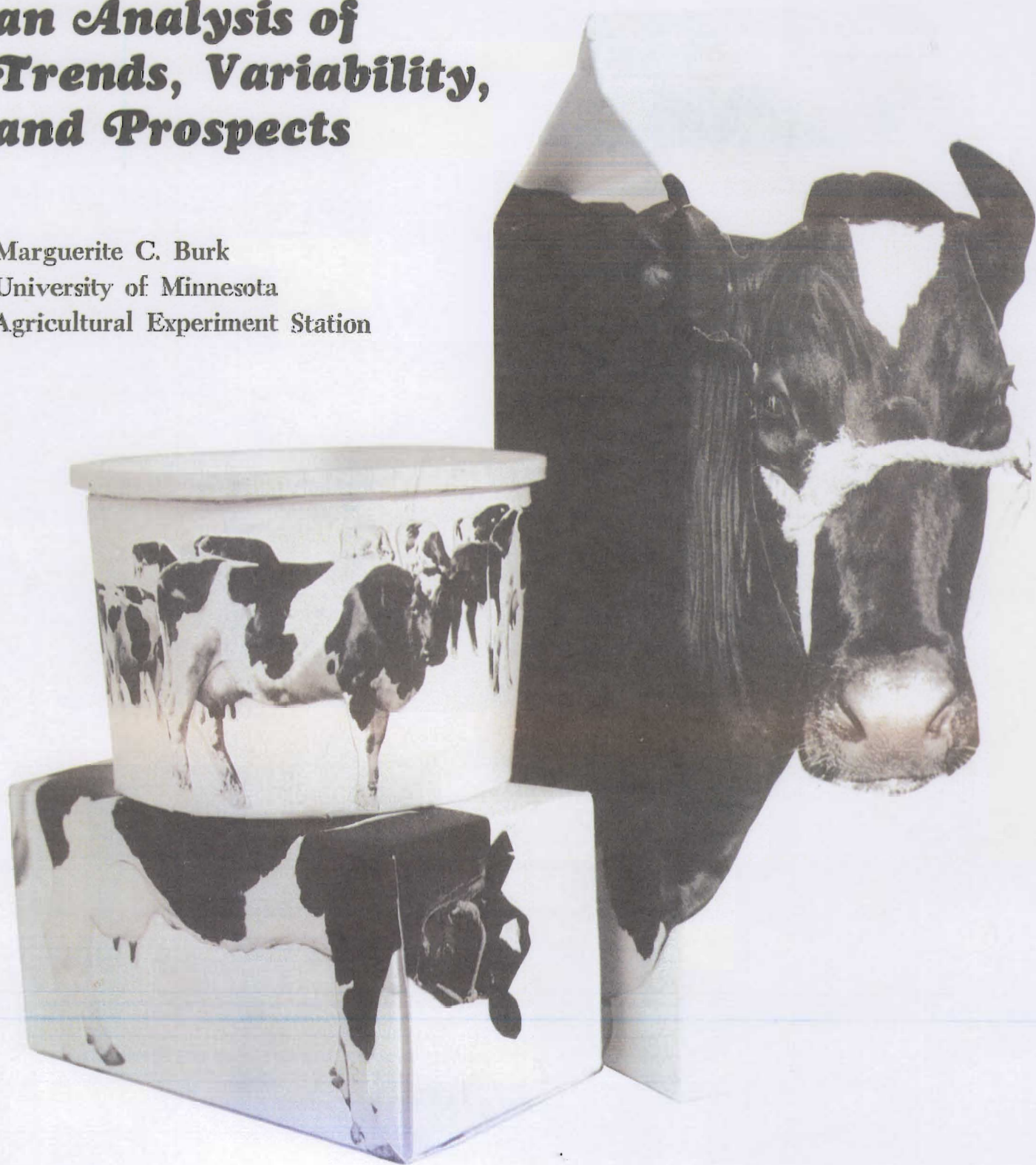


Consumption of Dairy Products

***an Analysis of
Trends, Variability,
and Prospects***

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CONSUMPTION OF DAIRY PRODUCTS: AN ANALYSIS OF TRENDS, VARIABILITY, AND PROSPECTS

by Marguerite C. Burk

Introduction and Summary

A backlog of knowledge about the consumption of dairy products in the United States has built up through years of research and can only be found with persistent search through research reports and articles in professional and government publications. A summary of this knowledge, supplemented by analyses of new data on the present and future market for Minnesota's milk, is presented here. For example, analysis of the expenditures for all foods and for dairy products by upper income families in Minneapolis-St. Paul provides clues to expected changes in consumer demand with increasing affluence anticipated in this area and this country during the next decade.

Contents

The first chapter of this bulletin reviews major historical trends in U. S. per capita consumption of major dairy products and several analyses of trends. Because the historical series are averages and several statistical analyses are unsatisfactory, data are considered from cross section surveys for information on changes by subgroups of the population and for measurement of the effects of factors, other than price and income, on consumption. Data from the surveys of household food consumption in 1942, 1955, and 1965 conducted by the U. S. Department of Agriculture (USDA) are compared. The Minneapolis-St. Paul survey of upper income families provides supplementary information on a variety of socioeconomic factors of potential use in predicting dairy product trends. Analyses of these data are reported in chapter 3.

Conventional economic analyses of trends and patterns in consumption have ignored social psychological factors, but market researchers haven't. These factors provide important pieces of knowledge for products promotion. The dairy industry has invested heavily in such research through agencies such as the American Dairy Association (ADA). Its research reports are valuable sources of knowledge. The author has been given full access to published and unpublished ADA reports, but assumes complete responsibility for their interpretation and use in chapter 4.

The last chapter describes the development of alternative sets of projections for U. S. consumption of dairy products. The author selects a set of "most likely" estimates for the socioeconomic factors and identifies the projections they generate, both per capita and the U. S. totals. The final section identifies implications of the projected changes in terms of shifts in milk use, factors subject to industry influence, and problems and issues to be faced by the industry.

Summary of Findings

1. Declining consumption of dairy products (except low-fat milk, cheese, and frozen milk desserts) is characteristic of the last 20 years. Although the fluid whole milk market had in its favor the high proportion of young children in the population, increased income, and subsidized consumption; on the minus side, price increases, a high proportion of nonwhite population, and changes in tastes and preferences more than offset the positive factors and led to the downtrends in consumption. The relative importance of dairy products (including butter) in the total retail value of all foods dropped from 19 to 17 percent.

2. Analysis of cross section data on consumption of dairy products by housekeeping households revealed a general lowering of the rates of consumption for fluid whole milk, canned milk, and butter in relation to the level of real income within each urbanization category. Higher incomes encouraged cheese and ice cream consumption.

3. High income families in the United States decreased dairy product purchases from 1955 to 1965 more than moderate income families. Data from a special survey of expenditures of upper income families in Minneapolis-St. Paul revealed that income was not a significant factor in variations in expenditures for dairy products except for cheese and home-delivered milk. Only a sixth of the homemakers indicated any interest in spending more for dairy products if they had a larger food budget. Age composition was a key factor in the variations in consumption of most dairy products; younger families used more fluid milk and older families more fluid cream, butter, and cheese. The higher the homemakers' education, the larger expenditures for cheese and frozen milk desserts but the lower expenditures for butter.

4. The ADA has funded and directed survey research on the values, goals, attitudes, and knowledge of consumers related to different rates of milk consumption. Many of the findings have been used in advertising and sales promotion campaigns. USDA and ADA cooperated in a comprehensive test of promotion effectiveness. Considering returns for a 1-year period, the medium level of promotion expenditures (15 cents per capita per day extra) yielded higher net returns to dairy farmers than either the higher or lower rates in the market test. Intensive analysis by Wendell Clement, a USDA researcher, of data obtained from surveys concurrent with the test provided evidence that attitude change follows, not precedes, the change in purchase behavior. This raises serious questions regarding the usual explanation that advertising increases consumer awareness, leading to attitude change and then to change in behavior. Further research on the complex problem of changing consumer behavior is badly needed.

5. Two alternative procedures were used to develop projections of U.S. consumption of dairy products. One made use of regression analyses of per capita consumption in 1947-67, and the other's base was data from cross section surveys of household food consumption. Changes in major socioeconomic factors related to the consumption of dairy products are discussed in section 5.2. The set used for the author's "most likely" projections included a 44 percent increase in real disposable income per capita

from 1966 to 1980; higher relative prices for fluid milk and cheese and about the same butter-margarine price ratio; further decline in the birth rate; and expansion of programs to subsidize children's (including that of preschoolers) milk consumption. With these assumptions, total fluid milk consumption would drop to 43 billion pounds, whole milk equivalent on fat content basis. The consumption of butter and canned milk would continue to decline; cheese and frozen dessert consumption would increase substantially. Total U.S. consumption of milk in all forms would fall 5 to 10 percent below the 1968 civilian and military total of 116 billion pounds and changes in milk use would occur. However, if the birthrate should increase, the 1980 total might be close to that of 1968.

6. Section 5.5 contains an appraisal of the implications of the projected changes in consumption. After a discussion of the potential shifts in milk use, the factors which may be influenced by milk industry actions, and the impending problems, the author identifies two critical issues for the dairy industry. First, the industry must face up to the "marketing revolution," meaning it must produce new products with the attributes consumers want, often not the traditional products. Second, the shifts in milk use, the marketing revolution, and the current rise in urban consumers' political power will build tremendous pressures on the present institutional arrangements for marketing and pricing milk.

Chapter 1 ANALYSES OF HISTORICAL TRENDS

This chapter begins with a description of well-known trends in the per capita consumption of dairy products in the United States before and after World War II. Then it reviews research findings which identify and measure the effects of several economic factors on historical changes in consumption of major products. To round out and update earlier analyses, the results of a number of relatively simple statistical analyses are presented. The last substantive section identifies several marketing changes significant for the consumption of dairy products.

1.1 The Major Trends in Consumption¹

From 1924 to 1941 there were some fluctuations but no strong trends in the per capita consumption of dairy products measured in whole milk equivalents or in milk fat content. (See table 1.1.) A slight upward trend was apparent in milk fat excluding butter. The use of nonfat solids provided by all forms of dairy products rose gradually. Average consumption of all dairy products, as measured by their total retail value at constant prices, showed a slight upward trend. Without butter, this indicated about a 10 percent increase in domestic consumption of dairy products per capita.

The World War II and immediate postwar changes in consumption were so greatly affected by price controls, subsidies, and abnormal population shifts that no analysis contributes much to understanding postwar and prospective changes. Therefore, these periods are omitted from this bulletin, except for a few allusions to the 1942 survey of household food consumption.

1.1.1 Postwar Trends

Consideration of postwar changes in consumption begins with the 1947-49 period. Fat-content measures of the consumption of dairy products indicate a continued gradual decline, both including and excluding farm production of milk and butter for home consumption on farms where produced. The reductions were particularly significant in farm consumption of fluid milk, cream, and butter and in commercial sales per capita of butter, cream, and evaporated milk (table 1.2). Average consumption of milk solids-not-fat rose for a few years, then fell back to the 1947-49 level. Most of the decline came from the decrease in farm production for farm home use.

¹ Data for this section, given in table 1.1, came from publications of the U. S. Economic Research Service, particularly Hiemstra, Stephen Food Consumption, Prices and Expenditures (Agr. Econ. Report No. 138, July 1968), The National Food Situation, and The Dairy Situation. These estimates of per capita consumption in a year are derived from data on production, stocks, military takings, foreign trade. They are often called "disappearance data" because they represent disappearance into civilian distribution channels.

The tables are grouped at the end of each chapter.

On a retail price-weighted basis (using constant prices), consumption of all dairy products including butter has declined about 10 percent while dairy products other than butter dropped only 5 percent. The relative importance in the total food picture of all dairy products, including butter, declined from 19 percent to 17 percent, but no noticeable change occurred for dairy products excluding butter.

Since 1947-49, retail prices of the dairy product group of foods have increased approximately as much as prices for all foods for home consumption.

The critical change in the consumption of dairy products has been the downtrend in the consumption of milk fat--principally in the forms of butter, cream, farm home use of fluid whole milk, and evaporated milk. Measured by calcium content, dairy products have held their own in American diets (figure 1.1). When viewed from the standpoint of their roles in the meals of nonfarm people, dairy products have increased in importance as beverages (when fluid equivalent of nonfat dry milk solids is taken into account), as desserts, and as side dishes (cheeses, yogurt). But their uses as baby food and as a spread (there is less bread eaten) have fallen sharply.

1.1.2 Major Products in Postwar Years

Shifts in the per capita consumption of fresh fluid milk items have been varied and partly offsetting. Total farm home consumption of fluid milk and cream declined because there are fewer farm families and less milk used per capita. Purchases of fluid whole milk declined on a per capita basis, and fluid cream consumption dropped dramatically. In contrast, higher per capita purchases of 2 percent milk, chocolate milk, and skim milk offset the substantial decrease in farm home consumption of buttermilk and skim milk. (However, estimates of these consumption rates have never been very reliable.)

Among the processed milks, per capita consumption of evaporated milk is now less than half the average rate in 1947-49. Use of nonfat dry milk has increased significantly in the last 15 years, and much is reconstituted for consumption in fluid form. Consumption rates for whole and part-skim milk cheeses and for cottage cheese have risen. Butter consumption has decreased drastically. Farm home production and consumption of butter has dropped more sharply in the overall butter change. The most striking changes in consumption per capita of frozen dairy products have been the increases in ice milk, mellorine, and sherbet.

1.2 Factors Related to Historical Trends

A variety of factors have influenced postwar changes in consumption of dairy products. The decrease in butter consumption per capita is generally attributed to less demand for table fats and competition from the inexpensive vegetable oil product, margarine. Changes in infant feeding practices, partly because of the improved quality of fluid whole milk, have reduced average use of evaporated milk. The decline in whole milk is related to decreasing farm home production and the shift in demand toward low-fat milks. The

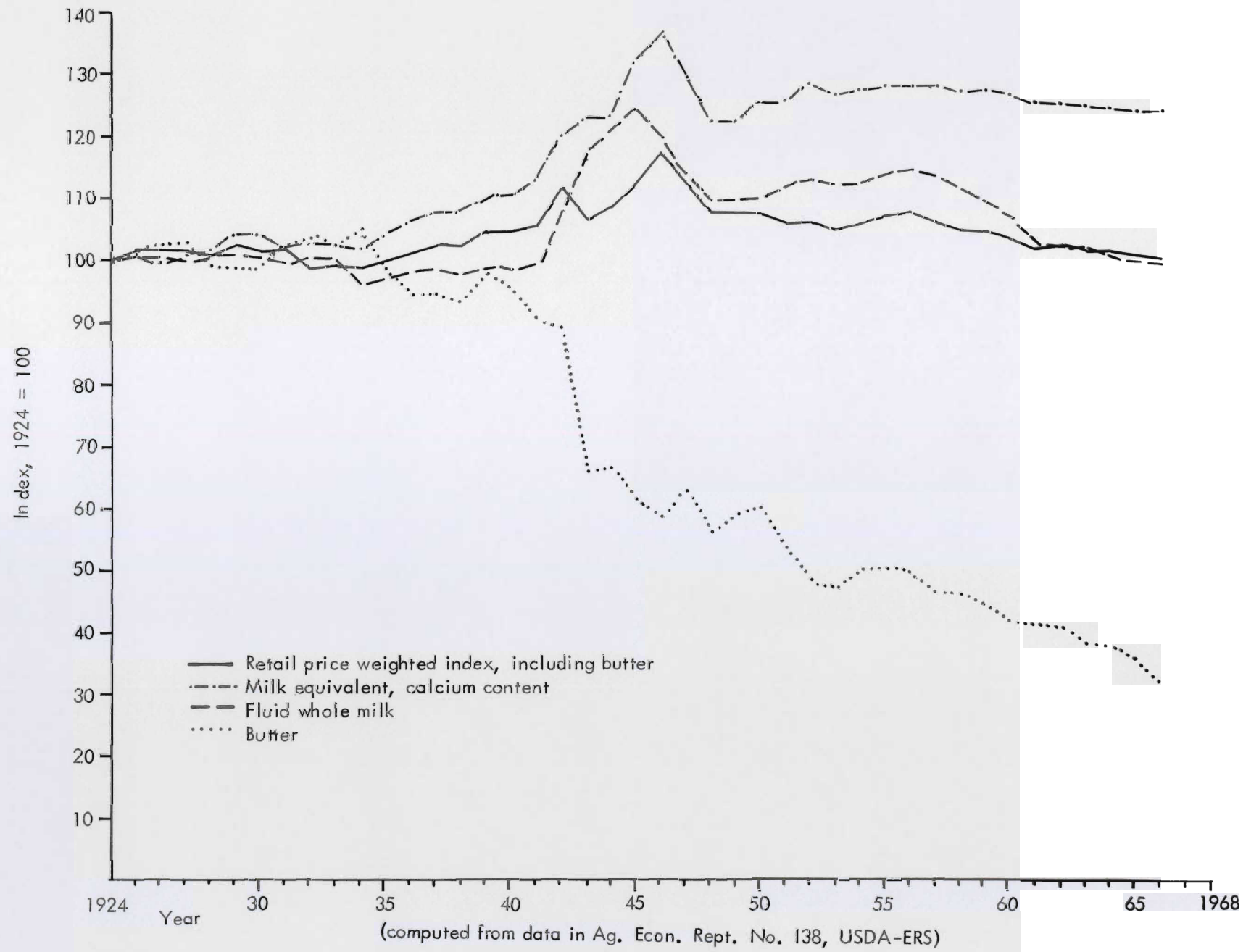


Figure 1.1. Trends in U.S. consumption of dairy products per capita, 1924-68

increases in cheese and frozen dairy products have been encouraged by consumers' higher real incomes and production and marketing of a wider variety of quality products.

This chapter has been confined to an analysis of changes in per capita consumption, to avoid the complication of the effects of increases in population on the total market. Economists customarily study variations and trends by careful examination of the effects of supply factors, prices, and consumer income.

The unfavorable impact of rising prices of dairy products on consumption is illustrated in figure 1.2 by the backward movement on the quantity scale of the dots marking price-quantity relationships for the several years.

1.2.1 Fluid Whole Milk

As stated earlier, the most striking change in fluid milk consumption and supplies was the sharp decrease in farm home production of milk because of fewer farm families and fewer farms with milk cows. The latter change reflects the trend toward specialization in farm operations.

Commercial supplies of whole milk and nonfat solids rose with increased farm marketings of whole milk and technological changes in feed output and operations of dairy enterprises. Figure 1.3 highlights the diverse trends in per capita sales of several major dairy products.

The National School Lunch Program and the Special School Milk Program have encouraged children's consumption of fluid milk. Under the latter program, the USDA subsidizes the price by an average of 3 cents a pint. Federal contributions to the Special School Milk Program amounted to slightly over \$100 million in 1967-68. In 1968 approximately 3.6 billion pounds of milk (about 3 percent of the total civilian consumption that year²) were distributed through the National School Lunch and the Special School Milk Programs.

Consider the effect of price on commercial sales of fluid milk. Several years ago Johnson reported results of a careful review of research on consumers' response to price over the last 30 years. He found price elasticities of the demand for milk had decreased, partly because of rising incomes, from about -.5 in the 1930's to -.4 in the 1940's, -.3 in the 1950's, and -.2 in the 1960's.³ These data mean, taking .2 for example, that for each 10 percent rise in price in the 1960's, consumption decreased a fifth as much or 2 percent, while the effect of such a price increase during the 1930's ran around 5 percent. But Johnson found the price elasticity of demand for fluid milk

2 Data from The Dairy Situation, Nov. 1968, tables 14 and 11.

3 Johnson, Stewart "The Effect of Price on Consumption", Proceedings of the Sixth National Symposium on Dairy Market Development, ADA, 1966, pp. 7-18.

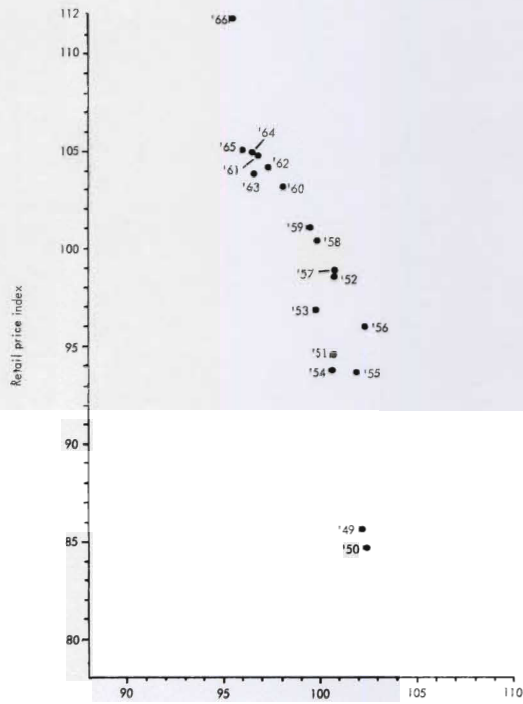


Figure 1.2. Relationships of price and per capita quantity of dairy products, 1959-68 (including butter, data from tables 11 and 96 of Ag. Econ. Rept. No. 138, USDA-ERS)

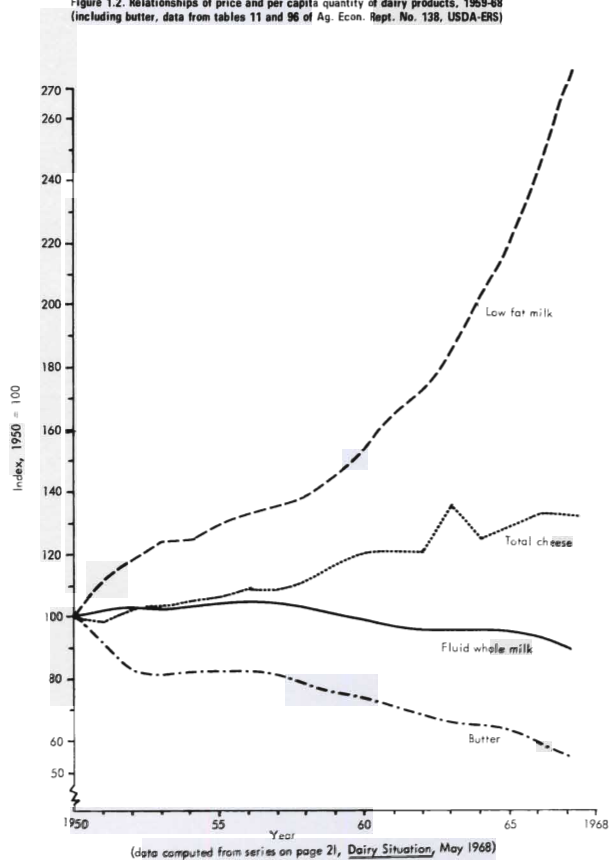


Figure 1.3. Sales of selected dairy products (per capita, 1950-68)

varied widely in different sections of the country, in different markets, and for fluid products other than whole milk.

The major research study of the demand and price structure for dairy products was made by Rojko in the late 1950's.⁴ Rojko's estimates of the price elasticity of fluid milk and cream combined for 1947-54 were $-.32$ and $-.41$, varying with the statistical formulation used. Hu extended Rojko's analysis to cover 1947-63 and obtained a price elasticity of $-.2$, but with a standard error of $.2$. (The size of the standard error indicates the lack of precision in the estimate.) In an alternative formulation, Hu found a price elasticity of $-.3$, but again with a standard error of $.2$.⁵ Two other econometricians used a different model and obtained the same price elasticity for this postwar period and a standard error as large as the coefficient.⁶ Brandow used $-.3$ in his simultaneous model for 1955-57.⁷

Although Bartlett described his price analyses for fluid milk sales as "long-run", they are essentially cross section analyses. To explain the variation among 55 markets in average per capita sales of fluid whole and skim milk, he used averages for disposable income per capita in 1949-59 and for retail prices in 1949-59 and 1960 data on percent nonwhite population in multiple regression analyses. The analysis indicated quite different price elasticities for markets with retail prices at different levels. He reported an average price elasticity for all 55 markets of $-.63$, but he did not report its standard error.⁸ His use of unusual time periods for his variables and the combination of skim milk with fluid whole milk make appraisal of his results very difficult. His results are substantially higher than those obtained with more standard econometric analyses and more precisely specified data.

Economists measure consumer response to variations in income in terms of the income elasticity of consumption. Rojko estimated the income elasticity of consumption for fluid milk and cream in 1947-54 to be $.3$ or $.4$, with standard errors as large as the coefficients. An income elasticity of $.3$ means

4 Rojko, Anthony S. The Demand and Price Structure for Dairy Products, USDA Technical Bulletin 1168, 1957. See table 24.

5 Hu, Teh-wei "An Econometric Model of Demand for Dairy Products in the U.S. Postwar Period 1947-63." Paper presented to the Econometric Society, Toronto, Canada, Aug. 28-30, 1967, table 3.

6 Wilson, Robert R. and Russell G. Thompson "Demand, Supply, and Price Relationships for the Dairy Sector, Post-World War II Period", J. Farm Economics 49:2:360-371, May 1967.

7 Brandow, G. E. Interrelations among Demands for Farm Products and Implications for Control of Market Supply. Pennsylvania State University, Agricultural Experiment Station Bulletin 680, University Park, Pa. Aug. 1961, table 1.

8 Bartlett, Roland W. "Fluid Milk Sales as Related to Demand Elasticities", J. Dairy Science XLVII:12:1314-1321, Dec. 1964, p. 1318.

that for each 10 percent increase in consumer income per capita there was a 3 percent increase for 1947-54 in milk consumption. Hu obtained practically the same estimate for 1947-63 with a standard error of .25. Wilson and Thompson's estimates for the income coefficient and standard error were quite similar. But Brandow used a somewhat lower figure, .16, for his comprehensive simultaneous model for 1955-57.⁹

In recent years, economists have examined the effects of factors other than supplies, prices, and incomes on consumption rates. Wilson and Thompson considered a combined price of coffee, tea, and cola in their econometric model and concluded that changes in this price had a greater effect on consumption than did changes in consumer incomes. Teh-wei Hu found that the proportion of the population under age 14 was a significant factor. Herrmann also studied the effect of changes in the age composition of the population on fluid milk consumption, using year-to-year differences for the 1929-59 period. He concluded that the increase in the proportion of young people in the total population of the postwar years had offset 60 percent of the downtrend in milk consumption.¹⁰

Spencer's study of the New York-New Jersey markets for fluid milk stressed the importance of racial and nationality backgrounds to milk consumption patterns.¹¹

1.2.2 Manufactured Dairy Products

Consumer response to variations in the price of butter and the effect of income variations on butter consumption are substantially greater than for fluid milk. But the estimates of the price and income elasticities for butter vary considerably with the way the estimates are developed and the years included, as the following indicate:

<u>Researcher</u>	<u>Period</u>	<u>Price elasticity</u>	<u>Income elasticity</u>
Rojko	1947-54	-1.3	.3
Hu	1947-63	-1.1	.6
Brandow	1955-57	-.8	.3

9 Op. cit., table 1.

10 Herrmann, Robert O. "Changes in Population Composition as an Explanation of Changes in the Demand for Food: The Case of Fluid Milk," Department of Agricultural Economics, Michigan State University, Agricultural Economics 866, Apr. 1962, p. 8.

11 Spencer, Leland "Whys and Wherefores of Milk Consumption Trends in the Nation's Largest Market," Proceedings of Second Market Symposium on Dairy Market Development, ADA, 1961, pp. 11-22.

For cheese, the income and price elasticities estimated by Rojko and Hu vary considerably, but tests indicated they are not statistically significant. The price elasticity estimates were $-.7$ and $-.9$ (Rojko's for American cheese only in 1947-54) and $-.3$ (Hu), and the income elasticities were -1.0 and $-.8$ (Rojko) and $.3$ (Hu). The differences may result from Hu's use of a longer time period and inclusion of all cheeses.

Brandow used a price elasticity of $-.3$ for evaporated milk and set the income elasticity for it at zero. Hu's estimates are $-.3$ for price and $.5$ for income, both with such high standard errors as to make them statistically insignificant.

For his structural model encompassing all farm commodities, Brandow selected a price elasticity of $-.55$ for ice cream and an income elasticity of $.35$.

1.2.3 Supplementary Analyses of Consumption from All Sources

To provide some supplementary data needed in later sections of this bulletin, a number of simple statistical models were formed and multiple regression analyses of U.S. per capita consumption from all sources were run. The statistical results for the 1924-41 and 1947-67 periods are given in table 1.3.

The regression models explained a much higher proportion of the variations in consumption of the major products during the postwar period than in 1924-41, as indicated by the coefficients of multiple determination (R^2) (unadjusted). Therefore, attention is focused on the postwar data reported in section B of table 1.3.

Practically all of the postwar change in per capita consumption of fluid milk and cream (measured on whole milk equivalent basis and including supplies from all sources) was explained by changes in the five factors used and all of the factors were statistically significant at the 1 percent level. The negative effect of increasing milk prices apparently offset much of the favorable effect of increasing income. (The price and income elasticities match well with estimates by Johnson, Rojko, and Hu.) The increase in the proportion of the population under age 15 and the decrease in the proportion living on farms had significant and positive relationships of about equal importance to variations in fluid milk and cream consumption. However, the 12 percent rise in proportion of nonwhite population offset about half of the effects of the two preceding population shifts.

Analysis of factors affecting cheese consumption in the postwar period (referring here to whole and part-whole-milk cheeses) yielded an income elasticity of $-.3$. This coefficient has the "wrong" sign, but it is not statistically significant. The price elasticity came out at

-.1, also not statistically significant. The unfavorable effects of rising income, of the higher proportion of children (who are low cheese eaters) and of the lower percentage of the population living on farms were partly offset by the favorable effect of the increasing proportion of nonwhites in the population.

The relationships of income and price to consumption of frozen desserts, measured in product weight, were both positive but statistically nonsignificant. The same type relationship is indicated in table 1.3 for percentages of population under age 15 and on farms. The relationship between frozen dessert consumption and the increase in proportion of nonwhite population was also positive but more significant. Although the R^2 is high, the nonsignificance of four out of five factors makes the measurements less than satisfactory.

The statistical results, shown in table 1.3, of the analysis of factors related to changes in the consumption of butter reveal how inadequate conventional sets of factors may be in a case like butter in which the effects of changes in institutional factors (margarine laws), consumer attitudes (toward margarine), and technological developments (in manufacturing margarine) may completely upset a statistical model. Although the income elasticity is statistically significant, it is negative, however cross section analyses reveal that butter consumption is positively correlated with income. (See section 2.5.1) Two price factors were used in the regression: the deflated retail price of butter and the ratio of the butter price to the price of margarine. Both had negative coefficients as expected, and they were statistically significant. The coefficient for the response of butter consumption to variations in its own retail price (deflated) was -.3.

1.2.4 Analyses of Commercially Supplied Products

Let us turn now to analysis of postwar trends in per capita consumption of commercially supplied fluid whole milk, lowfat milks, and butter. The consumption data in table 1.2 exclude home-produced supplies and distribution from USDA supplies, but they include consumption by the Armed Forces in the United States. Table 1.4 contains the results of the regression analyses.

The first analysis is for fluid whole milk, excluding fluid cream. The net effects of income on the two forms or measures of milk consumption were equal at .4. The shifts in population composition affected consumption of whole milk from commercial sources in the same direction as for all fluid milk and cream from both commercial and farm home output, but the positive effect of the higher proportion of children under age 15 was greater than that of the proportion on farms, as measured by

the standardized beta coefficient.¹² The negative beta coefficient for the population proportion nonwhite was much larger than the price coefficient for commercially supplied fluid milk, just as it was for all fluid milk and cream.

Separate data are available for commercially supplied low-fat fluid milks so the trend in these items can be examined apart from fluid whole milk. There is no separate price series so the price factor was measured by changes in the ratio of fluid whole milk prices to the retail food price index. The relationship of consumption to price was positive but not statistically significant. The income elasticity was much higher than for fluid whole milk. This probably reflects the increasing use of these foods by dieters. Changes in the proportions of the population living on farms and nonwhite were not significant in explaining increased consumption of low-fat milks, but the increase in the proportion under age 15 had a significant, negative relationship.

The analysis of postwar changes in per capita consumption of commercially supplied butter indicated significant negative relationships between consumption and both income and the ratio of the retail price of butter to the margarine price. The sign of the income factor is illogical. The decline in the proportion of the population living on farms had a substantial positive relationship, but it was statistically significant only at the 20 percent level. The relationships of butter's own price (deflated), time used as a trend factor, and margarine consumption to changes in butter purchases were not statistically significant. Again, the analysis is less than adequate because of institutional and preference changes which altered the structure of the demand for butter.

The single equation models used in this author's analyses are less sophisticated than the simultaneous models used by Rojko and Hu, but their incorporation of several significant demographic factors represents some conceptual improvement.

1.3 Changes in Marketing Related to Trends in Consumption of Dairy Products

The Marketing Economics Division of the U.S. Economic Research Service publishes data on the farm value, "consumer expenditures," and marketing bill for major farm commodities domestically produced and sold to civilian consumers. The August 1968 estimates indicate that the

¹² The beta coefficient is the net regression coefficient adjusted for the units in which the variables are stated by multiplying it by the ratio of the standard deviation of the independent variable to that for the dependent variable.

share of dairy products in total "consumer expenditures" for all farm commodities declined from 19 percent in 1947-49 to 16 percent in 1967.¹³ Dairy products' share of the farm value changed very little, but their share in the marketing bill fell from 18 percent to 14 percent. This indicates relatively less purchase of dairy marketing services than services bought with other foods. Even so, the share of the costs of marketing services in total "consumer expenditures" for dairy products rose from 53 percent in 1947-49 to 60 percent in 1967.

Partly to offset rising prices, consumers shifted their buying patterns for dairy products. Two well-known changes were the drop in home deliveries and increased use of supermarkets as a source for dairy products. Manchester reported that home delivery dropped from 37 percent of 1954 sales of dairy products by 80 fluid milk firms to 29 percent in 1964.¹⁴ Concurrently, consumers were shifting their ice cream buying from drug stores to supermarkets' large size, prepackaged containers.¹⁵

Without question, the increased variety of dairy products marketed in recent years helped maintain the total demand for milk. Particularly notable are the variety of cheeses and frozen desserts, 2 percent milk, and sour cream. Most of the shifts in demand have been toward lower fat content.¹⁶

Another set of developments in the marketing of dairy products to consumers merits special note. The importance of the away-from-home eating place market for dairy products has been changing, but its total importance can not be measured until data are available from the 1967 USDA survey. Meanwhile, USDA's data on distribution of dairy products through the National School Lunch and Special School Milk Programs indicate their significance. In 1968 these programs accounted for 3.5 billion pounds of fluid milk products (in milk equivalents) compared with the total of 49.0 billion

13 Marketing and Transportation Situation, Aug. 1968, table 6. (This author has serious doubts about the adjustments made in retail share value of farm products sold to allow for restaurant markups, but the net effect on the analysis is probably minor.)

14 Marketing and Transportation Situation, May 1966, p. 25.

15 Ibid., p. 26.

16 For further discussion of marketing changes, see Manchester, Alden C. "Dairy Marketing," Agricultural Markets in Change. USDA Economic Research Service, Marketing Economics Division. Agr. Econ. Report No. 95, July 1966, pp. 150-169.

sold to civilians by commercial distributors.¹⁷ Total school distribution was about evenly divided between the Special School Milk and National School Lunch Programs. In 1947-49 the latter program handled only half a billion pounds per year and the Special School Milk Program was not established until 1954.

1.4 Summary

This chapter has been concerned with four sets of economic phenomena related to changes in consumption of dairy products: (1) major trends in U.S. consumption of dairy products supplied by commercial handlers and home production; (2) factors related to these trends in consumption; (3) changes in the consumption of commercially supplied whole milk, low-fat milks and butter; and (4) marketing changes.

There were no strong trends in the consumption of dairy products from 1924 to 1941, but average consumption of dairy products, excluding butter, increased about 10 percent. In the years after World War II there was a gradual decline in the consumption of dairy products per capita according to measures which take butterfat into account. Excluding butter, the change in the per capita rate of consumption between 1947-49 and 1967-69 was about 5 percent. Changes in farm home production and use reduced the consumption of fluid milk and cream, butter, buttermilk, and skim milk, but increased the purchases of fluid milk and manufactured dairy products other than butter. Per capita consumption of evaporated milk declined sharply. Butter consumption fell among all population groups. The most general change in the consumption picture was the reduction in the rates of at-home consumption of dairy products with higher fat content at most levels of income and in all three urbanization categories.

Statistical research on the effects of income and price on changes in consumption have been rather inconclusive. The effect of price has apparently been declining as income levels have risen. Measurements of the income effects have been clouded by offsetting demographic changes and probably by unmeasured factors influencing consumer tastes and preferences. Proportionally more young children in the population apparently helped support the average rates of consumption for fluid milk, while the increase in the nonwhite proportion population was unfavorable. Postwar decreases in butter consumption have been generally ascribed to changes in institutional factors, technological developments, and consumer attitudes and preferences.

Consumption rates for commercially supplied dairy products were more strongly related to the increased proportion of the population which was nonwhite and to changes in age composition. The consumption of low-fat milks seems much more responsive to variations in income than fluid whole milk.

¹⁷ Dairy Situation, Nov. 1968, table 19.

The proportion of children under age 15 has had a significant negative relationship to the consumption of low or nonfat milks.

Although the share of marketing services in "consumer expenditures" for dairy products has risen since World War II, consumers have not increased their purchases of marketing services with dairy products as much as for some other foods. There have been substantial shifts toward less costly distributors and forms. Measures of purchases of dairy products in commercial eating places are not yet available, but subsidized sales of milk to school children accounted for 6 percent of total sales of fluid milk products to civilian consumers in 1968.

Table 1.1. U.S. per capita consumption of dairy products and margarine, 1924-68¹

Year	All dairy including butter						Fluid milk and cream				Frozen dairy products		Cheese, whole or part milk	Evaporated and condensed milk	Non-fat dry milk	Table spreads (product weight)		
	Retail price-weighted index 1957-59=100 ²		Milk equivalent		Milk solids equivalent		Total	Fluid whole milk	Cream	Low-fat milks	Total in fluid milk equivalent	Net milk used				Product weight	Butter	Margarine ³
	Including butter	Excluding butter	Fat content basis pound	Calcium content basis quart	Milk fat	Non-fat												
1924	95.1	80.9	796	188	31.1	34.3	65.4	269	10.8	52.1	336	20.9	8.8	4.6	11.9	.4	17.8	2.0
1925	96.4	82.0	802	189	31.4	34.4	65.8	270	10.8	51.1	337	23.5	9.7	4.7	11.7	.4	18.1	2.0
1926	96.6	81.8	818	187	32.0	34.6	66.6	270	10.8	50.0	338	23.0	9.5	4.6	11.8	.5	18.3	2.0
1927	96.5	81.8	813	190	31.8	34.7	66.5	269	10.8	49.2	336	24.2	9.9	4.6	11.7	.7	18.3	2.3
1928	95.9	82.1	804	191	31.5	34.9	66.4	270	10.8	48.5	337	24.4	9.9	4.4	12.3	.8	17.6	2.6
1929	97.6	84.0	811	197	31.8	35.9	67.7	272	10.9	48.1	340	27.1	10.7	4.7	13.6	1.1	17.6	2.9
1930	96.4	82.7	819	196	32.1	35.7	67.8	270	10.8	48.1	337	24.7	9.8	4.7	13.6	1.3	17.6	2.6
1931	95.9	81.1	838	193	32.9	35.4	68.3	268	10.7	49.2	335	21.6	8.6	4.5	13.4	1.4	18.3	1.9
1932	94.7	79.5	832	194	32.7	35.6	68.3	271	10.8	50.1	339	15.9	6.4	4.4	14.0	1.4	18.5	1.6
1933	94.3	79.4	814	193	31.9	35.5	67.4	270	10.8	50.4	337	15.1	6.2	4.6	13.8	1.4	18.2	1.9
1934	94.1	78.6	813	192	32.0	35.0	67.0	258	10.3	50.3	322	17.8	7.3	4.9	15.0	1.5	18.6	2.1
1935	95.0	81.2	800	196	31.6	35.7	67.3	261	10.4	49.3	326	20.2	8.3	5.3	16.2	1.6	17.6	3.0
1936	96.1	83.4	792	200	31.2	36.3	67.5	264	10.6	48.6	330	23.8	9.8	5.4	15.9	1.8	16.8	3.1
1937	97.5	85.1	797	203	31.5	36.9	68.4	265	10.6	47.8	331	26.7	10.9	5.5	16.7	1.9	16.8	3.1
1938	97.2	84.9	796	204	31.4	37.1	68.5	263	10.5	47.5	329	26.0	10.7	5.9	17.3	2.1	16.6	3.0
1939	99.5	86.3	824	207	32.6	37.7	70.3	266	10.6	47.7	332	27.7	11.7	6.0	17.8	2.2	17.4	2.3
1940	99.5	87.0	818	209	32.5	38.1	70.6	265	10.6	47.3	331	28.9	12.3	6.0	19.3	2.2	17.0	2.4
1941	100.5	89.6	803	212	32.0	38.4	70.4	267	10.7	47.1	334	34.3	14.6	5.9	18.5	2.5	16.1	2.8
1942	106.2	95.9	832	226	33.2	41.0	74.2	290	10.2	46.5	354	39.4	16.9	6.4	18.4	2.5	15.9	2.8
1943	101.4	96.4	750	231	30.1	42.6	72.7	315	11.1	45.3	371	31.0	16.0	4.9	18.8	2.1	11.8	3.9
1944	103.3	98.4	763	232	30.6	42.8	73.4	328	10.7	43.1	381	33.5	17.3	4.9	15.7	1.5	11.9	3.9
1945	106.7	103.8	788	249	31.6	45.5	77.1	335	12.8	41.7	399	37.5	19.7	6.7	18.3	1.9	10.9	4.1
1946	111.6	109.8	786	257	31.4	46.9	78.3	323	13.6	39.7	389	57.9	24.4	6.7	18.6	3.3	10.5	3.9
1947	107.4	104.0	768	241	30.7	44.0	74.7	306	13.2	37.4	369	52.1	21.3	6.9	20.4	2.9	11.2	5.0
1948	102.3	100.2	773	234	28.8	42.4	71.2	295	13.0	35.5	355	45.6	19.9	6.9	20.2	3.3	10.0	6.1
1949	102.3	99.4	734	234	29.1	42.3	71.4	296	12.4	33.8	352	45.4	19.5	7.3	19.8	3.3	10.5	5.8
1950	102.4	99.2	740	236	29.3	43.6	72.9	296	11.8	33.6	348	45.0	19.4	7.7	20.1	3.7	10.7	6.1
1951	100.8	99.1	712	236	28.1	43.5	71.6	301	11.5	33.0	350	44.7	20.2	7.2	18.3	4.2	9.6	6.6
1952	100.8	100.5	698	242	27.2	44.1	71.3	304	10.8	32.8	350	47.4	21.6	7.6	17.6	4.6	8.6	7.9
1953	99.8	99.5	689	237	26.7	43.5	70.2	302	10.5	31.5	346	48.3	22.5	7.5	17.4	4.2	8.5	8.1
1954	100.7	99.9	697	239	27.0	43.8	70.8	302	10.1	28.1	346	47.1	22.5	7.9	16.8	4.5	8.9	8.5
1955	101.9	101.1	706	244	27.2	44.5	71.7	306	9.9	28.5	348	48.7	23.5	7.9	16.2	5.5	9.0	8.2
1956	102.3	101.8	702	244	26.9	44.6	71.5	308	9.9	27.8	348	49.7	23.8	8.0	15.8	5.2	8.7	8.2
1957	100.7	100.6	687	241	26.1	44.3	70.4	305	9.7	26.4	344	49.3	24.1	7.7	15.4	5.3	8.3	8.5
1958	99.8	99.6	682	239	25.7	43.7	69.4	300	9.3	26.7	337	49.5	24.2	8.1	14.8	5.6	8.3	9.0
1959	99.5	99.8	667	239	25.1	43.7	68.8	294	9.1	27.1	330	52.2	25.8	8.0	14.4	6.2	7.9	9.2
1960	98.1	98.7	653	238	24.5	43.4	67.9	285	9.1	27.1	321	51.5	25.7	8.3	13.7	6.2	7.5	9.4
1961	96.8	97.4	641	235	24.0	43.0	67.0	277	8.7	27.9	311	51.5	25.8	8.6	13.3	6.2	7.4	9.4
1962	97.3	97.9	641	235	23.9	43.0	66.9	275	8.5	29.0	308	51.6	26.4	9.2	12.5	6.1	7.3	9.3
1963	96.6	97.7	631	234	23.4	42.3	65.7	275	8.1	30.2	307	51.9	27.0	9.2	11.6	5.8	6.9	9.6
1964	96.6	97.8	631	235	23.3	42.5	65.8	271	8.0	32.6	304	52.8	27.5	9.4	11.3	5.9	6.8	9.7
1965	96.0	97.6	618	234	22.9	42.4	65.3	269	7.5	34.7	301	53.7	28.1	9.5	10.6	5.6	6.4	9.9
1966	94.7	97.1	602	234	22.2	42.2	64.4	265	7.3	38.3	296	52.8	28.0	9.8	9.7	5.8	5.7	10.5
1967 ⁴	33.2	95.6	582	231	21.4	41.5	62.9	255	6.8	42.5	286	52.3	27.7	10.0	9.0	5.5	5.5	10.5
1968 ⁴	94.0	96.5	578	227	21.3	41.9	63.2	249	6.6	48.2	281	54.4	28.7	10.6	8.6	5.9	5.6	10.7

1 Except where noted, data are from Hiemstra, Stephen J. *Food Consumption, Prices, and Expenditures*, USDA, Economic Research Service, Agr. Econ. Rep. No. 138, July 1968, table 11.
 2 *Ibid.*, table 1.
 3 *Ibid.*, table 12.
 4 Preliminary data from U.S. Economic Research Service.

Table 1.2. Milk and dairy product sales (domestic disappearance, commercial sources) per capita, United States, 1950-68¹

Year	Fluid milk product sales					Butter	Cheese			Evaporated and condensed			Frozen products				Dry milk products				
	Fluid whole milk	Cream ² fat milk ³	Total		Whole milk equivalent ⁴		Whole and part milk	skim cheese	Cottage Cheese	Evap- orated whole milk	Con- densed whole milk	Evap- orated and condensed skim and buttermilk	Ice cream	Ice milk	Sher- bet	Mello- rine	Dry whole milk	Non- fat dry milk	Dry but- ter milk	Dry Whey	Malted milk
			Prod- uct weight	Whole milk																	
	pound						gallon						pound								
1950	278	11.1	15.6	304	321	9.1	5.4	2.2	3.1	18.5	2.0	5.1	3.7	0.2	0.1	---	0.3	3.5	0.2	0.2	0.2
1951	282	11.1	17.4	310	324	8.4	5.1	2.1	3.3	17.0	2.0	4.8	3.7	.3	.1	---	.4	4.1	.1	.1	.2
1952	285	10.5	18.4	314	325	7.5	5.3	2.3	3.4	16.5	1.9	4.6	3.8	.3	.2	0.1	.6	4.5	.2	.2	.2
1953	284	10.3	19.3	313	322	7.3	5.0	2.4	3.6	15.9	1.9	4.8	3.8	.4	.2	.2	.3	4.1	.2	.2	.2
1954	287	9.8	19.4	316	324	7.6	5.2	2.4	3.8	15.1	2.0	4.9	3.7	.5	.2	.2	.2	4.2	.2	.2	.2
1955	290	9.6	20.0	320	326	7.5	4.8	2.5	3.9	14.5	2.0	4.6	3.8	.5	.2	.2	.3	4.9	.2	.2	.2
1956	293	9.8	20.5	323	328	7.4	4.8	2.6	4.4	13.9	2.2	4.5	3.8	.6	.2	.2	.3	4.6	.3	.2	.2
1957	291	9.6	21.1	322	326	7.4	4.6	2.5	4.5	13.3	2.3	4.5	3.8	.7	.2	.2	.2	4.7	.3	.3	.2
1958	286	9.3	21.4	317	320	7.1	4.7	2.6	4.6	12.5	2.4	4.2	3.8	.7	.2	.2	.3	4.7	.4	.3	.2
1959	281	9.1	22.5	313	314	6.9	5.0	2.8	4.7	12.0	2.5	4.5	4.0	.8	.2	.2	.3	5.4	.4	.3	.1
1960	276	9.1	23.8	309	309	6.8	5.3	2.9	4.8	11.4	2.5	4.4	3.9	.8	.2	.3	.3	5.6	.4	.3	.1
1961	268	8.8	25.7	302	300	6.4	5.5	2.9	4.6	10.8	2.6	4.7	3.8	.9	.2	.3	.3	5.3	.4	.3	.1
1962	266	8.6	27.0	302	298	6.3	5.3	3.1	4.6	10.2	2.3	4.8	3.8	1.0	.2	.3	.3	5.1	.4	.4	.1
1963	267	8.2	28.7	304	298	5.9	5.4	3.1	4.6	9.5	2.2	4.5	3.8	1.1	.2	.3	.3	4.9	.4	.4	.1
1964	265	7.8	31.6	304	296	5.9	5.4	3.2	4.7	9.1	2.3	4.7	3.9	1.1	.2	.3	.3	5.1	.4	.5	.1
1965	264	7.6	33.9	305	294	5.8	5.7	3.4	4.6	8.6	2.2	5.0	3.9	1.2	.2	.3	.3	4.8	.4	.6	.1
1966	260	7.2	37.8	305	290	5.4	6.2	3.6	4.6	7.9	2.0	5.3	3.8	1.2	.2	.3	.3	5.2	.3	.7	.1
1967	250	6.8	42.2	299	281	4.9	6.0	3.6	4.5	7.1	1.9	5.0	3.8	1.2	.2	.3	.3	5.0	.3	.8	.1
1968	244	6.4	48.0	299	274	4.9	6.1	4.0	4.5	6.6	1.8	4.7	3.9	1.3	.2	.3	.2	5.2	.3	.8	.1

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- 1 Excludes milk used on farms where produced, and distribution from USDA supplies, includes sales to the Armed Services for use in the United States.
- 2 Includes milk and cream mixtures. Per capita estimates based on resident population, except fluid milk product sales-based on estimated population using fluid products from purchased sources.
- 3 Includes skim milk, buttermilk, and flavored milk drinks.
- 4 Fat solids basis.
- 5 Excludes cottage cheese.
- 6 Includes full-skim American.
- 7 Preliminary.

Sources: Dairy Situation, May 1968, p. 21 (USDA-ERS) and table 7 of Mathis, Anthony G. "Outlook for Dairy," paper presented at Annual Agricultural Outlook Conference, USDA, February 19, 1969.

Table 1.3. Summary of regressions for per capita consumption of major dairy products, all sources, 1924-41 and 1947-67

Variable and regression measure	Per capita quantities in logarithms				
	Fluid whole milk and cream pound	Fluid whole milk pound	Cheese, whole and part whole 1/10 pound	Frozen desserts, product weight 1/10 pound	Butter pound
A. 1924-1941					
Arithmetic mean (in logarithms)	2.5233	2.4267	.6996	.9787	1.2457
R ²	.63	.64	.84	.58	.94
Standard error of estimate	.0044	.0043	.0230	.0695	.0053
<u>Independent variables</u>					
1. Disposable income per capita of preceding year, 1958 dollars in logarithms (significance level)	¹ (n.s.)	(n.s.)	(n.s.)	(n.s.)	(1)
a. Arithmetic regression coefficient and income elasticity	.0447	.0408	.3739	.9038	-.2565
b. Beta, standardized coefficient	.30	.27	.31	.40	-.59
c. Partial correlation coefficient	.27	.26	.41	.33	-.74
2. Ratio to retail food price index for price of: (significance level)	<u>fluid whole milk</u> (n.s.)	<u>cheese</u> (n.s.)	<u>ice cream</u> (n.s.)	<u>butter</u> (1)	
a. Arithmetic	.0474	.0500	-.8215	.6672	-.1052
b. Beta	.31	.34	-.23	.23	-.49
c. Partial	.27	.28	-.36	.24	-.69
3. Ratio of retail prices (significance level)	...	...	...	...	<u>butter, margarine</u> (n.s.)
a. Arithmetic	...	...	...	...	-.0005
b. Beta	...	...	...	...	-.01
c. Partial	...	...	...	...	-.01
4. Percent of population under 15 years	(2)	(2)	(5)	(n.s.)	...
a. Arithmetic	.0042	.0043	-.0189	.0139	...
b. Beta	1.50	1.53	-.84	.33	...
c. Partial	.60	.62	-.53	.19	...
5. Percent of population living on farms	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(2)
a. Arithmetic	-.0032	-.0032	.0010	-.0365	-.0130
b. Beta	-.61	-.63	.24	-.47	-.87
c. Partial	-.29	-.30	.17	-.21	-.67
6. Margarine consumption per capita in logs	...	...	...	...	(10)
a. Arithmetic	...	...	...	...	-.0464
b. Beta	...	...	...	...	-.23
c. Partial	...	...	...	...	-.51
7. Time	...	...	...	...	(1)
a. Arithmetic	...	...	...	...	-.0047
b. Beta	...	...	...	...	-1.38
c. Partial	...	...	...	...	-.83

¹ Not significant at 10 percent level using the two tail "t" test.

Table 1.3. Summary of regressions for per capita consumption of major dairy products, all sources 1924-41 and 1947-67 -- Continued

Variable and regression measure	Per capita quantities in logarithms				
	Fluid whole milk and cream	Fluid whole milk	Cheese, whole and part whole	Frozen desserts, product weight	Butter
	pound	pound	1/10 pound	1/10 pound	pound
B. 1947-67					
Arithmetic mean (in logarithms)	2.5196	2.4621	.9122	1.3778	.9099
R ²	.99	.97	.96	.96	.99
Standard error of estimate	.0044	.0048	.0145	.0134	.0122
<u>Independent variables</u>					
1. Disposable income per capita of preceding year, 1958 dollars in logarithms (significance level)	(1)	(1)	(n.s.)	(n.s.)	(1)
a. Arithmetic regression coefficient	.3551	.4350	-.3324	.2881	-.7251
b. Beta, standardized coefficient	.57	.89	-.35	.27	-.44
c. Partial correlation coefficient	.70	.75	-.33	.25	-.63
2. Ratio to retail food price index for price of: (significance level)	<u>fluid whole milk</u> (1)	<u>fluid whole milk</u> (1)	<u>cheese</u> (n.s.)	<u>ice cream</u> (n.s.)	<u>butter</u> (1)
a. Arithmetic	-.3560	-.4275	-.1319	.1916	-.3266
b. Beta	-.16	-.25	-.03	.28	-.30
c. Partial	-.66	-.70	-.11	.27	-.68
3. Ratio of retail prices for (significance level)	...	...	...	...	<u>butter margarine</u> (10)
a. Arithmetic	...	...	...	...	-.0505
b. Beta	...	...	...	...	-.15
c. Partial	...	...	...	...	-.50
4. Percent of population under 15 years	(1)	(1)	(1)	(n.s.)	...
a. Arithmetic	.0164	.0203	-.0168	.0063	...
b. Beta	1.07	1.69	-.72	.24	...
c. Partial	.90	.92	-.63	.24	...
5. Percent of population living on farms	(1)	(2)	(5)	(n.s.)	(n.s.)
a. Arithmetic	.0102	.0069	-.0135	.0053	.0001
b. Beta	1.22	1.04	-1.05	.37	-.00
c. Partial	.74	.57	-.50	.19	-.00
6. Percent of population nonwhite	(1)	(1)	(10)	(10)	...
a. Arithmetic	-.0879	-.1206	.1050	.1453	...
b. Beta	-1.16	-2.03	.91	1.12	...
c. Partial	-.75	-.82	.47	.44	...
7. Margarine consumption per capita in logs	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	-.2711
b. Beta	...	...	...	...	-.29
c. Partial	...	...	...	...	-.40
8. Time	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	-.0057
b. Beta	...	...	...	...	-.41
c. Partial	...	...	...	...	-.24

Table 1.4. Summary of regressions for per capita consumption of commercially supplied milks and butter, 1950-67

Variable and regression measure	Per capita quantities in logarithms		
	Fluid whole milk	Low fat milks	Butter
	pound	1/10 pound	pound
Arithmetic mean (in logarithms)	2.4409	2.3778	.8306
R ²	.95	.99	.99
Standard error of estimate	.0050	.0131	.0098
<u>Independent variables</u>			
1. Disposable income per capita of preceding year, 1958 dollars in logarithms (significance level)	(1)	(1)	(2)
a. Arithmetic regression coefficient and income elasticity	.39	.96	-.66
b. Beta, standardized coefficient	.92	.38	-1.72
c. Partial correlation coefficient	.69	.68	-.65
2. Ratio to retail food price index for price of: (significance level)	(1)	<u>fluid whole milk</u> (n.s.)	<u>butter</u> (n.s.)
a. Arithmetic	-.41	.19	-.07
b. Beta	-.31	.02	-.71
c. Partial	-.67	.15	-.18
3. Ratio of butter price to margarine price	...	...	(1)
a. Arithmetic	...	...	-.08
b. Beta	...	...	-.47
c. Partial	...	...	-.82
4. Percent of population under 15 years	(1)	(1)	...
a. Arithmetic	.02	-.03	...
b. Beta	1.56	-.34	...
c. Partial	.91	-.74	...
5. Percent of population living on farms	(20)	(n.s.)	(20)
a. Arithmetic	.01	-.01	.02
b. Beta	1.09	-.36	2.05
c. Partial	.43	-.30	.45
6. Percent of population nonwhite	(2)	(n.s.)	...
a. Arithmetic	-.09	.03	...
b. Beta	-1.77	.08	...
c. Partial	-.63	.07	...
7. Time (in years)	...	(n.s.)	(n.s.)
a. Arithmetic	...	.01	.01
b. Beta	...	.44	.44
c. Partial	...	.27	.26
8. Margarine consumption (in logs)	...	...	(n.s.)
a. Arithmetic	...	...	.02
b. Beta	...	...	.08
c. Partial	...	...	.07

Table 1.5. Comparisons of farm value, marketing bill, and "consumer expenditures" for dairy products including butter with totals for all domestically produced and civilian-purchased farm food, 1947-67¹

Year	Farm value			Marketing bill ²			"Consumer expenditures"		
	All domestic farm food	Dairy products Total	As per-cent of all food	All domestic farm food	Dairy products Total	As per-cent of all food	All domestic farm food	Dairy products Total	As per-cent of all food
	-million dollar-		percent	-million dollar-		percent	-million dollar-		percent
1947	19,294	3,869	20.1	22,643	4,083	18.0	41,937	7,952	19.0
1948	19,869	4,226	21.3	24,936	4,588	18.4	44,805	8,814	19.7
1949	17,386	3,613	20.8	25,985	4,435	17.1	43,371	8,048	18.6
1950	18,032	3,656	20.3	25,960	4,501	17.3	43,992	8,157	18.5
1951	20,512	4,174	20.3	28,740	5,161	18.0	49,252	9,335	18.9
1952	20,413	4,429	21.7	30,519	5,482	18.0	50,932	9,911	19.5
1953	19,460	4,061	20.9	31,553	5,649	17.9	51,013	9,710	19.0
1954	18,824	3,886	20.6	32,316	5,877	18.2	51,140	9,763	19.1
1955	18,749	4,077	21.7	34,378	6,224	18.1	53,127	10,301	19.4
1956	19,246	4,321	22.5	36,302	6,510	17.9	55,548	10,831	19.5
1957	20,405	4,435	21.7	37,888	6,767	17.9	58,293	11,202	19.2
1958	21,445	4,463	20.8	39,549	6,987	17.7	60,994	11,450	18.8
1959	20,916	4,541	21.7	42,202	7,308	17.3	63,118	11,849	18.8
1960	21,699	4,625	21.3	44,150	7,484	16.9	65,849	12,109	18.4
1961	22,043	4,648	21.1	45,101	7,602	16.8	67,144	12,250	18.2
1962	22,424	4,612	20.6	46,891	7,838	16.7	69,315	12,450	18.0
1963	22,574	4,667	20.7	48,945	7,959	16.3	71,519	12,626	17.6
1964	23,352	4,812	20.6	51,188	8,102	15.8	74,540	12,914	17.3
1965	25,544	4,861	19.0	52,095	8,113	15.6	77,639	12,974	16.7
1966	28,112	5,354	19.0	54,739	8,123	14.8	82,851	13,477	16.3
1967	27,346	5,456	20.0	57,634	8,262	14.3	84,980	13,718	16.1

¹ Estimated retail values adjusted upward to approximate expenditures including higher prices for foods bought in eating places. (It is the author's judgment that the meager data for such adjustments for commodity data are quite unsatisfactory, but the net effect on the trend may be minor.) Data from table 6 of *The Marketing and Transportation Situation*, Aug. 1968.

² Calculated as residual.

Chapter 2 CHANGES IN PATTERNS OF CONSUMPTION OF DAIRY PRODUCTS

Chapter 1 provided an overall view of the trends in U.S. consumption of dairy products and their relationships to several key socioeconomic factors. This chapter uses sets of data from cross section surveys of household food consumption to identify and analyze major changes in consumption patterns underlying the trends in the all-U.S. averages.

The chapter begins with identification of variations in the consumption of milk at home in all forms by major population groups, using several different measures and including both home produced and commercial supplies. In the next two sections, attention is focused on variations in the consumption of major milk products from all sources and on purchases only, by urbanization and income groupings of the population. The fourth section is concerned with shifts in the relative importance of dairy products. The results of two types of analyses of factors related to changes in patterns of consumption are presented in section 2.5. A section on changes in the consumption of different dairy products in the North Central Region and in the South concludes the analyses.

2.1 Alternative Measures of Changes in U.S. Consumption Patterns for All Dairy Products Combined

Data in table 2.1 indicate changes from spring 1955 to spring 1965 in the average consumption of dairy products by all households in each urbanization category. These changes in averages reflect the upward shift in the distribution of households by size of income as well as changes in the levels of the Engel curves. Engel curves are formed graphically by the relationships between average income and average rate of consumption for each income group.

Changes in average consumption per person indicated by household food consumption surveys in the springs of 1942, 1955, and 1965 are quite similar to those indicated by the time-series measures, such as the retail price-weighted index of all dairy products except butter, milk fat, and milk solids not fat. The striking change in consumption of dairy products is the general lowering, from 1955 to 1965, of the rate of consumption per person in relation to real income per person for each urbanization category. Figure 2.1 presents Engel curves for money value of purchased products (excluding butter).¹⁸ Graphic analyses for several other types of measures of the consumption of dairy products revealed comparable changes. About the only exception to the lowering of the curves is the rise in the level of money value of purchased dairy products consumed per person by farm households. But increases in these purchases failed to offset the decrease in home production.

¹⁸ These Engel curves are formed by plotting the average money value figures for each income group against average income of that group.

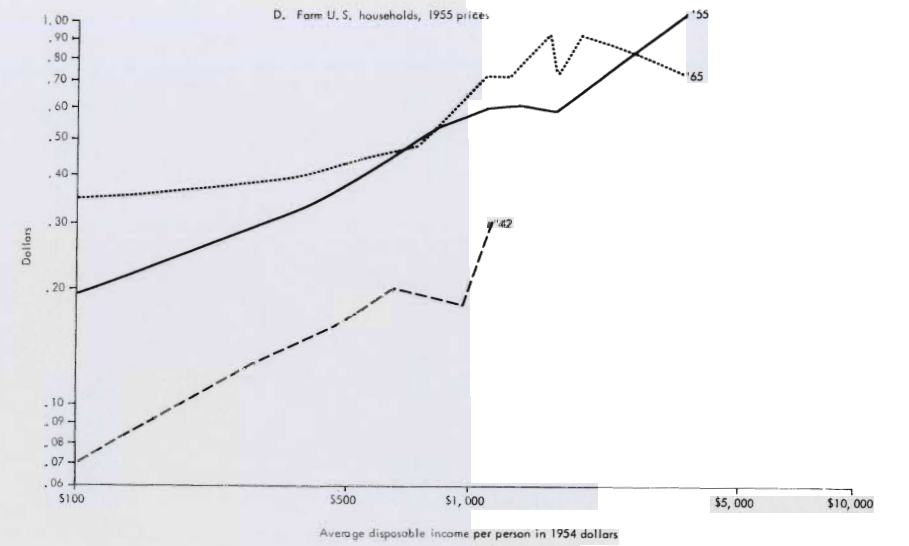
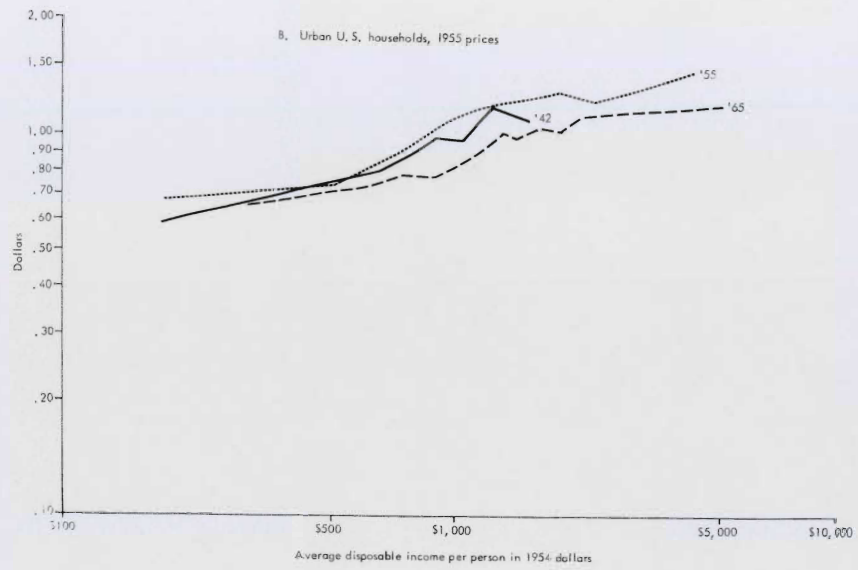
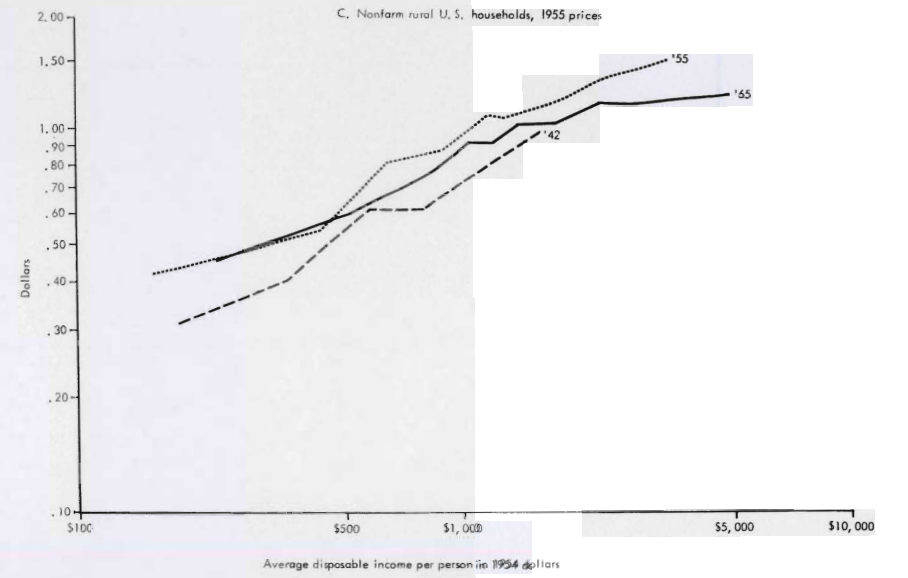
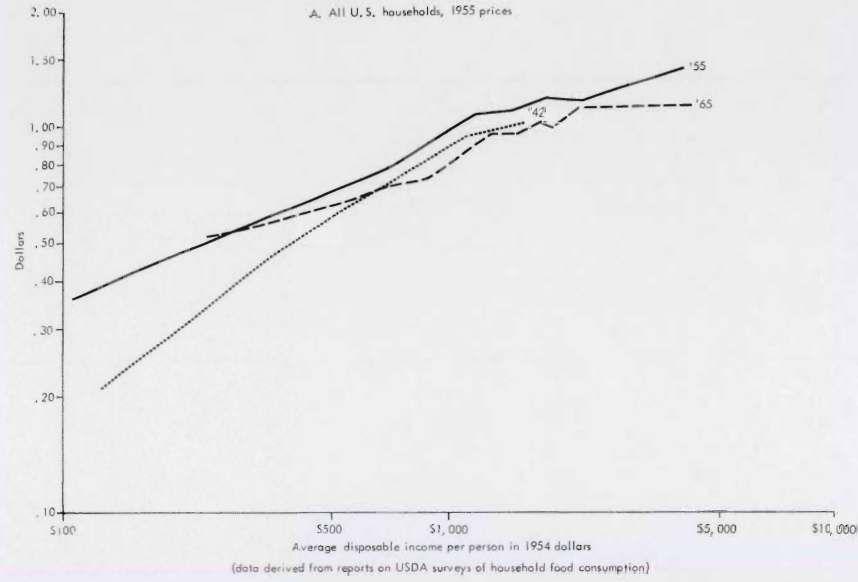


Figure 2.1 Money value of dairy products (excluding butter) purchased in a week of spring 1942, 1955, 1965

In the lower range of real income per person, the money value of dairy products (excluding butter) consumed by nonfarm households in a week of spring 1965 was fairly close to the averages reported in spring 1942, but the amount of milk fat consumed per person (including and excluding butter) was definitely lower than in 1942 or in 1955. Through the middle of the income range, consumption rates in 1965 were below the averages indicated by the two earlier surveys. So few families in the 1942 survey were in the range now considered to be upper income that comparisons between 1942 and 1965 averages for this group are not reliable. But the consumption of dairy products per person by upper income families in 1965 was generally lower than a decade earlier, whether measured in money value, milk fat, calcium content, or in milk solids not fat.

2.2 Changes in the Consumption of Major Products

Changes in average consumption of major dairy products per person by housekeeping households can be evaluated by the survey data for the springs of 1942, 1955, and 1965. They are generally consistent in direction with changes in the per capita averages for the whole U.S. population, according to the USDA time-series derived from disappearance data. But the decline from spring 1955 to spring 1965 in consumption at home was somewhat larger for fluid whole milk and butter than consumption from all sources which included school milk, school lunch, and restaurant eating.

The time-series data indicated a 10 percent decrease in the per capita consumption of fluid whole milk from 1955 to 1965, but the reduction in at-home consumption was 20 percent. Data in table 2.2 for fluid whole milk show about a half quart drop in a week's consumption per person from spring 1955 to spring 1965 at the four levels of real income. Because a substantial number of one-person adult households were included at the two lower levels in 1965 but not in 1955, the reduction for all households at lower levels of income probably was not quite as large as these data indicate. The decrease in consumption of fluid whole milk was quite general but greater among farm than nonfarm households.

Estimated per capita consumption of low fat fluid milk rose from 28.5 pounds for the year 1955 to 34.7 pounds for 1965, but household consumption per person in a week of spring 1965 nearly matched the average for a week of spring 1955. The reduced consumption rate for other fresh milks in the lower part of the income range marks a significant change in the relationship of consumption to income level. This may reflect the fact that between the two survey periods the average price paid for low fat milk increased much more than the price of fluid whole milk. These low fat milks have now become responsive to variations in income. Their higher consumption rate by higher income families may be related to dieting.

Patterns of consumption for condensed and evaporated milk changed markedly from 1955 to 1965. Lower income families used much less in the midsixties, especially rural nonfarm families, but use by upper income families did not change. The change was probably related in part to

differences in baby feeding practices, and may have been due to the increased availability of high quality fresh milk.

Increase in the average consumption of whole and part-whole milk cheeses has come from the upward shift in the income distribution and from higher rates of consumption at upper income levels. The disappearance data indicate a greater increase from 1955 to 1965 in cheese consumption than the household survey data do, both for skim and for part whole milk cheeses. This difference may arise from increased consumption in eating places.

As data in tables 2.1 and 2.2 show, U.S. households at all levels of income and in the three urbanization categories reduced their use of butter quite generally. Among urban households the decrease in per person consumption was greatest among high income families. According to the data on margarine in table 2.1, farm households on the average substituted margarine for butter almost pound for pound, but nonfarm households reduced their average use per person of table fats slightly.

Household consumption of frozen milk desserts per person rose about 28 percent from 1955 to 1965 (table 2.1). Rural nonfarm and farm households reported greater increases per person than urban, perhaps reflecting increased availability of freezers. Comparison of consumption rates at several real income levels indicates that households in the three urbanization categories increased consumption quite generally.

The effects of these changes in consumption of major dairy products on average consumption per person of all dairy products measured in four ways, in households classified by degree of urbanization, are summarized in figure 2.2. The calcium content measure shows an increase in average consumption in urban and rural nonfarm households from spring 1942 to 1955, then a dropping back by spring 1965. The farm rate declined from 1942 to 1955 and again from 1955 to 1965. The measurements based on equivalent pounds of milk solids not fat and pounds of milk fat, excluding that in butter, yielded changes comparable with the calcium content data. Consumption of milk fat including butter declined for each urbanization category, both from spring 1942 to spring 1955 and from spring 1955 to spring 1965.

2.3 Changes in Use of Purchased Dairy Products

The decrease in per person dairy expenditures for dairy products (except butter) by urban households from 1955 to 1965, measured in constant dollars, contributed substantially to the decrease in the national average. Much of the urban decrease was in fresh fluid whole milk, as shown in table 2.1. USDA data on annual sales of dairy products indicate a drop of about 26 pounds per capita for fluid milk and cream or 8 percent, from 1955 to 1965 and 1.7 pounds per capita for butter, a decrease of 23 percent.

Engel curves describing income-consumption relationships in spring 1955 and 1965 for urban households in the North Central Region and South

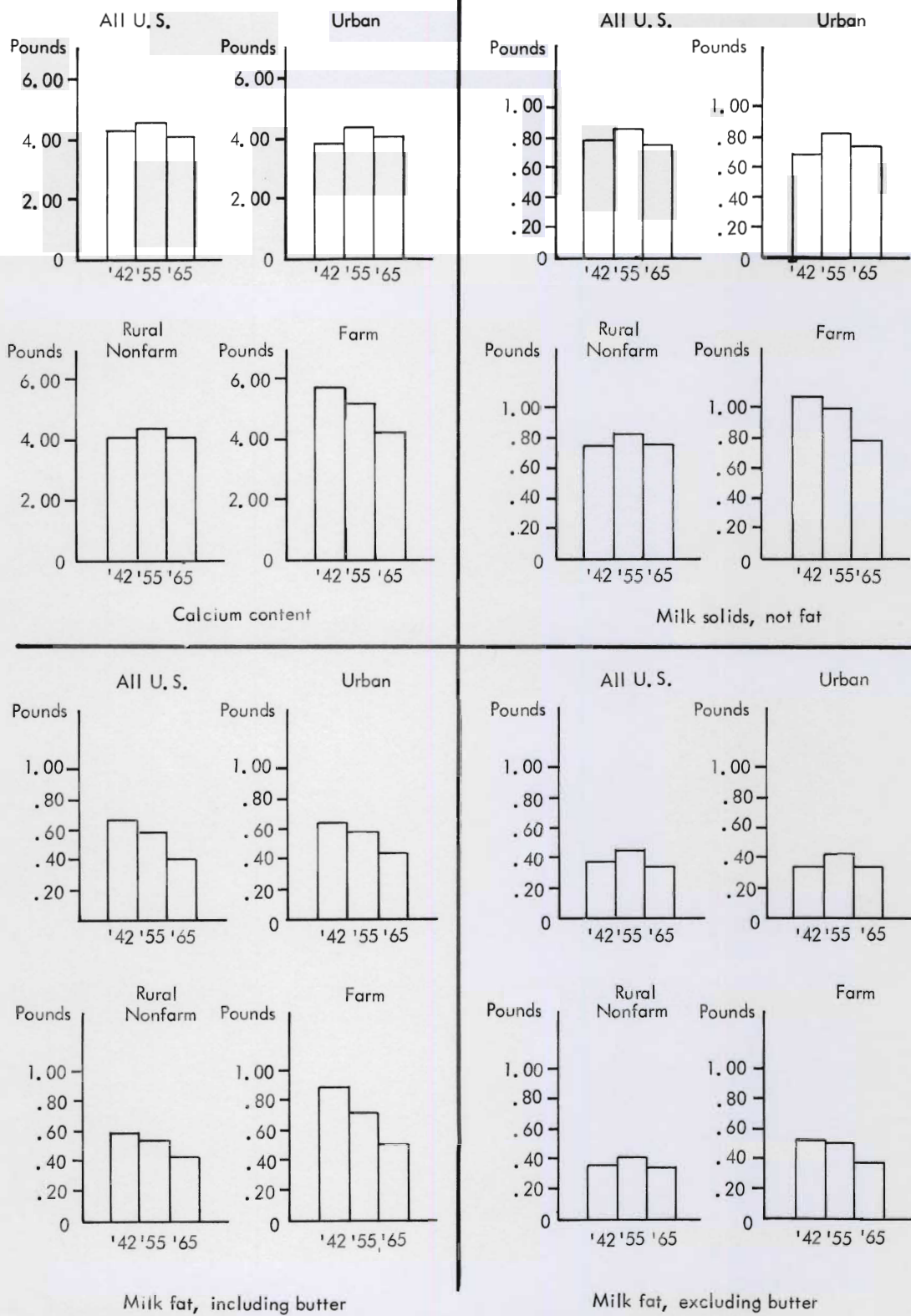


Figure 2.2. Four measures of variations in average consumption of dairy products, per person, U.S., spring 1942, 1955, 1965 (data derived from reports on USDA Surveys of Household Food Consumption)

are given in figure 2.3. They illustrate the general pattern of changes noted earlier for all U.S. households in figure 2.1. At most levels of real income, per person average consumption of fluid whole milk was lower in 1965 than in 1955. This general decline in fluid whole milk lowered the Engel curves for milk fat in all products except butter (part B) and for milk solids not fat (part C). There were exceptions in the two lowest income groups in the South. As noted in section 2.2, the spring 1955 data by income level excluded one-person households, which are much more frequent in the low income brackets. This difference in size composition between published data from the 1955 and 1965 surveys might have contributed to these exceptions, but data are not available to evaluate this possibility.

The decline in consumption per person indicated by spring 1955 and 1965 household survey data for all U.S. households for the combination of purchased fresh fluid whole milk, other fluid milks, cream, and half and half is consistent with time-series data. Examination of the per person rates for the three urbanization categories indicates that the urban decrease of 19 percent was partly offset by the doubling of farm purchases. For butter, the 30 percent reduction in average purchases per person for home use between spring 1955 and spring 1965 was somewhat larger than the 23 percent reduction in U.S. average sales, which included restaurant use. Farm and rural nonfarm purchases of butter per person declined less than urban household purchases from 1955 to 1965. But farm purchases of margarine increased more than nonfarm purchases. Total purchases of condensed and evaporated milk were materially affected by the reduction in use of these products by rural nonfarm households.

The effects of these changes from 1955 to 1965 in household purchase rates of dairy products, plus the impact of changes in population distribution on the U.S. market for dairy products are measured by data in table 2.3. The South and West became much more important in the total household market for all dairy products including butter, and the urban sector rose in relative significance. The net effect of the changes in regional consumption patterns was to bring them closer together. Southern and western urban households accounted for substantially larger shares of the market in 1965 than in 1955, while urban households in the Northeast and North Central Region became relatively less important in the U.S. market. Only in the South was there an increase in all dairy product purchases by rural nonfarm and farm households. The shares for the rural nonfarm and farm sectors decreased in both the Northeast and North Central Region. In the West the farm share remained unchanged, but the rural nonfarm proportion went down.

2.4 Relative Importance of Dairy Products

The decreases in the consumption of dairy products from 1955 to 1965 materially reduced their relative importance in the money value of all foods consumed at home. Data in table 2.4 demonstrate again how general the reductions were. Among regions, the average share for dairy products declined most for all households in the South and least in the West. Among the urbanization categories, the decreases were greatest for farm households, especially in the South and the North Central Region.

Because of the major importance of the urban sector of the market, data are presented in table 2.5 by income level for urban households. These were derived from the spring 1955 and 1965 USDA surveys, reported in current dollars. Because the figures for one-person households were excluded from published data by income level for the 1955 survey and most of them were in the low levels of income, the data for these income groups are not directly comparable. If these adult households had been included, the dairy product share might have been reduced slightly from the 14 to 16 percent indicated by the data. The lack of variation with income and lower shares of dairy products in the value of all foods consumed by urban households in 1965 appear to represent substantial shifts in consumption patterns of those families in the middle and upper ranges of income. The reduction in butter consumption was an important factor, but lower purchases of fluid milk and cream had significant effects in the middle income range. The relative importance of manufactured milk products (excluding butter) rose at all income levels because of small increases in expenditures for these items and the reductions in purchases of other dairy products.

2.5 Factors Related to Changes in Patterns

Two statistical approaches were used to study reasons for changes in consumption patterns for dairy products. One was multiple regression analysis, and the other was a procedure based on alternative combinations of consumption averages for subgroups of the U.S. housekeeping population.

2.5.1 Regression Results

Regression analyses were made with data from the spring 1955 and spring 1965 surveys for households in all urbanizations. Separate analyses were run for per person money value of all dairy products including and excluding butter, money value of fluid milk and cream; and for the quantities of fluid milk, cheese, frozen desserts, milk fats, and butter. The results are reported for all urbanizations combined and for each urbanization separately in table 2.6, parts 1-8.

Looking first at the data on money value of all dairy products consumed by all urbanizations combined, we find that responsiveness of dairy consumption to variations in income, often termed "income elasticity," declined from 1955 to 1965 and that the importance of variations in the proportion of population on farms decreased sharply because of the decline in that proportion. Much of the decrease in the response of variations in money value of all dairy products to variations in income can be traced to the change in the relationship of fluid milk consumption to income.

For frozen desserts, income became a more significant factor in variations in consumption in spring 1965 than in 1955 and matched the importance of the age composition factor. There was little change in the relationship of cheese consumption to age composition or income between the two periods, and age continued to be more important than income. Farm population became a negative factor but without statistical significance.

The relationships of butter consumption to all independent factors in the regression analyses changed markedly. The income elasticity dropped from .5 to .2. Responsiveness of average butter consumption for each income group to variations in average number in the family who were 10 years or older became significant and positive. The proportion on farms changed from a positive factor to a negative element in the variations in butter consumption. The relationship between butter and margarine consumption was not statistically significant in either period.

The relationships of variations in urban consumption of all dairy products per person (measured by money value), fluid milk, frozen desserts, cheese, and milk fat (except butter) to variations in income and age composition did not change significantly from spring 1955 to spring 1965 (tables 2.6 (3) and (4)). But their level changed as previously indicated for all households. The income elasticity of butter consumption was virtually unchanged at .4. The importance of the number of adults in the family to variations in butter consumption increased and became statistically significant. The correlation of butter consumption with margarine consumption, holding other factors constant, changed from slightly positive to slightly negative, but it did not achieve statistical significance.

Among rural nonfarm households, the response of variations in purchases of dairy products to income variations decreased, but there was no change in the relationships to the age composition factors (tables 2.6(5) and (6)). The relationships of consumption of dairy products from all sources, of fluid milk and cream, of frozen desserts, and milk fat to income and age composition were practically the same in 1965 as in 1955. The income elasticity of cheese and butter consumption became statistically significant at .2. But there was no change in the relationships of butter and cheese consumption to variations in the age composition factor.

The simple relationships of variations in consumption of dairy products by farm households to variations in income changed little from spring 1955 to spring 1965, as measure by Engel curves. But the statistical measurements of these relationships based on multiple regression analyses, which consider variations in age-composition and the distribution of the population by size of income as well as average income for each level, indicate a dramatic change in the relationships. (See parts 7 and 8 of table 2.6.) In 1955, income was a very important factor, especially for purchased products, and consumption of dairy products was very responsive to variations in income, meaning the income elasticity was high. Because of the heavy off-farm movement of low income farm families from 1955 to 1965 and the upward shift in the farm population by income level, farm consumption of dairy products became unresponsive to income. In 1965, variations in consumption were much more closely related to variations in age composition than in spring 1955.

2.5.2 Effects of Changes in Income, Urbanization, and Consumption Patterns

The importance of changes in the distribution of households by level of income and urbanization and of changes in the relationships of consumption to income for income groups within each urbanization category has been measured using data from the USDA Surveys of Household Food Consumption in the springs of 1942, 1955, and 1965. The procedure involved multiplying averages for each income group within a given urbanization category by alternative weights which are percentages of the total population in the category. The resulting products are estimates of the averages for each urbanization group. These are then multiplied by percentage shares of each urbanization category in the total U.S. population in alternative periods.¹⁹ Data derived from alternative combinations are reported in table 2.7.

Between spring 1942 and spring 1955 the upward shift in the distribution of households by size of income and higher rates of consumption at most levels of real income increased average consumption of most dairy products (except butter). Average money value of all commercially and home-supplied dairy products (excluding butter) rose 14 percent in this period. (Compare the \$1.13 average for line a of the 1955 set with the \$0.99 for line a of the 1942 set.) Then the average declined from 1955 to 1965 so much that there was a net decrease of 2 percent from spring 1942 to spring 1965 in the average value per person (measured in constant prices). The change in urbanization had only a slight negative effect over the period, as indicated by computed U.S. averages in lines a, b, c of the 1955 set. The increase in income from 1942 to 1965 offset the sharp drop in the consumption rate which occurred between 1955 and 1965 at each real income level. That is, the income change raised the average about 10 percent, but the change in consumption patterns dropped it 10 percent. (The effect of the income change is illustrated by lines e and f of the 1955 set and that of the change in consumption patterns by line e of the 1942 set and line c for the 1965 set.)

Average money value of purchased dairy products (excluding butter) rose 31 percent from spring 1942 to spring 1965. The shift in urbanization accounted for about half of the net increase in the average U.S. value and increased incomes for most of the balance. The drop in consumption rates at each level of real income from 1955 to 1965 wiped out most of the increases that had occurred between 1942 and spring 1955.

19 For further description of this procedure, see section 4.3 of Burk, M.C. Measures and Procedures for Analysis of U.S. Food Consumption (U.S. Department of Agriculture, Agr. Handb. 206, 1961) or Appendix A of Burk, M.C. Consumption Economics: A Multi-disciplinary Approach (New York: John Wiley & Sons, 1968).

Average consumption of dairy products per person, measured in terms of their nutrient equivalents on a calcium basis declined 4 per cent from spring 1942 to 1965 largely from the change in consumption patterns after 1955. The shift in urbanization offset most of the effect of higher incomes.

The consumption of milk fat per person, including butter, declined 34 percent from spring 1942 to spring 1965 because of the radical change in consumption rates at all levels of income. The increased income of American families offset the effect of families leaving the farm. Average per person consumption of milk fat (excluding butter) declined 10 percent from 1942 to 1965, with a 21 percent decrease from 1955 to 1965 more than offsetting the increase from 1942 to 1955. The major factor again was the change in consumption rates for the several income groups, with the income and urbanization effects about offsetting, the former being positive and the latter negative in effect. Average use of milk solids not fat increased about 10 percent from spring 1942 to spring 1955, but it decreased slightly more than that from spring 1955 to 1965. Income and urbanization effects were offsetting so the decrease resulted from slightly lower consumption rates at each level of income.

There was little change in average consumption of fluid milk excluding cream between spring 1942 and spring 1955 on a per person basis as the increase in income offset the small negative effects of urbanization shift and the change in consumption patterns. But between 1955 and 1965 there was a sharp decline in the consumption rates at each real income level which brought the average for spring 1965 about 17 percent below that of spring 1942 and spring 1955.

Average consumption of all cheese per person doubled from spring 1942 to spring 1965 with two-thirds of the change resulting from the generally higher rates of consumption across the income range. The income effect was also significant, and there was a slight contribution to increased consumption coming from the shift in urbanization.

Butter consumption at home on a per person basis dropped 65 percent from spring 1942 to spring 1965. The decline was about evenly divided between the periods 1942 to 1955 and 1955 to 1965. The positive effect of the increase in income was twice as important as the adverse effect of the urbanization shift, but only one-sixth of the negative effect of the changes in consumption patterns.

2.6 Changes in Consumption Per Person in the North Central Region and the South

Dairy farmers and processors in the North Central Region have considerable interest in the changes in the southern market for dairy products. This section compares and contrasts changes in consumption of these foods from 1955 to 1965 in the South with those in the North Central Region and the whole country. (Table 2.8)

2.6.1 Changes in the Averages

Several measures of the consumption of dairy products per person from all sources indicate that average consumption in the South decreased to about the same degree as in the whole country. These measures are the money value of dairy products (including butter) in constant prices, milk fat, and milk solids not fat. But the declines in the north-central averages were somewhat greater than in the South. The major reduction in consumption in the South occurred among rural farm and nonfarm households while the north-central reduction came in the urban and farm households rather than rural nonfarm.

The changes in average purchases of dairy products in these two regions, measured in the same way, went in opposite directions. Dairy purchases increased in the South but decreased in the North Central Region. The great increase in purchases by the southern farm population more than offset the urban reductions in the purchases of dairy products. North-central farm households also bought more dairy products, but not enough to counterbalance urban decreases.

Fresh Milk. The decrease in farm home production of fluid milk was the most significant change in both regions. Farm purchases of fluid whole milk increased, but not enough to offset the smaller supplies from home production. All three urbanization categories decreased their average consumption in the North Central Region, but there was relatively little decrease among urban households in the South. For other fresh fluid milks, there were increases in the nonfarm consumption in the North Central Region, but the consumption in rural southern households fell sharply. Southern households did not change their relatively low use rate of cream and half and half, but consumption rates were almost halved in the North Central Region.

Manufactured Products. Farm households in the North Central Region increased their use of condensed and evaporated milk to almost offset the reductions in use by nonfarm households. Southern farm use increased, but rural nonfarm consumption was cut in half, and the urban rate was down a fourth. Increases in consumption of cheese (excluding cottage cheese) were general in three urbanization categories in the North Central Region, but there was no significant change in southern consumption. Rural households in both regions increased their consumption of frozen desserts per person. The north-central rural consumption rate went up, but the regional average increased less than the U.S. average. In the South, rural households increased their use of frozen desserts substantially and raised the regional average more than the U.S. average.

The decrease in the consumption of butter from all sources in the South was greater than in the North Central Region. Because the 1955 level was lower, the reduction in pounds consumed per capita was smaller. The rates of decline in butter consumption in the North Central Region were generally about the same in all three urbanizations, but in the South the rural decrease was greater than the urban. Southern nonfarm purchases of butter per person decreased. However, the average for the region changed very little because of population shifts. Purchases of butter fell off

generally in the North Central Region, but the rates in 1965 were still above the U.S. averages for each of the three urbanization categories. It is interesting to note that the rates of margarine consumption in the three urbanization categories of the two regions were relatively close in 1965.

2.6.2 Changes in Patterns

Underlying the changes in averages described in the preceding section are changes in the averages at each income level within each of the three urbanization categories and upward shifts in the distributions of the population in these urbanizations along the income-consumption curve, often referred to as "Engel curves."²⁰ The striking characteristic of the changes from spring 1955 to spring 1965 in the patterns formed by income-consumption relationships for dairy products was the general lowering of the curves for both regions.

Money Value of Products Except Butter. North-central urban households reduced the money value per person of all dairy products consumed at each level of income. In the South, only the values for the middle and upper income categories fell. These shifts brought the 1965 curves for the two regions (except for the low income groups) close together. Concurrent increases in income were insufficient to maintain average consumption.

There were declines in the use of dairy products from all sources and purchases of dairy products by rural nonfarm households in the lower range of income in the North Central Region. In the South the middle income families cut back on their use of dairy products from all sources, but there was no consistent change in the purchase pattern. Among farm households in the North Central Region, the level of consumption of dairy products from all sources (including home produced supplies) in relation to income decreased. But average quantities purchased by the lowest and highest income groups in the region increased. The cutback in consumption of all dairy products was prevalent among southern farm households. Purchases rose, but there was somewhat more of a rise in the lowest and highest income sections of the curves. The combination of the shifts in the curves for purchased products with the upward shift in the income distribution brought average farm purchases in 1965 above the 1955 averages in both the North Central Region and the South.

²⁰ Engel curves similar to those in figure 2.3 were developed from data in the 1955 and 1965 reports for the two regions from the USDA Household Food Consumption Survey. The findings for this section are drawn from charts with these curves.

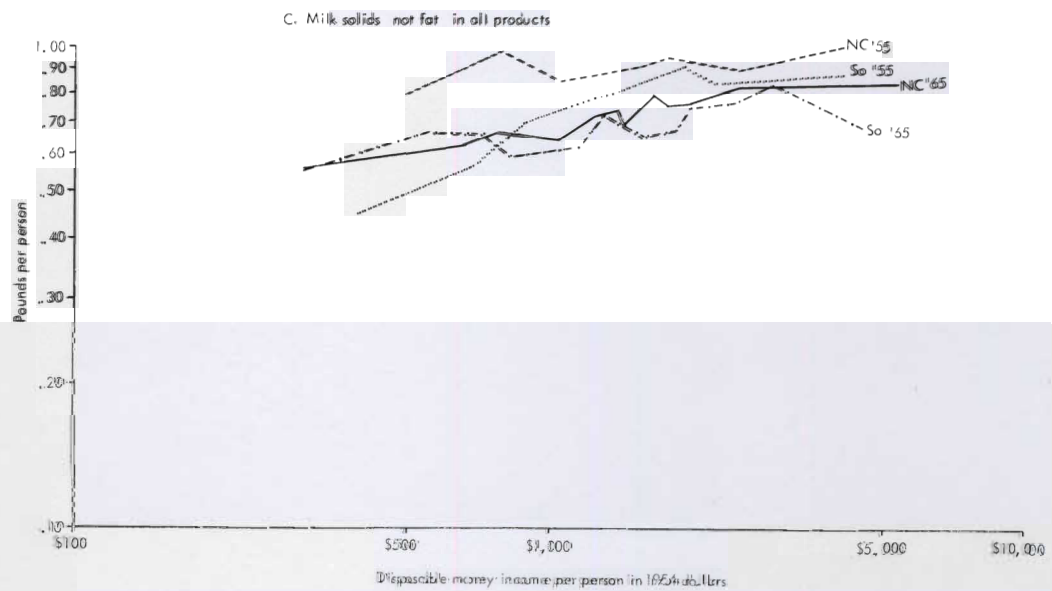
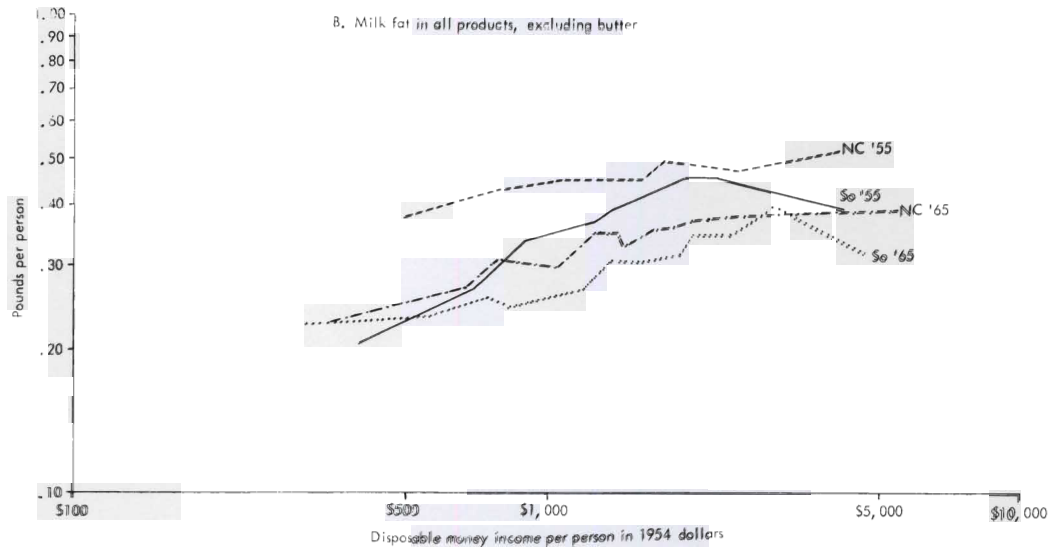
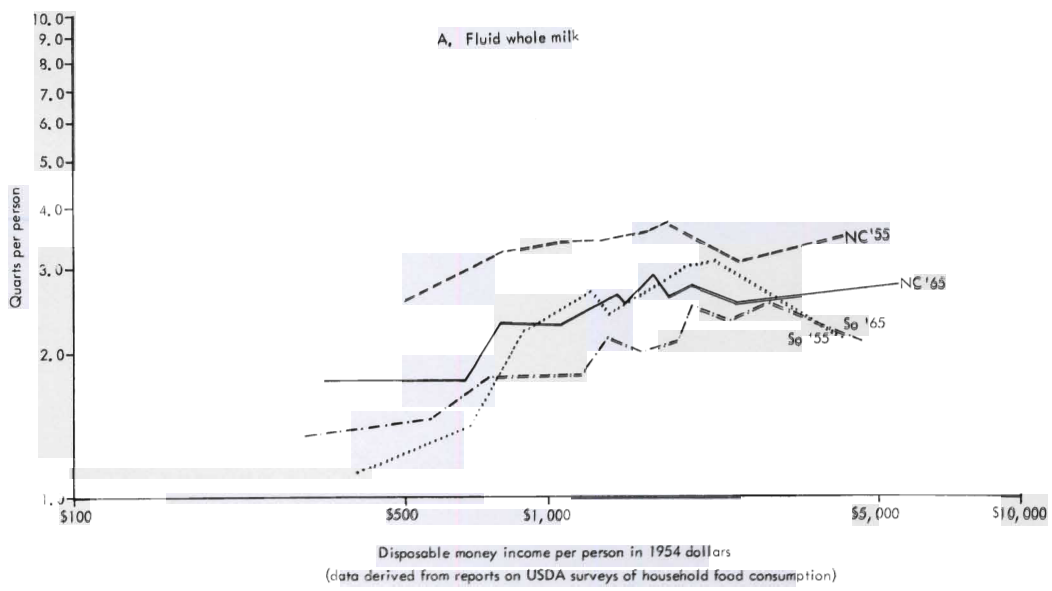


Figure 2.3. Income-consumption relationships for dairy products within households, North Central and South regions, spring 1955 and 1965

Milk Fat From All Sources. The general reduction in the average consumption of milk fat from all sources for each urbanization category resulted from the general lowering of the curve which describes the relationship between income and consumption per person. The only exception in the three urbanization categories for the two regions was found among the lowest income group of southern urban households which changed their consumption only slightly.

Nutrient Equivalent.²¹ Changes in the income-nutrient equivalent relationships for the several urbanization categories differed somewhat between the two regions. Among urban households in the North Central Region, there was a greater reduction at the lower end of the income range. The north-central urban average declined a little more than 10 percent. In the South, the lower income groups increased their consumption, measured in milk equivalent, but consumption rates of the middle and upper income groups decreased. With increased incomes, there was little change in the average for southern urban households. Among rural nonfarm households in the North Central Region there were no consistent changes in the relationships between income and nutrient equivalent and little change in the average. In the South, the reductions were primarily in the middle and upper income range, and the average went down.

Lower rates of consumption of dairy products by north-central farm households in the lower and middle income groups decreased the average for dairy products combined in terms of calcium equivalents. Therefore, the negative slope in the Engel curve became slightly positive by 1965. The curve for southern farm households was generally lower in spring 1965 than in spring 1955.

Fluid Milk. North-central urban households generally reduced consumption of fluid milk, with slightly more reduction in the lower income range. The average fell substantially. Southern urban households in the lowest income groups increased consumption of fluid milk. Across the middle and upper ranges of income there was some reduction in consumption. The urban average consumption of fluid milk per person in the South decreased about 5 percent. For rural nonfarm and farm households in both regions, the consumption of fluid milk dropped at all levels of income and averages decreased.

Milk Solids Not Fat. Changes in the consumption of dairy products by north-central urban households resulted in greater decreases at lower than at highest levels of income in consumption measured in nonfat solids. In the South, only the lower income households increased consumption of nonfat solids. The net effects were a substantial decrease in the average for the north-central urban sector and unchanged averages for southern urban households on a per person basis. Rural nonfarm households in both regions reduced their consumption at most levels of income. These reductions pulled down the averages for both regions. Among north-central farm households,

²¹ Based on calcium content.

the lower income groups reduced their consumption of nonfat solids relatively more than the middle and upper income families did. Therefore, by 1965 there was little variation with income instead of the slight decline with income found for spring 1955. The curve formed by the relationship of the consumption of nonfat solids with income for southern farm households was generally lower.

Table Fats. Urban households in the North Central Region reduced their use of table fats and of butter from 1955 to 1965. Among southern urban households the rate of table fat use was slightly higher in the lower income range and slightly lower in the upper range of income. But butter consumption was generally lower. There was no significant change in the rural nonfarm and farm income-consumption curves for table fat in either region because increased use of margarine offset the lowering of the Engel curves for butter.

2.6.3 Relative Importance of Products Used by Urban Households in Spring 1965

This section examines the relative importance of the major dairy products in the expenditures for all dairy products by north-central and southern urban households and provides some comparisons with U.S. urban patterns. In neither region was there a consistent variation with income in the share of fluid milk expenditures in purchases of all dairy products. However, the middle income group tended to allocate relatively more money for fluid whole milk. Fluid cream and half and half were substantially more important in north-central expenditures than in the South. The north-central pattern was close to the U.S. average share in each income group.

Canned and dried milks were much more important in southern dairy consumption than in the North Central Region. This obviously reflects historical experiences with the keeping quality and prices of fresh milks. For frozen desserts and for whole and part-whole milk cheeses, there was little difference between the patterns in the two regions and in comparison with U.S. patterns. Expenditures for cottage and cream cheeses were relatively much more important among low and middle income urban families in the North Central Region than in the South. The north-central shares for these products were higher than those for the U.S. in the lowest income groups, but lower in the highest income groups.

The relative importance of butter and margarine in expenditures for total table fat by north-central households was about the reverse of that prevailing among southern urban households. All urban households in the North Central Region spent about 63 percent of their table fat money for butter, while butter received only 37 percent of southern expenditures. Among the highest income families in the South, less than half of the table fat money went for butter compared with about two-thirds among similar families in the North Central Region.

2.7 Summary

Changes in average U.S. consumption of dairy products by house-keeping households indicated by the cross section surveys are consistent with changes in all U.S. consumption rates per capita per year indicated by disappearance data. The most striking feature of the change in consumption has been the general lowering of the consumption rates in relation to the level of real income within each urbanization category. The only major exception was the increase in the purchases of dairy products by farm households.

There was a greater decrease in consumption per person at home between the spring 1955 and spring 1965 for fluid whole milk and butter than was evidenced by the annual U.S. averages per capita which include school milk, school lunch, and restaurant eating. A major part of the decrease in the consumption of condensed and evaporated milk was by lower income families, especially those in rural nonfarm areas. In contrast, the consumption of whole and part whole milk cheese increased because of the upward shift in the income distribution and higher rates of consumption by upper-income families. Consumption of frozen desserts by households at all income levels in all three urbanization categories increased. Part of the urban decrease in the purchases of dairy products was offset by the farm increases in purchases. The urban sector and the South and West gained in relative importance as markets for dairy products.

The responsiveness of the consumption of dairy products to income declined from spring 1955 to spring 1965, mostly because of changes in fluid milk. Age composition became more important over this decade. The change in consumption patterns offset the positive effect of higher income. Urbanization shifts had a slight negative effect on average consumption of all dairy products from all sources, but they raised purchases. Other factors related to changes in consumption patterns are not revealed by national survey data; therefore, one must turn to information from special surveys such as that of the consumption patterns of upper income families reported in the next chapter.

Table 2.1. Average money value of dairy products and quantity of selected items consumed per person in a week of spring 1955 and 1965, all U.S. and by urbanization¹

Measure	Unit	All U.S.		Urban		Rural nonfarm		Farm	
		1955	1965	1955	1965	1955	1965	1955	1965
A. Money value of dairy products									
Excluding butter, all sources,									
current prices	dollar	1.13	1.10	1.15	1.11	1.03	1.08	1.26	1.11
1955 prices ²	dollar	1.13	.97	1.15	.98	1.03	.96	1.26	.98
Excluding butter, bought,									
current prices	dollar	.97	1.04	1.14	1.10	.89	1.00	.41	.67
1955 prices ²	dollar	.97	.92	1.14	.97	.89	.89	.41	.59
Including butter, all sources,									
current prices	dollar	1.27	1.19	1.28	1.20	1.15	1.16	1.44	1.22
1955 prices ³	dollar	1.27	1.06	1.28	1.07	1.15	1.04	1.44	1.09
Including butter, bought,									
current prices	dollar	1.09	1.13	1.27	1.19	.99	1.08	.51	.75
1955 prices ³	dollar	1.09	1.01	1.27	1.06	.99	.96	.51	.67
B. Quantity consumed									
Milk fat, excluding butter,									
all sources	pound	.43	.34	.42	.34	.40	.33	.50	.37
bought	pound	.36	.32	.42	.33	.35	.31	.17	.23
Milk fat, including butter,									
all sources	pound	.59	.44	.58	.44	.54	.42	.72	.50
bought	pound	.50	.41	.58 ⁴	.44 ⁴	.46	.39	.28	.32
Milk solids not fat,									
all sources	pound	.85	.74	.82	.74	.82	.75	.99	.77
bought	pound	.71	.70	.81	.72	.71	.69	.27	.45
Milk equiv., calcium basis,									
all sources	quart	4.45	4.07	4.33	4.03	4.37	4.11	5.16	4.21
Dairy products:									
Fresh fluid whole milk,									
all sources	quart	3.01	2.41	2.96	2.40	2.78	2.35	3.68	2.70
bought	quart	2.45	2.24	2.96 ⁴	2.40 ⁴	2.34	2.15	.61	1.18
Other fresh fluid milk,									
all sources	quart	.29	.30	.25	.31	.27	.28	.52	.24
Cream and half and half,									
all sources	quart	.06	.04	.06	.04	.04	.03	.10	.07
Condensed and evaporated	pound	.31	.25	.27	.24	.45	.29	.18	.21
Cheese, whole & part whole ⁵	pound	.19	.21	.19	.21	.19	.20	.16	.18
Frozen milk desserts	quart	.32	.41	.33	.40	.30	.43	.32	.46
Butter, all sources	pound	.20	.13	.20	.13	.17	.11	.27	.17
Butter, bought	pound	.17	.12	.20 ⁴	.13 ⁴	.14	.10	.15	.12
Margarine	pound	.20	.24	.20	.24	.23	.27	.13	.22

1 Computed from data on household consumption and household size measured in terms of 21 meals at home = one person, USDA 1955 and 1965-66 Household Food Consumption Survey Report No. 1 Food Consumption of Households in the United States.

2 1965 dollars x 88.5 percent to convert to 1955 prices.

3 1965 dollars x 89.3 percent to convert to 1955 prices.

4 All urban supplies assumed to have been bought.

5 Cottage cheese not included.

Table 2.2. Average quantity of selected dairy products used per person in a week of spring 1955 and 1965 by families with specified family income at 1954 prices ¹

Urbanization category and product	Period	In families with disposable money income in 1954 dollars of			
		\$2,500	\$5,000	\$7,500	\$10,000
I. All urbanization categories combined					
A. Fresh fluid whole milk, quart	1955	2.70	3.20	3.20	3.30
	1965	2.10	2.55	2.65	2.70
B. Other fresh milks, quart (including half and half, excluding cream)	1955	.30	.28	.33	.42
	1965	.24	.25	.36	.43
C. Evaporated and condensed milk, pound	1955	.42	.28	.19	.16
	1965	.36	.25	.20	.16
D. Whole and part whole milk cheese, pound	1955	.18	.19	.21	.21
	1965	.17	.21	.23	.25
E. Butter, pound	1955	.16	.19	.25	.30
	1965	.09	.13	.15	.17
II. Urban households					
A. Fresh fluid whole milk, quart	1955	2.40	3.15	3.15	3.10
	1965	2.05	2.50	2.65	2.70
B. Other fresh milks, quart	1955	.30	.26	.35	.45
	1965	.24	.24	.34	.43
C. Evaporated and condensed milk, pound	1955	.43	.25	.19	.14
	1965	.37	.26	.19	.16
D. Whole and part whole milk cheese, pound	1955	.17	.19	.21	.21
	1965	.17	.21	.23	.25
E. Butter, pound	1955	.14	.19	.25	.30
	1965	.09	.13	.15	.17

¹ 1955 data exclude one-person households. Data read from charts after smoothing the Engel curves.

Table 2.3. Regional and urbanization shares in the U.S. household market for purchased dairy products (including butter) in a week of spring 1955 and 1965 ¹

Area	Year	Urbanization category			
		All	Urban	Rural nonfarm	Farm
		Percent	Percent	Percent	Percent
United States	1955	100.0	68.6	25.1	6.3
	1965	100.0	71.4	23.6	5.0
Northeast	1955	32.2	24.1	7.2	.9
	1965	29.0	22.0	6.6	.4
North Central Region	1955	33.2	22.0	8.1	3.1
	1965	29.3	19.8	7.1	2.4
South	1955	21.9	13.0	7.2	1.7
	1965	26.5	16.4	8.4	1.7
West	1955	12.7	9.5	2.6	.6
	1965	15.2	13.2	1.5	.5

¹ Calculated by multiplying the money values of purchased dairy products per household by the percentage of U.S. households (weighted sample) in the category and then dividing by the U.S. average for money value of such products. All data from the USDA spring surveys of Household Food Consumption for 1955 and 1965.

Table 2.4. Shares of dairy products (including butter) in money value of all food (excluding alcoholic beverages) used at home, by urbanization and region, all housekeeping households, in a week of spring 1955 and 1965 ¹

Area	Year	Urbanization category			
		All	Urban	Rural nonfarm	Farm
		Percent	Percent	Percent	Percent
United States	1955	17.3	16.5	16.9	21.8
	1965	14.1	13.8	14.6	15.4
Northeast	1955	17.5	17.2	17.9	20.6
	1965	14.7	14.4	15.5	16.9
North Central Region	1955	17.5	16.5	17.3	21.8
	1965	14.3	13.9	14.8	16.1
South	1955	17.0	15.4	16.3	22.4
	1965	13.3	12.8	13.7	14.8
West	1955	16.8	16.6	16.1	20.9
	1965	14.2	14.1	14.8	14.4

¹ Data calculated by dividing money value of all dairy products (including butter) per household by money value of all food at home exclusive of alcoholic beverages. Basic data taken from USDA Household Food Consumption Survey Reports 1-5, spring 1955 and 1965. Percentages for 1955 taken from table 16, National Food Situation, Feb. 1957 (USDA-AMS).

Table 2.5. Money value per person of all food used at home and of major dairy products in a week of spring 1955 and 1965 at current prices, with comparisons, U.S. urban households, by income

Period and income level	Value of all food consumed at home per person ²	Value of dairy products consumed per person							
		Total including butter		Fluid milk and cream	Manufactured excluding butter	Butter	Percent of total dairy		
		Value	Percent of all food				Fluid milk and cream	Manufactured excluding butter	Butter
	dollar		percent	dollar		percent			
Spring 1955, all urban families and single individuals	7.38	1.28	17	.76	.39	.13	59	31	10
Households of 2 or more persons									
Under \$1,000	5.59	.82	15	.44	.27	.11	54	33	13
\$1 to 2,000	5.51	.85	15	.46	.30	.09	54	35	11
2 to 3,000	6.24	1.03	16	.60	.33	.10	58	32	10
3 to 4,000	6.84	1.19	17	.71	.37	.11	60	31	9
4 to 5,000	7.13	1.31	18	.82	.38	.11	63	29	8
5 to 6,000	7.79	1.37	18	.83	.40	.14	61	29	10
6 to 8,000	7.97	1.44	18	.85	.44	.15	59	31	10
8 to 10,000	7.85	1.41	18	.79	.44	.18	56	31	13
10,000 and over	9.66	1.70	18	.93	.52	.25	55	30	15
Spring 1965, all urban families and single individuals	8.70	1.20	14	.69	.42	.09	57	35	8
Under \$1,000	6.84	.89	13	.46	.37	.06	52	41	7
\$1 to 2,000	7.12	.95	13	.52	.37	.06	55	39	6
2 to 3,000	7.32	1.01	14	.58	.36	.07	57	36	7
3 to 4,000	7.11	.95	13	.55	.34	.06	58	36	6
4 to 5,000	7.90	1.05	13	.62	.37	.06	59	35	6
5 to 6,000	8.58	1.23	14	.70	.44	.09	57	36	7
6 to 7,000	8.73	1.21	14	.70	.41	.10	58	34	8
7 to 8,000	9.28	1.28	14	.75	.43	.10	58	34	8
8 to 9,000	9.25	1.27	14	.71	.45	.11	56	35	9
9 to 10,000	9.43	1.37	15	.80	.47	.10	59	34	7
10 to 15,000	10.20	1.42	14	.81	.49	.12	57	35	8
15,000 and over	11.32	1.50	13	.81	.54	.15	54	36	10

1 21 meal equivalent basis. All data from spring 1955 and 1965 USDA Household Food Consumption Survey Reports No. 1.

2 Excluding alcoholic beverages. Data for 1955 from table 3.16 of Burk, M.C. Measures and Procedures for Analysis of U.S. Food Consumption. USDA, Agr. Handb. 206, 1961.

Table 2.6. (1) All United States households of two or more persons, spring 1955: Summary of regression analyses for per person expenditures for dairy products ¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk & cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean, in logarithms ²	1.1557	1.0860	1.1048	1.0350	.9316	1.5237	.5585	.3200	.6768	.3635
R ²	.98	.98	.97	.98	.92	.91	.98	.96	.91	.98
Standard error of estimate	.0445	.0398	.0469	.0425	.0842	.0987	.0406	.0573	.0911	.0318
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(10)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(5)
a. Arithmetic regression coefficient and income elasticity	.3214	.3277	.2900	.3006	.6198	.5457	.2086	.1545	.5513	.5405
b. Beta, standardized coefficient	.37	.36	.32	.32	.66	.54	.23	.17	.58	.84
c. Partial correlation coefficient	.65	.70	.59	.64	.73	.63	.52	.30	.66	.91
2. Number of household members: age group specified	10 & over (2)	10 & over (1)	10 & over (2)	10 & over (1)	Under 10 (n.s.)	Under 10 (n.s.)	10 & over (1)	16 & over (2)	Under 10 (n.s.)	10 & over (n.s.)
a. Arithmetic	.0001	.0001	.0001	.0001	.0002	.0002	.0001	.0002	.0002	-.0000
b. Beta	.78	.88	.82	.91	.46	.55	.98	.92	.52	-.10
c. Partial	.91	.94	.91	.94	.70	.73	.95	.90	.72	-.11
3. Percent of population on farms	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(10)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(5)
a. Arithmetic	.0325	-.0274	.0261	-.0325	.1032	.0913	-.0312	.0076	.0910	.0888
b. Beta	.25	-.20	.19	-.23	.73	.61	-.23	.05	.64	.92
c. Partial	.45	-.43	.36	-.46	.76	.66	-.47	.09	.69	.91
4. Margarine, pound in logarithms	...	...	...	...	...	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	...	...	...	...	...	.2349
b. Beta	...	...	...	...	...	...	...	...	...	.43
c. Partial	...	...	...	...	...	...	...	...	...	.50

¹ Data from USDA Household Food Consumption Survey, 1955.

² Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.6. (2) All United States households, spring 1965: Summary of regression analyses for per person expenditures for dairy products ¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk & cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean in logarithms ²	.9430	.9062	.9091	.8723	.6997	1.2403	.4754	.1751	.3936	-.0428
R ²	.96	.97	.96	.97	.92	.92	.96	.97	.92	.99
Standard error of estimate	.0534	.0531	.0561	.0571	.0828	.0887	.0613	.0550	.0852	.0368
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(5)	(1)	(10)	(1)	(5)	(5)	(1)	(10)	(5)	(1)
a. Arithmetic regression coefficient and income elasticity	.1692	.2642	.1632	.2650	.2737	.2451	.3017	.1367	.2498	.1954
b. Beta, standardized coefficient	.30	.41	.29	.41	.46	.39	.48	.23	.42	.34
c. Partial correlation coefficient	.65	.80	.62	.78	.71	.64	.80	.56	.66	.84
2. Number of household members: age group specified	10 and over (1)	10 and over (1)	10 and over (1)	10 and over (1)	Under 10 (2)	Under 10 (1)	10 and over (1)	16 and over (1)	Under 10 (2)	10 and over (1)
a. Arithmetic	.0002	.0002	.0002	.0002	.0004	.0004	.0002	.0003	.0004	.0002
b. Beta	.73	.65	.73	.64	.56	.63	.57	.83	.59	.61
c. Partial	.89	.89	.88	.87	.73	.77	.83	.91	.74	.85
3. Percent of population on farms	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(5)
a. Arithmetic	.0391	.0159	.0517	.0308	.1093	.0940	.0537	-.0562	.1030	-.1442
b. Beta	.05	.02	.07	.04	.14	.11	.06	-.07	.13	-.18
c. Partial	.19	.08	.23	.14	.33	.27	.22	-.25	.30	-.68
4. Margarine, pound in logarithms	...	...	...	...	...	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	...	...	...	...	...	.17
b. Beta	...	...	...	...	...	...	...	...	...	.17
c. Partial	...	...	...	...	...	...	...	...	...	.43

1 Data from USDA Household Food Consumption Survey, 1965.

2 Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.6. (3) United States urban households of two or more persons, spring 1955: Summary of regression analyses for per person expenditures for dairy products ¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk & cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean in logarithms ²	.9211	.9170	.8714	.8661	.6850	1.2717	.3334	.0953	.4321	.1163
R ²	.98	.99	.98	.99	.91	.90	.99	.98	.89	.98
Standard error of estimate	.0347	.0339	.0359	.0351	.0928	.1025	.0350	.0360	.0980	.0370
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(1)	(1)	(2)	(1)	(5)	(10)	(1)	(10)	(n.s.)	(2)
a. Arithmetic regression coefficient and income elasticity	.2251	.2300	.2031	.2132	.3300	.2918	.2578	.1293	.2452	.3827
b. Beta, standardized coefficient	.30	.31	.27	.28	.41	.35	.33	.18	.32	.64
c. Partial correlation coefficient	.90	.90	.87	.88	.76	.69	.92	.75	.64	.89
2. Number of household members: age group specified	10 and over (1)	10 and over (1)	10 and over (1)	10 and over (1)	Under 10 (1)	Under 10 (1)	10 and over (1)	16 and over (1)	Under 10 (1)	10 and over (n.s.)
a. Arithmetic	.0002	.0002	.0002	.0002	.0004	.0005	.0002	.0003	.0005	.0001
b. Beta	.79	.79	.82	.81	.69	.73	.77	.88	.75	.38
c. Partial	.98	.98	.98	.98	.89	.90	.98	.98	.89	.37
3. Margarine, pound in logarithms	...	...	...	...	...	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	...	...	...	...	...	.1061
b. Beta	...	...	...	...	...	...	...	...	...	.14
c. Partial	...	...	...	...	...	...	...	...	...	.17

1 Data from USDA Household Food Consumption Survey, 1965.

2 Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.6. (4) United States urban households, spring 1965: Summary of regression analyses for per person expenditures for dairy products¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk and cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean in logarithms ²	.7843	.7756	.7508	.7402	.5379	1.0775	.3044	.0267	.2284	-.2053
R ²	.98	.98	.98	.97	.96	.96	.97	.99	.96	.97
Standard error of estimate	.0406	.0442	.0438	.0473	.0518	.0622	.0503	.0306	.0568	.0542
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)										
a. Arithmetic regression coefficient and income elasticity	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
b. Beta, standardized coefficient	.1780	.2145	.1629	.2010	.2919	.2590	.2638	.1470	.2530	.3564
c. Partial correlation coefficient	.31	.36	.29	.33	.49	.41	.42	.27	.43	.56
2. Number of household members: age group specified										
a. Arithmetic	10 and over (1)	10 and over (1)	10 and over (1)	10 and over (1)	Under 10 (1)	Under 10 (1)	10 and over (1)	15 and over (1)	Under 10 (1)	10 and over (5)
b. Beta	.0003	.0003	.0003	.0003	.0006	.0007	.0002	.0003	.0006	.0002
c. Partial	.73	.68	.75	.70	.58	.66	.62	.78	.64	.50
3. Margarine, pound in logarithms										
a. Arithmetic	.95	.94	.95	.94	.90	.92	.92	.98	.92	.67
b. Beta	...	...	...	...	...	...	...	...	...	(n.s.)
c. Partial	...	...	...	...	...	...	...	...	...	-.0187
	...	...	...	...	...	...	...	...	...	-.01
	...	...	...	...	...	...	...	...	...	-.04

1 Data from USDA Household Food Consumption Survey, 1965.

2 Averages for each income group were weighted by proportion of its population in U.S. total.

Table 2.6. (5) United States rural nonfarm households, spring 1955: Summary of regression analyses for per person expenditures for dairy products ¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk and cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean, in logarithms ²	.5570	.4999	.5098	.4558	.3247	.9432	-1.9567	-.2375	.1044	-.2694
R ²	.98	.97	.98	.97	.84	.86	.97	.94	.84	.90
Standard error of estimate	.0403	.0422	.0421	.0418	.1141	.1136	.0409	.0691	.1135	.0864
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(10)	(1)	(10)	(1)	(n.s.)	(n.s.)	(1)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic regression coefficient	.1694	.4692	.1908	.4726	.1398	.1553	.5610	.0117	.1093	.0147
b. Beta, standardized coefficient	.14	.43	.16	.42	.11	.12	.53	.01	.09	.01
c. Partial correlation coefficient	.68	.93	.71	.92	.25	.28	.95	.04	.20	.04
2. Number of household members: age group specified (significance level)	10 and over (1)	10 and over (1)	10 and over (1)	10 and over (1)	Under 10 (1)	Under 10 (1)	10 and over (1)	16 and over (1)	Under 10 (1)	10 and over (n.s.)
a. Arithmetic	.0005	.0003	.0005	.0004	.0010	.0011	.0003	.0006	.0010	.0004
b. Beta	.93	.76	.93	.76	.86	.87	.67	.97	.88	.98
c. Partial	.99	.97	.99	.97	.89	.90	.97	.97	.90	.56
3. Margarine, pound in logarithms	(n.s.)
a. Arithmetic	-.0269
b. Beta	-.04
c. Partial	-.03

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¹ Data from USDA Household Food Consumption Survey, 1955.

² Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.6. (6) United States rural nonfarm households, spring 1965: Summary of regression analyses for per person expenditures for dairy products ¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk and cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean, in logarithms ²	.3196	.2767	.2886	.2471	.0678	.6064	-.1187	-.4408	-.2262	-.7069
R ²	.96	.97	.96	.97	.89	.88	.96	.91	.89	.92
Standard error of estimate	.0455	.0474	.0488	.0486	.0861	.1022	.0561	.0764	.0840	.0740
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(1)	(1)	(1)	(1)	(10)	(n.s.)	(1)	(1)	(n.s.)	(1)
a. Arithmetic regression coefficient	.1631	.3175	.1573	.3036	.1662	.1160	.3894	.2287	.1347	.2376
b. Beta, standardized coefficient	.28	.48	.27	.46	.26	.17	.60	.38	.22	.41
c. Partial correlation coefficient	.78	.92	.75	.91	.54	.36	.92	.73	.47	.77
2. Number of household members age group specified (significance level)	10 and over (1)	10 and over (1)	10 and over (1)	10 and over (1)	Under 10 (1)	Under 10 (1)	10 and over (1)	16 and over (1)	Under 10 (1)	10 and over (1)
a. Arithmetic	.0006	.0006	.0006	.0006	.0015	.0019	.0005	.0007	.0016	.0009
b. Beta	.80	.64	.81	.65	.76	.83	.52	.71	.80	1.11
c. Partial	.96	.95	.96	.95	.88	.89	.90	.90	.89	.76
3. Margarine, pound in logarithms	...	...	...	...	...	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	...	...	...	...	...	-.4461
b. Beta	...	...	...	...	...	...	...	...	...	-.48
c. Partial	...	...	...	...	...	...	...	...	...	-.46

¹ Data from USDA Household Food Consumption Survey, 1965.

² Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.6. (7) United States farm households, spring 1955: Summary of regression analyses for per person expenditures for dairy products ¹

Variable and regression measure	Money value per person in logarithms				Fluid milk and cream, all sources dollar	Quantity per person in logarithms				
	All including butter		All except butter			Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean, in logarithms ²	.1895	-.1793	.1337	-.2698	.0089	.5894	-.4050	-.7591	-.2629	-.5345
R ²	.89	.90	.89	.93	.91	.90	.88	.83	.91	.96
Standard error of estimate	.1674	.1152	.1622	.1005	.1521	.1631	.1416	.2061	.1484	.1110
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(10)	(2)	(10)	(1)	(n.s.)	(n.s.)	(5)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic regression coefficient	1.2718	1.4368	1.2983	1.5191	.8915	.9263	1.4995	1.1397	1.0708	-1.4139
b. Beta, standardized coefficient	.54	.83	.55	.87	.36	.38	.78	.48	.46	-.58
c. Partial correlation coefficient	.72	.86	.74	.90	.57	.55	.82	.61	.64	-.69
2. Number of household members age group specified (significance level)	10 and over (10)	10 and over (n.s.)	10 and over (10)	10 and over (n.s.)	Under 10 (5)	Under 10 (10)	10 and over (n.s.)	16 and over (n.s.)	Under 10 (10)	10 and over (n.s.)
a. Arithmetic	.0004	.0001	.0004	.0001	.0023	.0022	.0001	.0005	.0019	.0001
b. Beta	.47	.15	.46	.12	.63	.61	.19	.49	.54	.11
c. Partial	.67	.29	.68	.28	.77	.73	.33	.61	.70	.28
3. Margarine, pound in logarithms	...	...	...	...	...	...	...	...	...	(2)
a. Arithmetic	...	...	...	...	...	...	...	...	...	1.3183
b. Beta	...	...	...	...	...	...	...	...	...	1.42
c. Partial	...	...	...	...	...	...	...	...	...	.89

¹ Data from USDA Household Food Consumption Survey, 1955.

² Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.6. (8) United States farm households, spring 1965: Summary of regression analyses for per person expenditures for dairy products¹

Variable and regression measure	Money value per person in logarithms					Quantity per person in logarithms				
	All including butter		All except butter		Fluid milk and cream, all sources dollar	Fluid whole milk quart	Frozen desserts quart	Whole or part whole milk cheese pound	Milk fat except butter pound	Butter pound
	All sources dollar	Bought dollar	All sources dollar	Bought dollar						
Weighted mean, in logarithms ²	-.2018	-.4067	-.2462	-.4584	-.4219	.1340	-.6284	-1.0438	-.7233	-1.0614
R ²	.92	.82	.91	.82	.82	.85	.90	.80	.84	.93
Standard error of estimate	.0759	.0995	.0800	.1025	.1180	.1091	.0779	.1216	.1078	.0633
<u>Independent variables</u>										
1. Disposable income per person in logarithms (significance level)	(n.s.)	(5)	(n.s.)	(5)	(n.s.)	(n.s.)	(5)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic regression coefficient	.0041	.1517	-.0026	.1464	-.0607	-.0239	.1062	.0508	-.0407	.0675
b. Beta, standardized coefficient	.01	.37	-.01	.35	-.13	-.05	.24	.11	-.09	.17
c. Partial correlation coefficient	.03	.65	-.02	.63	-.27	-.12	.61	.23	-.20	.52
2. Number of household members age group specified (significance level)	10 and over (1)	10 and over (1)	10 and over (1)	10 and over (1)	Under 10 (1)	Under 10 (1)	10 and over (1)	16 and over (1)	Under 10 (1)	10 and over (n.s.)
a. Arithmetic	.0024	.0017	.0025	.0018	.0075	.0075	.0021	.0028	.0073	.0011
b. Beta	.96	.75	.96	.77	.93	.93	.87	.87	.94	.50
c. Partial	.95	.87	.95	.87	.90	.92	.94	.82	.91	.54
3. Margarine, pound in logarithms	...	...	...	...	...	...	...	...	...	(n.s.)
a. Arithmetic	...	...	...	...	...	...	...	...	...	.3823
b. Beta	...	...	...	...	...	...	...	...	...	.43
c. Partial	...	...	...	...	...	...	...	...	...	.47

¹ Data from USDA Household Food Consumption Survey, 1965.

² Averages for each income group were weighted by the proportion of its population in U.S. total.

Table 2.7. U.S. averages for selected measures of dairy product consumption based on alternative survey (1) averages for each income class, (2) income size and (3) urbanization distributions of the housekeeping populations, spring 1942, 1955, 1965¹

Measure	Income class averages for spring	Distribution of population		Average per person for households in urbanization category			U.S. average computed			
		By income	By urbanization	Urban	Rural nonfarm	Farm	Actual U.S.	Amount	As percent of actual	
(1) Money value of all dairy products except butter in 1955 dollars, all sources	a.	1942	1942	1942	.99	.85	1.17	.99	....	....
	b.			1955	....	....	....	....	.97	98
	c.			1965	....	....	....	....	.97	98
	d.		1954	1942	1.04	.98	1.37	....	1.09	110
	e.			1955	....	....	....	....	1.06	107
	f.			1965	....	....	....	....	1.05	106
	a.	1955	1954	1955	1.15	1.03	1.26	1.13	....	....
	b.			1942	....	....	....	....	1.15	102
	c.			1965	....	....	....	....	1.13	100
	d.		1942	1942	1.10	.93	1.18	....	1.08	96
	e.			1955	....	....	....	....	1.06	94
	f.		1964	1955	1.18	1.08	1.30	....	1.17	104
g.			1965	....	....	....	....	1.16	103	
a.	1965	1964	1965	.98	.96	.98	.97	....	....
b.			1955	....	....	....	....	.98	101	
c.		1954	1955	.95	.91	.95	....	.94	97	
d.			1965	....	....	....	....	.94	97	
(2) Money value of all dairy products except butter in 1955 dollars, purchased only	a.	1942	1942	1942	.99	.56	.11	.70	....	....
	b.			1955	....	....	....	....	.75	107
	c.			1965	....	....	....	....	.82	117
	d.		1954	1942	1.04	.69	.17	....	.79	113
	e.			1955	....	....	....	....	.83	119
	f.			1965	....	....	....	....	.89	127
	a.	1955	1954	1955	1.14	.89	.41	.97	....	....
	b.			1942	....	....	....	....	.94	97
	c.			1965	....	....	....	....	1.03	106
	d.		1942	1942	1.09	.72	.30	....	.85	88
	e.			1955	....	....	....	....	.89	92
	f.		1964	1955	1.17	.96	.50	....	1.03	106
g.			1965	....	....	....	....	1.07	110	
a.	1965	1964	1965	.97	.89	.59	.92	....	....
b.			1955	....	....	....	....	.90	98	
c.		1954	1955	.94	.82	.51	....	.85	92	
d.			1965	....	....	....	....	.88	96	

Table 2.7. U.S. averages for selected measures of dairy product consumption based on alternative survey (1) averages for each income class, (2) income size and (3) urbanization distributions of the housekeeping populations, spring 1942, 1955, 1965 ¹ - continued

Measure		Income class averages for spring	Distribution of population		Average per person for households in urbanization category				U.S. average computed	
			By income	By urbanization	Urban	Rural nonfarm	Farm	Actual U.S.	Amount	As percent of actual
(3) Nutrient equivalent on calcium basis, quarts	a.	1942	1942	1942	3.83	4.05	5.71	4.26	....	....
	b.			1955	....	....	....	....	4.13	97
	c.			1965	....	....	....	....	4.01	94
	d.	1954	1954	1942	3.93	4.37	5.73	....	4.39	103
	e.			1955	....	....	....	....	4.28	100
	f.			1965	....	....	....	....	4.16	98
	a.	1955	1954	1955	4.33	4.37	5.16	4.45	....	....
	b.			1942	....	....	....	....	4.51	101
	c.			1965	....	....	....	....	4.40	99
	d.	1942	1942	1942	4.19	4.10	4.99	....	4.33	97
	e.			1955	....	....	....	....	4.27	94
	f.			1955	4.40	4.51	5.20	....	4.53	102
g.	1964	1964	1955	4.40	4.51	5.20	....	4.53	102	
			1965	....	....	....	....	4.48	101	
			1965	....	....	....	....	4.48	101	
a.	1965	1964	1965	4.03	4.11	4.21	4.07	....	....
b.			1955	....	....	....	....	4.08	100	
c.			1954	1955	3.95	3.99	4.08	....	3.98	98
d.				1965	....	....	....	....	3.97	98
(4) Milk fat in pounds, including butter	a.	1942	1942	1942	.64	.59	.88	.67	....	....
	b.			1955	....	....	....	....	.66	98
	c.			1965	....	....	....	....	.64	96
	d.	1954	1954	1942	.66	.66	.92	....	.71	106
	e.			1955	....	....	....	....	.69	103
	f.			1965	....	....	....	....	.68	101
	a.	1955	1954	1955	.58	.54	.72	.59	....	....
	b.			1942	....	....	....	....	.60	102
	c.			1965	....	....	....	....	.58	98
	d.	1942	1942	1942	.55	.49	.65	....	.56	95
	e.			1955	....	....	....	....	.55	93
	f.			1955	.59	.56	.74	....	.60	102
g.	1964	1964	1955	.59	.56	.74	....	.60	102	
			1965	....	....	....	....	.59	100	
			1965	....	....	....	....	.59	100	
a.	1965	1964	1965	.44	.42	.50	.44	....	....
b.			1955	....	....	....	....	.44	100	
c.			1954	1955	.39	.37	.44	....	.39	89
d.				1965	....	....	....	....	.39	89

Table 2.7. U.S. averages for selected measures of dairy product consumption based on alternative survey (1) averages for each income class, (2) income size and (3) urbanization distributions of the housekeeping populations, spring 1942, 1955, 1965 ¹ - continued

Measure	Income class averages for spring	Distribution of population		Average per person for households in urbanization category				U.S. average computed		
		By income	By urbanization	Urban	Rural nonfarm	Farm	Actual U.S.	Amount	As percent of actual	
(5) Milk fat in pounds, excluding butter	1942	1942	1942	.34	.35	.52	.38	....	....
			1955	....	....	....	....	.37	97
			1965	....	....	....	....	.36	95
		1954	1942	.35	.38	.54	....	.39	103
			1955	....	....	....	....	.38	100
			1965	....	....	....	....	.37	97
	1955	1954	1955	.42	.40	.50	.43	....	....
			1942	....	....	....	....	.43	100
			1965	....	....	....	....	.42	98
		1942	1942	.40	.36	.44	....	.40	93
			1955	....	....	....	....	.39	91
			1964	1955	.43	.42	.5244	102
				196543	100
	1965	1964	1965	.34	.33	.37	.34	....	....
			1955	....	....	....	....	.34	100
		1954	1955	.33	.32	.36	....	.33	97
			1965	....	....	....	....	.33	97
	(6) Milk solids not fat in pounds	1942	1942	1942	.69	.74	1.07	.78
1955				....	....	....	....	.75	96
1965				....	....	....	....	.73	94
1954			1942	.70	.80	1.06	....	.79	101
			1955	....	....	....	....	.77	99
			1965	....	....	....	....	.75	96
1955		1954	1955	.82	.82	.99	.85	....	....
			1942	....	....	....	....	.85	100
			1965	....	....	....	....	.83	98
		1942	1942	.79	.77	.79	....	.79	93
			1955	....	....	....	....	.79	93
			1964	1955	.84	.86	.9786	101
				196585	100
1965		1964	1965	.74	.75	.77	.74	....	....
			1955	....	....	....	....	.75	101
		1954	1955	.72	.73	.75	....	.73	99
			1965	....	....	....	....	.73	99

Table 2.7. U.S. averages for selected measures of dairy product consumption based on alternative survey (1) averages for each income class, (2) income size and (3) urbanization distributions of the housekeeping populations, spring 1942, 1955, 1965¹ - continued

Measure		Income class averages for spring	Distribution of population		Average per person for households in urbanization category				U.S. average computed			
			By income	By urbanization	Urban	Rural nonfarm	Farm	Actual U.S.	Amount	As percent of actual		
(7) Fluid milks (excluding cream) in quarts	a.	1942		1942	2.70	3.09	5.01	3.27	....	....
	b.			1955	....	....	....	....	3.10	95	
	c.			1965	....	....	....	....	2.60	80	
	d.			1954	1942	2.80	3.35	4.89	....	3.34	102
	e.				1955	....	....	....	....	3.22	98
	f.				1965	....	....	....	....	3.08	94
	a.	1955	1954	1955	3.23	3.07	4.21	3.31	....	....
	b.			1942	....	....	....	....	3.39	102	
	c.			1965	....	....	....	....	3.26	98	
	d.			1942	1942	3.10	2.82	4.15	....	3.25	98
	e.				1955	....	....	....	....	3.16	95
	f.				1964	1955	3.31	3.25	4.19	3.40	103
	g.			1965		....	....	....	....	3.36	102
	a.			1965	1964	1965	2.71	2.63	2.94	2.71
	b.					1955	2.72	100
	c.	1954	1955			2.62	2.51	2.83	....	2.62	97
	d.		1965			....	....	....	....	2.61	96
	(8) All cheeses, including cottage, in pounds	a.	1942		1942	.22	.16	.16	.18	....	....
b.		1955			....	....	....	....	.20	111	
c.		1965			....	....	....	....	.20	111	
d.		1954			1942	.22	.18	.19	....	.21	117
e.					1955	....	....	....	....	.20	111
f.					1965	....	....	....	....	.21	117
a.		1955	1954	1955	.34	.31	.26	.32	....	....
b.				1942	....	....	....	....	.32	100	
c.				1965	....	....	....	....	.33	103	
d.				1942	1942	.32	.26	.21	....	.28	88
e.					1955	....	....	....	....	.29	91
f.					1964	1955	.35	.31	.2833	103
g.				1965		....	....	....	....	.34	106
a.				1965	1964	1965	.36	.34	.31	.36
b.						195535	97
c.		1954	1955			.34	.31	.29	....	.33	92
d.			1965			....	....	....	....	.33	92

Table 2.7. U.S. averages for selected measures of dairy product consumption based on alternative survey (1) averages for each income class, (2) income size and (3) urbanization distributions of the housekeeping populations, spring 1942, 1955, 1965¹ - continued

Measure	Income class averages for spring	Distribution of population		Average per person for households in urbanization category				U.S. average computed			
		By income	By urbanization	Urban	Rural nonfarm	Farm	Actual U.S.	Amount	As percent of actual		
(9) Butter in pounds	1942	1942	1942	1942	.37	.30	.45	.37	....	....
			1955	1955	....	....	....	....	.36	97
			1965	1965	....	....	....	....	.36	97
			1954	1942	1942	.39	.35	.4640	108
				1955	195539	105
				1965	196539	105
	1955	1954	1955	1955	.20	.17	.27	.21	....	....
			1942	1942	....	....	....	....	.21	100
			1965	1965	....	....	....	....	.20	95
			1942	1942	1942	.19	.16	.2620	95
				1955	195519	90
				1964	1955	.21	.18	.2821	100
			1965	1965	....	....	....	....	.21	100
	1965	1964	1965	1965	.13	.11	.17	.13	....	....
			1955	1955	....	....	....	....	.13	100
			1954	1955	1955	.12	.10	.1512	92
				1965	196512	92

¹ Data derived from reports on U.S. Department of Agriculture's Surveys of Household Food Consumption. For description of procedures used, see chapter 4, of Burk, M.C. Measures and Procedures for Analysis of U.S. Food Consumption, USDA Agr. Handb.206, June 1961, and appendix B of Burk, M.C. Consumption Economics: A Multidisciplinary Approach, New York: John Wiley & Sons, Inc., Mar. 1968.

Table 2.8. Money value of dairy products at 1955 prices quantities of major items consumed per person in a week of spring 1955, 1965 by north-central and southern households, by urbanization¹

Item	Year	All U.S. average	North-Central Region				South			
			All	Urban	Rural nonfarm	Farm	All	Urban	Rural nonfarm	Farm
A. Money value of dairy products, per person										
1. Excluding butter, all sources, current prices	1955	1.13	1.19	1.20	1.08	1.34	.96	.95	1.04	1.14
	1965	1.10	1.09	1.05	1.14	1.18	.98	.99	.96	.99
1955 prices ²	1965	.97	.96	.93	1.01	1.04	.87	.88	.85	.88
Excluding butter, bought, current prices	1955	.97	1.04	1.19	1.02	.51	.70	.92	.77	.28
	1965	1.04	1.02	1.05	1.09	.72	.90	.97	.87	.58
1955 prices ²	1965	.92	.81	.93	.96	.64	.80	.86	.77	.51
2. Including butter, all sources, current prices	1955	1.27	1.36	1.37	1.22	1.56	1.05	1.01	1.15	1.28
	1965	1.19	1.20	1.16	1.24	1.35	1.03	1.03	1.01	1.04
1955 prices ³	1965	1.06	1.07	1.04	1.11	1.21	.92	.92	.90	.93
Including butter, bought, current prices	1955	1.09	1.18	1.35	1.16	.69	.74	.98	.82	.30
	1965	1.13	1.13	1.16	1.19	.87	.93	1.01	.91	.60
1955 prices ³	1965	1.01	1.01	1.04	1.06	.78	.83	.90	.81	.54
B. Quantity consumed per person										
1. Milk fat, excluding butter, all sources, pounds	1955	.43	.49	.46	.46	.60	.34	.33	.38	.38
	1965	.34	.36	.35	.38	.43	.30	.30	.29	.31
bought, pounds	1955	.36	.41	.46	.44	.22	.25	.32	.29	.11
	1965	.32	.34	.34	.36	.26	.27	.29	.27	.19
2. Milk fat, including butter, all sources, pounds	1955	.59	.69	.65	.64	.87	.44	.40	.50	.50
	1965	.44	.49	.47	.50	.63	.35	.35	.34	.37
bought, pounds	1955	.50	.61	.64	.61	.45	.30	.40	.35	.13
	1965	.41	.46	.47	.47	.43	.32	.35	.30	.21
3. Milk solids, not fat, all sources, pounds	1955	.85	.92	.90	.89	1.02	.75	.69	.87	.92
	1965	.74	.77	.74	.82	.84	.69	.68	.69	.69
bought, pounds	1955	.71	.79	.89	.85	.34	.52	.67	.63	.19
	1965	.70	.72	.73	.77	.49	.62	.68	.61	.40
4. Milk equivalent, calcium basis, all sources, quarts	1955	4.45	4.76	4.66	4.59	5.37	3.98	3.65	4.64	4.85
	1965	4.07	4.20	4.05	4.45	4.58	3.74	3.73	3.75	3.76
5. Fresh fluid whole milk, all sources, quarts	1955	3.01	3.50	3.14	3.39	4.16	2.30	2.08	2.52	3.11
	1965	2.41	2.65 ⁴	2.55	2.75	3.02	2.01 ⁴	1.99	1.94	2.30
bought, quarts	1955	2.45	2.91	3.36	3.20	.87	1.42	2.08	1.55	.30
	1965	2.24	2.43 ⁴	2.55	2.57	1.30	1.80 ⁴	1.99	1.70	1.04
6. Other fresh fluid milk, all sources, quarts	1955	.29	.22	.25	.11	.23	.49	.35	.54	.86
	1965	.30	.33 ⁴	.34	.36	.22	.30 ⁴	.32	.27	.27
7. Cream and half and half, all sources, quarts	1955	.06	.09	.08	.08	.17	.02	.02	.02	.03
	1965	.04	.05	.05	.04	.09	.02	.02	.02	.04
8. Condensed and evaporated, all sources, pounds	1955	.31	.17	.16	.23	.11	.47	.46	.76	.22
	1965	.25	.15	.14	.19	.49	.35	.35	.37	.30
9. Cheese, whole and part whole, (excluding cottage) all sources, pounds	1955	.19	.18	.19	.17	.18	.16	.17	.18	.14
	1965	.21	.22	.21	.23	.21	.18	.18	.18	.14
10. Frozen desserts, all sources, quarts	1955	.32	.40	.40	.39	.45	.25	.33	.22	.19
	1965	.41	.44	.41	.46	.54	.41	.43	.40	.36
11. Butter, all sources, pounds	1955	.20	.25	.24	.22	.34	.13	.09	.15	.15
	1965	.13	.16	.15	.15	.26	.06	.06	.06	.08
bought, pounds	1955	.17	.24	.24	.21	.28	.06	.09	.08	.02
	1965	.09	.15	.15	.14	.22	.05	.06	.05	.02
12. Margarine, pounds	1955	.20	.19	.19	.22	.12	.19	.24	.21	.11
	1965	.24	.24	.23	.29	.21	.27	.28	.26	.21

1 From USDA, Agricultural Research Service Food Consumption of Households in the North Central Spring 1965. Household Food Consumption Survey 1965-66, Report No. 3, July 1968 and Food Consumption of Households in the South Spring 1965. Household Food Consumption Survey 1965-66, Report No. 4, July 1968.

2 1965 prices x 88.5 percent.

3 1965 prices x 89.3 percent.

4 Based on weighting by urbanization of whole milk, all sources and bought.

Table 2.9A Dairy products and margarine: Average value consumed per household and per person in a week of spring 1965 by U.S. urban families and single consumers, grouped by family income¹

Item	All households		Disposable money income per family in 1964												
			Under \$3,000		\$3,000 to \$10,000		\$10,000 to \$15,000		\$15,000 and over						
	Per household	Per person	Per household	Per person	Per household	Per person	Per household	Per person	Per household	Per person	Per household	Per person			
	dollar	percent	dollar	dollar	percent	dollar	dollar	percent	dollar	dollar	percent	dollar	dollar	percent	dollar
Expenditures for dairy products,															
Excluding butter	3.44		1.09	1.93		.85	3.70		1.09	4.50		1.29	5.04		1.34
Including butter	3.73		1.18	2.08		.92	4.00		1.18	4.93		1.41	5.62		1.49
Fresh fluid whole milk ²	1.80	51	.57	1.01	49	.45	1.99	53	.59	2.21	49	.63	2.36	46	.63
Other fresh fluid milks ²	.22	6	.07	.14	7	.06	.20	5	.06	.38	8	.11	.41	8	.11
Fluid cream, including sour, half and half (excluding substitutes)	.12	4	.04	.05	3	.02	.12	3	.04	.20	5	.06	.26	5	.07
Canned milks	.16	5	.05	.14	7	.06	.18	5	.05	.14	3	.04	.08	2	.02
Dry milks	.06	2	.02	.06	3	.03	.06	2	.02	.04	1	.01	.08	2	.02
Frozen milk desserts	.49	14	.16	.26	13	.12	.51	14	.15	.69	15	.20	.88	17	.23
Cheese, including cheese spreads, but excluding cottage, cream	.44	13	.14	.25	12	.11	.47	13	.14	.61	14	.17	.64	13	.17
Cottage and cream cheeses ²	.19	5	.06	.12	6	.05	.19	5	.06	.24	5	.07	.34	7	.09
Expenditures for table spreads	.51		.16	.32		.14	.53		.16	.67		.19	.80		.21
Butter ²	.29	57 ⁵	.09	.15	47 ⁵	.07	.30	57 ⁵	.09	.43	64 ⁵	.12	.58	72 ⁵	.15
Margarine	.21	43 ⁵	.07	.17	53 ⁵	.07	.23	43 ⁵	.07	.24	36 ⁵	.07	.22	28 ⁵	.06
Household size, 21 meal equivalent															
number of persons		3.16				2.26			3.40		3.49			3.77	
Number of cases		4,356 ³				800			2,759		414			138	

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1 From USDA, Agricultural Research Service, Food Consumption of Households in the United States, Spring 1965. Household Food Consumption Survey 1955-66. Report No. 1, February 1968.
 2 Money value includes small amounts home produced.
 3 Total includes 245 cases not classified by income.
 4 Percentage of total value of dairy products from all sources.
 5 Percentage of total expenditures for table spreads.

Table 2.9B Dairy products and margarine: Average value consumed per household and per person in a week of spring 1965 north central urban families and single consumers, grouped by family income¹

Item	All households		Disposable money income per family in 1964												
			Under \$3,000			\$3,000 to \$10,000			\$10,000 to \$15,000			\$15,000 and over			
	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources
	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴
Expenditures for dairy products:															
Excluding butter	3.44	1.04		1.90	.84		3.57	1.02		4.66	1.21		5.18	1.33	
Including butter	3.80	1.15		2.07	.91		3.94	1.12		5.15	1.34		5.89	1.51	
Fresh fluid whole milk ²	1.78	.54	52	.99	.44	50	1.92	.55	53	2.14	.56	46	2.53	.65	49
Other fresh fluid milk ²	.24	.07	7	.17	.07	8	.20	.06	6	.46	.12	10	.37	.10	7
Fluid cream, including sour, half and half (excluding substitutes)	.15	.05	4	.09	.04	4	.15	.04	4	.21	.05	4	.31	.08	6
Canned milks	.10	.03	3	.06	.03	3	.11	.03	3	.17	.04	4	.04	.01	1
Dry milks	.03	.01	1	.02	.01	1	.02	.01	1	.03	.01	1	.12	.03	2
Frozen milk desserts	.51	.15	15	.26	.11	13	.53	.15	15	.73	.19	16	.84	.22	16
Cheese, including cheese spreads, but excluding cottage, cream	.43	.13	12	.25	.11	13	.45	.13	12	.66	.17	14	.70	.18	14
Cottage and cream cheese ²	.22	.07	6	.16	.07	8	.22	.06	6	.26	.07	5	.28	.07	5
Expenditures for table spreads:	.57	.17		.33	.14		.59	.16		.76	.20		.87	.22	
Butter ²	.36	.11	63 ⁵	.17	.07	52 ⁵	.37	.10	63 ⁵	.49	.13	64 ⁵	.71	.18	81 ⁵
Margarine	.21	.06	37 ⁵	.16	.07	48 ⁵	.22	.06	37 ⁵	.27	.07	36 ⁵	.17	.04	19 ⁵
Household size, 21 meal equivalent, number of persons		3.31			2.27			3.51			3.83			3.89	
Number of cases		1,187 ³			179			767			130			40	

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1 From USDA, Agricultural Research Service, Food Consumption of Households in the North Central Spring 1965. Household Food Consumption Survey 1965-66. Report No. 3, July 1968.
 2 Money value includes small amounts home produced.
 3 Total includes 71 cases not classified by income.
 4 Percentage of total value of dairy products from all sources.
 5 Percentage of total expenditures for table spreads.

Table 2.9C Dairy products and margarine: Average value consumed per household and per person in a week of spring 1965 by southern urban families and single consumers, grouped by family income¹

Item	Disposable money income per family in 1964															
	All households			Under \$3,000			\$3,000 to \$10,000			\$10,000 to \$15,000			\$15,000 and over			
	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	Per household	Per person	Percent all sources	
	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	dollar	dollar	percent ⁴	
Expenditures for dairy products:																
Excluding butter	2.97	.96		1.92	.78		3.24	.96		4.15	1.28		4.78	1.10		
Including butter	3.11	1.00		2.04	.83		3.38	1.00		4.38	1.35		5.04	1.16		
Fresh fluid whole milk ²	1.53	.49	50	.99	.40	48	1.71	.51	52	2.03	.63	48	2.34	.54	49	
Other fresh fluid milk ²	.24	.08	8	.20	.08	10	.22	.06	7	.31	.10	7	.50	.11	10	
Fluid cream, including sour, half and half (excluding substitutes)	.06	.02	2	.02	.01	1	.08	.02	2	.12	.04	3	.12	.03	2	
Canned milks	.22	.07	7	.19	.08	9	.25	.07	8	.16	.05	4	.11	.03	2	
Dry milks	.06	.02	2	.09	.04	4	.05	.01	2	.06	.02	1	.05	.01	1	
Frozen milk desserts	.44	.14	15	.28	.11	13	.46	.14	14	.70	.22	17	.83	.19	17	
Cheese, including cheese spreads, but excluding cottage, cream	.37	.12	12	.22	.09	11	.39	.12	12	.64	.20	15	.64	.15	13	
Cottage and cream cheese	.11	.04	4	.08	.03	4	.11	.03	3	.19	.06	5	.22	.05	6	
Expenditures for table spreads:																
Butter	.14	.04	37 ⁵	.12	.05	40 ⁵	.14	.04	35 ⁵	.23	.07	46 ⁵	.26	.06	41 ⁵	
Margarine	.24	.08	63 ⁵	.18	.07	60 ⁵	.26	.08	65 ⁵	.27	.08	54 ⁵	.38	.09	59 ⁵	
Household size, 21 meal equivalent, number of persons		3.10			2.46			3.37			3.24			4.36		
Number of cases		1,199 ³			321			708			79			33		

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1 From USDA, Agricultural Research Service, Food Consumption of Households in the South, Spring 1965. Household Food Consumption Survey 1965-66, Report No. 4, July 1968.
 2 Money value includes small amounts home produced.
 3 Total includes 58 cases not classified by income.
 4 Percentage of total value, all sources.
 5 Percentage of total expenditures for table spreads.

Chapter 3 EXPENDITURES OF AFFLUENT URBAN FAMILIES FOR DAIRY PRODUCTS

Because of rising real incomes of American families, it seems reasonable to expect that recent consumption patterns of urban upper income families can indicate patterns of dairy product consumption of American families a decade or so in the future. This chapter provides summaries and analyses of data on consumption patterns of upper income families in urban United States and of data from a special survey by the University of Minnesota in Minneapolis-St. Paul, 1965.

3.1 Expenditure Patterns of Urban Upper Income Families in the United States

The first step in studying expenditure patterns of urban upper income families is to determine how they differ from average U.S. patterns. This section identifies changes in relationships from 1955 to 1965, as well as variations in the money value data for major products for urban upper income families and single individuals in spring 1965, both for the United States and for the four regions.

The average urban American family allocated 15 percent of its expenditures for food at home to dairy products (other than butter) in spring 1955, 17 percent including butter (table 3.1). By 1965 the allocations had changed to 13 percent (excluding butter) and 14 percent (including butter). The shares allocated to dairy products by upper income families were practically the same in both years as the country's average. In 1955 there was relatively little variation among the regions in the shares allocated to dairy products. Again in 1965 the regional variations were insignificant except that the North Central Region's highest income group, families with incomes of \$15,000 or more, allocated 15 percent of their food money to dairy products, while the South's share for the same income group was only 12 percent.

3.1.1 Money Value for All Dairy Products

Table 3.2 tabulated comparisons of average expenditures per person for dairy products by urban upper income families in each region with the U.S. average. In spring 1955, families with incomes above \$10,000 spent about a fifth more for dairy products than did those with incomes in the \$8,000 to 10,000 bracket. In 1965, families with incomes of \$15,000 or more spent practically the same amount on a per person basis as the families in the \$10,000 to 15,000 bracket. Both groups had expenditures running 25 to 30 percent above the U.S. average (urban and rural). The declines in the consumption of dairy products by upper income families in the North Central Region and the South contributed significantly to the drop in the U.S. average from 1955 to 1965. In the North Central Region there were relative decreases in the consumption of fluid whole milk, fluid cream, butter, and frozen desserts. In the South the highest income group reduced its actual dollar expenditures per person for ice cream and butter, and the averages declined in relation to the U.S. averages.

3.1.2 Expenditures for Major Products

We turn now to the allocation of the total expenditures for dairy products among individual commodities (table 3.1). U.S. urban upper income families increased their allocation in 1965 over 1955 for fresh milk (other than whole milk) and cheese and decreased their relative outlays for butter and cream. In the Northeast from 1955 to 1965, the highest income group decreased its share allocated to fluid whole milk significantly, but its other shifts in consumption patterns were much like those for all upper income families in the United States. However, the share allocated to butter by northeastern upper income families in 1965 continued higher than that by upper income families in other regions. In the North Central Region the allocations of dairy expenditures among products changed in much the same ways as for all U.S. upper income families. The share of expenditures allocated by upper income families in the South to frozen desserts decreased, but average expenditures had been relatively high in 1955. In both survey periods the southern upper income families allocated the smallest share for butter, only 5 percent in 1965 compared with the urban U.S. upper income average of 9 to 10 percent. Other fresh milk, mostly skim milk, was used more extensively in 1955 and 1965 by western upper income families than in other regions.

3.1.3 Regression Analyses

The regression analyses reported in table 3.3 incorporate expenditure per person for each product in logarithms as the dependent variable; disposable income per person (in logarithms); and an age-composition factor as independent variables.²² The coefficients vary only slightly from those reported in table 2.6(4) for money value of all fluid milk and cream and for quantities of the products consumed per person. The income elasticities are all statistically significant, and all except for canned and dried milks, positive. The response of expenditures for cream to variations in income per person was more than twice as high as that for fresh fluid milks. The elasticities for butter and frozen milk desserts were about .3, while that for cheese was .2.

Based on the relative sizes of the standardized beta coefficients for the age-composition factor and for income, the age makeup of the household was more important than income to variations in per person expenditures for fluid milks, cheese, and manufactured products other than butter. For cream, income was much more significant. In the cases of frozen milk desserts and butter, the two factors played equal roles. For canned and dried milks, the age composition factor was a strong positive element while the income relationship was negative.

²² Age composition appears to be a more important factor in variations in consumption of several dairy products than for most other foods. The age groups used in the regressions reported in this bulletin were selected after testing a number of alternatives in regression models.

3.2 Expenditure Patterns of Upper Income Families in Minneapolis-St. Paul

The University of Minnesota surveyed upper income families in Minneapolis-St. Paul in 1965 primarily to obtain information on additional socioeconomic characteristics and the families' activities for analysis of factors possibly related to variations in food expenditures. A second objective of the study was to provide data from an independent survey which could be compared with urban data from the 1960-61 Bureau of Labor Statistics Survey of Consumer Expenditures and Incomes at the national, regional, and the metropolitan Minneapolis-St. Paul area (for 1964). Data for the University of Minnesota study were collected by personal interview, mostly during the spring months in order to match data from the national surveys of household food consumption. Earlier research indicated that the spring period was most indicative of the year's food consumption patterns.

A key hypothesis of the study was that current consumption patterns of upper income families provide important clues to consumption by the mass of the population a few years hence. Therefore, the survey included two-person families with before-tax incomes in 1964 of \$8,000 or more and three or more person families with before-tax incomes of \$10,000 or more. In addition to the income and family-size criteria for eligibility, families had to have purchased food at some grocery store during the week surveyed. This stipulation was necessary to obtain expenditures for the individual commodity groups for use at home.

The sampling and survey procedures and the social and economic characteristics of the Minneapolis-St. Paul upper income families are described briefly in appendix A of this bulletin and at greater length in another bulletin.²³

3.2.1 Food-Nonfood Competition Among Upper Income Families in Minneapolis-St. Paul

Minneapolis-St. Paul families with incomes in the \$10,000 to \$15,000 bracket allocated about 20 percent of total expenditures to food, about the same as that for all north-central urban families sampled for that group in 1960-61 (table 3.4). Minneapolis-St. Paul families with incomes over \$15,000 had relatively higher (17 percent of total expenditure) food expenditures than those in the North Central Region (15 percent). Most of the difference was in away-from-home food expenditures, which might reflect the fact that Minneapolis-St. Paul is a metropolitan area while the north-central sample included families living in non-metropolitan areas. The ratio of food expenditures to nonfood expenditures by Minneapolis-St. Paul families in the \$10,000 to \$15,000 income group was 1:4.0. The estimate of nonfood

23 Burk, Marguerite C. Food Expenditures by Upper Income Families: An Analysis of Factors Related to their Changing Importance in the U. S. Food Market. Technical Bulletin 269, Univ. of Minn. 1969.

expenditures by Minneapolis-St. Paul families with incomes over \$15,000, derived by a residual method, appears low. This factor and higher away-from-home expenditures make the ratio of food to nonfood expenditures by the Twin Cities families in the top income group 1:4.9 compared with 1:5.5 for all north-central urban families with incomes over \$15,000. ²⁴

Regression analyses of several 1964 food categories and total nonfood expenditures by the Minneapolis-St. Paul families supported the general observation that expenditures for food at home are much less responsive to variations in income among upper income families than are away-from-home expenditures or nonfood expenditures (table 3.5). At home food expenditures per person vary a third as much as income per person whereas the data in the table indicate almost a 1:1 ratio with income for food away from home and for total nonfood expenditures. Other factors positively related to higher per person expenditures for food at home included the presence of more older children and adults in the family, lower ranking occupation of the husband, the degree of dissaving identified by the wife (indicated by the fact that the high savers were coded with lower numbers), and her characteristic of emphasizing the reputation of goods she buys, called the reputation-striving characteristic. ²⁵ Two factors apparently have negative effects on expenditures for food at home: the higher number of full-time earners and the economizing bent of the wife, as evaluated by the score on the CVO economizer measure.

3.2.2 Expenditures for Food at Home

Minneapolis-St. Paul families with incomes above \$10,000 allocated about the same amount of money for food at home in 1964 as did the north-central urban families in 1960-61. The \$10,000 to \$15,000 group's outlays for food away from home and for alcoholic beverages in the two areas were about equal. But Minneapolis-St. Paul families with incomes above \$15,000 spent substantially more for food away from home and for alcoholic beverages. The larger outlays may reflect the response of families with high discretionary income to the greater degree of urbanization in the metropolitan area and less response to prices.

Variations in expenditures for food groups with level of family income are indicated in table 3.6. The sample's inclusion of only two-person families with less than \$10,000 before-tax income resulted in a smaller

24 North-central data reported in table 4.3 ibid.

25 A special set of psychometric measures for Consumer Value Orientation (CVO) was developed for this survey, as described in appendix C (ibid.). The two measures most pertinent to variations in food expenditures turned out to be the measure described as "reputation striving," i. e., preference for best known brands of consumer items, and that which reflects the desire to obtain the best buys from an economy standpoint, identified as "CVO economizer."

share of food dollars allocated to dairy products by the lowest after-tax income group (with incomes of \$6,400 to \$10,000) than that by the next higher income group, which included many more children. Based on data given for families with \$10,000 to \$15,000 after-tax incomes and those with \$20,000 and over, somewhat lower shares were allocated by the top income group to dairy products, nonalcoholic beverages, and potatoes and sweet potatoes, but larger allocations for fresh fruits and vegetables and prepared dishes. Per person expenditures by the \$10,000 to \$15,000 income group, calculated from the household averages by dividing them by household size, were similar to the group with incomes of \$15,000 or more.

Minneapolis-St. Paul families in the upper income category allocated their food expenditures differently from families of comparable affluence throughout the North Central Region. The Minneapolis-St. Paul families spent a slightly larger proportion of their at home food money for dairy products, fresh fruits, and vegetables other than potatoes, but they spent less on the meat, poultry, fish group, potatoes, and sweet potatoes than did north-central families in all urban areas.

Regression analyses of the week's food expenditures in total, for food at home, and for commodity groups by the Minneapolis-St. Paul sample are reported in table 3.7. The income elasticity for all food expenditures per person in a week, based on the semi-logarithmic form was .4 which is significantly lower than the elasticity of .5 for the year 1964.²⁶ The regression in the table indicated that the response of food expenditures per person to the preceding year's income is somewhat greater, at least in the range of incomes above average, than indicated by the .15 elasticity derived for U.S. urban food expenditures per person in spring 1965.²⁷

The income elasticity of expenditures per person for food for use at home by upper income families in Minneapolis-St. Paul was a statistically insignificant .1. This figure is quite consistent with the .04 elasticity for all U.S. urban families. The week's elasticity was significantly lower than the .35 derived for the year 1964. The analysis of data for these upper income families indicates that the wife's age had the greatest effect on food expenditures at home of all the independent variables in the analysis, followed by the CVO measures for economizing and reputation striving.

The factors related to variations in per person expenditures for the dairy group by upper income families in Minneapolis-St. Paul, as reported in table 3.7, explained only 20 percent of the variation in dairy expenditures per person.²⁸ A number of factors were omitted from this regression

26 That is, income was expressed in logarithms for the analysis but expenditures were in arithmetic form.

27 Table 2.6(4)

28 However, the regression analyses of family expenditures reported in table 3.11 explain about 60 percent of the variation in such expenditures, a relatively high proportion for ungrouped data.

analysis because earlier analyses indicated insignificance. The only statistically significant relationships found were the positive relationships of expenditures for dairy products with expenditures for cereal products and for nonalcoholic beverages and the negative relationship to social status. The conclusion is that the major socioeconomic factors related to per person expenditures for dairy products as a group are still to be identified and measured. Or it may be that the relationships of several factors to variations in individual products are offsetting for the total group.

In contrast, variations in per person expenditures for a number of other food groups were statistically related to variations in income and other socioeconomic factors. Income was a significant factor for red meats and for the total meat, poultry, fish group. The income elasticity for these foods was .3, meaning that for each 1.0 percent higher income per person, there was a .3 percent increase in per person expenditures for these foods. These are the income elasticities for per person expenditures for the following products (each percentage is statistically significant): eggs, .03; fresh vegetables, fresh and processed fruits, .4; and nonalcoholic beverages, .4.

Other significant positive relationships with per person expenditures were these: (a) degree of dissaving with purchases of meat, poultry, fish and of fresh fruits; (b) older age of the wife for cereals and bakery products; for the meat, poultry, fish group; fresh fruits, and nonalcoholic beverages; (c) additional years of education of the wife for egg expenditures; (d) wife's working more hours in survey week on expenditures for red meats and for processed vegetables; (e) reputation-striving and percent of dinners eaten out for the meat, poultry, fish group. Because the weighting system for the Hollingshead index of social position, used to measure family social status, yields a higher number for lower social position (i. e., negative coding), the negative relationship of this factor to expenditures for dairy products must be interpreted to mean that higher social position was a significant factor in higher expenditures for dairy products.

Statistically significant negative factors for per person expenditures for particular food groups identified by the regression analyses were: (a) wife's additional education for fresh vegetables (including potatoes); (b) her work outside the home during the survey week for fresh fruits; (c) the economizing bent of the wife for the meat group, processed vegetables, fats and oils, and nonalcoholic beverages. The relationships of possible complementary and substitute food groups to per person expenditures for other foods were investigated. Expenditures per person for cereals and bakery products were positively related to expenditures for dairy products, fats and oils, eggs, sugars, and sweets. This result probably reflects such complements as breakfast cereals and milk, toast and eggs, bread and butter, and flour and sugar for home baking. The relationship between dairy products and nonalcoholic beverages probably indicates frequent consumption of beverages as well as the coffee and cream combination. The heavy use of fats in frying may explain the relationship of fat and oil expenditures to eggs and to prepared dishes, but eggs and fats are also important ingredients in home baked items.

3.3 Expenditures for Dairy Products by Upper Income Families in Minneapolis-St. Paul in the Spring of 1965

Expenditures per person for dairy products reported by upper income families in the Minneapolis-St. Paul area in the University of Minnesota survey are at a significantly lower level than per person money value of dairy products used by north-central and U.S. urban families and single individuals, according to the spring 1965 USDA survey. (Compare tables 2.9 A and B and table 3.8.)²⁹ Differences between the two sets of survey data might be expected to arise from sampling variations, differences between population groups covered, and differences in interview procedures for obtaining "expenditure" data and income data used for classification of families.

The University of Minnesota survey utilized many of the interviewing procedures, the food expenditure questionnaires, and the financial questions of the Bureau of Labor Statistics' survey. The sample for the University of Minnesota survey was drawn from the area probability samples of the Minneapolis Star-Tribune's Research Department. (See appendix A.) Several categories of the expenditures by Minneapolis-St. Paul upper income families were matched directly with comparable data from a similar Bureau of Labor Statistics survey in 1964 and found to be remarkably consistent. The sampling for the USDA survey was directed by the top sampling experts of the USDA and Bureau of the Census. It does not seem likely that the differences were due to any major sampling errors. Differences in level were consistent across income brackets so they could not have been due to sampling.

Interview procedures may be a key difference between surveys of the Bureau of Labor Statistics and the University of Minnesota and those by the USDA. The Bureau of Labor Statistics and the University focused attention on obtaining specific income data while USDA's survey asked only for placement within an income group. However, the USDA survey asked for detailed quantity information on foods used in the preceding week in order to evaluate diets and placed less emphasis on price and value data.

Three checks on the levels of USDA expenditures are described in another bulletin.³⁰ These checks indicate some upward bias in the per person averages derived from the household data reported by USDA and some downward bias in the University of Minnesota's data. The Bureau of Labor Statistics' (BLS) expenditure data for nonfarm families in 1960-61 provide the only set of commodity data by income level that has been published. Nonfarm expenditures for dairy products (excluding butter) were adjusted to

²⁹ But the Univ. of Minn. data are generally consistent with food expenditure data from the Bureau of Labor Statistics surveys as indicated in section 5.1 of the report on food expenditures of upper income families, op. cit.

³⁰ Ibid.

the basis of urban expenditures per person and to allow for price changes from the 1960-61 period to 1965. With these adjustments, average expenditures for upper income families appeared to be about 10 percent below USDA estimates, but slightly above the University's survey data for Minneapolis-St. Paul. Food data for metropolitan areas required for further analysis are not available from published reports by USDA or BLS. It may be that metropolitan expenditure patterns differ slightly from urban averages because the urban averages include small cities and towns. But the relationships with income revealed by the Minneapolis-St. Paul data are consistent with U.S. urban data from the USDA surveys. Therefore, it is reasonable and desirable to proceed with the analysis of the University of Minnesota's survey data in an effort to identify factors other than income and household size related to variations in expenditures for dairy products.

Research on earlier sets of survey data and historical analyses reported in chapter 2 indicated the importance of income, household size and age composition, and education to expenditures for dairy products. Detailed data on a number of other socioeconomic characteristics of upper income families are available from the University of Minnesota survey, as described in appendix A, which can be related to variations in expenditures for dairy products.

3.3.1 Relationships of Expenditures to Variations in Income

Average expenditures per family for dairy products varied with level of family income among upper income families in Minneapolis and St. Paul (figure 3.1). Much of the variation disappears when differences in family size are taken into account by using per person averages (table 3.8). Expenditures for fresh fluid whole milk averaged substantially higher among families in the \$10,000 to \$15,000 income group than for other groups. In contrast, the \$15,000 to \$20,000 group spent substantially more for processed dairy products, especially frozen milk desserts and cheese.

Outlays for table spreads averaged practically the same for all income groups, but families in the \$15,000 to \$20,000 income group spent less for butter and more for margarine than those in the other income groups.

When upper income families are grouped by per person income, as in table 3.9 and figure 3.2, some variation in per person expenditures for dairy products with level of per person income reappears. Most of this is due to increased expenditures for processed dairy products which more than offset the lower expenditures for fluid milk.

3.3.2 Variations with Age Composition and Household Size

Data in table 3.10 reveal the cross currents in the relationships of expenditures for dairy products with family size and age. Families with children under 18, and particularly those with children under 6, spent more money for fluid milk per person, while adult families bought more fluid cream and processed dairy products. Families with adult heads under age 45 also bought more butter per person.

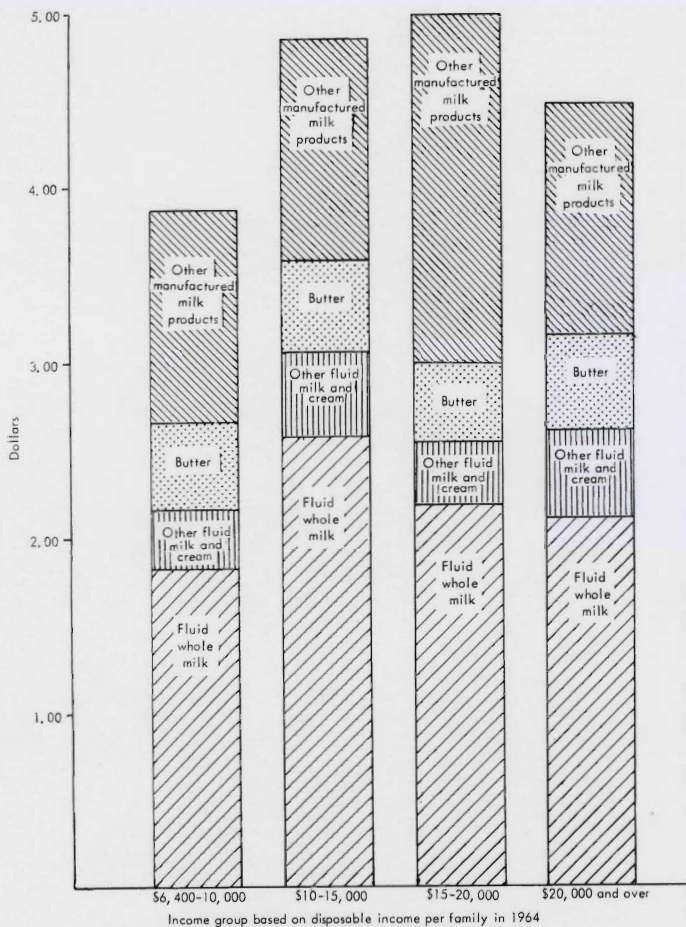


Figure 3.1. Expenditures for dairy products by upper income families, Minneapolis-St. Paul by level of family income (family averages for a week of April-July 1965)

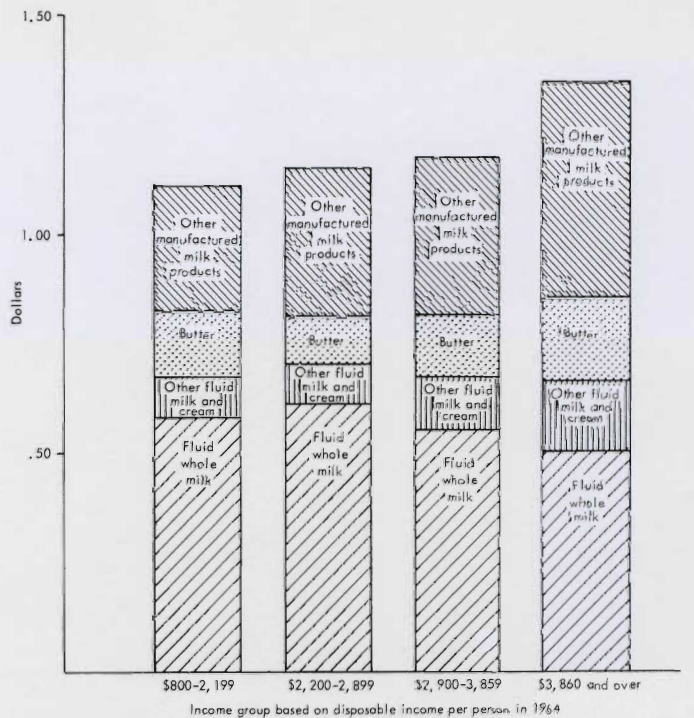


Figure 3.2. Expenditures for dairy products by upper income families, Minneapolis-St. Paul, by level of per person income (per person averages for a week of April-July 1965)

The interrelationships among socioeconomic characteristics are so great that it is not possible to sort out meaningful patterns without use of statistical analysis. The results of a number of such analyses follow.

3.3.3 Multivariate Analyses of Expenditures by Upper Income Families in Minneapolis-St. Paul

The relationships between a number of socioeconomic factors and variations in expenditures for dairy products have been measured statistically, both for family expenditures and for expenditures per person. (Tables 3.11 and 3.12) These socioeconomic factors explain fairly high proportions of the variations in family expenditures. If several statistically insignificant factors had not been omitted from the per person regression models or formulations, the coefficients of multiple determination (R^2) would have been slightly larger, but the statistical measurements of the relationships would be quite similar.

All Dairy Products. Comparison of the results of the analyses for dairy products (including and excluding butter) given in table 3.11 reveals no major differences in relationships of the two overall measures to the socioeconomic variable studied. Income proved to be a significant factor only at the 20 percent level. The income elasticity based on semi-logarithmic form was quite low, about .1 for per family and per person expenditures, compared with the .2 calculated for per person expenditures by all U.S. urban families in spring 1965 (see table 2.6-4). Household size was the most important factor for dairy expenditures by upper income families in Minneapolis-St. Paul as it was for all U.S. urban families. Both the standardized beta and the partial correlation coefficients for upper income expenditures indicate that about half of the variation in total family expenditures for dairy products was due to the number of people in the household. The complementary relationships of dairy products to nonalcoholic beverages and cereal products are shown in the regression results. Several characteristics of the wife, whether she was a reputation-striver or not, and her appraisal of the saving characteristics of the family, were relatively minor factors in expenditure variations from family to family.

Fresh Fluid Dairy Products. Household size, not income, is an important factor in variations in family expenditures for fresh fluid whole milk, as for all dairy products combined. Lower ranking social positions (as measured by the Hollingshead index based on the husband's occupation and education) had a significant negative effect on fluid milk expenditures. Reputation striving, though not statistically significant, was a positive factor.

The model used for home-delivered whole milk explained considerably less of the variations in such expenditures than did that for all fresh fluid milk. Although the income elasticity of family purchases of such milk was relatively high, .9, it was still only half as important as household size. A higher proportion of the household members under age 10 also tended to raise expenditures for truck-delivered milk. These milk expenditures were highly correlated with purchases of nonalcoholic beverages.

The relationships of socioeconomic factors to expenditures for all fresh fluid milks were substantially the same as for fluid whole milk. A set of dummy variables for different stages in the family life cycle was used in the regressions reported. The beta coefficient for this set of variables was $-.10$ for expenditures per person for fresh fluid whole milk, indicating that its effect on expenditures was about the same as the negative influence of lower social position. Comparison of regression results for models based on per person averages using family life cycle stages as an alternative for the age composition factor indicated that the differences in explanatory power were minor.

Cheese Expenditures. Income was almost as important a factor in family cheese expenditures as household size. The income elasticity of per person expenditures for cheese by upper income families in Minneapolis-St. Paul was close to $.6$, compared with the U.S. urban income elasticity of $.15$ for the quantity consumed in spring 1965. The quantity measure excludes variations in prices paid, which vary considerably with income level. Cheese expenditures were significantly and positively related to the homemaker's additional years of education. The relatively high positive relationship of cheese expenditures to expenditures for meat, poultry, fish is difficult to interpret. One may surmise that both types of expenditures are probably related to unmeasured socioeconomic or attitudinal factors.

Frozen Desserts. Only 22 percent of the variation in family expenditures was explained by factors introduced into the regression model. Household size, wife's education, and concurrently high expenditures for pastry emerged as the factors statistically significant at 10 percent or less.

Butter. Household size was the major positive factor in family expenditures for butter. Factors with negative effects and significant at 20 percent or higher levels for family expenditures were the greater proportion of household members below 10 years of age, more education and greater interest in economizing on the part of the wife, and the rate of expenditure for margarine. The regression coefficient for the latter factor was significant at the 1 percent level.

A different model was used for butter expenditures per person. It revealed the major contributions of the CVO reputation-striving measure and family life cycle stages to the explanation of variations in butter expenditures. The income elasticity reported in table 3.12 is $-.1$ and nonsignificant. An earlier model without family life cycle stages and reputation-striving yielded an income elasticity of $.3$, quite close to the $.4$ elasticity for the quantity of butter consumed per person by U.S. urban households in spring 1965. This provides a good example of the problems involved in trying to appraise the relationship of income to expenditures when data for potentially important factors are not available.

Share for Dairy. Data in the first column of table 3.12 are from the regression analysis of variations in the share of dairy products (excluding butter) in total expenditures for food at home. The wife's older age, additional outside employment in the survey week, and her reputation-striving characteristic as well as higher expenditures for the cereal and bakery

group of products were statistically significant negative factors. The only positive factor identified which favored a higher share for dairy products was the economizing bent of the homemaker.

3.4 Desire to Spend More for Dairy Products

The homemakers participating in the survey of upper income families in Minneapolis-St. Paul were asked to indicate the degree to which they agreed or disagreed with the statement that if they had a few more dollars to spend for food, they would buy more and better quality dairy products. Only a sixth of the homemakers said they would buy more dairy products if they had a few dollars more of food money. One-half would spend no more for dairy products. The other homemakers were undecided or made no response. Those currently buying all the dairy products they wanted tended to be in the higher income and education categories, and half expressed no need for additional food money. This group was already spending more for food than those saying they would like to buy more dairy products if they had a larger food budget. Among those wanting to buy more dairy products, were larger households, families with relatively more members in the 7-15 age category, and those with more interest in spending more for meats. Half of these homemakers could make use of \$7.50 or more additional food money per week.

3.5 Summary

U.S. upper income families spent about the same share of food dollars for dairy products as the average for all U.S. households in spring 1955 and 1965. The top income group decreased its purchases of dairy products more from 1955 to 1965 than did families just above the median level of income. The decline was particularly significant in the North Central Region and the South.

Analysis of the survey data on upper income families in Minneapolis-St. Paul revealed that income was not a significant factor in variations in expenditures for dairy products except for cheese and home-delivered milk. Only a sixth of the homemakers would spend more for dairy products, that is if they had a larger food budget. Those who wanted to spend more for dairy products had larger families and more children in the 7- to 15-year age group.

Fluid milk consumption rates of upper income families in Minneapolis-St. Paul were tied most closely to age composition variations, but lower ranking social position had a negative effect on fluid milk consumption. Adult families bought more fluid cream, butter, and most of the other processed dairy products than did families with a high proportion of younger members. The higher education of homemakers was related to larger expenditures for cheese and frozen desserts, but lower expenditures for butter. Economizing homemakers allocated a larger share of their total food budget to dairy products, while reputation strivers spent relatively less for dairy products as a group even though they were above average spenders for butter.

Table 3.1 Percentage allocations of at-home food expenditures to dairy products and of dairy total among major items for all urban households and those in two highest income groups, United States and four regions, in a week of spring 1955 and 1965¹

Item	All urban- zations	United States													
		Urban		Northeast urban		North Central urban		South urban		West urban					
		1955	1955	1955	1955	1955	1955	1955	1955	1955	1955				
		All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000		
I. Percentage allocation of at-home food expenditures															
A. In spring 1955 to															
1. All dairy products, excluding butter	15	15	14	15	15	15	14	15	14	15	16	14	15	14	
2. All dairy products, including butter	17	17	17	17	18	17	17	16	16	18	16	16	17	16	
B. In spring 1965 to															
1. All dairy products, excluding butter	13	13	13	12	13	12	12	13	13	13	13	12	14	14	
2. All dairy products, including butter	14	14	14	14	14	14	14	14	14	15	13	14	12	15	
II. Percentage allocation of dairy expenditures															
A. In spring 1955 to															
1. Fresh fluid whole milk	48	51 ²	46	42	54	49	48	49	41	41	49	54 ²	36	46	39
2. Total fresh milk	51	54	50	48	57	50	52	53	46	47	55	59	47	51	47
3. Cream	5	4	6	7	4	5	6	5	9	8	3	3	2	7	6
4. Canned and dry milks	5	4	2	2	3	3	2	3	2	2	8	1	5	5	6
5. Frozen milk desserts	14	13	14	15	11	12	12	14	15	14	15	16	21	13	13
6. Cheese, excluding cottage	11	10	10	10	11	11	10	9	8	10	10	13	12	10	13
7. Cheese, including cottage	14	13	15	14	13	15	12	13	13	14	13	14	16	15	20
8. Butter	11	11	13	14	12	15	16	12	15	15	6	6	9	9	14
B. In spring 1965 to															
1. Fresh fluid whole milk	47	47	45	42	51	49	43	47	42	42	49	45	46	43	43
2. Total fresh milk	52	53	52	50	54	54	46	53	51	49	56	52	56	51	54
3. Cream	3	3	4	5	3	3	3	4	5	5	2	3	3	5	6
4. Canned and dry milks	6	6	4	3	5	2	3	3	4	3	9	5	3	8	5
5. Frozen milk desserts	14	13	14	15	13	14	17	13	14	14	14	16	16	12	12
6. Cheese, excluding cottage	13	13	13	13	13	13	14	12	14	14	13	15	15	13	11
7. Cheese, including cottage	17	17	17	17	16	16	18	17	18	17	15	19	17	18	16
8. Butter	8	7	9	10	9	11	13	10	10	12	4	5	5	6	7

¹ From USDA, Agricultural Research Service, Food Consumption of Households in the United States, Spring 1965 (Rept.No. 1); --in the Northeast (Rept.No. 2); --in the North Central (Rept.No. 3); --in the South (Rept.No. 4); --in the West (Rept.No. 5). Household Food Consumption Survey 1965-66, 1968.
² Unrounded data adds to 99 percent.

Table 3.2 Per person expenditures for dairy products by all urban households and those in two highest income groups, United States and four regions as percentages of all United States average, in a week of spring 1955 and 1965¹

Item	All urbanizations	United States														
		Urban		Northeast urban		North Central urban		South urban		West urban						
		1955	1955	1955	1955	1955	1955	1955	1955	1955	1955					
	All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000	All	\$8,000 to \$10,000	\$10,000 to \$15,000	
		1965	1965	1965	1965	1965	1965	1965	1965	1965	1965	1965	1965	1965	1965	1965
		\$10,000 to \$15,000	\$15,000 and over	\$10,000 to \$15,000	\$15,000 and over	\$10,000 to \$15,000	\$15,000 and over	\$10,000 to \$15,000	\$15,000 and over	\$10,000 to \$15,000	\$15,000 and over	\$10,000 to \$15,000	\$15,000 and over	\$10,000 to \$15,000	\$15,000 and over	
1955																
Percentage comparison with 1955 all U.S. average																
1. All dairy products, excluding butter	100	118	126	148	126	124	130	123	126	156	95	132	136	127	126	158
2. All dairy products, including butter	100	117	128	155	128	129	137	124	133	164	96	126	133	124	122	162
3. Fresh fluid whole milks	100	123	123	132	145	130	136	126	113	138	91	142	100	119	98	128
4. Other fresh milks	100	125	150	250	67	50	175	125	175	275	150	175	375	150	250	300
5. Fluid cream, including sour and half and half	100	100	150	200	83	117	133	117	217	233	50	67	50	190	133	250
6. Canned milks	100	80	40	40	60	60	40	40	20	20	120	40	120	100	100	40
7. Dry milk	100	100	100	100	100	200	100	100	200	300	100	100	100	200	200	200
8. Frozen milk desserts	100	113	127	167	100	107	120	127	147	173	100	147	207	120	113	193
9. Cheese, excluding cottage cheese	100	108	117	142	125	125	117	100	100	150	83	142	150	117	142	158
10. Cheese, including cottage cheese	100	113	140	160	120	147	120	120	127	167	87	133	160	133	173	167
11. Butter	100	117	150	208	142	175	192	133	192	225	50	75	100	100	92	200
1965																
Percentage comparison with 1965 all U.S. average																
1. All dairy products, excluding butter	100	106	125	130	119	128	146	101	117	129	93	124	107	112	134	147
2. All dairy products, including butter	100	105	126	133	121	132	154	103	120	135	89	121	104	110	133	150
3. Fresh fluid whole milks	100	108	119	119	132	136	140	102	106	123	92	119	102	100	121	109
4. Other fresh milks	100	117	183	183	83	117	100	117	200	167	133	167	183	150	257	317
5. Fluid cream including sour and half and half	100	100	150	175	100	125	150	125	125	200	50	100	75	150	200	300
6. Canned milks	100	100	80	40	80	40	20	60	80	20	140	100	60	120	100	80
7. Dry milk	100	100	100	100	100	25	150	50	50	150	100	100	50	200	100	50
8. Frozen milk desserts	100	100	125	144	113	131	168	94	119	138	88	138	110	88	112	150
9. Cheese, excluding cottage cheese	100	107	136	143	129	136	179	100	136	150	93	150	121	114	114	121
10. Cheese, including cottage cheese	100	105	126	137	116	126	168	105	126	137	79	137	195	121	126	163
11. Butter	100	100	133	167	144	178	244	122	144	200	44	78	67	89	122	189

¹ From USDA, Agricultural Research Service, Food Consumption of Households in the United States Spring 1955 (Report No. 1); --in the Northeast (Report No. 2); --in the North Central (Report No. 3); --in the South (Report No. 4); --in the West (Report No. 5). Household Food Consumption Survey 1965-66, 1968.

Table 3.3. Summary of regression analyses for expenditures per person for major dairy products in a week in spring 1965 by U.S. urban families and single individuals¹

Variable and regression measure	Dollar value per person in logarithms									
	Fresh fluid milks			Cheeses						
	Total	Whole	Fluid whole milk and cream	Cream	Canned and dried milks	Frozen milk deserts	Total	Whole and part whole milk only	Butter	Manufactured dairy products excluding butter
Weighted mean in logarithms ²	.5077	.4564	.5372	-.6687	-.4373	-.1163	.0043	-.1513	-.3469	.3391
R ²	.96	.96	.96	.92	.65	.98	.99	.99	.98	.99
Standard error of estimate	.0607	.0583	.0615	.1167	.1453	.0411	.0276	.0297	.0454	.0316
Independent variables										
1. Disposable income per person in logs (significance level)	(1)	(1)	(1)	(1)	(10)	(1)	(1)	(1)	(1)	(1)
a. Arithmetic regression coefficient and income elasticity	.2702	.2580	.2942	.6486	-.3377	.3127	.1833	.1749	.3296	.1293
b. Beta, standard coefficient	.45	.42	.49	.77	-.67	.50	.34	.31	.52	.25
c. Partial correlation coefficient	.85	.85	.87	.86	-.58	.92	.91	.89	.91	.78
2. Number of household members: age group specified (significance level)	(1)	(1)	(1)	(n.s.)	(1)	(1)	(1)	(1)	(1)	(1)
a. Arithmetic regression coefficient	.0006	.0006	.0006	.0001	.0004	.0002	.0003	.0003	.0002	.0003
b. Beta, standardized coefficient	.62	.65	.58	.23	1.22	.55	.72	.74	.53	.79
c. Partial correlation coefficient	.91	.93	.90	.46	.79	.93	.98	.98	.91	.97

¹ Based on data from USDA 1965-66 Household Food Consumption Survey, Rept. No. 1.

² Weighted average approximately 70 percent of actual average, reflecting the fact that urban population is about 70 percent of all U.S.

Table 3.4. Averages and selected ranges for 1964 expenditures per family for food and selected nonfood items in upper income Minneapolis-St. Paul families, by level of disposable family income

Characteristic	Unit	Disposable family income					
		All	\$6,410 to \$10,000	\$10,000 to \$15,000	\$15,000 and over	\$15,000 to \$20,000	\$20,000 and over
Number of cases	Number	257	83	127	47	30	17
Proportion of sample	Percent	100	32	49	19	12	7
Family size, average	Number	4.4	3.9	4.6	4.7	4.8	4.4
Family disposable income, average	Dollar	12,420	8,910	11,950	19,850	17,110	24,720
Expenditures for:							
All goods and services, average	Dollar	11,120	8,370	10,790	16,880	15,000	20,230
As proportion of income	Percent	89.6	93.9	90.3	85.0	87.7	81.8
High for such expenditures	Dollar	30,000	24,240	16,870	30,000	21,320	30,000
Low for such expenditures	Dollar	2,870	2,870	3,730	4,160	4,160	5,470
Total food in year, average	Dollar	2,170	1,830	2,140	2,860	2,740	3,080
As proportion of total expenditures	Percent	19.5	21.9	19.8	17.0	18.3	15.2
Ratio to nonfood expenditures		1:4.1	1:3.6	1:4.0	1:4.9	1:4.5	1:5.6
High for total food	Dollar	5,270	3,680	5,270	5,190	4,350	5,190
Low for total food	Dollar	600	650	850	600	600	1,640
For use at home	Dollar	1,580	1,402	1,587	1,884	1,910	1,850
Away from home, in home city	Dollar	415	296	409	643	592	730
Outside home city	Dollar	175	132	144	333	238	500
Total away from home	Dollar	590	428	553	976	830	1,230
As proportion of total food	Percent	27.2	23.4	25.8	34.1	30.3	40.1
All nonfood goods and services, average	Dollar	8,950	6,540	8,650	14,020	12,260	17,150
Alcoholic beverages, average	Dollar	208	163	189	338	327	358
For use at home	Dollar	129	101	116	213	214	211
Away from home, in home city	Dollar	62	44	60	100	83	131
Outside home city	Dollar	17	18	13	25	30	16

Table 3.5. Summary of regression analysis of 1964 per person food and nonfood expenditures, by category, and major socio-economic factors: Upper income Minneapolis-St. Paul families¹

Variable and regression measure	Expenditures in logarithms					Total for nonfood in \$10
	Total food	Food at home	Food away from home		Total for nonfood in \$10	
			Total	In home city			Outside home city
Arithmetic mean	2.6980	2.5578	2.0531	1.8703	1.3354	2.3121
R ²	.36	.22	.26	.19	.16	.64
Standard error of estimate	.1373	.1412	.3034	.3576	.5407	.1434
<u>Independent variables</u>						
1. Disposable income per family in logs (significance levels)	(1)	(1)	(1)	(1)	(1)	(1)
a. Arithmetic regression coefficient and income elasticity	.5279	.3543	.9505	.8514	1.0762	.8942
b. Standard error of regression coefficient	.0507	.0526	.1119	.1713	.1995	.0675
c. Beta, standardized coefficient	.60	.44	.53	.42	.36	.73
d. Partial correlation coefficient	.55	.40	.48	.30	.33	.65
2. Number of family members under 16 years	.....	.....	.....	(n.s.)	.....	.....
a. Arithmetic	.....	.....	.....	.0000	.....	.....
b. Beta	.....	.....	.....	.03	.....	.....
c. Partial	.....	.....	.....	.02	.....	.....
3. Number 10 years and older	(2)	(5)	(1)	.....	(1)	.....
a. Arithmetic	.0000	.0000	.0000	.....	.0001	.....
b. Beta	.14	.14	.17	.....	.19	.....
c. Partial	.16	.13	.18	.....	.18	.....
4. Number full-time earners	.....	(5)	.....	.....	.....	.....
a. Arithmetic	.....	-.0036	.....	.....	.....	.....
b. Beta	.....	-.14	.....	.....	.....	.....
c. Partial	.....	-.14	.....	.....	.....	.....
5. Husband's occupation (negative coding)	(n.s.)	(5)	(10)	(2)	(n.s.)	(n.s.)
a. Arithmetic	.0014	.0108	-.0199	-.0321	.0018	.0024
b. Beta	.01	.12	-.10	-.15	.01	.02
c. Partial	.02	.13	-.12	-.15	.01	.03
6. Kind of saver (negative coding)	(10)	(5)	(n.s.)	(10)	(2)	.....
a. Arithmetic	.0166	.0200	.0084	.0426	-.0841	.....
b. Beta	.10	.13	.02	.11	-.15	.....
c. Partial	.12	.14	.03	.12	-.16	.....
7. Husband's education in years	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(10)	(n.s.)
a. Arithmetic	.0002	-.0010	.0045	.0037	.0106	.0018
b. Beta	.01	-.04	.08	.06	.11	.05
c. Partial	.01	-.04	.09	.06	.12	.08
8. CVO economizer	(5)	(10)	(n.s.)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic	-.0065	-.0052	-.0079	-.0040	-.0160	.0010
b. Beta	-.12	-.10	-.07	-.03	-.09	.01
c. Partial	-.14	-.11	-.08	-.03	-.09	.02
9. CVO reputation striver	(n.s.)	(10)	(n.s.)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic	.0044	.0060	-.0005	-.0028	.0097	.0012
b. Beta	.07	.11	-.00	-.02	.05	.01
c. Partial	.09	.12	-.00	-.02	.05	.02

¹ Based on data for 252 cases with complete data.

Table 3.6. Expenditures for food groups and their shares in total expenditures for food at home in a week, family and per person averages: Upper income Minneapolis-St. Paul families, by level of family income, April-July 1965¹

Food group	Family averages for families with income of:										Per person average expenditures in income group	
	\$6,410 to 10,000		\$10,000 to 15,000		\$15,000 and over		\$15,000 to 20,000		\$20,000 and over		\$10,000 to \$15,000	\$15,000 and over
	Amount dollar	Share in total percent	Amount dollar	Share in total percent	Amount dollar	Share in total percent	Amount dollar	Share in total percent	Amount dollar	Share in total percent	dollar	dollar
Total expenditures for food at home	26.49	100	27.69	100	29.26	100	28.99	100	29.75	100	6.92	7.32
Dairy products excluding butter	3.34	13	4.31	16	4.32	15	4.55	16	3.91	13	1.08	1.08
Dairy products including butter	3.86	15	4.83	17	4.78	16	4.97	17	4.45	15	1.21	1.20
Fats and oils including butter	1.26	5	1.16	4	1.28	4	1.36	5	1.13	4	.29	.32
Cereal and bakery products	3.44	13	3.41	12	3.76	13	3.98	14	3.38	11	.85	.94
Meat, poultry, fish	7.98	30	8.40	30	8.31	28	8.14	28	8.62	29	2.10	2.08
Eggs	.64	2	.56	2	.59	2	.56	2	.65	2	.14	.15
Sugars, sweets	.90	3	.85	3	.86	3	.80	3	.97	3	.21	.22
All fruits and vegetables	4.92	19	5.09	18	5.47	19	4.70	16	6.84	23	1.27	1.37
Fresh fruits and vegetables												
Including potatoes and sweet-potatoes	2.76	11	2.96	11	3.50	12	2.95	10	4.47	15	.74	.87
Excluding potatoes and sweet-potatoes	2.51	10	2.59	10	3.27	11	2.73	9	4.22	14	.65	.81
Fruits	1.31	5	1.50	5	1.86	6	1.45	5	2.59	9	.38	.46
Vegetables including potatoes and sweetpotatoes	1.45	6	1.46	5	1.64	5	1.50	5	1.88	6	.36	.41
Vegetables excluding potatoes and sweetpotatoes	1.20	5	1.09	4	1.41	5	1.28	4	1.63	5	.27	.35
Potatoes and sweetpotatoes	.25	1	.37	1	.23	1	.22	1	.25	1	.09	.06
Commercially processed fruits and juices excluding frozen	.88	4	.68	2	.59	2	.56	2	.65	2	.17	.15
Commercially frozen fruits and juices	.41	1	.50	2	.48	2	.45	1	.52	2	.13	.12
Commercially processed vegetables including potatoes and sweet-potatoes but excluding frozen	.60	2	.60	2	.41	1	.26	1	.68	2	.14	.11
Commercially frozen vegetables, total	.27	1	.35	1	.49	2	.48	2	.52	2	.09	.12
Nonalcoholic beverages	1.45	6	1.55	6	1.59	5	1.84	6	1.16	4	.39	.40
Prepared dishes, total	1.85	7	1.74	6	2.39	8	2.24	8	2.66	9	.44	.60
Soups, baby and junior foods, not frozen	.57	2	.44	2	.30	1	.29	1	.31	1	.11	.08
Other dishes, not frozen	.97	4	.98	3	1.61	5	1.64	6	1.56	5	.25	.40
Frozen dishes	.31	1	.32	1	.48	2	.31	1	.79	3	.08	.12
Total expenditures for food away from home ²	7.94		11.92		18.98		18.83		19.26		2.98	4.75
Per person averages based on number family members in survey week												
for food away from home ²	....		....		....		....		....		2.65	4.13
for food at home	....		....		....		....		....		6.15	6.36
Household size, number in 21-meal equivalents	3.7		4.0		4.0		4.2		3.7		4.0	4.0
Number of cases in sample	83		125		47		30		17		125	47

¹ Per person data computed using family averages for income group and matching household sizes, except as noted.

² Includes expenditures for alcoholic beverages and tips.

Table 3.7. (1) Summary of regressions for per person expenditures for all food and for food groups in a week of April-July 1965, upper income Minneapolis-St. Paul families¹

Section 1. All food and seven food groups

Variable and regression measure	All food groups			Dairy excluding butter	Eggs	Cereal and bakery products	Red meats	Meat, pou- try, fish	Fruits	
	Total	Food at home	Food away						Fresh	Processed
Arithmetic mean (commodity data in cents)	9.88	6.75	3.11	104	15	92	193	233	41	33
R ²	.22	.21	.13	.20	.09	.16	.22	.21	.11	.03
Standard error of estimate	5.36	3.18	4.28	48	14	53	146	159	36	37
<u>Independent variables</u>										
1. Disposable income per person in logs (significance level)	(1)	(n.s.)	(1)	(n.s.)	(10)	(n.s.)	(5)	(1)	(1)	(5)
a. Arithmetic regression coefficient	8.99	1.33	7.64	26.52	1.00	-23.52	127.34	166.48	36.70	33.46
b. Beta, standardized coefficient	.29	.07	.33	.10	.01	-.08	.15	.18	.19	.18
c. Partial correlation coefficient	.26	.07	.27	.09	.01	-.07	.14	.17	.18	.14
d. Income elasticity	.39	.09	1.07	.11	.03	-.11	.28	.31	.39	.44
2. Family income change since 1959 (negative coding)	....	....	....	....	....	....	(n.s.)	(n.s.)	....	....
a. Arithmetic	....	....	....	....	....	....	-2.07	-.01	....	....
b. Beta	....	....	....	....	....	....	-.01	-.00	....	....
c. Partial	....	....	....	....	....	....	-.01	-.00	....	....
3. Change in family income expected to 1969 (negative coding)	....	....	....	....	....	....	(n.s.)	(n.s.)	....	....
a. Arithmetic	....	....	....	....	....	....	3.31	-4.82	....	....
b. Beta	....	....	....	....	....	....	.02	-.03	....	....
c. Partial	....	....	....	....	....	....	.02	-.03	....	....
4. Age composition: identification (significance level)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	....	(10)
a. Arithmetic	.00	-.00	.00	.00	.00	-.00	-.01	-.00	....	31.51
b. Beta	.01	-.06	.06	.06	.04	-.02	-.03	-.01	....	.15
c. Partial	.01	-.06	.05	.05	.04	-.02	-.03	-.01	....	.12
5. Catholic or not	....	....	....	....	....	....	(n.s.)	(n.s.)	....	....
a. Arithmetic	....	....	....	....	....	....	-.36	-2.67	....	....
b. Beta	....	....	....	....	....	....	-.00	-.01	....	....
c. Partial	....	....	....	....	....	....	-.00	-.01	....	....

¹ Per person averages based on household sizes, 21-meals-at-home equivalent to one person. Based on 252 cases.

Table 3.7. (2) Summary of regressions for per person expenditures for all food and for food groups in a week of April-July 1965, upper income Minneapolis-St. Paul families¹ (continued)

Variable and regression measure	All food groups			Dairy excluding butter	Eggs	Cereal and bakery products	Red meats	Meat, poul- try, fish	Fruits	
	Total	Food at home	Food away						Fresh	Processed
6. Family social status	....	....	....	(5)	....	....	(n.s.)	(n.s.)	....	(n.s.)
a. Arithmetic	....	....	....	-5.92	....	....	2.43	4.63	....	.84
b. Beta	....	....	....	-.14	....	....	.02	.03	....	.03
c. Partial	....	....	....	-.15	....	....	.02	.03	....	.03
7. Wife's age in years	(1)	(1)	(n.s.)	....	....	(1)	(1)	(1)	(2)	(n.s.)
a. Arithmetic	.11	.11	-.01	....	....	1.07	3.58	3.98	.60	-.06
b. Beta	.18	.34	-.02	....	....	.19	.23	.23	.16	-.02
c. Partial	.17	.30	-.02	....	....	.18	.21	.21	.16	-.01
8. Wife's education in years (significance level)	(n.s.)	(n.s.)	(n.s.)	....	(10)	....	(n.s.)	(n.s.)	....	....
a. Arithmetic	-.10	.06	-.16	....	.73	....	1.35	5.24	....	....
b. Beta	-.04	.04	-.08	....	.11	....	.02	.06	....	....
c. Partial	-.04	.04	-.07	....	.11	....	.02	.06	....	....
9. Wife's work in survey week	(n.s.)	(20)	(n.s.)	....	....	....	(10)	(n.s.)	(10)	....
a. Arithmetic	.06	.14	-.08	....	....	....	6.88	5.91	-1.67	....
b. Beta	.03	.11	-.05	....	....	....	.12	.09	-.12	....
c. Partial	.02	.10	-.04	....	....	....	.12	.09	-.12	....
10. Degree of saving (negative coding)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	....	(n.s.)	(5)	(5)	(2)	(n.s.)
a. Arithmetic	.40	.27	.13	.91	....	.60	21.81	23.32	5.93	-1.28
b. Beta	.07	.08	.03	.02	....	.01	.14	.13	.16	-.04
c. Partial	.07	.08	.03	.02	....	.01	.14	.14	.16	-.03
11. CVO economizer	(2)	(1)	(n.s.)	....	....	....	(2)	(10)	....	(n.s.)
a. Arithmetic	-.26	-.18	-.09	-7.66	-6.42	-.58
b. Beta	-.14	-.16	-.06	-.15	-.11	-.05
c. Partial	-.15	-.17	-.06	-.16	-.12	-.05

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¹ Per person averages based on household sizes, 21-meals-at-home equivalent to one person. Based on 252 cases.

Table 3.7. (3) Summary of regressions for per person expenditures for all food and for food groups in a week of April-July 1965, upper income Minneapolis-St. Paul families¹ (continued)

Variable and regression measure	All food groups			Dairy excluding butter	Eggs	Cereal and bakery products	Red meats	Meat, poultry, fish	Fruits	
	Total	Food at home	Food away						Fresh	Processed
12. CVO reputation striver	(1)	(2)	(5)	(n.s.)	....	(n.s.)	(1)	(1)	....	....
a. Arithmetic	.38	.18	.20	1.27	....	.59	9.08	9.72	....	....
b. Beta	.18	.14	.12	.07	....	.03	.16	.15	....	....
c. Partial	.19	.15	.13	.07	....	.03	.17	.17	....	....
13. CVO convenience	....	....	....	....	(10)	....	....	....	....	....
a. Arithmetic	....	....	....	....	-.41	....	....	....	....	....
b. Beta	....	....	....	....	-.11	....	....	....	....	....
c. Partial	....	....	....	....	-.11	....	....	....	....	....
14. Expenditure for another food group: ident. (significance level)									Processed fruit	Fresh fruit
									(n.s.)	(n.s.)
a. Arithmetic									.01	-.00
b. Beta									.01	-.00
c. Partial									.01	-.00
15. Expenditure for another food group: ident. (significance level)										
a. Arithmetic										
b. Beta										
c. Partial										
16. Percent of week's dinners eaten out	....	....	....	....	....	....	(n.s.)	(10)	....	....
a. Arithmetic	....	....	....	....	....	....	83.88	155.44	....	....
b. Beta	....	....	....	....	....	....	.06	.11	....	....
c. Partial	....	....	....	....	....	....	.07	.11	....	....
17. Number of full-time earners	(n.s.)	(n.s.)	(n.s.)	....	....	....	....	....	....	....
a. Arithmetic	-.07	-.02	-.05	....	....	....	....	....	....	....
b. Beta	-.07	-.04	-.06	....	....	....	....	....	....	....
c. Partial	-.06	-.04	-.05	....	....	....	....	....	....	....
18. Husband's occupation (negative coding)	(n.s.)	(n.s.)	(n.s.)	....	....	....	....	....	....	....
a. Arithmetic	-.00	.15	-.15	....	....	....	....	....	....	....
b. Beta	-.01	.08	-.06	....	....	....	....	....	....	....
c. Partial	-.00	.07	-.06	....	....	....	....	....	....	....

¹ Per person averages based on household sizes, 21-meals-at-home equivalent to one person. Based on 252 cases.

Table 3.7. (4) Summary of regressions for per person expenditures for all food and food groups in a week of April-July 1965, upper income Minneapolis-St. Paul families¹ (continued)

Section 2. Six more food groups

Variable and regression measure	Vegetables		All prepared dishes	Fats and oils	Sugar and sweets	Non-alcoholic beverages
	Fresh	Processed				
Arithmetic mean in cents	41	25	51	32	23	44
R ²	.18	.12	.07	.19	.13	.11
Standard error of estimate	32	33	50	25	23	44
<u>Independent variables</u>						
1. Disposable income per person in logs (significance level)	(2)	(n.s.)	(5)	(n.s.)	(n.s.)	(5)
a. Arithmetic regression coefficient	36.75	13.75	50.64	-6.28	1.18	38.87
b. Beta, standardized coefficient	.20	.08	.19	-.04	.01	.16
c. Partial correlation coefficient	.15	.06	.14	-.05	.01	.14
d. Income elasticity	.39	.24	.43	-.08	.22	.38
2. Age composition - identification (significance level)	<u>Number under 16</u>				<u>Number 10 and over</u>	
	(n.s.)	(n.s.)	(n.s.)	....	(n.s.)	(n.s.)
a. Arithmetic	-.00	.00	.00	....	.00	.00
b. Beta	-.10	.03	.01	....	.02	.00
c. Partial	-.08	.02	.00	....	.02	.00
3. Wife's age in years	....	(n.s.)	....	(n.s.)	....	(2)
a. Arithmetic	....	.03	....	-.14	....	.75
b. Beta	....	.01	....	-.05	....	.17
c. Partial	....	.01	....	-.05	....	.15
4. Wife's education in years	<u>Actuals</u>		<u>In logarithms</u>	<u>Actuals</u>		
	(1)	....	(n.s.)	(n.s.)	....	....
a. Arithmetic	-2.66	....	-57.26	-.98	....	....
b. Beta	-.16	....	-.08	-.08	....	....
c. Partial	-.17	....	-.08	-.08	....	....
5. Wife's work in survey week	....	(2)	(n.s.)	....	....	....
a. Arithmetic	....	1.91	-.24	....	....	....
b. Beta	....	.15	-.01	....	....	....
c. Partial	....	.15	-.01	....	....	....
6. CVO economizer	....	(10)	....	(5)	....	(10)
a. Arithmetic	....	-1.32	....	-1.12	....	-1.51
b. Beta	....	-.12	....	-.13	....	-.10
c. Partial	....	-.12	....	-.13	....	-.11
7. CVO reputation striver	....	....	(5)	....	(n.s.)	(2)
a. Arithmetic	....	....	2.44	....	.02	2.49
b. Beta	....	....	.13	....	.00	.15
c. Partial	....	....	.13	....	.00	.15

¹ Per person averages based on household sizes, 21-meals-at-home equivalent to one person.

Table 3.7. (5) Summary of regressions for per person expenditures for all food and food groups in a week of April-July 1965, upper income Minneapolis-St. Paul families¹ (continued)

Section 2. Six more food groups

Variable and regression measure	Vegetables		All prepared dishes	Fats and oils	Sugar and sweets	Non-alcoholic beverages
	Fresh	Processed				
8. CVO convenience	(n.s.)	....	....	....
a. Arithmetic	1.05	....	....	....
b. Beta08	....	....	....
c. Partial07	....	....	....
9. Expenditure for another food group: identification (significance level)	<u>Processed vegetables</u> (1)	<u>Fresh vegetables</u> (1)	....	<u>Eggs</u> (1)	<u>Nonalcoholic beverages</u> (n.s.)	....
a. Arithmetic	.24	.22	....	.32	.01	....
b. Beta	.24	.26	....	.17	.02	....
c. Partial	.25	.22	....	.17	.02	....
10. Expenditure for another food group: identification (significance level)	<u>Cereals</u> (1)	<u>Cereals</u> (1)	....
a. Arithmetic08	.15	....
b. Beta17	.36	....
c. Partial17	.33	....
11. Expenditure for another food group: identification (significance level)	<u>Processed vegetables</u> (n.s.)	....	....
a. Arithmetic08	....	....
b. Beta10	....	....
c. Partial10	....	....
12. Expenditure for another food group: identification (significance level)	<u>All prepared dishes</u> (1)	....	....
a. Arithmetic10	....	....
b. Beta19	....	....
c. Partial20	....	....

¹ Per person averages based on household sizes, 21-meals-at-home equivalent to one person.

Table 3.8. Dairy products and margarine: Average expenditure per household and per person in a week of April-July, 1965 by upper income Minneapolis-St. Paul families of two or more persons, grouped by family income

Item	All upper income families			Disposable money income per family in 1964														
	Amount			\$6,410 to \$10,000			\$10,000 to \$15,000			\$15,000 and over			\$15,000 to \$20,000			\$20,000 and over		
	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total
dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	
Expenditures for dairy products	4.00	1.03	100	3.34	.90	100	4.31	1.08	100	4.31	1.08	100	4.55	1.06	100	3.90	1.00	100
Excluding butter	4.51	1.16	...	3.86	1.04	...	4.83	1.21	...	4.78	1.20	...	4.97	1.15	...	4.45	1.14	...
Including butter	2.26	.58	57	1.82	.49	54	2.58	.64	60	2.14	.54	49	2.17	.50	48	2.10	.55	54
Fresh fluid whole milk	.24	.06	6	.21	.06	6	.26	.07	6	.24	.06	6	.24	.05	5	.25	.06	6
Other fresh fluid milks (including half and half)	.17	.04	4	.12	.03	4	.21	.05	5	.16	.04	4	.11	.03	2	.25	.06	6
Fluid cream, including sour (excluding substitutes)	1.33	.34	33	1.19	.32	36	1.26	.32	29	1.77	.44	41	2.03	.47	45	1.30	.33	34
Total processed dairy products excluding butter	.56	.14	14	.53	.14	16	.52	.13	12	.71	.17	16	.83	.19	18	.49	.12	13
Frozen milk desserts	.41	.10	11	.32	.09	10	.39	.10	9	.60	.15	14	.71	.17	15	.39	.10	10
Cheese, including cheese spreads but excluding cottage, cream	.18	.05	4	.14	.04	4	.17	.04	4	.30	.08	7	.30	.07	7	.30	.08	8
Cottage and cream cheeses	.18	.05	4	.20	.05	6	.18	.05	4	.16	.04	4	.19	.04	4	.12	.03	3
Other (including canned, dried)	.69	.18	...	.71	.19	...	.88	.17	...	.67	.17	...	.66	.16	...	.67	.17	...
Expenditures for table spreads	.51	.13	74 ²	.52	.14	73 ²	.52	.13	76 ²	.47	.12	70 ²	.42	.10	64 ²	.55	.14	82 ²
Butter	.18	.05	26 ²	.19	.05	27 ²	.16	.04	24 ²	.20	.05	30 ²	.24	.06	36 ²	.12	.03	18 ²
Margarine	...	3.9	...	...	3.7	...	...	4.0	...	...	4.0	...	...	4.2	...	...	3.7	...
Household size, 21-meal equivalent	...	255	...	...	83	...	...	125	...	...	47	...	...	30	...	...	17	...
number of persons	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Number of cases	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

1 Percentage of total value of dairy products from all sources.
 2 Percentage of total expenditures for table spreads.

Table 3.9. Dairy products and margarine: Average expenditure per person in a week of April-July 1965 by upper-income Minneapolis-St. Paul families of two or more persons, in quartiles based on average income per person

Item	All upper income families		Disposable income per person							
	Amount per person	Share in total	\$800 to \$2,199		\$2,200 to \$2,899		\$2,900 to \$3,859		\$3,860 and over	
			Amount per person	Share in total	Amount per person	Share in total	Amount per person	Share in total	Amount per person	Share in total
	dollar	percent ¹	dollar	percent ¹	dollar	percent ¹	dollar	percent ¹	dollar	percent ¹
Expenditures for dairy products										
Excluding butter	1.05	100	.96	100	1.04	100	1.03	100	1.15	100
Including butter	1.19	...	1.11	...	1.15	...	1.17	...	1.33	...
Fresh fluid whole milk	.56	53	.58	61	.61	59	.55	53	.50	44
Other fresh fluid milk (including half and half)	.07	7	.06	6	.05	5	.07	7	.10	9
Fluid cream including sour (excluding substitutes)	.05	5	.03	3	.04	4	.05	5	.06	4
Total processed dairy products, excluding butter	.37	35	.29	30	.33	32	.36	35	.49	43
Frozen milk desserts	.15	14	.13	14	.14	13	.15	15	.16	14
Cheese, including cheese spreads, but excluding cottage cheese	.12	11	.07	7	.13	13	.09	8	.18	16
Cottage and cream cheeses	.05	5	.04	4	.04	4	.06	6	.08	7
Other (including canned, dried)	.05	5	.05	5	.02	2	.06	6	.07	6
Expenditure for table spreads	.19	...	.19	...	.16	...	.20	...	.24	...
Butter	.14	68 ²	.15	79 ²	.11	69 ²	.14	70 ²	.19	79 ²
Margarine	.05	32 ²	.04	21 ²	.05	31 ²	.06	30 ²	.05	21 ²
Household size, 21 meal equivalent number of persons	3.9		5.7		4.1		3.3		2.5	
Number of cases	255		66		63		63		63	

1 Percentage of total value of dairy products from all sources.

2 Percentage of total expenditures for table spreads.

Table 3.10. Dairy products and margarine: Average expenditure per household and per person in a week of April-July 1965 by upper-income Minneapolis-St. Paul families of two or more persons, grouped by stage in family life cycle

Item	All households			Youngest child under 6			Heads under 45 years			Heads 45 and over								
	Amount			Amount			Children 6-17 years			No children under 18 at home			Children under 18 at home			No children under 18 at home		
	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total	Per household	Per person	Share in total
	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹	dollar	dollar	percent ¹
Expenditures for dairy products bought, excluding butter	4.00	1.03	100	4.86	.99	100	4.06	1.00	100	1.75	1.00	100	4.35	1.00	100	2.47	1.03	100
including butter	4.51	1.16	...	5.33	1.09	...	4.72	1.16	...	2.35	1.34	...	4.96	1.14	...	2.79	1.16	...
Fresh fluid whole milk	2.26	.58	57	3.09	.63	64	2.17	.53	53	.82	.47	47	2.24	.51	51	1.04	.44	42
Other fresh fluid milks, including half and half	.24	.06	6	.29	.06	6	.19	.05	5	.02	.01	1	.25	.06	6	.24	.10	10
Fluid cream including sour (excluding substitutes)	.17	.04	4	.17	.03	3	.19	.05	5	.13	.07	7	.18	.04	4	.17	.07	7
Total processed dairy products, excluding butter	1.33	.34	33	1.31	.27	27	1.50	.37	37	.78	.45	45	1.68	.39	39	1.02	.42	41
Frozen milk desserts	.56	.14	14	.61	.12	13	.53	.13	13	.14	.08	8	.74	.17	17	.42	.17	17
Cheese, including cheese spreads, excluding cottage, cream	.41	.10	11	.40	.08	8	.39	.10	10	.45	.26	26	.49	.11	11	.33	.14	13
Cottage and cream cheese	.18	.05	4	.16	.03	3	.30	.07	7	.11	.06	6	.21	.05	5	.13	.05	5
Other (including canned, dried)	.18	.05	4	.14	.03	3	.28	.07	7	.08	.05	5	.24	.06	6	.14	.06	6
Expenditures for table spreads	.69	.18	...	.66	.14	...	.86	.21	...	.65	.37	...	.79	.18	...	.49	.20	...
Butter	.51	.13	74 ²	.47	.10	71 ²	.66	.16	77 ²	.60	.34	92 ²	.61	.14	77 ²	.32	.13	65 ²
Margarine	.18	.05	26 ²	.19	.04	29 ²	.20	.05	23 ²	.05	.03	8 ²	.18	.04	23 ²	.17	.07	35 ²
Household size, 21 meal equivalent number of persons		3.9			4.9			3.8			1.6			4.2			2.4	
Number of cases		255			99			42			116			52			46	

¹ Percent of total value of dairy products from all sources.
² Percent of total expenditures for table spreads.

Table 3.11. Summary of regressions for family expenditures for major dairy products in a week of April-July 1965 by upper income Minneapolis-St. Paul families.

Variable and regression measure	Total dairy		All fresh products	Fresh fluid whole milk	Home delivered whole milk	Cheese	Frozen desserts	Butter
	Including butter	Excluding butter						
Arithmetic mean in cents	449	398	266	227	116	58	56	51
R ²	.61	.60	.53	.52	.27	.12	.22	.12
Standard error of estimate - cents	172	159	144	141	162	61	62	63
Independent variables								
1. Family income in logarithms (significance level)								
	(20)	(20)	(n.s.)	(n.s.)	(2)	(10)	(n.s.)	(n.s.)
a. Arithmetic regression coefficient	135.17	126.73	60.10	43.23	228.98	60.83	16.29	-2.03
b. Beta, standardized coefficient	.07	.07	.04	.03	.16	.13	.03	-.00
c. Partial correlation coefficient	.09	.09	.05	.04	.16	.12	.03	-.00
d. Income elasticity	.13	.14	.10	.08	.86	.46	.13	.00
2. Household size in 21 meal equivalents								
	(1)	(1)	(1)	(1)	(1)	(10)	(2)	(1)
a. Arithmetic	7.80	7.35	7.14	7.04	3.58	.56	.66	1.10
b. Beta	.53	.55	.65	.66	.36	.16	.18	.31
c. Partial	.51	.52	.53	.53	.33	.11	.16	.27
3. Percent of household in specified age group								
	10 and over		under 10 years			16 and over	10 and over	under 10 years
	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(15)
a. Arithmetic	.62	.47	.26	.09	.92	.27	-.04	-.39
b. Beta	.05	.05	.03	.01	.12	.11	-.01	-.14
c. Partial	.06	.05	.02	.01	.09	.07	-.01	-.10
4. Extent of wife's employment in survey week								
	(20)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	.....
a. Arithmetic	-.69	-.19	.37	1.47	-2.01	-.27	1.20	.....
b. Beta	-.01	-.00	.00	.02	-.03	-.01	.05	.....
c. Partial	-.01	-.00	.01	.02	-.03	-.01	.05	.....
5. Wife's age in years								
	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic	-1.64	-.94	.50	-.09	.20	-.17	.40	-.28
b. Beta	-.06	-.04	.03	-.00	.01	-.03	.06	-.04
c. Partial	-.07	-.05	.02	-.00	.01	-.02	.05	-.04

Table 3.11. Summary of regressions for family expenditures for major dairy products in a week of April-July 1965 by upper income Minneapolis-St. Paul families - continued

Variable and regression measure	Total dairy		All fresh products	Fresh fluid whole milk	Home delivered whole milk	Cheese	Frozen desserts	Butter
	Including butter	Excluding butter						
6. Wife's education in years	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(5)	(5)	(20)
a. Arithmetic	3.67	6.29	-5.05	-5.62	4.49	4.55	4.46	-3.03
b. Beta	.03	.06	-.05	-.06	.05	.15	.14	-.10
c. Partial	.04	.08	-.07	-.07	.05	.14	.14	-.09
7. Kind of saver (negative coding)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	.....
a. Arithmetic	10.40	12.64	7.65	11.30	12.70	1.23	1.66	.....
b. Beta	.04	.05	.04	.06	.07	.02	.02	.....
c. Partial	.06	.08	.05	.08	.08	.02	.03	.....
8. CVO economizer	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(10)
a. Arithmetic	-2.57	-.89	.63	-1.91	-2.69	-1.75	-.11	-2.34
b. Beta	-.03	-.01	.01	-.03	-.05	-.09	-.01	-.11
c. Partial	-.05	-.02	.01	-.04	-.05	-.09	-.01	-.11
9. CVO reputation striver	(10)	(20)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	.....
a. Arithmetic	7.04	4.89	4.22	3.76	-.74	.47	1.48	.....
b. Beta	.07	.05	.06	.05	-.01	.02	.06	.....
c. Partial	.11	.08	.08	.07	-.01	.02	.07	.....
10. Family social position (negative coding)	(n.s.)	(20)	(5)	(10)	(n.s.)	(n.s.)	(n.s.)	(n.s.)
a. Arithmetic	-9.98	-13.69	-19.19	-16.99	3.63	3.64	1.12	.94
b. Beta	-.05	-.07	-.12	-.11	.02	.07	.02	.02
c. Partial	-.06	-.08	-.13	-.12	.02	.06	.02	.01
11. Expenditure for nonalcoholic beverages	(1)	(1)	(20)	(n.s.)	(1)	(n.s.)	(1)	.....
a. Arithmetic	.32	.20	.09	.08	.21	.04	.11	.....
b. Beta	.17	.12	.06	.06	.16	.08	.23	.....
c. Partial	.24	.17	.08	.08	.17	.08	.24	.....
12. Expenditures for another food group			Cereal products			Meat, poultry, fish	Fresh fruit	Margarine
	(1)	(1)	(n.s.)	(n.s.)		(5)	(n.s.)	(1)
a. Arithmetic	.27	.24	.04	.04		.02	.05	-.40
b. Beta	.25	.25	.05	.05		.15	.10	-.21
c. Partial	.29	.28	.05	.05		.14	.10	-.21

Table 3.11. Summary of regressions for family expenditures for major dairy products in a week of April to July by upper income Minneapolis-St. Paul families - continued

Variable and regression measure	Total dairy		All fresh products	Fresh fluid whole milk	Home delivered whole milk	Cheese	Frozen desserts	Butter
	Including butter	Excluding butter						
13. Expenditures for another food group							Pastry (1)	
a. Arithmetic26	...
b. Beta19	...
c. Partial21	...
14. Family life cycle								
Head under 45:								
(1) Children under 6			(n.s.)	(n.s.)	...	...	...	...
Beta	-.09	-.06	...	...	...	...
Partial	-.04	-.03	...	...	...	...
(2) Children 6 to 17			(n.s.)	(n.s.)	...	...	...	...
Beta	-.13	-.10	...	...	...	...
Partial	-.09	-.07	...	...	...	...
(3) No children (omitted)								
Head 45 and over								
(4) Children under 18			(n.s.)	(n.s.)	...	...	...	...
Beta	-.16	-.14	...	...	...	...
Partial	-.10	-.08	...	...	...	...
(5) No children under 18 at home			(n.s.)	(n.s.)	...	...	...	...
Beta	-.10	-.08	...	...	...	...
Partial	-.05	-.04	...	...	...	...
Beta coefficient for set	-.10	-.10	...	...	...	...

Table 3.12. Summary of regressions for per person expenditures for major dairy products and for the dairy share of expenditures for food at home in a week of April to July 1965 by upper income families in Minneapolis-St. Paul

Variable and regression measure	Share for dairy excluding butter	Total dairy						
		Including butter	Excluding butter	All fresh products	Fresh fluid whole milk	Cheese	Frozen desserts	Butter
Arithmetic mean in 10 cents except for share	.16	11.83	10.40	6.78	5.64	1.68	1.44	1.43
R ²	.11	.21	.20	.07	.08	.12	.03	.19
Standard error of estimate, 10 cents except for share	.09	5.30	4.84	4.24	3.79	1.83	1.91	1.83
<u>Independent variables</u>								
1. Per person income in logarithms, (significance level)								
a. Arithmetic regression coefficient	(n.s.)	(5)	(n.s.)	(n.s.)	(n.s.)	(1)	(n.s.)	(n.s.)
b. Beta, standardized coefficient	-.0341	4.10	2.20	1.41	-.35	2.18	-.58	-.15
c. Partial correlation coefficient	-.07	.13	.08	.06	-.02	.22	-.06	-.01
d. Income elasticity	-.06	.13	.07	.05	-.01	.19	-.05	-.01
	-.09	.15	.09	.09	-.03	.57	-.17	-.07
2. Number of household members 10 and over								
a. Arithmetic	(n.s.)	(n.s.)	...	...	...	(n.s.)	...	(n.s.)
b. Beta	-.0000	.00	...	...	...	.00	...	-.00
c. Partial	-.05	.06	...	...	...	.08	...	-.00
	-.04	.06	...	...	...	.08	...	-.00
3. Number of household members under 10 years								
a. Arithmetic	...	...	(n.s.)	(15)	(10)	...	(n.s.)	...
b. Beta	...	...	.00	.00	.00	...	-.00	...
c. Partial	...	...	.02	.12	.14	...	-.07	...
	...	...	.01	.09	.11	...	-.06	...
4. Family life cycle stage:								
Head under 45 years								
Youngest child under 6								
Beta	...	...	...	...	...	...	...	(1)
Beta	...	...	...	...	...	...	...	-.56
Children 6-17								
Beta	...	...	...	...	...	...	...	(1)
Beta	...	...	...	...	...	...	...	-.31
No children (omitted)								
Head 45 and over								
Children under 18								
Beta	...	...	...	...	...	...	...	(1)
Beta	...	...	...	...	...	...	...	-.36
No children under 18								
Beta	...	...	...	...	...	...	...	(1)
Beta	...	...	...	...	...	...	...	-.42
Beta for all stages	...	...	...	...	...	...	...	-.28

Table 3.12. Summary of regressions for per person expenditures for major dairy products and for the dairy share of expenditure for food at home in a week of April to July 1965 by upper income families in Minneapolis-St. Paul - continued

Variable and regression measure	Share for dairy excluding butter	Total dairy			All fresh products	Fresh fluid whole milk	Cheese	Frozen desserts	Butter
		Including butter	Excluding butter						
5. Wife's age in years	(10)	...	...	...	...	...	(n.s.)	...
a. Arithmetic	-.0013	...	...	...	...	...	.02	...
b. Beta	-.14	...	...	...	...	...	.09	...
c. Partial	-.12	...	...	...	...	...	.08	...
6. Wife's education in years	(n.s.)	...	...	(n.s.)	(n.s.)	...	...	...
a. Arithmetic	-.0008	...	...	-.05	-.09	...	...	...
b. Beta	-.02	...	...	-.03	-.05	...	...	...
c. Partial	-.02	...	...	-.02	-.04	...	...	...
7. Wife's work in survey week	(10)	...	...	...	...	...	...	...
a. Arithmetic	-.0043	...	...	...	...	...	...	...
b. Beta	-.13	...	...	...	...	...	...	...
c. Partial	-.12	...	...	...	...	...	...	...
8. Kind of saver (negative coding)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	(n.s.)	...	(n.s.)	
a. Arithmetic	-.0009	.16	.10	.10	.28	.04	...	.04
b. Beta	-.01	.03	.02	.02	.07	.02	...	.02
c. Partial	-.01	.03	.02	.02	.07	.02	...	.02
9. CVO economizer	(5)	...	...	(n.s.)	(n.s.)	(10)	(n.s.)	(10)
a. Arithmetic	.0040	...	...	.01	-.05	-.06	-.04	-.07
b. Beta	.14	...	...	.01	-.04	-.10	-.07	-.11
c. Partial	.14	...	...	.01	-.04	-.11	-.07	-.12
10. CVO reputation striver	(n.s.)	(5)	(n.s.)	(n.s.)	(20)	...	(n.s.)	(2)	
a. Arithmetic	-.0032	.24	.13	.11	.11	...	.05	.11
b. Beta	-.10	.11	.07	.07	.08	...	.07	.15
c. Partial	-.10	.13	.07	.07	.08	...	.07	.16
11. Family social position (negative coding)	(n.s.)	(n.s.)	(5)	(10)	(5)	(n.s.)	(n.s.)	(n.s.)	
a. Arithmetic	-.0033	-.32	-.58	-.47	-.48	.06	-.10	.16	
b. Beta	-.04	-.07	-.13	-.13	-.15	.04	-.06	.10	
c. Partial	-.04	-.07	-.14	-.12	-.13	.04	-.06	.09	

Chapter 4 ROLE OF SOCIAL PSYCHOLOGICAL FACTORS IN THE CONSUMPTION OF DAIRY PRODUCTS

Research reported in preceding chapters indicates the limitations of socioeconomic factors such as income, price, urbanization, age, family size, and education in explaining variations in the consumption of dairy products. Therefore, market researchers and behavioral scientists investigated the effects of social psychological factors. To put research on consumer values and attitudes toward dairy products in perspective, ideas of several social psychologists pertinent to consumer behavior are surveyed in this chapter.

The second section of the chapter summarizes major research on attitudes toward fluid whole milk. An important analysis of the relationship of advertising to consumer behavior with respect to milk follows. In the last section two studies of consumer attitudes toward other dairy products are reported.

4.1 Social Psychological Ideas About Consumer Behavior

Some social psychologists argue that the psychological structure of an individual is determined by external and internal factors and that his behavior is a consequence of his central structure or patterning. Through the socialization process, which begins at birth, the individual develops characteristic ways of behaving which reflect the values, norms, and attitudes of his family and his social groups. Each individual develops a system to relate himself to his surroundings and to identify himself within his environment. Attitudes are learned ways of organizing information received and of responding to it. Attitude research focuses on the interaction between individuals and their worlds.

4.1.1 Kinds of attitudes

In connection with consumer behavior, interaction occurs between the individual's needs and drives and the products which he wishes to buy or has bought. Such interaction is influenced by a variety of economic, social, and psychological factors. One writer has identified the following four dimensions of the underlying structure of an individual's attitudes: (1) awareness and knowledge as elements in cognition, the process of knowing; (2) values and norms that set the frame of reference for reactions; (3) reaction in positive or negative ways to the individual's evaluation of the particular situation, product, or person; (4) and the affect dimension which reflects his intensity of feeling and involvement with the product or situation or person.³¹

Factors related to the consumer, to choice and use of the product enter into consumer behavior. The so-called consumer variables include his economic and social characteristics and the several dimensions of his attitudes just described. Product variables refer to the characteristics (i. e., suitability for certain purposes) attributed by the consumer to the product

31 Crespi, Irving. Attitude Research, Marketing Research Techniques Series No. 7. American Marketing Association, 1965, page 5.

plus certain intrinsic characteristics of the product (such as size and color) which are perceived by consumers. Consumers perceive certain products as symbols of their objectives (e.g., symbolizing the consumption character of the social group to which they belong or aspire) or as satisfying particular hedonic or aesthetic interests or as supplying certain wanted services.

Situational factors determine whether a particular product should be bought or used at one time and place or on another occasion. An extreme example is that one does not serve breakfast cereals to guests at a formal dinner party. Our behavior is a response to selected and interpreted learnings from earlier experiences. We develop expectations as to how we and others should act under given circumstances. We are quite conscious of some of the expectations, conceptions, and definitions of particular situations which guide our behavior, but unconscious of others.

Psychologists have developed a variety of techniques to identify, evaluate, and measure the effects of these social psychological phenomena.

4.1.2 Bayton's Research on Consumer Behavior Related to Food

James A. Bayton, a psychologist and market researcher, directed a variety of research projects investigating consumers' behavior with respect to food. He has been responsible for much of the attitudinal research financed by the ADA, and ADA has published many of his results and interpretations. In a 1967 speech, he identified 22 sets of ideas which affect food choices, grouped into seven basic categories. The ideas or parameters or cognitions follow:³²

I. Nutrition parameters

1. Body growth needs
2. General health needs (rather than specific health needs)
3. Vitality; energy
4. Energy 'carry-through' (concern over 'long-lasting' energy)

II. Economic parameters

5. Price, per se
6. Value (what you get for your money)

III. Sensory-aesthetic parameters

7. Taste-aroma-appearance complex
8. Refreshment (especially 'coolness'; relief of thirst)

³² From pp. 3, 4 of talk given to the national Nutrition Education Conference, February 1967, printed in the summer 1967 issue of Dairy Promotion Topics, American Dairy Association. These sets of ideas and groupings were based on careful analysis of 11,527 people's responses regarding their beliefs about milk and their consumer actions, reported in 1963 and 1964 surveys by Universal Marketing Research for ADA.

IV. Personableness parameters

9. Personableness in general (lively; good complexion; bright and sparkling eyes; general attractiveness)
10. Sex personableness
Males-vigorous, athletic; masculinity
Females-lovely complexion; nice figure; femininity

V. Appropriateness parameters, (suitability to my kind of person or to given situations)

11. Age-group appropriateness (milk for children; coffee for older ages)
12. Status-group appropriateness (class-relatedness of some foods)
13. Social setting appropriateness (family privacy; intimate friends, special guests; restaurants)

VI. Convenience parameters

14. Convenience in purchasing; availability
15. Convenience in storing
16. Convenience in preparation
17. Convenience in serving
18. Convenience in consumption

VII. Health apprehensions parameters

19. Weight apprehension
20. Cardiac apprehension
21. Contamination apprehension (pesticides, bacterial, animal medications, atomic fallout)
22. Allergies"

Bayton did not find quality to be a separate idea and considers it to be interrelated with several of the ideas listed. It seems to the author of this bulletin that quality has several dimensions which are so tied in with other factors in varying degrees that researchers have not yet been able to sort them out.

Bayton analyzes these sets of ideas and their relationships to consumer behavior at three different levels. First, he examines the ordering or relative importance different kinds of people attach to each of these ideas about food in general. He says the ranking given to each idea by an individual provides a person's "profile" or measure of general orientation about food in general, e. g., first to vitality and energy, second to general health, third to taste-aroma-appearance satisfaction.

Second, Bayton studies how consumers relate each of these ideas to particular foods. He argues that consumers perceive each food as having a different set of scores on each of these 22 ideas. "Milk, for example, is heavily 'endowed' with nutrition concepts. There is also a strong component in the sensory aesthetic area, especially with respect to cooling refreshment.

Better cuts of meat would seem to be heavily 'endowed' with the taste-aroma-appearance complex in the sensory-aesthetic parameter, with price considerations also being critical and with nutritional considerations being somewhat secondary." (Ibid., p.4)

In effect, these "product profiles" are consumers' perceptions of the relationships between the existing attributes of the product and the desired attributes in particular products. People match the ideas they have about foods with their perceptions of the characteristics of particular products as they decide how to buy and use products. The fact that a consumer knows that a particular food offers certain essential nutrients may not cause him to buy it. Therefore, Bayton's third level of analysis is concerned with the relationships between these ideas and action reported by consumers in the form of actual consumption in a recent specified period. He identifies as a "discriminating influence" each idea which is held by people who act in a particular way as opposed to the action of people who do not hold that particular idea or belief.

Bayton used the following examples: "Suppose we establish two groups of people. One group believes it is true that milk 'helps produce cholesterol.' The other group does not believe that this is true about milk. Suppose we find now that in the group that believes this about milk, 63 percent say they drink milk fairly regularly. In the group that does not believe this to be true, 62 percent drink milk fairly regularly. Since practically the same proportion report drinking milk, this idea about milk and cholesterol does not have a discriminating influence on milk consumption behavior.

"On the other hand, suppose the item is 'milk is refreshing' and it is found that among those who believe this to be true 75 percent drink milk fairly regularly whereas among those who do not believe it only 30 percent drink milk fairly regularly. The concept 'milk is refreshing' does have a discriminating role in consumption of this product." (Ibid., p. 5.)

Bayton argues that such discriminating influences or functions are the "essential forces in the psychodynamics of food products." (Ibid., p. 5)

Because homemakers are the principal shoppers and preparers of food, they are often referred to as "gate keepers" for the flow of food to individual consumers. Therefore, Bayton has studied the sets of ideas which influence the decisions and actions of homemakers. He provides the following list of ideas which individual homemakers hold to varying degrees:

- "1. Health and nutrition--sensitivity to meeting the health and nutrition needs of the family; concern over the nutrition value of specific foods.
2. Sensory-aesthetic--providing food and meals that satisfy the taste-aroma-appearance complex.
3. Economic--how to save money on food purchasing; how to compare prices; determining how much food actually costs; how to keep within the food budget.

4. Market knowledge--how to tell quality or grade of foods wanted; how to get grade or quality for money available to spend.
5. Family wishes--how to accommodate the demands of various family members.
6. Time pressures--how to save time in shopping and in meal preparation.
7. Preparation pressures--avoiding a lot of 'mess and fuss' in preparing meals.
8. Prestige; achievement--obtaining achievement satisfactions in demonstrating how smart a shopper she is; how good a cook she is; how different and unique her meals can be." (Ibid., p.6)

In relation to particular products, Bayton suggests that there are positive appeals of individual foods which encourage homemakers to use them and negative factors or barriers. Although these negative factors are basically the negative aspects of the eight ideas listed, Bayton drew on a pilot research study he had made a decade earlier for the Federal Extension Service to identify the following "barrier profiles:"

- "1. Price too high.
2. Inability to tell quality or grade.
3. The quality of the product wanted is not available.
4. Sensory-aesthetic (product does not satisfy sensory-aesthetic criteria).
5. Objections of family members.
6. Lack of familiarity with product.
7. Trouble and fuss of preparations.
8. Possibility of social stigma (friends or neighbors 'looking down' on the homemaker and her family because she serves this particular food).

"Any given food can be investigated as to the characteristic barrier profile tending to keep homemakers from using it. For lamb chops, for example, the key barrier is 'price is too high.' For dry milk the barrier profile contains, as its strongest components, family objections, lack of familiarity, and social stigma." (Ibid., p. 6)

4.2 Research on Attitudes Toward Fluid Whole Milk

Producers and distributors obviously cannot change the incomes or urbanization or social characteristics which influence consumer behavior, but they can, through product promotions of several types, affect to some extent consumers' knowledge of their food needs, knowledge of products, and their attitudes toward products. Therefore, a number of agricultural economics professors and agricultural groups have sought to identify values, goals, attitudes, and knowledge of consumers related to different rates of milk consumption.

4.2.1 ADA Research

The most comprehensive research along these lines for fluid milk and other dairy products has been funded and directed by the ADA in an effort to develop and utilize scientific knowledge in promoting sales.³³ Most of this research has focused on fluid milk. A spring 1961 survey for ADA found that a third of adult consumers were concerned about weight control and that many of them viewed milk and butter as foods to avoid or minimize in consumption.³⁴ Dairy groups attempt to alter this attitude by stressing the nutritional contribution of whole milk.

In 1964, Market Facts, Inc. surveyed attitudes of Californians at the request of the Dairy Council of California to learn why people drink or reject milk.³⁵ These researchers found confusion about nutritional needs and preoccupation with weight control. Their analysis, like those of Bayton, revealed that multiple factors and conditions combine to influence milk consumption. Although age and sex are the most prominent factors, food habits, food attitudes, individual roles, and life styles of particular population groups are also significant. Taste for milk appeared to interact with nutritional attitudes and weight control concerns. They found that the social perception of milk as a proper mealtime beverage was associated with people having athletic, youthful, energetic, and sophisticated characteristics. This market research group recommended the use of nutritional appeals for the older age group, one of three key market segments. They suggested that emphasis on milk as a family beverage at mealtime, in an appealing dramatic social context which portrayed milk as particularly appetizing would appeal to young housewives, the second key segment. For teenage girls, the functional appeal should be the value of milk as a weight control food.

The relationship between attitudes toward objects like milk and attitudes toward situations is apparently quite important for research and promotional campaigns to change behavior.³⁶ The observed high rate of milk drinking by teenage boys at home meals and infrequent purchases of milk on social occasions with their peers is a good example of the differences in behavior between two situations. ADA studies of consumer attitudes and milk drinking behavior have revealed little correlation between attitudes toward the cholesterol problem and the amount of milk consumed or between belief that milk is fattening and milk drinking. Apparently, positive attitudes toward the value of milk more than offset these negative views.

33 The author wishes to acknowledge her indebtedness to Gerald G. Quackenbush, director of market research of the American Dairy Association, for access to and advice in interpretation of published and unpublished reports on the ADA research studies.

34 Public Relations Tips 1:7:1-4, July 1961, ADA, pp. 1,2.

35 Public Relations Tips 5:9:1-4, September 1965, p. 2.

36 See the discussion in Public Relations Tips, 7:4:1-5, July-August 1967, of Milton Rokeach's paper, "Attitude Change and Behavioral Change," Public Opinion Quarterly, Winter 1966-67.

A 1967 research study of young women, made for ADA, explored the ways attitudes and behavior are interrelated with values.³⁷ Values are generally stable and enduring and are shaped by a wide range of family, peer group, school, church, and public influences. This research identified values that appeared to be stable within the age 12 to 22 span, values that became less important in the older age groups, and those that became more important.

Because of the difficulties in changing values unfavorable to milk drinking, the researchers identified values favorable to milk consumption to which milk promotion can be related; namely, independence, physical concerns, companionship, creativity, prudence, peer group identification, and esthetics. Accordingly, ADA directed its milk promotion program to teenage girls to combine their observed belief in the vitality value of milk with social situations portraying important values favorable to drinking more milk.

The National Consumer Beverage Survey, sponsored by ADA in 1962, identified the occasions and the amounts of milk beverages consumed. It revealed that 80 percent of the heavy milk consumers (i.e., three glasses or more per day) were under age 20, 13 percent in the 20 to 44 year bracket, and only 7 percent age 45 and over.³⁸ Most of the milk was consumed at mealtime. The reduction in milk consumption rates of the 20-24 age group compared with the 13-19 age group was most significant at breakfast, followed by the cutback in lunchtime usage. Knowledge of situational facts like these, of the deep-seated values of different groups of people, and of specific attitudes of particular groups toward specific products provides the major part of the scientific basis for promotional efforts to change consumer behavior in use of fluid milk. The details of such programs lie outside the scope of this bulletin, but many are reported in ADA publications.

The Center for Research in Marketing, Inc. showed in 1962 research that the Negro market for fluid milk products differed from the general market primarily because of economic factors, not taste.³⁹

4.2.2 ADA - USDA Market Test

One of the most comprehensive market tests of promotion effectiveness ever made was carried out in March 1963 - February 1965 by USDA and ADA. The specific objective of the main part of the study was to determine if increases in fluid milk sales resulting from special promotional efforts are sufficient to cover the costs involved in those efforts. Details of the design of the test are reported elsewhere.⁴⁰ Here, I note only the facts that variations in milk consumption and in the characteristics of the markets

37 Reported in Public Relations Tips 7:4:3-4.

38 Dairy Promotion Topics, Nov. - Dec. 1962, p. 6.

39 Ibid., p. 6.

40 Clement, Wendell E., Peter L. Henderson, Cleveland P. Eley, The Effect of Different Levels of Promotional Expenditures on Sales of Fluid Milk, U.S. Economic Research Service, ERS-259, Oct. 1965, pp. 2-7

subjected to alternative levels of sales promotion efforts were carefully studied in advance by USDA market researchers. The measurement of changes in fluid milk sales as a measure of consumption was based on the regular reporting procedure in the Federal Order Milk Markets.

The ADA advertising campaign used during the 2-year period promoted milk use at specific times of the day and stressed benefits from milk drinking, such as refreshment, pep, energy, and vitality. Three levels of promotional expenditures were used -- normal (2 cents per capita per day), medium (15 cents extra), and heavy (30 cents extra). The experimental design provided for measurement only during the period of special promotion and the following 6 months. At the medium level of promotion, the added revenue to dairy farmers amounted to \$398,580, of which \$237,530 was offset by the promotional costs, leaving a net return of \$161,050, 68 percent above their investment. Comparable data for the high level of promotion are \$521,220 in added revenue; \$436,313 for costs, and \$84,907 for net profit, or 19 percent. Considering only returns in this 1-year period, the medium level provided higher net returns. The medium level of promotion resulted in a 4.5 percent increase in sales, to be compared with the 5.9 percent increase with heavy promotional efforts.

At the end of each promotion period in each market, the ADA had a market research firm interview a sample of persons age 15 or older. They sought information on awareness of the promotional program and on effects of the program on changes in attitudes toward milk, in reasons for drinking milk, in health apprehensions about milk, and in actual milk drinking behavior.⁴¹ The surveys revealed net increases in the prevalence of attitudes favorable to milk consumption and decreases in the frequency of unfavorable attitudes. Each wave of interviews used 43 statements about milk for respondents to indicate their degrees of concern or belief. The increased milk sales in the test markets apparently resulted from a higher proportion of milk drinking on an average day by the population over age 14.

Therefore, the market researchers concluded that increased advertising affected the frequency of consumption by irregular, light milk drinkers.⁴²

In analyzing each of the 43 statements, the respondents were grouped by degree of belief and the milk consumption behavior for the preceding day was compared for the two extreme groups, high belief and high disbelief. Items for which there were significant differences between the two belief groups in milk consumption were identified as discriminating.

"It was found, for instance, that the statement 'milk gives you vitality' is discriminatory for all females. In the 20 to 24 year female age group, as

41 As reported in Quackenbush, Gerald G. "The American Dairy Association Special Milk Promotion Test, Additional Evaluation including Attitude and Behavior Changes," paper presented to the Board of Directors, ADA, Denver, Sept. 21, 1965 (distributed by ADA).

42 Public Relations Tips 5:10:1-4, Oct. 1965, p. 2.

an example, it was found that only 38% who tend to completely disagree with the vitality idea drink milk on an average day. At the other end of the scale, however, 71% of those who tend to agree decisively with this concept drink milk on an average day. Average daily consumption of milk among those who disagree with the vitality idea is 1.0 glass, while, among those who agree, daily consumption averages 1.6 glasses. . . . "43

"Five of the 43 items about milk showed no discrimination for any sex-age group, and some of these are most interesting since some dairymen have worried much about them. These items are: 'The containers that milk comes in need to be improved'; 'Milk helps to produce cholesterol'; 'Atomic fallout can get into milk'; 'Chemicals sprayed on farms have harmful effects through milk'; and 'People would drink more milk if it had less fat than now, but more fat than in skim milk.'

"None of these five items, then, affected milk consumption regardless of whether a person had high belief of the statements or high disbelief of the statements.

"Nine of the 43 items were found to be discriminating for practically all age-sex groups. This means that people who believe these statements (high belief) are more likely to be milk consumers than those with high disbelief. Included were such items as 'Milk is relaxing'; 'People should drink three glasses of milk every day'; 'If you drink milk at bedtime, you will sleep better at night.'" 44

4.3 An Important Analysis of the Relationship of Advertising to Consumer Behavior

Using data from the ADA-USDA study of the effects of three levels of advertising expenditures on fluid milk sales, Wendell E. Clement tested several hypotheses implicit in the generally accepted explanation of how advertising affects consumption.⁴⁵ This explanation assumes that advertising influences consumer awareness of products, consumer awareness then changes consumer attitudes, and with changed attitudes, consumers respond by changing their purchases.

4.3.1 Regression Results

In addition to information on sales and types of advertising, Clement had data from seven waves of survey interviews conducted for the ADA. These

43 Ibid., p. 3.

44 Ibid., p. 4.

45 The author wishes to express appreciation to Wendell E. Clement for access to his doctoral dissertation An Analysis of the Advertising Process and Its Influence on Consumer Behavior, submitted to the Faculty of the Graduate School of The American University, Apr. 1967, and for his helpful suggestions regarding this bulletin.

data included the scaling of a variety of attitudinal statements regarding milk by 1,500 respondents on each of seven rounds of interviewing in the six markets. These attitude statements had been evaluated and found to be critically related to consumption in earlier research. There were also data on aided and unaided recall to measure respondents' awareness of advertising themes. These respondents supplied information on their use of milk and other beverages on the day preceding their interviews and on their characteristics of sex, age, education of the head of the household, and presence of children. No information on income or size of family was obtained. All respondents were age 15 or over. The variables in the analysis were consumption of fluid milk by individuals, the six different markets, several time periods, age, day of week of the interview, education, sex, market price of fluid milk in each market, consumption of competing products, the recall of the advertising of milk, and a measure of the physiological need for fluid beverages (based on the total fluid consumption of all beverages for the respondent which were then classified as low, medium, and high). These factors explained 60 percent of the variation in milk consumption. The statistically significant factors were the consumption of coffee and soft drinks, age (which had an inverse relationship), education of the head of the family (which served as a proxy variable for income), and sex. A separate analysis of the relationships of attitudes to milk consumption explained only 14 percent of the variation in milk consumption.

Clement paid particular attention to relationships between: 1) the level of advertising expenditures and recall, 2) level of recall and purchases measured by total sales in the area, 3) advertising expenditures and attitudes, 4) recall and attitudes, 5) advertising inputs and the level of purchases, both current and lagged, 6) attitudes and purchases. Regarding the relationship between the level of advertising expenditures and recall, Clement found that each increased level of advertising increased consumer awareness as measured by recall. But the expenditures for advertising in the preceding period also affected recall. The level of exposure as measured by recall was not a linear function of advertising expenditures. It increased at a decreasing rate.

Relative to the relationship between the level of recall and sales and purchases by consumers in the preceding day, Clement found that the total sales in the area were linearly related to awareness. Clement ascribed the decreasing rate of increase in sales at increased expenditure levels to the failure to achieve additional consumer exposure to the advertising. An increase in recall of more than 60 percent was required to increase sales by 6 percent.

The analysis of the relationship between advertising expenditures and attitude yielded unexpected results. Attitudes became more unfavorable during the intensive advertising period, but they improved in the subsequent period.

The statistical results indicated that recall was the highest among consumers with the most favorable attitudes. Aided recall was 20 percent higher among the favorable attitude group than among those with attitudes unfavorable to milk drinking. Using responses which involved identifying

the advertising themes (without prompting), recall was 50 percent higher among those with favorable attitudes than among those with unfavorable attitudes. Changes in attitudes were less marked than were the changes in recall.

Analysis of the relationships between advertising inputs and purchases indicated that sales increased with each higher level of current expenditures. Sales also responded to the level of expenditures in the preceding period. Clement concluded that sales response had a parabolic relationship to advertising inputs, that is, it increased at a decreasing rate after a certain level.

Analysis of the relationships between attitudes and purchases yielded interesting results. Purchase response was greatest among those with the least favorable attitudes. Thus the data did not appear to support the usual hypothesis of a causal relationship between advertising, attitude change, and changes in purchases. Attitude change appeared to follow not to precede the change in purchases.

The apparent inconsistencies among these findings led Clement to reappraise the conceptual framework of the relationship between advertising and consumer behavior.

4.3.2 Reformulation of the Conceptual Framework

Challenged by an initial increase in the unfavorable attitudes concurrently with increased purchases and by the reversal in the timing of attitude change and purchase change, Clement sought alternative explanations which would fit the parts of the puzzle together and match his data. The most relevant explanation was based on Festinger's theory of cognitive dissonance.⁴⁶ This psychological theory seeks to explain apparent inconsistencies in individuals' behavior. Cognitive dissonance refers to the state of inconsistency or disequilibrium between an individual's beliefs and his behavioral pattern. It may also refer to the inconsistency of an individual's opinions or attitudes. The basic proposition of the theory is that individuals strive to maintain consistency within themselves with respect to their attitudes, beliefs, opinions, and behavior. Therefore, cognitive dissonance becomes a motivating factor and leads to attempts to reduce the dissonance because of the psychological discomfort experienced.

Applying these ideas, Clement argues that the ADA advertising campaign created dissonance among the unfavorable attitude group of milk drinkers from two points of view:⁴⁷

46 Festinger, Leon A Theory of Cognitive Dissonance, Stanford, Calif. Stanford University Press, 1957.

47 Clement, Wendell E. "An Analysis of the Advertising Process and Its Influence on Consumer Behavior," a paper presented to the American Marketing Association, Dec. 27-29, 1967, Washington, D.C., pp. 26, 27. Published in 1967 Winter Conference Proceedings, Series 26.

(1) The advertising messages or themes, extolling the virtues of milk, clashed with their basic belief structure, as reflected by their scale ratings of the attitude questions, and (2) the advertising messages clashed with their behavioral patterns as reflected by their lower levels of consumption. Through both regression and cross tabular analyses, it was determined that consumers with unfavorable attitudes had been consuming less milk than those with favorable attitudes.

"With dissonance having been created, several alternative adjustments were made by the affected consumers to reduce the dissonance and move in the direction of consonance.

"As mentioned above, one alternative is to adjust to dissonance by ignoring, forgetting or avoiding the dissonance arousing information, ... recall of the advertising themes was lowest among consumers with unfavorable attitudes because they ignored, avoided, or forgot the advertising as a means of reducing dissonance. This might also explain why attitudes showed a tendency to become more unfavorable during advertising. Discrediting the advertising was another means of adjusting to the dissonance-arousing information.

"Finally, and most importantly, another alternative adjustment to dissonance, as indicated by the theory, is a change in either behavioral patterns or cognitive structure ... The results observed in this study, however, suggest that behavior change did take place prior to attitude change.

"It is concluded, therefore, that the initial effect of advertising was to bring about a behavioral change. The behavioral change was followed by an attitude change to give meaning to the already achieved behavior. We would further add that if the behavioral change does not provide the experience expected from the product, both behavior and attitudes can revert back to their original positions. This is why experience with the product is an important aspect of attitude information."

After reappraisal of his data in light of the possibilities of a model based on Festinger's ideas, Clement reformulated his conceptual framework for the relationships among advertising, consumer awareness, attitudes, and behavior as indicated in figure 4.1. "According to the reformulation, the first effect of advertising inputs is the same as before with consumers first becoming exposed to and aware of the advertising. Added to the model at this stage are existing attitudes. It is included as an exogenous variable influencing the extent of awareness. This follows from the findings that consumers with favorable attitudes toward milk were more likely to observe the advertising than those with unfavorable attitudes notwithstanding the fact that the former did not increase their purchases.

"Another change in the model is that awareness is now shown as creating dissonance rather than directly influencing attitudes. The amount of dissonance created is a function of the advertising and of existing attitudes. The model shows that dissonance might have three separate effects: (1) There could be feedback having a depressing effect on awareness, (2) dissonance could depress existing attitudes, and (3) it could induce behavioral changes. It may be recalled that all three of these effects were observed in this study.

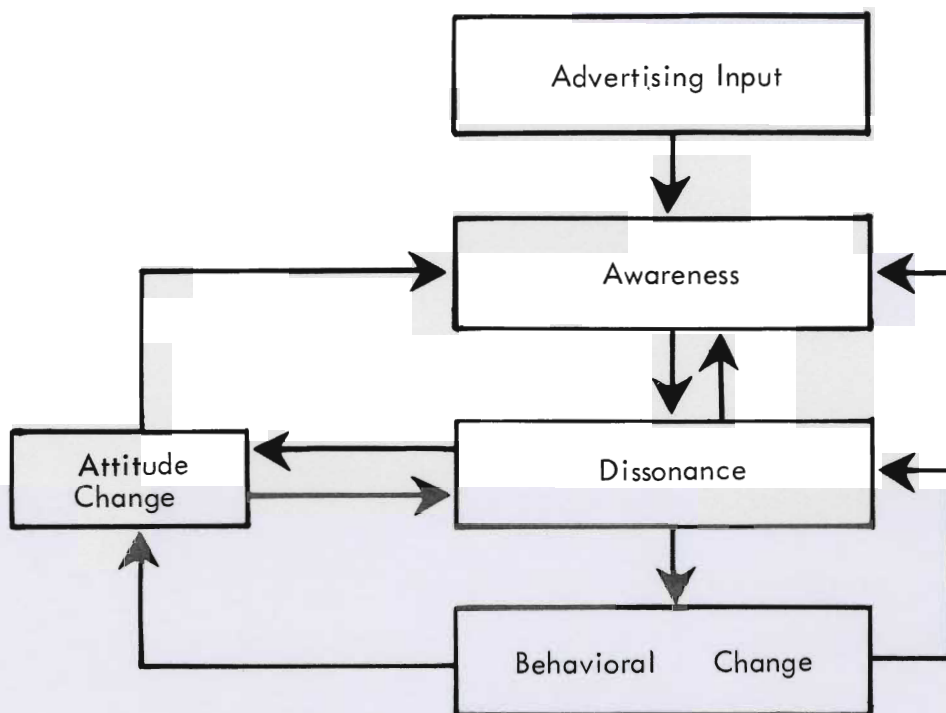


Figure 4.1. Model of the advertising system for a selected class of products and advertising situations from Wendell E. Clement, "An Analysis of the Advertising Process and its Influence on Consumer Behavior," *Ibid.*

"The effect at the behavioral level flows in two directions. If product experience yields satisfaction, attitudes become more favorable. Furthermore, there will be feedback into the system indicating that the consumer will notice the advertising more readily, experience less dissonance, and become a repeat purchaser.

"A second effect at the behavioral stage is that there will be feedback on attitudes. This feedback can have a positive or negative effect depending upon the consumers' experience with the product."⁴⁸

Clement is very cautious in interpreting his findings. He suggests that they are most pertinent to a product like milk on which they are based. He recommends a number of hypotheses for further investigation. The first of these hypotheses is that the less obvious the benefit to be gained from the consumption of a product, the more likely a behavioral change will precede an attitude change, and conversely.

A second hypothesis is that the less important price and income are in the purchase decisions, the more likely a behavioral change will precede the change in attitudes. The converse is also hypothesized. The third hypothesis follows from the second, the more frequently a consumer purchases an item, the more likely it is that behavioral change will precede the change in attitude. Frequent purchases permit easy correction of errors in judgment and occasion less careful thinking for each purchase decision.

To sum up, Clement has illuminated important features of the relationships of consumer attitudes to explanation of variations in the consumption of fluid milk and to advertising campaigns.

4.4 Consumer Attitudes toward Other Dairy Products

Much less research information is available about consumer attitudes toward dairy products other than fluid whole milk. The USDA's market researchers have explored market potential for low fat milk and have done some work on consumer attitudes. The ADA has had some pilot studies done for several products including instant nonfat dried milk, but the data are not available at this time. James H. Clarke of West Virginia University made a survey of the effects of advertising on hot cocoa consumption with somewhat unsatisfactory results, reported here, together with USDA findings.

4.4.1 Low Fat Milk

A sample survey of household consumption of low fat and other milk products was made during June and July 1963 in Milwaukee, Wisconsin and

48 Ibid., pp. 28, 29.

New Orleans, Louisiana.⁴⁹ The survey indicated that higher incomes and higher educational levels are related to greater use of low fat milk. Among nonusers of the 2 percent milk, 61 percent of the respondents in Milwaukee and 29 percent in New Orleans knew the product was available. References to health factors were prominent in responses to questions about why they tried and used low fat milk. The effects of New Orleans seller and mass media emphasis on the novelty of the recently introduced product caused a substantial share of the respondents there to note this element as a factor in their trying the product. Low fat milk was regarded as a substitute for other milks by about half of the respondents in both cities.

4.4.2 Advertising and Hot Cocoa Consumption

Clarke's study was designed to evaluate the effects of advertising campaigns which promoted the adult use of hot cocoa as a breakfast drink.⁵⁰ Effects were appraised in terms of the awareness of advertising themes, changes in consumer attitudes, opinions regarding hot cocoa, and the manner of preparing the product. The study included surveys in a test city in which special advertising efforts were made and in a controlled city without the special advertising. Waves of personal interviews preceded and followed the advertising campaign in both cities. At the end of the intensive phase of advertising, telephone interviews were used.

Clarke's initial model incorporated the hypotheses that the advertising campaign would create consumer awareness of the themes, increased consumer awareness would lead to increased use of hot cocoa, consumer use of hot cocoa would also be affected by socioeconomic factors, and that consumer behavior would be affected by the awareness of advertising, attitudes concerning competing products, and their use.

Although the intensive advertising campaign resulted in increased recognition of advertising themes, the effect was short-lived. The small proportion of respondents who could identify themes raised doubts regarding the effectiveness of advertising in changing attitudes and behavior regarding a relatively minor product like hot cocoa. Attitudes and beliefs about hot cocoa as a breakfast beverage for adults were changed only slightly by the advertising campaign, some favorably and some unfavorably. There was significant evidence that the intensive advertising campaign could increase the consumption of hot cocoa, but the percentage declined after the end of the campaign. Clarke rejected the hypothesis, on the basis of his data that the type of advertising campaign used, including its low intensity phase, would increase the use of hot cocoa.

49 Moede, Herbert H. and Burnside, Betty, Market Potential for Low-Fat Milk, U.S. Department of Agriculture, Economic Research Service and Statistical Reporting Service, Marketing Research Report No. 709, May 1965.

50 Clarke, James Harris. Effect of an Advertising Campaign on Hot Cocoa Consumption, Ph.D. thesis, Univ. of Minn., Mar. 1969.

Findings of the study led Clarke to question the sequence of events assumed by his initial model even though intensive advertising did appear to follow the sequence of the model and did result in increased revenue for farmers who sponsored the advertising campaign. Clarke concluded, "Because of the costs of this campaign, the low incidence of hot cocoa consumption, of the limited increase in the frequency of drinking hot cocoa, of the campaign's small effect on milk sales, and of the limited and diverging effect of the advertising on the consumers' image of hot cocoa, it appears that the dairy farmers would be well advised to seek alternative uses of their advertising and promotion resources. . . . 51

"To determine advertising's effect on the demand for milk, selection of a product which utilized a greater proportion of the supply than does hot cocoa would give greater promise of measurable results, with reduced research costs, since sample size could be reduced substantially. A somewhat longer period of intensive advertising than was used in this campaign would be helpful in determining whether increased consumption can be maintained or increased beyond the levels established in this study."⁵²

4.5 Summary

Consumer attitudes are learned ways of organizing information received and of responding to it. There appear to be four dimensions in the structure of an individual's attitudes--the cognitive; the frame of reference as set by values and norms; an individual's reaction to his evaluation of a particular situation, product, or person; and the "affect" dimension which reflects an individual's intensity of feeling and involvement.

Bayton has identified seven categories of ideas which affect food choices--nutritional, economic, sensory-aesthetic, personableness, appropriateness, convenience, and health apprehension. These operate at levels of general orientation toward food, of reaction to particular foods, and in evaluation of the positive and negative attributes of particular foods. The ADA has funded and directed research on the values, goals, attitudes, and knowledge of consumers related to different rates of milk consumption. The research findings have been used in formulating advertising and other sales promotion campaigns.

A comprehensive test of promotion effectiveness was made in 1963-65 by USDA and ADA. The impacts of three levels of promotional expenditures in six markets were evaluated during 6 months of special promotion and the following 6 months. Considering returns only in this 1-year period, the medium level provided higher net returns to dairy farmers. Concurrent surveys of awareness of the promotion program, attitudes toward milk consumption, and of actual milk drinking behavior indicated that increased milk sales in the test markets apparently resulted from a higher proportion

51 Ibid., p. 231.

52 Ibid., p. 232.

of milk drinking on an average day by the population over age 14. Increased advertising apparently affected the frequency of consumption by irregular, light milk drinkers.

Clement, USDA economist, used these ADA data to test several hypotheses implicit in the generally accepted explanation of how advertising affects consumption. Attitudinal change appeared to follow the change in purchase behavior of consumers. This finding led him to revamp his hypotheses in terms of ideas regarding the role of the advertising campaign in creating dissonance for milk drinkers with unfavorable attitudes toward milk. The difference between such attitudes and the advertising messages regarding the virtues of milk apparently make people uncomfortable. To reduce this difference, they can ignore the messages or change their behavior by drinking more milk, then change their attitudes on the basis of this experience, if favorable.

Clarke's study of the impact of advertising on hot cocoa consumption for breakfast by adults raised doubts regarding the effectiveness of advertising in changing attitudes and behavior related to a fairly minor product. He concluded that intensive advertising did result in increased revenue for farmers for a brief time. Changes in attitudes and beliefs were favorable to increasing consumption in some instances and unfavorable in others. But, as in Clement's research, the statistical results raised serious questions regarding the hypotheses that advertising affects behavior through a sequence of effect on awareness, attitude change, and then behavioral change. Clarke's study preceded the ADA-USDA tests and its design did not permit definitive testing of these hypotheses.

Chapter 5 PROSPECTS FOR U.S. CONSUMPTION OF DAIRY PRODUCTS

This chapter builds on the analyses in the preceding chapters to develop indications of possible consumption of dairy products in the year 1980. It also incorporates information on trends in the factors related to historical changes and variations in the consumption of dairy products among population groups. In so far as possible, the assumptions that are being made are specified in order that the reader may alter the projections according to his acceptance or nonacceptance of the assumptions.

5.1 Important Factors in Historical Changes

The most important feature in the changing consumption rates for dairy products over the last 25 years was the reduction in the rates of consumption for several major products from 1955 to 1965 at most levels of income. The declines were particularly important for all dairy products combined, fluid milk, cream, and butter. The major exceptions were the increases in cheese consumption, and low-fat frozen desserts and in the rate of farm purchases of dairy products (excluding butter).

The shift in urbanization from farm to nonfarm had a slightly negative effect on the consumption of dairy products including home-produced supplies, but it had a very significant positive effect on purchases of dairy products. U.S. household purchases of dairy products (excluding butter) per person increased about 40 percent from 1942 to 1955, but declined between 1955 and 1965. The South and West grew in importance as markets for dairy products.

Consumption of fluid whole milk has declined significantly on a per person basis since 1955. This reflects the substantial change in consumption rates in each urbanization category at most levels of real income. The positive effect of increased income on the U.S. average consumption per person at home was partly offset by the negative effect of the off-farm movement. A small part of the decrease in consumption can be traced to increased prices, but much of it was related to changes in age composition, the increasing proportion nonwhite population, and the shift to low fat milks. The lower purchases of fluid milk by the urban population were partly offset by increased farm purchases. Subsidized school milk consumption accounted for 3 percent of the total civilian consumption of fluid milks in 1968.

The decrease in the consumption of fluid cream has been generally ascribed to the off-farm movement and to the increased avoidance of high-fat foods. The consumption of low fat and skim milks declined significantly from the late 1930's to the late 1950's as the use of farm-separated skim milk and farm-churned buttermilk decreased. Since the late 1950's there has been a significant increase in consumer demand for commercially supplied low-fat and skim milk products, apparently reflecting dietary concerns. Analysis of postwar consumption patterns for these milks indicates a very high income elasticity and a strong negative relationship to a higher proportion of young children. Concurrently, price and dietary factors have encouraged the beverage use of instant dry nonfat milk.

Consumption of evaporated milk is now less than half the average rate in the period 1947-49. Decreased use by low income families and particularly by rural nonfarm families has been the significant factor in the decline, but changes in infant feeding practices have also had an effect. As the quality and availability of fluid whole milk have improved, there has been less reliance on evaporated milk for infant feeding.

Average consumption of all cheese per person in housekeeping households doubled from spring 1942 to spring 1965. The increase was in both cottage cheese and whole and part-whole milk cheeses. About two-thirds of the increase came from higher rates at each income level, but increased income and the urbanization shift also had favorable effects on the rate of cheese consumption. Our historical analysis indicates that the higher percentage nonwhite and the higher percentage of adults contributed to the rise in consumption rates.

Increases in the consumption of frozen milk desserts have been most significant in the cases of the low dairy fat forms such as ice milk and sherbet, as measured in product weight. The historical analysis revealed a strong positive relationship of the consumption of frozen milk desserts to the percentage of nonwhite population. Cross section survey data indicate increased consumption by rural households, probably related to freezer availability. Consumption varied slightly more with income in 1965 than in 1955.

The decrease in the rate of per person butter consumption in housekeeping households amounted to 65 percent from spring 1942 to spring 1965. The decline was divided about evenly between the periods 1942 to 1955 and 1955 to 1965. The positive effect of increased incomes amounted to only about a sixth of the negative effect of lower consumption rates at each level of income. Part of the decline in butter represented a shift to margarine, but part represented a net decrease in the consumption of table fats along with less bread. Because of major shifts in consumer tastes and preferences, statistical analyses of changes in butter consumption are really quite unsatisfactory. There is some evidence of small positive effects of income and of a higher proportion of adults, but butter consumption by upper income urban families decreased significantly from 1955 to 1965.

In sum, the evidence indicates substantial changes in consumer tastes and preferences for dairy products quite generally among rich and poor, urban and rural families over the last 25 years.

5.2 Prospective Changes in Key Socioeconomic Factors to 1980

What indications do we find of changes in major socioeconomic factors likely between now and 1980? Such indications, of course, cannot be at all definitive, but they can help build an understanding of prospective changes in the consumption of dairy products and of the possibilities for altering the prospective trends.

5.2.1 Urbanization

Shifts in urbanization have played a varying role in the consumption changes for dairy products in the past. Unofficial estimates from knowledgeable researchers indicate that the number of farm families in 1980 may be between 1-1/2 and 2 million. If so, about 3 or 4 percent of the U.S. population would be living on farms in 1980 compared with 7 percent in 1965. With increased urbanization and total population, it appears that the downward trend in population proportion in rural nonfarm areas is likely to continue. In 1955, 29 percent of the population was classified as rural nonfarm, in 1965, 24 percent. Reasonable guesstimates for 1980 appear to be 17 to 19 percent. These two estimates would leave a balance of 77 or 80 percent of the population in urban areas in 1980 compared with 69 percent in 1965.

5.2.2 Population Total and Composition

The Bureau of the Census prepares alternative projections of the total population and its age make-up for the years ahead. Series B, C, and D vary depending on the assumptions made with regard to the birth rate. Series B is based on a moderate increase in the birth rate and yields a 1980 total of 243.3 million people, 21 percent above the 1968 figure. Series C continues the current birth rate and yields a total population of 235.2, 17 percent higher than in 1968. Series D assumes a continued decline in the birth rate and projects the total for 1980 of 227.7 million people in the United States, which would be 13 percent higher than in 1968.⁵³

The age composition is materially affected by the assumption regarding the birth rate. The proportion of the population under age 15 is projected by the Census Bureau at 29.9 percent for Series B, 27.5 percent for C, and 25.1 percent for D. These variations are highly significant for projections of the consumption of dairy products, but it is obvious that the dairy industry cannot influence the outcome. Likewise, the fertility rates influence the percentages of nonwhites in the total population. For this factor, the Bureau of the Census estimates for 1980 are 13.4 percent for Series B, 13.2 percent for C, and 13.0 for D.⁵⁴

5.2.3 Income

Income is a significant factor in changes in the consumption of some dairy products.

Based on the current economic framework being used by economists in the Federal Government for demand projections and an estimate of 4 percent unemployed, real disposable income per capita would be 44 percent higher

53 1968 Statistical Abstract, table 7.

54 1968 Statistical Abstract, table 5.

in 1980 than in 1966. If unemployment were to run 6 percent, the increase from 1966 would be about 40 percent.⁵⁵

The 1980 average income figure based on an assumed 4 percent unemployment represented an increase of 58 percent from 1964. This rate of change was utilized in deriving income-size distributions for 1980 from the 1964 income distribution of the sample in the 1965-66 Household Food Consumption Survey. The estimates were derived by shifting the cumulative frequency curves of family members in the three urbanization categories and then by a series of adjustments.⁵⁶ Assuming that some kind of minimum income would be established for practically all of the population by 1980, a minimum of \$2,000 per family was used in projections for the non-farm population and \$1,000 for the farm population. Because of the higher social security payments that will be available to retired people and to dependents from the Social Security program, a significant proportion of the lower income family members was shifted up the income scale. Smaller family sizes than indicated by 1965 data also necessitated an upward adjustment for the per person income distribution.

5.2.4 Price Ratios⁵⁷

Two sets of price ratios were used in developing the projections for 1980 based on the regression statistics reported in table 1.3. For one set the price ratios computed for 1968 were used. The alternative set varied from item to item. For the two fluid milk analyses the ratio of the fluid milk price (delivered) to the retail food price index was raised from the 1968 figure of .52 to .60, assuming a continuation of the recent increase in fluid milk prices to reflect higher production and distribution costs. On the assumption that costs of cheese would continue to rise in relation to the costs of other foods, .50 was selected as an alternative price ratio to the 1968 ratio of .38. To allow for greater substitution of less expensive fats in frozen milk desserts and changes in the quality mix for this food group, .75 was used as an alternative price ratio. This was slightly above the .70 experienced for 1968.

The ratio of butter prices to margarine prices in 1968 was 3.0. To measure the potential effect of dropping price supports on the price ratio of butter to margarine, a ratio of 2.0 was selected as an alternative. (This was the ratio experienced in 1947.) Then on the assumptions that the ratio of margarine to the retail food price index would not change from 1968 and

55 For discussion of income projections, see Madden, J. Patrick "Poverty by Color and Residence-Projections to 1975 and 1980," American Journal of Agricultural Economics 50: 5: 1399-1412, Dec. 1968.

56 The procedure for shifting the curve is described in section 4.1.4 of Burk, Marguerite C. Measures and Procedures for Analysis of U.S. Food Consumption, USDA Agr. Handbook 206, 1961.

57 J. W. Hammond, associate professor, Agricultural Economics, Univ. of Minn., assisted in developing these projections of price ratios.

using the 2.0 for butter-margarine ratio, the butter-retail food price ratio of .47 was calculated. This can be compared with the actual .72 ratio in 1968. A per capita rate of 10 pounds of margarine was used in developing the projections for butter.

5.2.5 Attitude Changes

Discussion with James A. Bayton of his research findings over a number of years dealing with consumer attitudes toward dairy products led to two conclusions: such attitudes apparently change very slowly, and there is little likelihood of any major shift between now and 1980, providing the dairy industry continues its efforts to maintain consumer awareness of the desirable characteristics of major dairy products. Despite the usual lethargy of consumer attitudes, unexpected attitudinal changes might occur as a result of new research findings regarding nutrition or introduction of competing foods.⁵⁸ Therefore, intermittent monitoring of attitudes appears highly desirable. In addition, there is much need for scientific research on factors related to changes in consumer attitudes and on how dairy products may be changed to match a change in consumer demand for particular attributes for foods.

5.2.6 Special Public Programs

Because the Special School Milk and National School Lunch Programs accounted for about 3-1/2 billion pounds of fluid milk in 1968, it seemed desirable to explore the possibilities of expansion of these programs by 1980. If the birth rate continues to decline, as projected in Series D, there would be 10 percent fewer children in the 6-15 year age group in 1980 than in 1965. If these subsidy programs were expanded, it might be possible to increase poor children's consumption of milk so that the total would rise 25 percent and amount to 4-1/2 billion pounds of milk in 1980.

Recent research findings on the significance of adequate supplies of protein for small children led to consideration of the development of a special milk program for the 3-5-year-old group. This might operate either in connection with expanded Head-Start programs or with coupons to subsidize milk consumption of children in low income families. About 12 million children will be in the 3-5-year-age group in 1980, assuming the significant decline in the birth rate. If 25 percent of these children were covered under the subsidy program and were provided roughly 300 pounds of fluid milk per child, one billion pounds might be used for this special milk program.

Extensions of the Food Stamp Program might be expected to affect the rate of milk consumption by young children in the homes of very low income families. But the total increase would not be likely to exceed a billion pounds of milk.

⁵⁸ The slowness of the decline in cigarette consumption in response to adverse scientific findings provides an example of the low rate of response of consumer attitudes to changes in information.

Adding the three increases together, it is obvious that even with considerable subsidy it is unlikely that the expansion in children's milk consumption in 1980 would surpass the 1968 figure by more than an additional 3 billion pounds. However, this amount is critical for prices to milk producers and is one area in which the dairy industry can influence the demand for its product, via the public decision-making process.

5.2.7 Technological Changes in Dairy Products

It is not known how technology will change in the dairy industry. In the case of filled milk, it appears the changes will not come rapidly because of legal and pricing restrictions. For comparison of rates of changes in consumption as these restrictions are removed, consider the fact that the margarine share of table fats increased roughly 2 percent a year from 1939 to 1969, even with great price advantages. In contrast, the price disincentive for filled milk production can be somewhat controlled under the milk marketing orders and appears likely to slow up the expansion in sales of filled milk.⁵⁹

Several new dairy products in the developmental stage might attract consumer interest and add to the total consumer demand for dairy products by 1980. Historically, most of the research and development activities of dairy product laboratories have been related to products with higher butterfat content. The University of Minnesota's Food Science and Industries Department has been engaged in developmental work on low fat cheeses for a number of years. A low fat cheese developed by the Eastern Utilization Research and Development Division of the USDA attracted considerable consumer acceptance in a preliminary market test in Washington, D.C. because it was low fat. This product appears to have good market potential and is of interest to processors because of its short time requirements for manufacturing and ripening.

USDA's vacuum-dried and spray-dried whole milk powders also show promise. Both forms have high quality attributes for beverage consumption and cost significantly less to produce and market than the going retail store price of fluid whole milk. As yet, the market testing of these products has been quite limited.

A recent report by the McKinsey Company to the ADA emphasizes the need for a greatly expanded research and development program for dairy products.⁶⁰ The current relatively small research effort is generally aimed at product modification and process improvement rather than at developing new products which will provide new uses for milk.

59 Hammond, J. W., S.. T. Coulter, R. Sirny. Nutritional, Technical, and Economic Aspects of Milk Substitutes. Minnesota Agricultural Experiment Station. Station Bulletin 496, University of Minnesota, 1969.

60 "The McKinsey Report," Dairy Promotion Topics, Winter 1969, ADA, pp. 4, 5.

Although considerable progress may be made within the next decade toward expanding the consumer use of new products now in the laboratory or yet to be developed, it is unlikely that their consumption can grow rapidly enough to utilize a substantial amount of milk output until after 1980. 61

5.3 Alternative Sets of Projections

Projections of the consumption of dairy products in 1980 have been made using the regression equations reported in table 1.3 for consumption of dairy products from all sources for the 1947-67 period, and the data on consumption by households at different income levels in the three urbanization categories.

5.3.1 Projections Based on Regression Analyses

Estimates for the independent factors described in the preceding section were plugged into the regression equations reported in table 1.3. A considerable range of projected consumption rates resulted. The effects of alternative estimates for each independent factor on the projected rate of per capita consumption are indicated by data in table 5.1. For example, use of the higher estimate of per capita income results in a 2 pound higher projected rate for the consumption of fluid milk than that derived with per capita income based on an expectation of 6 percent unemployment rate. Much more significant for fluid milk consumption is the assumption regarding changes in the birth rate between now and 1980. If it increases moderately (series B), fluid milk consumption might be 35 pounds higher than if the decline in the birth rate continues, as in series D, which was selected by the author. Because much of the higher birth rate would be in the nonwhite population, the increase in this sector would be likely to offset half of the effect of the higher proportion of children on fluid milk consumption per capita. The significance of further price increases for fluid milk to consumer demand is indicated by the 12-pound difference between the 138 pounds projected on this assumption and the 150-pound projection based on the 1968 price situation. (Since the higher price was selected for the projection, the sign for the 12-pound adjustment shown in table 5.1 is negative.)

Before reviewing the projected data on cheese consumption in table 5.1, recall the fact that this projection process rests directly on the statistical adequacy of the regression results summarized in table 1.3. For cheese, the coefficients for income and own price were statistically nonsignificant and that for income had a negative sign rather than the positive sign expected from research on cross section variations in cheese consumption among households grouped by income. In cheese, the statistical relationships indicate that a greater increase in the nonwhite population would raise consumption whereas a higher proportion of young people in the population would be expected to lower consumption.

61 The author wishes to acknowledge the advice of Philip Dwoskin, USDA, Economic Research Service, in the preparation of this section.

Table 5.1. Alternative projections for per capita consumption of major dairy products in 1980, in pounds, using regression models¹

Commodity from all sources	Actual consumption in		1980 projection based on selected alternatives ³	Difference in 1980 estimates calculated by subtracting projection based on the lowest value for variable from that for the highest					Other factor varied	
	1965 ²	1968 ²		Per capita income	Percent of population		Non-white	Own price	Identification	Difference
					On farms	Under 15 years				
Fluid milk and cream	301	281	175	2	4	35	-14	-12	.....	.....
Fluid whole milk	269	249	138	2	3	35	-14	-12	....	....
Cheese, part or all whole milk	9.5	10.6	16.0	-.2 ⁴	-.4	-2.9	1.5	-.6 ⁴	....	....
Frozen milk desserts (product weight)	28.1	28.7	44.5	.4 ⁴	.5 ⁴	3.3 ⁴	6.5	+1.1 ⁴	....	....
Butter	6.4	5.6	5.1 ⁵	-.1	....⁶	....	....	-.9	....	-.6
Total U.S., civilian and military, use of milk, fat content basis, billion pounds	121.5	116.1	115	....	....	....	....	....	.....	.....

- 1 Using regression models reported in table 1.3 for 1947-67 and alternative projections of values for socioeconomic factors discussed in section 5.2.
- 2 Data from USDA - Economic Research Service.
- 3 Projection based on following projections of socioeconomic factors: income assuming 4 percent unemployment, 3 percent of population on farms, Census series D for population which assumes continued decline in birth rate, higher own price assumption except where noted.
- 4 Regression coefficient not statistically significant so difference is unreliable. See table 1.3.
- 5 Using butter-margarine price ratio of 2.0 and assumption of substantial lowering of butter price without price support.
- 6 Less than .1, but not statistically significant.

Several of the independent variables used in the regression equation for frozen milk desserts had nonsignificant coefficients, as footnoted in table 5.1. For these products the relationship with income is positive as expected, but a negative relationship to own price is expected from demand theory. The relationships of butter consumption to two price factors are in the "right" direction and statistically significant so the higher consumption rate projected on the assumption that butter prices might go down to a 2:1 ratio with margarine has statistical support.

For expository purposes, the author selected the following combination of estimates for socioeconomic factors: the higher level of per capita income; three percent of the population on farms; population series D with the continued decline in the birth rate; and increased prices for fluid milk, cheese, and frozen milk desserts, but a substantially reduced price for butter. Use of these estimates resulted in the projected consumption rates shown in the third column of table 5.1. They included a 38 percent decline in the consumption per capita of fluid milk and cream (from all sources) and a 45 percent decrease in fluid whole milk consumption from the 1968 rates. In contrast, the projected per capita consumption rates for cheese and frozen desserts are half again as large as in 1968. Under the assumption of the substantially lower price for butter, its consumption might drop no more than 10 percent from the 1968 rate.

Readers of this bulletin may not agree with the author regarding likely changes in these socioeconomic factors. The effect of incorporating an alternative estimate can be calculated readily from the data in table 5.1. For example, if the reader believes that the butter price will continue at the 1968 ratio of three times the price of margarine, subtract 1.5 pounds (.9 + .6) from the 5.1 pound consumption estimate and conclude that that alternative would yield an average consumption rate of 3.6 pounds. (The author considers this estimate to be more likely.)

Before reaching any conclusions regarding expected rates of consumption for dairy products in 1980, consider the results of an alternative approach to developing projections.

5.3.2 Projections Based on Cross Section Data

The second procedure for developing projections of possible consumption of dairy products in 1980 utilized data from the 1965-66 Household Food Consumption Survey by USDA. These projections apply only to at-home consumption. Engel curves which depict graphically the relationship between average consumption and income per person for each income group were developed from the spring 1955 and the spring 1965 Household Food Consumption Surveys. Assuming that the Engel curves might be expected to adjust downward from 1965 to 1980 to somewhat lesser degree than the shift from 1955 to 1965, estimates were derived graphically for the rates of consumption for each income group within each urbanization category. (The conservative view of further declines in consumption materially affected the resulting projections.)

The income size distributions and the urbanization distributions described in the earlier section of this chapter were used in combining the rates of consumption, first for each income level within each urbanization category, and then across urbanization categories.

The following changes from the 1965 rates of consumption were indicated. Declines of about 15 percent were indicated for the money value of all dairy products consumed per person per week from all sources and for milk fat including butter. The decrease in the per person rate of consumption of milk solids not fat might amount to 8 to 10 percent. The consumption of fluid whole milk per person might decline about 20 percent. In contrast, per person consumption of other fluid milks might very well increase as much as two-thirds. If so, the total for all fluid milks would average only 12 percent lower. Average consumption of condensed and evaporated milks might be expected to decline 40 percent between 1965 and 1980. The decline for butter might amount to 30 percent based on these changes in the Engel curves, in income, and in urbanization. Consumption of part and whole milk cheese per person apparently might increase about 20 percent. Use of the same procedure to project consumption of margarine per person led to a figure about a tenth below the average from the spring 1965 survey.

5.4 Discussion of the Projections

Before comparing the results of the two alternative approaches to the projected consumption of dairy products per capita in 1980, remember the regression approach considers consumption from all sources and in all places, at home, in commercial eating places, and in schools. The cross section data pertain only to at-home consumption, and a conservative assumption regarding further declines in the consumption of dairy products underlies this set of projections. Although the analyses of consumption rates for dairy products by upper income families provided no indication of a reversal in consumption trends, the author chose a conservative strategy to identify reasonable ranges for projected rates.

5.4.1 Fluid Whole Milk and Cream

The regression projection takes specific account of changes in age composition and of prices. In contrast, the use of the cross section data does not take these explicitly into account. If adjustments are made in the 138-pound figure for fluid whole milk for the higher proportion of children, for the nonwhite population, and for use of the same price ratio as in 1968, the total comes to about 170 pounds. To that should be added another adjustment, perhaps 10 pounds for the change in price ratio from 1965 to 1968. The resulting figure of about 180 pounds is roughly 30 percent below the 1968 figure, to be compared with the 15 percent decline projected from cross section data. This calculation tells us that regression analysis projects a continuation of the drop in the Engel curve observed from 1955 to 1965 at a substantially faster rate than was used in developing the cross section projections. The author is led to conclude that consumption of fluid whole milk per capita may run around 140 pounds in 1980 unless additional programs

are instituted to encourage consumption. A substantial increase in low-fat fluid milks will offset part of the impact of the reduction in fluid whole milk on the nutritional situation, but this will be less favorable to consumer demand for butterfat. If total fluid milk and cream consumption per capita, measured in whole milk equivalents, falls to 175 pounds, as indicated by the selected combination of factors used for column 3 of table 5. 1, and the decline in the birth rate continues, U.S. consumption in 1980 would total about 40 billion pounds of fluid milk. Add to this the three billion pound increase which could result from further subsidy for milk consumption by poor children. (See section 5.2.6.)

5.4.2 Manufactured Products

No regression analysis was made of historical trends in the consumption of condensed and evaporated milks, but the cross section analysis indicates further substantial decreases by 1980, probably dropping the total use of milk for these products to around two billion pounds.

For cheese the outlook is entirely different. The projections based on statistical analyses of changes in the 1947-67 period indicate the possibility of a 50 percent increase, substantially higher than the 20 percent increase developed from cross section data by taking into account the projected changes in urbanization and income and an arbitrary further rise in the relationships of consumption rates to real income. The statistical nonsignificance of income and price factors in the regression analysis and some question regarding the changes in the quality of cheeses being supplied (which are without current documentation) cause the author to consider the 16-pound projection for 1980 to be overly optimistic. A 14-pound average looks more realistic. With a 14-pound per capita rate and 227.7 million people, aggregate consumption would reach 3.2 billion pounds of cheese. Allowing for some lowering of the fat content, 22.5 billion pounds of milk would be used to produce the cheese.

A large proportion of frozen milk desserts is consumed away from home so the regression analysis is more reliable than a cross section analysis. The possibility of a 50 percent increase in per capita consumption from 1968 to 1980 as indicated in table 5.1, using the selected set of projection factors may be compared with the 28 percent increase in per person consumption at home from spring 1955 to spring 1965, according to USDA surveys of at-home consumption. Again, technical inadequacies of the regression analyses cause the author to conclude that the projected per capita rate is exaggerated and that a 35-pound average would be more likely for 1980. Such an average consumption rate by 227.7 million people yields an aggregate for the United States of 8 billion pounds of frozen milk desserts. On the assumption of lower butterfat content (e.g., a conversion factor of 2.0), about 16 billion pounds of milk would be required to meet this level of domestic consumption.

The cross section analysis yielded a 30 percent reduction in butter per capita. If the relationship of the butter price to margarine price and to all food prices were kept at the 1968 level, the projection based on the regression comes to the same conclusion. Aggregate consumption of 820 million pounds of butter would require about 18 billion pounds of milk.

5.4.3 Total Milk

If one adds (a) the 43 billion pound total for fluid milk and cream, (b) the 22.5 billion pounds for cheese, (c) 16 billion pounds for frozen desserts, (d) 18 billion for butter, (e) 1.5 billion pounds to the 1968 figure of a billion pounds used for miscellaneous manufactured products to allow for new products, and (f) 2 billion for condensed and evaporated milk, the total comes to 104 billion pounds. A total of 104 billion pounds represents a drop of 12 billion pounds (10 percent) from the 1968 aggregate for civilian and military consumption. Use of unadjusted projection data given in table 5.1 yields an aggregate about equal to the 1968 total for milk, but this appears to the author to be a highly optimistic total. On the other hand, an increase in the birthrate assumed in Census Series B and a 1980 total population of 243 million people would offset the decreases in per capita consumption indicated by other factors. Under this premise, consumption in 1980 might approximate the 1968 total. But this is overly optimistic for the dairy industry.

5.5 Implications of Projected Changes in Consumption

The 1980 projections of the consumption of dairy products cannot be taken as absolute forecasts, but they do provide useful indications of the consumer demand situation within which the dairy industry can identify its problems and formulate policies and programs for the next decade.

5.5.1 Shifts in Milk Use

The projected 1980 consumption rates indicate the strong likelihood of a 5 to 10 percent decline in aggregate domestic use of milk and substantial shifts in relative importance of end uses. According to USDA data on utilization of the 113 billion pounds of milk sold by farmers in 1968, 53.7 billion pounds or 48 percent were sold in fresh fluid forms.⁶² Assuming the 175 pound per capita rate given in table 5.1 and that programs to increase children's milk consumption are in effect and use an extra 3 billion pounds of milk, aggregate consumption of fluid milks and cream (civilian and military) would total 43 billion pounds whole milk equivalent. Total fluid sales would be only 41 percent of the projected 1980 total use of 104 billion pounds, and the fluid milk market would bear most of the reduction in U.S. consumption of milk in all forms of dairy products. If the birthrate were to increase as projected in Census Series B, the fluid milk share would run even higher, around 45 percent.

Use of milk in manufactured products would rise from 52 percent in 1968 to 59 percent of total milk equivalent based on fat content, under the author's "most likely" set of projections. The following changes in shares are implicit in this set of projections: butter from 22 percent in 1968 to 17 percent; cheese from 16 to 22 percent; frozen desserts from 10 percent to 15 percent. (It is obvious that comparable data on a nonfat content basis are needed for industry decision making, but the author lacks the detailed information required for such an analysis.)

⁶² Mathis, Anthony G. "Outlook for Dairy," a paper given at Annual Agricultural Outlook Conference, USDA, Feb. 19, 1969, table 3.

5.5.2 Factors Subject to Industry Influence

Review of the key socioeconomic factors used in developing these 1980 projections, set forth in section 5.2, reveals factors which the dairy industry can and cannot influence. For example, this industry could not expect to have any major effect on average income of the U.S. population, on the birth rate, or on population size, and composition. Obviously, the industry does influence consumption through market supply decisions. Through price policies of individual firms, marketing agreements, and participation in public policy and program formulation, dairy producers and processors have an effect on prices consumers pay. If there is an impressive research and development program, technological changes in existing products and new products might attract consumer demand. But the effects of such efforts will come slowly.

As indicated in section 5.2.5 the author and consultant, Bayton consider continued support of consumer education and promotion efforts necessary for the maintenance of consumer awareness of the favorable attributes of dairy products. Without such efforts, even the projected rate of fluid milk consumption, for example, probably could not be achieved. Milk may appear to be a sacred food to dairy producers, but it is only one among many foods for consumers.

5.5.3 Problems Ahead

These shifts in milk utilization will magnify current marketing problems and intra-industry friction. The author can only identify a few points which merit elaboration by dairy marketing specialists. The decline in consumer demand for fluid milk and cream, indicated at 54 billion to 43 billion pounds on the fat content basis, would amount to about 2 percent a year. Only in 1946 to 1948 did the industry ever experience such a change and at that time milk prices were rising rapidly. One possibility for coping with the decline in fluid demand would be to go all-out in encouraging the development and marketing of new forms of whole and low-fat milk for beverage use.

The fluid demand problem is even more serious than the overall milk equivalent figures indicate. As noted earlier, consumer demand for low fat and nonfat fluid milk is increasing while the decline in consumption of whole milk and fluid cream is continuing. These contrary trends will raise pressures to change the pricing structure in milk markets.

The dairy industry is now discussing needs for and alternative ways of expanding research and development efforts. The McKinsey Report has identified the great need for product development. It noted the expectation of increased competition from synthesized products designed to provide the attributes consumers want. The critical importance of changes in consumer attitudes to this industry makes this researcher curious as to why leaders in the industry have not sponsored research to develop scientific knowledge of how food attitudes can be changed. To paraphrase an old cliché, everybody talks about changing attitudes, but nobody does anything about it.

5.5.4 Two Critical Issues

The findings of this research and the implications of the projected changes in consumption raise two critical issues for dairy industry decision making. First, the industry must face up to the "marketing revolution." Instead of viewing their output as a sacrosanct product which the American public ought to consume in the quantities and forms the producers want to supply, all sectors of the industry must learn to live with the fact that American food industries must research consumer wants for product attributes and tailor their output to demand. The large flour millers recognized this change more than 10 years ago and more recently the meat packers have decided that they are in the food business, not the meat business.⁶³

Spread of the marketing revolution in the dairy industry will raise the vertical integration problem as large firms systematize their operations and are forced to specify their input supplies.

Second, the shifts in milk use, the marketing revolution, and the current rise in urban consumers' political power will build tremendous pressures on the present institutional arrangements for marketing and pricing milk. The shift from pricing based solely on fat content to a mixed pricing system is one facet of change now under way.

⁶³ For an excellent description of the changing view of food marketing, see Keith, Robert J. "The Marketing Revolution," J. Marketing 24: 3: 35-38, Jan. 1960.

Appendix A SUPPLEMENT ON THE UNIVERSITY OF MINNESOTA
SURVEY OF UPPER-INCOME FAMILIES
IN MINNEAPOLIS-ST. PAUL

The sample for the University of Minnesota survey was derived from two area probability samples for the metropolitan area developed by the Research Department of the Minneapolis Star-Tribune Company. In matching 1964 and 1965 surveys by that firm, respondents were asked if they would cooperate in a University of Minnesota research project. About half of those eligible in terms of income and family size agreed to cooperate with the University.⁶⁴ The survey questionnaires used were modeled after those of the Bureau of Labor Statistics for the 1960-61 Survey of Consumer Expenditures and Incomes. Income data from the Star-Tribune sample were in terms of before-tax incomes. Accordingly, the deduction of income taxes brought a number of families in the \$10,000 and over income level down into the disposable income bracket with less than \$10,000 income.

A.1 Social Characteristics of Upper Income Families

Upper income families are generally larger than the averages for all urban families in the country, and those in Minneapolis-St. Paul are still larger than the average for all affluent families in the United States, both according to census data and to the sample survey. In the \$10,000 to \$15,000 income bracket there is a higher percentage of families with children under age 18 than among all U.S. urban families. This characteristic is also accentuated in the Minneapolis-St. Paul sample. Data comparing the social characteristics of Minneapolis-St. Paul families and those in urban areas of the North Central Region and the United States are given in tables A.1 and A.2.

In table A.1 families within each income group are subdivided according to the stage in the life cycle. The criteria for this categorization are those used by the Michigan Survey Research Center, the age of the head of the family, and the age of the youngest child. Adults in lower income families within this category of upper income families are younger and have younger children and older families are found more frequently in the highest income groups.

Upper income families generally are headed by men with above average education, and their wives' education tends to correlate with the husbands'. The high levels of education of the heads of the families and of their wives in the Minneapolis-St. Paul sample are indicated by the distributions given in table A.1. For analysis of the relationships between social class and consumption patterns, the Hollingshead Two Factor Index of Social Position has

⁶⁴ Burk, M. C. Food Expenditures by Upper Income Families: An Analysis of Factors Related to Their Changing Importance in the U.S. Food Market, Appendix B, Technical Bulletin 269, University of Minnesota, 1969.

been used. The two factors considered are the husband's education and his occupational status. Class I includes the highly educated, professional and executive group: 30 percent of the sample for Minneapolis-St. Paul. Classes II and III are successively less educated and in less high-ranking occupations, and include about 50 percent of the families. Among these upper income families, 16 percent had skilled workers with high school education as heads. These are categorized in class IV by the Hollingshead Index. The remaining 5 percent of the families was headed by men with relatively less occupational skill and less education, class V.

A.2 Economic Characteristics

Surveys of family income and consumption reveal significantly higher average numbers of earners among upper income families compared with all families, but the average number is lower in the highest income bracket (\$15,000 and over income) than it is in the next highest income level, with \$10,000 to \$15,000 income. Self-employment was relatively more frequent in the Minneapolis-St. Paul sample than in the United States or the north-central urban samples of families in the \$10,000 to \$15,000 income group (table A.2). Also, there was a larger proportion of family heads employed in the salaried professional, managerial, and official occupations. Approximately half as many families in Minneapolis-St. Paul in the \$10,000 to \$15,000 income bracket were headed by skilled and semi-skilled workers as in the United States and the north-central urban areas in 1960-61. No unskilled principal wage earner was identified in the Minnesota sample. By definition the income of upper income families is above average. As expected, these families spend more and save more.

Two sets of information from the upper income survey of Minneapolis-St. Paul families supplemented knowledge of the families' financial characteristics. The homemakers were asked to classify their families' saving pattern on a five point scale, ranging from much above average to much below average in saving. In the total sample 14 percent of the homemakers rated their families as high savers, 27 percent as above average but not high, 43 percent as average, and 15 percent as below average savers. The ratings for the saving characteristic varied significantly with family income. About a third of the families with incomes below \$10,000 were self rated as above average or high savers, compared with half of the families in the \$15-20,000 income bracket, and two-thirds of those in the \$20,000 and over income group. (A comparable question is frequently used by the Michigan Survey Research Center.)

Homemakers were asked about the degree to which they were satisfied with the financial status of their families. In the total sample 29 percent were very satisfied with their current financial status, 53 percent were well satisfied, 9 percent were neutral, and only 8 percent were not satisfied. Here, again, there were variations with income. In the lowest income group of the sample, 18 percent were very satisfied, 55 percent well satisfied, 16 percent neutral, and 11 percent not satisfied. Among families with incomes above \$15,000, 40 percent were very satisfied, 52 percent well satisfied, 4 percent neutral, and 4 percent dissatisfied with their current economic situation.

Table A.1. Social and economic characteristics of upper income families in Minneapolis-St. Paul, comparable with Bureau of Labor Statistics data, by level of disposable family income in 1964¹

Item	Unit	Total sample	\$6,410 to \$10,000	\$10,000 to \$15,000	\$15,000 to \$20,000	\$20,000 and over
Sample data						
Number of cases	number	257	83	127	30	17
Percent of total sample	percent	100	32	49	12	7
Social characteristics for 1964:						
Average family size in 1964	number	4.4	3.9	4.6	4.8	4.4
Family size; percent of total with:						
2.0 to 2.9 members	percent	18	31	13	7	12
3.0 to 3.9 members	percent	15	16	11	20	23
4.0 to 4.9 members	percent	25	16	34	20	24
5.0 to 5.9 members	percent	21	23	20	20	17
6.0 to 6.9 members	percent	12	7	12	20	12
7.0 to 7.9 members	percent	5	2	5	10	12
8.0 to 13.6 members	percent	4	5	5	3	0
Children under 18, percent having	percent	75	64	82	77	76
Children under 18, average per family	number	2.0	1.8	2.2	2.3	1.7
With persons 65 and over	percent	5	2	4	17	18
Age of head in years, average	number	43	41	42	47	46
Family life cycle stage:						
Head under 45:						
Youngest child under 6	percent	39	41	39	37	59
Children 6-17	percent	16	11	18	16	30
No children under 18	percent	6	13	4	0	0
Head, 45 and over:						
Children under 18	percent	39	35	39	47	41
No children under 18	percent	20	13	25	24	18
No children under 18	percent	19	22	14	23	23
Education of husband, by category:						
8th grade or less	percent	5	11	3	0	6
9-12 years, total						
9-11 years	percent	19	22	20	13	6
12th grade	percent	5	6	4	7	0
12th grade	percent	14	16	16	6	6
13-16 years, total						
12 plus technical school	percent	52	53	51	57	47
1-3 years of college	percent	9	13	8	3	0
4 years of college	percent	17	21	16	17	12
Over 16 years, total	percent	26	19	27	37	35
One year more	percent	24	14	26	30	41
Masters or 2 years	percent	4	5	4	3	0
3 or more years	percent	10	4	14	10	6
3 or more years	percent	10	5	8	17	35
Education of wife, by category:						
8th grade or less	percent	3	5	3	0	0
9-12 grades, total						
9-11 grades	percent	27	35	24	23	18
12th grade	percent	6	7	6	0	0
12th grade	percent	21	28	18	23	18
13-16 years, total						
12 plus technical	percent	64	57	66	70	70
1-3 years of college	percent	16	17	17	17	0
Finished college	percent	28	24	28	37	41
Over 16 years, total	percent	20	16	21	16	29
One year more	percent	6	2	7	7	12
Masters or 2 years	percent	2	0	2	4	0
3 or more years	percent	3	1	4	0	6
3 or more years	percent	1	1	1	3	6
Other	percent	2/	2/	0	0	0

Table A.1. Social and economic characteristics of upper income families in Minneapolis-St. Paul, comparable with Bureau of Labor Statistics data, by level of disposable family income in 1964¹ - Continued

Item	Unit	Total sample	\$6,410 to \$10,000	\$10,000 to \$15,000	\$15,000 to \$20,000	\$20,000 and over
Percent of wives full-time homemaker	percent	66	55	64	87	94
Social class (Hollingshead measure)						
Class I	percent	30	22	27	44	65
Class II	percent	27	22	30	33	23
Class III	percent	22	19	27	13	6
Class IV	percent	16	28	13	10	0
Class V	percent	5	9	3	0	6
<u>Economic characteristics for 1964:</u>						
Full-time earners	number	1.4	1.4	1.4	1.2	1.4
Home owners all year	percent	84	82	84	87	94
Money income before income taxes ³	dollar	14,770	10,440	13,970	20,830	31,210
Money income after taxes ³	dollar	12,420	8,910	11,950	17,110	27,720
Total expenditures, including gifts, contributions, insurance	dollar	11,120	8,370	10,790	15,000	22,230
Food expenditures	dollar	2,170	1,830	2,140	2,740	3,080
Nonfood expenditures	dollar	8,950	6,540	8,650	12,260	17,150
Net change in assets and liabilities	dollar	1,300	700	1,200	2,100	4,500
Proportion of heads in occupational category:						
Self employed	percent	19	15	18	23	41
Salaried professional, officials	percent	53	43	57	67	47
Clerical and sales workers	percent	9	10	11	7	...
Skilled wage earners	percent	11	19	8	3	...
Semi-skilled wage earners	percent	7	12	5	...	6
Unskilled	percent	2/	1	...	...	...
Retired	percent	2/	...	1	...	...
Not working (widow)	percent	2/	...	...	...	6

1 Totals based on unrounded data.

2 Less than 1 percent.

3 Does not include other money receipts.

Table A.2. Selected social and economic characteristics of samples of all urban families with two or more persons sampled in U.S. and North Central Region in 1960-61, of all Minneapolis-St. Paul families (including single individuals) in 1963, and for those in each area having disposable money incomes of \$10,000 to \$15,000 and \$15,000 or more¹

Item	Unit	All income levels			\$10,000 to \$15,000			\$15,000 or more		
		United States urban	North central urban	Minneapolis-St. Paul 1963	United States urban	North central urban	Minneapolis-St. Paul 1963	United States urban	North central urban	Minneapolis-St. Paul 1963
Sample data:										
Number of cases	number	7,914	2,290	206	720	199	29	222	55	4
Percent of total sample	percent	100.0	100.0	100.0	9.1	8.7	14.1	2.8	2.4	3.8
Social characteristics:										
Average family size in year	number	3.5	3.6	3.3	4.1	4.2	4.5	3.8	3.8	3.8
Children under 18, percent having	percent	60	61	50	64	63	62	53	49	50
Children under 18, average per family	number	1.4	1.5	1.4	1.5	1.5	1.9	1.1	0.9	1.3
With persons 65 or over	percent	19	17	27	14	13	21	21	19	25
Age of head in years	number	46	45	48	47	47	47	51	53	51
Education of head by category: ²										
8th grade or less	percent	32	31	26	11	15	3/	9	9	3/
9 to 12 years	percent	45	46	36	40	36	3/	19	24	3/
13 to 16 years	percent	19	18	31	35	35	3/	42	54	3/
Over 16 years	percent	4	5	7	14	14	3/	30	13	3/
Economic characteristics for year:										
Full-time earners	number	0.9	0.9	0.8	1.4	1.5	1.4	1.2	1.3	1.0
Home owners all year	percent	57	62	67	78	80	90	87	93	75
Money income before income taxes	dollar	7,371	7,421	7,880	13,604	13,542	13,821	27,805	27,190	32,135
Money income after taxes	dollar	6,600	6,670	6,858	11,811	11,813	11,668	22,266	22,167	25,790
Total expenditures, including gifts, contributions, insurance	dollar	6,638	6,501	6,820	11,116	10,706	10,669	17,784	17,072	15,225
Food expenditures	dollar	1,451	1,399	1,305	2,186	2,099	2,027	2,808	2,620	2,341
Nonfood expenditures	dollar	5,187	5,102	5,515	8,930	8,607	8,642	14,976	14,452	12,884
Net change in assets and liabilities	dollar	207	377	413	843	1,260	1,302	4,719	5,506	10,558
Proportion of heads in occupational category: ²										
Self-employed	percent	6	6	4	11	10	3/	33	28	3/
Salaries professionals, officials	percent	18	17	21	43	42	3/	52	53	3/
Clerical and sales workers	percent	13	12	15	12	13	3/	5	11	3/
Skilled wage earners	percent	16	19	16	15	15	3/	3	4	3/
Semi-skilled wage earners	percent	14	16	10	9	10	3/	1	0	3/
Unskilled	percent	13	11	12	4	3	3/	4/	0	3/
In Armed Forces	percent	1	1	1	1	1	3/	0	0	3/
Retired	percent	13	13	15	4	3	3/	4	4	3/
Not working	percent	6	5	6	1	2	3/	2	0	3/

1 Data from U.S. Bureau of Labor Statistics, Survey of Consumer Expenditures, 1960-61. Consumer Expenditures and Income: Detail of Expenditures and Income. Urban United States, 1960-61 (Suppl. 3-Part A to BLS Report 237-38, July 1964) and Urban Places in North Central Region, 1960-61 (Suppl. 3-Part A to BLS Report 237-35, July 1964); Consumer Expenditures and Income, Minneapolis-St. Paul, Minnesota, 1963, BLS Report 237-81, July 1965.

2 Data for families and single consumers from Consumer Expenditures and Income: Cross-Classification of Family Characteristics, Urban United States, 1960-61 (Suppl. 2-Part A to BLS Report 237-38, July 1964) and Urban Places in the North Central Region, 1960-61 (Suppl. 2-Part A to BLS Report 237-35, July 1964); Consumer Expenditures and Income, Minneapolis-St. Paul, Minnesota, 1963, Suppl. 1 to BLS Report 237-81, July 1965.

3 Not available.

4 Less than 1 percent.

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