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Does Local Label Bias Consumer Taste Bud and Preference: Evidence of a Strawberry Sensory Experiment

Chenyi He

Graduate Student

Food and Resource Economics Department

University of Florida

cyhe@ufl.edu

Zhifeng Gao

Associate Professor

Food and Resource Economics Department

University of Florida

zfgao@ufl.edu

Charles A. Sims

Professor

Food Science & Human Nutrition Department

University of Florida

csims@ufl.edu

Xin Zhao

Associate Professor

Horticultural Sciences Department

University of Florida

zxin@ufl.edu

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Abstract

Demand for local food, particularly for fresh vegetable and fruits, keeps increasing. Consumer claimed reasons of purchasing local food often include that local food are fresher, more environmental friendly and can support local community, which implies that the local information can affect consumer' perception of food quality. Previous research mainly focused on the impact of local information/label on consumer preference as a credence attribute that is not observable even after purchasing the products. However, the local information of food may also influence consumer perception of the other two types of important attributes, search and credence attributes. In this study, we linked sensory test with consumer willingness to pay (WTP) to determine the impact of local information on consumer perception of strawberry search and experience attributes and how these three types of attributes affect consumer choice. Results show that providing local information positively affect some of the search and experience attributes such as color, freshness and flavor. Locality information is not a significant factor to determine consumers' WTP. In addition, freshness and color have significant impact on consumer WTP before respondents taste the strawberries while flavor and texture became dominant to have most influential impact on consumer WTP after tasting.

Key words: Strawberry, Local produced, Sensory test, Willingness to pay, Multivariate Tobit model

1. Introduction

In recent years, the sale of agricultural products labeled “local” has dramatically increased. The number of local farmers’ market has increased from 1,755 in 1994 to 8,372 in 2014 (USDA, 2014). Meanwhile, the number of local products retailers has also grown rapidly. (Carpio, 2009) finds that South Carolina’s consumers are willing to pay premiums for locally produced food and (Hu, 2012) confirms that consumers’ willingness to pay is higher for products labeled as produced in state or in well- identified multi-state region. (Curtis, 2011) finds that consumers’ demands for local and organic food are increasing due to food safety and health concerns. Growing evidence suggests more consumers seek out and willing to pay more for locally produced fresh produce than non-local fresh produce. Recent national survey of retail food shoppers found that 86% of respondent believed it was either very important or somewhat important for retail food store to carry local produce and other locally produced food item they carry (Bernard, 2010) (Clifford, 2010). Locally produced is a credence attribute, which means that it cannot be observed or experienced directly through consumption (Oude Ophuis, 1995) . The other two types of attributes play important roles in consumer choice and preference are search and experience attributes. Search attributes are product characteristics that consumers can easily evaluate before purchasing. Experience attributes are product characteristics that customers cannot observe before purchasing but can experience after consuming the products. For food products, search and experience attributes normally include the physical attributes such as color, size, appearance, taste and other sensory attributes, which are usually mentioned by consumers as important quality factors in their choice decisions. (Anselmsson, 2007) For instance (Zeithaml, 1988) shows that observed quality is the outcome of the evaluation of different sensory stimuli (i.e. acidity,

sweetness, bitterness, aromas...). Credence attributes normally include product properties that indicate the production practices (e.g. organically produced), processing procedure (e.g. animal welfare), production locations (e.g. country of origin, locality), and food nutrient (e.g. omega-3 fatty acid). Although it is very costly for consumers to verify the authenticity of the credence attributes, labels carrying information about specific credence attributes are used to distinguish the products in the market. The effectiveness of labeling these attributes in the market are determined by consumer choices and willingness to pay, which reflect the benefit that firms expect to receive (Thong Meas, 2013). In general, product differentiation through labels is shown to be an effective strategy in increasing market share and pricing over undifferentiated products. Labeling credence attributes has become one of the most obvious value adding strategies. (Kynda R. Curtis, 2014).

The key reason for consumers to value credence attributes and firms' continuing labeling credence attributes is that they are perceived by consumers as important quality cue of other types of attributes. For example, consumers perceive that local products are fresher, more authentic and nutritious, tastier and safer, and have higher quality. (Boyle, 2003) (La Trobe, 2001) (Lee, 2002) (Seyfang, 2004). Consumers also think organic foods are better for environment, healthier, taste better and have more nutrient. Sales of organic food grew by approximately 20% per year during the 1990s (Dimitri, 2000). There are some researches indicate that although recent growth in organic market has decrease, evidences shows that it continued to increase between the range 10% and 20% per year from 2000 to 2005 (Klonsky, 2007). Precious studies have examined individual level choices driving the increase in consumption of organic food choices in the U.S. and elsewhere. The aforementioned reason for consumer preferring credence attributes implies that these attributes not only directly

affect consumer preference, but also have indirect impacts on consumer choice by influencing consumer perceived quality of other types of attributes.

Most previous studies concentrate on consumer sensory evaluation of food products and consumers' willingness to pay on sensory attributes without any credence attributes (Gabrielyan, 2014). On the other hand, most studies focus on determining the impacts labeling different credence attributes on consumer overall liking and choices of products (Poelman A. , 2008) (Krystallis, A. and Chryssohoidis, G. , 2005) (Canavari, 2003, September) (Carlos, 2008) (Darby, K. and Batte, M., 2006). The objective of this study is to examine the interaction between credence attribute and search and experience attributes by determining the impacts of local information on consumer valuation of fresh strawberry sensory attributes such as color, size, taste etc. In addition, the study also determines the dynamics of revealing product information at different stage on consumer preferences. This is accomplished by first assess fresh strawberry color, size, freshness on consumer willingness to pay (WTP), and then by examine how the impact of these search attributes influence consumer preference when experience attributes are revealed to consumer by tasting the strawberries. Information obtained from this study further enhances our understanding of the importance of different product attributes in consumer preference before (when search attributes are available) and after (when experience attributes are available) their purchase decisions and what are the roles of credence attributes in formulating consumer perception of other types of attributes.

2. Method

2.1 Participants and design

One hundred panelists participated in the sensory test that was conducted in the sensory lab of the department of Food Science & Human Nutrition at University of Florida. Participants received \$3 University dining hall voucher in exchange for their participation. We applied a within participants design in which participants were asked to taste and evaluate three strawberry samples. Three varieties of strawberry were assigned with 3- digit codes while the experimental conditions and orders were also counterbalanced to avoid confounds associated with a within-participant design.

2.2 Materials and procedure

All the strawberries used in the sensory test are from Driscoll's. Three varieties of strawberries were used as three different sample in the sensory test. Figure 1 presents the basic procedure of the sensory test. For the situation customers purchase strawberry in grocery, when people choose what kind of strawberry they are going to purchase, all they know are search properties of the strawberry that means they can only make decision by the appearance attributes of strawberries such as color, size, shape, uniformity and freshness. After them purchasing then eating the strawberries, they will get the experience properties of the strawberries. For the credence properties of strawberry, they are usually referred to the product information such as nutritional and health information, and information about the origin of the product and its way of production, which may have an influence on product liking. Based on these, for all panelists, at the beginning of the test three varieties assigned with random 3-digit codes in 16oz clear clamshells were presented on the table of each booth. The panelists were asked to observe the strawberries in the boxes, but were not allowed to open the box or eat the berries. They were

then asked to rate the three varieties of strawberries regarding size, uniformity of shape, freshness and likelihood to purchase and fill in the computer questionnaire on the desktop in the booth. They were also asked to state their willingness to pay (WTP) for 16oz box of strawberry of each variety. Then each panelist received three fresh strawberries samples in 1oz cup from each of the three varieties. The cups had the same 3-digit codes corresponding to the three boxes on the table. After tasting the berries, panelists rated overall liking, flavor, texture, likelihood to purchase and stated their WTP for each variety. Panelists were then asked to answer several demographics questions and at the end of the test they were ask about their likelihood to repurchase each of the strawberries if they had the chance to see them in store.

Fifty of the panelists were told at the very beginning that the strawberries they were going to evaluated were locally produced (from farms within 100 miles) and the other fifty panelists didn't have this information.

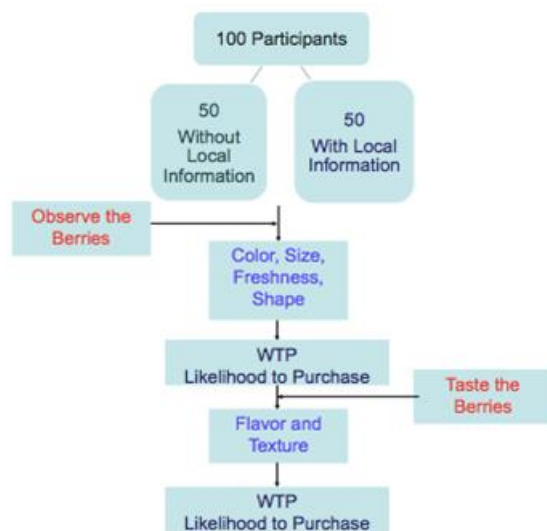


Figure 1 Sensory Test Procedure

2.3 Measures

2.3.1 Appearance and taste related attributes

There are two scales were applied in the sensory test rating. The scale of rate used to rate the color, overall liking, flavor and texture of strawberries is 9 –point hedonic scale which consisted of a series of nine verbal categories representing degrees of liking from “dislike extremely” to “like extremely”. To rate other attributes like size, uniformity and freshness, we use just about right scale and gave panelists five choices to choose.

2.3.2 Purchase likelihood and WTPs

Participants were asked to estimate the purchase likelihood and repurchase likelihood of each stage. The scale to rate used is similar to just about right scale. The panelists were give five choice from very unlikely to very likely and the undecided choice was in the middle. Besides, panelists were also asked to report the highest amount of money that they would be willing to pay for a 16oz box strawberry separately before and after tasting, the reference price \$3.99 was given for 16oz strawberry.

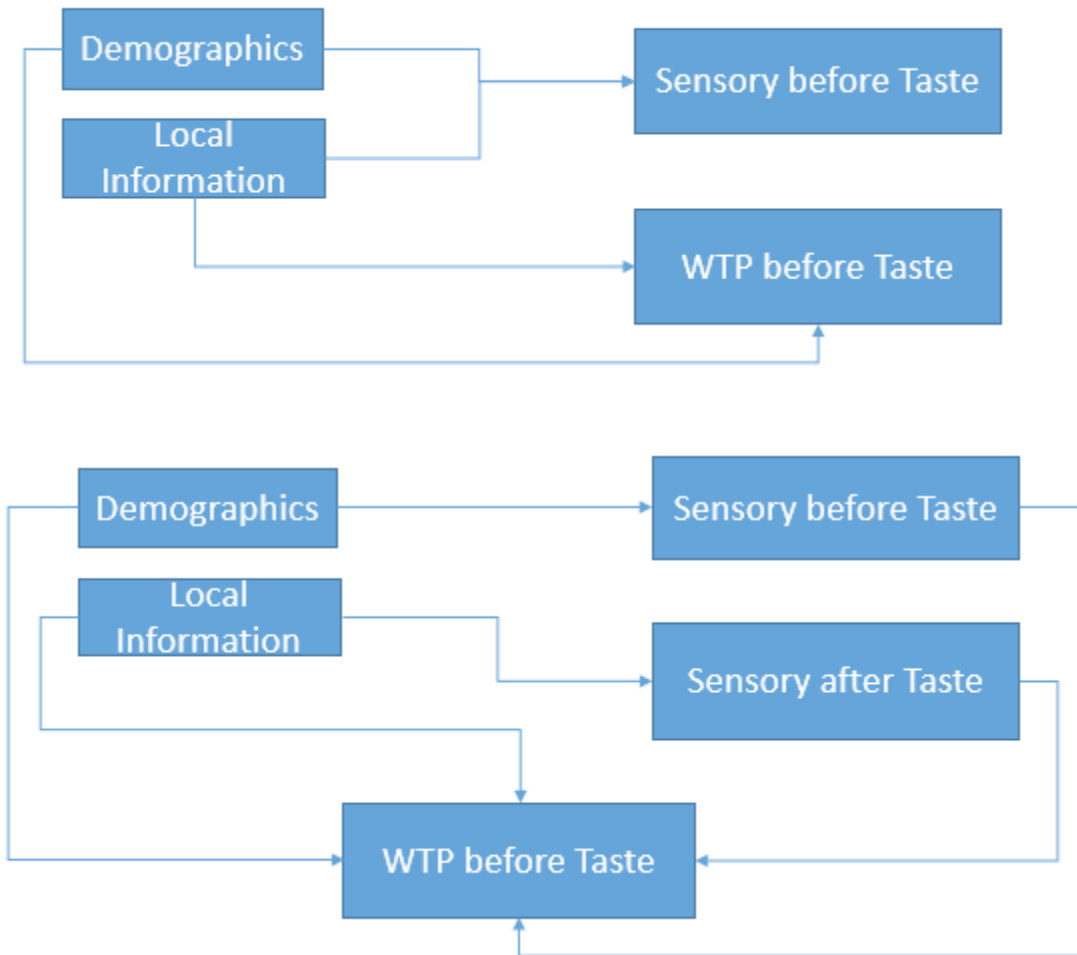
2.3.3 Local definition

To measure their knowledge of local produced information, they were asked to choose the from one statement they agree with most from “Locally produced strawberries are grown using less pesticides.”, “ Locally produced strawberries are much safer.”, “Locally produced strawberries are more nutritious.”, “Locally produced strawberries are environmentally friendly.”, “ Locally produced strawberries are much fresher.”.

2.4 data analysis

Multivariate Tobit model (MV-Tobit model) were combined to examine how the locally produced label affects the consumers’ willingness to pay after controlling the search attributes and experience properties attributes.

Since the search property attributes and experience property attributes on strawberries may related with each other, the potential cross-equation correlation need to be addressed by an equation system in order to obtain efficient results (Barslund, 2009). In first equation, the consumers' willingness to pay before tasting is the dependent variable while the consumers' willingness to pay after tasting is the dependent variable in the second equation. The explanatory variables include search property attributes, local information and demographics characteristics and add property attributes in the second equation.



The empirical model is showed as:

$$Y_{1i} = \beta_0 + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \varepsilon_{1i} \quad (1)$$

$$Y_{2i} = \beta_0 + \beta_{1i}X_{1i} + \beta_{2i}X_{2i} + \beta_{3i}X_{3i} + \varepsilon_{2i} \quad (2)$$

Where $i=1, \dots, 100$, Y_{1i} is consumers' WTP before tasting, Y_{2i} is consumers' WTP after tasting, X_{1i} is search properties and credence properties and demographic factors, X_{2i} is local information which is a dummy variable, X_{3i} is experience properties. The error term vector is assumed to follow multivariate normal distribution:

$$\varepsilon = (\varepsilon_1, \varepsilon_2)' \sim N(0, V)$$

$$0 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, V = \begin{bmatrix} r_1^2 & r_{12} \\ r_{21} & r_2^2 \end{bmatrix} \quad (3)$$

Where V is variance-covariance matrix of error terms. r_{12} and r_{21} are the corresponding cross-equation correlation between equation (1) and (2), and r_1^2 and r_2^2 are the standard deviation of error terms.

The statistical analyses were carried out with STATA. Two general regression models were set up. First one uses the willingness to pay (WTP) before tasting as dependent variables while the search properties such as color, size, uniformity and freshness as independent variables. The second model uses willingness to pay (WTP) after tasting as dependent variables instead and add two more independent variables about the experience properties such as flavor and texture. Information about locally produced was included as dummy variables and demographics factors were included in the model as well.

The model was estimated using maximum simulated likelihood by STATA mvtnb program (Barslund, 2009).

3 Results

3.1 Demographic

We have 100 panelists in the sensory test. 46% of the panelists of the sensory are male while 54% are female. Since the sensory test conducted on campus, 76% of the panelists is from age 18 to 29 while 50% of the participants' annual income is less than \$24999. Only 7% of participants have annual household income above \$100000. For the education, 15% of the panelists have education less than college, 65% panelist have been educated in college and 20% of panelists have postgraduate experience or graduate degree. Most panelists are students who may not main shopper in family or have meal plan on campus, 27% of panelist purchase strawberries at least once per week while 46% of panelists purchase strawberries less than once per week but at least once per month.

For the statement of 'locally produced' strawberries, most panelists agree with the "locally produced" strawberries are much fresher. The mean of last purchase price are \$3.185/ box (16 oz).

3.2 Taste related evaluations

The results show that panelists who know that the strawberries were locally produced had higher rating of color, size, uniformity, freshness and flavor, for color and freshness, those two attributes have significant higher ratings (Figure 2), as well as the overall liking of the strawberries (Figure 3). Their WTP for strawberries as well as the likelihood to purchase were significantly increased than those who didn't had the local information before and after tasting the strawberries (Figure 4). In addition, the likelihood of repurchase the strawberries of the panelists who had the local information were increased than those who didn't have the local information. The results also demonstrate that consumer's purchase likelihood / WTP for the

strawberries decrease significantly after they taste the strawberries for both groups. And their likelihood to repurchase further decreased at the end of the sensory taste (Figure 5).

In the regression model, the independent variables in the first equation includes the search attributes color, size, uniformity and freshness, as well as the demographics factors which include gender, age, annual household income, education level, consumption frequency, local definition and last purchase price. The locally information was added in the equation as a dummy variable. The dependent variable is consumers' WTP before tasting the strawberries. In the second equation, besides all the independent variables which included in the first equation, we add experience attributes variables flavor and texture. The dependent variable becomes WTP after tasting. Regression results show that before the sensory test, age, price of last purchase, freshness and color were the most significant factors that affect consumers' WTP; after tasting the strawberries, price of last purchase, flavor and texture have significant impact on consumers' WTP while all the attributes before the tasting were considered as well (Figure 6).

4 Discussion

In the regression, the "locally produced" variable in the equation system is not significant to influence the consumers' willingness to pay neither before nor after tasting which is different from the results of other papers. The possible reasons for this result are others' conclusions are from a survey but this project gets the data from a sensory test. Panelists may be influenced more on sensory attributes in sensory test than that of online or paper surveys themselves. Besides, for this sensory test which conducted on campus, most of panelists are students which they may not the primary shopper in household, so the results different from other kind of surveys.

These results implies although the two groups of the panelists tasted the same varieties of strawberries, the information about locally produced biased them and they gave higher ratings on most attributes and offered higher consumers' WTP of the locally produced strawberries. For the attributes which determined the consumers' WTP, before getting a chance to taste the strawberries, consumers usually paid more attention on whether the strawberries were fresh or the color of the strawberries satisfied them. They are willing to pay higher price if so. After tasting the strawberries, the flavor and texture became dominant and influenced most on consumers' WTP and the prices they offered were lower than that they offered. The reason might be that the flavor was not as good as they expected after tasting. Combing all the attributes together, the color, flavor and texture were the key factors that determine consumers' choice of fresh strawberries. For growers or retailers, they should pay more attention on fruit quality while focus on local labels.

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Table 1 Demographics of panelists

		Percentage
gender	male	46.00%
	female	54.00%
Age	Under 18	2.00%
	18-29	76.00%
	30-44	13.00%
	45-65	7.00%
	over 65	2.00%
Annual household income	Less than \$14999	30.00%
	\$15,000 - \$24,999	20.00%
	\$25,000 - \$34,999	11.00%
	\$35,000 - \$ 49,999	17.00%
	\$50,000 - \$74,999	5.00%
	\$75,000 - \$99,9999	10.00%
	\$100,000 or above	7.00%
Education level	Less than high school	2.00%
	High School / GED	13.00%
	Some college	30.00%
	2-year college degree	16.00%
	4-year college degree	19.00%
	Postgraduate (MS, PhD, MD, etc)	16.00%
	Doctoral Degree	4.00%
Purchase Frequency	Daily	0.00%
	2-3 times per week	5.00%
	Once per week	12.00%
	2-3 times per month	23.00%
	Once per month	23.00%
	Less than once per month	29.00%
	Never	8.00%
“locally produced” strawberry definition	Grown using less pesticides	11%
	Much safer	3%
	More nutritious	6%
	Environmentally friendly	14%
	Much fresher	66%
		Mean
Price of Last purchase		3.185

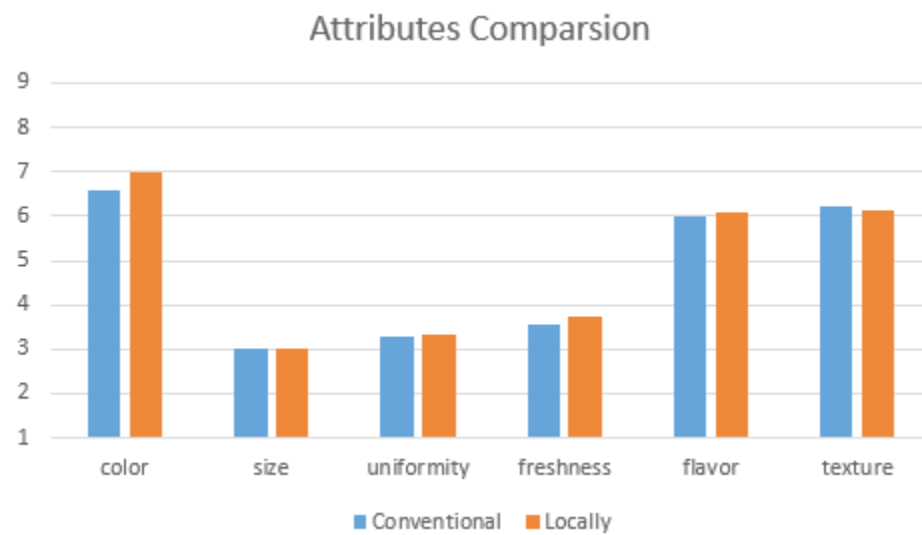


Figure 2 Attributes comparison

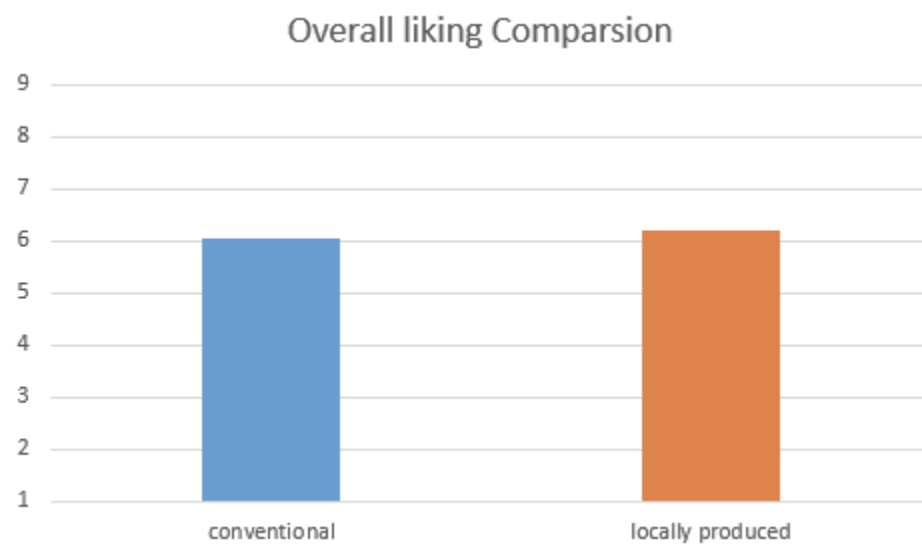


Figure 3 Overall liking Comparison

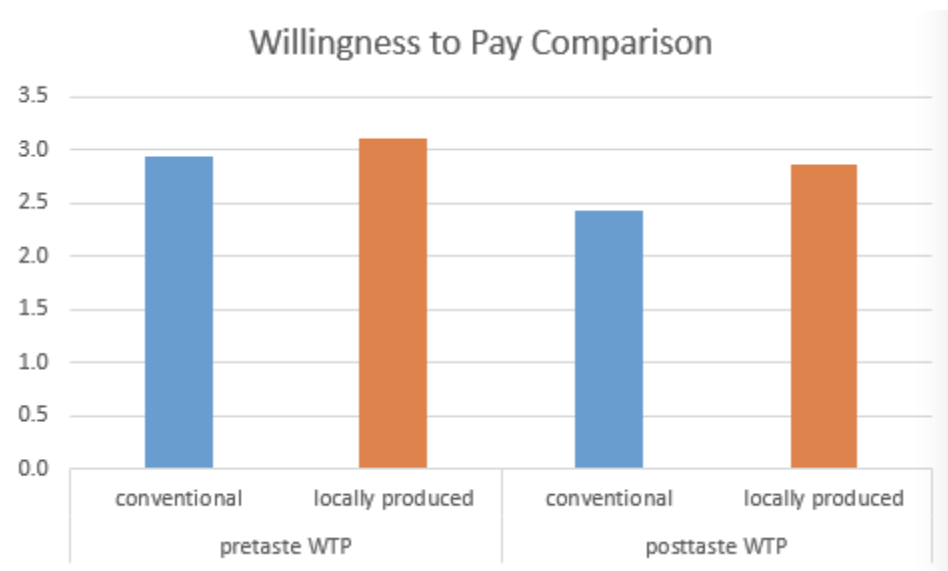


Figure 4 Willingness to Pay Comparison

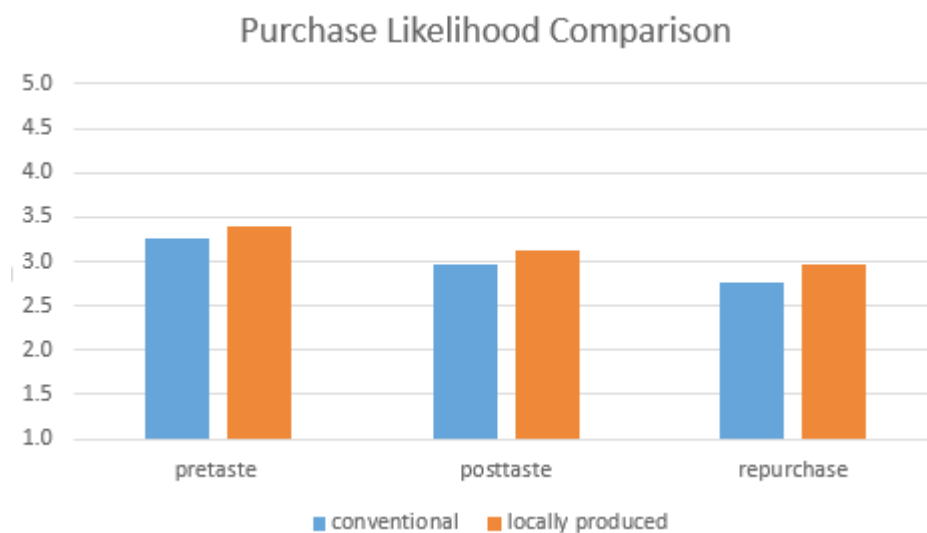


Figure 5 Purchase Likelihood Comparisons

Table 2 Estimation results of consumer willingness to pay on attributes of strawberries

Pre-taste WTP	Coef.	P-Value	Post-taste WTP	Coef.	P-Value
Gender	0.004	0.969	Gender	-0.065	0.489
Age	0.149	0.019	Age	0.0108	0.870
Income	-0.041	0.096	Income	-0.046	0.072
Education	-0.015	0.629	Education	-0.003	0.933
Consumption Frequency	-0.032	0.380	Consumption Frequency	-0.019	0.619
Local Definition	-0.045	0.175	Local Definition	0.035	0.091
Price	0.246	0.000	Price	0.277	0.000
Color	0.085	0.007	Color	-0.005	0.892
Size	0.666	0.290	Size	0.017	0.797
Uniformity	-0.002	0.964	Uniformity	-0.078	0.114
Freshness	0.211	0.000	Freshness	0.083	0.151
Locally	0.075	0.414	Flavor	0.213	0.000
_cons	0.838	0.069	Texture	0.099	0.000
			Locally	0.038	0.696
			_cons	0.274	0.285