

An Assessment of Consumer Preferences for Strawberry Products

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Abstract

California has exploited its production advantages and marketing efficiency to increase strawberry production at the expense of traditional production areas like Louisiana. Conjoint analysis is used to examine consumer's preferences for selected product attributes of fresh strawberries in Louisiana. Consumers put highest relative importance on brand/origin and, to a lesser degree, price.

Key words: branding, conjoint analysis, consumers' preferences, marketing, origin, strawberry

Introduction

In 2001, about 46,100 acres of strawberries were harvested in the United States. Of that total, Louisiana harvested 387 acres, the industry leader California harvested 26,400 acres, and Florida harvested 6,500 acres. As California production increased, Louisiana production has decreased. Louisiana growers have market channel alternatives through direct markets (fruit and vegetable stands, peddlers, farmers' markets, and pick-your-own) and to a smaller degree through retail grocers. About 20 percent of Louisiana strawberry production is distributed through fruit and vegetable stands, about 15 percent through peddlers, about 15 percent through farmers' markets, about 10 percent of strawberry production is sold through pick-your-own (La. Extension Service estimates). As indicated, these alternatives constitute a large percentage of Louisiana's strawberry markets because the majority of Louisiana growers are low acreage producers. However, in California, direct to consumer sales probably represents only 2 percent of total volume (Cook, 2003). The remaining 98 percent of strawberries are sold directly to large retail buyers, wholesalers, and food service distributors.

Strawberry production costs are high for all producers. Louisiana has an early but relatively short season due to cool winter weather followed by high summer temperatures. The threat of losing certain fumigants affects production cost. Other production technologies and a consistent supply of trained agricultural labor provide another area of advantage for California.

There are several issues in Louisiana's decline in production. *Consolidation at retail* (fewer but larger chain retailers) has benefited California, because that state's industry has the production capability to serve large retailers. In 2000, estimated total fresh produce sales were about \$78 billion, of which retail grocery stores had a market share of about 55%, foodservice channels had about 47% and direct markets had about 2% (Cook, 2003). As large grocery chains have merged, their total supply requirements have increased and they tend to use fewer suppliers. The *dominant channel to the consumer*, for produce as a category and for strawberry, is the retail grocer. Regions of low production are disadvantaged. *Food safety and health issues* are increasingly important to consumers. Nutrition concerns are revealed in the debate about contents of vending machines in public schools, and changes that are occurring in fast-food restaurant menus. These are positive signals for healthy fresh products like strawberries. Overall, retail consolidation, and consumer behaviors and preferences, have made access to some channels more difficult and small volume strawberry production areas have come to rely on direct and local markets as their main options.

Consumer preferences for strawberries in the local market area have not been identified. The objective of this study is to identify preferences for selected strawberry attributes (characteristics) by consumers' demographics, and by purchasing behavior. The characteristics included are brand/origin, price, pesticide strategy and kind of retail container. The study includes analysis of demographic and lifestyle factors that influence the decisions about source of and preferences for strawberries.

Literature Review

Previous Studies Focusing on Consumer Preferences

Little work has been done before regarding identification of consumer preferences for fresh strawberries. There was, however, a body of research that addressed consumer preferences for fresh produce items and for ornamental plant products. These studies addressed objectives similar to those defined for this work. The studies were stimulated by concern about loss of access to regional and/or national wholesale markets, and subsequent reliance on direct markets. Topics of these research works included consumer preferences for fresh produce and products of garden centers at local superstores, consumer attitudes regarding the value of identification logos on fresh produce, and consumer preferences for items grown in-state compared to that grown out-of-state.

Variables representing pesticide usage and assurance of regulatory compliance were the focus of a nationwide study on consumer preferences for apples (Baker, 1999). Previous research indicated that price and quality characteristics (including size, color, and the absence of physical damage) were the factors most commonly mentioned by consumers as influencing their purchase decisions. Respondents placed the most importance on pesticide policy. Relative importance was placed on price, damage, and certification program.

Investigation into whether state logos, an identifying symbol used for advertising on a product package, affected the consumer's decision to purchase selected food products was the subject of research (Brooker and Eastwood, 1989). This study focused on the potential for enhanced sales of locally generated products, fresh or processed, in local retail stores. The researchers' questionnaire addressed consumer preferences on a number of topics for fresh local products, including preferences about buying local products and logos to identify local produce.

The results showed that about 93 percent of the respondents felt that a logo should be used to identify locally grown produce. About 89 percent would like information on the origin of produce sold in supermarkets. But, about 95 percent said a supermarket would be helpful if it identified locally grown produce

This study aims to identify those fresh strawberry attributes consumers place importance on so that better marketing decisions can be made to benefit the local industry.

Conjoint Analysis

Conjoint analysis is used in marketing research to estimate the relative importance of a product's attributes with buyers' or consumers' total utility for those attributes (Harrison et. al, 2001). CA was developed as a measurement technique from the mathematical psychology and psychometric fields to establish the relative importance of a product's multidimensional attributes (Green and Wind, 1975). Conjoint measurement refers to any decompositional method used to approximate the organization of consumer evaluations of predetermined combinations of product attributes (Green and Srinivasan, 1978).

Preferences to specific product profiles are given when respondents assign values to the particular levels of determinant attributes. These values are called the subject's part worth utilities for the levels of each attribute of a product. It is assumed that consumers evaluate a product by combining these part-worth utilities using a decision model (Louviere, 1988).

The combination of individual or part worth utility values for each attribute or the product is determined from the respondent's total utility for that product. The part worth utility estimates can be combined for any combination of attributes so that the total utility for a wide range of products can be determined. In addition the part worth estimates can be used as a

method to fragment the market (Green and Srinivasan, 1978). Then individuals with similar estimates can be clustered together to identify variations in characteristics.

$$[1] \quad U_j = f(X_{1j}, X_{2j}, \dots, X_{nj}; Z_1, Z_2, \dots, Z_n; \Theta_n) + e$$

In equation 1, the general form of the individual utility equation is illustrated, U_j = represents the utility an individual acquires from product j , X_{ij} represents the i th attribute level for product j , Z_i represents the socioeconomic profile for each individual ($i = 1, \dots, N$), Θ_n represents a vector of parameter estimates for each attribute level, and e is an error term. The variables X and Z are main effect variables for product attributes and individuals' profiles, respectively.

Methodology

Attribute Selection

Four factors (attributes) were chosen to represent the strawberry product and each had more than one level. The four factors and their levels were:

- Container – clear plastic clamshell and the traditional plastic basket. The new clear plastic clamshell provides better protection and a better appearance compared to the traditional plastic basket.
- Pesticide strategy – conventional application strategy and reduced pesticide strategy. Food safety and health issues are becoming more important to consumers. Pesticide residue is one of these issues. Conventionally, pesticides are applied on a predetermined schedule that is expected to control most insect or disease problems. In the alternative strategy, farmers apply pesticides only when problems are observed or anticipated.
- Price per pint - \$1.99, \$2.49, and \$2.99. A representative base price of \$1.99 was increased by 25 and 50 percent, to reflect respondent's reaction to price changes.

- Origin/brand – The two best-known states, California and Florida, were included with Louisiana. California private company brand or label, Florida private company brand or label, and a ‘Louisiana produced’ strawberry indicated by a sticker or logo. Origin and brand carry images that customers relate to, through implications of overall quality.

Conjoint Design

A software package was used to create 11 hypothetical product profiles including two holdout samples from the selected attributes (Bretton Clark, 1988). A total of 36 distinct product profiles were created. This number resulted from the 2 products having 2 levels and 2 products having 3 levels each ($2 \times 2 \times 3 \times 3 = 36$).

This study used the full profile approach to generate the most efficient statistical design. Statistical procedures allow all the model’s parameters to be estimated with ratings of nine selected profiles, an acceptable rating task for respondents. For validation of the model, two holdout profiles were also rated. The predictive ability of the model is measured by evaluating the estimated utility to the reported utility for the products in the holdout samples (Acito and Jain, 1980). A measure of predictive ability is usually given by Pearson’s correlation coefficient, which is indicated by calculating the predicted preferences with the actual preference scores of the holdout sample (Baker and Crosbie, 1993).

The advantages in utilizing the full-profile approach in data collections are as follows:

1. The description of the concepts is more realistic since all aspects of the data collection are considered at the same time.
2. The concept evaluation task can employ either a rating or ranking scale.
3. The respondents make fewer judgments than in the case of the two-attribute trade-off approach (Green and Tull, 1978).

Survey Administration

Surveys were mailed to 2,000 randomly selected individuals from Louisiana, Mississippi, and Alabama. The names and addresses of households were purchased from a commercial source with access to national databases. Responses were received from 401 (20.05%) individuals. Only 309 returned a completed questionnaire for a 15.45% useable response rate.

The survey packet included a cover letter, the survey, and a postage-paid return envelope. The cover letter included a brief reasoning for the study and a confidentiality statement. The survey asked recipients to let the survey be completed by the member of the household who makes most of the purchasing decisions regarding fruit and vegetables for home use. Follow-up postcards were mailed approximately two weeks after the original mailings. A second survey packet was sent two weeks following the follow-up postcard. This packet included the same material as the first packet except a new cover letter was sent reminding recipients of the importance of the survey material.

The questionnaire was divided into six sections. The first section was based on how often fresh strawberries were consumed and purchased. The second section asked for percentage of fresh strawberries purchased from local or direct markets. The third section asked about the origin of individual consumer's strawberries. The fourth section was a conjoint analysis section on rating strawberry products. The fifth section was a willingness-to-pay section. The sixth section asked about consumer's demographics.

The conjoint section of the questionnaire was a two-page design that contained 11 hypothetical strawberry products based on fractional factorial design. Respondents were asked to rate the strawberry products based on their preferences toward that product. The instructions required respondents to rate each of 11 products using a scale from 1 to 7 where 1 was the

product definitely liked the least and 7 was the product definitely liked the best. Respondents were told that if two products had the same overall appeal, then they could rate them the same. They also didn't have to use all the numbers in the 1 to 7 rating scale. The products differed in terms of the factors listed above.

The last section collected information regarding demographic and socioeconomic factors. Questions were related to household, age, gender, racial/ethnic background, education level, employment status, and household income.

Model Specification

The model was specified as:

$$[2] \quad W_i = B_{i1} + B_{i2} \text{ Plastic} + B_{i3} \text{ Clamshell} + B_{i4} \text{ Conventional} + B_{i5} \text{ Reduced} + B_{i6} \text{ Price} + B_{i7} \text{ Brand} + e_i$$

Equation 2 is the specific equation estimated for individual utility. W is the preference level for the i th individual; B_{i1} is the intercept; Plastic is the traditional plastic basket; Clamshell is the clear plastic clamshell design; Conventional is the conventional control strategy, pesticides are applied on a regular schedule that is expected to control most insect or disease problems; Reduced is in a reduced use control strategy, in some portions of the growing season farmers may apply pesticides only when problems are observed or anticipated; Price is price per pound - \$2.99, \$2.49, or \$1.99; Brand is California private company brand or label, Florida private company brand or label, or a sticker or logo indicating 'Louisiana produced' strawberries.

Results

Table 1 shows the demographic characteristics of the household survey. Comparative results were obtained from the United States Census Bureau.

A relatively high proportion of the respondents, almost 2/3, were female. For comparison, the average female percentages in Alabama, Mississippi, and Louisiana were 52%.

Most respondents had attended some college, and more than 40% had a bachelor or higher degree. State population averages in Alabama, Mississippi, and Louisiana were 30, 22 and 20%, respectively, who had attended some college, and 21, 12, and 12% respectively who had a BS or higher degree. Average age of respondents was about 50 years, compared to average ages in Alabama, Mississippi, and Louisiana of 36, 34, and 34, respectively (those under 21 were excluded when the mailing list was created, so a higher average age was expected). Over half of the respondents (53%) were employed full time. State averages for Alabama, Mississippi, and Louisiana were 56%, 54%, and 55% respectively. About 37% of the respondents had annual incomes below \$40,000, and another 26 % were in the range of \$40,000 to \$59,999, which is substantially higher than the state household averages for Alabama (\$34,135), Mississippi (\$31,330) and Louisiana (\$32,566). Couples with no children at home were the leading type of household. Households with children less than 20 years of age accounted for 29% of respondents. About 36%, 40%, and 39% of Alabama, Mississippi, and Louisiana households, respectively, had children less than 18 years old living at home. An overwhelming number of respondents were Caucasians. Alabama, Mississippi, and Louisiana had white populations of 71, 61, and 64%, respectively (Table 1).

A description of consumer habits concerning strawberry consumption is presented next. Results indicated that during the Louisiana season, 82 percent of the respondents ate fresh strawberries at least occasionally, about 64 percent of respondents purchased fresh strawberries in grocery stores, and 36 percent purchased fresh strawberries from direct markets. These results were consistent with our expectations that most households would purchase in grocery stores. The results also document the importance of direct markets to Louisiana growers.

As mentioned earlier, estimation of the importance of retail strawberry product attributes and the influence of demographic characteristics on respondents' preferences were done with Conjoint Analysis (CA). Estimates for the part-worth values were obtained using SPSS. Analysis of respondents' ratings showed that the attribute origin ('Louisiana produced' logo) was highest in relative importance with a value of 56.11. According to standard interpretations from CA, this value is the percentage that origin part-worths contribute to the sum of all factors' part-worths. Since it is a percentage, it can be considered as the relative importance of each factor in explaining respondent ratings. In order of importance, origin was highest, followed by price, container, and pesticide strategy (Table 2).

Pearson's R was used to measure the goodness of fit. The average Pearson's R for the models was 0.998 indicating a good fit. In addition, the average part-worth estimates all had the expected sign. Clamshell container, Louisiana produced, Pesticide strategy as needed, and low price (\$1.99) all had positive signs.

In table 3, CA results are compared across household income levels. Origin/brand was expected to have more value in the higher income categories, price was expected to be relatively more important at lower income levels, price's importance was expected to decrease as income increases, and higher income consumers were expected to be more concerned about safety issues, such as pesticide residues.

Compared to the overall model, price was relatively more important than origin/brand for the bottom income level (Table 3). The expected relationships were found for origin/brand and price in the remaining income categories. The relative importance of origin/brand increased with income (from about 33 to about 57, but decreased a bit when the highest category was reached). For price, importance decreased (from about 42 for the lowest category to between 20 and 30 in

the higher categories). The importance of pesticide strategy was lowest for the middle income category, and tended to be higher for both the lower and the higher income categories.

Kind of pesticide strategy was expected to be more important in these ratings for households with children (due to concerns of susceptibility by children), price was expected to be more important for households with children, and there was no particular expectation regarding origin/brand.

Origin/brand was higher for couples with no children at home (63), and lower for singles and those with small children (Table 4). Price was most important to couples with young children at home (about 37), while the other household types were similar in regard to price. Type of container was most important for households with no children (about 24). Single respondents and single with children indicated more concern regarding pesticide strategy than did the other household categories.

It was expected that respondents with more education would be more aware of and concerned with food safety issues so that pesticide strategy would be more important to their ratings, the association between higher income and educational attainment was expected to lead to similar results for both income and education. There were differences between groups, as origin/brand was less important to the ratings for the B.S. and higher category (about 52 to about 57) (Table 5), and pesticide strategy was more important (7 to 13). Overall, for these respondents, ratings across categories seemed more similar compared to the other demographic categories.

A large majority of the respondents were Caucasian (white), so CA results for nonwhites were based on few observations. Average incomes for the white population usually are higher, so results for white respondents would be expected to be similar to those of higher income

categories, and vice versa. As expected, white respondents placed higher importance on origin/brand (Table 6) (about 56 to about 40) and less on price (about 25 compared to about 33). Non-whites placed more importance on container than whites.

CA results are compared between two employment categories. Employed households were expected to have higher incomes than the 'other' categories. However, there was a diverse set of respondents in the other category, so the relationships were ambiguous. Overall, price was expected to be less important for respondents in the workforce, while the value of origin/brand might have been higher. However, outcomes were just the opposite (Table 7). Origin/brand was less important for the 'employed' categories (52 to 59) but price and pesticide strategy were more important (28 compared to 20, and 11 to 8, respectively).

There were no particular expectations concerning age's impact on the importance of the ratings. Origin/brand was more important in explaining ratings as age group increased, while it decreased for both price and for kind of pesticide strategy (Table 8).

Women were expected to be more interested in origin/brand, less sensitive to price, and more concerned about food safety. Origin/brand was important in explaining women's ratings (Table 9). For men, price influenced ratings, but pesticide strategy did not.

Respondents also reported their purchase behavior in terms of whether a majority of fresh strawberry purchases were made at retail grocery stores. Understanding these consumers' preferences is important for marketing strawberry products in retail grocery stores. Origin/brand and container were expected to be important to supermarket shoppers. Price was expected to be more important for these respondents, and there was no expected effect for kind of pesticide strategy. Origin/brand and price had similar relative importance for consumers who shopped at retail grocery stores (about 40 and about 33) (Table 10). Compared to overall conjoint results,

type of container was similar and kind of pesticide strategy had higher importance for these respondents.

There were no expectations about which factors would be more important to ratings by differences in frequency of purchase. Origin/brand was most important to the ratings and increased with frequency. Price followed in importance but declined with frequency (Table 11).

Discussion

Conjoint analysis was used to estimate the tradeoffs between attributes of strawberry products. Households rated fresh strawberry products that varied based on levels of four attributes: container, pesticide strategy, price, and brand.

The most preferred strawberry product was in the clamshell container, had a 'Louisiana produced logo', pesticide protection was applied as needed, and at the lowest price level. The least preferred strawberry product was in the traditional plastic basket, carried a major California label, pesticide use was on a planned application schedule, and was priced at the highest price level.

Households' ratings indicated (i) that brand/origin was the strongest impact on preferences and could be a selling point for local producers, and (ii) the pesticide strategy factor was less important to the ratings than expected when placed in the context of tradeoffs with other factors. In addition, the proportion of sales through both retail and direct was strong, with about 64 percent of respondents purchasing in grocery stores and 36 percent purchasing through direct markets. It was noted earlier that most consumers get produce items at grocery stores. A relatively low share of Louisiana production goes through the retail channel. Growers should work to make the product more accessible at grocery stores.

Local production is important to consumers and can be documented with a sticker, but applying that sticker is the grower's choice. A non-product specific logo sticker is available through the state Department of Agriculture, but is not widely used even though that could enhance sales in retail markets. Grocery store managers and growers might increase sales further by working together to make sure that products are available for sale. Given that price was not as important relative to brand, then it need not be the dominant point of competition. In addition, it seems important that food safety continue to be a marketing tool though results suggested it was not as valuable as branding, price, or container. These results may raise some interesting questions for produce marketers, particularly for strawberry promotions, in Louisiana. Are the consumers provided with the specific attributes that they showed preferences toward in this research? Can these attributes be combined in such a way that consumers are satisfied with their purchases?

Additional research could focus on consumer psychographic mindsets and lifestyle characteristics as a marketing tool. The VALS (Values and Life Styles) measurement approach (Kahle and Timmer, 1983) is one procedure to categorize consumers for marketing program purposes. In addition, it would be interesting to compare results obtained in this study to markets in California and Florida.

Table 1. Demographic Characteristics of Survey Respondents, Louisiana, Mississippi and Alabama, 2004.

	Question	Responses (%)
Respondent's Gender	Male	36
	Female	64
Educational Level	Less than high school	2
	High school graduate or GED	22
	Some college	34
	Bachelor's degree	16
	Some graduate study	6
	Advanced degree	19
Employment Status	Still in school	1
	Employed part-time	7
	Employed full-time	53
	Unemployed	5
	Retired	24
	Other	10
Household Characteristics	Single	21
	Single with children	6
	Couple (no children)	16
	Couple (children aged 13 to 20)	14
	Couple (children aged 0 to 12)	15
	Couple (no children at home)	23
	Other	5
	Household Income	Less than \$20,000
	\$20,000-\$39,999	23
	\$40,000-\$59,999	26
	\$60,000-\$79,999	11
	\$80,000-\$99,999	12
	\$100,000 or more	14

Table 2. Conjoint Analysis Results, All Respondents

Factor	Relative Importance
Container	12.09
Origin/brand	56.11
Pesticide strategy	7.09
Price per unit	24.71

Table 3. Conjoint Analysis Results by Demographics: Household Income

Factor	Relative Importance				
	Less than <u>\$20,000</u>	\$20,000 to <u>\$39,999</u>	\$40,000 to <u>\$59,999</u>	\$60,000 to <u>\$99,999</u>	More than <u>\$100,000</u>
Container	7.14	16.27	10.98	9.54	10.26
Origin/brand	33.33	49.08	56.60	57.26	45.96
Pesticide strategy	17.35	12.07	5.90	12.35	15.60
Price per unit	42.18	22.57	26.52	20.85	28.18

Table 4. Conjoint Analysis Results by Demographics: Household Composition

Factor	Relative Importance		
	Couple, children aged <u>0 to 12 at home</u>	Couple, children aged <u>13 to 20 at home</u>	Couple, no <u>children at home</u>
Container	9.42	11.66	4.60
Origin/brand	45.98	54.84	62.97
Pesticide strategy	7.16	11.49	9.83
Price per unit	37.44	22.00	22.59

Factor	Relative Importance		
	<u>Couple, no children</u>	<u>Single, with children</u>	<u>Single</u>
Container	23.81	11.66	12.37
Origin/brand	55.24	54.84	48.08
Pesticide strategy	1.90	11.49	17.94
Price per unit	19.05	22.00	21.60

Table 5. Conjoint Analysis Results by Demographics: Education

Factor	Relative Importance	
	<u>Some college credit or lower</u>	<u>B.S. degree or more</u>
Container	10.84	9.33
Origin/brand	56.66	51.72
Pesticide strategy	7.07	12.58
Price per unit	25.44	26.38

Table 6. Conjoint Analysis Results by Demographics: Race

Factor	Relative Importance	
	<u>Caucasians</u>	<u>Non-Caucasians</u>
Container	9.03	19.29
Origin/brand	55.85	39.76
Pesticide strategy	9.93	8.31
Price per unit	25.19	32.64

Table 7. Conjoint Analysis Results by Demographics: Employment

Factor	Relative Importance	
	<u>Full-time and part-time</u>	<i>Other categories</i>
Container	8.71	13.63
Origin/brand	52.03	59.11
Pesticide strategy	10.76	7.50
Price	28.50	19.75

Table 8. Conjoint Analysis Results by Demographics: Age

Factor	Relative Importance		
	Under 40	40 to 60	Greater than 60
Container	9.18	9.80	12.36
Origin/brand	48.07	52.06	63.63
Pesticide strategy	14.01	10.39	4.56
Price per unit	28.74	27.75	19.45

Table 9. Conjoint Analysis Results by Demographics: Gender

Factor	Relative Importance	
	<u>Females</u>	<u>Males</u>
Container	10.85	8.19
Origin/brand	51.17	59.60
Pesticide strategy	14.13	1.88
Price per unit	23.84	30.34

Table 10. Conjoint Analysis Results when most Strawberries were Purchased through Grocery Stores.

Factor	Relative Importance
Container	13.74
Origin/brand	39.97
Pesticide strategy	13.61
Price per unit	32.69

Table 11. Conjoint Analysis Results by Frequency of Strawberry Purchase during the Louisiana Season.

Factor	Relative Importance	
	<u>Every two weeks or less</u>	<u>Weekly or more</u>
Container	10.06	9.10
Origin/brand	47.99	62.53
Pesticide strategy	11.05	12.27
Price per unit	30.90	16.09

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