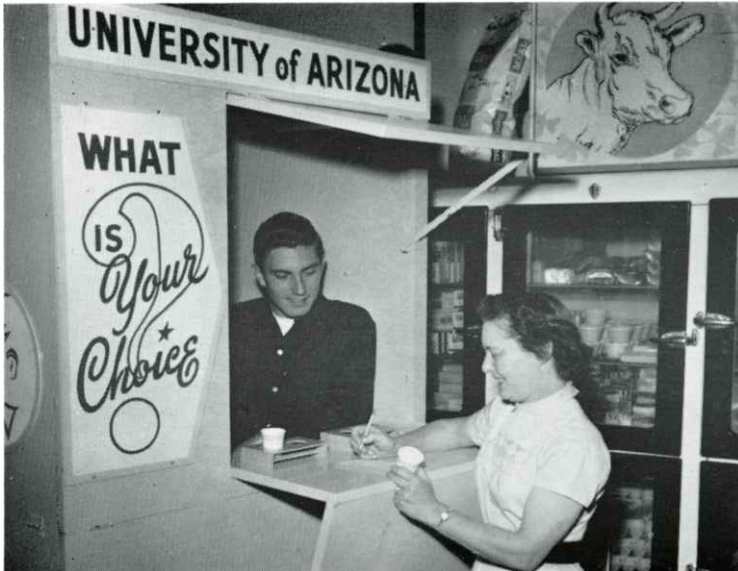


Consumer Preference and Acceptance for Milk Varying in Fat and Solids-Not-Fat



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Summary

In recent years new forms of dairy products have resulted from attempts by the dairy industry to meet changing demand patterns of consumers. These new products have begun to alter and may alter further certain production-supply relationships in the dairy industry. The Departments of Agricultural Economics and Dairy Science, through funds from the American Dairy Association, conducted extensive consumer and market tests to evaluate the effects of variation in milk composition on preference and acceptance of a variety of fluid milk beverages. Some results of these tests are:

1. Consumer acceptance observations were made on milk beverages of varying fat and solids-not-fat (SNF) content. Threshold taste tests indicated that many people can differentiate between milk beverages with variations in fat and SNF of 0.5 and 1.0%, respectively.

2. The addition of 1.0% SNF to whole, low-fat, or nonfat milk beverages caused a highly significant increase in consumer acceptance of each type of beverage tested.

3. A slight but significant preference was shown for a low-fat beverage with 1.0% added SNF when compared with whole milk of normal composition.

4. Equal preference was indicated for a low-fat beverage without added SNF when compared with a nonfat product fortified with 1.0% SNF.

5. A slight but significantly greater preference was evident for a regular whole milk with 1.0% added SNF, when compared to a higher fat (4.0%) product without added SNF.

6. A substantial market test of a milk containing 3.5% fat standardized to 9.5% SNF was introduced on the market in Tucson, Arizona, for a period of six weeks. In general, the results of the market test reinforced the taste and preference tests. Over three-fourths of the consumers indicated that they would continue to purchase this milk beverage if it were regularly available. Respondents to a questionnaire expressed general willingness to pay a two-cent premium per half-gallon for this milk.

Consumer Preference and Acceptance for Milk Varying in Fat and Solids-Not-Fat¹

J. S. Hillman, J. W. Stull and R. C. Angus²

New forms of dairy products, coupled with changes in consumer acceptance, may alter production-supply relationships in the dairy industry. One recent change has been the decline in consumption of milk fat per person to a low of 26.0 pounds in 1959. This decline has been associated with an increase in consumption of milk solids-not-fat from 40 pounds in 1935-39 to 48.0 pounds per person in 1959.³ These changes motivated The University of Arizona and the American Dairy Association to undertake research to evaluate the effect of variation in milk composition upon consumer preference and acceptance of fluid milk beverages.

Standards for minimum fat and solids-non-fat (SNF) content of regular whole milk are usually set by law. Irregular, unavoidable variations in one or both constituents may occur in any given market. In most jurisdictional areas composition standards for nonfat and low-fat beverages have not been adopted. Furthermore, the practice of standardizing the SNF content of whole milk is not provided for. There has been a general awareness that the addition of nonfat milk solids in whole milk, low-fat milk, or nonfat beverages changes the palatability, flavor, and food value. Of equal importance is the fact that the utilization of nonfat solids could be increased by wider application of SNF standardization and fortification of milk beverages.

This study was initiated to provide data on which standards and practices relating to optimum composition of milk beverages can be based. The investigation was carried out in three phases. First, a taste

¹ This research was supported by a grant from the American Dairy Association. The authors wish to acknowledge the work of J. S. Hill, J. A. Nicholes, R. R. Taylor, H. Tucker, and the local milk distributors who cooperated.

² Professor of Agricultural Economics, Professor of Dairy Science, and Associate Professor of Agricultural Economics.

³ Agricultural Marketing Service, *The Dairy Situation*, United States Department of Agriculture, Washington, D.C., November, 1959, p. 26.

panel experiment was run to determine discrimination levels and preferences for beverages varying in fat and SNF. The second phase involved consumer taste tests conducted in food markets, schools, and at public gatherings to determine the consumer's choice of milk beverages varying in fat and nonfat solids. Phase three involved an actual market test on one of the more preferred milk beverages tested in the preference trials. This beverage contained 3.5 percent fat and was standardized at 9.5 percent solids-not-fat by adding good quality nonfat dry milk. This product was marketed in four retail sales outlets during the test.

REVIEW OF LITERATURE

The effects of various SNF levels on consumer acceptance and preference for milk beverages has been reported by several workers. Limited investigations of the ability of individuals to detect changes in SNF and fat composition in milk were also found.

Kelly⁴ announced wide variance in people's ability to detect differences in the fat content of milk. He claimed that palatability of milk was not dependent on fat and that higher SNF with the same total solids improved flavor.

A comparison between homogenized 4.8 percent fat premium milk and skim milk with 12.5 percent total solids, 1.5 percent butterfat, and added vitamins was made by Foust.⁵ These beverages were delivered to 320 of his milk customers. The fortified skim milk was preferred by 296. Foust stated that people tasted the SNF in milk and not the fat. Foust's claims were supported by Holland's judging panel taste tests with milk fortified with vitamins A and D and modified by varying SNF and fat.⁶

Consumer reaction to milk varied in fat and SNF was also investigated by Jenks.⁷ Preferences from untrained and expert panels for milk varying in fat and SNF were reported as well as their ability to differentiate among beverages. The study took eight months, and 3,500 judgments of beverages were obtained.

Jenks concluded the following:

1. The addition of as high as 1.5 percent fat to low-fat milk (zero fat to 1.5 percent) fails to produce enough difference to result in real preferences.

⁴ Kelly, Ernest, "Promote the Fresh Milk Business," *Milk Plant Monthly*, 24:44 (1935).

⁵ Foust, W. L., "Let's See More Fat Free Milk," *Milk Dealer*, 48:44, 80 (October, 1948).

⁶ Holland, B. K., and Winder, W. C., "Preparation of Modified Skim Milk," *Milk Dealer*, 40:43, 92-96 (1951).

⁷ Jenks, S. J., "Consumer Reaction to Milk Varied in Fat and Solids-Not-Fat Composition," M.S. thesis, Ohio State University, 1953.

2. At higher fat contents (1.0 percent or more) additional fat produces changes in flavor and results in preferences for the higher fat sample.
3. Addition of SNF to low-fat milk changes the flavor resulting in preferences for the modified milk over standard milk.
4. Addition to SNF to 2.5 percent fat milk reduces the preference for a 3.5 percent milk beverage.

In Mississippi, Caster, Herzer, and Cordwell⁸ studied the taste effects of varying fat and SNF content in milk. Their results were based on opinions of a taste panel composed of two experienced dairy judges. The panel tasted milk with 4.0 percent fat supplemented with 0.0 percent, 1.0 percent, and 2.0 percent SNF. Milk with more than 1.0 percent additional SNF became too sweet and thus less acceptable.

The next step in the Mississippi research was to expand tests to include milk beverages with different fat contents, 3.0 percent, 3.5 percent, and 4.0 percent. The SNF content for each fat level was standardized from 9.0 percent to 11.0 percent in increments of 0.5 percent. The 3.0 percent fat sample containing 10.0 percent SNF was selected as most acceptable. Standardization of SNF at 9.5 percent was judged most acceptable for the 3.5 and 4.0 percent fat levels. In each case the beverage preferred contained 13.0 percent or 13.5 percent total solids, a level somewhat greater than found in most market milk.

Phase I — Taste Discrimination Tests

Discrimination tests were set up to determine the ability of persons to distinguish between milk beverages which contained different levels of fat and nonfat solids. These tests were to provide a basis for selecting milk beverage composition for the research which was to follow.

Experimental Procedure

Milk from the University dairy herd was used for the tests. When necessary, the fat content was increased by adding cream separated at 90-95°F. from the same lot of milk. In cases when the SNF content was increased, good flavored, low heat, nonfat dry milk of high solubility was added. Nonfat dry milk was added to the milk prior to pasteurization and homogenization. Nordihydrogriaiaretic acid (NDGA) and 0.01 percent citric acid (on the fat basis) were added before pasteurization to prevent development of oxidized flavors during storage.

⁸ Caster, E. W., F. H. Herzer, and J. T. Cordwell, *The Effect of Various Levels of Solids-Not-Fat on the Flavor Acceptability of Fluid Milk*, Mississippi Agricultural Experiment Station Bulletin No. 561, 1958.

Fat and total solids analysis used the Babcock and Mojonnier methods, respectively. Batches of milk were standardized, heated to 135° F., and homogenized with a double stage machine at 500-2,500 p.s.i. After homogenization, the products were pasteurized at 143° F. for thirty minutes and then cooled at 35 to 40° F.

Threshold values for fat and SNF were determined by use of a taste panel. This panel, 20 men and 8 women, was selected from volunteers on the faculty and staff of The University of Arizona. Threshold taste tests followed paired and triangulation techniques as suggested by Clements.⁹

Members of the taste panel were seated in individual booths (Figure 1) which prevented conversation during testing periods. Milk samples were tempered to 60-70° F. before serving. Twenty-five to 30 ml. of the test beverages were poured into nontransparent 1¾ ounce sham

Table 1. Taste Panel Discrimination Tests

Taste Acuity Level	Decisions			
	Correct	Total	Average Correct	Range
	Number		Percent	
Acceptable	744	1,025	76	67-92
Not Acceptable	315	616	51	41-60

glasses and served. Tasters were instructed to taste without swallowing, to dispose of the milk, and to rinse their mouths with tap water at room temperature. There was a four- or five-minute interval between each pair or series of samples.

The preliminary taste panel threshold tests indicated that many people can differentiate between milk beverages with variation in fat and SNF of 0.5 percent and 1.0 percent, respectively. A summation of these tests is presented in Table 1. Half of the original panel was selected for a second panel with superior discrimination ability. Members selected made two out of three correct decisions in products varied 0.5 to 1.0 percent in fat or SNF, respectively. Individual correct decisions ranged from 67 to 92 percent and averaged 76 percent for the superior group. Panel members rejected averaged 51 percent correct with a range from 41 to 60 percent.

The preliminary discrimination tests were followed by further discrimination and preference tests by the superior taste panel. Milk with less than 0.1 percent fat and with 8.5, 9.5, and 10.5 percent SNF was

⁹ Clements, F. E., Psychophysical Methods in Market Research, Florida State Hort. Soc., Proc., 64:148. 1951.

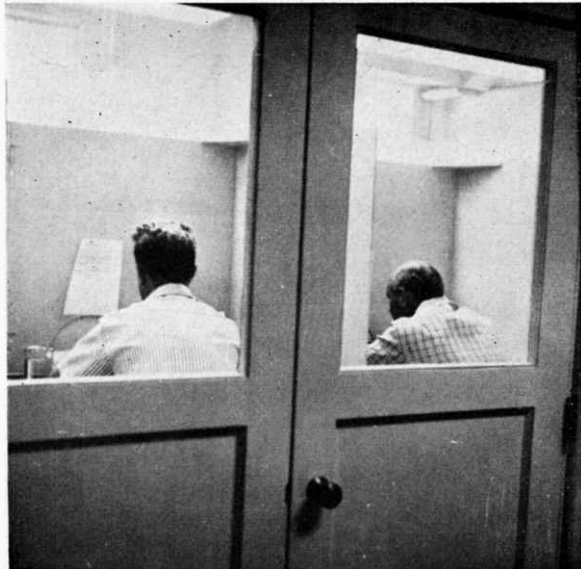


Figure 1. Taste panel members in individual booths.

sampled. At each of three meetings, four series of three samples were presented. In each series two of the samples represented two different SNF levels at a one percent increment. The third sample was identical with one of the other two. Tasters were asked to select the beverage which corresponded to the third sample. They were also asked to indicate which sample they preferred.

Similar tests were conducted using the following samples:

Nonfat milk (less than 0.1 percent fat) with 8.5, 9.5, and 10.5 SNF.

Low-fat milk (2.0 percent fat) with 8.5, 9.5, and 10.5 SNF.

Regular whole milk (3.5 percent fat) with 8.5, 9.5, and 10.5 SNF.

Regular whole milk (8.5 percent SNF) with 3.0, 3.5, and 4.0 percent fat.

The panel made correct discriminations in 81.7 percent of the cases. This was 10 percent higher than in the previous trials.

In the cases of nonfat and low-fat trials, the panel indicated preferences for 9.5 percent SNF over 8.5 percent and 10.5 percent over 9.5 percent. However, when whole milk was used, the panel preferred 9.5 percent SNF to 8.5 percent and 9.5 percent over 10.5 percent.

The trial with whole milk of 8.5 percent SNF and varying levels of fat showed a preference for 3.5 percent over either 3.0 and 4.0 percent fat beverages.

The next program for the taste panel was to compare the acceptability of low-fat milk containing added solids-not-fat with whole milk of normal composition. The samples were presented four at a time in random arrangements. The composition of the beverages and preference choices are presented in Table 2.

Table 2. Taste Panel Preference for Beverages of 12.0 Percent Total Solids and Varying Fat Contents

Sample Number	Beverage Composition			Preference Ranking				Weighted Total
	Fat	SNF	Total Solids	1st	2nd	3rd	4th	
	Percent							
1.....	3.5	8.5	12.0	41	42	24	33	329
2.....	2.5	9.5	12.0	45	58	32	5	277
3.....	1.5	10.5	12.0	33	31	67	9	332
4.....	0.5	11.5	12.0	21	9	17	93	462

The weighted total equals the sum of total choices of each ranking times their respective numerical ranking. The lower the weighted total, therefore, the greater the preference for the beverage. The beverages with 3.5, 2.5, and 1.5 percent fat had weighted totals of approximately the same magnitude. The low-fat beverages (2.5 and 1.5 percent fat) with added SNF had an acceptability as high as whole milk (3.5 percent fat). The 0.5 percent fat product was the least preferred. Its high SNF and low fat content resulted in a slightly salty flavor.

Phase II — Consumer Preference Tests

Individual Preference Tests

The next step, Phase II, of the project was to use the taste panel observations from Phase I as a basis for selecting milk beverage samples for large-scale consumer preference tests. Six pairs of samples varying in fat and SNF were selected (Table 3) for presentation as choice combinations among low-fat, nonfat, and whole milk.

These milk beverage samples were submitted to various cooperating people for preference observations. The tests were conducted in food markets, schools, and public gatherings to obtain observations over wide ranges of economic, social, and educational levels. Retail food markets

Table 3. Composition of Milk Beverages and Preference Observations

Pair Number	Sample	Fat	SNF	Total Solids	Number Preferring	Percent of Total
			Percent			
I	A	3.5	8.5	12.0	1,087	40*
	B	3.5	9.5	13.0	1,643	60
II	A	2.0	9.0	11.0	1,448	46*
	B	2.0	10.0	12.0	1,683	54
III	A	0.1	9.0	9.1	882	41*
	B	0.1	10.0	10.1	1,254	59
IV	A	3.5	8.5	12.0	1,011	47*
	B	2.0	10.0	12.0	1,112	53
V	A	1.5	8.5	10.0	1,058	51†
	B	0.1	10.0	10.1	1,012	49
VI	A	4.0	8.5	12.5	986	48**
	B	3.5	9.0	12.5	1,078	52
Total					14,294	

*Significant at the one percent level of probability.

**Significant at the five percent level of probability.

†Not significant.

and public schools used in the experiment were located in Tucson, Arizona. A series of observations were obtained from groups at (1) the Arizona State Fair, Phoenix, (2) the dedication ceremonies of a new Dairy Science Center at The University of Arizona, (3) the Annual Arizona Dairy Industry Conference at the University, and (4) the Annual Meeting of the American Dairy Association of Arizona, Phoenix.

Milk was dispensed at the markets and at public gatherings from a portable booth (Figure 2). The location of the booth in the markets was influenced by traffic flow within the store and by the discretion of the store manager. Samples were dispensed from five-gallon stainless steel cans placed in a refrigerated ($38 \pm 2^\circ\text{F}$.) milk dispenser. Only one pair of samples was tested at any one place at any one time. Over 14,000 observations were obtained from essentially that number of individuals. It was apparent that only in rare instances did an individual make more than one observation during the course of the study. The samples were dispensed in 1 to 1½ ounce portions in paper cups.

Tests were conducted in the schools by bringing children in groups to either their cafeteria or auditorium for the test (Figure 3). The booth was not used for reasons of space and flexibility. Milk was dispensed and containers placed on a sheet of paper with large letters marked A and B prior to the students' entry. After brief directions students began the experiment simultaneously. The tests were closely proctored by research personnel and teachers to minimize conversation and other distracting elements.

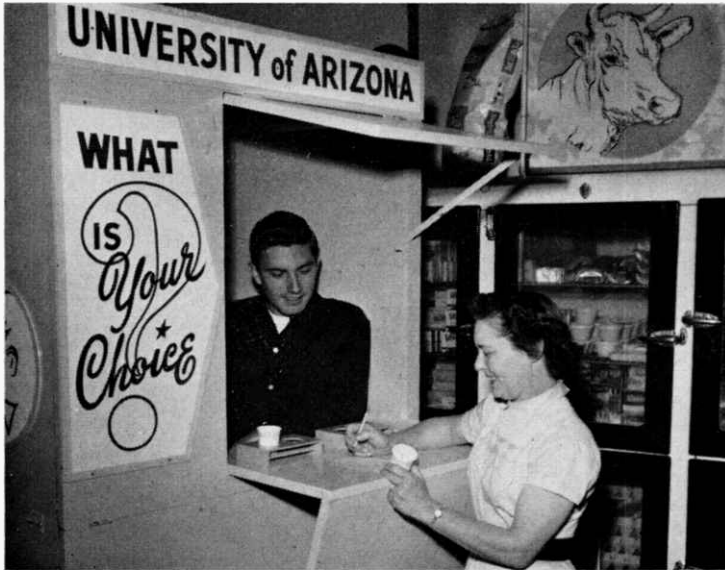


Figure 2. Milk samples being dispensed from portable booth for preference observation.

The addition of 1.0 percent SNF caused a highly significant improvement in the consumer acceptance of whole, low-fat, or nonfat milk beverages (Pairs I, II, III). There was a slight preference for a fortified low-fat beverage compared with a nonfortified whole milk (Pair IV). No significant difference for a nonfortified low-fat beverage compared with a fortified nonfat product (Pair V). A slight but significant preference was shown for regular fortified whole milk compared with a nonfortified higher fat milk (Pair VI).

Respondents in food stores, public gatherings, and schools were asked to complete a brief questionnaire (Appendix A). In the food markets and public gatherings, each cooperator was asked to indicate his age, sex, use of tobacco, regularity of milk use, occupation, and the kind of milk used at home. At the schools, children were requested to report their age, sex, parents' occupations, and regularity of milk use.

Chi square techniques were used to analyze different variables listed on the questionnaires. The hypothesis that different characteristics (occupation, age groups, districts, etc.) were independent was tested (Table 4). No significant differences were found within any of the variables for Pairs I, III, IV, and V.



Figure 3. Milk beverage preference testing in a public school.

Sample pair II showed significant differences for age groups, regularity of use, and for intergroup comparisons; the difference in Sample pair II with respect to age is due to the disproportionate selection of Sample A by persons under 20 years of age while the three other groups chose Sample B. Sample pair II showed the only significant difference between those persons who were regular milk users and those who were not. Regular and nonregular users of milk preferred milk with added SNF. However, 53 percent of regular users made this choice against 57 percent of the nonregular users.

The other sample pair for which differences appeared was Number VI. In this case a slight but significant difference occurred from district to district. Districts one and four reported preference for Sample B, the fortified beverage, while districts two and three show a slight preference for Sample A, the higher fat product. This trial also resulted in differences with respect to sex. Men preferred Sample A by a small margin and the women preferred Sample B by a considerable amount.

In addition, trials II and VI showed significant differences in intergroup comparisons. In other words, the frequencies choice of Sample A and B varied among food stores, public gatherings, and schools.

The preceding analysis indicates that the ability to distinguish between milk products and the preference for milk products is unaffected by variation in income levels and standards of living of individuals in different occupations. With a single exception in both cases, age and sex had no significant effect on the preferences. No significant difference was apparent between those who used tobacco and nonsmokers. The type of milk used at home by the respondent did not significantly influence his preference choices.

Household Preference Tests

A second part of the consumer preference research was initiated to substantiate the results obtained in the large-scale single exposure trials. A population sample of about 130 families was drawn from volunteers on the faculty and staff of The University of Arizona. Another population sample, 141 households, was selected from a block pattern representing four income and occupational areas in Tucson. The university group and the city group provided wide income and occupational variations. The characteristics of both groups are presented in Appendix Tables 1 and 2.

Milk beverages were packaged in single-service quart containers labeled "A" and "B." Assignment of "A" or "B" was changed from one sample pair to the next. Households of five or less members received two quarts twice a week, a total of four quarts per week. Households

Table 4. Chi Square Values Associated with the Variables in Classifying Preference Samples A and B of Six Pairs of Milk Beverages

Pair Number	Districts	Occupations	Age	Sex	Tobacco Use	Regularity of Milk Use	Type of Milk Used	Institutions
I	4.99	11.83	3.31	1.27	.54	3.79	.57	.77
II	3.28	12.43	11.51**	.73	2.06	5.19*	1.65	10.39**
III	5.08	2.15	1.70	.23	.06	.60	.025	.028
IV	4.87	8.24	1.98	.008	.29	.89	.65	2.57
V	1.29	12.18	4.64	.032	.69	2.25	.049	3.90
VI	7.82*	9.43	3.04	4.27*	.028	1.58	.105	5.05*
Degrees Freedom	3	8	3	1	1	1	1	1 and 2 ^a
.95	7.815	15.507	7.815	3.841	3.841	3.841	3.841	3.841 ^b -5.991 ^c
.99	11.345	20.090	11.345	6.635	6.635	6.635	6.635	6.635 ^b -9.210 ^c

* Significant at 5 percent level.

** Significant at 1 percent level.

^a Sample III and VI have 1 df.

^b Sample I, II, IV, and V have 2 df.

^c Chi Square 1 df.

^c Chi Square 2 df.

of six or more received twice this amount. The milk was delivered to the city group while the university group obtained their samples at the Dairy Science Department.

The composition of the beverages was the same as used previously in the individual preference tests (Table 3). Pair VI was modified slightly by increasing the SNF content 0.5 percent to give a total solids content of 13.0 percent.

A different pair of samples was provided each week for six weeks. Evaluations were obtained by questionnaire (Appendix Figure 2). This questionnaire was designed to indicate which sample was preferred, the reason for the preference, and whether or not the household would be willing to pay a premium for the milk. Household heads were instructed to arrive at a consensus of opinion and report it in answer to the questions.

Preferences indicated by the university and city households corresponded closely with the preferences reported in the individual tests (Appendix Tables 3 through 8). In Pairs I, II, and III, representing whole, low-fat, and nonfat milk, a significant preference was shown in both household groups for the higher SNF beverage.

While cooperators were instructed specifically to indicate a preference for "A" or "B," approximately 35 percent of the city households failed to do this for Pair III. This may have been because both samples were nonfat beverages and were of generally lower acceptability than the more familiar whole milk products.

There was a greater preference indicated by both household groups for low-fat beverages over regular whole milk with the same total solids (Pair IV). Both groups showed a very definite and significant preference for low-fat beverages compared to nonfat beverages with equal total solids (Pair V).

Neither group of households showed significant preference for a fortified regular whole milk over a high-fat (4 percent) beverage with the same total solids. However, a significant preference for the fortified regular whole milk was shown when both groups were considered collectively. Results of the group household preference tests are summarized in Table 5.

The most frequent reason given by the university households for their preference was "a more pleasing taste." This reason was offered by 30 percent of the university households and by 23 percent of the city group. "A richer taste" was checked 24 percent of the time by the university group and 27 percent of the time by city respondents. "Sweeter taste," "less after taste," and "smoother body" appeared equally important as preference reasons.

All sample pairs except Pair III showed the above results. The most frequent reason given for Pair III, the nonfat sample, was "less after taste." This reason had the lowest frequency of selection in the other pairs.

A milk beverage without fat content tends to more closely resemble water and leaves less of a filmy or creamy after taste.

Few of the respondents indicated willingness to pay a premium price for the preferred beverage. In cases where premiums were offered, two cents per quart was the maximum for most households. Willingness to pay a premium was generally greater in the higher fat, fortified beverages.

Table 5. Composition of Milk Beverages and Preference Observations by 260 Households

Pair Number	Sample	Fat	SNF	Total Solids	Number Preferring ^a	Percent of Total
I	A	3.5	8.5	12.0	80	31**
	B	3.5	9.5	13.0	179	69
II	A	2.0	9.0	11.0	88	36**
	B	2.0	10.0	12.0	156	64
III	A	0.1	9.0	9.1	62	32**
	B	0.1	10.1	10.1	134	68
IV	A	3.5	8.5	12.0	108	45†
	B	2.0	10.0	12.0	131	55
V	A	1.5	8.5	10.0	184	76**
	B	0.1	10.0	10.1	57	24
VI	A	4.0	9.0	13.0	97	43*
	B	3.5	9.5	13.0	128	57

* Significant at the 5 percent level of probability.

** Significant at the 1 percent level of probability.

† Not significant.

^a Although 260 households cooperated in the study, some failed to send in the questionnaires and some failed to indicate a preference for either sample. Therefore, the total number preferring is not the same as the number of participating households.

Comparison of Individual and Household Results

Comparisons of preferences shown in the individual and household tests show similarity in the general levels of preference for Pairs I, II, III, and VI. The only dissimilarities appeared in Pairs IV and V.

Individual respondents for Pair IV showed marked preference for the low-fat beverage over regular milk with equal solids. This trend was shown in the household tests but was not at a statistically significant level.

No significant difference in preference for Sample A or B was shown for Pair V in the individual tests. In contrast, this pair yielded greater differences in the household tests than any other pair. A larger sample and a longer time to test the beverage could account for these results.

In summary, it is evident from the percentages that more pronounced preferences were developed when milk beverages were con-



Figure 4. Carton used in the market test.

sumed for a week rather than simply tested once. The household tests supported or yielded essentially the same results as the individual taste tests.

Phase III — The Market Test

The first phases of this research verified that people are able to distinguish between milk beverages varying in fat and nonfat content. The investigation indicated that there are definite consumer preferences for milk beverages of certain fat-SNF compositions. A market test phase of the research was initiated to determine whether or not consumers would purchase one of the beverages as a part of their normal milk supply.

Whole milk with added SNF, one of the most preferred milk beverages tested, was selected for the market test. Fortified low-fat milk would also have been acceptable; however, it already had been introduced in the Tucson market.

The fortified whole milk used in the tests was called "Flavorful" milk. It contained 3.5 percent fat and was standardized to 9.5 percent SNF by adding nonfat dry milk. It corresponds to Sample B, Pair Number I in Table 3.

One of the largest distributors of milk in Tucson agreed to provide all the milk necessary to carry out the test. The company processed, packaged and delivered the milk to the food stores. Research personnel supervised the standardization of the milk.

A carton design was developed by the Departments of Agricultural Economics and Dairy Science, University of Arizona, a commercial artist, a commercial advertising firm, carton fabricators, and the advertising staff of the milk distributor (Figure 4). The carton design and color, blue and green, fit into the distributor's line of products while differentiating it from other cartons in the line. Only half-gallon cartons were used.

The milk was packaged and delivered to four retail food markets of comparable size. Two markets were located in an area of lower income and multi-racial population. Two markets were located in a higher income area of predominantly Caucasian inhabitants.

Promotion of two types was used during the market tests. Point-of-sale advertising was provided through the use of signs. The product was also promoted by demonstrators who offered samples in the stores on Tuesdays and Saturdays during four of the six test weeks (Figure 5). Demonstrator assignments were rotated during the test to minimize differences due to sales effectiveness of the individuals.



Figure 5. Sales demonstration giving samples of "Flavorful" milk in the market test.

Promotion by point-of-sale sampling was relatively costly, but proved effective (Table 6). Average weekly sales were three times greater when demonstrators were used even though they worked only two eight-hour days a week.

Table 6. "Flavorful" Milk Sold During the Market Test Showing the Price Differential and Sales in the Two Geographical Areas

Price	Geographical Area	Store No.	Number of Half-gallon Cartons						Total
			1	2	3*	4	5*	6	
Same as regular milk	High Income	1	175	225	30	189	28	133	780
	Low Income	2	108	100	38	139	36	91	512
2 cents per half-gallon more than regular milk	High Income	3	122	126	26	88	25	84	471
	Low Income	4	125	129	32	108	30	119	543

* No demonstrators were used during the third or fifth week.

Approximately 2,300 half-gallon cartons of "Flavorful" milk were marketed in four retail sales outlets during the test period which ran from Tuesday, February 28, through Saturday, April 8. "Flavorful" milk was sold at the same price as homogenized milk in one store in each geographical area (Store Numbers 1 and 2). The price was two cents higher per half-gallon in the other two markets. A difference in sales due to price variation was indicated by the sales figures. A significantly greater volume of "Flavorful" milk was sold at the low price in Store Number 1 than was sold in Store Number 3 at two cents per gallon more. Both stores were located in the higher income areas and Store Number 1 had a considerably smaller volume of sales. The store located in the lower income area selling "Flavorful" milk at lower prices had approximately the same sales volume as the Store Number 4 which had the higher price. Store 2 reported a sales volume of one-fourth that of Store Number 4. The discrepancies were attributed to the price differential because the product received the same promotion in all four stores.

The final stage of the research was an attempt to obtain information on consumers' attitudes towards "Flavorful" milk. Customers who purchased milk in the presence of the demonstrators were given a questionnaire printed on a self-addressed card. A fact sheet containing a description of "Flavorful" milk and the market test was part of the card. Results from the questionnaires were as follows:

1. Did you like the milk?

Yes	133	92%
No	13	8%

2. Did you like this milk better than, less than, or about the same as the milk you regularly use?

Better	81	55%
Less	11	8%
Same	54	37%

3. What type(s) of milk do you regularly use?

Whole	111	76%
Low-fat	10	7%
Skim	2	1%
Powdered	3	2%
Combinations	20	14%

4. Do you feel you would buy this milk regularly if it were available?

Yes	108	73%
No	31	21%
Maybe	7	6%

Individuals who gave their names and addresses on the questionnaire were contacted a second time. These people were contacted by telephone, personally, or by mail and interviewed or requested to fill out a questionnaire. The results were as follows:

1. Now that you have tried the new "Flavorful" milk, are you going to continue using it all of the time?

Yes	63	78%
No	12	15%
Undecided	6	7%

2. What was your reaction to the carton design and color combination?

Like it	59	65%
Don't like it	13	14%
Indifferent	19	21%

3. Would you pay two cents more per half-gallon if it were offered regularly?

Yes	45	55%
No	24	30%
Maybe	12	15%

In general the market test questionnaires reinforced the previous taste and preference tests. Those who purchased "Flavorful" milk had a favorable impression. Over three-fourths of these consumers indicated that they would continue to purchase this milk beverage if it were regularly available. In addition, respondents were generally willing to pay a two-cent premium per half-gallon of "Flavorful" milk.

Following the market test, investigators attempted to determine whether "Flavorful" sales affected total milk sales, or whether "Flavorful" milk had been substituted for other milk beverages. Fluid milk sales figures were obtained from each of the four food markets for the "Flavorful" distributor and for one other company. These data covered the six weeks periods prior to, during, and after the test in 1961. Sales records for these companies were gathered for the same three periods in 1960.

The "Flavorful" distributor sold considerably more milk during the test period than during the preceding or following periods. Analysis of variance was used to test whether or not the difference was significant. The analysis consisted of a two-way classification of the four stores and the three periods. Orthogonal comparisons were used to determine if the second period was significantly larger than the average of the other periods. No significant difference was detected at the five percent level.

The control data were gathered to check whether or not the second trends influenced test period sales differentially. Analysis of variance computed for each group of control data indicated differences in the sales of the "Flavorful" distributor in the previous year. In this case, the period following the tests had lower sales volume. Milk consumption usually drops in the late spring months in Tucson because of the tendency to use other beverages during high environmental temperatures and outward migration of winter visitors.

Analysis of each dairy for both years found no significant difference in total milk sales for the second period compared to the first or third periods. Therefore, there was no statistical evidence that the introduction of "Flavorful" milk affected total milk sales of these companies.

It appears that consumers substituted "Flavorful" milk for milk which normally would have been purchased. The evaluation of the substitution effects in these market tests is a likely subject for more extensive investigation.

**Appendix Table 1. Characteristics of Cooperating University Households.
Academic Classification of Head of Household and Number of Each**

Position	Dean or Director	Professor	Associate Prof.	Assistant Prof.	Instructor	Clerical	Graduate Student	Total
No. in group	2	14	17	16	16	35	24	123

Family Size and Number of Families in Each

Number in family	1	2	3	4	5	6	7	8	9
Number of families	3	20	26	29	18	8	11	6	1

Yearly Income and Number in Each Classification

Gross Yearly Income	Under \$2,000	\$2,001-\$4,000	\$4,001-\$6,000	\$6,001-\$8,000	\$8,001-\$10,000	Over \$10,000
	4	21	32	33	18	15

Type of Milk Normally Used in Home^a

Type of Milk	Whole Milk	Low fat Milk	Skim Milk	Other ^b
Number using	109	31	15	77

Age Characteristics

	Adults	Children
Number in group	258	261
Average age of group (yrs.)	35.8	8.3

^a Many households use more than one type of milk.

^b Includes powdered, buttermilk, chocolate, and goat milk.

Appendix

Tables and Figures

**Appendix Table 2. Characteristics of Cooperating City Households.
Occupational Classification of Head of Household and Number of Each**

Occupation	Skilled	Unskilled	Pro- fessional	Retired	Business	Military	Unem- ployed	Student	Other	Not Reported
No. in group	31	5	29	7	48	11	4	3	1	2

Family Size and Number of Families in Each

No. in family	1	2	3	4	5	6	7	8
No. of families	1	29	27	37	26	12	5	4

Yearly Income and Number in Each Classification

Gross yearly income	Under \$2,000	\$2,001- \$4,000	\$4,001- \$6,000	\$6,001- \$8,000	\$8,001- \$10,000	Over \$10,000	Not Reported
No. in group	6	10	50	33	22	15	5

Type of Milk Normally Used in Home^a

Type of Milk	Whole Milk	Low-fat Milk	Skim Milk	Other ^b
Number using	139	16	16	72

Age Characteristics

	Adults	Children
Number in group	284	270
Average age of group (yrs.)	42.1	9.5

^a Many households use more than one type of milk.

^b Includes powdered, buttermilk, chocolate, and goat milk.

Appendix Table 3. Number and Percent of Households Preferring Sample A or Sample B, Reasons for Their Preference, and Their Willingness to Pay Premiums of Varied Amounts for Their Preference of Milk Beverages Having the Following Compositions: Sample A—3.5% fat, 8.5% SNF, 12.0% TS; Sample B—3.5% fat, 9.5% SNF, 13.0% TS.

	Sample A						Sample B					
	Number		Percent of Total		Number		Percent of Total		Number		Percent of Total	
	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group
Preference ^a	40	40	32	29	83	96	67	71				
Reasons for Preference ^b												
1. Richer taste.....	18	23	45	58	62	60	75	63				
2. Sweeter taste.....	6	14	15	35	19	25	23	26				
3. Smoother body.....	14	12	35	30	33	41	40	43				
4. More pleasing taste.....	23	21	58	53	44	62	53	65				
5. Less after taste.....	14	14	35	35	19	25	23	26				
6. Other.....	5	6	13	15	6	16	7	17				
Willing to pay premium of												
1 cent.....	9	8	23	20	23	11	28	12				
2 cents.....	4	10	10	25	19	30	23	31				
3 cents.....	2	1	5	2	5	5	6	5				
4 cents.....	0	2	0	5	1	3	1	3				
5 cents.....	0	2	0	5	0	10	0	11				
0 cents.....	25	15	62	38	35	33	42	34				
No opinion.....	0	2	0	5	0	4	0	4				

^a Total households cooperating: University group—124, one respondent or approx. 1% of total cooperators had no preference; city group—136.

^b Many respondents listed more than one reason for their preference.

Appendix Table 4. Number and Percent of Households Preferring Sample A or Sample B, Reasons for Their Preference, and Their Willingness to Pay Premiums of Varied Amounts for Their Preference of Milk Beverages Having the Following Compositions: Sample A—2.0% fat, 9.0% SNF, 11.0% TS; Sample B—2.0% fat, 10.0% SNF, 12.0% TS.

	Sample A						Sample B					
	Number		Percent of Total		Number		Percent of Total		Number		Percent of Total	
	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group
Preference ^a	44	44	36	34	77	79	63	61				
Reasons for Preference ^b												
1. Richer taste.....	12	24	27	55	33	47	42	59				
2. Sweeter taste.....	11	14	25	32	13	27	17	34				
3. Smoother body.....	13	17	30	39	25	23	32	29				
4. More pleasing taste.....	23	25	52	57	38	41	49	52				
5. Less after taste.....	13	18	30	41	14	21	18	27				
6. Other.....	5	5	11	11	10	15	13	19				
Willing to pay premium of												
1 cent.....	9	7	20	16	11	16	14.5	20				
2 cents.....	3	9	7	20	11	17	14.5	21				
3 cents.....	0	4	0	9	4	3	5	4				
4 cents.....	0	1	0	2	1	2	1	3				
5 cents.....	0	2	0	5	0	4	0	5				
0 cents.....	32	17	73	39	49	34	64	43				
No opinion.....	0	4	0	9	1	3	1	4				

^a Total households cooperating: University group—122; one respondent or approx. 1% of total cooperators had no preference; city group—129, six respondents or approx. 5% of total cooperators had no preference.

^b Many respondents listed more than one reason for their preference.

Appendix Table 5. Number and Percent of Households Preferring Sample A or Sample B, Reasons for Their Preference, and Their Willingness to Pay Premiums of Varied Amounts for Their Preference of Milk Beverages Having the Following Compositions: Sample A—0.1% fat, 9.0% SNF, 9.1% TS; Sample B—0.1% fat, 10.0% SNF, 10.1% TS.

	Sample A						Sample B					
	Number		Percent of Total		Number		Percent of Total		Number		Percent of Total	
	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group
Preference ^a	21	41	18	32	91	43	77	33				
Reasons for Preference ^b												
1. Richer taste.....	6	11	29	27	18	13	20	30				
2. Sweeter taste.....	3	7	14	17	14	9	15	21				
3. Smoother body.....	5	6	24	15	9	12	10	28				
4. More pleasing taste.....	10	10	48	24	40	15	44	35				
5. Less after taste.....	6	17	29	41	42	16	46	37				
6. Other.....	2	18	10	44	20	24	22	56				
Willing to pay premium of												
1 cent.....	3	2	14	5	9	4	10	10				
2 cents.....	3	3	14	7	3	1	3	2				
3 cents.....	2	2	10	5	4	2	4	5				
4 cents.....	0	2	0	5	1	0	1	0				
5 cents.....	1	1	5	2	5	1	6	2				
0 cents.....	12	26	57	2	5	1	6	2				
No opinion.....	0	5	0	12	3	1	3	2				

^a Total households cooperating: University group—118, six respondents or approx. 5% of total cooperators had no preference; city group—130, 46 respondents or approx. 35% of total cooperators had no preference. Both samples were nonfat milk which undoubtedly accounts for the high percentage of rejection.

^b Many respondents listed more than one reason for their preference.

Appendix Table 6. Number and Percent of Households Preferring Sample A or Sample B, Reasons for Their Preference, and Their Willingness to Pay Premiums of Varied Amounts for Their Preference of Milk Beverages Having the Following Compositions: Sample A—3.5% fat, 8.5% SNF, 12.0% TS; Sample B—2.0% fat, 10.0% SNF, 12.0% TS.

	Sample A						Sample B					
	Number		Percent of Total		Number		Percent of Total		Number		Percent of Total	
	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group
Preference ^a	49	59	42	46	68	63	58	50				
Reasons for Preference ^b												
1. Richer taste.....	30	41	61	69	35	38	51	60				
2. Sweeter taste.....	6	18	12	31	19	25	28	40				
3. Smoother body.....	17	24	35	41	19	20	28	32				
4. More pleasing taste.....	29	32	59	54	39	32	57	51				
5. Less after taste.....	8	17	16	29	15	13	22	21				
6. Other.....	3	1	6	19	9	15	13	24				
Willing to pay premium of												
1 cent.....	16	10	23	17	11	15	16	24				
2 cents.....	13	21	26	36	15	10	22	16				
3 cents.....	1	5	2	8	3	5	4	8				
4 cents.....	0	0	0	0	0	2	0	3				
5 cents.....	0	1	0	2	0	2	0	3				
0 cents.....	19	19	39	32	35	24	52	38				
No opinion.....	0	3	0	5	4	5	6	8				

^a Total households cooperating: University group—117, city group—127, five respondents or approx. 4% of total cooperators had no preference.

^b Many respondents listed more than one reason for their preference.

Appendix Table 7. Number and Percent of Households Preferring Sample A or Sample B, Reasons for Their Preference, and Their Willingness to Pay Premiums of Varied Amounts for Their Preference of Milk Beverages Having the Following Compositions: Sample A—1.5% fat, 8.5% SNF, 10.0% TS; Sample B—0.1% fat, 10.0% SNF, 10.1% TS.

	Sample A						Sample B					
	Number		Percent of Total		Number		Percent of Total		Number		Percent of Total	
	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group
Preference ^a	85	99	73	79	32	25	27	27	20	20	20	20
Reasons for Preference ^b												
1. Richer taste.....	40	74	47	76	8	8	25	25	32	32	32	32
2. Sweeter taste.....	9	25	11	27	8	8	25	25	32	32	32	32
3. Smoother body.....	17	38	20	39	6	4	19	19	16	16	16	16
4. More pleasing taste.....	51	51	60	52	16	12	50	50	48	48	48	48
5. Less after taste.....	4	19	5	19	11	7	34	34	28	28	28	28
6. Other.....	12	12	14	12	3	1	9	9	4	4	4	4
Willing to pay premium of												
1 cent.....	15	17	18	17	7	6	22	22	24	24	24	24
2 cents.....	23	22	27	22	2	6	6	6	24	24	24	24
3 cents.....	5	11	6	11	1	1	3	3	4	4	4	4
4 cents.....	3	9	4	9	0	0	0	0	0	0	0	0
5 cents.....	2	4	2	4	1	0	3	3	0	0	0	0
0 cents.....	36	28	42	28	21	10	66	66	40	40	40	40
No opinion.....	1	9	1	9	0	2	0	0	8	8	8	8

^a Total households cooperating: University group—117, city group—125, 1 respondent or approx. 1% of total cooperators had no preference.
^b Many respondents listed more than one reason for their preference.

Appendix Table 8. Number and Percent of Households Preferring Sample A or Sample B, Reasons for Their Preference, and Their Willingness to Pay Premiums of Varied Amounts for Their Preference of Milk Beverages Having the Following Compositions: Sample A—4.0% fat, 9.0% SNF, 13.0% TS; Sample B—3.5% fat, 9.5% SNF, 13.0% TS.

	Sample A						Sample B					
	Number		Percent of Total		Number		Percent of Total		Number		Percent of Total	
	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group	Univ. Group	City Group
Preference ^a	47	50	42	42	62	66	55	55	66	66	55	55
Reasons for Preference ^b												
1. Richer taste.....	23	35	51	70	16	43	22	65	16	43	22	65
2. Sweeter taste.....	9	20	20	40	13	26	21	39	13	26	21	39
3. Smoother body.....	12	21	27	42	13	25	21	38	13	25	21	38
4. More pleasing taste.....	23	27	51	54	33	39	53	59	33	39	53	59
5. Less after taste.....	9	17	20	34	15	19	24	29	15	19	24	29
6. Other.....	1	2	2	4	6	2	10	3	6	2	10	3
Willing to pay premium of												
1 cent.....	13	12	28	24	14	11	23	17	14	11	23	17
2 cents.....	9	13	19	26	7	19	11	29	7	19	11	29
3 cents.....	1	3	2	10	2	4	3	6	2	4	3	6
4 cents.....	1	5	2	6	0	2	0	3	0	2	0	3
5 cents.....	1	2	2	4	2	0	3	0	2	0	3	0
0 cents.....	16	11	34	22	32	27	52	41	32	27	52	41
No opinion.....	6	4	13	8	5	3	8	4	5	3	8	4

^a Total household; co-operating: University group—113, four respondents or approx. 3% of total cooperators had no preference; city group—120, four respondents or approx. 3% of total cooperators had no preference.

^b Many respondents listed more than one reason for their preference.

Appendix Table 9. Number and Percent of Persons Choosing Sample A and Sample B by Districts for the Six Sample Pairs of Milk Beverages.

Pair	District 1						District 2						District 3						District 4																
	Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B												
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.											
I.....	286	37	492	63	269	41	386	59	86	36	153	64	202	41	296	59	324	48	356	52	390	40	580	60	32	38	53	62	455	55	380	45			
II.....	236	43	316	57	278	40	419	60	33	32	69	68	303	43	407	57	339	46	406	54	109	49	114	51	180	45	221	55	331	51	324	49			
III.....	278	53	251	47	25	56	20	44	25	56	20	44	282	50	386	50	366	44	459	56	50	53	45	47	314	51	298	49	239	48	258	52			
IV.....																																			
V.....																																			
VI.....																																			

Appendix Table 10. Number and Percent of Persons Choosing Sample A and Sample B by Occupation for the Six Sample Pairs of Milk Beverages.

Occupation	Pair I		Pair II		Pair III		Pair IV		Pair V		Pair VI													
	Sample A		Sample B		Sample A		Sample B		Sample A		Sample B													
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.												
Skilled Labor.....	153	43	232	57	223	50	224	50	121	44	157	56	169	48	185	52	194	47	218	53	131	49	138	51
Unskilled Labor.....	113	40	172	60	103	47	115	53	118	40	172	60	155	49	162	51	105	45	130	55	98	40	147	60
Professional.....	75	42	105	58	120	51	114	49	89	43	117	57	58	47	65	53	84	47	93	53	64	45	78	55
Retired.....	4	27	11	73	6	32	13	68	7	54	6	46	10	83	2	17	8	57	6	43	5	63	3	37
Business.....	122	40	184	60	177	45	215	55	176	40	259	60	108	50	119	50	222	55	180	45	131	50	133	50
Military.....	41	36	72	64	122	55	98	45	26	42	39	58	37	47	42	53	36	54	31	46	12	53	25	67
Unemployed.....	16	41	23	59	12	41	17	59	23	43	31	57	18	60	12	40	9	64	5	36	13	35	24	65
Student.....	5	83	1	17	5	83	1	17	1	100	0	0	2	67	1	33	1	100	0	0	1	33	2	67
Other.....	6	43	8	57	9	47	10	53	18	46	21	54	12	50	12	50	10	43	13	57	6	38	10	62

Appendix Table 11. Number and Percent of Persons Choosing Sample A and Sample B by Age Groups for the Six Sample Pairs of Milk Beverages.

Pair	Under 20 Years				20 to 40 Years				40 to 60 Years				Over 60 Years			
	Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
I.....	84	44	109	56	220	40	330	60	153	30	234	70	46	33	92	67
II.....	106	51	102	49	284	45	349	55	139	32	222	68	50	36	87	64
III.....	28	37	45	63	136	41	198	59	75	39	117	61	28	38	46	62
IV.....	39	39	60	61	190	46	219	54	120	46	139	54	62	48	67	52
V.....	50	56	40	44	176	56	139	44	101	55	82	45	27	42	38	58
VI.....	66	50	65	50	260	51	251	49	120	47	137	53	61	57	47	43

Appendix Table 12. Number and Percent of Persons Choosing Sample A and Sample B by Sex for the Six Sample Pairs of Milk Beverages.

Pair	Male				Female			
	Sample A		Sample B		Sample A		Sample B	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
I	534	41	770	59	548	39	803	61
II	700	47	784	53	743	46	885	54
III	416	41	603	59	462	42	642	58
IV	497	48	549	52	511	48	560	52
V	549	52	515	48	503	50	496	50
VI	467	50	461	50	515	48	611	52

Appendix Table 13. Number and Percent of Persons Choosing Sample A and Sample B by Use of Tobacco for the Six Sample Pairs of Milk Beverages.

Pair	Use Tobacco				Do Not Use Tobacco			
	Sample A		Sample B		Sample A		Sample B	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
I	173	41	251	59	356	39	564	61
II	217	41	312	59	390	45	478	55
III	109	41	158	59	180	40	273	60
IV	167	47	185	53	265	46	316	54
V	155	56	121	44	217	53	193	47
VI	210	50	209	50	304	51	296	49

Appendix Table 14. Number and Percent of Persons Choosing Sample A and Sample B by Regularity of Milk Use for the Six Sample Pairs of Milk Beverages.^a

Pair	Use Regularly						Use Occasionally						Never Use			
	Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
I.....	714	41	1028	59	242	36	496	64	36	45	44	55				
II.....	924	48	1005	52	386	44	497	56	36	41	51	59				
III.....	588	42	823	58	220	39	340	61	27	45	33	55				
IV.....	634	48	681	52	312	46	361	54	27	43	36	57				
V.....	717	50	716	50	276	55	226	45	23	43	31	57				
VI.....	633	49	660	51	295	47	338	53	30	41	43	59				

^a For purposes of statistical analysis data in this table were combined into two categories, regular user and other. Regular users are those persons drinking milk at least once each day. Others were people drinking milk less than once each day.

Appendix Table 15. Number and Percent of Persons Choosing Sample A and Sample B by Type of Milk Used for the Six Sample Pairs of Milk Beverages.^a

Pair	Whole						Low Fat						Skim						Whole and Powder						Others				
	Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		Sample A		Sample B		
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	
I.....	342	38	555	62	32	52	29	48	9	56	7	44	20	32	42	68	38	39	59	61									
II.....	358	45	430	55	19	41	27	59	14	56	11	44	14	25	43	75	36	40	54	60									
III.....	138	39	213	61	12	48	13	52	7	64	4	36	9	39	14	61	13	30	31	70									
IV.....	228	48	246	52	22	54	19	46	11	52	10	48	11	43	15	57	34	54	29	46									
V.....	173	51	166	49	12	71	5	29	3	67	6	33	19	48	21	52	27	54	23	46									
VI.....	326	51	316	49	15	41	22	59	9	43	12	57	27	49	28	51	51	57	37	43									

^a For purposes of statistical analysis, low-fat, skim, whole and powder, and others were considered as one category and compared to whole milk users.

Appendix Table 16. Number and Percent of Persons Choosing Sample A and Sample B by Sampling Groups for the Six Sample Pairs of Milk Beverages.

Pair	Stores						Schools						Others									
	A		B		Sample		A		B		Sample		A		B		Sample		A		B	
	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
I.....	346	39	548	61	545	40	810	60	191	41	275	59	59	59	41	41	191	41	275	59	59	59
II.....	437	43	586	57	831	49	873	51	175	46	208	54	54	54	46	46	175	46	208	54	54	54
III.....	375	40	553	60	588	42	808	58	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
IV.....	414	46	485	54	568	48	604	52	26	57	20	43	43	43	57	57	26	57	20	43	43	43
V.....	320	53	279	47	680	50	692	50	52	50	40	43	43	43	50	50	52	50	40	43	43	43
VI.....	514	50	509	50	468	45	563	55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Appendix Figure 1. Questionnaires Used in Food Markets, Public Gatherings and in Schools.

Used in food markets and public gatherings

PLEASE MARK THE APPROPRIATE ITEM

1. *PREFER SAMPLE IN:* Container A ; Container B .
2. *Age:* Under 20 ; 20 to 40 ; 40 to 60 ; above 60 .
3. *Sex:* Male ; Female .
4. *Do you use tobacco?* Yes ; No .
5. *Do you drink milk?* Regularly ; Occasionally ; Never .
6. *Occupation:* _____
(If housewife, indicate husband's occupation)
7. *Kind of milk used in your home:* Homogenized, }
Pasteurized or } ; low fat
Whole milk }
Skim ; Powder .

Please *DO NOT* sign your name

Used in public schools

PLEASE MARK THE APPROPRIATE ITEM

1. *PREFER SAMPLE IN:* Container A ; Container B .
2. *Sex:* Boy ; Girl .
3. *Do you drink milk with meals:* Every day ; Now and then ; Never .
4. *Parent's Occupation:* _____

Please *DO NOT* sign your name

Appendix Figure 2. Weekly Evaluation Questionnaires Used for Household Preference Tests.

(Place an "X" in the appropriate space)

A. Prefer sample in: Container "A" _____; Container "B" _____.
(A preference for sample "A" or "B" must be indicated.)

B. Why did you prefer the sample of your choice?
(More than one choice may be appropriate.)

Preferred milk has:

Richer taste _____

Sweeter taste _____

Smoother body _____

More pleasing taste _____

Less after taste _____

Other: (Please write in) _____

C. If you had the choice of buying these two beverages only for regular consumption, how much more (if any) per quart would you be willing to pay for the sample marked as being preferred on this questionnaire?

(Select only one)

1 cent _____

2 cents _____

3 cents _____

4 cents _____

5 cents _____

0 cents _____

PLEASE DO NOT SIGN YOUR NAME