9 | 13.12 | 43.62 | 12.58 | 42.63 | 11.7 | Continuous variable; year of age |
| INCOME | 68227.4 | 28098.2 | 68671.3 | 27872.7 | 67752.5 | 28219.3 | 69978.5 | 27769.5 | Continuous variable; Annual household income before tax |
| EDU | 15.80 | 3.04 | 17.51 | 2.50 | 17.27 | 2.63 | 17.33 | 2.50 | Continuous variable; year of education |
| TRIAL | n/a | n/a | 0.83 | 0.40 | 0.804 | 0.40 | 0.77 | 0.42 | Dummy variable; 1 for trial the product |
| WTP | n/a | n/a | 3.46 | 1.75 | 3.26 | 2.08 | 3.39 | 2.01 | Continuous variable; amount willing to pay; \$/ package |
| Sample | 101 | | 93 | | 87 | | 71 | | |

Table 4.1 describes sample statistical characteristics of variables used in this study. A total of 9 variables, including Gender, Age, Income, Education, Blueberry Baking Experience, Watching the Food Network, and the location of participants' recruitment were used to best determine WTP for all three blueberry products. One needs to note that 93 participants out of 102 (91.17%) were willing to pay for Blueberry Pancake Mix, including 17.3% of those who didn't try the product at home. A total number of 87 out of 102 (85.29%) participants had intentions to buy Blueberry Muffin Mix, including 20% of those who didn't try the product, and the other 71 out of 102 (69.60%) participants had intentions to buy Banana Bread Mix, including 12.6% who didn't try the product.

The average income of the participants was \$68,227.4, well above the national average U.S. income of \$51,939 and Kentucky income of \$42,958 (U.S Census Bureau, 2014). Near 23.7% of participants were recruited at the Good Foods Café and Market (GFC) chosen as a representative market, which is well known in central Kentucky for promoting and selling locally branded products, including agricultural goods. And 24.24% of participants was from Panagia Greek Orthodox church and 55.55% of participants were University of Kentucky employees. The mean level of education of participants was 15.8 years of study, which is almost the equivalent of a bachelor's degree. At least 37.1% of participants had a bachelor degree, 30.9% had a master degree and 7% had a PhD. At least one these numbers is close to the state average. The city of Lexington and its surrounding areas is one of the higher ranked cities for education in the U.S, with 40.1% of the population having completed a bachelor degree or more, and 88.6% of the population having a high school diploma (U.S Census Bureau, 2014). The mean age of the overall

sample is 43.5. People who identify themselves as male were 19.8%. Among participants, 67% declared they were not living with children under the age of 18.

Chapter V. Research Methodology

This study is a contribution to the market valuation of value added products (these products still being developed). The inventive aspect of this study was examine a home trial impact on willingness to pay. The study aimed to give necessary time to the participants to perform the assignment without rushing. Two samples of blueberry mixes were given to the participants so they could take them home to cook and to eat, and then to fill out the survey. The survey design adopted this path to minimize hypothetical bias which commonly results in an overstatement of WTP.

Studies have found in the past that most marketing survey participants have overstated the WTP of proposed products (Alfnes and Rickertsen, 2003). Apart from non-food goods, it is important to conduct a market prospectus for new products by exposing consumers to the real product, thus giving them the ability to provide accurate feedback relative to the product itself. This will not only allow producers and marketing structures to forecast product viability but also to improve the product. Since the concept of “local food” surfaced in the U.S a significant number of studies were conducted to see how the population would react to the promotion of local food. A variety of value added products have been launched in the market with that label with hopes for success, but in many cases these ventures have failed (Henard and Szymanski, 2001). This failure has caused damage to small businesses when the product didn’t perform as they predicted. This study is a collaboration between different groups: the FSIC, the USDA, and local producers, who are involved in the improvement of local producers’ welfare. The group together tries to estimate accurately the question of will the locally produced frozen blueberry mixes be successful in the market, and does trial make a difference in the WTP.

We are also confident that the methodology used in this study will contribute to minimizing hypothetical bias related to overestimation of WTP. Many studies on consumer behavior have found that sellers and potential buyers have a tendency to overestimate WTP for a given good. Van Boven et al, (2000), found that sellers endowed with goods overestimated the amount that buyers were prepared to pay for them. Kurt and Inman, (2013), in their study found that consumers overestimate the potential amount offered by other buyers. Frederick, 2012, demonstrated during an on-site experience in auction bids that people would overestimate the bids for the next buyers by 40%. As these studies highlight, this tendency to overestimate WTP for products may lead to hypothetical bias, which would produce a misleading result.

V.1. Hypothesis Signs

The selection of variables for this study was very important. Literature states an abundance of factors that have an impact on an individual's or household's choices. These factors are intrinsic and extrinsic to the product. This study has considered a range of factors that literature and previous similar studies have used to select variables. We can classify these factors into two categories, socio-economics and characteristics of products. With a sample size constraint $N=102$ for the overall sample, we used the multicollinearity Pearson correlation matrix test and economic importance of variables to select those that remained in the econometrics model. Variables below are those used in this study: LocGroc, previous experience with blueberry products (BBEXP), watching cooking channels (FOODNET), gender, age, income, education, and trial of blueberries at home. Table 5.1 provides the expectation sign for the estimated variables used in this study.

Table 5.1 Variables and Expected Estimates Signs

| Variable | Expected signs on WTP | | | Explanation |
|----------------|-----------------------|-----------|-----------|--|
| | BB Pancake | BB Muffin | BB Banana | |
| LocGroc | + | + | + | Location of recruitment of participants in experiment |
| BBEXP | + | + | + | Previous experience with blueberries products |
| FOODNET | + | + | + | Watching Food Channel |
| Male | - | - | - | Gender if survey participant is a male |
| Age | - | - | - | Age of participant |
| Income | + | + | + | Annual income of participant |
| Edu | + | + | + | Level of Education of participant |
| Trial | + | + | + | Participant in experiment had tried the product in home trial. |

Locgroc: Local grocery (locgroc) represents participants recruited from a food co-op. This takes the experiment to a further unique dimension of simulation. These stores have a competitive advantage when sourcing and promoting local foods compared to other grocery stores (Katchova and Woods, 2016). The expected sign for the coefficient of this parameter is positive (+). One of the three locations randomly selected, Good Foods Co-op, has the unique characteristic of selling local foods. The hypothesis is that a good proportion of participants who were selected in this place will have a positive attitude toward the product and this variable will have positive effect on WTP for all three products.

This store (GFC) is a consumer co-op grocery that represents consumers that place a high value on local products.

Blueberry Experience (BBEXP): To determine the expected sign for the coefficient of previous experience with blueberry products is not easy. The experience that every individual earned in all areas allows him to have objective judgement when facing a given situation. In the case of the blueberry products, participants' previous experience with blueberry products is crucial because it helps the study to be confident about the feedback that participants will give. This parameter has been used in studies involving marketing (Dhar and Wertenbroch, 2000).). The positive sign is the expected sign for this variable. When higher, it can reflect a general preference for blueberries, but it could also impose a more demanding expectation for take-and-bake blueberry products.

Watching Cooking Channel (FOODNET): A positive sign (+) is the expected sign for the coefficient of watching the Food Network. Under this category, we include food channels and cooking shows. We expect this sign because studies have shown a positive correlation between watching cooking shows and enjoying cooking at home. A study has shown that 8 out of 10 U.S adults watch cooking shows (Harris Poll, 2010). In that study, 21% of adults have never watched cooking shows, 20 % do so rarely, 34 % occasionally, and 15% watch very often. The study also reveals that 57% of those who watch these shows have purchased food related to the subject they watched. 24% of them purchase cooking books. Another aspect in liaison with this study is cooking at home. The study found that 79 % of American adults enjoy cooking at home.

Gender: the expected sign for the coefficient of gender is negative (-). This variable is a dummy variable (1 if male and 0 otherwise). 80% of participants were female and 67 % said that they have the responsibility of buying household food. However, we will not be surprised if the sign of the coefficient estimate of this parameter is positive. Most participants of this study were female, and knowing that grocery shopping is mostly influenced by women in the household may affect this sign (Roy Dholakia, 1999).

Age: We expect a negative sign (-) for this parameter. The overall mean of the parameter age is 43.5 years old. Most participants were living with a partner and without other persons (children). The Harris Poll study, mentioned previously, found that families with children enjoy cooking at home more than families without children. But also, we know that older people are more likely to be cautious of their health, and are therefore more likely to cook at home as well. 65% of participants in this study do not live with the children under the age of 18, which suggests that they are less likely to cook at home.

Income: It is expected that the coefficient of this parameter has a positive sign (+). With the overall mean income of \$68,227.40 of participants, the income should have a positive relationship with WTP. And if so, this will be a good sign for these study results since the increase of income allow consumer to increase his consumption (Meghir and Pistaferri, 2011). Any negative sign for this coefficient will be a red flag for the product and producers will need to work on improving it.

Education: The sign for the education coefficient that we expected for this study is a positive sign (+). Studies have shown a positive correlation between level of education and consciously supporting the local economy. The more people are educated the more they

are aware of all issues concerning ties with food and the local economy (Zepeda and Deal, 2009). Data collected in this study has shown a high mean of 15.8 years of education. This number nearly corresponds to the standard number of years that individuals may spend to get a bachelor degree in the U.S. Recall that the city of Lexington Kentucky (Fayette County) is one of the cities with the highest number of its population who have completed a high school degree and some college courses or completed a college degree in the U.S. According to the Census Bureau between 2013-2014, Fayette county had 89.2% of its population of age of 25+ who had graduated from high school and 40.2% of people of age 25 years + who had a Bachelor degree (U.S Census Bureau, 2016).

Trial: The expected sign for the coefficient of the parameter trial is positive (+). We expect that the take and bake experience will have an overall positive impact on consumers' WTP. However, a negative sign for either product will not be surprising. The nature of this experiment is to put participants in situations similar to their normal routine. This parameter is the essence of this study. This parameter is, beside WTP, this study's interest variable. We think that this key variable will contribute to minimizing hypothetical bias due to lack of not seeing and not tasting the product for which survey participants offer their WTP (Morrison, 2000). But we also know that the negative sign could be an opportunity for producers to better shape the products. This variable (Trial) is the reference variable in this study. It essential to note this experimental survey was design to allow participant to try the actual products in real time then provide feedback.

V.2. Consumer Theory

The utility function that we will use throughout this study was elucidated first by Lancaster (1966). The concept is that a product is a bundle of attributes, and utilities are derived from the bundle of attributes rather than the product as a whole. McFadden (1974), better illustrated this theory, assuming that utility maximization (RUM) is the underlying incentive behind an agent's decision.

In the case of our study McFadden's RUM theory can be written as follows: Assuming that the consumer i is facing multiple choices ($n=1,2,3,\dots,n$) of products ($j=1,2,\dots,3$). In this study, the consumer (participant) was asked to choose to state if he would be willing to pay for blueberry product in the future or not, and also to choose a corresponding amount that he would be willing to pay for it. It is assumed that consumer will choose the option j over others if that option provides him with maximum of utility and everything else is held constant. Assume utility U , associated with the j option, is meant to be linear. The Utility equation can be written as follows:

$$U_{ijn} = X_{ijn}\beta + \varepsilon_{ijn} \quad (1)$$

β is described as unknown coefficients to be estimated, associated with product attributes X_{ijn} and ε_{ijn} . The random error term is identically distributed.

V.3. Willingness to Pay Elicitation Framework

The importance of choosing a statistical model that best fits a study's data and goals has been consistently discussed in the literature. Many previous studies on consumer WTP have utilized diverse approaches and statistical models for their data, depending on the

nature of the study (Hu et al, 2011; Ready et al, 1996; Hua Wang and Whittington, 2005). The analytical statistics paths that inspired this study were those measuring consumers' WTP for food. In the case of this study, the goal is simply to measure how much influence independent variables have on WTP.

Previous studies provide solid arguments on which model would better fit data in the case of WTP (Cameron, 1987; Broberg and Brännlund, 2008). Some studies have used Ordinary Least Square (OLS) which required making some assumptions when using it. As we stated it previously, consumers' WTP for blueberry products expressed in this study is our dependent variable. The payment card approach used in this study gave the opportunity to participants to choose the amount that they are willing to pay for product.

- **OLS Model**

Considering that the WTP is a function of consumer utility maximum of blueberry recipe X_i and a function of consumer socio-demographics aspects Y_i , the empirical model for OLS can be written as follows:

$$\mathbf{WTP}_{ij} = \beta_0 + \beta_i X_i + \beta_j Y_j + \varepsilon \quad (2)$$

From equation (1), WTP_{ij} = maximum price in US dollars that the consumer is willing to pay to maximize utility illustrated in equation (1) and i represents all three blueberry baking mix recipes. X_i represents product characteristics and Y_j represents individual socio-demographic information. Denotes variables that we use in the equation (1): X_i for variables: Loggroc (recruitment location: grocery store with local foods specialty), BBEXP, FOODNET, Male, Age, Income, Edu and Trial. A range of amounts in U.S dollars from \$1.00 to \$6.35 was provided for each product to allow participants to choose the

amount that expressed their willingness to pay in this range after the respective trial (or hypothetically), and the ε , an independent error is assumed to be normally and identically distributed and the variance σ^2 is constant. It is important to mention that the option of not willing to purchase this product was allowed in each case.

The equation (2) can be written as:

$$\text{WTP} = \beta_0 + \beta_1 * \text{LOGGROC} + \beta_2 * \text{BBEXP} + \beta_3 * \text{FOODNET} + \beta_4 * \text{MALE} + \beta_5 * \text{AGE} + \beta_6 * \text{INCOME} + \beta_7 * \text{EDU} + \beta_8 * \text{TRIAL} + \varepsilon \quad (2)$$

Considering two major factors, the limited sample size of data we have in this study (overall N=102) and a high number of zeros (suggesting unobserved value in the dependent variable WTP), the appropriate model suggested in the literature is the Tobit model (Tobin, 1958). For this study we preferred a censored Tobit to OLS to elicit consumer WTP. However, we will display without further analysis the results of the OLS.

- **Tobit Model**

Studies have demonstrated the value of the use of Tobit model censoring regression in case of micro data (Heien and Wesseils 2012). Tobin (1958), inspired by the censored probit model, developed a regression model called the Tobit model. Using the probit model, he derived what became known as the Tobit (Tobin's probit) or censored normal regression model for situations in which y is observed for values greater than 0 but is not observed (that is, is censored) for values of zero or less.

The standard Tobit model is defined as:

$$\begin{aligned}
 Y_t &= X_t \beta + u_t & \text{if } X_t \beta + u_t > 0 \\
 Y_t &= 0 & \text{if } X_t \beta + u_t \leq 0
 \end{aligned}
 \quad t = 1, 2, \dots, N \quad (3)$$

where N is the number of observations, Y_t is the dependent variable, X_t is a vector of independent variables, β is a vector of unknown coefficients, and u_t is an independently distributed error term assumed to be normal with zero mean and constant variance σ^2 . Thus the model assumes that there is an underlying, stochastic index equal to $(X_t \beta + u_t)$ which is observed only when it is positive, and hence qualifies as an unobserved, latent variable. In the case of this study, we are censoring from the lower bound ($lb=0$).

As was previously stated, past studies have used a variety of models to estimate WTP. The nature of the data has a major role to play when it comes to choosing an econometrics model that better fits the data. In this study we have presented two models, OLS and Tobit. Due to the nature of our data, a high number of zero for the proposed amount to pay for blueberry mixes, we have chosen censored Tobit. This model will take into consideration our small size sample and allow us to censure the zero number (lower bound of WTP). Thus, we can be confident that the result will not be misleading (Foster and Kalenkoski, 2011). Although we are using the Tobit model, we will display OLS results to demonstrate why Tobit is the preferred method in this case.

We assume that Φ to be the standard normal cumulative distribution function and ϕ to be the standard normality probability density function. For data set with N observations the Likelihood function for the equation (2) is:

$$L(\beta, \sigma) = \sum_{j=1}^n \left(\frac{1}{\sigma} \phi \left(\frac{y_j - X_j \beta}{\sigma} \right) \right)^{I(y_j)} \left(\mathbf{1} - \Phi \left(\frac{X_j \beta - y_j}{\sigma} \right) \right)^{1 - I(y_j)} \quad (4)$$

In the equation (4), y_j represent WTP of all products either is greater than zero or equal or less than zero and x_j represents explanatory variables Place, Baking blueberries' products experience, Watch Food channel, Gender (Male), Age, Income, Education and the trial of Blueberries Mixes. The same model was used for all three products.

Chapter VI. Results

We are starting this chapter by presenting the frequencies of maximum price that the consumer is willing to pay. Then will we discuss estimated WTP for all three products using OLS and Tobit models. To better explain the estimated coefficients of parameters we may use some facts from study areas or economic values of the parameter. A range of different amounts in U.S. dollars was attached to the survey. The intention was to allow participants to express the amount that they would be willing to pay for the products whether they tried them or not. It is important to mention that the overall results found in this study are consistent with the result found in similar study by Hu et al, 2011. Table 6.1 presents Frequency of Maximum Price Choice chosen by participants.

Table 6.1 Frequency of Maximum Price Chosen (value in U.S dollar) in %

| Price Choice | Blueberry Pancake | Blueberry Muffin | Blueberry Banana Bread |
|---------------------|--------------------------|-------------------------|-------------------------------|
| \$0.00 | 20.6 | 26.1 | 30.8 |
| \$1.95 | 1.1 | 0.0 | 0.0 |
| \$2.10 | 0.0 | 0.0 | 0.0 |
| \$2.35 | 0.0 | 1.1 | 0.0 |
| \$2.50 | 0.0 | 1.1 | 0.0 |
| \$2.60 | 2.1 | 0.0 | 1.3 |
| \$2.85 | 5.2 | 1.1 | 0.0 |
| \$3.10 | 2.1 | 5.7 | 0.0 |
| \$3.35 | 2.1 | 2.3 | 1.3 |
| \$3.50 | 0.0 | 0.0 | 1.3 |
| \$3.60 | 5.2 | 5.7 | 5.1 |
| \$3.85 | 16.5 | 11.4 | 6.4 |
| \$4.00 | 2.1 | 3.4 | 1.3 |
| \$4.10 | 8.2 | 6.8 | 10.3 |
| \$4.11 | 0.0 | 0.0 | 1.3 |
| \$4.35 | 5.2 | 6.8 | 9.0 |
| \$4.60 | 7.2 | 3.4 | 7.7 |
| \$4.75 | 1.0 | 0.0 | 1.3 |
| \$4.85 | 9.3 | 3.4 | 7.7 |
| \$5.00 | 1.0 | 2.3 | 1.3 |
| \$5.10 | 6.2 | 6.8 | 6.4 |
| \$5.35 | 1.0 | 1.1 | 2.6 |
| \$5.60 | 1.0 | 2.3 | 0.0 |
| \$5.85 | 2.1 | 2.3 | 2.6 |
| \$6.10 | 1.0 | 4.5 | 2.6 |
| \$6.35 | 0.0 | 2.3 | 0.0 |
| Total | 100% | 100% | 100% |
| N | 93 | 87 | 71 |

As we explained in the data description section, the WTP expressed by participants by choosing a maximum price that they are willing to pay for a product offers a general view of WTP on all three products. The respective percentage of the choice is displayed in table 6.1. The amount most frequently chosen by respondents for all three products was zero.

This result is similar to a previous study (Hu et al, 2011). Blueberry Banana Bread has the most percentage of card value zero chosen, which represents 30.8% of the Blueberry Banana Bread sample size. The Blueberry Muffin Mix collected 26.1% of zero as amount chosen by the customer. Blueberry Pancake Mix collected 20.6% of the sample size. The second most and third most card value chosen by participants were \$3.85 and \$4.10 with respectively 8.2% of the sample size of Blueberry Pancake, 6.8% of the sample size of Blueberry Muffin and 9% of the sample size of Blueberry Banana Bread.

The amount of \$4.85(WTP) was chosen by nearly the same percentage of participants for each product of the three Blueberry Mixes: 6.2% of the sample size of Blueberry Pancake, 6.8% of sample size of Blueberry Muffin and 6.4% of sample size of Blueberry Banana Bread. A total number of 6 card values out of 18 in addition to zero were chosen by 5% or more participants in each product sample size. This range counts a minimum of \$3.60 card value and a maximum of \$5.10. An average WTP (card value) expressed by participants was respectively \$3.30 for Blueberry Pancake Mix, \$3.20 for Blueberry Muffin Mix and \$3.08 for Banana Bread Mix.

Willingness-to-pay estimation

To estimate the relationship between the independent variables and WTP, the same model was used for all three blueberry products. As we explained in the section V.2, we have included both the OLS model and the Tobit model to run regression. The focus of this chapter will be on the Tobit model rather than the OLS. A limited explanation was given for the OLS results. A Tobit model result was interpreted using facts, previous study results, and economic theories of variables. We used the Tobit model without interaction

variables and with interaction variables. Table 6.2 displays estimated WTP for all three products using the OLS model. Table 6.3 shows the estimated Tobit of WTP and marginal effect for BBPCK without interaction variables, Table 6.4 shows estimated Tobit and marginal effect for BBMUF without interaction variables, Table 6.5 shows estimated Tobit of WTP for BBAN without interaction variables. Finally, Table 6.6 displays Tobit estimates of WTP with interaction effects for all three products.

VI.1. Estimates Willingness to pay of Blueberry using OLS model

Table 6.2 displays the results of estimated OLS regression of willingness to pay for blueberry products.

Table 6.2 Estimates willingness to pay of blueberry products using OLS model

| Variable | BB Pancake | BB Muffin | BB Banana bread |
|----------------------|-----------------------------|-----------------------------|-----------------------------|
| Intercept | 2.812*** (0.731) | 3.855*** (0.986) | 5.187*** (1.094) |
| LocGroc | -0.506** (0.194) | -0.550** (0.266) | 0.525** (0.278) |
| BBEXP | -0.001 (0.197) | -0.078 (0.298) | 0.556** (0.257) |
| FOODNET | 0.054 (0.187) | 0.27626 (0.266) | 0.719** (0.259) |
| Male | 0.234 (0.205) | -0.106 (0.299) | -0.165 (0.285) |
| Age | -0.032*** (0.006) | -0.039*** (0.009) | -0.037*** (0.010) |
| Income | 0.015*** (0.003) | 0.010** (0.004) | 0.003 (0.004) |
| Edu | 0.045 (0.032) | 0.03759 (0.042) | -0.014 (0.046) |
| Trial | 0.273 (0.209) | 0.275 (0.279) | -1.613*** (0.264) |
| N | 93 | 87 | 71 |
| R² | 0.116 | 0.089 | 0.235 |

Standard error in parenthesis *p<0.1**p<0.05 ***p<0.0001

In table 6.2 we can see that some variables are significant under all three products. However, R² is very small for this model under all three products. Despite the fact that some variables are significant, we run heteroscedasticity test to see if it was a problem here. The test used in this study was Breusch-Pagan test. Below are the results of Heteroscedasticity for all three products.

Below, Breusch-Pagan test for heteroscedasticity

Ho: constant variance

Ha: variance not constant

Table 6.3 Result of Heteroscedasticity test using Breusch-Pagan test

| | BB Pancake | BBMuffin | Banana bread |
|------------|------------|----------|--------------|
| Chi2 | 0.31 | 0.43 | 18.18 |
| Pro > chi2 | 0.578 | 0.51 | <.0001 |

Based on results on table 6.3, we have enough evidence to reject the null hypothesis that variance is constant for the OLS model for banana bread. But, we don't have evidence to reject the null hypothesis for the OLS model under blueberry pancake and blueberry muffin. Thus, there is heteroscedasticity in the model use for blueberry banana bread and not for the model used blueberry pancake mix and blueberry muffin mix. However, we will run robust standards for all three models to see if there are any differences.

VI.2. Estimates Willingness to Pay of Blueberry using the Robust Regression

Table 6.4 displays the results of estimated robust regression of willingness to pay for blueberry products. We mention that Breusch-Pagan test for Heteroscedasticity for OLS was positive for blueberry banana bread. The robust model relaxes the assumption that the errors are identically distributed (Williams, 2015).

Table 6.4 Estimates Robust Regression of WTP of Blueberry Products

| Variable | BB Pancake | BB Muffin | BB Banana Bread |
|----------------------|----------------------------|----------------------------|-----------------------------|
| Intercept | 3.899*** (0.361) | 3.511*** (1.054) | 6.097*** (1.091) |
| LocGroc | 0.332*** (0.096) | -0.481 (0.284) | 0.311 (0.279) |
| BBEXP | -0.011 (0.097) | 0.028 (0.317) | 0.775** (0.257) |
| FOODNET | -0.086 (0.092) | 0.328** (0.284) | 0.801** (0.260) |
| Male | 0.167* (0.101) | -0.041* (0.321) | -0.563* (0.287) |
| Age | -0.008* (0.003) | -0.043*** (0.01) | -0.035*** (0.01) |
| Income | 0.008*** (0.001) | 0.012** (0.004) | 0.003 (0.004) |
| Edu | -0.009 (0.016) | 0.053 (0.045) | -0.08* (0.046) |
| Trial | 0.227* (0.103) | -0.150 (0.299) | -0.961*** (0.265) |
| N | 93 | 87 | 71 |
| R² | 0.0825 | 0.088 | 0.1721 |

Robust standard error in parenthesis *p<0.1**p<0.05 ***p<0.0001

We performed the Breusch-Pagan test for heteroscedasticity on OLS and was positive under blueberry banana bread. Thus, a robust standard regression was run to

correct the problem due to heteroscedasticity. A low R^2 and adjusted R^2 is one of the indications that the OLS model is not going to better explain the data. But here R^2 tells us that only 17.21% of variability of WTP is explained by the model. Another aspect is numbers of zero in the dependent variable. Table 6.1 shows that the frequency of zero (zero intention of WTP) was high compared to other payment card values for all three models. This suggests some left-censored distribution. Since WTP varies, OLS is not an appropriate model for this type of data (McDonald and Moffit, 1980).

The Censored Tobit Model explained in chapter V is used to estimate WTP for Blueberry Pancake, Blueberry Muffin Mix and Blueberry Banana Bread. We report first the results of pancake mix in table 6.5. As was mentioned, we censored the lower bounds of the dependent variable 0 to better understand the unobserved values fewer than zero value. As we did for the OLS, the same model was used for all three products.

VI.3. Estimates of the Censored Tobit Model

Table 6.5 contains the results of the censored Tobit Model of WTP for blueberry pancake mix without interaction variables.

Table 6.5 Estimated Censored Tobit for WTP of BB Pancake without Interaction

| Variable | Coeff. | Std. Error | Marginal Effect |
|-----------------------|------------------|-------------------|------------------------|
| Intercept | 2.438** | 0.874 | |
| LocGroc | -0.669** | 0.233 | -0.65 |
| BBEXP | -0.005 | 0.234 | -0.125 |
| FOODNET | 0.089 | 0.224 | 0.434 |
| Male | 0.277 | 0.244 | -0.071 |
| Age | -0.039*** | 0.008 | -0.047 |
| Income | 0.018*** | 0.004 | 0.009 |
| Edu | 0.064* | 0.038 | 0.043 |
| Trial | 0.319 | 0.25 | -0.426 |
| N | 93 | | |
| Log-Likelihood | -180.043 | | |
| Sigma | 1.941*** | 0.166 | |

*p<0.1, **p<0.05 ,p***<0.001

Log Likelihood is reported in table 6.3 of estimated coefficient and is equal to -180.043. Sigma value is also reported in the same table. Its estimated coefficient is equal to 1.940 and it is highly significant at a 99% confidence level. This significance gives us

the confidence to say that the Censored Tobit Model is preferred to the Robust Standard Model. The result of this model shows that of the five coefficients of estimates of parameters including the intercept, LocGroc is significant at 95% of confidence interval when Age and Income are significant at 99% of confidence interval. Education is significant at the 90% of confidence interval. This result is consistent with what literature suggests. In the literature, individual income is identified as one of the key factors in consumer choices (Revelt and Train 1998). In the micro-economy, consumer demand theory states that people maximize utility with respect to their budget which is represented here by annual income (Frank and Glass 1991). The estimated coefficient of income can be interpreted as follows. Ceteris paribus and measured at the sample size mean, people with an annual average income (mean= \$68227.4) are likely to pay \$0.02 more. The marginal effect for this variable can be interpreted as, for each additional one thousand dollars a year of consumer revenue, the mean of WTP for pancake mix will increase by \$0.009. The increased amount is not large. This situation may be explained by the nature of goods, since the sample mean of consumer revenue is way above that of state and national average sample size. We may assume that for this sample size Blueberry Pancake Mix is considered as a normal good (Mankiw, 2012). The estimate of coefficient sign is positive as expected even though the increase is slight.

Two more variables, Age and LocGroc, are significant at 99% and 95% in this model. The sign of one of these coefficients of parameters (LocGroc) is not which was expected. The negative sign of the estimate coefficient of the variable Age is what was expected. Nearly 67% of participants in the study attest that they live without children. This is consistent with the idea that households without children are less likely to cook at

home. The estimated coefficient of this variable can be interpreted as holding everything else constant. The marginal effect of the variable age also is negative, which suggests that for each additional year of age, the consumer is likely to decrease the amount they are willing to pay for Blueberry Pancake Mix by \$0.008. We expected a positive sign on the variable LocGroc, but the result shows the opposite sign. This suggests that people who shop at local grocery stores (GFC) are likely to pay less by \$0.7 than others. The expected sign is also the opposite of what we expected for this variable, since Good Foods Café, a dummy variable, is one of the popular grocery stores that sell only local food. We expected that this location would have a positive impact on WTP, but instead the estimate coefficient of variable LocGroc had a negative sign. This is considerable feedback from people who know and buy local food on a weekly basis. All other variables were not significant at 95% of confidence or more so we are not going to interpret them. The estimate coefficient of education can be interpreted as, measure at sample mean and holding everything else constant, consumer with high education are likely to pay \$0.06 more for blueberry pancake. And, the marginal effect for variable education can be interpreted as, for each additional year of education, consumer is likely to increase is WTP for blueberry pancake by \$0.043.

In this section, we have learned how WTP varied across the model. Based on this result and some evidence from literature we can posit with time (years), the WTP for people getting older may change. Drewnowski and Shultz (2001) found that the more individuals get older the more they are health conscious. Based on health information about blueberries, we are confident that people over age 50 will have positive WTP for these products. Further, in this study we measure the interaction effect of the variable age on trial.

VI.4. Estimates Willingness to pay for Blueberry Muffin Mix

The results in Table 6.6 are of estimated Censored Tobit Model for willingness to pay for blueberry muffin mix.

Table 6.6 Estimated Censored Tobit for WTP of BBMUF without Interaction

| Variable | Tobit | Std. Error | Marginal Effect |
|-----------------------|----------------|-------------------|------------------------|
| Intercept | 4.051** | 1.278 | |
| LocGroc | -0.76** | 0.350 | -0.65 |
| BBEXP | -0.145 | 0.391 | -0.125 |
| FOODNET | 0.506 | 0.354 | 0.434 |
| Male | -0.083 | 0.395 | -0.071 |
| Age | -0.1*** | 0.013 | -0.047 |
| Income | 0.011* | 0.005 | 0.009 |
| Edu | 0.051 | 0.055 | 0.043 |
| Trial | 0.496 | 0.362 | -0.426 |
| N | 87 | | |
| Log-Likelihood | -176.56 | | |
| Sigma | 2.6*** | 0.243 | |

*p<0.1, **p<0.05, p***<0.001

Three out of eight variables in table 6.6 are significant. Those variables are Income, Age, and LocGroc. The estimated coefficient of the variables Age and Place are significant and have a negative sign which are similar to the result of blueberry pancake. This can be

interpreted as, measured at the sample mean and holding everything constant, consumer with the age of 43.5 are likely to pay less by \$0.1 for blueberry muffin. The marginal effect of this variable can be interpreted as, for each additional one year of age added; the consumer is likely to decrease his WTP by \$0.05. The variable LocGroc is a good indicator of local food buyers. The negative sign of the estimate coefficient of Place, which is the opposite of our hypothesis, can suggest what we evoke in Chapter 3. Studies have demonstrated that, besides the motivation of supporting the local economy, people who buy local are appreciative of the quality and freshness of the products that they buy (Onozaka et al 2010). This product trial may not have turned out to be what they expected for local value added products. On the other hand, the coefficient of the variable Income is significant and positive. Measured on sample mean average and holding everything constant, people with high average income (mean=68227.4) are likely to pay \$0.01 more compared to those with income inferior to that average. The marginal effect of the variable income suggests that, for each increase of \$1,000 in annual income, consumer WTP for blueberry muffin will increase by \$0.009. This increase is very small. This is how the consumer perceives this good. Based on this result, blueberry muffin mix is considered as a normal good by the consumer.

VI.5. Estimates Willingness to Pay for Blueberry Banana Bread

Table 6.7 shows the results of the censored Tobit model for willingness to pay for blueberry banana bread without interaction variables.

Table 6.7 Estimated Censored Tobit for WTP of BBAN without Interaction

| Variable | Tobit | Std. Error | Marginal Effect |
|-----------------------|-----------------|------------|-----------------|
| Intercept | 5.475*** | 1.423 | |
| LocGroc | 0.636** | 0.355 | 0.566 |
| BBEXP | 0.653** | 0.333 | 0.582 |
| FOODNET | 0.985** | 0.339 | 0.877 |
| Male | -0.248 | 0.370 | -0.221 |
| Age | -0.04*** | 0.013 | -0.040 |
| Income | 0.003 | 0.005 | 0.003 |
| Edu | -0.027 | 0.06 | -0.024 |
| Trial | -1.99*** | 0.336 | -1.775 |
| N | 71 | | |
| Log Likelihood | -138.207 | | |
| Sigma | 2.235 | 0.232 | |

p<0.1, **p<0.05, p***<0.001

The results displayed in table 6.7 convey statistical information from consumers based on our sample size, compared to the estimated censored Tobit model of WTP for blueberry pancake mix and blueberry muffin. Three estimated coefficients of variables,

different from the two previous models, are significant. Variable BBEXP and FOODNET are both significant at 95%, and Age and Trial are significant at 99%. The sign of estimated coefficient of the variable Trial is negative. As stated in Chapter V, we expected a positive sign for the Trial variable, but a negative sign that we have makes us learn more about this variable. Perhaps any given participants did not like the taste or any other aspect of the product. For any reason given by participants that may negatively affect the variable Trial, further investigation of comments on the survey are needed to help to understand participants' needs for blueberry banana bread. The estimated coefficient of the variable trial can be interpreted as follows. People who try blueberry banana bread are likely to pay less \$1.99 than those who did not try it. This amount is huge. It is more than the half of mean WTP for banana bread (Mean WTP= \$3.40). Its marginal effect may suggest that for each time the trial of blueberry banana bread does not satisfy a consumer, his WTP for this product will likely be decreased by \$1.78. This is important for the future, because we need to understand consumers' desires on that type of product. The sample size of blueberry banana bread was the smallest compared to the sample size of the two others.

The trial situation explained previously can be related to two other variables here: variable FOODNET and variable BBEXP. Both of these variables are significant and also the sign of the coefficient of the estimates are positive for these variables. This can be interpreted for BBEXP that, people with previous experience on blueberry products are likely to pay \$0.65 more for banana bread than those with no experience. The marginal effect for this variable suggest that for each additional experience gained on blueberry banana bread, the average amount that a consumer will be willing to pay (WTP) for Blueberry Banana Bread will increase by \$0.58.

Variable age is significant and its estimate of coefficient sign is negative. The interpretation here is that, measured at the simple mean and holding everything constant people, with average age of 43.5 years, are likely to pay less by \$0.04 for blueberry banana. The marginal effect for this variable is that, for each additional year of age, the average amount that consumer is WTP for blueberry banana bread will decrease by \$0.04. Another variable to interpret here is LocGroc. The sign of this variable is positive which was expected. This variable can be interpreted as follows: people who shop at local food specialized grocery stores (GFC) are likely to pay more than those who do not shop at these types of stores. The marginal effect for this variable suggests that each improvement on the quality of blueberry banana bread for sale at this grocery store will increase the willingness to pay for banana bread by \$0.6.

Sigma on the models for all three products was significant. This is important to mention because, sigma is the estimated standard error of the regression. And its value is comparable to the root mean squared error that would be obtained in an OLS regression. Blueberry Pancake Mix and Blueberry Muffin Mix both share the same significant variables. However, Blueberry Banana Bread had four significant variables, three different than Blueberry Pancake Mix and Blueberry Muffin Mix. All other variables were not significant and based on this data set their impact on WTP for each of these products are not statistically significant. Trial, our interest variable, was not significant, but was positive under blueberry pancake and blueberry muffin, and may be indicative of a customer need for more exposure. Morrison, (2000), found in his study involving trial experiments that the acceptance level and willingness to pay for the product that the

consumer tried was increased each time that consumer repeated the operation. This could lead one to conclude that only one trial may not be ideal.

Despite the insignificance of variables in the regression, the Trial variable for BBPAN and BBMUFF has a positive relationship with willingness to pay. The use of t-score to test the significance of variables after regression, confirmed that the variables BBEXP, FOODNET, Male, and Trial were not significant to the absolute value of their respective t-score ($t = \text{estimate coefficient} / \text{standard error}$), which was less than 1.64 (corresponding to 90% confidence interval). This is for blueberry pancake mix. As for pancake, the respective t-scores for the variables BBEXP, FOODNET, Male, Edu, and Trial were less than 1.64 and statistically insignificant. And for Blueberry banana, the variables Male, Income, and Edu were statistically not significant, their respective t-scores was less than 1.64. Thus, we can interpret from this information that those variables under the related product did not much influence consumer WTP despite their respective estimated coefficient sign.

VI.6. Estimates of WTP using Censored Tobit with Interaction Variables

Another level of understanding data that we use in this study is to run the regression with interaction variables. We were curious to see if some variables' effect depended on the level of another. We had three interactions: LocGroc*TRIAL, BBEXP*TRIAL, and AGE*TRIAL variables. The hypothesis for the interaction variables in this study is that Trial may be important in the context of (1) when consumers (participants) are familiar with local grocery store specialized in sale of locally grown agricultural product; (2) consumers have previous experience with blueberry products (3) consumer age fall in category of those who are susceptible to cook at home. The same model was used for all three blueberry products. Table 6.8 displays the estimated Tobit of WTP for all three products with interaction variables.

Table 6.8 Estimated Tobit of WTP for all three products with interaction variables

| Variable | Model I | | | Model II | | | Model III | | |
|----------------|-----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|
| | BBPNCK | BBMUF | BBBAN | BBPNCK | BBMUF | BBBAN | BBPNCK | BBMUF | BBBAN |
| Intercept | 2.503** (0.873) | 3.204* (1.383) | 5.364*** (1.463) | 2.066* (0.921) | 3.371* (1.532) | 6.787*** (1.600) | 7.387*** (1.486) | 4.321* (2.103) | 2.87 (1.774) |
| LocGroc | -1.617* (0.718) | 0.475 (0.726) | -0.848 (0.752) | -0.664** (0.232) | -0.801* (0.353) | 0.64* (0.354) | -0.507* (0.232) | -0.763* (0.350) | 0.84** (0.362) |
| BBEXP | 0.0071 (0.234) | -0.221 (0.391) | 0.7* (0.331) | 0.681 (0.593) | 0.579 (0.985) | -0.151 (0.74) | 0.011 (0.231) | -0.14 (0.392) | 0.58* (0.332) |
| FOODNET | 0.053 (0.225) | 0.459 (0.352) | 1.075** (0.34) | 0.018 (0.230) | 0.532 (0.355) | 0.99** (0.338) | 0.008 (0.221) | 0.498 (0.354) | 1.055** (0.337) |
| Male | 0.246 (0.244) | -0.043 (0.394) | -0.207 (0.367) | 0.286 (0.243) | -0.104 (0.396) | -0.235 (0.368) | 0.246 (0.240) | -0.087 (0.396) | -0.16 (0.37) |
| Age | -0.037*** (0.008) | -0.057*** (0.013) | -0.05*** (0.013) | -0.039*** (0.007) | -0.06*** (0.013) | -0.1*** (0.013) | -0.15*** (0.028) | -0.066 (0.045) | 0.01 (0.025) |
| Income | 0.018*** (0.003) | 0.012* (0.005) | 0.003 (0.005) | 0.017*** (0.003) | 0.011* (0.005) | 0.004 (0.006) | 0.017*** (0.003) | 0.011* (0.005) | 0.003 (0.005) |
| Edu | 0.063* (0.038) | 0.083 (0.058) | 0.003 (0.061) | 0.059 (0.039) | 0.052 (0.055) | -0.036 (0.061) | 0.058 (0.038) | 0.051 (0.055) | -0.02 (0.06) |
| Trial | 0.180 (0.268) | -0.029 (0.433) | -2.38*** (0.377) | 0.980* (0.581) | 0.265 (1.016) | -2.8*** (0.737) | -4.88*** (1.296) | -0.952 (1.816) | 1.016 (1.336) |
| LocGroc*Trial | 1.051 (0.752) | 1.600** (0.830) | 1.903* (0.853) | | | | | | |
| BBEXP*Trial | | | | 0.813 (0.645) | 0.865 (1.079) | 1.012 (0.83) | | | |
| Age*Trial | | | | | | | 0.118*** (0.029) | 0.011 (0.046) | -0.07* (0.029) |
| Log Likelihood | -179.847 | -176.092 | -137.586 | -178.775 | -176.557 | -552.08 | -178.337 | -176.548 | -137.482 |
| Sigma | 1.937*** (0.074) | 2.547*** (0.121) | 2.216*** 0.231 | 1.937*** (0.074) | 2.56*** (0.122) | 2.23*** (0.12) | 1.909*** (0.073) | 2.56*** (0.122) | 2.213*** (0.12) |

In the table 6.8, standard errors are in parenthesis * $p < 0.1$, ** $p < 0.01$, *** $p < 0.001$ and sample size is $N=93$ for Blueberry pancake mix(BBPNCK), $N=87$ for Blueberry Muffin mix (BBMUF) and $N=71$ for Blueberry banana bread (BBBAN).

The goal here was to see if there is a relationship between Trial and selected variables suggesting the trial effect may be related to factors like age, blueberry cooking experience or Food Co-op patronage. Based on the result displayed in Table 6.8, measured by the average sample size of data used in this study, the p-value indicated whether or not interaction variables are significant or not. The interaction variables from Table 6.8 had the following p-value. With the p-value ($p=0.0257$), the interaction variables $\text{Loggroc} * \text{Trial}$ and $\text{Age} * \text{Trial}$ are both significant under the blueberry banana bread model. When considering the whole estimated parameters under interaction variables, the estimated coefficient of variable Trial is also significant. Trial is also significant under the estimated equation with interaction variable $\text{BBEXP} * \text{Trial}$ using blueberry banana model. So we may say that location has an effect on Trial. As we said earlier in the results above, recruitment location was critical in this experiment which is good news for producers. The variable place has a positive effect on Trial. Targeting experienced local grocery store shoppers as marketing strategies will require a very good quality of blueberry products. The $\text{BBEXP} * \text{Trial}$ variable was not significant. There was no effect of the variable BBEXP on Trial for blueberry banana.

The interaction variable $\text{Age} * \text{Trial}$ was statistically significant under blueberry banana model. This suggests a positive effect of age on trial of blueberry banana. This reinforced our conclusion of the negative effect of age in this study. Households with children need to be considered in marketing strategies in the future. For Trial of blueberry

muffin mix, the interaction variable LocGroc*Trial was significant under blueberry muffin model. As has been stated, GFC is a great location to measure the level of acceptance of local products. BBEXP*Trial and Age*Trial were not significant under blueberry muffin. There was no effect of experience and Age on trial under blueberry pancake, only the interaction variable Age*Trial was significant.

The Estimated Tobit Model of WTP for blueberry products with interaction variables allowed us to see interactions between the variables place, blueberry experience, and age. It appears that LocGroc and age had positive effects on Trial under Blueberry Pancake model and Blueberry banana bread model. But only blueberry banana had its estimate coefficient with a negative sign suggesting the decrease of WTP for this product for the future. However, we can see on that result perhaps a demand for the improvement of the product in the future. We also can notice based on the result in table 6.8 that the willingness of people who try blueberry products are greater than those who did not try. This is another indication that in all cases of figures, Trial had positive effect on WTP. This experience was truly beneficial.

From the table 6.8 we draw the table 6.9 to show the net effect of interaction variables LocGroc*Trial, BBEXP*Trial and Age*Trial.

The trial effect values in the table below are obtain by using the estimates coefficient of variable LocGroc, BBEXP, Trial, LocGroc*Trial, BBEXP*Trial and Age*Trial from the table 6.8. The following formula was used:

- **Interaction effect x_j** = Estimate coefficient of variable x_j + estimate coefficient of Trial_j + estimate coefficient of interaction variable_j (5)

- *Net Trial effect* = value with Trial-Value with No Trial (6)

In the equation (5): x = LocGroc, BBEXP, Age and j= BBPNCK, BBMUF, BBBAN.

Table 6.9 Interaction effects of variables LocGroc, BBEXP and Age on variable Trial

| Variable | | BBPNCK | | | BBMUF | | | BBBAN | | |
|----------|----|----------|--------|------------------|----------|--------|------------------|----------|--------|------------------|
| | | No Trial | Trial | Net Trial effect | No Trial | Trial | Net Trial effect | No Trial | Trial | Net Trial effect |
| LocGroc | | -1.617 | -0.386 | 1.231 | 0.480 | 2.050 | 1.570 | -0.848 | -1.325 | -0.477 |
| BBEXP | | 0.681 | 2.474 | 1.793 | 0.579 | 1.709 | 1.130 | -0.151 | -1.637 | -1.486 |
| Age | 30 | -4.500 | -5.84 | -1.34 | -1.980 | 3.262 | 5.242 | 3.000 | -1.916 | -4.916 |
| | 50 | -7.500 | -6.48 | 1.020 | -3.300 | -3.702 | -0.402 | 0.500 | -2.984 | -3.484 |

All values in the table 6.8 are in US dollars. Since we cannot observe a negative amount of WTP, these values illustrate how variables BBEXP, LocGroc and Age have an influence on trial. So we can notice based on this table that the willingness of people who try blueberry products are greater than those who did not try. This is another indication that in all cases of figures, Trial had positive effect on WTP. The net trial effect is positive for blueberry pancake mix and blueberry muffin mix except for the case of age 30 for BBPNCK which is -5.840 and for the age of 50 which is -6.480 for the case of blueberry muffin. The positive net trial effect may suggest that people who shop in the specialized local grocery store are willing to pay \$1.23 for blueberry banana bread and \$1.57 for blueberry muffin under certain circumstances.

For those consumers who have experience with blueberry products, the net trial effect also is positive under blueberry pancake mix and blueberry muffin mix. This situation suggests that consumers with previous experience with blueberry products and

trial incentive are likely to pay \$1.80 more for blueberry pancake mix than those who do not have experience. Those consumers are also likely to pay \$1.13 more for blueberry muffin mix than those who do not have experience with blueberry products.

For the consumers of the age of 30, the net trial effect seems to not have positive effect on willingness to pay for blueberry pancake mix and banana bread, however it has a positive effect on consumers' willingness to pay for blueberry muffin mix and it is \$5.42, which suggests that consumers of age of 30 are likely to pay \$5.42 more for blueberry muffin. And for consumer of age of 50 the net trial effect is positive under blueberry pancake mix, but negative under blueberry muffin mix and blueberry banana bread mix. This may be interpreted as, consumers with the age of 50 are likely to pay \$1.02 for blueberry pancake.

Results of net trial effect are a good indication for marketing strategies and may suggest that free coupons, free demonstration of these products in store, discounting and free trial offer to older consumers may enhance the sale of these products.

Table 6.10 Average WTP for all three products

| | Blueberry Pancake Mix | Blueberry Muffin Mix | Blueberry Banana Bread |
|------------------|-----------------------|----------------------|------------------------|
| Average WTP (\$) | 3.456 | 3.257 | 3.394 |
| | (3.401 3.510) | (3.182 3.332) | (3.314 3.474) |

* 95% confidence intervals are in parentheses

The average WTP for Blueberry Pancake Mix is \$3.456, \$3.257 for Blueberry Muffin Mix, and Blueberry Banana Bread Mix is \$3.394. These prices are very close to observed retail

prices. This is a good indication for producers. Information on retail pricing in the grocery store price range was provided in the grocery store, from \$3.50 to \$4.50. Since the average WTP for all three products are slightly less than observe market price, marketing strategies need to target people with previous experience with blueberry products, specialized store and consumers with age likely to buy the products.

Chapter VII. Conclusions and Recommendations

VII.1. Conclusions

The take-and-bake experiment was designed to minimize the potential hypothetical bias that lies in the conventional WTP survey. The goal was to put participants in their comfort zones, acting as they do every day in order to get accurate information from them. Despite the challenges that this study faced, and based on results received from the data, we can confidently assert that this survey experiment was successful, and its outcome will help both researchers and the Kentucky Blueberry Growers Association in the future. The main focus of this study was to measure the influence that selected factors may have on consumers' willingness to pay.

The conclusion focuses on four key areas. Overall, the results of this study are instructive. First, the average WTP of all products was indicative of $WTP_{Pan} = \$3.456$; $WTP_{Muff} = \$3.257$, and $WTP_{Ban} = \$3.394$. Consumers were willing to pay an amount of money close to the market price (\$3.50 and \$4.50 for banana bread mix and frozen fruit) to buy the proposed products. The statistical insignificance of the trial variable for Blueberry Pancake Mix and Blueberry Muffin Mix was observed in the reduced model, but interaction effects suggests trial can be important in a number of practical cases. Both marketers and producers need closely to consider results generated in this study. The study also reveals that income has a positive effect on WTP. Targeting specific demographic populations such as Age, income, level of education and previous experience with blueberry products will be critical for initial success.

As mentioned in the description the variables Gender, Household size, and Income, were important factors that influenced purchasing decisions. Results from this study may suggest that marketing structures for value added blueberry products may be needed to create marketing plans based on demographic group and income level.

The results of the data also reveal that people who are familiar with local food specialty grocery stores, are those who are more critical of the products. In order to sell in those stores, the quality of the product needs to be improved. Other factors to be considered are gender and age, since these two factors were significant and had a negative relationship with WTP for all three products. Marketing strategists need to target the younger who are more likely to cook often at home. Most household purchases are influenced by women and this experiment had 80% women participants, thus, women are the population demographic to be targeted in the future.

Finally, we close this section with three questions: (1) Did the take home trial experimental survey generate meaningful results that will help Kentucky Blueberry growers to place products in the market? The answer is yes because, the results in chapter VI are consistent with hypothesis formulated before this study took place; (2) Were consumers' WTP close to observed retail prices? The answer is yes, the average WTP found in this study for all three products are of $WTP_{Pan} = \$3.456$; $WTP_{Muff} = \$3.257$, and $WTP_{Ban} = \$3.394$, these amount are slightly below rival non-local products which suggest that trial and positioning these products within selected consumer segment is critical. And the last question is (3) Is the Trial was important in this study? The answer is yes, throughout this study we have demonstrated how trial effect was important on consumer WTP. Also, socio-demographic parameters, especially age and income, should be in the

center of marketing strategies for local blueberry products. The information above is important for producers. They need consider the average WTP for each product obtained in this study for production cost and price setting.

VII.2. Limitations and Suggestions for future research and projects

We self-mention limitations of this study in order to better shape the research in the future. This study was a very first experience on take-and-bake at home blueberry value added products. We are conscious of all the limitations that the study imposed. First, we suggest that future research take care of sample size. We know that this study required significant logistical resources to execute. But, we think for the robustness of the result future projects need to have a large size sample. This may minimize doubt that sample size may generate when it comes to the conclusion of the study. It may also facilitate the closing of the gap between demographic sample mean of the study group and the real mean of the study area (example for this case: demographic population of Lexington, Kentucky). In addition to expansion of the study, future projects may consider the comparison of two or three different cities in the same state, or two or three different states, or compare behavior of populations of North vs South, or East vs West.

Second, the research was focused on local food aspects and local markets. To better translate the result to the entire population of the study area, future researchers need to expand the area of recruitment. The three locations of recruitment concerned may not be demographically representative of the area of the study. All three locations are located in the south and west of the town. This may have an influence on the category of participant. Recall that mean income of participants was 20+ thousand dollars above the average

income of the area of study. Also, the mean level of education was high, and was the equivalent of a bachelor degree for the city where only 40% of the residents have completed a bachelor degree. Perhaps future research may look at this aspect that could help the conclusions to be more robust for the benefit of blueberry growers.

Third, future projects may focus on contrasting results among demographic groups. For instance, compare the outcome between households with children and households without children. The example of the study cited here suggests that households with children are more likely to cook at home than those without children. This aspect will help marketing to a target population.

For Kentucky blueberry growers, we think two important recommendations related to the production side need to be transmitted. First, the value added products have some success toward consumers. But, some work needs to be done in order to improve them. Continue to shape the product in order to make it competitive. Do not only lean on the “Local Food” or “Kentucky Proud” label. Improve the taste and presentation of the product. The last recommendation is not the least one: The present project has been focused on consumer demand. We think that future projects may look at the production side, since these products are new for Kentucky blueberry growers. It may be important to help KBGA members to not only improve the products that they have conceived, but also to master all aspects related to the production side (transformation).

To collect data for this study, we relied on participants. Future research may include other interactive methods, such as one on one interviews, to better understand consumers’ views on the products. Studies in the past have revealed the increased level of

WTP and acceptance of product as consumers (participants) multiply trials (6 in totals). Future study may consider having multiple trials as resources will be available. The last recommendation is not the least one: The present project has been focus on consumer demand. We think that future project may look at production side to help producers forecast productions.

Appendix: Survey Form

Blueberry Recipe Evaluation

To the survey participant: You are being provided an opportunity to give feedback on your experience with two blueberry recipes we want you to prepare and try at home. 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 benefits associated with completing this survey include a free sample of two recipes that include dry ingredients and fruit and, upon completion of the survey mailed to us, a check for \$20 for your participation. 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 recipe will take around 30 minutes each to prepare and evaluate, depending on the recipe. The survey/questionnaire itself will take about 10 minutes to complete. There are no known risks to participating in this study. 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



Dear Food Shopper Panelist

You are being provided with **two** recipes and product to prepare in your home. Local blueberry growers are exploring possible product concepts like this and value your opinion on packaging, preparation, visual and taste appeal, and your overall impression of the product concept.

The instructions for this study are as follows:

1. Pick up your two recipes and ingredients. Place in your home freezer if you are not preparing one of them immediately.
2. Prepare one of the products and complete the first part of the survey
3. Prepare the second product and complete the second part of the survey
4. Complete the third part of the survey and return it along with your contact information to receive the \$20 check or credit.

We are interested in your full experience with this product.

These are **locally grown blueberries**. Dry ingredients for each recipe and frozen fruit are provided, similar to what you might find in the freezer section of your grocery store. **You will need to add eggs, milk, and oil.** Follow the instructions for each recipe provided.

Go ahead and **prepare one product at a time.** You have **one week** to prepare each of the products and complete your evaluation. **But please prepare each recipe on separate occasions.** It doesn't matter which you prepare first, but please identify the recipe on your evaluation.

We are appreciative of your time and effort. We ask that you give a completely honest and candid answer to each question. You'll see places for additional comments which are also welcome (but optional).

Product One: (please circle)

- Pancakes
- Muffins
- Banana bread

Please evaluate the packaging (circle the number on the scales below)

| | | | | | | | | | |
|------------------------------|---|---|----------------------------------|---|---|--------------------|---|-------------------------|----|
| Very difficult to use | | | Somewhat difficult to use | | | Easy to use | | Very easy to use | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

| | | | | | | | | | |
|--------------------------------------|---|---|---------------------------|---|---|-----------------------|---|---|----|
| Not at all visually appealing | | | somewhat appealing | | | Very appealing | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Any comments?:

Please evaluate the ease of preparation (circle the number on the scales below)

| | | | | | | | | | |
|----------------------------------|---|---|--------------------------------------|---|---|------------------------|---|-----------------------------|----|
| Very difficult to prepare | | | Somewhat difficult to prepare | | | Easy to prepare | | Very easy to prepare | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Any comments?:

Please evaluate the visual appeal of the cooked product (circle the number on the scales below)

| | | | | | | | | | |
|-----------------------------|---|---|----------------------|---|---|----------------|---|----------------------|----|
| Don't like it at all | | | Don't like it | | | Like it | | Like it a lot | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

PRODUCT ONE

Please evaluate the taste of the cooked product

| | | | | | | | | | | |
|---------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Don't like it at all | | | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Any comments?:

Overall, the cooked product turned out.... (circle)

| | | | | |
|---------------------------------------|----------------------------------|---|----------------------------------|---------------------------------------|
| Well below my expectations | below my expectations | About equal with my expectations | Above my expectations | Well above my expectations |
|---------------------------------------|----------------------------------|---|----------------------------------|---------------------------------------|

Any comments?:

Overall product concept

Compares favorably with other similar products prepared at home

| | | | | |
|--------------------------|-----------------|--------------------------|--------------|-----------------------|
| Strongly disagree | Disagree | No strong opinion | Agree | Strongly agree |
|--------------------------|-----------------|--------------------------|--------------|-----------------------|

This recipe using locally produced frozen fruit combined with the dry ingredients is a product (circle)

- a. I would probably not buy
- b. I would buy maybe once per year
- c. I would buy occasionally – 2-3 times per year
- d. I would buy regularly – more than three times per year

Any comments?:

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

Blueberry-Banana Bread Mix with Local Frozen Fruit (makes two 9x5x3 loaves)

For comparison purpose, a banana bread mix and frozen fruit sold for between **\$3.50** and **\$4.50** in a grocery store.

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

I do not wish to buy this product.

I would like to buy and the maximum price I would pay for it is:

\$2.10 \$2.35 \$2.60 \$2.85 \$3.10 \$3.35 \$3.60 \$3.85 \$4.10
\$4.35 \$4.60 \$4.85 \$5.10 \$5.35 \$5.60 \$5.85 \$6.10 \$6.35

Other amount (none of the above): _____

Lastly, we would like to know a bit more about yourself. Again – all individual responses are confidential and not shared with anyone

What is your gender? Female Male

What is your age? _____ Years

What is your annual household income before taxes?

- | | |
|--|--|
| <input type="checkbox"/> under \$15,000 | <input type="checkbox"/> \$50,000-74,999 |
| <input type="checkbox"/> \$15,000-24,999 | <input type="checkbox"/> \$75,000-99,999 |
| <input type="checkbox"/> \$25,000-34,999 | <input type="checkbox"/> above \$100,000 |
| <input type="checkbox"/> \$35,000-\$49,999 | |

What is the highest level of school you completed?

- | | |
|---|--|
| <input type="checkbox"/> not a high school graduate | <input type="checkbox"/> bachelor degree |
| <input type="checkbox"/> high school only | <input type="checkbox"/> master degree |
| <input type="checkbox"/> some college, no degree | <input type="checkbox"/> professional degree |
| <input type="checkbox"/> associate degree | <input type="checkbox"/> doctorate |

How many members are in your household, including yourself? _____

Are there any children under 18 in your household? Yes No

About what share of the household grocery purchases are made by you?

0-33%

34-66%

66%+

Thank You!

Please use the following space to express any comments/questions you may have on this survey.

Please return this survey in the envelope provided, or to Dr. Tim Woods, 402 CE Barnhart, Department of Ag Economics, University of Kentucky, Lexington, KY 40546

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VITA

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EDUCATION

University of Kentucky

2013-2016

Agriculture economics: graduate school: Master of Sciences. Major: Agricultural Economics. Expected degree: December 2016

University of Kinshasa, Kinshasa, Democratic Republic. of the Congo (Africa)

1993-2002

Bachelor of Sciences; Agricultural Sciences, Major: Agricultural Economics

CELABOR, Chaineux, Belgium (Europe)

September to December 2004

Certificate: quality management in food processing chain in agricultural industry

OPEC/APEFE, Kinshasa, Dem. Rep. of the Congo

August 2006

Certificate: adult education

RESEARCH AND PUBLICATION

- Home Cooking Trial and Willingness to Pay: Local Blueberry Pancake, Muffin, and Banana Bread Mixes in Take-and Bake Experiment. Master thesis. Agricultural Economics, University of Kentucky. Lexington, Kentucky. USA.
- Voluntary intake, chemical composition and in vitro digestibility of fresh forages fed to Guinea pigs in periurban rearing systems of Kinshasa (Democratic Republic of Congo) coauthor with Jerome Bindelle. *Kluwer Academic Publisher, Tropical animal Health and Production. Boston, MA 2007*
- L'impact du coût de soin de la Malaria (Paludisme) sur le budget du ménage et son implication sur la sécurité alimentaire en RDC. Cas de la ville de Kinshasa. (Impact

of health care's cost on household income and its influence on food safety in City of Kinshasa. Case of Malaria) Undergraduate research thesis. University of Kinshasa, 2002

- “Synthese des resultats anterieurs et des acquis de la recherche agrostologique(1946-1996) menee dans les zones de savanes d’altitude de l’Est (Ituri et la dorsale du Kivu) en RDC par l’Ineac/Inera”. *Associate study Thesis. University of Kinshasa, 2000*
- Les bonnes pratiques agricoles dans la lutte contre la contamination des plantes des cultures par les metaux lourds a Kinshasa. (Good practices of farming in urban area and prevention of chemicals contamination to farm) CELABOR, Chaineux, Belgium(Europe), 2004

WORKING PAPER and CONFERENCES PARTICIPATION

- Home Cooking and Willingness to Pay: Local Blueberry Pancake, Muffin, and Banana Bread Mixes in Take-and-Bake Experiment. Selected paper for presentation at SAEA annual conference, San Antonio, Texas, February, 2016
- Impact of Access to Healthy Food and Lifestyle on Obesity: The evidence from U.S Counties. Selected paper for presentation at SAEA annual conference, Atlanta, Georgie, February, 2015

PROFESSIONAL EXPERIENCE

- **Amazon.com (Lex2), Lexington, Kentucky**

September 2009 to present

- **University of Kentucky**

March, 2016 to December 2016

International project: World Food Program (United Nation Agency): PAM-Haiti: data entry clerk.

- **Centre Agronomique et Veterinaire Tropical de Kinshasa (CAVTK), Kinshasa, DR Congo (Center of Tropical Agronomy and veterinary of Kinshasa)**

April 2003-August 2009

- Assistant of research and project management

- Local Researcher for University of Liege (Belgium), Liege Belgium, Faculte Universitaire des Sciences Agronomiques de Gembloux, Gembloux Belgium, University de Kinshasa, Kinshasa, DRC.

- April 2003-2009 CAVTK-Universite de Liege

Contributor in redaction of “Troupeaux et cultures des Tropiques”. Bi-monthly journal of news from farmers and Universities. Published in Dem. Republic of the Congo and Belgium from 2005 to 2009.

INTERNATIONAL TRAVEL and MULTICULTURAL INTERACTION

- **Exploring Diverse Communities in the Dominican Republic. Summer, 2014**

Santiago, Dominican Republic

- **International internship. Belgium (Europe). Fall 2004**

CELABOR. Quality control in Process Foods Chains Industry. Chaineux, Belgium

AREAS OF INTEREST

- Strong background on international development with fund form European Union and USA Agencies (USAID)
- Strong background on producer’s survey and analyses
- Strong background on consumer’s survey and analyses
- Strong background of work with small scale farmers and beginner’s entrepreneurs
- Strong skills to multitask and working on multicultural environment
- Strong skills to communicate using multiple languages including English, French, Swahili (intermediate), Lingala.

ADDITIONAL SKILLS

French and English: fluent (college level)

Microsoft Office: Word, Excel and PowerPoint

Statistics and geographic software: SAS and Arc GIS (intermediate for Arc GIS)

REFERENCES

Available upon request.