Consumer Preferences and Attitudes Toward Characteristics of Dairy Products: A Selected Analysis of the Attitude, Usage, and Trends Survey Data (AUTS), 1976 – 1984

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Introduction

During the past two decades milk and dairy products have played an important role among farm foods demanded in the United States. Consumer expenditures for milk and dairy products are second only to beef products in the United States. Certain dairy products have maintained very positive per capita consumption growth rates, however the changing composition of consumer demand has lead to an increased interest in the effects and usefulness of brand and generic advertising as a stimulant to demand expansion. This has been reinforced by a per capita supply which has greatly exceeded demand over the last decade. The importance of a product's characteristics as perceived by consumers has been investigated theoretically and empirically in the economics literature. Ladd presents a thorough review of this field (Ladd). A primary issue in this research has been the relationship between changing product characteristics and the effect upon effective demand. Im-

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partant to this research is the identification of those characteristics which are influential in determining the strength of consumer demand (Aronson, Eiler and Forker; Eiler and Cook; Eiler and Thompson). A product is likely to posses many characteristics, some of which may be important to certain consumers but not to others.

Producers, agribusiness firms, and federal/state agencies have come to rely on generic advertising and promotion of milk and dairy products (Tauer and Forker). Dairy product promotion programs essentially cover the entire domestic market. In 1985, the United Dairy Industry Association represented 20 member organizations and 32 affiliated Dairy Council units; representing 95 percent of dairy farmers and 85 percent of marketed milk (Tauer and Forker, p. 49). The other 15 percent was addressed by state organizations, such as the California Milk Producers Advisory Board. By 1986, twenty states had instituted legislatively mandated milk promotion programs.

The principal objective of this paper is to present an analysis and evaluation of consumer preferences toward milk and dairy product characteristics, relate these perceptions to the frequency with which consumers use the product, and derive a statistical relationship between predicted frequency and per-capita use. Data used in the study were acquired from the Market and Research Division United Dairy Industries Association, and the Consumer Attitude and Usage Trends Survey (AUTS). A cross-section/time-series containing approximately 16,000 sample observations over the period 1976 - 1986 formed the basis for the statistical analysis.

Research Methodology

The AUTS data series does not collect direct quantity of use data. Instead, panel members are asked a series of questions whereby they record the frequency of use over a given time

period. This frequency of consuming milk and dairy products is treated as a binary response (0/1) in this study. 'Never drink' is classified as one group, and 'Use' as the other, both for regular whole milk, lowfat/skim milk, any cheese except cottage cheese, and butter.

There are a number of analytical models available for dealing with a qualitative dependent variable, including the linear probability model, the probit model, and the discriminant analysis model. The probit function, an integrated normal curve, or a t distribution with infinite degrees of freedom, approximates very closely the logistic function, which is very similar to the t distribution with seven degrees of freedom (Hanushek and Jackson, p. 189). Empirical results also show that these two models yield strikingly similar results (Capps and Kramer, p. 58; Haggstrom). However, the theoretical justification of the logistic model is somewhat more appealing (Cox, p. 29 and McFadden, 1974).

The linear discriminate analysis is less efficient in classification than that of the logistic model with maximum likelihood estimation when employing explanatory variables in both continuous and discrete forms (Press and Wilson, pp. 699-705, and Morehart and Slane, p. 16). More importantly, the logistic model allows hypothesis testing for both individual and the joint association of all variables in the model with the dependent variable, while the linear discriminant analysis does not.

The Logistic Model

The logistic model (LM) is treated extensively in most multivariate statistical or econometrics texts (Pindyck and Rubinfeld, Maddala). The LM transforms the problem of predicting probabilities within a (0,1) interval to the problem of predicting the odds of an event occurring within the range of the entire real line. For the LM, Pi, the probability that an

individual respondent, i, has for consuming a specific milk or dairy product, is given by:

(1) $$p_i = F(Z_i) = F(\underline{\beta}' \underline{X})_i = \frac{1}{1+e^{-z_i}} = \frac{1}{1+e^{-\sum_{k=0}^{k}[\beta_k X_{ik}]}},$$

$$-\infty < Z_i < +\infty, \text{ and } 0 \leq p_i \leq 1, \quad i = 1, 2, \cdots N.$$

Where

X = column vector of explanatory variables to the individual respondent i,

β' = row vector of unknown parameters,

K = the number of explanatory variables,

N = the number of observations,

e = the natural logarithm,

The probability, P_i, ranges from zero to one as Z_i goes from $-\infty$ to $+\infty$ and has a symmetric distribution.

In empirical estimation, the 'log of the odds ration,' i.e., index Z, a linear function of $\beta'\underline{X}$, is employed and the model specified as a linear logistic model. Mathematically:

(2)

$$Z_i = \log_e \left(\frac{p_i}{1-p_i}\right) = (\underline{\beta}'\underline{X})_i = \sum_{k=0}^{k} \beta_k X_{ik}$$

The index, Z_i, is called the log odds, or logit, transformation of the probability P_i. The numberical value of β_k measures the steepness of the logistic curve for the kth explanatory variable.

Estimation Techniques

The logistic model has two measurement techniques, these are the grouped data approach, and the microdata approach. The former employs Weighted Least Squares (WLS), while the latter is done by means of Maximum Likelihood Estimation (MLE). The microdata approach with the maximum likelihood iterative procedure will be employed for this study.

The MLE estimates are found by maximizing the likelihood function with respect to the parameters of interest. The primary appeal of applying MLE is that this techniques possesses the asymptotic properties, i.e., consistent, asymptotically efficient, and asymptotically normal (Kmenta, pp. 174).

Statistics of Model Performance

A number of goodness-of-fit statistics are used for evaluating model performance in this study. First, the mean, minimum value, and range of each defined explanatory variable are considered for judging the problem of limited dispersion. A variable is said to have limited dispersion when (mean - minimum) divided by its own range is not between .05 and .95. A variable with limited dispersion could be an inappropriate candidate for the model due to little chance of being declared significant (Harrell, p. 182).

Secondly, the condition index, and variance-decomposition proportion permit diagnosing of collinearity. The Belsley, Kuh, and Welsch diagnostic method is employed (Belsley, Kuh, and Welsch, p. 112). The condition incidces are the square roots of the ratio of the largest eigenvalue, sometimes called the characteristic root to each individual eigenvalue (Chiang, pp. 340-342). The rule of thumb of 'large' condition index and 'large' variance-decomposition proportions proposed by Belsley et al. are values of '30-100' (Belsley et al., p. 105), and 'greater than 0.5 respectively.

The third statistic is the likelihood ratio statistic (LR) which is used for testing the joint significance of all variables in the model. The likelihood ratio statistic follows a chi-square distribution with K-1 degrees of freedom. The null hypothesis is to be rejected if the likelihood ratio statistic exceeds the correspondent critical chi-square value.

Fourth, the MLE chi-square statistic (or called the Wald statistic), and the associated probability value (P). The MLE chi-square statistic is calculated for testing the null hypothesis of the individual estimated coefficient in the model. In other words, this statistic is employed for testing the null hypothesis by assuming that the individual estimated coefficient is equal to zero, based on asymptotically normally distributed estimators. The Wald statistic is computed by taking the beta coefficient divided by its standard error, and squaring the result. The associated MLE chi-square statistics with one degree of freedom at 10 percent and 25 percent significant levels are shown as follows (kmenta p. 141).

Similar to the likelihood ratio statistic, the Rao's (1973) efficient chisquare statistic (or called global score statistic) is also computed for testing the joint association of all variables in the model with the dependent variable. Harrell (pp. 182-3) states that "the global score statistic is useful if convergence is not obtained, . . . , when convergence is obtained, the likelihood ratio statistic is the preferred statistic." The global score statistic, Q, is defined in Bartolucci and Fraser, p. 442.

Finally, is the R statistic, and the partial R statistic. The R statistic is defined as (Harrell, p. 183)

$$R = \sqrt{(LR - 2K)/(-2 \text{ Log } L_0)}$$

The R statistic is similar to the multiple correlation coefficient, corrected R^2, in the normal setting, and is for measuring the predictability of the model. The size of R is in between 0 and 1. R has a value of 0 if the model is of no value, and 1 if the model predicts perfectly.

The partial R statistic for the individual explanatory variable provides a measure of the partial contribution of the variable to the changes of the dependent variable, and is independent of the sample size. Size of partial R is designed to be in between − 1 and +1, +1 (−1) if the explanatory variable is perfectly related to the dependent variable in the positive (negative) direction.

Data

Data used in this study are from the Marketing and Economic Research Division of the United Dairy Industry Association, Consumer Attitude and Usage of Dairy Product Survey. This survey was conducted annually from 1972 through 1978, and has been conducted biennially since 1978. Data prior to 1976 were not available for analysis. The sample observations are 3,659 panel members in 1976, 4,042 panel members in 1978, 4,170 panel members in 1970, 3,778 panel members in 1982, and 4,044 panel members in 1984, and are representative of the continental United States population, age 13 and older. This survey contains a rather large number of product, demographic, social, and attitudinal questions. These are addressed to dairy product usage and other product usage. The large number of items addressed required that many questions not be addressed in this analysis. Those items selected were based on the judgment of the authors as to their importance in the area of dairy product demand.

For the purposes of this analysis, several determinations were made: (1) Usage questions for each product category are

numbers, only frequency of consumption is employed, and is treated as a binary group -- drink versus not drink, and use against not use; (2) explanatory variables include annual household income, family composition, education of panel member, education of spouse, occupation of panel member, occupation of spouse, household size, race, and selected attitude scale variables. Both city size (population density of residence) and marital status were discarded due to very insignificant results; (3) data of 1976, 1978, 1980, 1982, and 1984 are classified under the same specification, and pooled together; (4) the geogrphic regions where aggregated into six larger regions for analysis; (5) two possible candidate variables regarding price information are: "Is the price of milk (or other product) too high," and "Is milk (or other product) a good value for the money." Both variables are believed to be too ambiguous and are therefore not included in this study.

Statistical Models and Variable Specification

The statistical model for each product group are given as follows:

Fluid Whole Milk:

$$\begin{aligned}(1)\ FWM = {} & \alpha_0 + \alpha_1 MT + \alpha_2 FT + \alpha_3 F5 + \alpha_4 F6\text{-}12 + \alpha_5 FE \\ & + \alpha_6 ED1 + \alpha_7 ED2 + \alpha_8 ES1 + \alpha_9 ES2 \\ & + \alpha_{10} OC1 + \alpha_{11} OC2 + \alpha_{12} SO1 + \alpha_{13} SO2 \\ & + \alpha_{14} IN1 + \alpha_{15} IN2 + \alpha_{16} IN3 \\ & + \alpha_{17} HOS + \alpha_{18} RAC \\ & + \alpha_{19} AFTM + \alpha_{20} CH2M + \alpha_{21} HATM \\ & + \alpha_{22} REFM + \alpha_{23} RELM + \alpha_{24} BALM\end{aligned}$$

Fluid Lowfat and Skim Milk:

$$\begin{aligned}(2)\ FSM = {} & \beta_0 + \beta_1 MT + \beta_2 FT + \beta_3 F5 + \beta_4 F6\text{-}12 + \beta_5 FE \\ & + \beta_6 ED1 + \beta_7 ED2 + \beta_8 ES1 + \beta_9 ES2 \\ & + \beta_{10} OC1 + \beta_{11} OC2 + \beta_{12} SO1 + \beta_{13} SO2 \\ & + \beta_{14} IN1 + \beta_{15} IN2 + \beta_{16} IN3\end{aligned}$$

$$+\beta_{17}\,\mathrm{AFTM}+\beta_{18}\,\mathrm{RAC}$$
$$+\beta_{19}\,\mathrm{AFTM}+\beta_{20}\,\mathrm{CH2M}+\beta_{21}\,\mathrm{HATM}$$
$$+\beta_{22}\,\mathrm{REFM}+\beta_{23}\,\mathrm{RELM}+\beta_{24}\,\mathrm{BALM}$$
$$+\beta_{25}\,\mathrm{WEIL}+\beta_{26}\,\mathrm{WATL}$$

Any Cheese (except Cottage):

(3) $$\mathrm{FUCH}=\gamma_0+\gamma_1\,\mathrm{MT}+\gamma_2\,\mathrm{FT}+\gamma_3\,\mathrm{F5}+\gamma_4\,\mathrm{F6\text{-}12}$$
$$+\gamma_5\,\mathrm{FE}+\gamma_6\,\mathrm{ED1}+\gamma_7\,\mathrm{ED2}+\gamma_8\,\mathrm{ES1}$$
$$+\gamma_9\,\mathrm{ES2}+\gamma_{10}\,\mathrm{OC1}+\gamma_{11}\,\mathrm{OC2}+\gamma_{12}\,\mathrm{SO1}$$
$$+\gamma_{13}\,\mathrm{SO2}+\gamma_{14}\,\mathrm{IN1}+\gamma_{15}\,\mathrm{IN2}+\gamma_{16}\,\mathrm{IN3}$$
$$+\gamma_{17}\,\mathrm{HOS}+\gamma_{18}\,\mathrm{RAC}$$

Butter:

(4) $$\mathrm{FBU}=\pi_0+\pi_1\,\mathrm{MT}+\pi_2\,\mathrm{FT}+\pi_3\,\mathrm{F5}+\pi_4\,\mathrm{F6\text{-}12}+\pi_5\,\mathrm{FE}$$
$$+\pi_6\,\mathrm{ED1}+\pi_7\,\mathrm{ED2}+\pi_8\,\mathrm{ES1}+\pi_9\,\mathrm{ES2}$$
$$+\pi_{10}\,\mathrm{OC1}+\pi_{11}\,\mathrm{OC2}+\pi_{12}\,\mathrm{SO1}+\pi_{13}\,\mathrm{SO2}$$
$$+\pi_{14}\,\mathrm{IN1}+\pi_{15}\,\mathrm{IN2}+\pi_{16}\,\mathrm{IN3}$$
$$+\pi_{17}\,\mathrm{HOS}+\pi_{18}\,\mathrm{RAC}$$
$$+\pi_{19}\,\mathrm{HEAB}+\pi_{20}\,\mathrm{TABM}+\pi_{21}\,\mathrm{CH2B}$$
$$+\pi_{22}\,\mathrm{HATB}+\pi_{23}\,\mathrm{WEIB}$$

Variable definitions are given in Table 1.

Economic and Demographic Variables

The first five explanatory variables (MT, FT, F5, F6-12, and FE) represent family composition; male teenager, female teenager, female panel member with child 0-5 years old, female panel member with child 6-12 years old, and female panel member. The subsequent eight variables are panel member education (ED1, ED2), spouse education (SO1, SO2). The variables (IN1-IN3) refer to three different annual household income groups. RAC indicates caucasian people. Family

composition, education, education, occupation, and race represents this study's attempt to capture the differential impacts of the separate groups on the probability of drinking or using milk and dairy products. HOS is the indicator of household size of the respondent's family, and is treated as continuous.

Selected Attitude Variables

Variables regarding a respondent's attitude toward milk or dairy product characteristics, represent scale variables for an attitude. The choices for these variables range from one to six. One and six refer to definitely disagree, and definitely agree respectively. That is, a variable with higher mean value indicates respondent tends to agree with the related statement.

In the milk model the attitude variables selected were: milk leaves a bad aftertaste (AFTM), milk is high in cholesterol (CH2M), milk can cause heart disease (HATM), milk is refreshing (REFM), milk is relaxing (RELM), and milk is needed for a balanced diet (BALM). In addition to the above six variables, two additional variables are added for lowfat/skim milk modeling: lowfat milk is great for those trying (on diet) to lose weight (WEIL), and lowfat milk tastes flat and watery (WAIL).

In the cheese model, HEAC, TASC, FATC, and CHOC refer to cheese is a healthful food, I like the taste of cheese, cheese is fattening, and cheese helps produce cholesterol respectively. In the butter model HEAB, TABM, CH2B, HATB, and WEIB represent butter is a healthful food, I like the taste of butter better than margarine, I worry about cholesterol from butter, butter can cause heart disease, and people should cut out butter (if dieting) to lose weight respectively.

Descriptive Statistics

The mean values of explanatory variables in the respective models are exhibited in Tables 2 through 6. Family composition, education, occupation, income, and race were decomposed as discrete variables. The interpretation of these variable means in the U.S. whole milk model (Table 2), for example, 11.63% respondents are male teenagers (MT); 52.37% of the panel members have 1-4 years of high school education (ED1); 43.77% of spouses have at least one year of college education (ES2); 21.04% of the panel members have menial, blue-collar, or craft occupations (OC1); 36.99% of the spouses have professional, or white-collar occupations (S02); and 96.27% of the respondents are white (RAC). Household size, and all behavioristic variables are continuous. A household size of 3.63 (Table 7, U.S. model) indicates that there are 3.62 people in the respondent's family. The mean value of 2.72 for AFTM (milk leaves a bad aftertaste) in the regular whole milk model (Table 11) for example, implies that 2.72 out of 6, or approximately 45% of respondents agree with this statement.

Influence of Social, Demographic, Economic, and Attitudinal Variables on the Frequency of Dairy Product Use

A comparison of the estimated probability of consuming each dairy product group as influenced by the respondents respective income level is given in Table 7. These comparisons are relative to the omitted income category of less than $10,000.00. For example, in the U.S., for regular whole milk, the probability of using this product declines with increases in income. Respondents with incomes over $30,000.00 had an estimated probability of only 84 percent of the lower income group. In contrast, probability of usage increases with income for the lowfat/skim milk product.

The estimated frequencies of using each product relative to

the attitudinal variables are reported in Table 8 through 11. These numbers are presented graphically in Figure 1, panel A and B. From Figure 1, the relationship between the probability of consumption and the eight attitudinal variables is evident. The most important point to notice is the relative slopes of the various probability curves. Those curves with a steeper slope identify perceived characteristics toward which consumers are most sensitive. For example, the perception that regular whole milk is refreshing (REFM) exhibits significantly more influence on consumers frequency of consumption than do other attitude variables.

Also, the steepness of the slope of the REFM curve suggests that the marginal return to shifting consumers average score on this characteristic would be greater than any other single variable. A 10% rise in the average value of the attitudinal index for this variable would result in an increase in the probability of consumption equal to 3.75% (movement from point A to point B, Figure 1). In comparison, the same index change for "milk is required for a balanced diet (BALM)" would result only in a 0.4% increase in probability of consumption (movement from point A to point C, Figure 1).

The perception that milk is refreshing (REFM) also has a significant influence on the frequency of consumption for low fat skim milk (Figure 1-B). A 10% rise in mean value of the attitudinal index for this variable would result in a change of the probability of consumption equal to 3.0% (movement from point E to point F). However, a 10% decrease in the attitudinal index for the variable low fat/skim milk tastes flat and water would result in a change of the probability of consumption equal to 3.5%.

The analysis to this point has focused on the frequency of use or the probability of use of a specified dairy product. It

would be interesting to convert this into a per capita consumption level. A very rudimentary approach to this problem was attempted by relating the predicted probability of use in each year for the U.S. and regional models to the actual level of per capita consumption in that year and region. This will give a crude method to convert the frequency data to quantity data in the absence of directly measured quantities. The results of this analysis for the attitudinal variables are reported in Tables 12 through 15. The data are presented for a simulated effect of a 10 percent increase in the mean value of each attitudinal variable. For example, a 10 percent increase in the attitude scale "Milk has an after taste", measure from the scale mean, would result in a 1.5 pounds per capita decline in regular whole milk consumption. In contrast, a 10 percent improvement in the attitude scale "Lowfat milk tastes flat and watery", i.e., a shift in opinion toward disagreement with this statement, would result in an estimated increase in per capita consumption of lowfat/skim milk of 12.2 pounds. This represents approximately 2.8 billion pounds of additional milk demand in 1985.

Conclusions

Relative price changes and shifts in consumers real incomes play important roles in the changes observed in consumption patterns of dairy products. Often times these variables do not offer a complete explanation of shifts which we observe to take place in consumers purchasing habits. In the case of milk and dairy products, the 1970's and 1980's were a time wherein consumers shifted from consuming regular whole milk to lowfat/skim milk. This was also a period in which interest in generic promotion and producer financed advertising was offered as one way to stimulate consumer demand.

This paper reports on a research study which investigated the relative important of various attitudinal variables to the

frequency and per capita use of milk and dairy products. The consumer survey data (AUTS) was used to estimate a maximum likelihood logistics model for whole milk and for low fat/skim milk products. The frequency of product usage was estimated as a function of traditional socioeconomic variables and specific consumer attitude variables.

The latter variables measured consumer perception of specific taste and health characteristics of the fluid milk products. From this research it was determined that certain perceptions of product quality and/or characteristics are more important to consumers than others. These characteristics need to be the focus of promotional strategies and advertising campaigns designed to increase demand. Consumer use of whole milk and low fat milk are most sensitive to taste characteristics and less so to health related characteristics of the products. In the case of low fat milk products it appears that a significant consumption increase could be generated by either changing consumer perception that the product has a flat, watery taste, or possibly making direct modification to the product to eliminate this undesirable characteristic.

The results of this study suggest that an advertising campaign aimed at changing consumer attitudes toward milk taste would be most effective for increasing consumer frequency of consumption. The analysis of the health variables resulted in flatter shaped curves, which indicates that consumers are less sensitive to health variables as compared to product taste. Recent per capita consumption studies reveal that consumers are subsiituting low fat/skim milk for whole milk at an increasing rate. This study indicates that consumers find the flat, watery taste of low fat/skim milk to be objectionable. An alternative to an advertising campaign focused on changing consumer perceptions would be an effort by the industry to improve the flat, watery taste characteristics of the product.

TABLE 1. Definition of Endogenous Variables

Variable	1	0
FWM	If drink regular whole milk	If never drink
FSM	If drink skim/lowfat/2% milk	If never drink
FCH	If use of any cheese except cottage cheese about once a month or more	If otherwise
FBU	If use of butter	If never use
	Definition of Exogenous Variables	
MT	Male teens (13-19)	Otherwise
FT	Female teens (13-19)	Otherwise
F5	Female panel member with child 0-5	Otherwise
F6-12	Female panel member with child 6-12	Otherwise
FE	Female panel member (Omitted group: husbands)	Otherwise
ED1	If 1-4 years high school	Otherwise
ED2	If at least one year college (Omitted group: less than or equal) to 8 years grade school)	Otherwise
ES1	If 1-4 years high school (spouse)	Otherwise
ES2	If at least one year college (spouse) (Omitted group: less than or equal to 8 years grade school)	Otherwise
OC1	If menial, blue-collar or craft occupation	Otherwise
OC2	If professional or white collar occupation	Otherwise
OS1	If menial, blue-collar or craft occupation (spouse)	Otherwise
OS2	If professional or white collar occupation (spouse)	Otherwise
IN1	If annual household income ranges $10,000 – $19,999	Otherwise

TABLE 1, continued:

IN2	If annual household income ranges $20,000 – $29,999	Otherwise
IN3	If annual household income is $30,000 and over. (Omitted group: less than $10,000)	Otherwise
RAC	If white	Otherwise
HOS	Number of household size	

Attitudinal Variables
1 = Strongly Disagree -- 6 = Strongly Agree

AFTM*	Milk leaves a bad aftertaste
CH2M	Milk is high in cholesterol
HATM	Milk can cause heart disease
REFM	Milk is refreshing
RELM	Milk is relaxing
BALM	Milk is needed for a balanced diet
WEIL	Lowfat milk is great for those trying (on diet) to lose wt.
WATL	Lowfat milk tastes flat and watery
HEAC	Cheese is a healthful food
TASC	I like the taste of cheese
FATC	Cheese is fattening
CHOC	Cheese helps produce cholesterol
HEAB	Butter is a healthful food
TABM	I like the taste of butter better than margarine
CH2B	I worry about cholesterol from butter
HATB	Butter can cause heart disease
WEIB	People should cut out butter (if dieting to lose weight)

* Respondent's attitudes toward the use of milk or dairy products. Data are treated as ordinal numbers from one to six. One represents definitely disagree and six respondents definitely agree.

TABLE 2 The Mean Values of All Economic and Demographic Variables in the Regular Whole Milk Models

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
MT	0.1163	0.1155	0.1071	0.1268	0.1182	0.1276	0.1190
FT	0.1320	0.1443	0.1239	0.1397	0.1312	0.1112	0.1267
F5	0.1366	0.1369	0.1619	0.1056	0.1240	0.1533	0.1200
F6-12	0.1462	0.1573	0.1659	0.1268	0.1160	0.1545	0.1200
FE	0.1459	0.1367	0.1469	0.1480	0.1493	0.1299	0.1626
ED1	0.5237	0.5608	0.5501	0.5349	0.4880	0.4121	0.4293
ED2	0.4503	0.4144	0.4223	0.4331	0.4815	0.5726	0.5556
ES1	0.3842	0.3998	0.4142	0.3874	0.3422	0.3395	0.3123
ES2	0.4377	0.4307	0.4085	0.4176	0.4575	0.5163	0.5202
OC1	0.2104	0.2078	0.2215	0.1994	0.2073	0.1920	0.2141
OC2	0.3189	0.3116	0.3087	0.3322	0.3364	0.3407	0.3170
SO1	0.3741	0.3516	0.4164	0.3608	0.3647	0.3641	0.3347
SO2	0.3699	0.3998	0.3520	0.3513	0.3720	0.3747	0.3877
IN1	0.3599	0.3690	0.3644	0.3620	0.3350	0.4004	0.3248
IN2	0.2595	0.2644	0.2725	0.2325	0.2451	0.2529	0.2728
IN3	0.2105	0.2101	0.2102	0.1925	0.2073	0.2025	0.2489
IIOS	3.6346	3.7633	3.7342	3.4806	3.4770	3.6677	3.4571
RAC	0.9627	0.9755	0.9739	0.9402	0.9470	0.9718	0.9516

TABLE 3 The Mean Values of All Economic and Demographic Variables in the Lowfat/Skim Milk Model

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
MT	0.1151	0.1178	0.1045	0.1249	0.1171	0.1248	0.1167
FT	0.1314	0.1141	0.1213	0.1389	0.1317	0.1107	0.1297
F5	0.1356	0.1361	0.1608	0.1067	0.1229	0.1531	0.1152
F6-12	0.1463	0.1581	0.1651	0.1264	0.1156	0.1578	0.1214
FE	0.1481	0.1359	0.1526	0.1477	0.1500	0.1378	0.1643
ED1	0.5218	0.5578	0.5502	0.5302	0.4890	0.4156	0.4263
ED2	0.4528	0.4175	0.4221	0.4399	0.4838	0.5700	0.5565
ES1	0.3833	0.3981	0.4134	0.3837	0.3462	0.3380	0.3157
ES2	0.4394	0.4328	0.4074	0.4268	0.4612	0.5135	0.5152
OC1	0.2082	0.2049	0.2175	0.1973	0.2101	0.1919	0.2134
OC2	0.3207	0.3170	0.3086	0.3350	0.3352	0.3415	0.3183
SO1	0.3730	0.3509	0.4149	0.3584	0.3696	0.3674	0.3307
SO2	0.3711	0.4007	0.3515	0.3563	0.3755	0.3710	0.3881
IN1	0.3596	0.3677	0.3670	0.3621	0.3338	0.3875	0.3245
IN2	0.2592	0.2630	0.2702	0.2338	0.2467	0.2591	0.2728
IN3	0.2112	0.2129	0.2083	0.2083	0.2093	0.2025	0.2480
HOS	3.6273	3.7679	3.7149	3.4761	3.4779	3.6657	3.4529
RAC	0.9636	0.9746	0.9472	0.9446	0.9487	0.9717	0.9514

TABLE 4 The Mean Values of A11 Economic and Demographic Variables in the Any Cheese Except Cottage Cheese Models

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
MT	0.1155	0.1155	0.1067	0.1257	0.1125	0.1300	0.1183
FT	0.1301	0.1389	0.1204	0.1388	0.1348	0.1142	0.1284
F5	0.1350	0.1364	0.1613	0.1008	0.1236	0.1549	0.1168
F6-12	0.1461	0.1608	0.1629	0.1274	0.1174	0.1459	0.1224
FE	0.1501	0.1385	0.1523	0.1523	0.1494	0.1346	0.1712
ED1	0.5230	0.5558	0.5504	0.5345	0.4954	0.4140	0.4287
ED2	0.4503	0.4177	0.4220	0.4324	0.4753	0.5735	0.5536
ES1	0.3841	0.3980	0.4132	0.3891	0.3432	0.3495	0.3108
ES2	0.4377	0.4331	0.4096	0.4152	0.4621	0.5101	0.5143
OC1	0.2142	0.2101	0.2243	0.2067	0.2154	0.1911	0.2166
OC2	0.3156	0.3121	0.3048	0.3277	0.3266	0.3371	0.3143
SO1	0.3743	0.3567	0.4110	0.3637	0.3676	0.3744	0.3304
SO2	0.3674	0.3963	0.3519	0.3485	0.3662	0.3687	0.3848
IN1	0.3598	0.3651	0.3640	0.3657	0.3300	0.3993	0.3309
IN2	0.2592	0.2663	0.2734	0.2292	0.2453	0.2522	0.2700
IN3	0.2094	0.2120	0.2092	0.1897	0.2056	0.1968	0.2468
HOS	3.6160	3.7438	3.7015	3.4746	3.4810	3.6737	3.4337
RAC	0.9634	0.9746	0.9733	0.9432	0.9478	0.9739	0.9541

TABLE 5 The Mean Values of A11 Economic and Demographic Variables in the Butter Models

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
MT	0.1145	0.1150	0.1037	0.1242	0.1164	0.1286	0.1192
FT	0.1287	0.1370	0.1201	0.1381	0.1348	0.1048	0.1262
F5	0.1371	0.1407	0.1643	0.1084	0.1208	0.1454	0.1109
F6-12	0.1478	0.1596	0.1629	0.1308	0.1252	0.1594	0.1224
FE	0.1491	0.1376	0.1546	0.1475	0.1418	0.1412	0.1690
ED1	0.5236	0.5584	0.5534	0.5336	0.4894	0.4139	0.4253
ED2	0.4508	0.4167	0.4203	0.4360	0.4754	0.5720	0.5599
ES1	0.3827	0.4060	0.4091	0.3792	0.3406	0.3370	0.3182
ES2	0.4331	0.4245	0.4068	0.4132	0.4605	0.5132	0.5038
OC1	0.2433	0.2414	0.2533	0.2331	0.2460	0.2209	0.2448
OC2	0.3136	0.3082	0.3003	0.3282	0.3213	0.3300	0.3233
SO1	0.3694	0.3505	0.4088	0.3564	0.3730	0.3692	0.3156
SO2	0.3697	0.3938	0.3541	0.3557	0.3660	0.3776	0.3890
IN1	0.3315	0.3339	0.3344	0.3438	0.3064	0.3762	0.2946
IN2	0.2673	0.2734	0.2815	0.2389	0.2539	0.2545	0.2799
IN3	0.2420	0.2452	0.2420	0.2180	0.2416	0.2293	0.2838
HOS	3.6075	3.7055	3.6995	3.4876	3.4998	3.6563	3.4146
RAC	0.9627	0.9758	0.9739	0.9410	0.9457	0.9706	0.9515

TABLE 6. The Mean Values of All Behavioristic Variables in the Models

Product	Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
Regular	AFTM	2.72	2.66	2.75	2.78	2.81	2.69	2.57
Whole Milk	CH2M	3.68	3.75	3.62	3.70	3.70	3.62	3.72
	HATM	2.39	2.43	2.36	2.32	2.36	2.43	2.47
	REFM	4.95	4.97	4.95	4.88	4.82	5.02	5.05
	RELM	4.14	4.09	4.14	4.14	4.14	4.14	4.25
	BALM	4.95	4.93	5.02	4.91	4.88	4.99	4.89
Lowfat/	AFTM	2.71	2.65	2.74	2.78	2.81	2.69	2.58
Skim Milk	CH2M	3.68	3.75	3.61	3.71	3.68	3.61	3.72
	HATM	2.39	2.44	2.35	2.34	2.35	2.42	2.45
	REFM	4.95	4.97	4.95	4.88	4.83	5.04	5.06
	RELM	4.15	4.09	4.15	4.14	4.15	4.16	4.26
	BALM	4.96	4.94	5.03	4.91	4.89	4.99	4.90
	WEIL	4.62	4.65	4.58	4.71	4.71	4.51	4.46
	WATL	3.51	3.55	3.43	3.62	3.81	3.51	3.24
Any Cheese	HEAC	5.24	5.21	5.25	5.24	5.26	5.28	5.25
Except Cottage	TASC	5.47	5.41	5.47	5.51	5.53	5.51	5.48
Cheese	FATC	4.34	4.39	4.27	4.45	4.36	4.25	4.28
	CHOC	4.19	4.25	4.16	4.23	4.14	4.09	4.16
Butter	HEAB	4.16	4.05	4.26	4.17	4.13	4.28	4.08
	TABM	4.09	4.41	4.09	3.89	3.61	4.18	4.12
	CH2B	3.62	3.75	3.56	3.69	3.51	3.47	3.53
	HATB	3.50	3.62	3.45	3.41	3.34	3.50	3.68
	WEIB	4.50	4.56	4.39	4.58	4.54	4.44	4.55

TABLE 7. Comparison of Simulated Probability of Consumption Among Income Levels on the Basis (= 100) of Omitted Group

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
Regular Whole Milk							
10,000 (omitted group)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
10,000 – 19,999	93.9**	98.3	93.3**	95.7**	90.0**	96.9	88.4**
20,000 – 29,999	89.4**	94.4**	88.5**	93.4**	89.1**	86.6**	82.3**
30,000 and over	84.9**	89.3**	81.9**	87.8**	92.6**	81.1**	80.3**
Lowfat/Skim Milk							
10,000	100.0	100.0	100.0	100.0	100.0	100.0	100.0
10,000 – 19,999	108.8**	110.7**	101.7	120.2**	88.5*	119.2**	111.0**
20,000 – 29,999	111.8**	114.7**	108.0**	116.3**	82.0**	115.1*	111.2**
30,000 and over	112.4**	124.4**	102.2	124.1**	87.8*	115.7*	105.8
Any Cheese Except Cottage Cheese							
10,000	100.0	100.0	100.0	100.0	100.0	100.0	100.0
10,000 – 19,999	101.4**	100.5	101.3**	106.6*	100.7	103.0**	101.6**
20,000 – 29,999	101.6**	101.0	100.9	101.8*	102.1	102.9**	101.0
30,000 and over	102.5**	102.1**	102.0**	103.1**	102.6	103.3**	100.7
Butter							
10,000	100.0	100.0	100.0	100.0	100.0	100.0	100.0
10,000 – 19,999	105.6**	108.1**	106.2**	101.3	105.3	105.0	105.6*
20,000 – 29,999	109.4**	108.7**	108.4**	110.1**	116.4**	109.1*	108.4*
30,000 and over	112.9**	110.4**	113.0**	113.6**	121.2**	108.2	113.2**

TABLE 8 Simulated Frequency of Drinking Regular Whole Milk for Behavioristic Variables

Region	Rank[1]	AFTM	CH2M	HATM	REFM	RELM	BALM
U.S.	1	0.7681	0.7566	0.7595	0.4988	0.7279	0.6821
	2	0.7572	0.7538	0.7521	0.5679	0.7348	0.6999
	3	0.7459	0.7511	0.7444	0.6345	0.7415	0.7172
	4	0.7343	0.7483	0.7367	0.6963	0.7481	0.7338
	5	0.7224	0.7455	0.7288	0.7517	0.7547	0.7498
	6	0.7102	0.7426	0.7207	0.7999	0.7611	0.7651
Northeast	1	0.8137	0.8061	0.8057	0.5508	0.7969	0.6931
	2	0.8053	0.8032	0.8004	0.6220	0.7973	0.7224
	3	0.7943	0.8003	0.7951	0.6884	0.7977	0.7500
	4	0.7830	0 7974	0.7841	0.7992	0.7985	0.7757
	5	0.7712	0.7944	0.7841	0.7992	0.7985	0.7995
	6	0.7589	0.7914	0.7784	0.8424	0.7988	0.8213
Northcentral	1	0.7255	0.7171	0.7182	0.4455	0.6801	0.6501
	2	0.7126	0.7116	0.7067	0.5134	0.6873	0.6635
	3	0.6993	0.7060	0.6950	0.5809	0.6945	0.6767
	4	0.6856	0.7004	0.6830	0.6454	0.7015	0.6896
	5	0.6716	0.6947	0.6708	0.7051	0.7085	0.7022
	6	0.6573	0.6889	0.6583	0.7584	0.7153	0.7145
South	1	0.8103	0.8024	0.7995	0.4990	0.7839	0.7098
	2	0.7991	0.7979	0.7924	0.5837	0.7859	0.7320
	3	0.7875	0.7933	0.7852	0.6637	0.7878	0.7530
	4	0.7753	0.7887	0.7778	0.7354	0.7898	0.7728
	5	0.7627	0.7839	0.7702	0.7964	0.7917	0.7915
	6	0.7496	0.7791	0.7624	0.8463	0.7936	0.8091
South	1	0.8103	0.8024	0.7995	0.4990	0.7839	0.7098
	2	0.7991	0.7979	0.7924	0.5837	0.7859	0.7320
	3	0.7875	0.7933	0.7852	0.6637	0.7878	0.7530
	4	0.7753	0.7887	0.7778	0.7354	0.7898	0.7728
	5	0.7627	0.7839	0.7702	0.7964	0.7917	0.7915
	6	0.7496	0.7791	0.7624	0.8463	0.7936	0.8091
Southwest	1	0.8242	0.8106	0.8089	0.5625	0.7455	0.7592
	2	0.8147	0.8091	0.8073	0.6362	0.7662	0.7721
	3	0.8048	0.8077	0.8057	0.7041	0.7858	0.7846
	4	0.7945	0.8062	0.8040	0.7640	0.8041	0.7966
	5	0.7838	0.8048	0.8024	0.8149	0.8212	0.8080
	6	0.7728	0.6033	0.8008	0.8569	0.8372	0.8190
Mountain	1	0.7615	0.7900	0.7455	0.6393	0.6470	0.7197
	2	0.7531	0.7743	0.7466	0.6680	0.6809	0.7267
	3	0.7445	0.7578	0.7478	0.6956	0.7129	0.7337
	4	0.7358	0.7405	0.7489	0.7218	0.7430	0.7405
	5	0.7268	0.7225	0.7500	0.7466	0.7709	0.7472
	6	0.7177	0.7036	0.7511	0.7699	0.7967	0.7537
Pacific	1	0.6969	0.6775	0.6986	0.4016	0.6486	0.6428
	2	0.6906	0.6810	0.6907	0.4735	0.6606	0.6544
	3	0.6842	0.6844	0.6827	0.5464	0.6724	0.6658
	4	0.6777	0.6879	0.6746	0.6174	0.6840	0.6771
	5	0.6712	0.6913	0.6664	0.6837	0.6954	0.6881
	6	0.6646	0.6947	0.6582	0.7433	0.7065	0.6989

TABLE 9 Simulaeted Frequency of Drinking Lowfat/Skim Milk for Behavioristic Variables

Region	Rank[1]	AFTM	CH2M	HATM	REFM	RELM	BALM	WEIL	WATL
U.S.	1	0.6515	0.6193	0.6114	0.4301	0.6128	0.5685	0.6105	0.8121
	2	0.6431	0.6259	0.6299	0.4830	0.6205	0.5862	0.6179	0.7512
	3	0.6346	0.6325	0.6480	0.5363	0.6282	0.6036	0.6252	0.6783
	4	0.6260	0.6390	0.6656	0.5887	0.6358	0.6208	0.6325	0.5956
	5	0.6173	0.6455	0.6829	0.6392	0.6434	0.6376	0.6397	0.5070
	6	0.6085	0.6519	0.6996	0.6869	0.6509	0.6542	0.6468	0.4181
Northeast	1	0.5860	0.5501	0.5527	0.3932	0.5197	0.5646	0.5459	0.7783
	2	0.5771	0.5578	0.5655	0.4372	0.5365	0.5663	0.5529	0.7062
	3	0.5682	0.5655	0.5783	0.4822	0.5532	0.5680	0.5598	0.6220
	4	0.5592	0.5731	0.5909	0.5275	0.5698	0.5697	0.5668	0.5297
	5	0.5502	0.5807	0.6035	0.5723	0.5862	0.5714	0.5737	0.4353
	6	0.5412	0.5883	0.6159	0.6160	0.6025	0.5731	0.5806	0.3454
Northcentral	1	0.7543	0.7024	0.7130	0.5350	0.7288	0.6453	0.7155	0.8677
	2	0.7424	0.7144	0.7281	0.5891	0.7303	0.6684	0.7206	0.8211
	3	0.7302	0.7262	0.7426	0.6412	0.7317	0.6907	0.7255	0.7625
	4	0.7175	0.7377	0.7567	0.6901	0.7331	0.7122	0.7305	0.6919
	5	0.7045	0.7489	0.7702	0.7351	0.7345	0.7327	0.7353	0.6110
	6	0.6912	0.7597	0.7832	0.7757	0.7360	0.7523	0.7401	0.5235
South	1	0.5630	0.5343	0.5162	0.3610	0.5267	0.4894	0.5096	0.7611
	2	0.5586	0.5420	0.5453	0.4093	0.5357	0.5062	0.5219	0.6903
	3	0.5542	0.5497	0.5740	0.4594	0.5448	0.5231	0.5342	0.6092
	4	0.5498	0.5573	0.6023	0.5103	0.5538	0.5398	0.5464	0.5216
	5	0.5454	0.5649	0.6298	0.5611	0.5628	0.5565	0.5586	0.4327
	6	0.5410	0.5725	0.6566	0.6106	0.5718	0.5731	0.5707	0.3479
Southwest	1	0.5146	0.4534	0.4778	0.2963	0.4456	0.4981	0.4015	0.7096
	2	0.5065	0.4707	0.4941	0.3453	0.4627	0.4985	0.4276	0.6400
	3	0.4984	0.4880	0.5104	0.3979	0.4799	0.4990	0.4541	0.5640
	4	0.4903	0.5054	0.5267	0.4529	0.4972	0.4995	0.4808	0.4849
	5	0.4822	0.5228	0.5429	0.5091	0.5144	0.4999	0.5076	0.4065
	6	0.4741	0.5401	0.5590	0.5650	0.5316	0.5004	0.5344	0.3326
Mountain	1	0.7300	0.7200	0.6771	0.3254	0.7290	0.7101	0.7314	0.8736
	2	0.7294	0.7235	0.7140	0.4246	0.7290	0.7149	0.7307	0.8260
	3	0.7288	0.7269	0.7482	0.5302	0.7290	0.7197	0.7300	0.7652
	4	0.7282	0.7303	0.7795	0.6332	0.7290	0.7244	0.7293	0.6912
	5	0.7277	0.7337	0.8080	0.7253	0.7290	0.7290	0.7287	0.6059
	6	0.7271	0.7370	0.8336	0.8015	0.7290	0.7336	0.7280	0.5136
Pacifi	1	0.7094	0.7071	0.6842	0.5225	0.6917	0.5586	0.6359	0.8508
	2	0.7020	0.7036	0.6940	0.5680	0.6935	0.5961	0.6543	0.7922
	3	0.6944	0.7001	0.7037	0.6124	0.6953	0.6325	0.6722	0.7181
	4	0.6867	0.6966	0.7132	0.6549	0.6971	0.6675	0.6896	0.6299
	5	0.6789	0.6931	0.7225	0.6951	0.6989	0.7008	0.7065	0.5322
	6	0.6711	0.6895	0.7317	0.7326	0.7007	0.7320	0.7228	0.4318

Table 10 Simulated Frequency of Use of Any Cheese Except Cottage Cheese for Behavioristic Variables

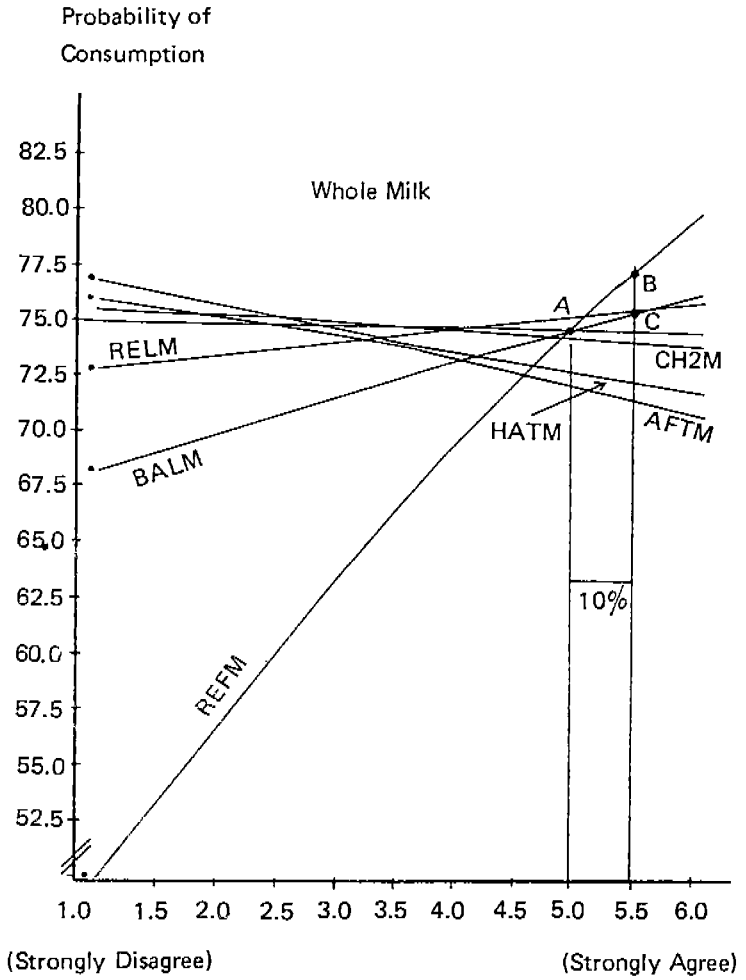
Region	Rank[1]	HEAC	TASC	FATC	CHOC
U.S.	1	0.9295	0.6161	0.9673	0.9680
	2	0.9385	0.7470	0.9655	0.9659
	3	0.9464	0.8445	0.9636	0.9637
	4	0.9534	0.9090	0.9616	0.9613
	5	0.9595	0.9484	0.9594	0.9588
	6	0.9648	0.9712	0.9572	0.9561
Northeast	1	0.9273	0.6349	0.9698	0.9717
	2	0.9383	0.7635	0.9681	0.9695
	3	0.9477	0.8571	0.9664	0.9671
	4	0.9574	0.8911	0.9675	0.9672
	5	0.9651	0.9358	0.9649	0.9651
	6	0.9714	0.9629	0.9620	0.9629
South	1	0.9170	0.6147	0.9523	0.9535
	2	0.9258	0.7328	0.9513	0.9520
	3	0.9336	0.8251	0.9502	0.9505
	4	0.9407	0.8902	0.9490	0.9489
	5	0.9471	0.9331	0.9479	0.9473
	6	0.9528	0.9599	0.9467	0.9456
Southwest	1	0.9372	0.5171	0.9682	0.9575
	2	0.9410	0.6708	0.9640	0.9558
	3	0.9445	0.7949	0.9593	0.9540
	4	0.9479	0.8806	0.9540	0.9522
	5	0.9511	0.9335	0.9481	0.9503
	6	0.9541	0.9639	0.9414	0.9483
Mountain	1	0.8500	0.4975	0.9876	0.9909
	2	0.9041	0.7028	0.9857	0.9884
	3	0.9400	0.8495	0.9836	0.9851
	4	0.9630	0.9309	0.9811	0.9809
	5	0.9774	0.9698	0.9783	0.9809
	6	0.9863	0.9871	0.9751	0.9688
Pacific	1	0.9848	0.4830	0.9670	0.9835
	2	0.9832	0.6855	0.9702	0.9815
	3	0.9814	0.8356	0.9732	0.9794
	4	0.9793	0.9222	0.9758	0.9770
	5	0.9771	0.9651	0.9782	0.9743
	6	0.9747	0.9847	0.9804	0.9713

1 One is definitely disagree and six is definitely agree.

Table 11 Simulated Frequency of Use of Butter for Behavioristic Variables

Region	Rank[1]	HEAB	TABM	CH2B	HATB	WEIB
U.S.	1	0.7851	0.5027	0.8489	0.8540	0.8791
	2	0.7998	0.6263	0.8416	0.8445	0.8663
	3	0.8138	0.7358	0.8340	0.8344	0.8524
	4	0.8270	0.8221	0.8262	0.8239	0.8373
	5	0.8395	0.8847	0.8180	0.829	0.8209
	6	0.8512	0.9272	0.8096	0.8013	0.8033
Northeast	1	0.8461	0.5515	0.9074	0.8976	0.9232
	2	0.8596	0.6773	0.8995	0.8926	0.9137
	3	0.8721	0.7817	0.8910	0.8875	0.9031
	4	0.8836	0.8594	0.8819	0.8821	0.8914
	5	0.8942	0.9125	0.8721	0.8766	0.8784
	6	0.9040	0.9468	0.8617	0.8708	0.8642
Northcentral	1	0.7556	0.5238	0.8502	0.8573	0.8884
	2	0.7813	0.6415	0.8434	0.8475	0.8738
	3	0.8049	0.7443	0.8363	0.8371	0.8576
	4	0.8266	0.8256	0.8289	0.8261	0.8397
	5	0.8464	0.8851	0.8213	0.8146	0.8200
	6	0.8642	0.9261	0.8135	0.8025	0.7985
South	1	0.7592	0.5198	0.8329	0.8345	0.8715
	2	0.7776	0.6371	0.8261	0.8263	0.8572
	3	0.7950	0.7401	0.8191	0.8178	0.8416
	4	0.8114	0.8220	0.8119	0.8090	0.8246
	5	0.8267	0.8822	0.8044	0.7998	0.8063
	6	0.8411	0.9239	0.7968	0.7903	0.7865
Southwest	1	0.7528	0.4371	0.7406	0.7660	0.7994
	2	0.7451	0.5547	0.7356	0.7503	0.7808
	3	0.7371	0.6665	0.7306	0.7338	0.7609
	4	0.7291	0.7623	0.7255	0.7166	0.7399
	5	0.7209	0.8372	0.7203	0.6988	0.7177
	6	0.7125	0.8919	0.7151	0.6804	0.6943
Mountain	1	0.8432	0.4220	0.8756	0.8482	0.8356
	2	0.8387	0.5689	0.8579	0.8404	0.8334
	3	0.8341	0.7046	0.8381	0.8323	0.8312
	4	0.8294	0.8117	0.8162	0.8238	0.8290
	5	0.8246	0.8862	0.7920	0.8150	0.8268
	6	0.8197	0.9337	0.7655	0.8059	0.8246
Pacific	1	0.7744	0.4574	0.8348	0.8748	0.8451
	2	0.7894	0.5904	0.8285	0.8558	0.8380
	3	0.8037	0.7113	0.8220	0.8344	0.8305
	4	0.8173	0.8082	0.8153	0.8105	0.8228
	5	0.8301	0.8781	0.8084	0.7841	0.8148
	6	0.8422	0.9249	0.8013	0.7552	0.8066

Figure 1. ESTIMATED CONSUMPTION PROBABILITY FOR SELECTED MILK PRODUCTS IN RESPONSE TO CHANGE IN SELECTED PRODUCT CHARACTERISTICS, US



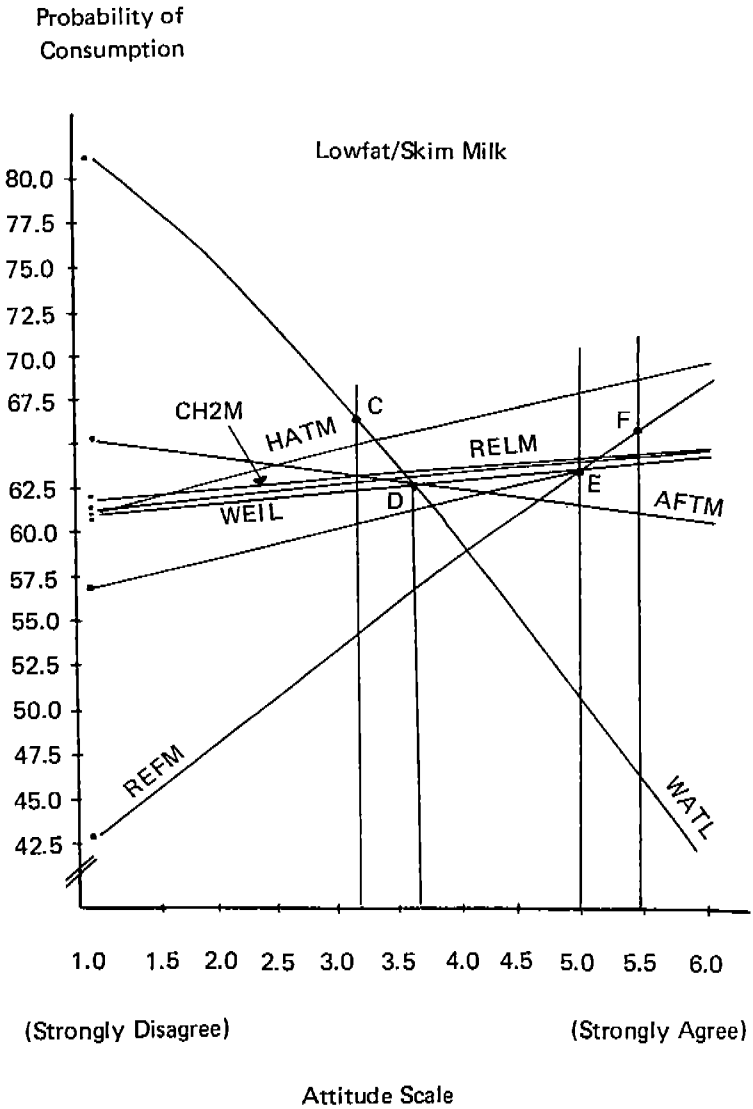


TABLE 12 Estimated Per Capita Annual Quantity Consumption Response to a 10 percent Increase in Behavioristic Variable, Regular Whole Milk[1]

Variable	U.S.	Northease	Northcentral	South	Southwest	Maintain	Pacific
AFTM	−1.5040**	−1.3758**	−1.8985**	−1.5815**	−1.3590**	−1.1937	−0.8532
	(27.73)	(7.43)	(10.74)	(7.01)	(2.26)	(0.73)	(0.81)
CH2M	−0.5024	−0.519	−1.0487	−0.8329	−0.2597	−3.2406*	0.6643
	(1.14)	(0.36)	(1.28)	(0.74)	(0.03)	(2.04)	(0.17)
HATM	−0.8869**	−0.6137	−1.4197**	−0.8059*	0.1821	0.1416	−1.0218
	(8.34)	(1.22)	(5.36)	(1.70)	(0.04)	(0.01)	(0.88)
REFM	12.6421**	11.1112**	14.4901**	13.3604**	11.1483**	6.2014**	16.4358**
	(311.44)	(75.74)	(97.75)	(92.25)	(29.67)	(2.93)	(34.92)
RELM	1.3286**	0.0742	1.4871*	0.3878	3.5037**	6.1171**	2.5156*
	(5.84)	(0.01)	(1.83)	(0.12)	(4.04)	(5.48)	(1.56)
BALM	3.8004**	5.3246**	3.2103**	4.3197**	2.6471*	1.7029	2.7753*
	(29.73)	(18.15)	(4.88)	(9.88)	(1.70)	(0.24)	(1.33)

1 Quantity consumption response is proposed for reference. The estimated linear relationship in between regular whole milk per capita annual quantity consumption, Qw (see Table 1), and the consumption probability of regular whole milk, Fw

$\hat{Q}w = -97.9701 + 3.3721 * \hat{F}w$, $r = 0.9287$, (number in parenthesis is t value).
(4.3363)

TABLE 13 Estimated Per Capita Annual Quantity Consumption Response to a 10 Percent Increase in Behavioristic Variable, Lowfat/Skim Milk[1]

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
AFTM	−0.9746**	−1.0812*	−1.3122**	−0.5736	−1.1549	−0.0609	−0.7817
	(11.55)	(2.68)	(9.74)	(0.56)	(0.77)	(0.00)	(1.12)
CH2M	1.0102**	1.3122*	1.6016**	1.3224	3.2488*	0.4822	−0.5229
	(4.67)	(1.35)	(5.59)	(1.18)	(2.41)	(0.07)	(0.18)
HATM	1.8224**	1.4264**	1.3325**	3.1422**	1.9442*	3.2894**	0.9543
	(33.81)	(3.72)	(8.48)	(15.03)	(2.05)	(6.83)	(1.24)
REFM	10.2668**	10.0840**	8.2540**	11.4698**	13.8100**	16.6578**	7.8225**
	(183.44)	(30.79)	(57.91)	(35.35)	(17.13)	(28.92)	(13.07)
RELM	1.3224**	3.0788**	0.2284	1.7488**	3.6397*	−0.0001	0.3046
	(5.63)	(5.96)	(0.08)	(1.44)	(1.94)	0.00)	(0.04)
BALM	3.4849**	0.3833	3.9011**	3.8123**	0.1142	0.9087	6.3529**
	(22.64)	(0.05)	(12.89)	(4.09)	(0.00)	(0.10)	(10.90)
WEIL	1.3960**	1.4645	0.2934	2.6752**	6.4113**	−0.1218	3.0178**
	(6.34)	(1.23)	(1.14)	(3.16)	(6.27)	(0.00)	(4.72)
WATL	−12.2440**	−15.0638**	−9.2794**	−14.8988**	−15.3557**	−10.2515**	−11.0231**
	(1403.24)	(372.67)	(388.36)	(280.91)	(87.36)	(62.35)	(194.97)

1 This table is constructed by means of the estimated linear relationship in between lowfat/skim milk per capita annual quantity consumption, Q1, and the consumption probability of lowfat/skim milk, F1, i.e. $\hat{Q}1 = 73.7322 + 2.5381$ (1.8259)

*$\hat{F}1$, r = 0.7255, (number in parenthesis is t value).

TABLE 14 Estimated Per Capita Annual Quantity Consumption Response to a 10 Percent Increase in Behavioristic Variable, Any Cheese Except Cottage Cheese[1]

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
HEAC	0.9426**	1.1441**	1.1844*	0.9381**	0.5284	3.3105**	−0.5396
	(18.18)	(6.20)	(10.57)	(2.94)	(0.32)	(3.60)	(0.64)
TASC	4.0882**	4.2001**	3.4434**	4.4441**	5.3733**	4.8539**	4.5561**
	(642.39)	(173.78)	(165.93)	(102.77)	(46.36)	(39.70)	(104.69)
FATC	−0.2978**	−0.3000	−0.3784*	−0.1545	−0.8418*	−0.6112	0.4500
	(3.79)	(0.81)	(2.29)	(0.16)	(2.00)	(0.72)	(1.15)
CHOC	−0.3381**	−0.4164*	−0.2888	−0.2082	−0.2575	−1.0478*	−0.4634
	(4.58)	(1.50)	(1.21)	(0.28)	(0.20)	(2.10)	(1.08)

1 This table is constructed by the medium of the estimated linear relationship between any cheese except cottage cheese per capita annual quantity consumption, Qc, and the consumption probability of any cheese except cottage cheese, Fc, i.e. $\hat{Q}c = -192.7942 + 2.2389 \times \hat{F}c$, $r = 0.8273$, (number in parenthesis is t value).
(2.5511)

TABLE 15 Estimated Annual Per Capita Quantity Consumption Response to a 10 Percent Increase in Behavioristic Variable, Butter[1]

Variable	U.S.	Northeast	Northcentral	South	Southwest	Mountain	Pacific
HEAB	0.0349**	0.0309**	0.0573**	0.0427**	)0.0227	−0.0138	0.0364**
	(27.67)	(7.74)	(21.60)	(8.02)	(0.57)	(0.16)	(2.99)
TABM	0.1938**	0.1671**	0.1850**	0.1859**	0.2275**	0.2383**	0.2234**
	(1602.35)	(346.99)	(473.90)	(295.70)	(132.27)	(94.01)	(196.56)
CH2B	−0.0188**	−0.0241**	−0.0175**	−0.0175*	−0.0121	−0.0513**	−0.0161
	(15.12)	(7.45)	(4.15)	(2.33)	(0.33)	(5.12)	(1.18)
HATB	−0.0244**	−0.0135*	−0.0251**	−0.0196**	−0.0383**	−0.0200	−0.0608**
	(22.51)	(2.13)	(7.77)	(2.92)	(3.14)	(0.67)	(11.65)
WEIB	−0.0485**	−0.0412**	−0.0569**	−0.0553**	−0.0680**	−0.0067	−0.0248
	(48.21)	(10.14)	(22.00)	(11.83)	(5.04)	(0.04)	(1.16)

1 This table is constructed by the medium of the estimated linear relationship in between butter per capita annual quantity consumption, Qb, and the consumption probability of butter, Fb, i.e. $\hat{Q}b = 1.3094 + 0.04244^{*}\ \hat{F}b$, r = (1.6009) 0.6787, (number in parenthesis is t value).

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乳品之消費特質：偏好和態度

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摘要

1970和1980年代，美國人全脂牛乳之消費逐次爲低脂肪牛乳取代。此期間，促銷廣告亦被列爲增加乳品需求之重要行銷策略。本研究藉助「消費者調查資料」（The Consumer Survey Data AUTS），以累積對數函數式最大概似法探究影響全脂牛乳、低脂肪牛乳、硬質乳酪和奶油購買頻率和每人消費量的理由，引之分析乳品1970和1980年代促銷廣告的有效性。

除傳統上之解釋變數外，研究模型也包括對產品風味和對健康關心等態度變數（attitude variables）。研究發現：價格和所得並不能完全說明消費者對乳品的購買行爲。消費者對乳品味道之反應最具影響力。「健康」也是重要因素，惟不若「味道」一項重要，其與消費頻率的關係曲線較爲平坦。研究尤其指出：「平淡無味」對低脂肪牛乳的購買決策有相當顯著地影響力。研究結果建議：何以提高消費者對乳品味道的接受性或改變乳品的風味，迎合消費者偏好，是爲增加消費的最佳促銷策略。

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