Evaluating Consumer Preferences and Marketing Opportunities for New Sauerkraut Products

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Per-capita consumption of sauerkraut in the U.S. has exhibited a continuously declining trend since the 1960s and 1970s. Consumption trends in the U.S. food market today are strongly determined by consumers desire for new and exciting flavors. However, sauerkraut sold in the market nowadays is not much different from sauerkraut made in the past. Through the addition of savory ingredients such as onions, garlic, dill seed, green peppers, mustard seeds and jalapeno peppers to the traditional cabbage kraut in different amounts and blends, Cornell University developed many new sauerkraut formulations. This study assessed the market viability of six new sauerkraut formulations, including sauerkraut containing the following ingredients in concentrations indicated in parentheses: garlic (1%), onion (30%), dill seed (1%), jalapeño peppers (10%), green peppers (20%), and onion and jalapeño peppers (25% and 5%, respectively). It encompassed a mail survey administered to 2,500 individuals in five U.S. cities and a more in-depth preference sensory-evaluation test conducted with 81 untrained panelists. Results showed that two of the new sauerkraut formulations tested sauerkraut with garlic and sauerkraut with dill have the highest marketing potential, and recommendations are made for potential marketing strategies.

Total cabbage consumption in the United States topped three billion pounds in 2001, of which about 88 percent was consumed fresh and the rest as processed cabbage, mainly sauerkraut. During the last decade (1991 to 2001), per-capita consumption of fresh cabbage has increased from 8.2 pounds to 9.0 pounds, while consumption of sauerkraut declined, from between 2.2 to 2.3 pounds per capita in the 1960s and 1970s to as low as one pound in 1996, stabilizing around 1.3 pounds in recent years (USDA 2004).

The consumption trends for cabbage reflect consumers strong interest in fresher and more convenient and complex food products. The incorporation of fresh cabbage to bagged salads, growth in away-from-home eating (which affects coleslaw consumption) and nutritional research showing the benefits of cruciferous vegetables are thought to be major factors in the increase in consumption of fresh cabbage (Stanford 2004). On the other hand, sauerkraut sold in the U.S. market today is not that different from the sauerkraut made in the past. According to Lucier and Lin (2002), men consume about 25 percent more cabbage (fresh and processed) per capita than do women. In proportion to their population shares, both men and women over the age of 40 are strong consumers of cabbage in its different forms compared to younger consumers. Moreover, three-fourths of the total U.S. sauerkraut consumption is concentrated in the Midwest and the East, with consumers in the South and West regions reporting light consumption of sauerkraut, and Whites consuming 91 percent of all sauerkraut, while Asians and Hispanics consume very little (Lin et al. 004).

Roberts (2002) developed various new sauerkraut formulations through the addition of savory ingredients to cabbage kraut in different amounts and blends for market testing. The new formulations were screened for consumer acceptance through a series of small sensory-valuation panels in Geneva, New York. Six sauerkraut formulations were found to be the most favored in the initial testing, including sauerkraut mixed with the following ingredients in concentrations indicated in parentheses: garlic (1%), onion (30%), dill seed (1%), jalapeño peppers (10%), green peppers (20%), and both onions and jalapeño peppers (25% and 5%, respectively). This study involved a wide-scale consumer-acceptance evaluation to determine which of the six new sauerkraut blends would most likely be successful in the consumer market and to formulate marketing-strategy recommendations. This study was conducted mostly through primary data collection, given that secondary information on sauerkraut consumption

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in the U.S. was limited. Two approaches used in this study are a mail survey and a preference sensory-evaluation test with untrained panelists.

Exploring Consumer Preferences: The Mail Survey

Given that consumption of sauerkraut is higher in the Midwest and in the East, five major cities and their suburbs in these areas of the United States were selected for the mail survey: New York, Philadelphia, Cincinnati, Chicago, and Detroit. Five hundred surveys were mailed to each city, a total of 2,500. The questionnaire was divided into five major sections: general characteristics of sauerkraut consumption, characteristics of sauerkraut consumption at home, characteristics of sauerkraut consumption away from home, participant s interest in each of the six new sauerkraut formulations, and participant's demographic characteristics. The design of the questionnaire and the mailing procedures conformed to the Total Design Method (TDM) as established by Dillman (1978). A total of 863 responses were received, a response rate of 37 percent. Responses from the five cities were not statistically different. Therefore, the results of the following analysis represents all responses combined.

According to the mail survey, almost three out of every four individuals surveyed (72 percent) have had sauerkraut in the 12 months prior to the survey and therefore are identified as sauerkraut consumers. Table 1 shows that contrary to the findings in the USDA study (2002), results from this survey indicated that the proportions of females and males who are sauerkraut consumers vs. non-consumers are similar, and the effect of higher sauerkraut consumption among higher income consumers is not evident in this survey. This survey confirms that consumers of sauerkraut tend to concentrate in the older age groups, and sauerkraut consumers are more likely to identify themselves as being of European descent.

Most of sauerkraut consumers (76 percent) eat sauerkraut once a month or less often. Individuals identified as non-consumers of sauerkraut in this survey often indicated aversion to fermented, pickled sauerkraut or cabbage-derived products. Consumption of sauerkraut takes place mostly at home, with 60 percent of sauerkraut consumers indicated they usually eat sauerkraut at home and another 17 percent indicating sauerkraut consumption both at home and away from home. There was not a particular key type of food with which sauerkraut is consumed at home, and most sauerkraut consumed at home was bought at a retail store. Special events such as fairs and festivals, sit-in restaurants, and hot dog stands are indicated by consumers as locations where they eat sauerkraut away from home. Different types of sausages, pork, Reuben sandwiches, and Polish/German dishes are the types of foods with which sauerkraut is commonly eaten away from home. Appetizers and salads, although only mentioned by a few respondents, constitute interesting applications to explore for product development.

The three new sauerkraut formulations with the highest market potential (identified as the highest percentages of consumers indicating interested and very interested in the product) were selected to be tested through a sensory evaluation: sauerkraut with garlic (38 percent), sauerkraut with onion (47 percent), and sauerkraut with dill (27 percent). Table 2 shows that female sauerkraut consumers were more interested in the sauerkraut-with-onion formulation than were male consumers, while male sauerkraut consumers indicated higher interest in the sauerkraut-with-garlic formulation. Female and male sauerkraut consumers expressed similar levels of interest in the sauerkraut-with-dill formulation. Eighty percent of non-consumers indicated no interest in any of the new sauerkraut formulations (circled 4=not interest on a 4-point scale).

Marketing-Potential Evaluation: The Sensory-Evaluation Study

Based on the results of the mail survey, three sauerkraut formulations that received the highest degrees of interest among sauerkraut consumers sauerkraut with onion, sauerkraut with garlic, and sauerkraut with dill were tested by a sensory-evaluation panel for tasting. Plain sauerkraut was included as a reference sample in the evaluation. Based on the mail survey, interest in the three selected formulations among sauerkraut consumers is very homogeneous across different consumer demographic categories. Therefore, the demographic composition of the sensory evaluation panel was not specifically defined. It was very important, however, that panelists be sauerkraut consumers, given that most non-consumers did not have much interest in the new formula-

Table 1. Sauerkraut Consumption by Consumer Characteristics.

Consumer characteristic	All participants (N=833) %	Sauerkraut consumers [a] (N=601) %	Non-consumers (N=232) %	Chi-square test p-value
Gender				
Females	50	50	49	
Males	49	49	49	
No response	1	1	2	0.677
Age				
18–34 years old	15	13	22	
35–50 years old	32	31	34	
51–65 years old	29	31	24	
66 years and older	24	25	20	
No response	0	0	0	0.003
Annual income				
Less than $25,000	14	14	15	
$25,001–$50,000	27	27	28	
$50,001–$75,000	22	24	18	
$75,001 or more	28	25	34	
No response	9	10	5	0.014
Ethnic origin				
North American	40	38	45	
European	49	55	32	
Other	10	5	22	
No response	1	2	1	0.000

[a] Sauerkraut consumers are defined as participants who answered yes to the question have you had sauerkraut in the past 12 months?

tions. Moreover, it was deemed worth exploring in depth the acceptance of these sauerkraut formulations among younger consumers (under 34 years of age), particularly given that they constitute a key market toward which these new formulations can be targeted.

The test was conducted on October 23, 2003 at the Sensory Evaluation Laboratory at Cornell University in Ithaca, New York. To take part in the preference test, participants had to be over 18 years of age and had to have eaten sauerkraut at least once in the past year. Participants were asked to taste each sample on its own and to rate overall acceptability, appearance, and flavor using a 9-point hedonic scale (1=dislike extremely and 9=like extremely.) After tasting the products, panelists were asked a additional questions on purchase intention, image of sauerkraut, frequency of consumption, and potential effect of health claims on their consumption of sauerkraut. A total of 81 untrained panelists participated in the evaluation.

Two of the three new sauerkraut formulations sauerkraut with garlic and sauerkraut with dill were acceptable for most of the panelists across age groups. Sauerkraut with onion received lower ratings for overall acceptance and flavor (Table 3).

Table 2. Interest Rating for the New Formulations of Sauerkraut among Sauerkraut Consumers And Non-Consumers.

		Sauerkraut Formula with					
		Garlic	Onion	Dill	Jalapeño peppers	Green peppers	Onion & jalapeño peppers
Sauerkraut consumers							
Total	Mean rating[a]	2.70	2.48	3.00	3.37	3.21	3.42
	STD	1.14	1.15	1.06	0.97	0.99	0.94
	N	535	553	513	493	491	488
Female	Mean rating	2.77	2.46	2.98	3.53	3.29	3.58
	STD	1.13	1.17	1.09	0.87	0.99	0.82
	N	264	283	265	244	248	246
Male	Mean rating	2.63	2.51	3.04	3.21	3.13	3.27
	STD	1.16	1.13	1.04	1.04	0.98	1.02
	N	268	265	244	246	240	238
No response	Mean rating	N/A	N/A	N/A	N/A	N/A	N/A
	STD	N/A	N/A	N/A	N/A	N/A	N/A
	N	3	5	4	3	3	4
Non-consumers							
Total	Mean rating	3.39	3.42	3.71	3.69	3.66	3.69
	STD	0.96	0.90	0.69	0.74	0.71	0.69
	N	204	204	200	198	198	198
Female	Mean rating	3.29	3.31	3.66	3.61	3.66	3.65
	STD	1.05	0.98	0.72	0.85	0.71	0.74
	N	97	99	95	95	94	95
Male	Mean rating	3.47	3.50	3.74	3.75	3.64	3.72
	STD	0.87	0.82	0.66	0.63	0.73	0.65
	N	104	102	102	100	101	100
No response	Mean rating	N/A	N/A	N/A	N/A	N/A	N/A
	STD	N/A	N/A	N/A	N/A	N/A	N/A
	N	3	3	3	3	3	3

[a] Ratings are on a scale of 1 to 4, where 1=Very interested, 2=Interested, 3=Somewhat interested, and 4=Not interested.

Table 3. Sensory Panel Evaluation Tasting Ratings of Sauerkraut Samples.

		Sauerkraut samples				
		Plain	With onion	With garlic	With dill	p-value
Overall acceptability rating						
All	Mean[a]	6.37a	5.25b	6.51a	6.14a	0.0000
(N=81)	STD	(1.58)	(2.16)	(1.45)	(2.05)	
< 34 yrs old	Mean	6.47a	5.58b	6.49a	6.44ab	0.0184
(N=43)	STD	(1.45)	(2.03)	(1.59)	(1.84)	
> 34 yrs old	Mean	6.34a	4.97b	6.53a	5.82ab	0.0025
(N=38)	STD	(1.70)	(2.27)	(1.29)	(2.26)	
Appearance rating						
All	Mean	6.86a	6.58a	6.60a	5.99b	0.0011
(N=81)	STD	(1.39)	(1.27)	(1.25)	(2.00)	
< 34 yrs old	Mean	6.98a	6.49a	6.56ab	5.91b	0.0075
(N=43)	STD	(1.34)	(1.40)	(1.28)	(2.17)	
> 34 yrs old	Mean	6.74	6.71	6.71	6.11	0.1658
(N=38)	STD	(1.46)	(1.11)	(1.25)	(1.83)	
Flavor rating						
All	Mean	6.28a	4.80b	6.35a	6.11a	0.0000
(N=81)	STD	(1.71)	(2.30)	(1.61)	(2.31)	
< 34 yrs old	Mean	6.37a	5.14b	6.33a	6.49a	0.0023
(N=43)	STD	(1.59)	(2.35)	(1.76)	(2.05)	
> 34 yrs old	Mean	6.26a	4.50b	6.39a	5.71ab	0.0003
(N=38)	STD	(1.83)	(2.23)	(1.46)	(2.55)	

[a] The ratings are on a 9-point hedonic scale, including 1=dislike extremely, 2=dislike very much, 3=dislike moderately, 4=dislike slightly, 5=neither like nor dislike, 6=like slightly, 7=like moderately, 8=like very much, and 9=like extremely.

[b] ANOVA (analysis of variance) was used to determine statistical significance of the mean ratings. If a significant difference was identified at 0.05 level, the Tukey s pair-wise comparison test was conducted.

The statistically lower ratings assigned to sauerkraut with onion by panelists in different age groups could indicate an unfavorable market perspective of this formulation. Lower ratings were given by panelists to the appearance of sauerkraut with dill than to the other samples, especially by the younger consumer group. Product developers should reconsider factors that might affect the appearance of this sauerkraut formulation before its introduction to the market.

According to the sensory-evaluation test (Table 4), the purchase-intent results were favorable for sauerkraut with garlic and sauerkraut with dill (in spite of the somewhat objectionable appearance) and less favorable for sauerkraut with onion. While many panelists are interested in the new sauerkraut formulations (73 percent indicated the new flavors are exciting or interesting), the younger panelist group exhibited a higher degree of enthusiasm toward the new sauerkraut formulations. Eighty-four percent of the younger panelists indicated the new products are exiting or interesting, compared to 60 percent of the older panelists. Many of the panelists (74 percent) indicated that they were very likely or somewhat likely to increase consumption of sauerkraut if there were any health benefits.

Table 4. Purchase Intent for the Sauerkraut Samples among Sensory Evaluation Panelists.

	Purchase intention	
Sauerkraut sample /age group	Likely[a] % respondents	Unlikely[b] % respondents
Plain sauerkraut		
All (N=81)	74.1	25.9
<34yrs (N=43)	86.5	13.5
34 yrs+ (N=38)	73.7	26.3
Sauerkraut with onion		
All (N=81)	44.5	55.5
<34yrs (N=43)	48.9	51.1
34 yrs+ (N=38)	42.1	57.1
Sauerkraut with garlic		
All (N=81)	63.0	37.0
<34yrs (N=43)	65.2	34.8
34 yrs+ (N=38)	60.3	39.7
Sauerkraut with dill		
All (N=81)	65.4	34.6
<34yrs (N=43)	69.8	30.2
34 yrs+ (N=38)	60.5	39.5

[a] Includes respondents who answered very likely and somewhat likely .

[b] Includes respondents who answered very unlikely and somewhat unlikely .

Conclusion

Sauerkraut has a large consumer market base with three out of every four individuals surveyed consuming sauerkraut. However, among sauerkraut consumers consumption frequency is very low and concentrated in the older age group. Consumers who do not eat sauerkraut currently are not a target market for new sauerkraut products. They will not be persuaded to try new sauerkraut products due to their aversion to fermented, pickled sauerkraut or cabbage products.

Among the three sauerkraut formulations selected to be tested by the sensory-evaluation panel, sauerkraut with garlic has the highest potential to succeed in the market and should be introduced to the market first. Before introducing sauerkraut with dill to the market, processors need to explore ways to reduce the somewhat objectionable appearance of the product. Although sauerkraut with onion also generated reasonable interest among the mail-survey consumers, it was not well-accepted when tested by the sensory-evaluation panelists and should not be introduced to the market until further improvements are made.

Promotion of the new flavors should focus primarily on younger consumers (under 34 years old). Moreover, to promote an increase in sauerkraut consumption and market the new formulations, it will be advantageous to widely promote the health benefits of and new uses for sauerkraut. Consumers purchased sauerkraut mainly from retail stores, so this market channel is an appropriate outlet for new sauerkraut products. The new sauerkraut products should also be made more widely available in the different types of food-service outlets.

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