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Consumer Perceptions and Demand for Locally-Grown Vegetables in South Dakota

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CONSUMER PERCEPTIONS AND DEMAND FOR LOCALLY-GROWN VEGETABLES IN SOUTH DAKOTA

BY

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THESIS ACCEPTANCE PAGE

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This thesis is approved as a creditable and independent investigation by a candidate for the master's degree and is acceptable for meeting the thesis requirements for this degree. Acceptance of this does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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ABSTRACT

CONSUMER PERCEPTIONS AND DEMAND FOR LOCALLY-GROWN VEGETABLES IN SOUTH DAKOTA

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An increasingly popular topic in the food labeling field over the last 15 years has been the increasing body of research for food that is locally produced. Consumers' definition of, attitudes toward, and willingness-to-pay (WTP) for local food have been areas of interest for researchers. To the best of our knowledge, this is the first study that contributes to the current body of local foods' research for vegetables by providing information on these areas of interest for the state of South Dakota. This study acquires data through a consumer-intercept survey conducted in grocery stores throughout South Dakota with a sample size of 200 to achieve the following objectives: first, to determine the current demand for locally-grown vegetables in South Dakota (SD); second, to determine how SD consumers define locally-grown vegetables; third, to determine SD consumers' reasons for purchasing locally-grown vegetables; fourth, to determine if SD consumers WTP is different for locally-grown cool-season vegetables (lettuce) versus locally-grown warm-season vegetables (tomatoes); fifth, to determine if seasonality has an impact on SD consumers' WTP; sixth, to determine if a provision of a local definition has an effect on SD consumers' WTP; seventh, to quantify WTP for locally-grown vegetables in SD; and eighth, to determine the factors affecting WTP through an empirical analysis. This study utilizes a payment card approach to examine the effect of provision of a local food definition on consumers' WTP and to examine the effect of seasonality on consumers'

WTP. Major findings included a definition that was primarily focused on within 100 miles of purchase and within South Dakota, a mean WTP premium of between 12.45% and 16.5% for locally-grown tomatoes and a mean WTP premium of between 15.98% and 17.70% for locally-grown lettuce with seasonality differences. Consumers found product attributes, such as freshness and taste, to be the most important attributes in the purchasing decision. Support for the local economy and environmental friendliness were also found to be important. As per empirical analysis age, income, and importance of traceability in the purchasing decision were highly significant in determining the WTP for locally-grown lettuce. Producers can benefit from these results in terms of understanding what consumers are willing to pay for these products. Retailers can use important product attributes and WTP values to set prices and promote products. Policymakers can use this information to reform labeling policies related to local foods and to adjust promotional campaigns for local food.

Chapter 1: Introduction

1.1 Background

Locally-grown produce has become very popular across the United States (U.S.) over the last few decades. National and state-wide campaigns have begun to promote locally-grown products as a healthier and safer alternative to imported products. One such example of this campaign is forming in South Dakota. A program by Dakota Rural Action, entitled SoDak Grown, is attempting to connect producers and consumers involved in the realm of local products. This program provides a list of some anticipated benefits of local foods including growing local economies, supporting local farms, preserving genetic diversity, protecting regional food security, fresher and better-tasting products, and environmental benefits (Dakota Rural Action, 2019). Other states have similar campaigns that support these ideas behind local food production. Farm-to-fork and farm-to-school programs focusing on local foods have also become very popular across the U.S. The United States Department of Agriculture (USDA) has a program in place to provide grants to implement farm-to-school programs with the intent to " increase local foods served through child nutrition programs, teach children about food and agriculture through garden and classroom education, and develop schools' and farmers' capacities to participate in farm to school (USDA Food and Nutrition Service, 2019)." The Farm to School program will award $7.5 million dollars in grants for the 2019-2020 round of grant applications. These programs demonstrate just how popular local foods are becoming.

Locally-grown produce varies in definition to the general population. Studies across the U.S. have found varying definitions consisting of mile definitions, political boundaries, and social aspects (Zepeda and Leviten-Reid, 2004; Brown, 2003; Durham, C. A., King, R. P., & Roheim, C. A., 2009; Conner, D., Colasanti, K., Ross, R. B., & Smalley, S. B., 2010; Bingen, J., Sage, J., & Sirieix, L., 2011; Adams, D. C., & Adams, A. E., 2011). Consumer willingness-to-pay (WTP) studies across the U.S. have produced consistent outcomes of showing premiums attributed to locally-produced products, with some deviations presented. Premiums of 0% in Xu, Loke, and Leung (2015), 10% in Loureiro and Hine (2002), 20-25% in Bond et al. (2008), 27% in Carpio and Isengildina-Massa (2009), 55% in Yue and Tong (2009), and 76% in Adams and Adams (2011) have been discovered. Surprisingly, locally-produced often commands a higher premium than organically produced items. Determinations of why consumers purchase local products have been the topics of many studies in the U.S. and have resulted in mixed findings in which product attributes, as well as social influences, have been both significant and insignificant in the purchasing decision. Studies examining these attributes include Jekanowski et al. (2000), Loureiro and Hine (2002), Brown (2003), Zepeda and Leviten-Reid (2004), Bond et al. (2008), Njange (2008), Yue and Tong (2009), Carpio and Isengildina-Massa (2009), Adams and Adams (2011), Constanigro et al. (2011). This study looks to expand on these themes of study for local foods by conducting a study of consumers in Eastern South Dakota.

1.2 Research Contribution

Consumers' definition of, attitudes toward, and willingness-to-pay (WTP) for local food have been the primary areas of interest for researchers in recent years. Although the demand for local foods is growing across the U.S. (Low et al., 2015), studies examining consumers' perceptions and demand for locally grown vegetables in the Midwest have been limited. In 2012, over 95% of South Dakota counties had only ten or fewer farms selling to retail stores or restaurants. From 2007 to 2012, most counties in South Dakota saw little growth (between -$123,000 and $123,000) in direct-to-consumer sales with only approximately 20% of counties having sales between $123,000 and $1,000,000 in 2012 (Low et al., 2015). These statistics show the potential for growth in locally-grown vegetable production and the previously mentioned SoDak grown initiative is displaying the growing interest in locally-grown products. An increased understanding of the drivers of the demand for local foods in the region will help policy-makers develop programs and policies to support locally-grown initiatives. Understanding what South Dakota consumers are willing to pay for local food will help to inform producers and retailers on what price to charge for local products. In an environment where conventional crop prices are low, the information in this study will also assist producers in determining the feasibility of producing vegetables in South Dakota. Retailers can benefit from the determination of the local definition for South Dakota consumers' by being able to understand what products consumers perceive as local. To the best of our knowledge, this is the first study that contributes to the current body of local

foods' research in vegetables by providing information on these areas of interest for the state of South Dakota. This research will provide an empirical analysis of consumer WTP for locally-grown vegetables and what the definition of locally-grown is to consumers in Eastern South Dakota.

1.3 Research Objectives

Specific objectives in this research include:

1. Determine the current demand for locally-grown vegetables in South Dakota.
2. Determine how South Dakota consumers define locally-grown vegetables.
3. Determine South Dakota consumers' reasons for purchasing locally-grown vegetables.
4. Determine if South Dakota consumers WTP is different for locally-grown cool-season vegetables (lettuce) versus locally-grown warm-season vegetables (tomatoes).
5. Determine if seasonality has an impact on South Dakota consumers WTP.
6. Determine if a provision of a local definition has an effect on SD consumers' WTP.
7. Quantify WTP for locally-grown vegetables in South Dakota.
8. Determine the factors affecting WTP for locally-grown vegetables through empirical analysis.

Chapter 2: Literature Review

2.1 Consumer Attitudes

Research has shown that consumers are motivated to purchase local produce for a variety of reasons. The most prominent of these reasons being perceived product quality, personal health, food safety, environmental considerations, and development of the local economy (Feldmann & Hamm, 2015). Product quality to the consumer primarily refers to the idea of better taste and freshness, among other qualities, of local product versus the lack of such qualities in non-local food. Personal health refers to the idea that local food is perceived to have more health benefits than that of non-local foods. Food safety refers to the knowledge of where your product specifically originates giving the consumer a higher sense of their food being safe. Environmental considerations refer to the idea of consumers perceiving the products produced locally to produce a smaller carbon footprint. The reduction in the carbon footprint is primarily related to the reduction in transportation emissions. Development in the local economy is the idea of creating business for local producers to strengthen communities (Feldmann & Hamm, 2015).

Researchers have used different methods in eliciting consumer response to the importance of product attributes in purchasing decisions. The first method is a direct presentation of the attribute, and a resulting question of importance. Jekanowski et al. (2000) conducted a study in Indiana via a telephone survey that asked consumers to rank the attribute of freshness on a five-point Likert scale of “not at all important” to “extremely important.” The mean score for freshness in a sample of 320 was 4.40 which indicated that consumers in Indiana placed a high value on freshness. In the

model, however, freshness was not found to be a significant factor in the purchasing decision of locally produced products (Jekanowski et al., 2000). In a study by Loureiro and Hine (2002), consumers in Colorado were asked to rank two attributes of produce, freshness and nutritional value, on a one to five Likert scale of "not important" to "important." The study found that personal health was the primary attitude involved in the purchasing decision through the significance of the variable "Nutrition." Bond et al. (2008), determined through a nationwide online survey that taste and flavor were one of the most important factors in consumers purchasing decisions with high mean scores based on a Likert scale. Support for the local economy was found to be of less importance in the purchasing decision. Yue & Tong (2009) performed a study in Minnesota using a five-point Likert scale of "not important" to "important" to rank the following attributes: freshness, lower price, safe to eat, support local economy, carbon footprint, and environmentally friendly. Consumers were asked to rank these attributes for the importance they hold in the purchasing decision of local fresh produce. The study found that high importance was placed on freshness and food safety with responses of very important at 83% and 72% respectively. Environmental friendliness, lower price, and supporting the local economy was found to be somewhat important in the study while carbon footprint was found to be relatively unimportant (Yue & Tong, 2009).

Another method that attempted to gather information on consumer attitudes was the use of statements to relay the attribute. Adams & Adams (2011) conducted a study in Florida that provided consumers with a series of 15 questions which covered five themes that included: environmental protection, product quality, farmer-worker

welfare, health, and cost. A Likert scale was utilized to determine how much consumers agreed or disagreed with the statements in regard to local food on a five-point scale ranging from “strongly disagree” to “strongly agree.” In general, consumers agreed with most statements in the group. The highest mean score was 4.40 which was in reference to the question, “The production of local fruits and vegetables is great for the environment.” “Buying local produce can help support farm workers,” and “Fruits and vegetables that are grown locally taste a great deal better than produce that is grown far away,” were also in high agreement with consumers with mean scores of 4.17 and 3.91, respectively. Consumers agreed the least with statements that related to low-pesticide use, nicer appearance, lower price, and higher nutritional value regarding local foods (Adams & Adams, 2011).

Discrete choice experiments can also be used to single out direct attribute effects on purchasing decisions by presenting a set of products to consumers and having them choose a product with different attributes. Nganje et al. (2011) conducted a study in which they identified taste, freshness, appearance, and food safety as being the most important characteristics in the purchasing decision during the choice experiment. Price and environmental friendliness were found to be of importance while traceability was relatively unimportant (Nganje et al. 2011). Our study utilizes the first method to determine the importance consumers placed on certain attributes in their purchasing decision of vegetables.

2.2 Willingness to Pay

Numerous studies have been done to elicit willingness to pay for locally produced products in order to provide an insight into consumer behavior. Loureiro and Hine

(2002), conducted a study to determine willingness to pay for GMO-free, organically grown, and Colorado-grown potatoes. They elicited WTP by using a payment card format. A base price of one dollar per pound was provided in the instructions and consumers were then asked to provide a premium amount to the base price. The results showed that consumers were willing to pay the highest premium for locally-produced potatoes at about ten percent premium. The study found that the only variable that had a positive and statistically significant effect on WTP was the variable "Nutrition." Demographic variables were not statistically significant which reiterated an idea that increased WTP for locally-grown products is related to product attributes, not just demographics (Loureiro and Hine, 2002). In a nationwide study, Bond et al. (2008) also utilized a payment card format in determining consumers' WTP. The study included a factor and cluster analysis and results determined a 20-25% premium for locally-produced melons across all clusters (Bond et al., 2008). Carpio and Isengildina-Massa (2009) conducted a study in South Carolina and found that consumers were willing to pay a 27% premium for local produce. Using a contingent valuation approach, consumers were asked to identify premiums they were willing to pay for the South Carolina Grown label from which a mean WTP value was derived (Carpio & Isengildina-Massa, 2009). Yue and Tong (2009) conducted a study in Minnesota on willingness to pay for organic, local, and organic and local tomatoes. The study determined that locally-grown tomatoes provided a $0.67 per pound premium over conventional tomatoes. Interestingly, organic tomatoes provided the same level of premium as locally produced products. This study used hypothetical and non-hypothetical experiments to help determine a bias level for using

hypothetical experiments. The result was 9% of the premium was considered as bias. In a non-hypothetical, in-store experiment, Colorado consumers presented a WTP for local apples nearly five times greater than organic apples at a premium of $1.18 per pound. The researchers hypothesize that this reason may be due to the lack of perceived difference in organic products versus the perceived difference in local products, or the larger social implications of buying local (Costanigro et al., 2011).

Most studies identify a price premium for locally produced foods, however, there are some that do not realize this general conclusion. A study in Hawaii determined, using actual transaction data, that there was no price premium for locally produced lettuce. This analysis singled out the specific effect of the labeling of local on the product and determined that this label had little effect. The quality of the product was the primary driver in WTP (Xu et al., 2015). Studies in the area of WTP have included conjoint analyses, contingent valuations, choice experiments, auctions, and an Information-Display Matrix (Feldmann & Hamm, 2015). This study uses a contingent valuation approach to elicit WTP for locally-produced vegetables.

2.3 The "Local" Definition

The definition of "local" varies greatly between consumers in different geographic locations, different levels of the supply chain, and even within communities. The definition of what "local" is defined as is important for producers to make marketing decisions. A focus-group study in Wisconsin determined that consumers have a wide range of definitions that include distance, political boundaries, and other social aspects. Driving distance in hours was a common idea presented in the study, although there was some disagreement on the hours ranging

from two to seven hours driving time. Political boundaries, defined as counties, states, and similar boundaries, were also noted to be important characteristics in defining local. The study could not provide a concise definition of what local means (Zepeda and Leviten-Reid, 2004). Political boundaries had previously been studied in Missouri where it was found that 40% of respondents believed that the southeast Missouri region defined local. Other categories including county, county and adjoining county, grown in-state, and grown in southern Illinois and southeast Missouri region were relatively evenly distributed (Brown, 2003).

The distance in miles is a common method, more recently, used to create a definition for locally produced. In Minnesota, it was found that locally-grown was defined by 40% of consumers as products being grown within a 150-mile-plus radius (Durham et al., 2009). A study in Michigan determined that 49% of consumers surveyed suggested that produce grown in the state that they are residing is considered local. Another 36% of consumers defined local as within a 100-mile radius (Connor et al., 2010). Another study in Michigan developed results that related the local definition to more characteristics than just distance. Respondents suggested that ideas such as traceability and personal connections with producers define local (Bingen et al., 2011). Adams and Adams (2011) added another layer to defining local with their study in Florida that emphasized the importance of the ownership factor. The study found that 70% of respondents said that produce production facilities needed to be owned locally for the produce to be defined as local. The study also provided some insight into the local definition in terms of age demographics. Younger consumers, with an average age of 24, defined local, using the “mile”

definition, evenly across 30 miles, 50 miles, and 100 miles or greater. Slightly under 70% of older consumers, with an average age of 43, defined local as within a 50-mile radius (Adams and Adams, 2011).

In Oregon, a study involving grocery stores was conducted to determine grocery retailers' definition of local and how these definitions relate to consumers' definitions. The majority of retailers defined local as a multi-state region, which differs with the views of many consumers. In the study, 42% of retailers indicated that distance was not the only factor in the definition of local. Other factors included methods of production, farm size, and farm ownership (Dunne et al., 2011). Our study uses distance and political boundaries to determine consumers' definitions of local.

Chapter 3: Data and Methodology

3.1 Data Collection

In order to meet the research objectives presented in this thesis, a consumer intercept survey was conducted from April 2019 to October 2019. The survey required five to ten minutes of the consumer's time to complete. Surveys were gathered at main shopping hubs and smaller local stores in seven major cities across eastern South Dakota including Sioux Falls, Brookings, Watertown, Aberdeen, Vermillion, Huron, and Brandon. The survey was distributed in person by the researcher and participants were selected at random. The sample size for this survey was 200 completed surveys.

Surveys were conducted at different times of the day as well as different days of the week in an attempt to gain a more representative sample of shoppers. Table 3-1 shows the survey collection distribution.

Table 3-1. Survey Collection Timing

Location	Day of the Week	Time
Brookings Hy-Vee	Wednesday	11:00 AM - 4:00 PM
Sioux Falls Hy-Vee - 57th & Cliff	Saturday	10:00 AM - 4:00 PM
Sioux Falls Hy-Vee - 26th & Marion	Friday	10:00 AM - 4:00 PM
Sioux Falls Sunshine Foods	Tuesday	4:30 PM - 7:00 PM
Watertown Hy-Vee	Wednesday	3:00 PM - 7:30 PM
Watertown County Fair	Saturday	9:00 AM - 3:30 PM
Huron Fair City Foods	Thursday	1:30 PM - 6:00 PM
Brandon Sunshine Foods	Monday	3:00 PM - 6:00 PM
Aberdeen Kessler's	Sunday	12:00 PM - 5:00 PM
Mitchell County Fair	Monday	3:30 PM - 6:30 PM
Vermillion Hy-Vee	Wednesday	3:30 PM - 7:00 PM

The survey was divided into four sections which are as follows: Attitudes and Behavior, Willingness-to-Pay for Locally-Grown Produce, Defining "Local", and Demographics. In the first section of the survey, in order to satisfy the third objective of this study, consumers were asked to rank how important certain attributes are in their purchasing decision of vegetables on a Likert scale of the following importance: Not Important, Slightly Important, Somewhat Important, Quite Important, and Very Important. The variables that were included were freshness, appearance, taste, lower price, traceability/knowledge of producer, safe to eat, support local economy, environmentally-friendly, carbon footprint, packaging quality, and locally-grown. These variables were based on previous research done by various researchers including Loureiro & Hine (2002), Yue & Tong (2009), and Nganje et al. (2011). These variables will be regressed against the WTP values to see what variables correlate with higher or lower WTP values. The first section also contains a measure to determine current demand through a seasonality and frequency table, satisfying the first research objective.

The second section includes the WTP measurement. This study utilizes a contingent valuation method to elicit WTP. More specifically, a payment card format comprised of price premiums is utilized similar to those used by Louriero & Hine (2002), Bond et al. (2008), and Carpio & Isengildina-Massa (2009). The payment card approach was utilized because WTP was to be determined for the single attribute of locally-grown where as other approaches for stated preferences focus on multiple attributes. The payment cards begin with a yearly average base price for the conventional product and grows exponentially to a 200% premium over the conventional product. The payment card is often criticized for hypothetical bias. In this study, a cheap talk script was added in an attempt to dissuade participants from overstating their WTP. This payment card quantifies WTP through stated-preferences which satisfies the seventh research objective. The payment card format can be seen in the survey presented in the appendix.

To satisfy the fourth research objective, two payment cards, one for tomatoes and the other for lettuce, are presented to the consumer. Tomatoes represent the warm-season vegetable and lettuce represents the cold-season vegetable. Tomatoes are a good proxy for warm-season vegetables because they are a commonly consumed warm-season vegetable. Tomatoes were also chosen as the warm-season product in this study because they are a product that can be commercially produced in South Dakota throughout most of the year. The primary reason for the small amount of tomato production in South Dakota is the large costs associated with out-of-season production. Lettuce was chosen as the proxy for cool-season vegetables as it is a commonly consumed cool-season vegetable. It was also chosen because it is a

vegetable that can be produced commercially throughout the year. If consumers are, on average, willing to pay more for warm-season or cold-season vegetables, this information will help producers decide what products to focus on in their production plans.

To determine seasonality in the study, consumers are presented with four months of the year (March, May, August, November) and asked to provide a WTP measure for each month. These four months were intentionally selected to reflect seasonal conditions related to South Dakota's climate for the vegetables used in this study. March reflects a time when tomatoes are rarely produced in South Dakota because of the supplemental light, additional heating, and pollinators needed for production in greenhouses. Lettuce, however, does not require the aforementioned growth stimulators to the level of tomatoes in March. In May, tomatoes are more readily available as harvest begins in high tunnel production. Lettuce also is readily available in May from both high tunnel and open field production. In August, tomatoes from open-field, high tunnel, and home garden production glutton the market. Open-field production of lettuce is not common in August as temperatures are too high to produce quality lettuce, so the primary production comes from temperature-controlled high tunnel production. In November, tomatoes in open field production have most likely experienced a frost ending the crop generally around the middle of October. Therefore, product comes from high tunnels. Lettuce is a cold-season vegetable, so a fall open field planting is possible. Product can come from both open field and high tunnel production. WTP information will help to inform decisions on whether

additional expenditures can be made by producers to support out of season production.

In order to satisfy the sixth research objective, two versions of the survey were created. An information treatment version provides a definition provided in the 2008 Farm Act prior to the participant's completion of the WTP payment cards, while a control version of the survey withholds this information. The two survey version groups are expected to not be statistically different from one another.

The third section satisfies the second research objective by asking consumers to choose a range that best aligns with their perception of locally-produced vegetables. Range values include 30, 50, 100, and 400 miles along with boundaries such as within county, state, and Midwest region. The mile values attempted to account for some of the survey locations close proximity to the state border. The mile definition and political boundary range values were developed from previous studies including those done by Brown (2009), Durham et al. (2009) and Conner et al. (2010). The value of 400 miles was included as it is the definition provided by the 2008 Farm Act. Boundaries were included to provide wider ranges.

The fourth section includes demographics that will be regressed against WTP values to help determine which characteristics correlate with higher and lower WTP values.

3.2 Descriptive Statistics

Table 3-2. Summary of Key Demographic Variables of Survey Respondents

Gender	**Whole Sample (n=200)**	**Control (n=100)**		**Treatment (n=100)**
Male	35.5%	29.0%	<	42.0%
Female	64.5%	71.0%	>	58.0%
Age				

18-25	7.0%	6.0%	<	8.0%
26-35	10.0%	12.0%	>	8.0%
36-45	11.0%	11.0%	=	11.0%
46-55	16.0%	12.0%	<	20.0%
56-64	30.0%	28.0%	<	32.0%
65+	26.0%	31.0%	>	21.0%
Mean Score	4.30	4.37	>	4.23
Education				
<=High School Diploma	22.5%	20.0%	<	25.0%
College Degree	61.0%	62.0%	>	60.0%
Post-Graduate Degree	16.5%	18.0%	>	15.0%
Mean Score	1.94	1.98	>	1.90
Household Income				
$0-$29,999	17.5%	22.0%	>	13.0%
$30,000-$59,999	24.5%	26.0%	>	23.0%
$60,000-$99,999	37.5%	35.0%	<	40.0%
$100,000+	20.5%	17.0%	<	24.0%
Mean Score	2.61	2.47	<	2.75

The gender of survey participants was 36% male and 65% female for the entire sample compared to an approximately even split of males and females in South Dakota (South Dakota Population, 2019). The highest represented age range was 56 to 64 years at 30% followed by 65+ years and 46 to 55 years at 26% and 16% respectively. Of the sample, 72% of participants were 46 or above in age. This was likely the case because of the times that the surveys were conducted as well as older participants higher willingness to participate in the survey. The sample overrepresented participants above 46 years and underrepresented below 46 years by approximately 18% (South Dakota Population, 2019).

For education, data was collected using a scale of three increments including: Some High School or Less/High School Diploma, a College Degree, or a Post-Graduate Degree. The overall mean score for education was 1.94 with 23% of participants having a

high school diploma or less, 61% of participants having a college degree, and 17% of participants having a post-graduate degree. This distribution was similar with South Dakota distribution (South Dakota Population, 2019).

Income can sometimes be a sensitive topic for consumers, so income levels were presented in a range format. These ranges included the following: $0- $29,999, $30,000-$59,999, $60,000-$99,999, and $100,000 or more. The overall mean score for the sample was 2.61, with the highest portion of participants (38%) earning a household income between $60,000-$99,999. The distribution was similar to the South Dakota population (South Dakota Population, 2019). The complete distribution is shown in Table 3-2.

A t-test was conducted to check for significant differences between the treatment and control participants in the survey for these primary demographics. Only the income variable of the demographics indicated a statistically significant difference between the two groups. The t-test results can be seen in Appendix 2.

Table 3-3. Other Demographics of Participants

Characteristics	**Yes**	**No**
Primary Shopper	86.5%	13.0%
Married	72.0%	28.0%
Employed	74.5%	25.5%
Passion for Cooking	69.5%	30.0%
Dietary Restrictions	37.0%	63.0%
Children Under 12	19.0%	80.5%
Urban	60.0%	
Rural	40.0%	
Ethnicity - White	95.0%	
Ethnicity - Other	5.0%	
Family Size (Mean Score)	2.50	

Participants in the study were primarily married, employed, and the primary shoppers in the household with 72%, 74.5% and 86.5%, respectively responding

affirmatively to the questions. Many respondents (69.5%) stated that they had a passion for or enjoyed cooking. This number was surprising in the study because of the trend in the U.S. of consumers moving more towards eating outside of the home. This data could be reflecting the high number of older respondents and their proclivity towards cooking inside the home. Dietary restrictions were found in 37% of households in the study. These dietary restrictions accounted for all types of restrictions that would prevent consumers from eating certain types of food. Included in the survey were examples of vegetarianism, gluten intolerance, high cholesterol, sodium restrictions. Sugar restrictions were also frequently inquired about while conducting the surveys. Only 19% of households had children under 12. This is likely due to the higher number of older participants.

Of consumers in the survey, 60% resided in urban areas while 40% resided in rural areas. For South Dakota, urban was defined as within the city limits and rural was defined as outside the city limits. This was not defined in the survey specifically, but this was the definition provided if the participant inquired. The higher ratio of urban residents is likely a result of the surveys being conducted in major shopping centers in towns.

According to World Population Review, recent data indicates South Dakota's population consists of approximately 85% white with the remaining in the other categories (South Dakota Population, 2019). Ethnicity in the study resulted in 95% of the participants being white. The remaining 5% of ethnicity accounted for the following other categories presented in the survey: Hispanic or Latino, Black or African American, Native American/Alaska native, Asian, or Other. The large percentage of white participants is not very significant because it closely resembles census data. The average

family size for participants was 2.5 people per household. This number is most likely reflecting the larger number of older participants who likely no longer have children in the household. The full information can be viewed in Table 3-3.

Table 3-4. Health Demographics of Participants

Quality	**Consumer Diet**	**Consumer Health**
Unhealthy	0.5%	2.5%
Somewhat Unhealthy	9.0%	7.5%
Somewhat Healthy	73.0%	59.0%
Very Healthy	17.5%	31.0%
Mean Score	3.08	3.19
Number of Days Per Week	**Intense Physical Activity**	**Moderate Physical Activity**
0	36.5%	3.0%
1	8.0%	6.0%
2	13.0%	12.5%
3	16.5%	17.5%
4	9.0%	15.0%
5	8.0%	22.0%
6	4.5%	8.0%
7	4.0%	16.0%
Mean Score	2.15	4.14

This survey also collected data relating to their health and physical activity. Information of consumer diet and health quality were measured using a scale consisting of the following increments: Unhealthy, Somewhat Unhealthy, Somewhat Healthy, and Very Healthy. The mean score of participants in relation to how they viewed their diet was 3.08 which places the average participant between Somewhat Healthy and Very Healthy. Most participants (73%), responded as viewing their diet as somewhat healthy. The mean score of participants in relation to how they viewed their health was 3.19. While only 17.5% of participants believed their diet was Very Healthy, 31% of

participants believed that their overall health was Very Healthy. For both diet and health, approximately 90% of participants responded as Somewhat Healthy and Very Healthy.

Participants were also asked how frequently they did at least 30 minutes of intense and moderate physical activity per week. The mean score for intense physical activity was 2.15 days. This lower average is likely due to the high number of older participants. The mean score for moderate physical activity was 4.14 days. This number is a reasonable expectation for the sample. The total distribution can be seen in Table 3-4.

3.3 Purchasing Decision Results

Table 3-5. Importance of Attributes in the Purchasing Decision of Vegetables for South Dakota Consumers

Attribute	Not Important	Slightly Important	Somewhat Important	Quite Important	Very Important	Mean Score
Freshness	0.0%	0.0%	1.0%	17.0%	82.0%	3.81
Appearance	0.0%	3.5%	9.0%	38.5%	49.0%	3.33
Taste	0.5%	1.0%	2.0%	18.0%	78.5%	3.73
Lower Price	4.0%	5.5%	39.0%	27.0%	24.5%	2.63
Traceability	13.0%	16.5%	31.0%	18.5%	21.0%	2.18
Safe to Eat	1.0%	1.5%	2.0%	14.0%	81.5%	3.74
Support Local Economy	1.5%	1.5%	16.5%	31.0%	49.5%	3.26
Environmentally Friendly	3.5%	7.0%	16.5%	30.0%	43.0%	3.02
Carbon Footprint	11.5%	17.0%	30.0%	21.0%	20.5%	2.22
Packaging Quality	10.0%	18.5%	28.5%	27.5%	15.5%	2.20
Locally-Grown	1.0%	7.0%	25.0%	28.5%	38.5%	2.97

In the purchasing decision, freshness, taste, and safe to eat were found to be the most important attributes to consumers with mean scores of 3.81, 3.73, and 3.74 respectively. These attributes are all related to the quality of the vegetable or are product-based attributes. The importance of these product based attributes were recognized in Njange et al. (2008) who also conducted a study that focused on the purchasing decision

of vegetables in general in Arizona. Consumers in South Dakota may place such a high importance on these quality related attributes because many consumers in South Dakota are familiar with home-grown vegetables and understand product differences. The high importance of these attributes to South Dakota consumers are consistent with a studies done by Loureiro and Hine (2000), Jekanowski et al. (2000), Brown (2003), Bond et al. (2008), Yue & Tong (2009), and Constanigro et al. (2011). On average, appearance, supporting the local economy, and environmentally friendly were found to be quite important in the purchasing decision with mean scores of 3.33, 3.26, and 3.02, respectively. Appearance is another product quality attribute and can be explained for the same reasons as the other product attributes. Supporting the local economy and environmental quality are attributes that relate to consumers' societal values. Nearly half (49.5%) of South Dakota consumers placed high importance on supporting their local economy. This finding was also consistent with the study done by Yue & Tong (2009). A significant amount (43%) of South Dakota consumers placed high importance on environmental friendliness while a very small portion (3%) found it unimportant. These findings differ from Yue & Tong (2009) who only found that 28% of Minnesota consumers found environmental friendliness very important and had nearly 13% of consumers finding it unimportant. This higher importance placed on environmental friendliness compared to Yue & Tong (2009) may have to do with the increasing environmental awareness over time in the U.S. Societal-based attributes were also found to of higher importance in studies done by Zepeda and Leviten-Reid (2004), Bond et al. (2008), and Adams and Adams (2011).

Traceability was found to be the least important attribute in this study with a mean score of 2.18. Almost 30% of South Dakota consumers placed no to little importance on traceability. This result was consistent with Njange et al. (2008) with their study in Arizona. This low interest in traceability could prove to be detrimental to labeling campaigns in South Dakota for vegetables. Carbon footprint and packaging quality were also not very important attributes to South Dakota consumers with mean scores of 2.22 and 2.20 respectively. Yue and Tong (2009) also found carbon footprint to be unimportant in the purchasing decision.

Lower price is an important attribute to be discussed because it relates very closely to consumers' WTP. If consumers are primarily focused on discount shopping, it will detrimental for higher WTP values. South Dakota consumers provided a mean score of 2.63 for lower price. Over 50% of South Dakota consumers considered a lower price as quite important or very important. This high percentage could be influenced by the higher number of older participants who live on fixed incomes as well as larger families who have a higher food expenditure. Brown (2003), Constanigro et al. (2011), and Adams and Adams (2011) also found high importance of lower price in the purchasing decision. In contrast, Yue and Tong (2009) found that lower price was not important to Minnesota consumers.

Locally-Grown was included on the attribute list to determine a general measure on the importance consumers placed on locally-grown. The response by South Dakota consumers resulted in a mean score of 2.97. Many consumers (67%) considered local as quite or very important in their decision to purchase vegetables. The complete distribution of this data can be viewed in Table 3-5.

3.4 Current Demand for Locally-Produced Vegetables Results

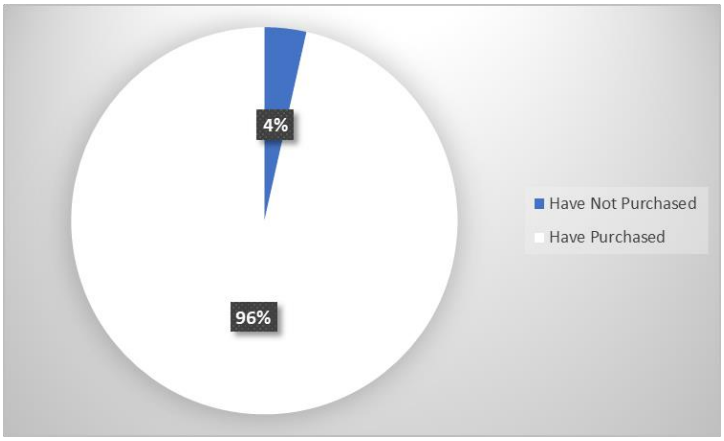

Figure 3-1. South Dakota Consumer Demand for Locally-Grown Vegetables

Figure 3-1 shows the distribution of how many consumers in South Dakota have purchased locally-grown vegetables in the past. The majority of participants (96%) have purchased locally-produced vegetables before. This number was higher than anticipated and reflected a high demand for locally-grown vegetables in South Dakota. It should be noted that the question did not include a time component so this number may have been high for that reason.

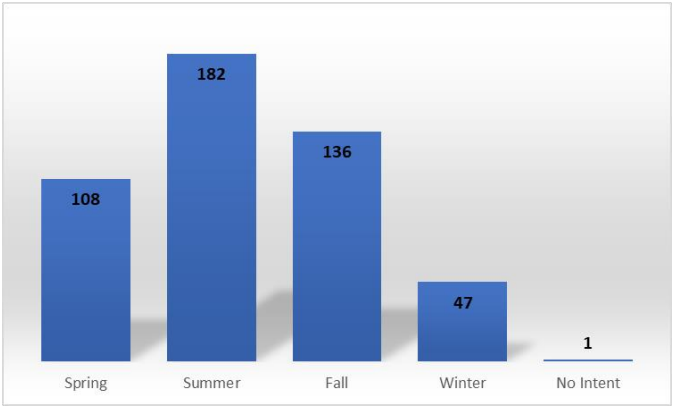

Figure 3-2. Number of Respondents Purchasing Locally-Grown Vegetables in Each Season

Figure 3-2 displays how many respondents purchased locally-grown vegetables in each season of the year. The most frequent season of purchase was summer with 91% of respondents stating that they have purchased locally-grown vegetables. Summer was

followed by fall with 68% of respondents stating that they have purchased locally-grown vegetables. These results were as expected with the seasonality of production in South Dakota.

Table 3-6. South Dakota Consumers' Purchase Frequency

Frequency of Purchase	**Response (%)**
Daily	4.00%
Weekly	52.50%
Bi-Weekly	27.00%
Monthly	15.50%
No Intent	1.00%

South Dakota consumers were most likely to purchase locally-grown vegetables on a weekly or bi-weekly basis with 52.5% and 27% of respondents respectively. This may relate to common shopping behavior of consumers shopping weekly for groceries as commented by survey respondents. Full distribution can be seen in Table 3-6.

3.5 Willingness to Pay Results

Table 3-7. Willingness to Pay Values for South Dakota Consumers

	Locally-Grown Tomatoes			**Locally-Grown Lettuce**		
Whole Sample (n=200)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.10	16.50%	$2.33	3.085	16.28%	$1.74
May	3.07	16.05%	$2.32	3.17	17.55%	$1.76
August	2.75	12.45%	$2.25	3.065	15.98%	$1.74
November	3.03	15.45%	$2.31	3.18	17.70%	$1.77
Control (n=100)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.06	15.90%	$2.32	3.05	15.75%	$1.74
May	3.03	15.45%	$2.31	3.16	17.40%	$1.76
August	2.72	12.20%	$2.24	2.96	14.60%	$1.72
November	2.96	14.60%	$2.29	3.06	15.90%	$1.74
Information (n=100)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.14	17.10%	$2.34	3.12	16.80%	$1.75
May	3.11	16.65%	$2.33	3.18	17.70%	$1.77

August	2.77	12.70%	$2.25	3.17	17.55%	$1.76
November	3.10	16.50%	$2.33	3.3	19.95%	$1.80

Table 3-7 presents the results of the WTP portion of this study. In the table, the sample mean refers to the mean WTP in terms of the coding scale of zero to ten and the premiums are then calculated into their corresponding dollar and premium percentage value. The survey separated WTP values into four months to check for seasonality. South Dakota consumers were willing to pay between 12.45% and 16.50% for locally-grown tomatoes. The month of March resulted in the highest premium at 16.5% with a corresponding dollar value of $2.33 per pound. August resulted in the lowest premium (12.45% or $2.25) for locally-grown tomatoes. This pattern was the expected pattern because it reflected the seasonality of tomato production in South Dakota. There is an abundance of tomatoes from a variety of sources in August and a low amount in March which was reflected in the premium.

South Dakota consumers were willing to pay between 15.98% and 17.70% for locally-grown lettuce. The month of November resulted in the highest premium at 17.70% with a corresponding dollar value of $1.77 per head. As with locally-grown tomatoes, August resulted in the lowest realized premium (15.98% or $1.74) for locally-grown lettuce. The premium in March had the second lowest premium at 16.28%. This was not an expected pattern as it was expected that seasonality would result in a lower premium in May and November as local lettuce would be more readily available. In contrast to this, a complete reversal of this assumption was realized. Since all the premiums were relatively close throughout the year, this could indicate that consumers are not affected by seasonality for locally-grown lettuce.

South Dakota consumers were willing to pay a higher premium for lettuce (a cool-season vegetable) than for tomatoes (a warm-season vegetable) in all times of the year except March. Consumers may be more familiarized with locally-grown lettuce as it is more readily available throughout the year in South Dakota which results in a higher WTP. The discrepancy in March is likely due to the difficulty of finding locally-grown warm-season vegetables such as tomatoes in March. Complete distribution can be observed in Table 3-7.

South Dakota consumers in the Information Group were willing to pay higher premiums for both products across all months. This result could suggest that the provision of the 2008 Farm Act definition of 400 miles being local could have affected premiums for locally-grown tomatoes and lettuce positively.

Table 3-8. Willingness to Pay Values for South Dakota Consumers by Location

	Locally-Grown Tomatoes			**Locally-Grown Lettuce**		
Sioux Falls (n=44)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	2.98	14.80%	$2.30	2.91	14.10%	$1.71
May	2.93	14.30%	$2.29	3.16	17.40%	$1.76
August	2.84	13.40%	$2.27	3.14	17.10%	$1.76
November	3.11	16.65%	$2.33	3.39	20.85%	$1.81
Watertown (n=38)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	2.79	12.90%	$2.26	2.66	11.60%	$1.67
May	2.84	13.40%	$2.27	2.71	12.10%	$1.68
August	2.21	7.10%	$2.14	2.66	11.60%	$1.67
November	2.66	11.60%	$2.23	2.71	12.10%	$1.68
Aberdeen (n=30)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.57	23.55%	$2.47	3.50	22.50%	$1.84
May	3.47	22.05%	$2.44	3.50	22.50%	$1.84
August	3.13	16.95%	$2.34	3.53	22.95%	$1.84
November	3.43	21.45%	$2.43	3.47	22.05%	$1.83
Brookings (n=23)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)

March	3.52	22.80%	$2.46	3.87	28.05%	$1.92
May	3.48	22.20%	$2.44	3.91	28.65%	$1.93
August	2.87	13.70%	$2.27	3.61	24.15%	$1.86
November	3.17	17.55%	$2.35	3.78	26.70%	$1.90
Mitchell (n=20)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	2.40	9.00%	$2.18	2.60	11.00%	$1.67
May	2.20	7.00%	$2.14	2.60	11.00%	$1.67
August	2.15	6.50%	$2.13	2.40	9.00%	$1.64
November	2.45	9.50%	$2.19	2.65	11.50%	$1.67
Vermillion (n=21)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.38	20.70%	$2.41	3.43	21.45%	$1.82
May	3.57	23.55%	$2.47	3.62	24.30%	$1.86
August	3.48	22.20%	$2.44	3.48	22.20%	$1.83
November	3.24	18.60%	$2.37	3.29	19.35%	$1.79
Brandon (n=10)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.50	22.50%	$2.45	3.30	19.50%	$1.79
May	3.50	22.50%	$2.45	3.30	19.50%	$1.79
August	3.10	16.50%	$2.33	2.90	14.00%	$1.71
November	3.30	19.50%	$2.39	3.20	18.00%	$1.77
Huron (n=14)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	2.93	14.30%	$2.29	2.64	11.40%	$1.67
May	2.79	12.90%	$2.26	2.57	10.70%	$1.66
August	2.36	8.60%	$2.17	2.50	10.00%	$1.65
November	3.00	15.00%	$2.30	2.79	12.90%	$1.69

South Dakota consumers' WTP differed across locations in South Dakota. Of the larger samples (Sioux Falls, Watertown, Aberdeen), Aberdeen consumers were willing to pay the highest premiums for both products across all months of the year. Aberdeen consumers had mean premiums of 21% for locally-grown tomatoes and 22.5% for locally-grown lettuce. Watertown consumers were willing to pay the lowest premiums for both products across all months of the year with mean premiums of 11.25% for locally-grown tomatoes and 11.85% for locally-grown lettuce. For the medium samples

(Brookings, Mitchell, Vermillion), Vermillion consumers were willing to pay the highest premiums for locally-grown tomatoes, except for the month of March with a mean premium of approximately 21.5%. Brookings consumers were willing to pay the highest premium across all months for locally-grown lettuce with a mean premium of approximately 27%. Mitchell consumers were willing to pay the least for both products across all months with mean premiums of 8% for locally-grown tomatoes and approximately 10.5% for locally-grown lettuce. For the smaller samples (Huron, Brandon), Brandon consumers were willing to pay the most for both products across all months with mean premiums of 20.25% for locally-grown tomatoes and 17.75% for locally-grown lettuce. Huron consumers were willing to pay the most for both products across all months with mean premiums of 12.7% for locally-grown tomatoes and 11.25% for locally-grown lettuce. Full distribution can be seen in Table 3-8.

Table 3-9. Willingness to Pay Values for Urban vs. Rural South Dakota Consumers

	Locally-Grown Tomatoes			**Locally-Grown Lettuce**		
Urban (n=120)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.11	16.65%	$2.33	2.97	14.70%	$1.72
May	3.15	17.25%	$2.35	3.08	16.20%	$1.74
August	2.90	14.00%	$2.28	3.08	16.20%	$1.74
November	3.03	15.45%	$2.31	3.09	16.35%	$1.75
Rural (n=80)	Sample Mean	Premium (%)	Premium ($)	Sample Mean	Premium (%)	Premium ($)
March	3.09	16.35%	$2.33	3.26	18.90%	$1.78
May	2.95	14.50%	$2.29	3.31	15.75%	$1.74
August	2.51	10.10%	$2.20	3.05	19.65%	$1.79
November	3.04	15.60%	$2.31	3.31	19.65%	$1.79

Urban South Dakota consumers were willing to pay more for locally-grown tomatoes than rural South Dakota consumers in all months except for November. Yue & Tong (2009) found that urban consumers were more willing to purchase locally-grown

tomatoes than rural consumers. Mean premiums for locally-grown tomatoes were approximately 16% for urban consumers and approximately 14% for rural consumers. Rural South Dakota consumers were willing to pay more for locally-grown lettuce in all months except for May. Mean premiums for locally-grown lettuce were approximately 16% for urban consumers and approximately 18.5% for rural consumers. On average, rural and urban South Dakota consumers were not very different in there WTP for locally-grown tomatoes and lettuce with both products being with 2.5%. Jekanowski et al. (2000) also found no significant difference between urban and rural consumers.

3.6 South Dakota Consumers' Definition of Local

Table 3-10. SD Consumer Definition of Local

Range	**Response (%)**
Within 30 Miles of Purchase	13.5%
Within 50 Miles of Purchase	18.0%
Within 100 Miles of Purchase	29.5%
Within 400 Miles of Purchase	3.5%
Within the County Where Purchased	1.0%
Within South Dakota	27.5%
Within the Midwest Region	7.0%

The highest number (29.5%) of South Dakota consumers defined local as within 100 miles of product purchase. This finding was similar to a study conducted in Minnesota by Durham et al. (2009) where 40% of consumers considered 150 miles as local. Within South Dakota followed closely with 27.5% of consumers defining this political boundary as local. Connor et al. (2010) found that these two categories were also considered the most supported definitions to consumers in Michigan. Within the county where purchased, within 400 miles of product purchase, and within the Midwest region

were the least supported definitions to South Dakota consumers with 1.0%, 3.5%, and 7.0% respectively.

Mile definitions were used by 64.5% of South Dakota consumers to define local. Political boundaries were used by the remaining 35.5% of consumers. South Dakota consumers may have been more inclined to provide mile definitions because of the close proximity of survey locations to neighboring states of North Dakota, Minnesota, Iowa, and Nebraska.

The Farm Act of 2008 definition of 400 miles was not frequently agreed with by South Dakota consumers. With such a low percentage, it is seen that this definition does not well represent South Dakota consumers' beliefs about what constitutes as local.

Chapter 4: Empirical Results and Discussion

4.1 Regression Framework

An OLS regression was conducted to determine what the factors are that affect South Dakota consumers' WTP for locally-grown vegetables. The model for this study can be described as follows:

$$WTP_{ij} = \alpha + \beta_1 Treatment/Control_i + \beta_2 Gender_i +$$
$$\beta_3 Age_i + \beta_4 Education_i + \beta_5 Income_i +$$
$$\beta_6 Passion_i + \beta_7 DietRestrict_i + \beta_8 FamilySize_i + \beta_9 IntenseAct_i +$$
$$\beta_{10} ModerateAct_i + \beta_{11} AttrFresh_i + \beta_{12} AttrEnvir_i + \beta_{13} AttrTrace_i +$$
$$\beta_{14} AttrLocal_i + \beta_{15} AttrLPrice_i + \beta_{16} LEcon_i + \varepsilon_{ij}$$

In the equation, WTP_{ij} is the mean willingness to pay for locally-grown product j (where j is locally-grown tomatoes or lettuce) by individual i. The independent variables used in

the analysis are presented in Table 4-1. The variables were checked for correlation and the correlation matrix can be seen in Appendix 3.

4.2 Regression Variables

Table 4-1. Definition of Variables Used in the WTP Regression

Variable name	Variable label	Definition
Information/Treatment	$Treatment/Control_i$	Binary variable, 1 if the respondent received information treatment, 0 otherwise
Age	Age_i	Respondent's Age Range: 1- 18-25 Years 2- 26-35 Years 3- 36-45 Years 4- 46-55 Years 5- 56-64 Years 6- 65+ Years
Gender	$Gender_i$	Respondent's Gender: 1- Male 2- Female
Education	$Education_i$	Respondent's Education Level: 1- High School Diploma or Less 2- College Degree 3- Post-Graduate Degree
Income	$Income_i$	Respondent's Income Level 1- <=$29,999 2- $30,000-59,999 3- $60,000-99,999 4- >=$100,000
Passion for Cooking	$Passion_i$	Binary variable, 1 if the respondent has a passion for cooking, 0 otherwise
Dietary Restrictions in the Household	$DietRestrict_i$	Binary variable, 1 if the respondent has dietary restrictions in the household, 0 otherwise
Family Size	$FamilySize_i$	Continuous variable: Values of 1 to 10
Days of Intense Physical Activity	$IntenseAct_i$	Range variable: Values of 1 to 7
Days of Moderate Physical Activity	$ModerateAct_i$	Range variable: Values of 1 to 7
Freshness Attribute	$AttrFresh_i$	Range variables: 1- Not Important 2- Slightly Important 3- Somewhat Important 4- Quite Important
Environmentally Friendly Attribute	$AttrEnvir_i$	

Traceability Attribute	$AttrTrace_i$	5- Very Important
Locally-Grown Attribute	$AttrLocal_i$	
Lower Price Attribute	$AttrLPrice_i$	
Support Local Economy Attribute	$AttrLEcon_i$	

Information treatment, or the provision of the 2008 Farm Act definition of local, was the first variable included in both regressions. It was unclear what the result would be from this variable. Age range was included in the regression because as people age, their attitudes and behaviors sometimes change. It is expected that younger consumers would positively impact WTP as younger consumers are more likely to accept new food trends.

Gender was included in both regressions because it is likely that male consumers and female consumers have different preferences when shopping. It is expected that females will be more likely to have a higher WTP for locally-grown vegetables (Yue & Tong, 2009).

Education was included in both regressions because it influences many decisions in a person's life. It is expected that as education increases, a higher WTP will result. This is expected because higher educated people may be able to understand more of the societal benefits of purchasing local.

Income was included in both regressions because it determines how much money can be allocated to the purchase of local foods. It is expected that as income increases, consumers have a higher WTP for locally-grown vegetables because they will have more available income to make local purchases.

Family size was included in the second regression for the effect of the variable on disposable income in the family. As the family size increases, it is expected that WTP for locally-grown vegetables will decrease as cheaper conventional products may be purchased to manage food expenses.

Passion for or the enjoyment of cooking was included in both regressions because this factor may affect what type of products consumers purchase. It is expected that consumers who have this attribute will have a higher WTP for local vegetables because they may have increased interest in the expected product benefits of purchasing local.

Dietary restrictions in the household was included in both regressions because it is a factor that determines what types of food are purchased in the household. The expectation for this variable is unclear, because restrictions could positively or negatively affect the WTP of the consumer depending on the dietary restriction.

Days of moderate and intense physical activity were included in both regressions because the amount of exercise and health consciousness (lifestyle) can affect what types of foods consumers are willing to purchase and therefore influence their WTP for such foods. Local foods may present a view of being healthier to these health-conscious consumers. It is expected that the more exercise that consumers' do in a week, the higher their WTP will be for local vegetables.

Attributes that are important in the purchasing decision for South Dakota consumers were also included in the regression because these attitudes will likely affect how much consumers are willing to pay. The attributes were included because of their importance in other studies including Jekanowski et al. (2000), Loureiro and Hine (2002), Brown (2003), Zepeda and Leviten-Reid (2004), Bond et al. (2008), Njange (2008), Yue

and Tong (2009), Carpio and Isengildina-Massa (2009), Adams and Adams (2011), and Constanigro et al. (2011). Freshness was the first of these variables and it is expected that as the importance in the purchasing decision of freshness increases, WTP will increase because this attribute is generally associated with local vegetables. Environmental friendliness is expected to increase WTP because environmental friendliness is also commonly associated with local. Traceability's importance in the purchasing decision is expected to increase WTP because consumers expect to be able to understand where their product is coming from when purchasing local. The attribute locally-grown and its importance in the purchasing decision are expected to have a positive effect on WTP because as the importance increases, consumers should be willing to pay more for that attribute. Lower price is expected to negatively affect WTP because as consumers place a higher importance on lower price, they will pay lower prices for locally-grown products. Support for local economy was included in the first regression because it was assumed that consumers would be willing to pay higher premiums because they valued the local economy in their purchasing decision. This variable was excluded in the second regression because of its very low significance and its high correlation with the locally-grown attribute.

4.3 Regression Results

Table 4-2. Regression Results for South Dakota Consumers' WTP

Variables	**OLS Linear Regression 1**			
Dependent	**Locally-Grown Tomatoes Mean WTP**	**Standard Error**	**Locally-Grown Lettuce Mean WTP**	**Standard Error**
Age	-0.055	0.041	-0.131***	0.036
Gender	-0.084	0.122	0.055	0.107
Education	-0.009	0.093	-0.025	0.082

Income	0.081	0.060	0.159***	0.052
Passion for Cooking	0.212*	0.127	0.021	0.111
Dietary Restrictions	0.003	0.118	0.042	0.103
Intense Activity	-0.050*	0.029	0.028	0.026
Moderate Activity	-0.012	0.033	-0.014	0.029
Freshness	-0.000	0.141	0.083	0.124
Environmentally Friendly	-0.131*	0.072	-0.055	0.063
Traceability	0.056	0.050	0.117***	0.044
Locally-Grown	0.096	0.077	0.130*	0.068
Support Local Economy	0.063	0.094	0.018	0.083
Information Treatment	0.041	0.117	0.064	0.102
Intercept	2.254***	0.638	0.989**	0.561

Note: *; **; *** indicates coefficients that are statistically significant at 10%, 5%, and 1% levels, respectively.

The first regression on WTP for locally-grown tomatoes resulted in an R-squared value of 0.080 indicating that only 8% of the variability was explained in the model. Adjusted R-squared was a mere 0.01. The significance of F was 0.31 indicating that the model was not significant. The first regression on WTP for locally-grown lettuce resulted in an R-squared value of 0.16 indicating that 16% of the variability was explained in the model. Adjusted R-squared was 0.10 indicating that this model had some slight significance. The significance of F was 0.002 indicating that this model was significant.

The provision of the 2008 Farm Act for the information treatment did have a positive coefficient for both products, but was not found to be significant for either products.

The coefficient of age was negative for both products being highly significant of locally-grown lettuce. This indicated that as the consumer ages, they would be willing to pay less. This was concurrent with the hypothesis for age. The coefficient of gender, while not significant for either products, was found to be negative for tomatoes and positive for lettuce The coefficient of education was negative, but not significant. Income was positive for both products and highly significant for lettuce. This aligns with the hypothesis that as income increases, the consumers WTP increases.

The passion for cooking coefficient was positive and significant for locally-grown tomatoes indicating that consumers who have a passion for or enjoy cooking were willing to pay much higher premiums for locally-grown tomatoes. The coefficient was also positive for locally-grown lettuce, but wasn't significant. Dietary restrictions in the household positively affected the WTP equation for both products. Intense activity had a negative and significant coefficient for locally-grown tomatoes which indicated that the more activity the consumer did during the week, the lower premiums they would be willing to pay. This went against the hypothesis of the alternate effect.

The coefficient for environmentally friendly was found to be negative for both products and statistically significant for locally-grown tomatoes. This indicated that an increase in the importance of the environmentally friendly attribute in the purchasing decision, decreased WTP for locally-grown tomatoes. This indicates that although environmentally friendly is important to consumers, they either do not attribute it to locally-grown or they are not willing to pay more for the attribute. The traceability,

locally-grown, and support local economy attributes all had positive coefficients for both products. The importance of traceability in the purchasing decision was highly significant and the importance of locally-grown was significant in the locally-grown lettuce model. All of these aligned with their respective hypotheses. It is possible that the high significance of traceability in lettuce could be capturing some of the effect of recent health scares in lettuce products recently in the U.S.

Studies that found similar results included Carpio and Isengildina-Massa (2009) who found age and higher local quality to be significant and Jekanowski et al. (2000) who found income and the quality perception of local to be significant. Xu, Loke, and Leung (2015) in contrast to this study found no significance for the locally-grown lettuce.

Table 4-3. Second Regression Results for South Dakota Consumers' WTP

Variables	**OLS Linear Regression 2**			
Dependent	**Locally-Grown Tomatoes Mean WTP**	**Standard Error**	**Locally-Grown Lettuce Mean WTP**	**Standard Error**
Age	-0.059	0.043	-0.134***	0.038
Gender	-0.079	0.122	0.058	0.107
Education	-0.021	0.093	-0.031	0.081
Income	0.075	0.062	0.155***	0.055
Passion for Cooking	0.188	0.126	0.008	0.111
Dietary Restrictions	0.009	0.118	0.048	0.104
Family Size	-0.002	0.046	-0.012	0.041
Intense Activity	-0.047	0.029	0.030	0.026
Moderate Activity	-0.013	0.033	-0.014	0.029
Freshness	-0.003	0.141	0.083	0.124

Environmentally Friendly	-0.113*	0.065	-0.053	0.057
Traceability	0.066	0.050	0.124***	0.044
Locally-Grown	0.128*	0.067	0.143**	0.059
Lower Price	-0.059	0.057	-0.048	0.050
Information Treatment	0.023	0.120	0.043	0.105
Intercept	2.500***	0.665	1.180**	0.584

Note: *; **; *** indicates coefficients that are statistically significant at 10%, 5%, and 1% levels, respectively.

In the second regression (Table 4-3), the variables for family size and the lower price attribute were added to the regression and the variable for support of local economy was removed for its high insignificance and correlation with locally-grown. The second regression on WTP for locally-grown tomatoes resulted in an R-squared value of 0.083 indicating that only 8.3% of the variability was explained in the model. Adjusted R-squared was a mere 0.008. The significance of F was 0.34 indicating that the model was not significant. The second regression on WTP for locally-grown lettuce resulted in an r-squared value of 0.165 indicating that 16.5% of the variability was explained in the model. The Adjusted R-squared was 0.10. The significance of F was 0.003 indicating that the model was significant.

Results of the second locally-grown tomatoes regression were similar except for the loss of significance for intense activity and a passion for cooking. The second locally-grown lettuce regression results were also similar with an increase in the significance of the locally-grown attribute. Family size and the attribute lower price both displayed a negative coefficients, but were not significant. Overall, the models were not very

significant indicating a wider range of factors determines South Dakota consumers' WTP for locally-grown vegetables.

Chapter 5: Conclusion

5.1 Conclusion

With the local food movement ever growing in the U.S., it is important to continue research into the consumers perceptions' of and demand for locally-grown vegetables. This study aimed to discover what South Dakota consumers' look for when purchasing vegetables, a definition for locally-grown, WTP for locally-grown tomatoes and lettuce, and what factors affected WTP for locally-grown vegetables. South Dakota consumers indicated that product attributes, such as freshness and taste, were the most important attributes in the purchasing decision of vegetables. Societal values, such as support for the local economy and environmentally friendly, were also quite important to consumers. Lower price was somewhat important, and traceability was not very important in the purchasing decision. Locally grown was found to be somewhat important in South Dakota consumers purchasing decision. South Dakota consumers did not have a very consistent definition of local, but the highest number of respondents defined local as within 100 miles of purchase at 29.5% followed closely by within the state of South Dakota with 27.5%. South Dakota consumers were willing to pay between 12.45% and 16.50% for locally-grown tomatoes and seasonality was seen with the lowest premiums being stated for the month of August. Consumers were willing to pay between 15.98% and 17.70% for locally-grown lettuce. Normal seasonality was not seen in the premiums stated by consumers. Aberdeen, Brookings, and Vermillion saw the highest premiums and Watertown, Mitchell and Huron saw the lowest premiums. There was little

difference between rural and urban consumers WTP for either products. The provision of the 2008 Farm Act definition of local did result in higher mean premiums, but was not statistically significant in the empirical model. A majority of South Dakota consumers (96%) had purchased locally-grown vegetables in the past. Locally-produced vegetables were primarily purchased in the summer and fall with 52% of consumers purchasing weekly.

In the empirical analysis, the importance of environmental friendliness in the purchasing decision was the only factor found to be significant across both models for locally-grown tomatoes. Age, income, and the importance of traceability in the purchasing decision were found to be highly significant and the importance of locally-grown was found to be significant in the WTP equation for locally-grown lettuce.

These findings can assist producers, retailers, and policymakers in South Dakota. Producers now have an understanding of what consumers are willing to pay in South Dakota for locally-grown tomatoes and lettuce. Producers can use this information to conduct feasibility analyses for commercialization of production and deep-winter production. This research discovered that consumers are willing to pay higher premiums for lettuce than tomatoes. Lettuce has lower input costs than tomatoes especially in deep-winter production. Since the premiums are not relatively high for both products, it is anticipated that feasibility studies will result in potential for lettuce but not tomatoes. Producers and retailers can use the importance of attributes in the purchasing decision to focus on attributes to strive for and what attributes to promote in advertising. Retailers can use the information on the consumers' definition of local to adjust their advertising campaigns for local products. Policymakers can use this information to adjust their

promotional campaigns for local food systems in terms of definitions, consumers' interest in local, and consumers' willingness to purchase local.

5.2 Limitations of the Study

This study included limitations inherent in survey research as well as limitations inherent in quantitative research. Consumers in the survey may have not been a completely representative sample of the Eastern South Dakota population. Time and financial constraints restrained the sample size attained. Consumers may not have answered truthfully or may have not stated intentions that are true to behavior, even though measures were taken to prevent this, which is a problem with stated-preference research. Response fatigue was recognized as a possible hindrance to the accuracy of the results as some questions may have asked for too much recollection. The empirical model did exclude some independent variables that may contribute to WTP for locally-grown products because the study did not include questions on all the factors affecting WTP.

5.3 Direction for Future Research

Future research in this area can attempt to understand more about what factors affect South Dakota consumers' decisions to purchase locally-grown vegetables. A different method, such as a choice experiment, may be able to better determine specific attributes that affect South Dakota consumers' WTP. Research to determine other factors that may affect WTP could help to improve analyses on the WTP for locally-grown vegetables. Research into understanding producers' costs on the production side will help to inform on whether South Dakota consumers' WTP justifies local production. This study found that different products had WTP differences so other products could be studied to determine how WTP changes.

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Appendix 1: Survey

Informed Consent

Dear South Dakota Consumer,

This is an invitation to participate in a survey being conducted by a thesis graduate student of the South Dakota State University Department of Economics. The research project titled, "Consumer Perceptions' and Demand for Locally-Grown Vegetables in South Dakota", is an attempt to gain an understanding of South Dakota consumers views on locally-produced vegetables.

You must be 18 years old or older to participate in the project. If you consent to participate, you will be asked to complete a survey, which will take approximately 5-8 minutes of your time. The survey is administered in printed form.

Participation in the project is voluntary. You have the right to withdraw from the survey at any time without penalty, and you have the right to skip any questions you do not wish to answer.

There are no known risks related to participation in the study. When the data and analysis are presented, you will not be linked to the data by your name, title or any other identifying item.

Upon completion of the survey, you will be provided with the opportunity to receive three chances at a $25 Visa Gift Card which will be awarded at the completion of the study. Your name and phone number will be taken to contact you if you win the gift card. This information will not be linked to the survey.

By completing the survey, you are indicating that you, as a research participant, are 18 years old or older, have read the above, have had any questions answered, and agree to participate in the research project. Your consent is implied by the return of the completed survey to the survey issuer.

Thank you very much for your time and support. Please start with the survey now by continuing to the next page.

Richard Mulder
Graduate Student of Economics
South Dakota State University

Section 1: Attitudes and Behavior

1. Please indicate the importance of the following attributes in your purchasing decision of vegetables (**check one box per each row**).

PRODUCT ATTRIBUTE	IMPORTANCE OF ATTRIBUTE				
	Not Important	**Slightly Important**	**Somewhat Important**	**Quite Important**	**Very Important**
Freshness	☐	☐	☐	☐	☐
Appearance	☐	☐	☐	☐	☐
Taste	☐	☐	☐	☐	☐
Lower Price	☐	☐	☐	☐	☐
Traceability/Knowledge of Producer	☐	☐	☐	☐	☐
Safe to Eat	☐	☐	☐	☐	☐
Support Local Economy	☐	☐	☐	☐	☐
Environmentally Friendly	☐	☐	☐	☐	☐
Carbon Footprint	☐	☐	☐	☐	☐
Packaging Quality	☐	☐	☐	☐	☐
Locally-Grown	☐	☐	☐	☐	☐

2. Have you ever purchased locally produced vegetables (**including** farmers' markets and grocery stores)?
    a. Yes
    b. No
3. If you have purchased locally produced vegetables, which of the following seasons do you purchase locally produced vegetables? If you **<u>have not</u>** purchased locally produced vegetables, which of the following seasons are you most likely to purchase locally produced vegetables? (**Check all that apply)**?

Spring	Summer	Fall	Winter	No Intent to Purchase
☐	☐	☐	☐	☐

4. From the seasons selected, how frequently would you purchase locally produced vegetables (**Please select One**)?

Daily	Weekly	Bi-Weekly	Monthly	No Intent to Purchase
☐	☐	☐	☐	☐

Section 2: Willingness to Pay for Locally-Grown Produce

There is not a true consensus on the definition of locally produced. The closest **definition** that has been provided through the 2008 Farm Act is that for food to be eligible for marketing as a "locally or regionally produced agricultural food product," it must be transported less than 400 miles from its origin, or within the State in which it is produced.

5. Shown below are eight scenarios for two different locally-grown products: tomatoes and lettuce. The scenarios are divided into these two locally-grown products being available at different months of the year. **What is the highest premium you would be willing to pay for each of these scenarios of locally-grown produce?**

   Before answering, note that prior research shows that people often over-state the amount they are willing to pay when answering survey questions like this. I ask that you respond to each of the following questions as if tomorrow this would be the price on the store shelves for these products. **(If you don't purchase locally-grown produce, mark 0 below.)**

Locally-Grown Tomatoes (Dollars per Pound)											
Premium Percentage and Dollar Value											
		0%	5%	15%	30%	50%	75%	100%	130%	150%	200%
	0	**2**	**2.10**	**2.30**	**2.60**	**3.00**	**3.50**	**4.00**	**4.60**	**5.00**	**6.00**
Month	--	--	--	--	--	--	--	--	--	--	--
March											
May											
August											
November											

*check the cell that represents your maximum willingness to pay for the **produce each month**.

Locally-Grown Lettuce (Dollars per Head)											
Premium Percentage and Dollar Value											
		0%	5%	15%	30%	50%	75%	100%	130%	150%	200%
	0	**1.50**	**1.60**	**1.75**	**1.95**	**2.25**	**2.60**	**3.00**	**3.45**	**3.75**	**4.50**
Month	--	--	--	--	--	--	--	--	--	--	--
March											
May											
August											
November											

*check the cell that represents your maximum willingness to pay for the **produce each month**.

Section 3: Defining "Local"

6. Please indicated below which range best aligns with your perception of locally produced vegetables (**Check only one)**.

Range	
Within 30 Miles of Purchase	
Within 50 Miles of Purchase	
Within 100 Miles of Purchase	
Within 400 Miles of Purchase	
Within the County Where Purchased	
Within South Dakota	
Within the Midwest Region	

Section 4: Demographics

7. Are you the primary shopper in your household?
    a. Yes
    b. No

8. In which of the following ranges (in years) does your age fit?
    a. 18-25
    b. 26-35
    c. 36-45
    d. 46-55
    e. 56-64
    f. 65+

9. What is your sex?
    a. Male
    b. Female
    c. Do not wish to disclose

10. Please indicate which ethnicity you most closely identify with?
    a. White
    b. Hispanic or Latino
    c. Black or African American
    d. Native American/Alaska native
    e. Asian
    f. Other

11. What is your level of education?
    a. Some High School or Less/High School Diploma
    b. College Degree
    c. Post-Graduate Degree

12. Are you married?
    a. Yes
    b. No

13. Do you have children under 12 in your household?
    a. Yes
    b. No

14. What is your family size (number of people currently in your household?)

15. Are you employed?
    a. Yes
    b. No
16. What is your average yearly household income?
    a. $0- $29,999
    b. 30,000-59,999
    c. 60,000-99,999
    d. $100,000 or more
17. Would you say you have a passion for or enjoy cooking?
    a. Yes
    b. No

18. Do you have any dietary restrictions in your household? (i.e. vegetarian, gluten intolerance, high cholesterol, sodium restrictions, etc.)
    a. Yes
    b. No

19. In what county do you live?

20. What most closely relates to your place of residence?
    a. Urban
    b. Rural

21. How would you describe your diet?
    a. Very Unhealthy
    b. Somewhat Unhealthy
    c. Somewhat Healthy
    d. Very Healthy

22. What would you say your health is?
    a. Very Unhealthy
    b. Somewhat Unhealthy
    c. Somewhat Healthy
    d. Very Healthy

23. On average how many days each week do you do 30 minutes or more of **intense** physical activity? Activities are considered **intense** if they significantly increase your breathing and heart rate including running, weight lifting, rock climbing, and other similar activities.

_____days

24. On average how many days each week do you do 30 minutes or more of **moderate** physical activity? Activities are considered **moderate** if they somewhat increase your breathing and heart rate including bicycling, gardening, power walking, and other similar activities.

_____days

Appendix 2: T-Test for Key Demographics

T-Test: Two-Sample Assuming Unequal Variances for Key Demographic Variables

Variable	Negative T-Critical Two-Tail		T-Statistic		Positive T-Critical Two-Tail	Null
Age	-1.97207903	<	0.637789462	<	1.97207903	Accept
Gender	-1.97207903	<	1.929283729	<	1.97207903	Accept
Education	-1.97201747	<	0.907350441	<	1.97201748	Accept
Income	-1.97207903	>	-1.99170312	<	1.97207903	Reject

Appendix 3: Correlation Matrix

	TreatCont	*FRESH*	*ENVIR*	*TRACE*	*LOCAL*	*LPRICE*	*LECON*	*AGE*	*GENDER*	*EDU*	*INCOME*	*PASSION*	*DIETREST*	*INTACT*	*MODACT*	*FSIZE*
Treatment/Control	1.00															
Q1ATTRFRESH	0.00	1.00														
Q1ATTRENVIR	-0.22	0.20	1.00													
Q1ATTRTRACE	-0.15	0.12	0.49	1.00												
Q1ATTRLOCAL	-0.18	0.18	0.44	0.30	1.00											
Q1ATTRLPRICE	-0.24	0.02	0.12	0.18	0.16	1.00										
Q1ATTRLECON	-0.12	0.17	0.61	0.39	0.63	0.09	1.00									
Q8AGERANGE	-0.05	0.10	0.19	0.23	0.28	0.03	0.33	1.00								
Q9GENDER	-0.14	0.14	0.18	0.07	0.18	0.05	0.14	-0.04	1.00							
Q11EDUCATION	-0.06	-0.06	-0.04	0.02	0.04	-0.07	-0.04	0.12	0.05	1.00						
Q16INCOME	0.14	0.04	-0.11	-0.02	-0.05	-0.23	0.02	0.18	-0.06	0.25	1.00					
Q17PASSION	-0.01	-0.02	0.17	0.13	0.15	-0.07	0.06	-0.12	0.12	-0.03	-0.01	1.00				
Q18DIET RESTRI	0.02	-0.07	0.16	0.12	0.10	0.07	0.13	0.13	-0.02	-0.06	-0.14	0.06	1.00			
Q23INTENSEACT	0.18	-0.03	-0.18	-0.14	-0.17	-0.01	-0.14	-0.26	-0.18	-0.07	-0.02	0.03	-0.04	1.00		
Q24MODERATEA	0.10	-0.17	0.07	-0.09	0.18	0.06	0.04	0.01	-0.18	-0.04	-0.01	-0.07	0.04	0.30	1.00	
Q14FAMILYSIZE	-0.05	-0.03	-0.08	-0.03	-0.02	-0.07	-0.04	-0.33	0.00	0.02	0.17	0.10	-0.02	0.11	0.00	1.00