

Testing for Differences in Consumer Acceptance Of Identically Appearing Potato Varieties *

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Abstract

Like many other vegetables, potatoes are marketed by type (russet, round white, red), rather than by variety (Burbank, Katahdin, Pontiac). Although varieties of the same type have similar outward appearances, they are also known to have different internal and cooking characteristics.

There has been considerable controversy over the need for variety identification promotion in the potato industry. A consumer response study that distinguished between user satisfaction with different potato varieties was viewed as a step toward resolving this issue.

Problem

Production and marketing of potatoes is a major agricultural enterprise in Maine. How-

ever, Maine potato producers have faced increasingly stiff competition primarily from western states, and more recently, from Canada. The increased competition has effectively eroded Maine's share in eastern U.S. markets. Western suppliers made substantial gains in the major eastern cities between 1975 and 1986 (*National Food Review*, 1986). Market penetration by Idaho alone increased from 13 percent in 1975 to over 23 percent in the northeast region. Canada also made solid moves into the Boston market, enjoying 11 percent of the market share by the mid 1980s.

In efforts to regain its eastern markets and increase profitability, the state's potato industry directed greater attention to re-establishing the quality image of Maine potatoes by revising marketing activities and developing improved varieties. A major issue relative to Maine's marketing practices is whether the potato industry is

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using appropriate varieties and marketing techniques.

Like many other vegetables, potatoes are marketed by type (russet, round, white, red), rather than by variety (Burbank, Katahdin, Pontiac). This means that consumers usually do not know what variety they are purchasing. Although varieties of the same type have similar outward appearance, they are also known to have different internal and cooking characteristics.

Maine has long been known for its round white potatoes and currently markets over fifteen different round white varieties. In the past few years, there has been considerable discussion as to whether consumers could differentiate between round white varieties in home use, and if variations in the performance of these different varieties contributed to a decline in Maine's quality image.

The Maine potato industry maintains extensive physical data on all commercially released varieties. In addition, all new varieties considered for release are comparatively evaluated for their physical attributes. However, no comparable data has been collected on consumer use and acceptance of the distinct varieties maintained by the industry. A consumer response study that distinguished between buyer attitudes toward different potato varieties was viewed as a complementary and valuable adjunct to the program and essential for effective marketing evaluation. Additionally, it could provide invaluable information concerning the on-going controversy over the need for variety identification promotion.

Objectives

This study was designed to accomplish two objectives:

1. To describe consumers' use of and attitudes toward Maine round white potatoes.
2. To determine if consumer acceptance of potatoes in home use varies by variety.

Procedures

The study was designed so that consumer information could be obtained and comparatively evaluated for selected round white varieties. The four varieties chosen were the Katahdin, Ontario, AF303-5, and the FL657. The Katahdin and Ontario are currently grown for table stock markets while the AF303-5 and FL657 are

new varieties under consideration by the industry.

The Katahdin is a high quality potato that has long been considered a standard by the Maine potato industry. All new varieties are compared to the Katahdin in lab sensory tests. The Ontario is a predominant round white potato produced in Maine for table stock marketing. However, considerable debate exists as to its consumer acceptance and questionable culinary qualities to the point that some industry leaders have indicated they would support banning its production.

The AF303-5 is a variety developed within the Maine Potato Breeding Program. This variety was selected because it had reached the stage in development where it should either be released for table stock or dropped from the breeding program. Information about the potato's performance in home use would clarify its success in the commercial market.

The FL657 had previously been used exclusively as a chipping potato by Frito-Lay. Although the company had recently released it in favor of using an improved chipping variety, the FL657 was still being produced by a limited number of growers and was reputed to have many desirable culinary qualities. Consequently, the variety was chosen to test systematically its consumer appeal on a larger scale.

To obtain the consumer information and varietal comparison, a consumer survey instrument was developed. The instrument underwent extensive pretesting in 1986-87 to perfect wording, packaging, and to determine the value of recipe inserts intended to increase response. The final questionnaire contained twelve questions pertaining to why the consumer had purchased the product, how the product was used, and how suitable the potatoes were for different preparations. In addition, consumers were asked to list any complaints, to compare the potatoes to those they usually purchased, and to state whether or not they would purchase the same potatoes again, if they were available. Respondents were also asked to provide basic demographic information.

The questionnaires were printed on a two-color postage paid card. Included on the card was a brief letter explaining why the survey was being conducted and stressing the importance of consumer feedback. This was signed by the Dean of the College of Life Sciences and Agriculture. A colorful recipe insert was added and

all items were placed in a heat sealed clear plastic package.

The different varieties were separated, sized 2 1/4" - 3 1/2", washed and packed into five-pound poly bags labeled Maine white, premium potatoes, U.S. No.1. The questionnaire package, which included a code to identify the specific variety, was inserted in each five-pound bag. In late February 1988, a total of 17,400 bags containing the four varieties were shipped through normal market channels to a major New England supermarket chain, and then sold at an identical price throughout the stores.

Consumers returned 733 usable questionnaires yielding a response rate of 4.2 percent, which is exceptionally high by market standards for questionnaire inserts. Responses were fairly evenly distributed among the four varieties; 30 percent of returns corresponded to the Katahdin, 22 percent were from those who had purchased the Ontarios, 24 percent pertained to the FL657 and another 24 percent reported on the AF303-5.

The data were analyzed using SPSSx. Statistics used in the analysis were Chi Square for categorical data and Analysis of Variance for continuous data. The 95 percent level was set as the criteria for testing statistical significance of the comparisons.

Results

The largest group of the respondents, 42.2 percent, typically purchased a mixture of potato types (Table 1). Of those respondents who normally purchased only one type of potato, Maine Russets were most often indicated; approximately 25 percent typically purchased Maine russets. Another 18 percent of the respondents reported that they normally purchased round whites while another 15 percent usually bought only Idaho Russets. Among respondents evaluating one of the four test round white varieties, differences in the types of potatoes they usually purchased proved to be insignificant.

Approximately two-thirds of the respondents normally purchased potatoes at least every other week (Table 2). The largest percentage of respondents, 39 percent, stated they purchase potatoes every two weeks. The timing of purchases was not significantly different between the four groups of respondents.

When respondents were asked why they had made their specific purchase, appearance of the potatoes was the reason most frequently re-

ported (Table 3). Approximately 47 percent of all responses were appearance. The most common multiple response was appearance and price. However, very few respondents made their purchasing decision based on price alone. The quality of the potatoes, as judged by their appearance was the major characteristic influencing the buying decision. This is consistent with a prior study which emphasized the importance of packaging potatoes in see-through bags to facilitate visual inspection of the potatoes (Smith, Parker, Kezis and Johnston; 1985). Again, no differences existed between the four groups of respondents concerning why they initially purchased one of the test varieties.

In addition to purchasing behaviors, demographic information was obtained in the surveys. Among all respondents, average household size was 2.84 people (Table 4). The predominant age group was within the range of 25 to 44 years old, which included over 41 percent of the respondents (Table 5). The oldest respondents, those 65 or older, accounted for approximately one-fourth of the total sample. Annual household income was provided by 634 of the respondents (Table 6). Close to 26 percent had incomes between \$20,000 and \$29,000; about 40 percent had incomes of \$30,000 and over; and the remaining one-third earned less than \$20,000. No statistically significant differences existed among the four respondent groups with respect to household size, age, or income. However, those respondents who purchased the FL657 did appear to be slightly younger.

Table 4

A Comparison of Mean Household Size for Respondents Evaluating Tested Potato Varieties

Variety Evaluated	Mean Household Size
Ontario	2.80
Katahdin	2.78
FL657	2.99
AF303-5	2.80
All Respondents:	2.84

F = 1.129 Not Significant

The major portion of the survey was designed to obtain an indication of the consumer's level of satisfaction with the potatoes. For each

Table 1

A Comparison of the Respondents' Usual Type of Potato Purchase, Versus Test Potato Variety Being Evaluated

Respondents' Usual Type of Potato Purchase	<i>Respondents Who Purchased:</i>				All Respondents
	Ontarios	Katahdin	FL657	AF303-5	
	----- percentages -----				
Maine Russets	24.2	24.0	24.3	25.9	24.6
Idaho Russets	12.7	11.8	16.2	21.8	15.4
Round Whites	18.8	19.0	17.3	16.1	17.8
Mixture of Types	44.2	45.2	42.2	36.2	42.2

Chi Square = 10.275 d.f. = 9
Not Significant

Table 2

A Comparison of How Often Respondents Normally Purchase Potatoes, Versus Potato Variety Being Evaluated

Respondents' Normal Purchasing Frequency	<i>Respondents Who Purchased:</i>				All Respondents
	Ontarios	Katahdin	FL657	AF303-5	
	----- percentages -----				
Weekly	29.9	24.9	29.2	29.4	28.1
Every 2 Weeks	37.2	39.9	40.5	35.9	38.5
Every 3 Weeks or more	32.9	35.2	30.4	34.7	33.4

Chi Square = 2.568 d.f. = 6
Not Significant

Table 3

A Comparison of Respondents' Purchasing Reasons, Versus Potato Varieties Being Evaluated

Reasons for Purchasing	<i>Respondents Who Purchased:</i>				All Respondents
	Ontarios	Katahdin	FL657	AF303-5	
	----- percentages -----				
Appearance	47.5	47.9	47.7	46.4	47.4
Price	38.0	39.2	35.7	42.2	38.8
Packaging	14.5	12.8	16.7	11.4	13.8

Chi Square = 4.18 d.f. = 6
Not Significant

Table 5

**A Comparison of Respondents' Age,
Versus Potato Varieties Being Evaluated**

Respondents Who Purchased:

Age	<i>Respondents Who Purchased:</i>				All Respondents
	Ontarios	Katahdin	FL657	AF303-5	
	----- percentages -----				
18-24	5.1	3.9	4.4	3.7	4.2
25-44	39.2	37.2	51.6	38.3	41.3
45-64	25.9	30.4	23.3	35.8	29.0
65+	29.7	28.5	20.8	22.2	25.5

Chi Square = 14.847 d.f. = 9
Not Significant

Table 6

**A Comparison of Respondents' Household Income,
Versus Potato Variety Being Evaluated**

Respondents Who Purchased:

Household Income	<i>Respondents Who Purchased:</i>				All Respondents
	Ontarios	Katahdin	FL657	AF303-5	
	----- percentages -----				
Less than \$10,000	11.8	13.2	12.2	14.5	12.9
\$10,000-\$19,999	21.5	21.6	24.3	18.4	21.5
\$20,000-\$29,999	27.8	24.2	25.0	27.0	25.9
\$30,000-\$49,999	21.5	23.7	22.3	26.3	23.5
\$50,000 or over	17.4	17.4	16.2	13.8	16.2

Chi Square = 3.893 d.f. = 13
Not Significant

Table 7

**A Composite Comparison of Respondent Evaluations
For Test Potato Varieties**

Respondents Who Purchased:

Evaluation	<i>Respondents Who Purchased:</i>				All Respondents
	Ontarios	Katahdin	FL657	AF303-5	
	----- percentages -----				
Poor-Fair	17.9	8.4	7.3	12.0	11.2
Good	42.4	42.0	40.7	44.5	42.4
Excellent	39.7	49.6	52.0	43.5	46.4

Chi Square = 34.04 d.f. = 6
Significant at the .01 level

preparation method used, the respondent was asked to rate the potatoes as "poor," "fair," "good," or "excellent." In addition, respondents were asked to list complaints about the potatoes, to rate the potatoes in comparison to the potatoes they usually purchased, and to state whether or not they would purchase the potatoes again if available.

An overall view of variety performance was obtained by examining a composite of evaluations across the most common preparation methods (Table 7). In general, all varieties fared very well. Over 82 percent of the respondents rated the varieties good or excellent over all preparations. However, significant differences were apparent between the varieties. The FL657 and the Katahdin appeared to be generally superior to the AF303-5 and especially with respect to the Ontario. Nearly 18 percent of the respondents evaluating the Ontarios rated them poor-fair, in comparison to approximately 7 percent for the FL657 and 8 percent for the Katahdin.

Examining respondent evaluations of the varieties for each preparation method further substantiates and explains the conclusions reached from the composite ratings. A very distinct hierarchy in performance appears (Tables 8-10). The FL657 and the Katahdin received the most favorable evaluations, followed by the AF303-5 and then the Ontario. The respondent evaluations were statistically different for baking but not for the boiling or mashing methods. However, within these last two preparation categories, the same hierarchy of varieties was apparent.

Respondents' answers to whether they had problems with the selected varieties, how they rated the potatoes in comparison to their normal potato purchase, and if they would purchase the test potatoes again further substantiate the previous findings. The responses by variety were statistically different in each case (Tables 11-13). The total incidence of problem reports given by 22 percent was low in consideration of complaints given by 49 percent of respondents in a national survey on general potato purchases (NFO Research, Inc. 1985). The FL657 showed the fewest amount of problem reports; approximately 16 percent of those evaluating the FL657 encountered some problems in comparison to 21 percent in each group of respondents reporting on the Katahdin and AF303-5, and 33 percent for the Ontario. Only 5 percent of those evaluating the FL657 indicated the variety was not as good as the potatoes they usually purchased, as compared to 9 percent for the Katahdin, 13 per-

cent for the AF303-5 and 18 percent for the Ontario.

Probably the most critical question asked was if the respondent would be willing to continue purchasing the same potatoes if available. Only 4 percent of those evaluating the FL657 said they would not buy the variety again, in comparison to 7 percent for the AF303-5, 8 percent for the Katahdins, and 15 percent for the Ontario.

Further analysis also showed that the respondent ratings of the potatoes in comparison to their usual purchase, and the incidence of problems were both related to the likelihood of repeat purchasing. Not surprisingly, those who felt the potatoes were inferior to other potatoes and those who reported problems were also more likely to indicate they would not continue buying the test potatoes. These findings were significant at the .01 level.

Summary and Conclusions

Initial consumer purchasing behavior was primarily based on the appearance and implied quality of the potatoes. However, repeat purchasing appears dependent upon consumer acceptance of the potatoes in home use. Although consumers were relatively pleased with all varieties tested, there were significant differences among the varieties with respect to their composite ratings, acceptance when used for baking, the extent of problems encountered with the potatoes, how the variety compared to usual potato purchases, and the consumer's willingness to buy the same variety again.

As a new variety for expanded table stock use, the FL657 showed exceptional promise by repeatedly garnering favorable responses that surpassed the other varieties. The Katahdin was also well accepted. Though not quite equivalent to the FL657, the high proportion of overall favorable responses justifies its continued marketing and use by the industry as a standard. The AF303-5 did not appear to receive consumer acceptance at a level comparable to the Katahdin or the FL657 and should probably not be marketed as a new Maine variety. The performance of the Ontario was disturbingly poor, especially given its current position as one of the most prevalent round white varieties marketed by Maine.

General Implications

Consumers can differentiate between potato varieties in home use. Generically marketing round white potatoes, which include

Table 8

**A Comparison of Respondent Evaluations
When Baking Test Potato Varieties**

Respondents Who Purchased:

<u>Evaluation</u>	<u>Ontarios</u>	<u>Katahdin</u>	<u>FL657</u>	<u>AF303-5</u>	<u>All Respondents</u>
	----- percentages -----				
Poor-Fair	21.6	8.9	6.3	16.9	13.1
Good	37.6	42.3	41.3	44.4	41.4
Excellent	40.8	48.8	52.4	38.7	45.5

Chi Square = 19.24 d.f. = 6
Significant at the .01 level

Table 9

**A Comparison of Respondent Evaluations of
Test Potato Varieties When Mashed**

Respondents Who Purchased:

<u>Evaluation</u>	<u>Ontarios</u>	<u>Katahdin</u>	<u>FL657</u>	<u>AF303-5</u>	<u>All Respondents</u>
	----- percentages -----				
Poor-Fair	14.2	6.6	6.0	8.5	8.8
Good	40.0	44.1	36.2	43.6	41.1
Excellent	45.8	49.3	57.8	47.9	50.1

Chi Square = 8.80 d.f. = 6
Not Significant

Table 10

**A Comparison of Respondent Evaluations of
Test Potato Varieties When Boiled**

Respondents Who Purchased:

<u>Evaluation</u>	<u>Ontarios</u>	<u>Katahdin</u>	<u>FL657</u>	<u>AF303-5</u>	<u>All Respondents</u>
	----- percentages -----				
Poor-Fair	18.0	9.4	10.1	13.3	12.3
Good	50.0	44.6	47.7	44.9	46.6
Excellent	32.0	46.0	42.2	41.8	41.0

Chi Square = 7.465 d.f. = 6
Not Significant

Table 11

A Comparison of Respondents Indicating Problems With Selected Potato Varieties

Respondents Who Purchased:

Problems	Ontarios	Katahdin	FL657	AF303-5	All Respondents
	----- percentages -----				
Yes	32.7	20.8	15.6	21.3	22.4
No	67.3	79.2	84.4	78.7	77.6

Chi Square = 15.18 d.f. = 3
Significant at the .01 level

Table 12

A Comparison of How Respondents Rated Selected Potato Varieties, Versus What They Normally Purchase

Respondents Who Purchased:

Evaluation	Ontarios	Katahdin	FL657	AF303-5	All Respondents
	----- percentages -----				
Not as Good	18.2	8.7	4.8	12.8	10.9
Equal	56.0	57.3	57.5	59.9	57.7
Better	25.8	34.0	37.7	27.3	31.4

Chi Square = 20.27 d.f. = 6
Significant at the .01 level

Table 13

A Comparison of Respondents Indicating They Will Purchase The Potatoes Again If Available, For Selected Varieties

Respondents Who Purchased:

Will Purchase Again	Ontarios	Katahdin	FL657	AF303-5	All Respondents
	----- percentages -----				
Yes	85.2	91.7	96.4	92.7	91.6
No	14.8	8.3	3.6	7.3	8.4

Chi Square = 13.588 d.f. = 3
Significant at the .01 level

numerous varieties with different culinary characteristics, should be strongly questioned. It appears that the Maine potato industry, retailers and consumers would be better served by varietal marketing or by only marketing varieties with similar characteristics. It also appears that more consumer information relative to the varieties' most appropriate uses and preparations would help alleviate consumer disappointment and generate more repeat business.

Finally, studies should continue monitoring the performance of these and other Maine potatoes. Comparative responses over time provide reference points through which progress can be measured in meeting particular marketing objectives. These include decreases in the percentage of dissatisfied consumers and improvements in the ratings of the potatoes, in comparison to the competition. Both of these measures are needed to judge a variety's potential for enhancing Maine's market position.

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