Impact of Sensory Quality and Labels on Consumer Preference of Fresh Strawberries

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Abstract: Growth in imports of strawberries, particularly from Mexico, threaten the Florida strawberry industry. To better compete with strawberries from Mexico, the Florida strawberry industry has focused on product differentiation with an emphasis on quality. In this study, we conducted one sensory test combined with experimental auctions to examine the impact of fruit quality and labeling strategies on consumer purchase. Two strawberry varieties, Sweet Sensation and Festival are used in the experiment. Ten samples with different labels under different strawberry varieties were randomly presented to participants. In total 103 panelists participated in sensory test and experimental auction. Results show that without labeling, consumers cannot distinguish different varieties of strawberry. In most cases, labeling varieties does not directly affect consumer preference. This indicates that actions need to be taken to improve consumers’ awareness and recognition of variety labels such as Sweet Sensation.

Key word: Sensory Quality, Labels, Fresh Strawberries, Experiment Auction
Introduction

Strawberry are an important commodity in United States. U.S. per capita strawberry use has generally trended higher over last two decades and the current production forecast supports the outlook for continued growth. The increasing strawberry consumption is due to multiple reasons: consumers have more awareness towards to healthy diet; yield improvements have created an expanded domestic supply and allowance for importing year round availability (USDA-ERS, 2014). California, Florida and Oregon are the top three strawberry states in U.S.. California is producing over 91% of the entire strawberry crop while Florida produces the majority of the domestic winter strawberry. Oregon provides between two and five percent of nation’s strawberries (USDA-NASS, 2015) (FSGA, 2014).

Strawberries grow best in moisture retaining soil and the ideal growing climate for strawberries is where the growing strawberries could be exposed to warm, sunny days and cool nights. In this climate, the sugar and vitamin C of growing strawberries are maximize. Therefore, the quality, flavor and vitamin content of berries depend upon the climate where they are grown. Florida is dominating the market of fresh strawberries during the winter months and is the largest domestic producer for East Coast markets. To compete with increased imports of Mexican strawberries during the same season, Florida Strawberry Grow Association (FSGA) aims to provide consumers fresher, tastier berries and began expanding strawberry industry by researching a relatively new strawberry variety “Florida 127” which was marketed under the “Sensation” brand. According to the Institute of Food & Agricultural Service (IFAS) of the University of Florida, Florida 127 is a promising new cultivar for west- central Florida growers due to its early yield, robust plant habit, excellent fruit size and eating quality (Whitaker, 2014).

Consumer are becoming increasing demanding of fresh fruit quality. Nelson,(1970) objectively defined three type attributes of product quality: search attributes, experience attributes and credence attributes. For fresh produce the search attributes which refer to the appearance attributes of fresh produce, such as freshness, shape, uniformity or color; the experience attributes also could be considered as sensory
attributes, such as sweetness, flavor, texture or juiciness; and the extrinsic attributes which are not directly related to appearance or flavor, such as the impact on organic, locally produced. Credence attributes are often delivered to consumers in the form of information label since those attributes are not likely other attributes such as sensory attributes or appearance attributes which could be perceived directly by consumers. In U.S., using label on food products is a common practice. Like U.S. Department of Agriculture’s (USDA) choice, Organic labels are prominently displayed on the retail packaging for much of fresh produce sold in the U.S.. In recent 2-3 decades, the interest in using labels on food products has dramatically increased and the accumulating evidence that labels are now served as effective tools for both marketing and policy making purposes because of the influences on consumers’ behavior. However, it is unclear how this label would affect consumers’ choice of fresh produce. And if “Fresh from Florida” label does positively affect consumers’ choice, will it still have the same impact after consumers have more information by tasting the fresh produce, therefore, affecting consumers’ repurchase? Answers to these questions may help stakeholders to develop more effective labeling programs as well as product development strategies for fresh produce industry.

The objective of this study is to examine consumers’ attitude toward strawberries, especial the effects of eating quality characteristics on the value consumers place on fresh “Sweet Sensation” strawberry quality. In a market growing as quickly as the strawberry market, it is very critical to understand consumers’ choice of these attributes combination. This information is also valuable for fruit growers since it could help them focus research on quality attributes and make successful in the market place.

**Literature Review**

Usually, food quality could be described as a bundle of characteristics which can be categorized as search attributes, experience attributes and credence attributes. Most previous studies have investigated the relationship between consumers’ purchase preference and food product attributes. Tronstad, Huthoefer, S.
and Monke (1992), Quagrainie (2003) and McCluskey (2007) found search attributes such as size, grade and cultivars are found to be important influences on product prices and demand. Meanwhile, the experience attributes play a key role in determining repeat purchases. Miller (2005) found consumers make their apple purchase decision based on their experience with experience attributes such as flavor and texture. Brennan and Kuri (2002) reported that once consumers are unlikely to change their purchase preference once they develop their preference for a product based on sensory characteristics. Recently, there is an increasing consumers’ concern for food quality and food safety. Therefore, there is a significant market increment in differentiated or high value products consumption. The goal of food consumption is not only to get nutriment but also improve their health over life time. Quality uncertainty are key drive in literature about safety and products liability (Rodríguez, 2006). Akerlof (1970) demonstrated that supplier could determine some product attributes, however, there are still some that consumer cannot test before purchase, and then bad goods tend to drive out good ones. Consumers usually make their purchase decisions depending on their perceived quality expectations. The credence attributes such as safety attributes of food; place or manner of product production; the plant method are all valued according to their subject perception. Some consumers are looking for food products which are healthier or more nutritious products and are willing to pay more for those products. There are lots of studies have already examined the impact of several credence attributes on consumers’ purchase behavior and found the credence attributes have a positive impact on consumers’ attitudes and buying intention towards a product (Erickson, Johansson and Chao, 1984) (Fishbein and Ajzen, 1975).

While lots of research are focused on measuring the impact of search attributes, experience attributes or credence attributes on consumers’ purchase behavior, questions have not been tackled systematically is whether the impact of credence attributes remains the same after consumers have more information on experience attributes by testing the fresh produce and whether credence attributes will affect consumers’ repurchase as well.
Compared with literature, our study examines consumers’ perception of all these attributes on fresh strawberries. Previous studies on fresh produce are mainly focused on consumers’ WTP on credence attributes such as Organic, locally produced or Country of Origin Labeling (COOL) (Poelman 2008, Canavari 2003, Krystallis 2005, Carlos 2008, Darby and Batte, 2006). We apply sensory experiment and experimental auction in our study to link the search attributes, experience attributes and credence attributes together to examine consumers’ preference on the combination of these attributes.

**Experiment Design**

For our study, we combined sensory evaluation and experimental auctions in a unique way. The sensory test and experimental auction were conducted on March 11th, 2015 in the sensory lab of Department of Food Science & Human Nutrition at University of Florida. Two strawberry varieties, Florida127 and Festival were used in the experiments. Because consumers could not distinguish between the two strawberry varieties, we need to use labels to reveal the variety information, which can be referred as variety branding. We consider two variety labels, Sweet Sensation and Sweet Berry. In addition we also consider “Fresh from Florida” labels. In total, we have three levels for strawberry varieties, Sweet Sensation, Sweet Berry, and without any variety labels; and two levels for Fresh from Florida, with and without this label. In total, we have ten combinations of strawberry varieties, “Fresh from Florida” label and variety labels. Table 1 lists all the variety and label combinations used in the sensory and experimental auctions.

Because it is very challenging for one participant to taste ten samples, we divided ten samples into two groups. Each participant will be randomly assigned into one of groups that had five strawberry samples. In total one hundred and five panelists participated the sensory test.
Model

Multivariate Tobit model (MV-Tobit model) were combined to examine 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, variety, “Fresh from Florida” information, label on box and demographics characteristics and add property attributes in the second equation.

The empirical model for taste panel is showed as:

\[ Y_{1i} = \beta_0 + \beta_1 X_{1i} + \varepsilon_i \]  \hspace{1cm} (1)

\[ Y_{2i} = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_2 \]  \hspace{1cm} (2)

Where \( Y_{1i} \) 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 experience factors. The error term vector is assumed to follow multivariate normal distribution:

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

\[ 0 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \quad V = \begin{bmatrix} r_{11} & r_{12} \\ r_{21} & r_{22} \end{bmatrix} \]  \hspace{1cm} (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 \( r_{11} \) and \( r_{22} \) 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, shape, size, uniformity, smell and freshness as independent variables. The second model uses willingness to pay (WTP) after tasting as dependent variables instead and add four more independent variables about the experience properties such as flavor, sweetness, texture and juiciness. Demographics factors were included in the model as well. The model was estimated using maximum simulated likelihood by STATA MvTobit program.

Results

(To Be Continued)
References


