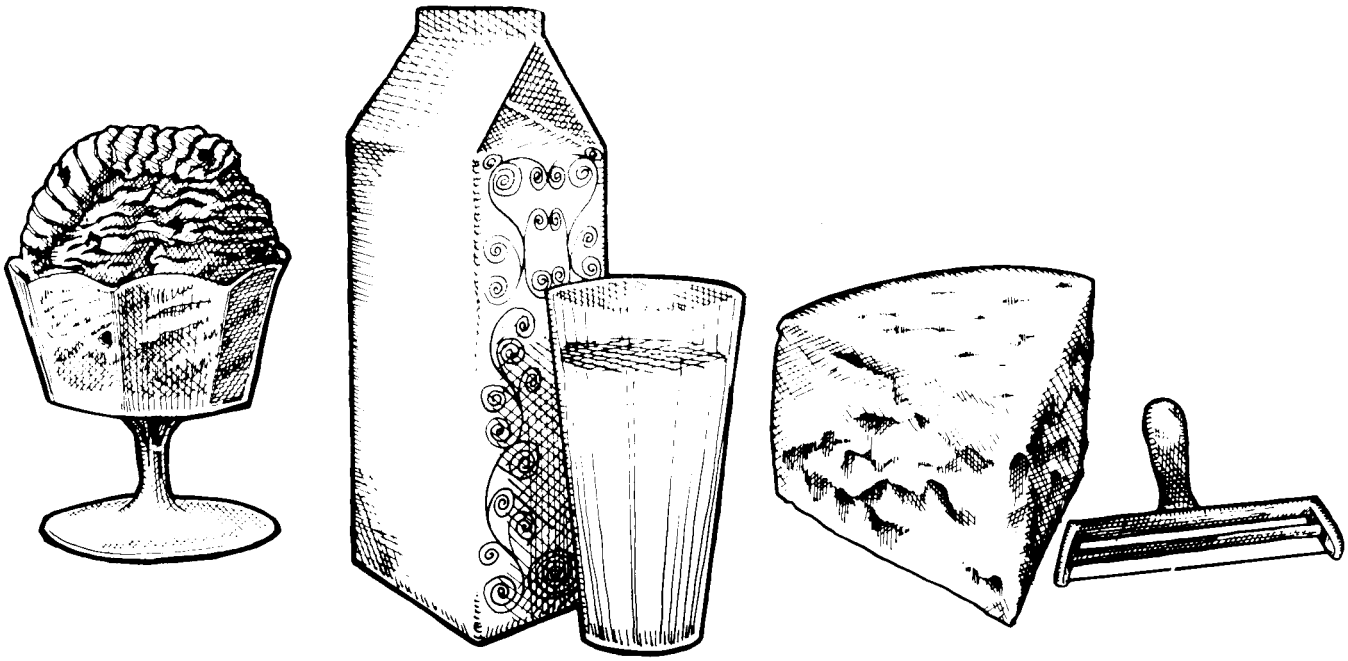
Economic Study Report S69-4 July 1969

Prospects for U.S. Consumption of Dairy Products

Marguerite C. Burk



Department of Agricultural Economics
Institute of Agriculture
University of Minnesota

ECONOMIC STUDY REPORT S69-4

PROSPECTS FOR U.S. CONSUMPTION OF DAIRY PRODUCTS

by

Marguerite C. Burk

Department of Agricultural Economics
Institute of Agriculture
University of Minnesota
St. Paul, Minnesota 55101

July 1969

PROSPECTS FOR U.S. CONSUMPTION OF DAIRY PRODUCTS

by Marguerite C. Burk

By 1980 total U.S. consumption of milk in all forms appears likely to fall five to ten percent below the 1968 total of 116 billion pounds. In addition, substantial changes in the utilization of milk in various forms of dairy products are to be expected. These prospects are indicated by analyses of historical trends in consumption and appraisal of prospective changes in major socioeconomic factors related to those trends. 1/

These prospective changes raise two critical issues for the dairy industry. First, the marketing revolution in the form of the need to tailor products to meet the specific wants and requirements of consumers is overtaking milk producers and processors. They must discover how to produce and market the foods consumers want, not those the dairy industry prefers to offer and has offered for many years. Second, the dairy industry must prepare to accept changes in institutional arrangements for marketing and pricing milk because of tremendous pressures coming from shifts in milk use, the marketing revolution, and the current rise in urban consumers' political power.

The research underlying these conclusions is summarized under five headings: 1) analysis of historical trends; 2) changes in consumption among different groups of families; 3) prospective changes in key socioeconomic factors related to consumption of major dairy products; 4) a set of projections to 1980 for major products; and 5) consideration of implications and issues.

Indications from Historical Trends

There were no strong trends in the consumption of dairy products in the period 1924-41, but average consumption of dairy products (excluding butter) increased about 10 percent. In the years after World War II there was a gradual decline of 10 percent in the consumption of dairy products

1/ Based on research reported in technical form in Burk, Marguerite C. Consumption of Dairy Products: An Analysis of Trends, Variability and Prospects. U. Minn. Agr. Exper. Station Tech. Bulletin 268, 1969. The author wishes to acknowledge the technical advice and professional support received from her colleagues, E. F. Koller and J. W. Hammond.

per capita according to measures which take butterfat into account. Excluding butter, the net change in the per capita rate of consumption between the period 1947-49 and 1967-69 was about 5 percent. (Table 1)

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) When viewed from the standpoint of their roles in the meals of nonfarm people, dairy products apparently 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 a baby food and as a spread (there is less bread eaten) have fallen sharply.

Shifts in the per capita consumption of fresh fluid milk items have been varied and partly offsetting. Farm home consumption of fluid milk declined in total because of the reduction in the number of farm families and a lower rate per capita. U.S. civilian 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.) Changes in per capita sales of fluid whole milk and low-fat milks are shown in figure 2.

Among the manufactured products, 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 year, and much 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.

Factors Related to Changes in Fluid Milk and Cream Consumption

Average U.S. consumption of fluid milk and cream has been greatly reduced by the sharp decrease in farm home production of milk. This was the result of the off-farm movement of the population and of the decrease in the proportion of farms with milk cows as farm operations have become more specialized. Increased income had a favorable effect on consumer demand, but much of it was offset by cutbacks in consumption in response to higher prices. For some years the higher proportion of population under age 15 and the decrease in the percentage of the low-income

Table 1 U.S. per capita consumption of dariy products and margarine, selected years, 1924-68 1/

Year	All dairy including butter: Retail Price-weighted index, 1957-59 = 100 2/: Including butter	All dairy including butter: Retail Price-weighted index, 1957-59 = 100 2/: Excluding butter	All dairy including butter: Milk equivalent: Fat content basis	All dairy including butter: Milk equivalent: Calcium content basis	All dairy including butter: Milk solids equivalent: Milk fat	All dairy including butter: Milk solids equivalent: Non-fat	All dairy including butter: Milk solids equivalent: Total	Fluid milk and cream 4/: Fluid whole Milk	Fluid milk and cream 4/: Cream	Fluid milk and cream 4/: Low-fat milks	Fluid milk and cream 4/: Total in fluid milk equivalent	Frozen dairy products: Net milk used	Frozen dairy products: Product weight	Cheese, whole or part whole milk	Evaporated and condensed milk	Non-fat dry milk	Table spreads (product weight): Butter	Table spreads (product weight): Margarine 3/
			Lb.	Qt.	Lb.													
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
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
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
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
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
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	723	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
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
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/	93.2	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

1/1 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.

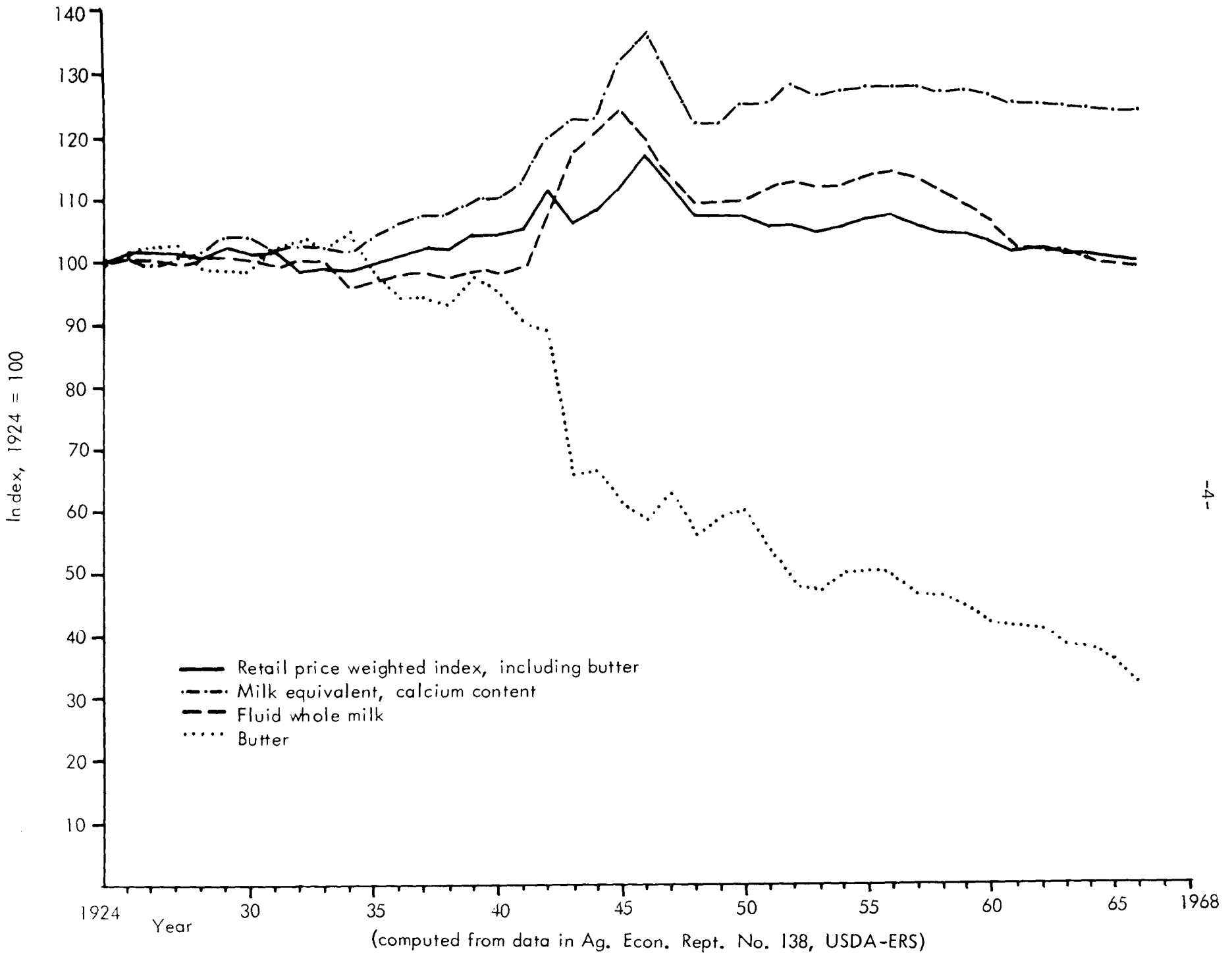
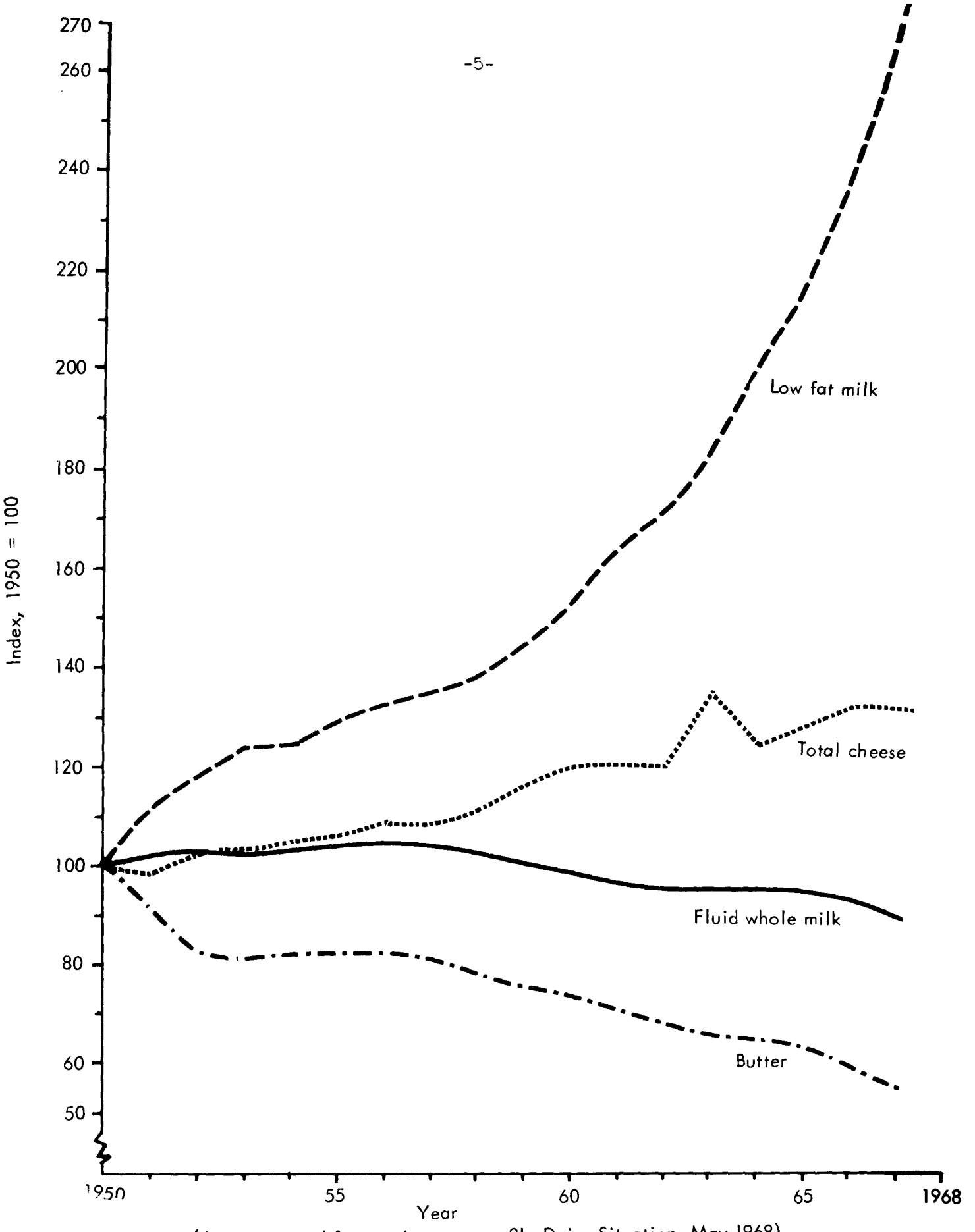


Figure 1. Trends in U.S. consumption of dairy products (per capita, 1924-68)



(data computed from series on page 21, Dairy Situation, May 1968)

Figure 2. Sales of selected dairy products (per capita, 1950-68)

population on farms raised consumption. But the lower birth rate in recent years and the increasing proportion of the nonwhite population have contributed to lower consumption per capita. Subsidized sales of milk to school children accounted for 6 percent of total sales of fluid milk products to civilian consumers in 1968.

Analyses of historical changes in milk consumption and cross-section data have revealed that the consumption of low-fat milk is favorably influenced by higher incomes, but unfavorably affected by a higher proportion of the children under age 15.

In efforts to stop the decline in milk consumption, the dairy industry has financed market research and substantial promotion campaigns. The market research identified the values, goals, attitudes, and knowledge of different groups of consumers related to different rates of milk consumption. This information has been used to guide plans for advertising and other sales promotion campaigns. In 1963-65, the American Dairy Association (ADA) and the U.S. Department of Agriculture (USDA) cooperated in a comprehensive test of promotion effectiveness. Considering the returns for the 6 months of special promotions and the following 6-month period, the medium level of sales promotion (15 cents above normal outlays) provided higher net returns to dairy farmers than either the higher or lower rates in the market test.

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 of milk drinking on an average day by the population over age 14. Increased advertising apparently affected the frequency of of consumption by irregular light milk drinkers. An intensive analysis of these data led Wendell Clement, a USDA economist, to conclude that many consumers were changing their unfavorable attitudes toward milk after drinking milk in response to advertising messages regarding the virtues of the product.

Changes in Consumption of Manufactured Products

Statistical analyses of historical data on per capita consumption of cheese and butter are generally unsatisfactory, apparently because of substantial changes in consumer tastes and preferences not measured by available data. For cheese a higher proportion of the children in the population and a lower percentage on farms are unfavorable factors. But a higher proportion of nonwhites in the population tends to raise consumption rates. The effects of price and income are inadequately measured by historical data so we have to examine variations in consumption and expenditures among population groups. The results are described below.

In the case of butter, the statistical analysis of historical trends was upset by changes in margarine laws, in consumer attitudes toward margarine, and technological developments in manufacturing marg ine. Price increases had a strong negative effect on the consumption of butter, but statistical analyses of historical data did not yield meaningful measures of the effect of higher income.

Price and income changes have not had a statistically measurable effect on consumption of frozen milk desserts measured in product weight. Increases in the nonwhite population have favored consumption of these foods. No statistical analysis yet devised can measure the effect of the wider variety of products on the consumption of frozen desserts or of cheese. Changes in infant feeding practices, partly because of the improved quality of fluid whole milk, have apparently reduced average use of evaporated milk, but the relationships cannot be measured satisfactorily with available data.

Changes in Consumption Among Different Groups of Families

Changes in average U.S. consumption of dairy products by housekeeping households, as measured by nationwide surveys for spring 1955 and 1965, are consistent with changes in U.S. per capita consumption measured by data on production and distribution. The most striking feature of the change in consumption of dairy products at home has been the general lowering of the consumption rates in relation to the level of real income within each urbanization category. Data in table 2 and figures 3 and 4 demonstrate this shift. The only major exception was the increase in the purchases of dairy products by farm households.

In figure 3 you will note increases from spring 1942 to spring 1955 in average consumption measured in terms of calcium content, milk solids not fat, and milk fat including butter in nonfarm households, followed by greater decreases from spring 1955 to 1965. Farm consumption of dairy products per person declined from 1942 to 1955 and again from 1955 to 1965, according to all four measures. For urban households in the North Central Region and the South, figure 4 shows how average consumption rates for fluid whole milk, milk fat excluding butter, and milk solids not fat fell from spring 1955 to 1965 at most levels of income. The exceptions were in the lower range of real income per person, but the inclusion of one-person households in the 1965 data probably caused these exceptions.

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 capital which include school milk, school lunch, and restaurant eating. (Consumption in these places was increasing.) 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

Table 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 prices1/

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, qt.	1955	2.70	3.20	3.20	3.30
	1965	2.10	2.55	2.65	2.70
B. Other fresh milks, qt. (including half & half, excluding cream)	1955	.30	.28	.33	.42
	1965	.24	.25	.36	.43
C. Evaporated and condensed milk, lb.	1955	.42	.28	.19	.16
	1965	.36	.25	.20	.16
D. Whole and part whole milk cheese lb.	1955	.18	.19	.21	.21
	1965	.17	.21	.23	.25
E. Butter, lb.	1955	.16	.19	.25	.30
	1965	.09	.13	.15	.17
II. Urban households					
A. Fresh fluid whole milk, qt.	1955	2.40	3.15	3.15	3.10
	1965	2.05	2.50	2.65	2.70
B. Other fresh milks, qt.	1955	.30	.26	.35	.45
	1965	.24	.24	.34	.43
C. Evaporated and condensed milk, lb.	1955	.43	.25	.19	.14
	1965	.37	.26	.19	.16
D. Whole and part whole milk cheese, lb.	1955	.17	.19	.21	.21
	1965	.17	.21	.23	.25
E. Butter, lb.	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.

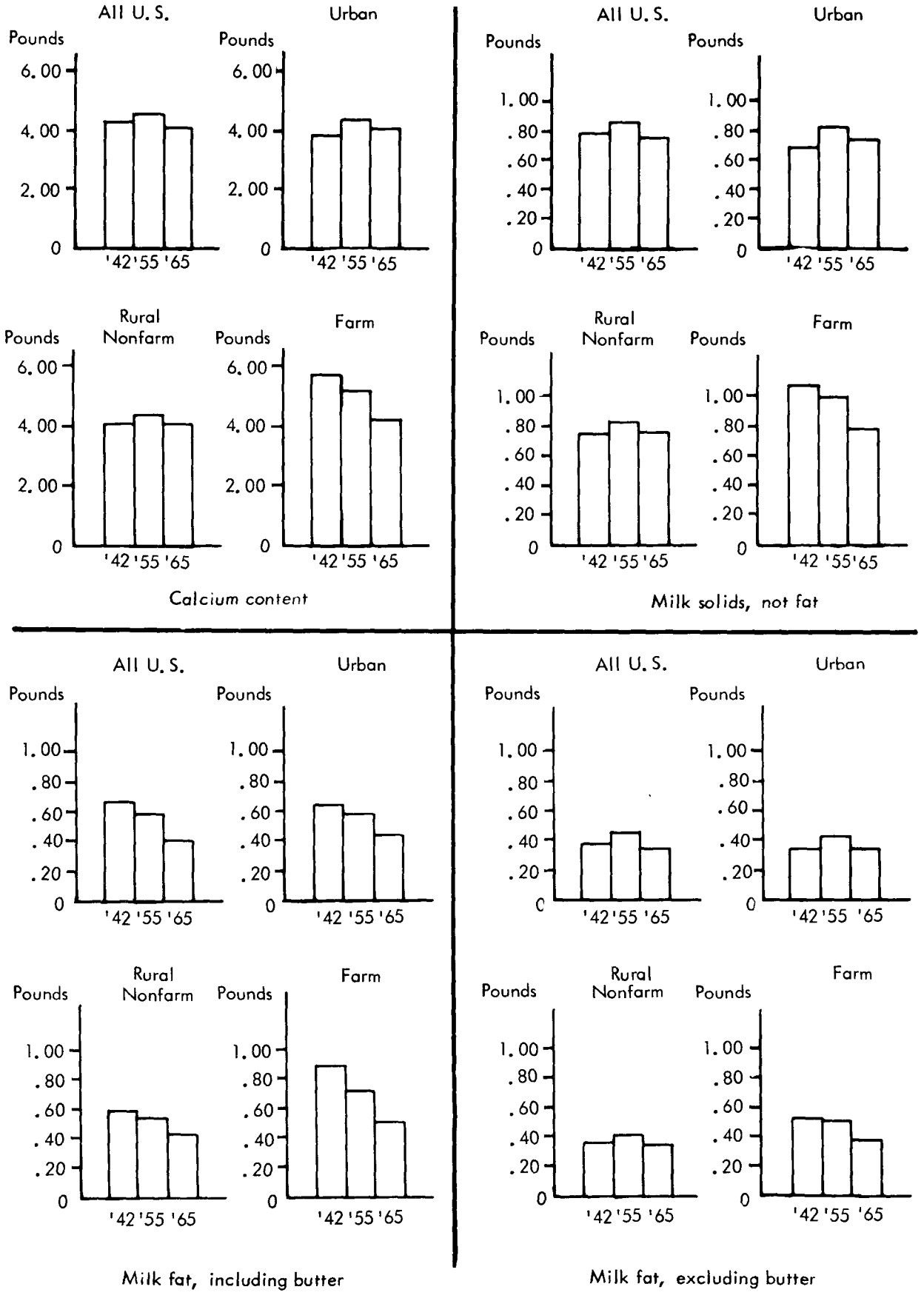


Figure 3. Four measures of variations in average consumption of dairy products per person (United States, spring 1942, 1955, 1965) (Data derived from reports on USDA surveys of household food consumption)

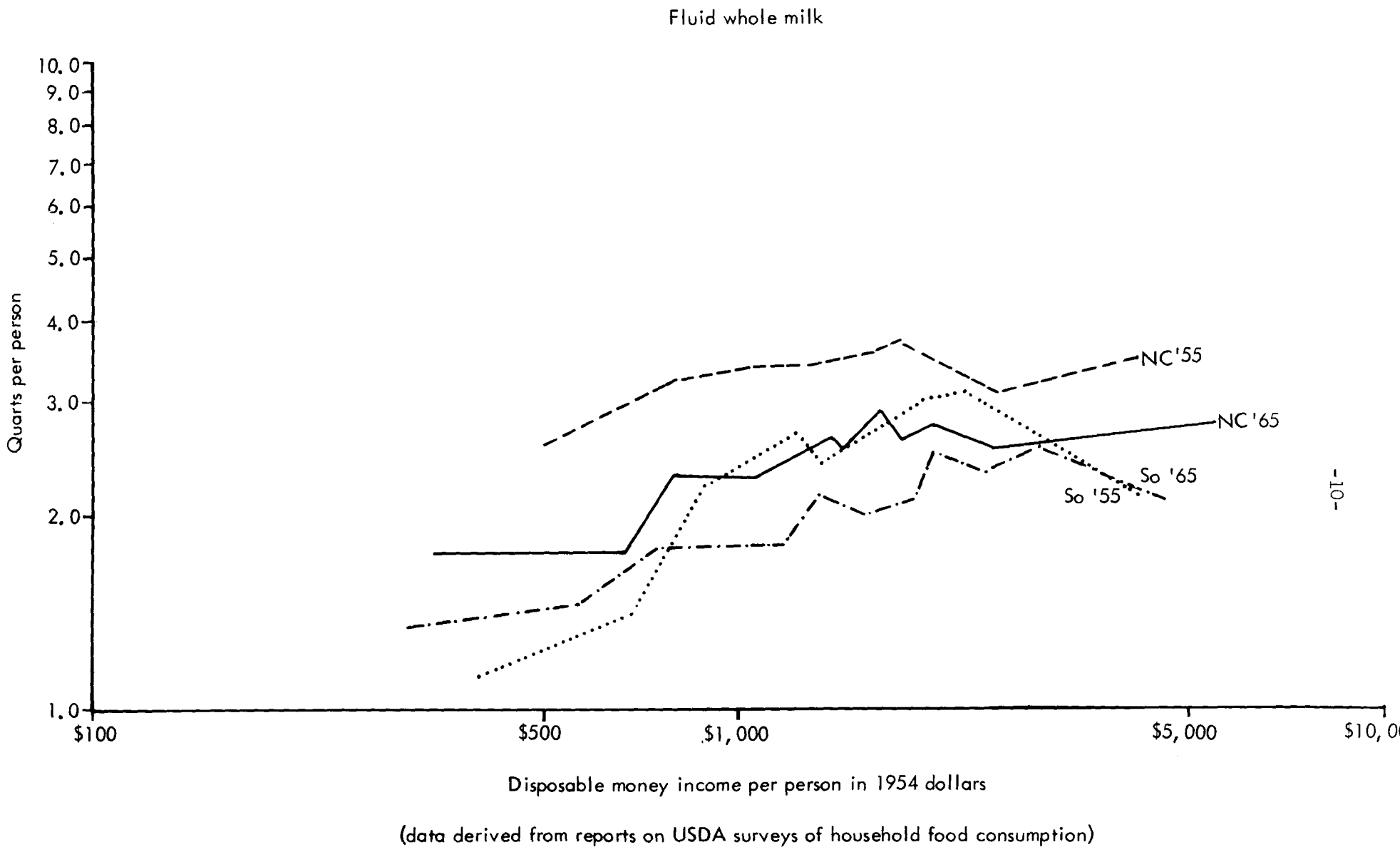


Figure 4A. Income-consumption relationships for dairy products, urban households, north central region and south (spring 1955 and 1965)

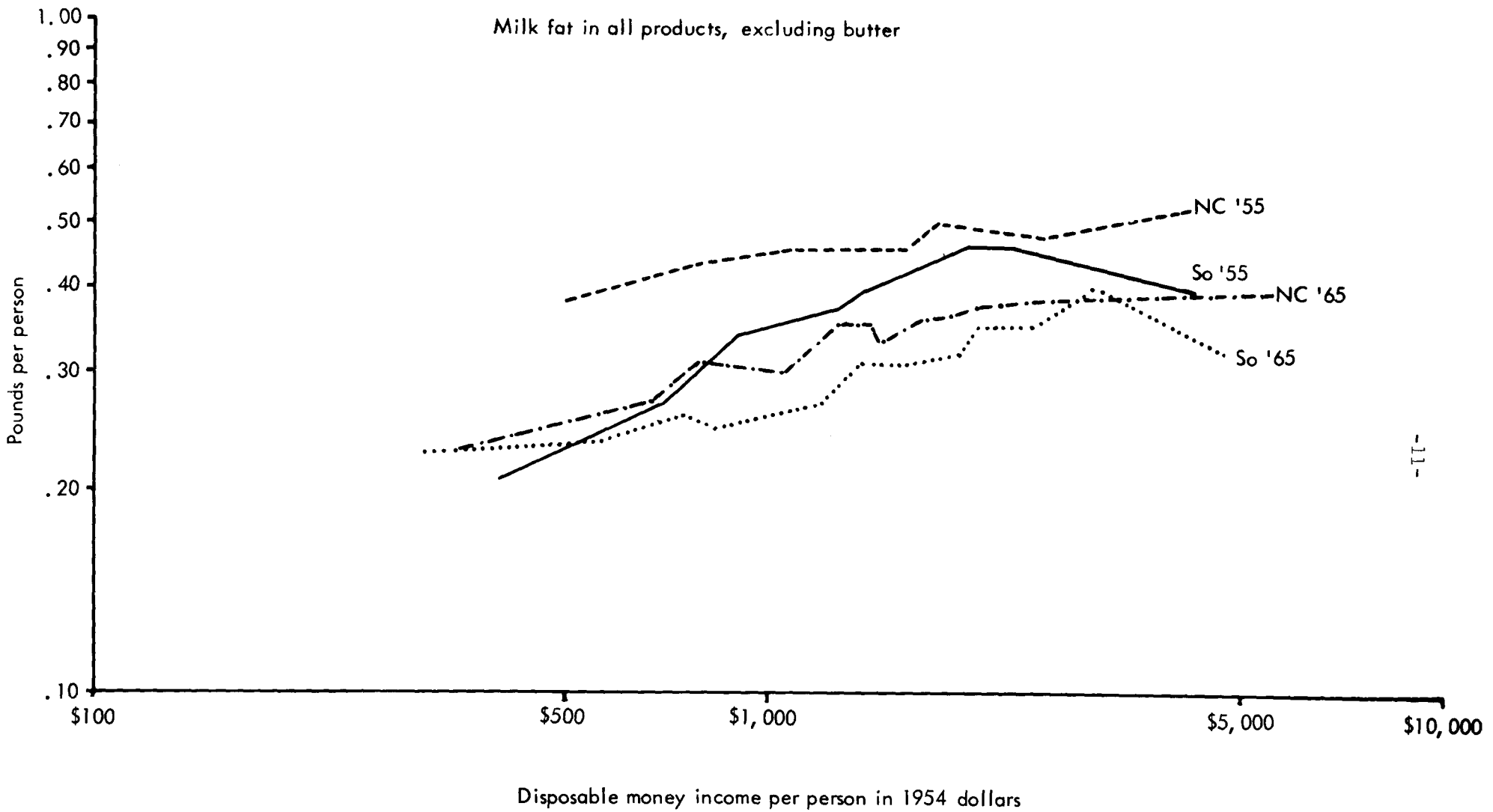


Figure 4B. Income-consumption relationships for dairy products, urban households, north central region and south (spring 1955 and 1965)

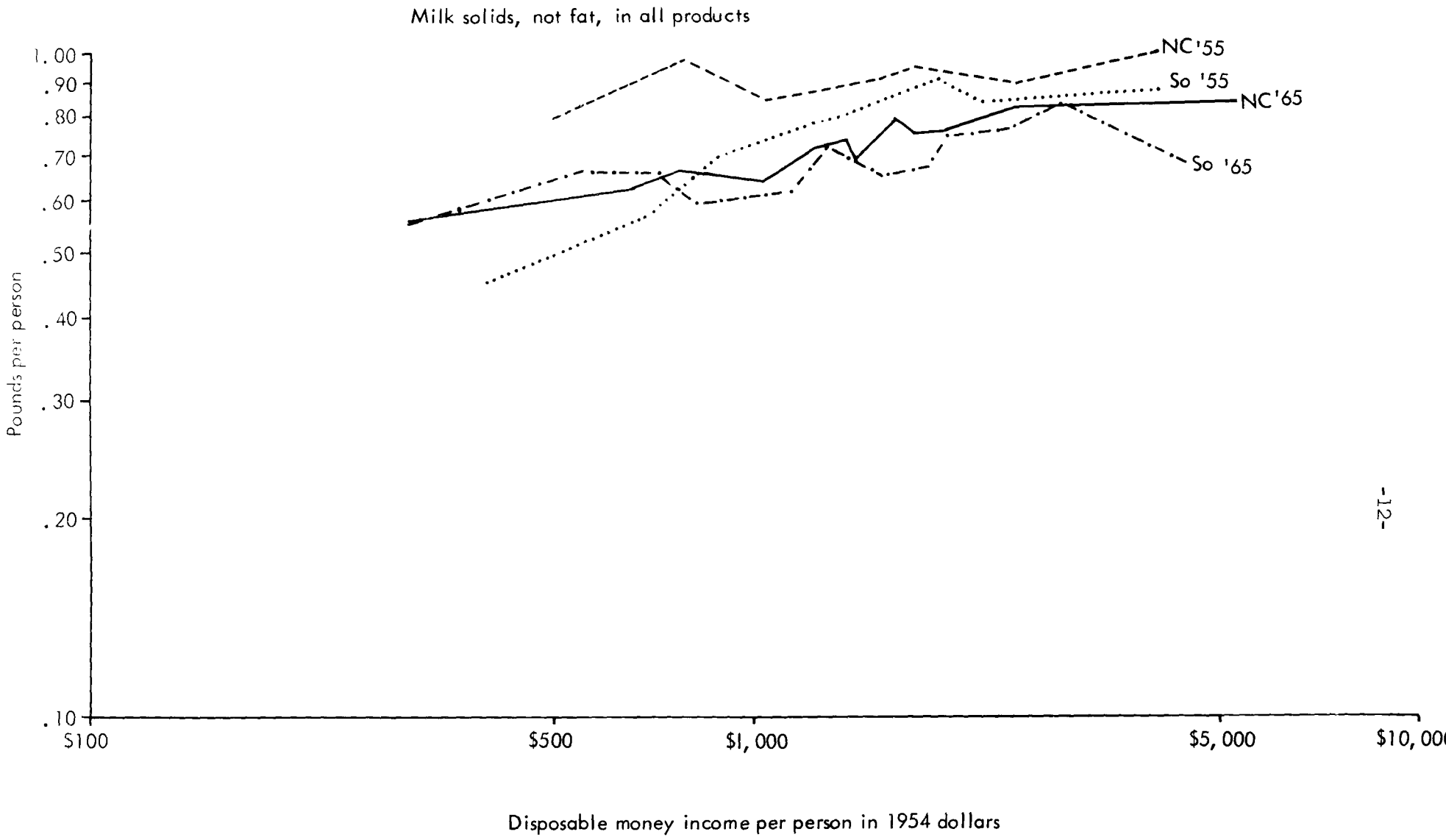


Figure 4C. Income-consumption relationships for dairy products, urban households, north central region and south (spring 1955 and 1965)

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 at each level of real income 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 in Minneapolis-St. Paul in April-July 1965, made by the Department of Agricultural Economics, University of Minnesota. 2/

Analysis of the survey data on upper income families in Minneapolis-St. Paul revealed that income was not a significant factor in variations in per person expenditures for dairy products except for cheese and home-delivered milk. Only a sixth of the homemakers would spend any more for dairy products 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 higher proportion of younger members. The higher education of homemakers was related to larger expenditures for cheese and frozen desserts, but lower expenditures for butter. Homemakers who were particularly concerned with economizing allocated a larger share of their total food budget to dairy products. In contrast, those who indicated reputation-striving concerns spent relatively less for dairy products as a group even though they were above average spenders for butter.

2/ Ibid., chapter 3.

Prospective Changes in Key Socioeconomic Factors

Although no one can accurately foretell the socioeconomic changes that will occur in the United States (or any other country) during the decade of the 1970's, many social scientists agree that it is possible to identify the ranges within which many are likely to take place.

Urbanization

Take the distribution of the population among urbanization categories as an example. Whereas 7 percent of the U.S. population lived on farms in 1965, the likelihood of further decreases is very strong. Knowledgeable researchers are using estimates of 3 or 4 percent for 1980. Similarly, the downtrend in the proportion of the population in rural nonfarm households is likely to continue from 1965 when the proportion was 24 percent. Reasonable guesses for 1980 appear to be 17 to 19 percent. These two estimates for the farm and rural nonfarm sectors would leave a balance of 77 to 80 percent of the population in urban areas in 1980, compared with 69 percent in 1965.

Population Total and Composition

The Bureau of the Census prepares several alternative projections of the total population and its age make-up for the years ahead. The critical element in these projections is the assumption made with regard to the birth rate. The birth rate has been falling significantly within recent years. On the assumption that this decline will continue, the Bureau of the Census estimate for 1980 is 227.7 million, 13 percent above the 1968 total. (Series D) Using the assumption of a moderate increase, the Bureau of the Census arrives at a 1980 figure of 243.3 million people, 21 percent higher than 1968. (Series B) If the birth rate continues at the current level, the Bureau of the Census estimates total population at 235.2 million, 17 percent above 1968. (Series C)

These differences are very significant for the demand for dairy products because they materially affect the age composition of the population. The lowest assumption for the birth rate and the smallest projection for total population yield a projection that 25.1 percent of the population would be under age 15; the middle estimate would be 27.5 percent; and the projection of an increased birth rate leads to an estimate of 29.9 percent. The fertility rates assumed also influence the proportion of nonwhites in the population because they are the most fertile group. This proportion would vary from 13.0 percent for the lowest birth rate to 13.4 percent for the highest estimate.

Income

Although the statistical analyses of historical relationships between income and consumption of fluid milk, butter, and cheese did not yield satisfactory results in some respects, the analyses of cross section variations in consumption in relation to income do indicate the importance of income for cheese and butter, in particular. Unofficial projections of real disposable income per capita being used internally in the Federal Government include a 44 percent increase from 1966 to 1980 if unemployment runs 4 percent and a 40 percent increase under the assumption of a 6 percent unemployment rate.

Because of the widespread interest in and growing support for some kind of minimum income level, minimum incomes of $2,000 per nonfarm family in 1980 and $1,000 for farm families were assumed. Allowance was made for higher social security payments and smaller family sizes in working out estimates of the 1980 distribution of the U.S. population by size of family income within each urbanization category.

Price Ratios

The relationships of the prices of individual dairy products to prices of all foods materially affect consumption rates for these products. Because these relationships are subject to industry and public decision-making, two sets of eatimates were used. One was the price relationships experienced in 1968. The ratios in the other set generally were estimated on the assumption of a continued rise in dairy product prices in relation to other foods. An exception was the use of 1947's 2:1 ratio of butter price to margarine price as an alternative and of a butter-retail food price ratio of .47 compared with the 1968 ratio of .70 to reflect possible price changes if the price support program for butterfat were dropped.

Attitude Changes

Discussion with James A. Bayton, a well-known market researcher and professor of psychology, of 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. 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 a particular attribute for foods.

Special Public Programs

Because the special School Milk and national School Lunch Programs accounted for about $3\frac{1}{2}$ billion pounds of fluid milk in 1968, it seemed desirable to explore the possibilities of expansion of these programs by 1890. 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 there were in 1965. If these subsidy programs were expanded, it might be possible to increase the poor children's consumption of milk so that the total would rise 25 percent and amount to $4\frac{1}{2}$ billion pounds of milk in 1980.

Recent research findings on the significance of adequate supplies of protein for young 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 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.

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 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.

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. 3/

3/ See Hammond, J. W., S. I. Coulter, R. Sirny -- Nutritional, Technical, and Economic Aspects of Milk Substitutes. U. Minn. Agr. Exper. Station Bulletin 496, 1969.

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.4/ 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.

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.

Projected Consumption of Dairy Products in 1980

Economists develop projections of consumption for future years by using relationships between socioeconomic factors and consumption rates which have been derived from statistical analyses of historical trends and variations in consuption among population groups with different characteristics. Both historical analyses and cross section approaches were used in the study of the possible rates of consumption of major

---

4/ "The McKinsey Report," pages 4-5 of Dairy Promotion Topics, Winter 1969, American Dairy Association.

dairy products in 1980.[5/] Time series data, such as those in table 1, indlude consumption from all sources and in all places, both at home, in commercial eating places, and in schools and other institutions. The only available data on consumption of different population groups at different points in time are from USDA's Household Food Consumption Surveys. They pertain only to consumption at home by housekeeping households.

Statistical analyses based on historical data have certain advantages in the way they take special account of changes in age and racial composition of the population and of price ratio changes. But the effects of income and urbanization changes show up more clearly in the cross section approach to making projections. The projections based on historical changes developed in the course of our research generally appeared to be more reasonable and are described here. [6/]

In the following discussion of the consumption projections, those derived from the combination of estimates for socioeconomic factors the author considers "most likely" will be identified first. Then alternative estimates will be noted in most instances. The "most likely" set of socioeconomic factors in the opinion of this researcher includes the higher level of per capita income; 3 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. The effect of a substantially reduced price for butter was tested because of the possibility of the end of the price support program for butterfat. But the author doubts that the price change will come soon enough to halt the shift of consumer demand away from butter. Therefore, the "most likely" projection of butter consumption is based on the assumption of a continuation of 1968 butter price relationships.

Fluid Milk and Cream

The "most likely" projection for per capita consumption of fluid milk and cream in 1980 is 175 pounds, down about 30 percent from the 281-pound average for 1968. If an increase in fertility is assumed, consumption might average 196 pounds. If the relative price of fluid

---

5/ The historical analyses utilized the regression technique which statistically fits trend lines so as to minimize variations from the line. The corss section approach made use of per person averages at various levels of income and changes in the distributions of the population among income groups and urbanization categories.

6/ Admittedly this is a subjective decision, but it is based on 25 years of experience with projecting food consumption.

milk did not increase, the average might run about 208 pounds. If total fluid milk and cream consumption per capita, measured in whole milk equivalents, falls to 175 pounds, U.S. consumption in 1980 would total about 40 billion pounds of fluid milk. To this total should be added the three billion pounds increase which could result from further subsidy for milk consumption by poor children.

For fluid whole milk the favored projection is 138 pounds, but different price and birth rate assumptions could raise it to 170 pounds, compared with the 249-pound average reported for 1968. 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.

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 conclude that a 50 percent increase to 16 pounds per capita in 1980 may be overly optimistic. A 14 pound average looks more realistic. Use of the highest assumption for the birth rate would lower the projected average about 1.4 pounds because children eat substantially less cheese than adults. 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. Even so, technical inadequacies of the regression analyses cause the author to conclude that the technically projected per capita rate of 44 pounds is exaggerated and that a 35 pound average would be more likely for 1980. The higher rate might be possible if the birth rate were to increase and a higher proportion of the population would be under age 15 years. Use of the 35-pound rate for 1980 and a total population of 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 statistical regression analyses comes to the same conclusion, a 3.6 pound rate for 1980 compared with 5.6 pounds in 1968. In contrast, a butter-margarine price ratio of 2:1 and a substantial lowering of the price of butter in relation to all food prices yield a projected consumption rate of 5.1 pounds per capita. Based on the 3.6 pound rate and the lowest population estimate, aggregate consumption would be 820 million pounds of butter, requiring about 18 billion pounds of milk.

Total Milk

Adding (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 out at 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 U.S. military consumption. In view of the alternative projections described above, this researcher concludes that the 1980 total for civilian milk in all forms is likely to be 5 to 10 percent below the 1968 total.

Implications of Projected Changes in Consumption

The 1980 projections of the consumption of dairy products described above 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.

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. 7/

7/ Table 3 of Mathis, Anthony G. "Outlook for Dairy," paper given at Annual Agricultural Outlook Conference, USDA February 19, 1969.

Assuming the 175 pound per capita rate for fluid milk and cream (exclusive of subsidy program changes) and that programs to increase children's milk consumption will use an extra 3 billion pounds of milk, aggregate U.S. consumption of fluid milks and cream 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. If so, 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 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).

Factors Subject to Industry Influence

Review of the key socioeconomic factors used in developing these 1980 projections, set forth above, 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 earlier, the author and consultant James A. 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.

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

expected decline in consumer demand for fluid milk and cream, from 54 billion pounds in 1968 to 43 billion pounds in 1980 on the fat content basis, would average about 2 percent a year. Only in 1946 to 1948 did the industry ever experience such a sharp rapid 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 over all 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 cliche, everybody talks about changing attitudes, but nobody does anthing about it.

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. More recently the meat packers have decided that they are in the food business, not the meat business. 8/

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. It is quite possible that

---

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

large dairy processing firms will develop large-scale milk production facilities in order to control the characteristics and flow of their supplies just as has happened in the broiler industry.

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 underway.