# 1982 APPLEBAUM SCHOLARSHIP WINNER

## MS. ELAINE TECKLENBURG

# FACTORS INFLUENCING CONSUMER KNOWLEDGE OF FOOD INGREDIENT FUNCTION

By

Elaine Tecklenburg
Graduate Student
Department of Food Science and Human Nutrition
Michigan State University

## INTRODUCTION

The findings of various surveys indicate that an increasing number of consumers are concerned and confused about the safety and nutritive value of several foods and food ingredients (Gorman, 1975; General Mills, Inc., 1976; Yankelovich et al., 1978; and Heimbach and Stokes, 1979). In several instances consumers reported that they had either discontinued purchasing a product or purchased it less frequently because of information suggesting that the item contained at least one possibly harmful ingredient (Gorman, 1975 and General Mills, Inc., 1976). Although it has been suggested that a lack of knowledge of the beneficial effects of certain ingredients and the fear of the unknown may be responsible for this type of consumer behavior, little work has been done to assess actual consumer knowledge about food ingredients. This informatin is vital for the development of successful marketing strategies and consumer education programs aimed at promoting confident consumer decision making in relation to food products.

## METHODS

### Experimental Design

Three sets of knowledge questions used in interviews about food ingredients were developed, pretested, and revised with the help of students, staff, and faculty members at a large university in central New York State. A questionnaire designed to measure interest in food and cooking, health orientation, the number of meals prepared away from home, and demographic information was also pretested in this fashion. The final versions of both the interview and the questionnaire were administered to 50 women. The blank questionnaire was given to each respondent when she was initially contacted and was returned completed at the interview session. The university's committee on human subjects approved the procedures before the study was undertaken.

### The Sample

Potential respondents were screened to include only women between the ages of 22 and 49 with at least one child under 18 living in their households. This subpopulation was selected because it has been demonstrated that younger shoppers and those with children possess a higher degree of interest in food labeling information (Brown and Weimer, 1979). Respondents were recruited by personal contact at various eating establishments on the university campus.

### Data Analysis

Using The Statistical Package for the Social Sciences, correlation coefficients were determined between each food ingredient function knowledge score and age, number of meals prepared away from home, health orientation score, and food interest score.

## INSTRUMENTATION

### The Questionnaire

The demographic information acquired in the questionnaire included the age of the respondent, her race, level of education, employment status, family size, number and ages of children present, and approximate annual household income. Nine statements about health related attitudes were used to measure the respondent's degree of health orientation. Participants indicated their opinion about each item by responding on a 5-point Likert scale ranging from "strongly agree" to "strongly disagree." Factor analysis was performed. The nine statements used, the scoring method and the factor loading for the first factor are presented in Table 1 with the reliability coefficient for the final five item scale, GENHLTH.

Interest in food and cooking was measured with ten "food activity" statements to which each respondent indicated her frequency of involvement on a 5-point scale ranging from "never" to "very often." Scoring was such that respondents indicating greater involvement earned higher scores. Factor analysis was performed on the scale and a reliability coefficient for the five statements in the first factor was calculated. The statements, factor loading, the final scale FOODINT, and the reliability coefficient for the sample are shown in Table 2.

### The Interview

During the interview, each respondent was asked questions designed to measure her knowledge of food ingredient function. Three methods were used in this assessment. Knowledge of each of five functional classes of food ingredients (sweeteners, preservatives, nutrients, emulsifiers, and leavening agents), FUNCCLAS, was determined in a series of three questions. For each functional class the respondent was asked 1) to describe the general function of that class in food products; 2) to name a food product containing an ingredient belonging to that class, and

TABLE 1. Factor Loadings and Reliability for Items in the Health Orientation Scale (GENHLTH)

| | FACTOR 1 |
|---|---|
| I get enough exercise[2] | -0.07225 |
| I wish I knew more about how to stay healthy[1] | 0.82839 |
| I don't have enough time to exercise as much as I should[1] | 0.21619 |
| I've improved my own diet and exercise habits in the past few years[2] | -0.10323 |
| I feel confident about making decisions relating to my family's health[2] | 0.37531 |
| Nutritious foods are too expensive[1] | 0.47776 |
| I feel well informed about health issues[2] | 0.51528 |
| As a household, we're eating more nutritiously now as compared to a few years ago[2] | -0.02673 |
| I wish I knew more about how to eat right[1] | -0.84744 |
| eigen value | 4.99 |
| percent variance explained | 55.3 |
| reliability (alpha) | 0.76 |

[1]scored 1 to 5 Strongly Agree to
[2]scored 5 to 1 Strongly Disagree

TABLE 2. Factor Loadings and Reliability for Items in the Food Interest Scale (FOODINT)

| | FACTOR 1 |
|---|---|
| I collect recipes[1] | 0.78290 |
| I try out new recipes on family and friends[1] | 0.49585 |
| I stick with proven successful recipes rather than experiment with new ones[2] | 0.05999 |
| I read cook books[1] | 0.74015 |
| I read food articles in magazines or newspapers[1] | 0.58653 |
| I browse through gourmet or cooking shops[1] | 0.65436 |
| I have time to try out new recipes[1] | 0.20468 |
| I use most of my kitchen equipment[1] | -0.06694 |
| I try new food products[1] | 0.30444 |
| I have time to prepare nutritious foods[1] | 0.06988 |
| eigen value | 5.11 |
| percent variance explained | 51.0 |
| reliability (alpha) | 0.80 |

[1]scored 1 to 5 Never to Very Often
[2]scored 5 to 1

3) to provide the name of the ingredient performing that function in the product mentioned by the respondent. One point was assigned for each correct answer; for some questions more than one correct response was possible.

The ability to classify 24 individual ingredients into their respective functional groups comprised the scale TOTINGRS, the second test used to measure ingredient function knowledge. Respondents were provided with a list of 24 ingredients and the names of the five functional classes of ingredients mentioned above. A reliability coefficient was calculated for this scale and as a result, salt was removed from the list of ingredients in determining the score. One point was earned for each correct response although no points were deducted for wrong answers.

The third measure of ingredient function knowledge, PRODINGR, was administered in the context of specific products. The names of two common ingredients found in six popular food products (bread, ice cream, cheddar cheese, cereal, fruit drink, and cola) were shown and respondents were asked to tell why there were present. Salt, an ingredient in cheddar cheese, decreased the reliability of this scale so it was excluded from determination of the score.

## RESULTS

The respondents ranged in age from 27 to 49. All had completed high school and most (71.4%) had at minimum attended college. At the time the survey was conducted, the number of respondents employed full-time was approximately equal to the number not employed full-time. Nearly 28% of the sample were employed part-time and 20.4% were not employed. The number of children 18 years old or younger living in the respondents' households ranged from one to four. Eighty percent of the households contained one or two children. Respondents reported annual household incomes ranging from less than $5,000 to more than $30,000. About 67% had incomes of at least $20,000. One respondent was hispanic while the remainder were white.

The mean scores and ranges for all tests of food ingredient function knowledge appear in Table 3. The mean scores in relation to the maximum possible scores attainable were higher for some tests than for others Both the FUNCCLAS and PRODINGR had mean scores greater than or equal to 70% of the maximum possible score whereas the mean score on TOTINGRS was notably

TABLE 3. Mean Scores and Ranges for the Knowledge Tests

| Test - Scale Name | Mean ± Std Dev. | Possible Range |
|---|---|---|
| FUNCCLAS | 14.86 ± 3.47 | 0 - 23 |
| PRODINGR | 7.42 ± 1.82 | 0 - 11 |
| TOTINGRS | 6.02 ± 3.32 | 0 - 19 |

*n = 50

lower. This suggests that while consumers may be capable of "figuring out" what an ingredient does in a specific product, this reasoning ability is lost when individual ingredient function is considered, such as in the TOTINGRS test. Presumably consumers view their purchase decisions in terms of obtaining products with certain attributes and not in terms of obtaining ingredients or benefits of a particular ingredient per se.

The mean scores and ranges for the scales GENHLTH and FOODINT, and the average number of meals prepared away from home per person are shown in Table 4, while the correlation coefficients between these variables and the three knowledge scores appear in Table 5.

TABLE 4. Mean Scores and Ranges for General Health Orientation (GENHLTH), food interest (FOODINT), and Number of Meals Prepared Away From Home (MEALS AWAY)*

| Test - Scale Name | Mean ± Std Dev | Possible Range |
|---|---|---|
| GENHLTH | 11.50 ± 3.61 | 0 - 20 |
| FOODINT | 11.00 ± 3.41 | 0 - 20 |
| MEALS AWAY | 2.61 ± 0.30 | 0 - 8.33 |

It was hypothesized that the level of ingredient knowledge would be lower for older individuals and higher for

TABLE 5. Correlation of Food Ingredient Knowledge Measures With Other Variables

| | FUNCCLAS | PRODINGR | TOTINGRS |
|---|---|---|---|
| AGE | -0.105 | -0.316** | -0.224[1] |
| FOODINT | 0.201 | 0.129 | 0.035 |
| GENHLTH | 0.257 | 0.144 | -0.085 |
| MEALS AWAY | -0.278* | -0.347** | -0.114 |

*$p \leq .05$
**$p \leq .01$
[1] $p = .059$

younger ones. The negative correlations seen between age and ingredient knowledge support this notion. Although the correlation coefficients were somewhat weak, it is important to recognize that the small age range of the sample population, 22 years, and the small sample size used probably prevented stronger correlation coefficients from being produced. A number of theories may explain these findings. It is likely that younger respondents had younger children than older respondents. Women with younger children may have greater influence over what their children eat, and therefore may be more aware of the safety and function of food ingredients than women with older children. Younger women may also have attended school in a decade when there was greater emphasis placed on science and technology than when the older respondents went to school. In addition, it is likely that older respondents were less accustomed to taking tests than younger respondents.

That more meals prepared away from home were associated with a lower level of food ingredient knowledge was also substantiated by the data. When more meals are prepared away from home, it is probably true that fewer are prepared at home, presumably by the female head of the household, in this case the respondent. Thus, the respondent's involvement with food ingredients becomes

more limited and her knowledge of their function may also be somewhat limited. Furthermore, it can be assumed that if less preparation occurs in the home, less food shopping is required. This may mean that product labels, including ingredient lists, are read less frequently, and any information normally conveyed by them does not reach the consumer.

The correlation coefficients between GENHLTH and the three knowledge scores were extremely low, and none were statistically significant. This finding suggests that the respondents' health orientation as measured by the GENHLTH scale was not associated with food ingredient function knowledge. GENHLTH measured attitudes whereas health knowledge or practices might be more related to ingredient knowledge.

It was also hypothesized that a higher level of interest in food and cooking would be associated with a higher level of food ingredient knowledge. The rationale for this hypothesis was that more interaction with food ingredients and possibly a greater interest in learning about them would result in greater knowledge. However, as the data indicate, no significant relationships were observed between food interest scores and food ingredient function knowledge. It is possible that interest in food and cooking may not be related to food ingredient knowledge in a linear fashion or that the scale developed was not a good indicator of food interest.

The findings of this study have important implications for those involved in food distribution as it relates to consumer behavior. As the number of women entering the work force grows, convenience will become increasingly important and the trend towards eating more meals prepared away from home will continue. Thus it is likely that certain consumer segments will become less and less familiar with ingredient information and product composition. In the long run this could result in increased confusion about ingredient function and safety, leading to less confident decision making.

If it is correct in assuming that shopping is done less frequently as a result of less in-home preparation, this may suggest that the supermarket, and product labels in particular, could become less significant means of disseminating information to consumers.

The negative correlation found between age and ingredient function knowledge in this study suggests that to be most effective, information regarding the safety and function of ingredients should, at least for the time being, be directed to younger consumers.

While learning what consumers know about food ingredient function is essential if educational marketing strategies and other consumer education programs which promote more confident decision making are to be developed, consumer knowledge and misconceptions of ingredient safety must also be assessed.

## REFERENCES


Brown, J. and J. Weimer, "Consumers and Food Shopping Aids," Consumer Research, Summer (1970).

General Mills Nutrition and Marketing Research Departments, A Summary Report on U.S. Consumers' Knowledge, Attitudes, and Practices About Nutrition, General Mills, Inc., (1977).

Gorman, Walter P., "The Frightened Consumer?," Journal of Retailing, 51 (2): 31 (1975).

Heimbach, J. T. and R. C. Stokes, FDA 1978 Consumer Food Labeling Survey, FDA Bureau of Foods, Division of Consumer Studies, (1979).

Yankelovich, Skelly, and White, Nutrition. A Study of Consumers' Attitudes and Behaviors Towards Eating at Home and Out of Home, Woman's Day, New York, (Nov. 1979).

"This project was supported in part by Cooperative Agreement No. 58-32U4-9-105 between the Division of Nutritional Sciences at Cornell University and the U.S. Dept. of Agriculture Human Nutrition Information Service."

* * * * * *

## AUTOBIOGRAPHICAL SKETCH OF MS. ELAINE TECKLENBURG

As a senior majoring in Foods and Nutrition at Cornell University, Elaine conducted an honors research project dealing with consumer knowledge about food ingredients. In addition to having her name appear on the Dean's List four out of eight semesters during her undergraduate career, she was elected to Omicron Nu Honor Society and received scholarships from both the New York and American Dietetic Associations. She was graduated from Cornell in May 1981, having earned a B.S. with honors in Nutritional Science.

Since September 1981, Elaine has held a position as a graduate research assistant in the Department of Food Science and Human Nutrition at Michigan State University, analyzing the composition and functionality of air-classified legume flour fractions. She is also a student member of the Institute of Food Technologists. Elaine hopes to complete her thesis research on legume flours and be awarded a Master's Degree early this summer.

Elaine has been accepted into Ph.D. programs in both the Marketing Department, College of Business Administration at Penn State and the Department of Agricultural Economics at Cornell for Fall 1983. She now faces the difficult task of choosing between the two.