Consumer and Food Industry Acceptance of a New Green Bean

by

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Abstract

The perceptions of food shoppers, produce managers in supermarkets, and wholesale produce buyers were examined with respect to acceptance of a fresh green bean that is slightly darker in color than the current leading cultivar. In-store interviews with shoppers revealed that retail shoppers are not biased for or against the darker color bean. The produce department managers and wholesale buyers indicated a willingness to handle the darker bean if shown evidence that consumers would purchase them. Analysis of variance was used to search for an acceptability or preference pattern associated with various socioeconomic factors.

Introduction

Recent trends in the production of green beans in Tennessee reflect changing food consumption patterns in the United States. That is, people are consuming more fresh vegetables while decreasing their consumption of canned vegetables [*Agricultural Statistics: 1989*]. Tennessee's snap bean acreage harvested for processing was reported to be 5,200 in 1989, a 57 percent reduction from the 12,100 acres in 1980 [*Tennessee Agricultural Statistics*]. Acreage statistics on fresh green beans are not maintained by state or federal market-news agencies. However, Tennessee's vegetable specialist with the Agricultural Extension Service estimated fresh-market acreage to be in the range of four to five thousand acres in 1991, which is about 50 percent of total green

bean acreage in the state [Rutledge]. This represents a dramatic shift from the years prior to 1980 when the fresh market acreage was less than five percent of the state's total green bean acreage.

The data suggest that during the past decade there has been a structural adjustment within the green bean industry of Tennessee. Prior to this time Tennessee's green bean industry was processing-oriented. However, during the 1980s growers increased fresh market acreage and reduced processing market acreage in response to reductions in canning volumes at in-state processing plants and to consumer demand.

The dominant color of green beans produced for the fresh market in this region is light- to medium-green. However, new cultivars described as dark-green in color have some desirable features. While a major seed company has introduced dark-green beans to the industry, growers have been hesitant to plant the new cultivars because of wholesaler/broker resistance to carrying these darker beans [Baker]. Some of the wholesalers/brokers reportedly had indicated that they did not believe consumers would accept dark-green beans as an acceptable substitute to the traditional, standard colored, lighter-green beans. Consumers were not given the opportunity to choose among the varieties in the marketplace. This circular situation and reluctance to handle a new variety could be addressed through information gathered from surveys of buyers and sellers beyond the farm gate.

Objective

The project was designed to interview consumers and agribusinessmen involved in the fresh green bean marketing system. This entailed three principle groups: wholesalers/brokers, supermarket produce managers, and retail food shoppers. Interviewees from each group were asked to compare two samples of green beans having identical quality. The only visual difference between the two samples of green beans was the shade of green. The purpose of the interviews was to gather information about the attitudes and opinions of these participants regarding their openness to a new cultivar of fresh green beans.

Procedure

Personal interviews were conducted with retail shoppers, produce department managers, and produce wholesalers. A separate questionnaire was developed for each group. This was done to accommodate different roles in the distribution system. For convenience and cost efficiency, the study was limited to Knoxville, Tennessee. However, Knox County is often used as a test market by national firms because of its "representativeness" [Sales and Marketing Management].

Retail Shopper Survey

The major survey effort involved shoppers in four supermarkets, two in North Knoxville and two in West Knoxville. The two stores in North Knoxville were located in lower income neighborhoods, and the two in West Knoxville were in higher income neighborhoods. Interviews were conducted on Friday and Saturday, roughly from noon till 8:00 P.M., for two consecutive weeks, July 12-13 and 19-20. The hours and days selected were reported as the busiest times for the stores. This facilitated the completion of numerous interviews within a brief, cost efficient time period.

Within each produce department, an exhibit was designed to place the interviewer in a strategic location to stop shoppers and ask them to examine the samples of green beans and to answer questions about the beans. The samples of green beans were displayed in a styrofoam cooler that was set on a card table within the produce department. The styrofoam container provided an ideal white background for the green bean samples. The interviewer in each retail store arranged the display of Strike and Labrador beans so that the two samples appeared identical, except for the perceptible, but slight, variation in color. All of the broken and immature beans were removed.

Interviewers were trained to avoid bias in selection of interviewees and in the manner in which questions were asked. Altogether, 691 interviews were conducted. In addition to asking which green bean was preferred, there were several attitudinal questions about green beans, and

some background information was also gathered. These questions were designed to permit statistical analyses of relationships between attitudes and respondents' characteristics.

Produce Department Manager Survey

Because of their daily contact with food shoppers, personal interviews were conducted with supermarket produce managers from five different chains. As with the retail shoppers, the produce department managers were shown the two samples of green beans and asked several questions about their perceptions and/or opinions of the beans. The key question dealt with their opinions regarding customers' preferences about light- versus dark-green beans.

Wholesaler/Broker Survey

All of the wholesalers located in the produce warehouse district of Knoxville that handle green beans were interviewed. This involved only five wholesalers located along Forest Avenue. These wholesalers were asked which of the two samples of green beans they thought their customers would prefer and to explain why. A few other questions regarding the sources of green beans they handled and varietal preferences were also covered.

Source and Quality of Green Beans

The green beans were grown at the Plateau Experiment Station. Two cultivars were provided for the interviews. The light-green bean was represented by Strike, the leading fresh green bean cultivar available from the Asgrow Seed Company. The dark-green bean produced for this study was Labrador. The first beans were picked on July 8 and delivered to refrigerated coolers in the food technology building on the UTK agricultural campus on the 9th and 10th of July.[1] These beans were inspected by a Federal Produce Inspector on the 11th and 19th of July.[2] The second supply of beans was picked on the 17th, delivered to the agricultural campus on the 18th, and inspected on the 19th. The primary purpose of the inspection activity was to determine if the quality of the two cultivars was comparable. Information was also gained about shelf-life by examining the beans 3 and 11 days after harvest.

The inspection of the green beans resulted in the supplies of both cultivars, Strike and Labrador, being certified as U.S. No. 1. The cultivars were similar in size, generally ranging from 4.5 to 7 inches with most being 5 to 6.5 inches in length. Defects included broken ends and immature beans. The average percentage of defects was estimated at three percent for both cultivars.

The second week's supply of beans was graded on the 19th. Each cultivar was certified U.S. No 1. The average percentage of defects remained at three percent for Strike, but increased slightly to five percent for Labrador. Bean size generally ranged from 3.5 to 6.5 percent, and most were 4.5 to 6 inches in length. While the average size was slightly smaller than with the first lot, there was no identifiable difference in the average length of beans between cultivars.

The first lot of beans was also examined after 11 days to determine possible differences in storage life. Both Strike and Labrador were still high enough in quality to be considered U.S. No 1. Both cultivars were full, firm, and in good condition. The only noticeable defect was slight mottling marks on the light-green beans. These marks were minor, yet visible. The dark-green beans did not appear to have any defects attributable to storage.

Results

Retail Food Shoppers

Characteristics of Shoppers

A total of 691 interviews were completed. Three-quarters of those interviewed were women, and nearly all (92.4%) were white. Relatively few shoppers were under the age of 25. The sample was rather evenly distributed among the age groups for those 25 and older. There were very few students (3.0%) and unemployed persons (0.8%) represented. Over half of all respondents (54.1%) were gainfully employed with the largest employment group being the sales and clerical

occupations (31.7%). Most of the shoppers were from two person households (36.5%). Just over three-fourths (75.6%) were from one to three person households. The sample contained fairly well educated respondents, with over 40 percent finishing college and over 30 percent having completed high school. Of those who answered the income question, one-fourth were from households with incomes under $20,000, and 44.1 percent were from households having incomes in excess of $40,000. The number of respondents was fairly evenly distributed across the stores. As expected, respondents from two of the supermarkets had significantly lower incomes than interviewees from the other two stores.

These observations suggest that a fairly representative sample of food shoppers patronizing suburban supermarkets in the area was obtained. Respondents were mostly working women from households with one to three members. The distribution of education levels is consistent with the distributions of income and occupations. Few interviewees were unemployed, respondents tended to hold higher status jobs, and most were from households in the higher income categories. These characteristics are consistent with nationwide surveys that indicate fresh produce shoppers tend to come from higher income, middle aged households [The Food Institute Report].

Preferences of Shoppers

The crucial question from an acceptance perspective is the distribution of responses to the survey question asking which green bean was preferred, the dark or the light. Overall there was a slight preference for light- over dark-green beans, as 52.2 percent of the respondents who answered the question chose the light-green beans. Interpretation of the results can be enhanced through relating the distribution of responses to the preference question to the response patterns of other attitudinal questions. Chi square tests were used to draw these inferences and are presented in Table 1.

Although the respondents were food shoppers in the produce department, it was not necessary that they purchased green beans. Consequently, it is informative to know if the color selection might be related to respondents' purchasing decisions. Whether the shoppers purchased green beans responses were found to be independent of the color preferences. That is, there was no tendency for purchasing decision responses to vary systematically with those for color choice (Table 1). Similarly, frequency of purchase was found to be independent of the color preferences. An implication is that the color selection was not associated with a particular green bean purchase pattern.

Reasons for buying were compared to color preference choice, and the statistical tests led to inferences that none of the reasons was related to the green bean color choice. A similar set of conclusions arose for the responses to the criteria for selecting green beans relative to the color choice. All of the determinants of choice were independent of the color-choice responses except for firmness. The latter test suggested that respondents who preferred the light green beans tended to use firmness as a criterion. Perhaps, they felt lighter green beans were less mature and therefore more firm. The independence of the reasons with respect to color is an indication that color is a separate element, unrelated to the more frequently cited criteria used to select fresh produce.

Altogether, these statistical tests suggest that consumers as a whole do not a have a strong predisposition to favor either color of green bean. The lack of an association between color as a selection criteria and color choice indicates that color is not an overriding consideration. Rather, it is only one criterion. Given that both types of beans were certified as top quality, this result can be interpreted as neither the light nor the dark beans' color is a dominant concern.

The color choice responses were also compared to the socioeconomic measures included in the survey. Most of these were found to be statistically independent (Table 2). That is, the distributions of responses to the questions about shopper occupation, sex, race, age of the respondent, and size of the household were unrelated to the color choice. Respondents who graduated from college tended to choose the dark green beans. Retired, unemployed, and student respondents

Table 1. Comparison of Responses Regarding Green Bean Color Preference to Selected Purchase Factors, Survey of 691 Supermarket Shoppers, Knoxville, TN, July, 1991

Item		Which green bean do you prefer? Dark	Light	Chi-Square
		--- *number*[a] ---		
Do you buy fresh green beans?	Yes	233	261	
	No	78	81	0.2
Frequency of green bean purchases?	Weekly	64	62	
	Bi-weekly	55	64	
	Monthly	47	49	
	Occasionally	68	84	1.2
Reason for buying green beans?[b]				
Nutrition	- Most important[c]	66	67	
	- Other rankings[d]	247	275	0.2
Taste	- Most important	125	149	
	- Other rankings	188	193	0.9
Variety	- Most important	33	35	
	- Other rankings	280	307	0.02
Criteria used in purchase decision?[e]				
Price	- Most important	34	48	
	- Other rankings	279	294	1.5
Color	- Most important	100	92	
	- Other rankings	213	250	2.0
Feel	- Most important	47	59	
	- Other rankings	266	283	0.6
Blemishes	- Most important	39	44	
	- Other rankings	274	298	0.02
Reason for choosing dark or light?[f]				
Size	- Most important	19	32	
	- Other rankings	294	310	2.5
Color	- Most important	78	102	
	- Other rankings	235	240	2.0
Firmness	- Most important	10	29	
	- Other rankings	303	313	8.2*
Freshness	- Most important	15	19	
	- Other rankings	298	323	0.2

[a]Totals vary because of differences in the number of respondents to each question.
[b]"Habit" not included because only 10 respondents ranked it as most important.
[c]Means that among the possible choices in an ordinal ranking system, this factor was ranked first.
[d]Number of times this factor given a rank other than first.
[e]Aroma not included because only 9 respondents ranked it as most important.
[f]Shape, blemishes,and aroma excluded because of the small number of times ranked first.
*Significant at .05 level.

Table 2. Comparison of responses regarding green bean color preference to selected socioeconomic measures, survey of 691 supermarket shoppers, Knoxville, TN, July, 1991

Item	Which green bean do you prefer? Dark	Light	Chi-Square
	- - - number[a] - - -		
Occupation of shopper:			
Professional or managerial	39	44	
Sales or clerical	102	88	
All others	143	185	4.9*
Gender of shopper:			
Female	224	261	
Male	85	77	7.9
Age of Shopper:			
34 and under	71	66	
35 thru 44	76	86	
45 thru 54	44	48	
55 thru 64	49	49	
65 and over	45	69	4.2
Size of household:			
1	57	59	
2	95	124	
3 or more	133	131	
Education of shopper:			
11 grade	14	29	
High school graduate	65	97	
1-3 years college	36	55	
College graduate	141	97	22.8**
Income of shopper's household:			
Less than $20,000	53	76	
$20,000 thru $40,000	80	88	
More than $40,000	125	114	4.2
By store:			
Store 1	66	112	
Store 2	47	72	
Store 3	97	72	
Store 4	103	86	21.1**

[a]Totals vary because of differences in the number of respondents to each question.

*Statistically significant at .10 level.

**Statistically significant at .05 level.

were more likely to select the light beans, whereas, those who were in sales or clerical positions tended to choose the dark. There was a tendency for food shoppers in the two lower income stores to prefer the light-green beans and for those in the two higher income stores to prefer the darker ones. However, income by itself was barely insignificant (.10 level). These results suggest that food shoppers in the rapidly growing area of West Knox County may be more "open" to quality green beans regardless of color, whereas, food shoppers from the older neighborhoods could tend to have a slight preference for lighter green beans. West Knox County tends to be more heterogenous and has residents from all parts of the country, whereas the neighborhoods around stores 1 and 2 are more likely to have residents who grew up in the area.

Supermarket Produce Managers

The interviews with the produce department managers were conducted Monday through Wednesday July 15-17 and 22-24. Green beans were transported to these individuals in an insulated container to maintain freshness for both cultivars.Out of the sixteen supermarket produce department managers interviewed, ten reported that they thought their customers would prefer the darker green beans. The other six thought their customers would prefer the light-green beans. When asked "if a customer survey indicated that food shoppers would buy the darker green beans, would you be willing to handle them," fifteen said "yes." This single manager who did not report a "yes" to the question qualified his answer by saying it would depend upon his headquarters.

Managers were asked to explain why they preferred the light- or dark-green beans presented to them. All but one of the managers who chose dark beans and the one who chose light beans said the beans of their choice appeared fresher or better looking. An interesting point is that the managers could look at the same samples and see some difference not "explicitly" related to color. One manager chose the darker green beans because "more color means more flavor." One manager chose dark green and another chose light green and gave the same reason, "customers prefer this color bean."

An implication from the responses of the surveyed produce department managers is that produce department managers are not prejudiced for or against either shade of green bean. Overall quality is the important factor, not the modest variation in the color of the beans. Given consumer interest in quality, it is easy to understand why these managers have emphasized quality.

The managers were asked to identify the cultivars preferred by their food shoppers. Of the eight that answered this question, pole beans and snap beans were listed by seven managers. Half runners was listed by five managers.

Limitations on the discretionary stocking power of produce department managers varies by chain and source of supply. When asked if they could make produce purchases directly from brokers or wholesalers, seven reported yes and nine reported no. Only two managers indicated they could make purchases directly from growers. Only one of the managers did not think his store attempted to introduce new products or cultivars of established products. Some examples of successful introductions reported were: red and yellow peppers, yellow watermelon, packaged mushrooms, ugli fruit, broccoli florets, and New Zealand apples. Examples of failures were: broccoli florets, hot peppers, white radishes, yellow watermelon, jack fruit, cilantro, and jicama potato. Obviously the clientele's interest in certain products varies among stores and neighborhoods.

Wholesalers/Brokers

Knoxville's produce district is centered around Forest Avenue. Among the wholesalers/brokers at this location, the five that handle green beans were interviewed. All five purchased green beans directly from packer-shippers, three via brokers, and four from other wholesalers. Purchases made directly from a packer/shipper involved firms located in Florida, Georgia, Kentucky, North and South Carolina, and Tennessee. Only one wholesaler did not make any purchases direct from a Tennessee-based packer/shipper.

Those wholesalers that used brokers reported the receipt of green beans from Florida, Georgia, and Tennessee. The four wholesalers that purchased green beans from other wholesalers indicated that all of these purchases were made with local wholesalers.

The cultivars requested by these wholesalers included Pole, Half Runner, Blue Ribbon, Blue Lake, Dade, and White McCausley. In response to the question as to why they request these cultivars, the consistent response for all five wholesalers was experience.

When presented with the two samples of green beans and asked to select the one that they thought their customers would prefer, three chose the darker green bean and two had no preference. One of the wholesalers who had no preference said the color is not important. For the three wholesalers who chose the darker beans they indicated the beans looked better and would sell better. This is an important result because the samples of green beans were identical. Both were picked the same day, refrigerated at the same temperature, and hand-checked to be sure the broken and immature beans were removed. Furthermore, a USDA Inspector indicated they were of the same high quality. When asked whether they would handle the dark-green beans if a survey of food shoppers indicated they would buy the darker beans, all five wholesalers said "yes."

The five wholesalers supply retail stores in Tennessee. Two of the wholesalers also delivered to retailers in Kentucky and Virginia. Four of them deliver produce to restaurants, all of which are located in Tennessee. One wholesaler supplied institutions in Tennessee and Kentucky with produce. Four of the wholesalers supplied other wholesalers, and all of these are located in Tennessee.

Two of the five wholesalers reported that on occasion they had tried to introduce new products to their customers. Success stories occurred with collard greens, kraut, and broccoliflower. One failure was reported, butter beans.

Concluding Comments

Results of the three surveys provide useful information about the fresh green bean market. Most importantly, there does not appear to be any bias on the part of retail shoppers, produce department managers, or wholesaler/brokers against the darker cultivar. Consistent with other fresh produce studies of consumer demand [Eastwood, Orr, and Brooker], freshness and quality are primary considerations, and color plays a much less notable role. Consequently, consumers appear to be accepting of a high quality darker cultivar. Produce managers and wholesalers/brokers also seem to be open to handling darker green beans for the fresh market.

This study examined the verbal responses of retail shoppers, produce department managers, and produce wholesaler/brokers to samples of two different green bean cultivars. Interpretation of the survey results was based on statistical analysis of the interviewee's "stated preferences and/or opinions." While there is no reason to doubt the results at this point, they should be tempered with the recognition that the only true test of acceptance or rejection of a food product at the retail level is when the product is actually available for sale in the supermarkets. The exhibits and interviews were designed to minimize the risk of consumers' stated preferences differing from their actual purchasing behavior.

Endnotes

[1]Consumer panel taste tests were conducted by the Food Technology Department, UTK, and are to be reported separately.

[2]Jerry Cook, Produce Inspector, Agricultural Marketing Service, USDA, stationed in Knoxville.

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