Effects of Fluid Milk Advertising in Taiwan

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ABSTRACT

This study utilized the cluster analysis to examine effectiveness of fluid milk advertising in Taiwan. Consumers with different perceptions of advertising were grouped into three clusters. The "high-perception" cluster consisted of larger percentage of women at ages 26 to 35, with higher household income, and living in smaller households. The "low-perception" cluster consisted of more male, older people, with lower household income, and living in larger households. Consumers who were more sensitive to fluid milk advertising tended to consume more fluid milk after perceiving advertising.

Key words: Milk advertising, Consumer perceptions

INTRODUCTION

Consumption of dairy products in Taiwan has gradually increased in the last decade. Due to increased income and nutritional concerns, consumers have conceptualized milk as an ordinary food. Dairy products, especially fluid milk, used to be considered only for very young children, elder people, or someone recovering from illness. Now a lot of families in Taiwan purchase fluid milk regularly and use it to substitute soft drinks. In 1989, the annual per capita consumption of fluid milk was 17 kilograms in Taiwan. This amount has increased to 27 kilograms in 1998.

Fluid milk products, including fresh milk, flavored milk, and fermented milk, are the most important dairy products consumed in Taiwan. Consumption patterns of fluid milk products from 1989 to 1998 are shown in Figure 1. Among fluid milk products, fresh milk is the most favored. Since 1992, the annual per capita consumption of flavored milk has shown a decreasing trend, while annual per capita consumption of fresh milk and fermented milk have been increasing.

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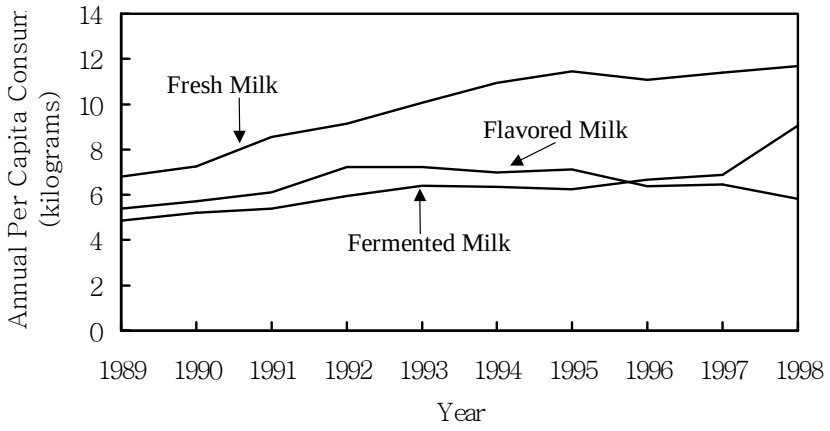

Figure 1. Annual Per Capita Consumption of Fluid Milk Products in Taiwan, 1989-1998

The annual per capita consumption of fluid milk in Taiwan is relatively low, comparing it of most developed countries. Based on data published by the Foreign Agricultural Service, United States Department of Agriculture, annual per capita consumption of fluid milk in 1998 was 96 kilograms in United States, 99 kilograms in Canada, 111 kilograms in Denmark, 70 kilograms in France, 170 kilograms in Ireland, 118 kilograms in United Kingdom, 101 kilograms in Australia, and 116 kilograms in New Zealand (Table1). However, annual per capita consumption of fluid milk in Taiwan was about 27 kilograms in 1998, which suggests a great potential to expand the market of fluid milk products.

Table 1. Annual Per Capita Consumption of Fluid Milk in Selected Countries

	1994 (kilograms)	1995 (kilograms)	1996 (kilograms)	1997 (kilograms)	1998 (kilograms)
Canada	101.02	100.27	98.26	97.13	96.18
United States	102.08	100.90	100.91	99.76	98.70
Austria	141.92	156.01	156.11	158.84	159.97
Denmark	108.72	109.43	109.39	109.34	110.83
France	75.92	76.17	74.75	68.24	69.60
Ireland	190.43	189.84	190.57	167.48	169.56
Netherlands	112.31	111.50	109.52	107.13	106.52
Sweden	159.25	158.02	159.57	158.12	156.73
United Kingdom	123.85	125.74	124.39	118.71	118.32
Australia [1/]	102.67	102.55	105.51	101.38	101.09
New Zealand [2/]	130.14	129.14	128.49	116.29	115.82
Mexico	35.79	35.72	35.63	36.41	37.69
Brazil	54.49	68.59	70.08	73.55	77.14
Chile	24.32	25.38	25.86	27.89	28.22
Japan	41.87	40.98	41.20	40.82	39.78
Taiwan	24.27	24.82	24.10	24.72	26.56

Source: Foreign Agricultural Service, U.S. Department of Agriculture

[1/]Year ending June 30 of the year showed.

[2/]Year ending May 31 of the year showed.

Production of raw milk in Taiwan was about 144 metric tons in 1987. This amount had increased more than twofold to 331 metric tons in 1997. However, the percentage of self-sufficiency of raw milk was about 20% in Taiwan. Consumption of dairy products heavily depends upon imports. As shown in Table 2, the volume of dairy product imports has been increasing and maintained at about 145 thousand metric tons per year, while the value of dairy product imports fluctuated with exchange rates. Figure 2 shows the origins of exporting dairy products to Taiwan in 1998. New Zealand and Australia are the major exporting countries.

Table 2. Volume and Value of Dairy Product Imports of Taiwan

Year	Volume (metric ton)	Value ($1,000 USD)
1985	77,191	149,220
1986	88,560	158,454
1987	84,617	154,033
1988	92,148	179,370
1989	106,474	298,272
1990	108,426	297,588
1991	128,363	354,256
1992	135,371	377,847
1993	144,563	392,218
1994	145,371	336,424
1995	152,519	379,581
1996	146,934	386,769
1997	144,846	363,490

Source: Agricultural Trade Statistics, Taiwan

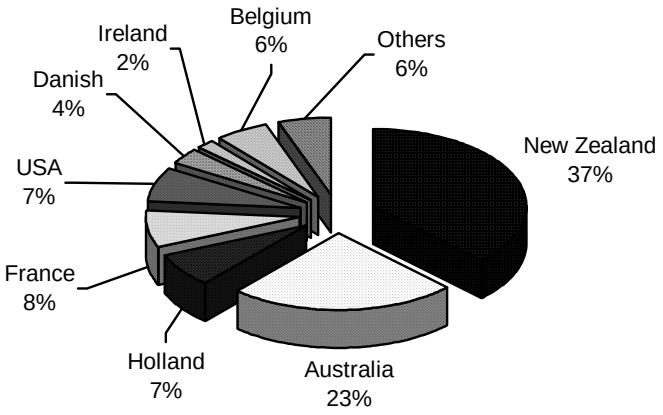

Figure 2. Origins of Exporting Dairy Products to Taiwan in 1998

Currently, there are twelve brands of fresh and flavored milk product, and seven brands of yogurt drinks in Taiwan. In order to increase consumption of fluid milk, generic advertising has been conducted by agricultural administration every winter since 1989, and the dairy industry also spends money on branded milk advertising. However, branded fluid milk

advertising is applied much more often than generic advertising in promotion. The money spent on branded milk advertising of fresh milk was 1.6 million U.S. dollars in 1988, while that had increased to 5.5 million U.S. dollars in 1995, grown 2.4 times over the period with the annual increasing rate of 20 percent. Advertising is considered the major marketing strategy to promote fluid milk consumption in Taiwan. However, lacking of research on consumer perceptions of fluid milk advertising reduces efficiency and effectiveness of advertising. In order to meet the gap of research, the objective of this study is to classify consumers based on their perceptions of fluid milk advertising in Taiwan. Demographic characteristics are considered, and brand preferences of classified consumers are evaluated.

RELATED RESEARCH

Lenz, Kaiser, and Chung (1998) estimated the responsiveness of fluid milk sales to advertising in New York City, Albany, Syracuse, Rochester, and Buffalo markets. Fluid milk demand equations for these five markets were estimated with monthly data for the period from January 1986 through June 1995. The demand equations included explanatory variables of retail milk prices, per capita weekly earnings in the manufacturing sector, index of consumer fat concerns, competing beverage advertising expenditures, generic milk advertising expenditures, trigonometric seasonal variables, and annual indicators. They concluded that generic milk advertising had positive and significant influences in each market. Spending on generic milk advertising over the period from 1987 to 1995 had been profitable for dairy farmers. The weighted average rate of return for the five markets was US$1.84 for an additional dollar spent on generic milk advertising.

Vande Kamp and Kaiser (1999) examined irreversibility in the advertising-demand relation in the short and long run to evaluate fluid milk advertising responses in New York City, U.S. Advertising was treated as a stock called goodwill and could be accumulated and decayed over time. They found that an increase in advertising goodwill had an immediate positive impact on demand; however, a decrease in goodwill would not significantly reduce demand in the current and next period. Consumption would gradually decline in the long-run to respond reduction in fluid milk advertising.

Kaiser (1997) estimated the effects of generic advertising on dairy markets at retailing, wholesaling, and farm levels in U.S. Quarterly data from 1975 through 1995 were utilized in a dynamic model. Results indicated that retail, wholesale, and farm markets of dairy products were all influenced by generic dairy advertising. For every U.S. dollar invested over the period 1984-95, farmers received an average rate of return of US$3.40. Moreover, the return of

investment in advertising was higher in the most recent years, about twofold the average of previous 11 years.

Capps and Schmitz (1991) used the polynomial distributed lag model to estimate the effects of television and radio advertising on fluid milk demand in Texas, U.S. Monthly data from January 1980 to September 1988 were used. The results showed that generic advertising expenditures generated rightward shifts in demand for fluid milk in Texas. He also concluded that television advertising generated responses which worn off more quickly than radio advertising. The long-run effect of radio advertising is about 1.75 times greater than the long-run effect of television advertising.

Suzuki and Kaiser (1997) examined whether the assumption of perfect competition in the U.S. dairy industry biased the findings of economic impacts of generic dairy advertising. Quarterly data from 1975 through 1995 were utilized. Results from an imperfect competition model were compared with results from a perfect competition model. They found that generic fluid milk advertising had positive impacts on fluid and manufactured milk markets in U.S. in terms of increasing producer prices and Class I volume. The differences in magnitude of impacts between the two models were small, indicating that the assumption of perfect competition for U.S. dairy markets was plausible.

Watanabe, Suzuki, and Kaiser (1997) used the consumer data from a Japanese consumer survey conducted by National Milk Promotion Association of Japan to examine consumer preferences toward milk and other beverages. Quantification Theory Type III technique was applied to quantify preferences for milk and other beverages of Japanese consumers. Cluster analysis was utilized to identify demographic and socioeconomic characteristics associated with degrees of preferences for milk products. Results showed that men, middle-aged, and consumers with no calcium concerns preferred soda drinks and alcoholic beverages. Younger people, larger families, and consumers with calcium concerns consumed milk more frequently.

Jensen (1995) measured the impacts of using nutritional information and household socioeconomic characteristics on market participation and household consumption of whole and low-fat milk products in the southern states of U.S. Data from the 1987-88 Nationwide Food Consumption Survey were used. Three models (Cragg Market Participation, Tobit, and Complete Dominance) were applied. Nutritional information from health professionals, packaging or labels, and media sources were considered. Results showed that using nutritional information affected market participation, but had limited effects on purchasing amount. Results also suggested promotion of milk products on the basis of nutritional benefits through

health professionals and product packaging could be useful for the dairy industry to increase market participation of consumers.

Venkateswaran and Kinnucan (1990) measured the campaigns of generic fluid milk advertising in Ontario, Canada, using different functional forms. The appropriate functional form for examining responses of sales to advertising was evaluated. Quarterly data from the first quarter of 1973 through the last quarter of 1984 were used. Data of fluid milk consumption, advertising prices and expenditures, prices of orange juice, disposable personal income, and average age of consumers were also included in the analysis. Four functional forms, double-log, semi-log, log-inverse, and inverse function, were utilized to examine the milk demand. Results indicated that the generic advertising programs of fluid milk had significantly increased milk consumption. The inverse functional form could properly interpret the empirical relationships between generic advertising and milk sales in Ontario, Canada. Using the inverse functional form, profits brought by fluid milk advertising expenditures increased 1.7 times.

THEORETICAL MODEL

In marketing strategies, segmentation and targeting potential markets need to classify individuals or households. The most commonly used technique for grouping individuals or households with similar characteristics is the cluster analysis (Hair *et al*., 1992). The essential criterion needed for cluster analysis is to classify experimental units into classes or groups, so that the units within a class or group are similar to one another while units in distinct classes or groups are different (Johnson, 1998). Two basic methods can be used to search and define clusters-hierarchical and nonhierarchical methods (Hand, 1981). The hierarchical method separates units into different groups in a nested sequence of clustering. The major defect of hierarchical method is that subsequent steps can never repair mistakes made in earlier steps (Kaufman and Rousseeuw, 1990). The nonhierarchical method, referred to as the *K*-means clustering method, is a popular practical technique in cluster analysis (Afifi and Clark, 1990) and is applied to this study.

For a specified number of clusters, *K*, the basic steps of clustering procedures are:

1. Divide the data into *K* initial clusters. The members of clusters may be specified by the researchers or may be selected by an arbitrary procedure in computer programs.
2. Calculate the means or centroids of the *K* clusters. The cluster centroid is the average value of points contained in the cluster on all of variables included in the analysis.
3. For a given point, calculate its distance to each centroid. If the point is closer to the centroid

of its own cluster, leave the point in that cluster. Otherwise, reassign the point to another nearest cluster.

4. Repeat step 3 for each point.
5. Repeat steps 2, 3, and 4 until no point to be reassigned.

The following is to illustrate the *K*-means clustering method using mathematical equations.

(1) Optimization criteria

Optimization criteria can be defined as the following equation in matrix form:

$$T = W + B \qquad \textbf{(1)}$$

where

$$T = \sum_{x \in X^n} (x - \bar{x})(x - \bar{x})'$$

$$W = \sum_{i=1}^{c} \sum_{x \in X_i} (x - \bar{x}_i)(x - \bar{x}_i)'$$

and

$$B = \sum_{i=1}^{c} n_i (\bar{x}_i - \bar{x})(\bar{x}_i - \bar{x})'$$

The notations used in the optimization criteria are defined as:

$X^n = \{ x_1, \ldots, x_n \}$,

$X_i = \{ x_j \mid x_j \in \text{cluster } i \}$,

$\bar{x}_i = \sum_{x \in X_i} x / n_i$,

n_i : the number of points in cluster i, and

$\bar{x} = \sum_{x \in X^n} x / n$, the grand mean

T is interpreted as the scatter matrix describing the overall deviations of the observation points from the grand mean. W is the within-class scatter matrix, giving the deviations of the observation points from their cluster means. B is a weighted sum, giving the scatter of the cluster means to the grand mean.

(2) Minimization of trace (W)

Minimizing trace (W) can reduce the deviations of points within clusters. Therefore, the similarity of characteristics represented by observation points in each cluster can be enhanced. The equation of trace (W) is defined as:

$$\begin{aligned} \mathrm{tr}(\mathrm{W}) &= \mathrm{tr}\left\{\sum_{i=1}^{\mathrm{c}}\sum_{\mathrm{x}\in \mathrm{X}_i}(\mathrm{x}-\bar{\mathrm{x}}_i)(\mathrm{x}-\bar{\mathrm{x}}_i)'\right\} \\ &= \sum_{i=1}^{\mathrm{c}}\sum_{\mathrm{x}\in \mathrm{X}i}\mathrm{tr}\left\{(\mathrm{x}-\bar{\mathrm{x}}_i)(\mathrm{x}-\bar{\mathrm{x}}_i)'\right\} \\ &= \sum_{i=1}^{\mathrm{c}}\sum_{\mathrm{x}\in \mathrm{X}i}(\mathrm{x}-\bar{\mathrm{x}}_i)'(\mathrm{x}-\bar{\mathrm{x}}_i) \end{aligned} \qquad (2)$$

(3) Beale's F-Type Statistic

Due to the possibilities of finding different numbers of clusters, Beale's F-type statistics were designed to help determine the actual number of clusters for a certain data set. Suppose first clustering result showing c_1 clusters with W_1 scatter matrix, and second clustering result showing c_2 clusters with W_2 scatter matrix. W_1 and W_2 are the corresponding sums of squares of within cluster distances computed from the cluster means, while c_1 is larger than c_2. If W_1 and W_2 are almost the same size, then the clustering result from fewer number clusters is as good as the result from larger number clusters. For simplicity, the clustering of fewer number clusters is selected. If W_1 is much smaller than W_2, then the first clustering result shows an improvement over the second. Then, the clustering of larger number clusters is selected. To test the differences of clustering results statistically, Beale (1970) suggested the pseudo F-type statistic, which is defined as:

$$\mathrm{F}^* = \frac{(\mathrm{W}_2 - \mathrm{W}_1)}{\mathrm{W}_1} \cdot \frac{(\mathrm{N}-\mathrm{c}_1)k_1}{(\mathrm{N}-\mathrm{c}_2)k_2 - (\mathrm{N}-\mathrm{c}_1)k_1} \qquad (3)$$

where $k_1 = \mathrm{c}_1^{-2/\mathrm{p}}$

$k_2 = \mathrm{c}_2^{-2/\mathrm{p}}$, and

$\mathrm{p} =$ number of variables

If F* is greater than the F critical value with $k_2(N - c_2) - k_1(N - c_1)$ degrees of freedom for the numerator and $k_2(N - c_1)$ for the denominator, then the first clustering with larger number clusters over the second with smaller number clusters is selected.

DATA

The data used in this study were collected through in-person survey conducted in supermarkets in the metropolitan areas of Taipei , Taichung, and Kaohsiung in Taiwan. These three cities are the most populated and located in the northern, central, and southern part of the island, respectively. The survey was completed in summer, 1999. In total, 110 valid samples were used in analysis, including 35 of Taipei, 34 of Taichung, and 41 of Kaohsiung.

The major difference between supermarkets and traditional markets in Taiwan is that supermarkets have potentials to attract customers from distance. Traditional markets tend to provide foods and services mainly for neighboring residents. With very limited amount of dairy products sold in traditional markets in Taiwan, supermarkets are the proper places to conduct the survey. Demographic characteristics of survey respondents and its comparison with the latest Census (1997) of Taiwan are listed in Table 3. Compared to the population, female are more likely to do grocery shopping. Supermarket shoppers tend to be the ones with larger household sizes, less annual household income, and having high school or college levels of education. The average age of the respondents was 32.7 years old, compared to the average age of 30.7 years old of the population.

Table 3. Comparison of Demographic Characteristics of Survey Respondents and the Census of Taiwan

Demographic Characteristics	Survey Respondents 1999	Census, Taiwan 1997
Gender (female)	80%	51.3%
Average Household Size	3.94 persons	3.51 persons
Average Age	32.7 years old	30.7 years old
Annual Household Income	US$36,000	US$40,131
Educational Level		
Junior High School or Less	5.4%	52.7%
Senior High School	38.2%	30.6%
College	53.7%	16.0%
Graduate School	2.7%	0.7%

Three major dairy products, fresh milk, flavored milk, and yogurt drinks, were selected to examine the consumer perceptions of fluid milk advertising in Taiwan. Respondents were

asked about the total amount of expenditures they would increase in purchasing fresh milk, flavored milk, and yogurt drinks after perceiving milk advertising of each type on mass media. According to respondents' responses, samples were clustered for within-group homogeneity and between-group heterogeneity using nonhierarchical clustering method.

RESULTS

Results from the K-means Methods

The nonhierarchical clustering analysis was conducted using the FASTCLUS procedure in SAS using the *K*-means methods. Two basic options of the FASTCLUS procedure were utilized to determine the number of clusters. One option is to specify the maximum number of clusters. Anther is to estimate the "size" of the clusters by specifying the "radius" of clusters. Different values of the *K* numbers and different radius of clusters were evaluated. Using the criteria of minimizing trace (W) and Beale's F-Type hypothesis, a three-cluster solution was suggested to be optimal.

Table 4 listed the standardized mean scores for each cluster. The first cluster, labeled "high-perception" group, includes approximately 14 percent of the respondents. Individuals in the "high-perception" group were more easily influenced by advertising to increase total consumption of fluid milk products. The second cluster, labeled "middle-perception" group, includes approximately 34 percent of the respondents. Individuals in the "middle-perception" group would not have strong motivations to increase fluid milk consumption after perceiving fluid milk advertising. The third cluster, labeled "low-perception" group, includes approximately 53 percent of the respondents. Individuals in the "low-perception" group would be less sensitive to fluid milk advertising.

Table 4 Cluster Delineation and Standardized Within-Cluster Means

	Cluster		
	High-Perception	Middle-Perception	Low-Perception
Fresh Milk	1.8827	0.3434	-0.7060
Flavored Milk	1.3837	0.1136	-0.4303
Yogurt Drinks	1.9816	0.1602	-0.6147
Percentage of Total Respondents	13.7%	33.6%	52.7%

K=3

Trace (W)=118.86

Pesudo F Statistic=93.68

Classifying Consumer Groups

Differences in demographic factors of the three clusters are listed in Table 5. Characteristics of these three clusters may be useful for the dairy industry in designing promotion strategies to target consumers and to efficiently segment markets in Taiwan. As shown in Table 5, the "high-perception" and "middle-perception" groups had lower percentages of men, 19% and 13%, respectively. This result indicated that women were generally affected by fluid milk advertising more easily than men were in Taiwan. Educational levels did not show significant differences among the three clusters. When comparing the age of shoppers, the "high-perception" group had a high percentage (60%) of respondents at ages 26 to 35. The "low-perception" group had lowest percentage (33%) of respondents in this range of ages, but had the largest percentage (27%) of respondents at ages 36 to 45. This suggested that older people tended to be less sensitive to fluid milk advertising.

Table 5 Demographic Characteristics of Clustering Results

Demographic Characteristics	High-Perception	Middle-Perception (percentage)	Low-Perception
Gender			
Male	19.0	13.0	25.0
Female	81.0	87.0	75.0
Educational Level			
High school or less	40.0	43.2	44.8
College	60.0	54.1	51.7
Graduate School	0.0	2.7	3.5
Age of Shoppers			
16 to 25	7.0	32.3	26.5
26 to 35	60.0	43.2	32.5
36 to 45	20.0	8.1	27.0
older than 45	13.0	16.1	16.0
Annual Household Income			
Less than US$24,000	26.0	35.1	41.4
US$24,000 to US$39,999	46.7	40.5	34.8
More than US$40,000	27.3	24.4	23.8
Average Household Size (person)	3.1	4.0	4.1

Income played an important role of consumers in perceiving fluid milk advertising. The "high-perception" group had higher annual household income than other two groups. The "low-perception" group had more households (41%) having annual income less than US$24,000. Income positively affected perceptions of fluid milk advertising. For the household size, respondents from larger households tended to be less sensitive to fluid milk advertising. The "high-perception" group consisted of respondents from smaller households

with average of 3.1 persons, while the respondents in the “low-perception” group were from larger households with the average of 4.1 persons.

The average increasing amount spent on each fluid milk product after advertising was perceived is shown in Table 6. The consumers in the “high-perception” cluster would increase more than five US dollars in fresh milk and in yogurt drinks after perceiving advertising. The consumers in the “middle-perception” cluster would increase about two US dollars, while the consumers in the “low-perception” cluster would only increase about 0.3 US dollars in fresh milk and yogurt drinks after seeing advertising. The advertising of flavored milk was not as effective as the advertising of fresh milk or flavored milk. The increasing amount of flavored milk was the lowest among three milk products in each cluster.

Table 6 The Average Increasing Expenditures on Fluid Milk Products After Perceiving Fluid Milk Advertising

	High-Perception	Middle-Perception	Low-Perception
		(USD)	
Fresh Milk	5.23	2.32	0.33
Flavored Milk	2.95	0.95	0.10
Yogurt Drinks	5.89	1.98	0.32

In Taiwan, consumers have a tendency to increase fluid milk consumption in summer as to substitute soft drinks. Prices of fluid milk products, especially fresh milk, would increase about 10% in summer due to the seasonal expansion in demand. In this research, respondents were asked if they would increase consumption of fresh milk, flavored milk, and yogurt drinks in summer. Results indicated, as shown in Table 7, that the majority of respondents in the “high-perception” group would increase consumption of fluid milk products in summer. For the “low-perception” group, about half of the respondents would increase fluid milk consumption in summer. This suggested that consumers who were more sensitive to fluid milk advertising tended to consume more fluid milk in the hot weather.

Table 7 The Percentages of Respondents to Increase Fluid Milk Consumption in Summer

	High-Perception	Middle-Perception	Low-Perception
		(percentage)	
Fresh Milk	80.0	60.0	57.4
Flavored Milk	90.0	35.3	52.9
Yogurt Drinks	93.3	64.5	54.8

Brands are influencing factors when consumers make their purchasing decisions in Taiwan. Respondents of the "high-perception" group showed higher brand preferences in choosing fluid milk products than respondents in the other two groups. As shown in Table 8, about 93% of respondents in the "high-perception" group preferred well-known brands of fresh milk and yogurt drinks. In the "low-perception" groups, the brands of fluid milk products did not seem to be that important to the consumers. About 39%, 44%, and 31% of respondents in the "low-perception" group mentioned that they did not care about the brands of fresh milk, flavored milk, and yogurt drinks, respectively. This result revealed that consumers who were more sensitive to fluid milk advertising also had higher preferences for well-known brands of fluid milk products.

Table 8 The Percentages of Respondents to Choose Well-Known Brands of Fluid Milk Products

	High-Perception		Middle-Perception		Low-Perception	
	Yes	No	Yes	No	Yes	No
			(percentage)			
Fresh Milk	93.3	6.7	60	40	61.1	38.9
Flavored Milk	81.8	18.2	76.5	23.5	56.3	43.7
Yogurt Drinks	93.3	6.7	77.4	22.6	69.1	30.9

CONCLUSIONS

This study examined the effectiveness of fluid milk advertising in Taiwan using cross-sectional data. Nonhierarchical clustering method was utilized to group consumers into three different clusters. Consumers in the cluster of "high-perception" of fluid milk advertising were more likely to be female, ages 26 to 35, having higher annual household income, and living in smaller households. The cluster of "low-perception" of fluid milk advertising consisted of more male, older people, having lower annual household income, and living in larger households.

Consumers who were more sensitive to fluid milk advertising would spend more on fluid milk products after perceiving advertising. Advertisements of fresh milk and yogurt drinks were more effective than advertisements of flavored milk. Consumers who were sensitive to fluid milk advertising tended to increase more fluid milk consumption in summer. About half of consumers with low perceptions of fluid milk advertising would not change their fluid milk consumption patterns in summer. Consumers in the cluster of "high-perception" showed strong brand preferences. Well-known brands of fluid milk products did not seem to attract consumers with low perceptions of fluid milk advertising as much as to consumers with high perceptions of fluid milk advertising.

Results of this study suggested household income, household sizes, increased fluid milk expenditures in response to advertising, and brand preferences could be factors to segment consumers in Taiwan for the dairy industry. In order to make efficient and effective fluid milk advertising, the dairy industry may want to maintain the customers in the "high-perception" cluster and to increase the advertising perceptions of customers in the "middle-perception" and "low-perception" clusters.

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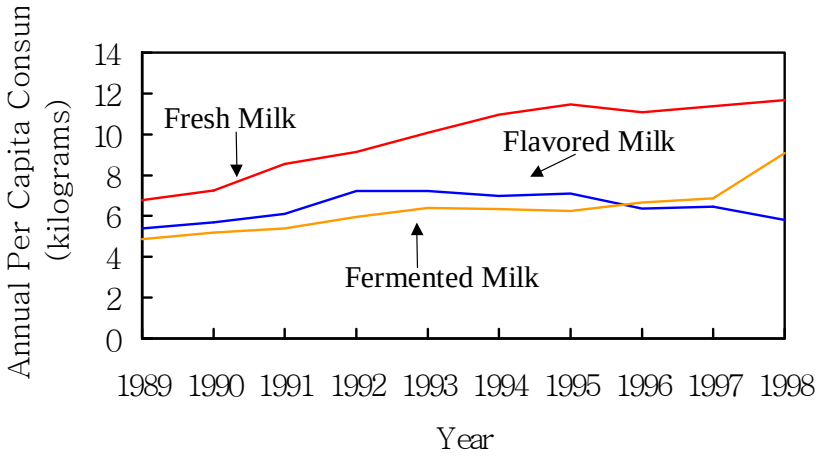

Figure 1. Annual Per Capita Consumption of Fluid Milk Products in Taiwan, 1989-1998

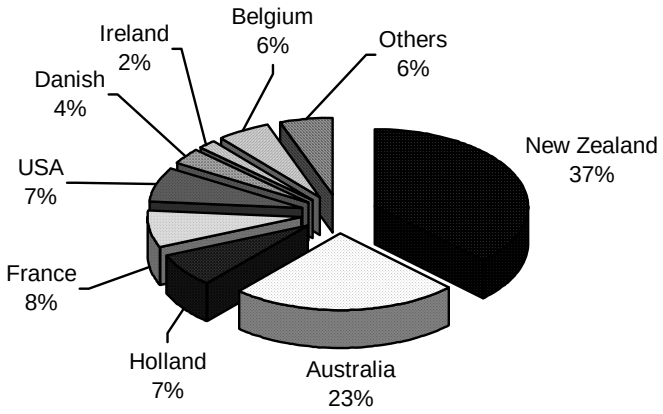

Figure 2. Origins of Exporting Dairy Products to Taiwan in 1998

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