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Dairy Product Demand Projections to 1975: Their Impact on South Dakota's Dairy Industry

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DAIRY PRODUCT DEMAND PROJECTIONS TO 1975: THEIR IMPACT ON SOUTH DAKOTA'S DAIRY INDUSTRY

BY

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DAIRY PRODUCT DEMAND PROJECTIONS TO 1975: THEIR IMPACT ON SOUTH DAKOTA'S DAIRY INDUSTRY

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Adviser

Head of the Major Department

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CHAPTER I

INTRODUCTION

The economic history of the United States is replete with examples of adjustment and readjustment by firms and industries. Such adjustments are usually made necessary by changes in the economic environment, and failure to adjust rather quickly and completely to such changes can mean economic disaster for entrepreneurs within an industry, and can result in inefficiencies in the total economic system.

To offset the effects of change, it is often advantageous to attempt to foresee change in the economic environment, to estimate the future impact of change on relevant sectors of the production and marketing system, and to recommend adjustments in particular industries which may help to relieve the inefficiencies which otherwise might arise.

This statement generally indicates the nature of this study. There have occurred and are presently occurring important changes in the social and economic environment affecting the marketing of dairy products. Population growth, concentration, and age composition; income and its distribution; competitive pricing within and outside of the dairy industry; non-price competition from other foods; and health and dietary ideas of consumers, are all factors that have been changing and affecting the consumption pattern of dairy products. Also, technological changes have been such that the volume of fluid milk plants and dairy product manufacturing plants has been increasing, while the

number of plants has declined. Smaller plants are usually unable to take advantage of technological change due to the lack of capital resources, small volume, position in the market, and sometimes because of poor management; and thus their operation may lead to difficulties. Although many adjustments have been made in South Dakota's dairy industry to counteract such changes, indications are that further adjustments will be necessary as the economic conditions surrounding the demand and supply of dairy products continue to change.

Objectives

The objectives of this study were: (1) to project probable future United States demand for dairy products to 1975 and (2) to recommend the type of milk products that should be produced in South Dakota.

Procedures

The procedures followed in this study were: (1) to examine historically the scope of South Dakota's dairy industry and to review research on the manufacturing and marketing developments and their implications for South Dakota's dairy industry, (2) to examine United States dairy product consumption trends, (3) to project by least-squares regression analysis the national demand for dairy products by type in 1975.

CHAPTER II

THE SCOPE OF SOUTH DAKOTA'S DAIRY INDUSTRY

South Dakota's dairy industry has for many years been going through a transitional period whereby many marketing and structural changes have resulted. Changes resulting from the transition are most evident in the number of milk cows, quantity of milk produced (total and per cow), disposition of the raw product, the manner in which the product is assembled, and the number of plants to process or manufacture the milk supply. The state has mainly continued, however, to manufacture the same dairy products.

Despite the transition, the industry has not become one of major importance when compared with total cash farm income from all agricultural products. Cash farm income derived from dairy products was $39.1 million in 1961. Although cash farm income from dairy products has risen $12.1 million since 1945, such income has not accounted for an increasing share of total cash farm income. (See Table 1).

Table 1. Cash Farm Income From Dairy Products and Per Cent of Total Cash Farm Income, South Dakota, 1945, and 1955-1961

Year	Cash Farm Income From Dairy Products	Per Cent of Total Cash Farm Income
	(dollars)	(per cent)
1945	26,995,000	8.5
1955	28,395,000	5.3
1956	30,867,000	6.0

Table 1. (Continued)

Year	Cash Farm Income From Dairy Products	Per Cent of Total Cash Farm Income
	(dollars)	(per cent)
1957	33,569,000	5.9
1958	33,020,000	4.7
1959	35,255,000	5.7
1960	35,086,000	5.8
1961	39,120,000	6.3

Source: Agricultural Statistics 1946, p. 391, U. S. Department of Agriculture, Washington, D. C. South Dakota Agriculture 1957 and 1961, p. 52 and p. 76, South Dakota Crop and Livestock Reporting Service, Sioux Falls, South Dakota. Dairy Situation - 290, p. 14, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., June 1962.

South Dakota milk-cow[1] numbers averaged 532,000 during 1930, 440,000 during 1945 and 244,000 during 1961. Milk production was 2,197 million pounds in 1930, 1,650 million in 1945 and 1,442 million in 1961. Production per cow increased 1,780 pounds during this 31 year period, but the increase was not sufficient to offset the decline in cow numbers, and thus milk production tended downward. Figure I graphically portrays South Dakota's milk production and sales by farmers.

Although a substantial change has taken place in farm disposition of milk, South Dakota is one of few states that disposed of as much as 40 per cent of its total milk supply as farm-skimmed cream in 1961. Such disposition was 580 million pounds in that year. Farm sales of cream were, however, 1,207 million pounds or 73.2 per cent

[1] Cows and heifers two years plus.

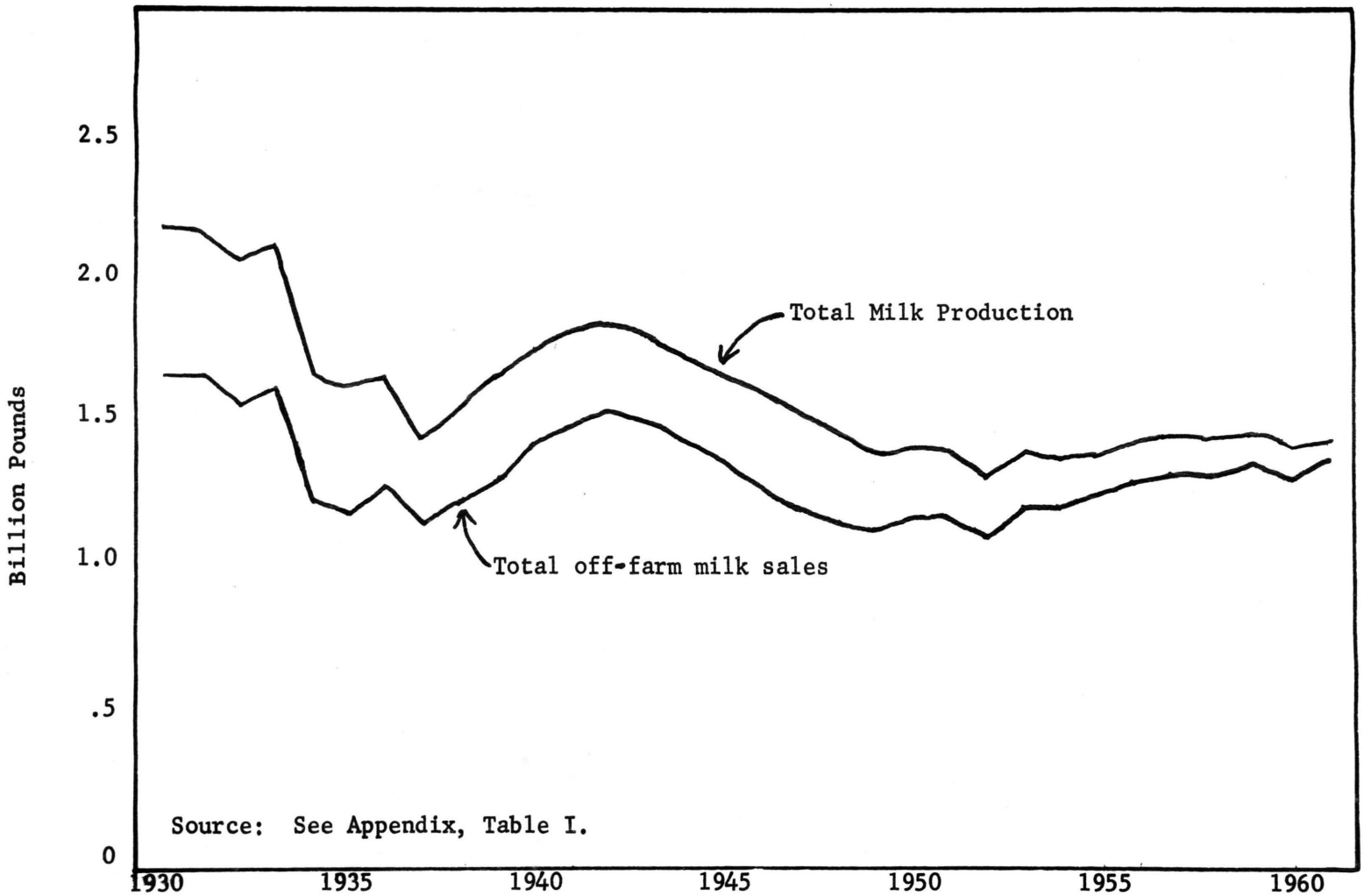

Figure I. Total annual milk production and sales by farmers in South Dakota, 1930-1961

of the total milk supply in 1945 and were at their highest level of 1,582 million pounds in 1930. Since 1955, sales of farm-skimmed cream have declined 40 per cent.

Shipments of whole milk to plants and dealers increased from 92 million pounds in 1945 to 750 million in 1961. Of the 658 million pound increase; 84.3 per cent took place from 1955 to 1961. Sales of whole milk for fluid consumption were about 150 million pounds in 1961[2] which left about 600 million pounds of delivered whole milk for utilization in manufactured dairy products. Milk used on farms was 108 million pounds in 1961 compared with 306 million in 1945 and 497 million in 1930. Milk and cream retailed by farmers had declined to four million pounds in 1961 from a high of 68 million pounds in 1930. Figure II graphically portrays the historical trends of farm disposition of milk.

Following the trend of increased marketing of whole milk has been a substantial increase in the use of farm bulk milk tanks. The number of tanks in the state increased from 500 in 1956 to 1,785 in 1961.[3] Leonard R. Benning, Extension Economist, South Dakota State College estimates that there were also 2,450 can milk coolers in 1960, 390 per cent higher than 1950.

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[2]State total estimated from utilization data of Class I milk in South Dakota's three Federal Milk Marketing Orders.

[3]From a survey compiled by Dairy Industries Supply Association and the National Association of Dairy Equipment Manufacturers.

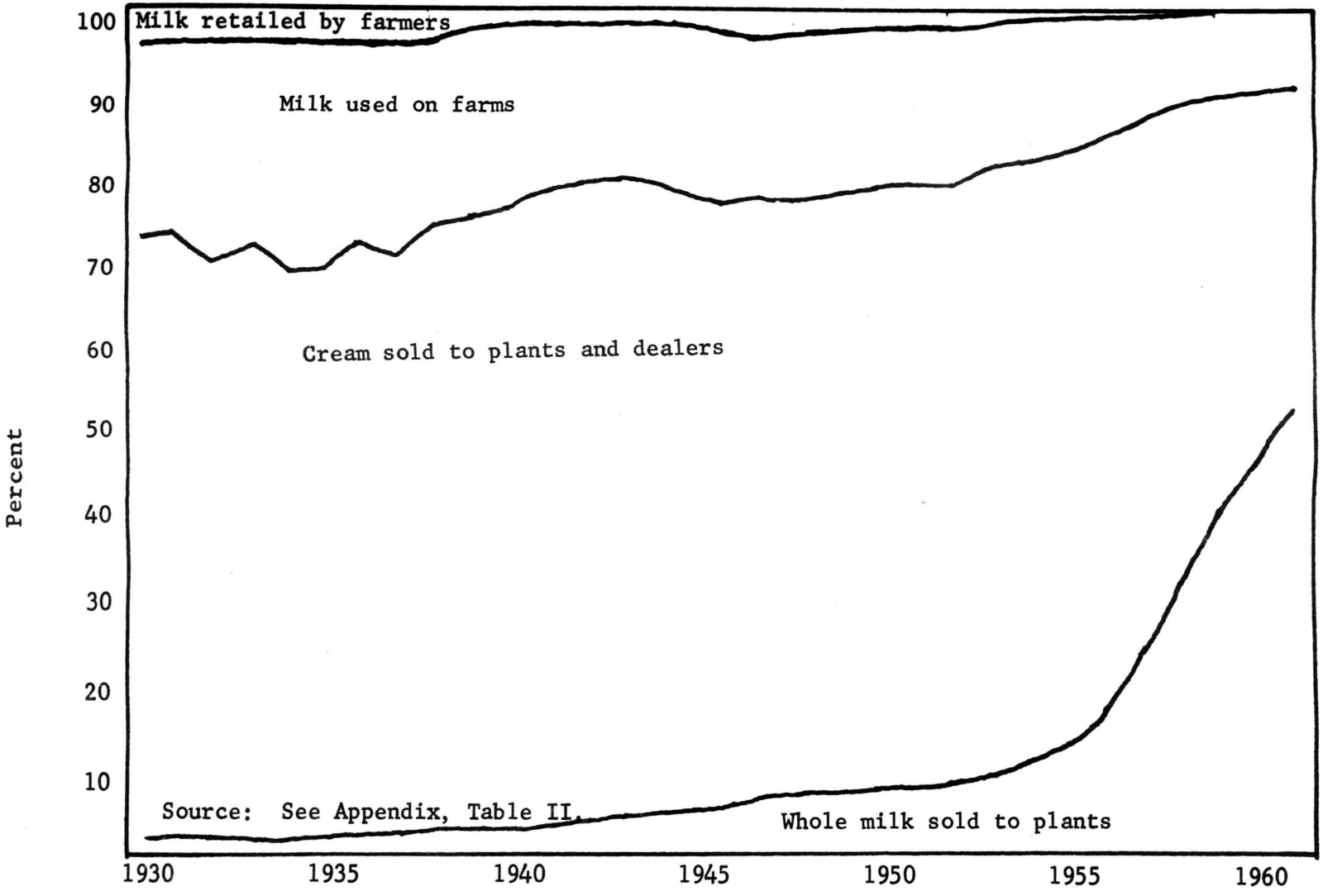

Figure II. Annual farm level disposition of total milk supply in South Dakota, 1930-1961

Butter is the major dairy product manufactured in South Dakota and attained its peak output in 1941 when 46.7 million pounds was produced. Production has, however, shown only minor fluctuations since 1945. Output in 1961 was 38.9 million pounds.

Production of "American" whole-milk cheese in South Dakota has increased 9.5 times since 1945. Output in 1961 was 15.2 million pounds. Cottage, pot, and bakers cheese output was 5.9 million pounds in 1961 compared with only 225,000 pounds in 1945. Data on South Dakota's nonfat dry milk production were first available in 1958 when output was 18.3 million pounds. Production in 1961 was 40.6 million pounds. Yearly production figures for these four major dairy products are shown in the Appendix, Table 3.

The decline in dairy processing and manufacturing plants in South Dakota has probably been hastened by the change from processing farm-separated cream to whole milk. Butter plants declined from 96 in 1951 to 41 in 1962, while fluid milk plants declined from 47 in 1951 to 39 in 1962. There were 25 ice cream factories in South Dakota in 1962 compared with 38 in 1953. Factories showing an increase from 1953 to 1962 were cheese and dry milk plants. The former increased from 5 to 9, while dry milk plants increased from 0 to 8.[4]

South Dakota is, and has historically been, a surplus producer of dairy products. Although many changes have come about in the industry,

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[4]South Dakota Department of Agriculture, Pierre, South Dakota.

the state still depends on out-of-state markets for the sale of large quantities of butter. From 1941 to 1960, shipments were 283.7 million pounds or 39 per cent of production during this period.[5] The state also ships most of its cheese and nonfat dry milk to out-of-state markets.

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[5] South Dakota Dairying, South Dakota Crop and Livestock Reporting Service, Sioux Falls, South Dakota, June 1958. Correspondence, South Dakota Crop and Livestock Reporting Service, September 5, 1962.

CHAPTER III

REVIEW OF LITERATURE

Most of the dairy marketing research done at South Dakota State College has emphasized the importance of marketing high quality products at competitive prices.

A study by Feder, Breazeale, and Newberg[6] indicated that much South Dakota butter was lacking in quality. In the spring and summer of 1950, butter manufactured by 20 sample creameries and amounting to 344,000 pounds was graded in the plants according to Federal standards. In 1951, butter amounting to 759,000 pounds was graded in a survey of all South Dakota plants.

In 1950, 81 per cent of the graded butter was Grade B and 19 per cent was Grade C. In 1951, 83 per cent was Grade B, 15 per cent Grade C, and the remainder (about 1 per cent each) Grade A and CC (cooking grade). Old-cream flavor was the most dominant flavor in the Grade B butter in 1950 and 1951. In the earlier year, 67 per cent of the butter was designated having this flavor, and in 1951, 80 per cent was so designated.

If the Federal standards of 1954 had been in force in 1950 and 1951, the proportion of Grade B butter in the state would have been

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[6] Ernest Feder, Delbert F. Breazeale, and Richard Newberg, Quality Aspects of Butter Marketing In South Dakota, Bulletin 443, Economics and Dairy Husbandry Departments, Agricultural Experiment Station, South Dakota State College, April 1955.

considerably lower and the proportion of Grade C butter considerably higher.

The above data were accumulated during a period when South Dakota farmers marketed most of their milk as farm-separated cream. A creamery's method of procurement, according to the study, is the most significant factor affecting butter quality. Plants which procured their cream from farm truck routes had a substantially higher percentage of Grade B butter for the 1950-51 period than plants using the door delivery or cream station methods.

South Dakota creameries obtain their cream by one or a combination of the following methods of procurement: (a) Farm truck routes, (b) direct door delivery by farmers to the plant, (c) company-owned or independent cream stations, and (d) direct railroad shipment by farmers to a distant plant. Currently, the first and second methods are the most popular.

A study conducted in the spring of 1955[7] would support the findings of Feder, Breazeale, and Newberg with regard to procurement practices. Five South Dakota creameries procured about 90 per cent of their cream by truck routes with the remainder being received by door delivery. Most of the creameries did their own hauling and those that did had lower trucking costs than the creameries that contracted for hauling.

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[7] Ralph O. Pelberg, The Economic Feasibility of Whole Milk Procurement In Eastern South Dakota, Master of Science Thesis, South Dakota State College, May 1957.

Felberg, after comparing actual costs and returns of butter manufactured from farm separated cream with estimated costs and returns of butter manufactured from whole milk, concluded that whole milk procurement would be economically feasible in southeastern South Dakota. The shift from cream to whole milk was likely to be less successful, however, for the low-volume creameries.

As Felberg's data show, the larger whole milk plants could pay a competitive price to producers, and thus furnish them a market for either farm-separated cream or whole milk. Due to the demand conditions of the industry, South Dakota plants are finding it to their economic advantage to convert to whole milk operations. The farmer has the choice, however, as to whether he makes the necessary changes on his farm so he will continue to have a market for his milk.

South Dakota farmers have three alternatives. They must decide to (1) sell cream as long as there is a market, (2) sell whole milk, or (3) discontinue the dairy enterprise. Factors to be taken into consideration in making these decisions are many. If the farmer quits milking or shifts to whole-milk marketing, he can eliminate the labor requirements of separating, washing the separator and carrying the skim milk to farm animals. Selling whole milk results in a higher cash income since the farmer is selling the butterfat and the skim milk. There is a trend toward decreased use of skim milk as an animal feed as prepared rations are displacing its use. Closely related to the latter factor is that farmers generally have an imbalance between their supply of skim milk and animals to be fed the product.

According to Felberg's study, farmers handling whole milk with a bulk tank operation and milking 15 cows could expect a net return of $2.57 per hundredweight of milk. Cream handling operations of this scope would have a net return of $2.18. The farmers marketing whole milk would thus be getting $.39 for skim milk per hundredweight of whole milk. Converting this to net per hundredweight of skim milk, the value of the product would be $.44.

Farm feeding value of skim milk varies widely depending upon price and availability of other feeds; how the skim milk is used; spillage; and number, type, and age of livestock on feed. With tankage at $5 per hundredweight and corn at $.90 per bushel, skim milk fed to livestock is worth $.45 per hundredweight. When fed in proper proportions, 100 pounds of skim milk is equivalent in feeding value to 7 pounds of tankage and 1/5 bushel of corn.[8] When the $.45 is compared with the $.44 per hundredweight farmers would get for their skim milk selling it as whole milk, it seems that it would make little difference if the product were fed to livestock or sold in the form of whole milk. Miller and Williams point out, however, that few farmers use the skim milk effectively enough to receive the benefits of its full value.

Dairy marketing research done at South Dakota State College points out that much of the butter produced in South Dakota has

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[8] Clarence J. Miller and Sheldon W. Williams, Potential Adjustments in Dairy Marketing in the Northern Plains States, Bulletin 450, Agricultural Experiment Station, University of Nebraska, July, 1959.

generally been of poor quality. Additional research shows, however, that better procurement practices, assembly practices, and the conversion from farm-separated cream to whole milk procurement are steps being taken that will help to improve butter quality. The buying of whole milk also means manufacturing plants can be more flexible in their operations and able to take better advantage of changing or new product demands by the consuming public. Consumer demand for dairy products is changing, and the above reviewed research indicates those production and manufacturing practices that will help to keep South Dakota dairy products competitive with products from other surplus producing states.

CHAPTER IV

HISTORICAL REVIEW OF DAIRY PRODUCT CONSUMPTION IN THE UNITED STATES 1930-1961

Since the late 1930's, two opposing consumption trends have developed in the dairy industry: (1) An uptrend in consumption of solids-not-fat, and (2) a downturn in consumption of milk fat per person. Figure III graphically portrays per capita milk fat and solids-not-fat consumption in the United States.

In the words of one source:[9]

> The decline in the use of milk fat has resulted from (1) a reduction in fat content of some dairy products and (2) a replacement of milk fat by vegetable fat in other products. Evidences of the former are the lower fat content of current sales of fluid milk, sales of some low-fat ice cream, increased sales of processed and cottage cheese, and smaller sales of fluid cream, particularly whipping cream. Evidences of the latter include (1) the drop in the use of milk fat in butter, which resulted in part from the general reduction in consumption of fat-type table spreads, and in part from the substitution for butter of margarine and other lower-priced spreads, and (2) the replacement of milk fat by vegetable fats in products that are referred to technically as "filled dairy products" but sell at retail under brand names in a form that permits them to compete directly with the dairy product they resemble, such as ice cream or evaporated milk.

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[9] Anthony S. Rojko, The Demand and Price Structure for Dairy Products, p. 26, Technical Bulletin No. 1168, U. S. Department of Agriculture, Washington, D. C., May 1957.

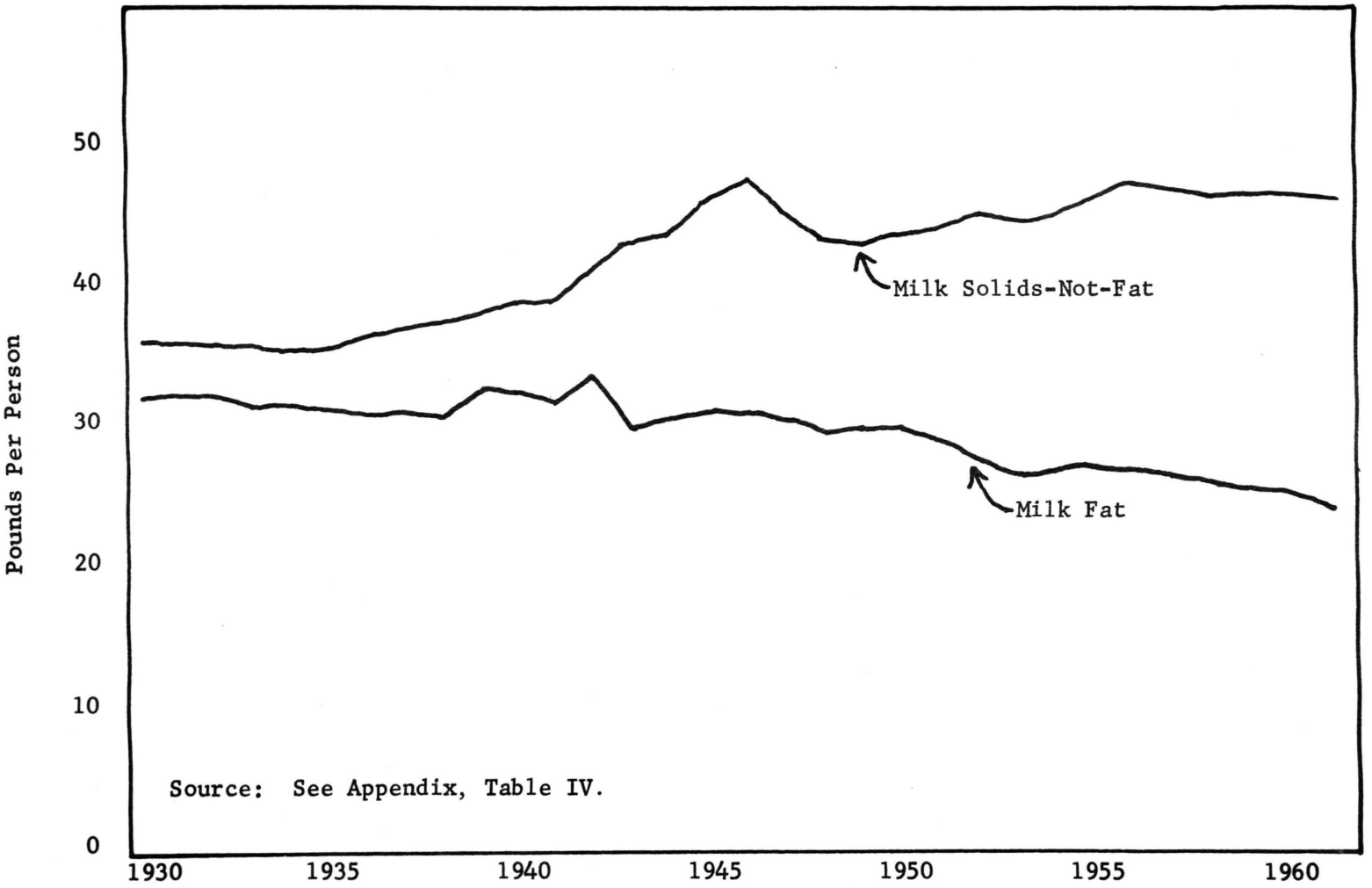

Figure III. Civilian consumption of milk fat and milk solids-not-fat per person in the United States, 1930-1960

The net result of these effects is that civilian per capita consumption of milk fat was 24.0 pounds in 1961 compared with 29.4 pounds in 1950 and an average of 32.3 pounds from 1930-34.

Civilian consumption of milk solids-not-fat has been increasing steadily since 1930 and in 1961 was 43.4 pounds per person compared with 35.7 pounds in 1930. Rojko contends that the increase is due to (1) the relatively greater use of dairy products containing both solids-not-fat and the fat portion of milk, and (2) the introduction of new or increased uses for nonfat products both for manufacturing and for household use. For example, per capita use of cheese has increased from 4.7 pounds in 1930 to 7.7 pounds in 1950 and 8.5 pounds in 1961. Per capita consumption of nonfat dry milk has increased 68 per cent since 1950 and was 6.2 pounds in 1961.

Consumer packages of nonfat dry milk have only been available in any sizable quantity since the late 1940's. In 1960, 184.4 million pounds of instant nonfat dry milk was packaged for home use, and such utilization has increased 33.2 million pounds since 1957 and 154.4 million since 1950.

Review of Butter Consumption

Per capita civilian consumption of butter, including government donations, declined from 17.6 pounds in 1930 to 7.4 pounds in 1961. The trend in consumption has been steadily downward over this time. Table 5 in the Appendix shows supply, distribution, and consumption data for the years 1930-61.

Fats and Oils Consumption

Although per capita consumption of butter has declined substantially, consumption of fats and oils per person has remained about the same since 1930 except during the World War II period. Total fats and oils include butter, lard, margarine, shortening, and other edible fats and oils. Figure IV graphically portrays per capita use of fats and oils in the United States.

The consumption of fats and oils per person has varied between 42 and 51 pounds since 1930. Butter and lard were the only two commodities to show a decline; while margarine, shortening and other edible oils all showed an increase. According to the data, it would seem margarine consumption has supplanted part of the butter use. (See Appendix, Table 6).

Government Price Support Program

The Federal Government first engaged in the purchase of surplus butter under various programs of the United States Department of Agriculture for price support purposes in 1933. Such programs are to remove butter from commercial channels and place a "floor" under the milk fat price. Under these programs the purchased butter is distributed domestically to those consumers who would normally consume very little butter or is distributed overseas through noncommercial channels. The result of these programs is that the supply of butter available to the consumer through commercial channels is reduced.

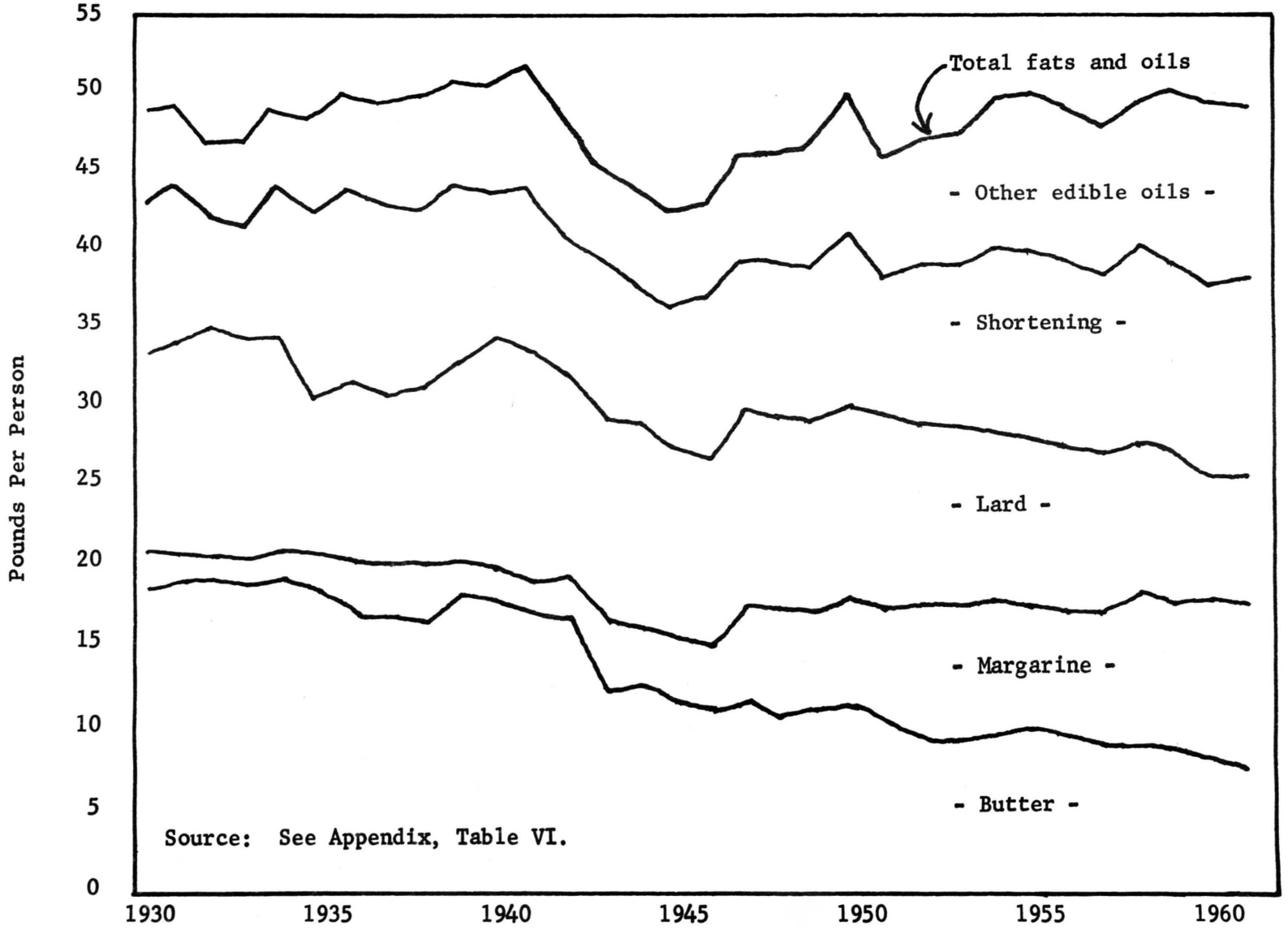

Figure IV. Civilian consumption of fats and oils per person by type, United States, 1930-61

Since the Government's initial butter purchase in 1933, only in 1947 and 1948 were no purchases made. Purchases have ranged from 200,000 pounds in 1951 to 358.9 million pounds in 1953.

Butter and Margarine

Margarine consumption per person increased from 2.6 pounds in 1930 to 9.5 pounds in 1961. During this time, butter consumption declined from 17.6 pounds to 7.4 pounds. The Agricultural Research Service of the U. S. Department of Agriculture found evidence in a study of household purchases during six-month periods (April-September 1947, 1953 and 1957) that margarine had or was becoming an increasingly popular product with households. Table 2 summarizes the data found.

Table 2. Percentage of Households Buying Butter and Margarine in the United States April-September 1947, 1953 and 1957.

Items	Percentage Buying		
	1947	1953	1957
Butter	70.7	58.6	56.9
Margarine	57.8	78.3	78.6

Source: Household Purchases of Fluid Milk, Nonfat Dry Milk, Butter, Margarine, by Family Characteristics, April-September 1957 With Comparisons, p. 21, 25, Agricultural Marketing Service, U. S. Department of Agriculture, HPD-58, July 1958.

A 473-million pound decline in butter production during World War II, along with fortification of oleomargarine with Vitamin A immediately after the War, contributed greatly to the decline of butter consumption during the 1940's.

Another major reason for the shift in levels of consumption between margarine and butter is the wider price differential between the two products now than that which prevailed only about a decade ago. Before World War II, the price of butter was about twice the price of margarine.[10] In 1960, the average retail price per pound of butter in leading cities of the United States was 2.8 times larger than the comparable price for margarine. Also, within the last 10 to 12 years, a number of Federal and state laws have been repealed to permit the freer production and distribution of margarine than prevailed in prior years.

Review of Cheese Consumption

Civilian consumption of cheese per person, including government donations, increased from 4.7 pounds in 1930 to 8.5 pounds in 1961. The trend has been steadily upward during this time and is mainly due to increased consumption of whole and part whole milk cheeses. Consumption of "American" cheese, whole milk cheddar, has shown only a minor increase since 1930. Although a projection of cottage cheese consumption was not done in this study, the product is continuing to become more popular and its manufacture could serve as an outlet for surplus milk supplies in South Dakota. Cottage cheese consumption was 4.6 pounds per person in 1961; an increase of 1.5 pounds over 1950.

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[10] The Dairy Situation - 280, Agricultural Marketing Service, U. S. Department of Agriculture, November 1960.

A graphic history of cheese consumption per person may be seen in Figure V, while Table 8 in the Appendix shows the supply, distribution, and consumption data of cheese from 1930 to 1961.

Government Price Support Program

Although authority was granted to purchase "American" cheese for price support purposes in 1933, purchases were first made in 1934 and totaled 17.9 million pounds. Total cheese purchases since the start of the program do not approach the volume of butter purchased, but in certain years (1953-1957), the quantity of cheese bought has approached or exceeded butter purchases. In 1953, 307.8 million pounds of "American" cheddar cheese were purchased, or 30.1 per cent of production of that type of cheese.

Cheese and Meat

In recent years, cheese has been used increasingly more as a substitute for meat or fish in planning a dinner meal, and as a substitute for spreads and meats in sandwiches. According to a consumer survey conducted by Alfred Politz Research Inc.,[11] that with 19 per cent of all adults eating cheese at lunch on an average, 62 per cent of luncheon usage was in sandwiches. This was the largest single use

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[11] American Dairy Association, Public Attitudes and Uses of Dairy Products, Highlights Study No. 6, Consumer study conducted Fall, 1956 by Alfred Politz Research, Inc., Chicago, Illinois.

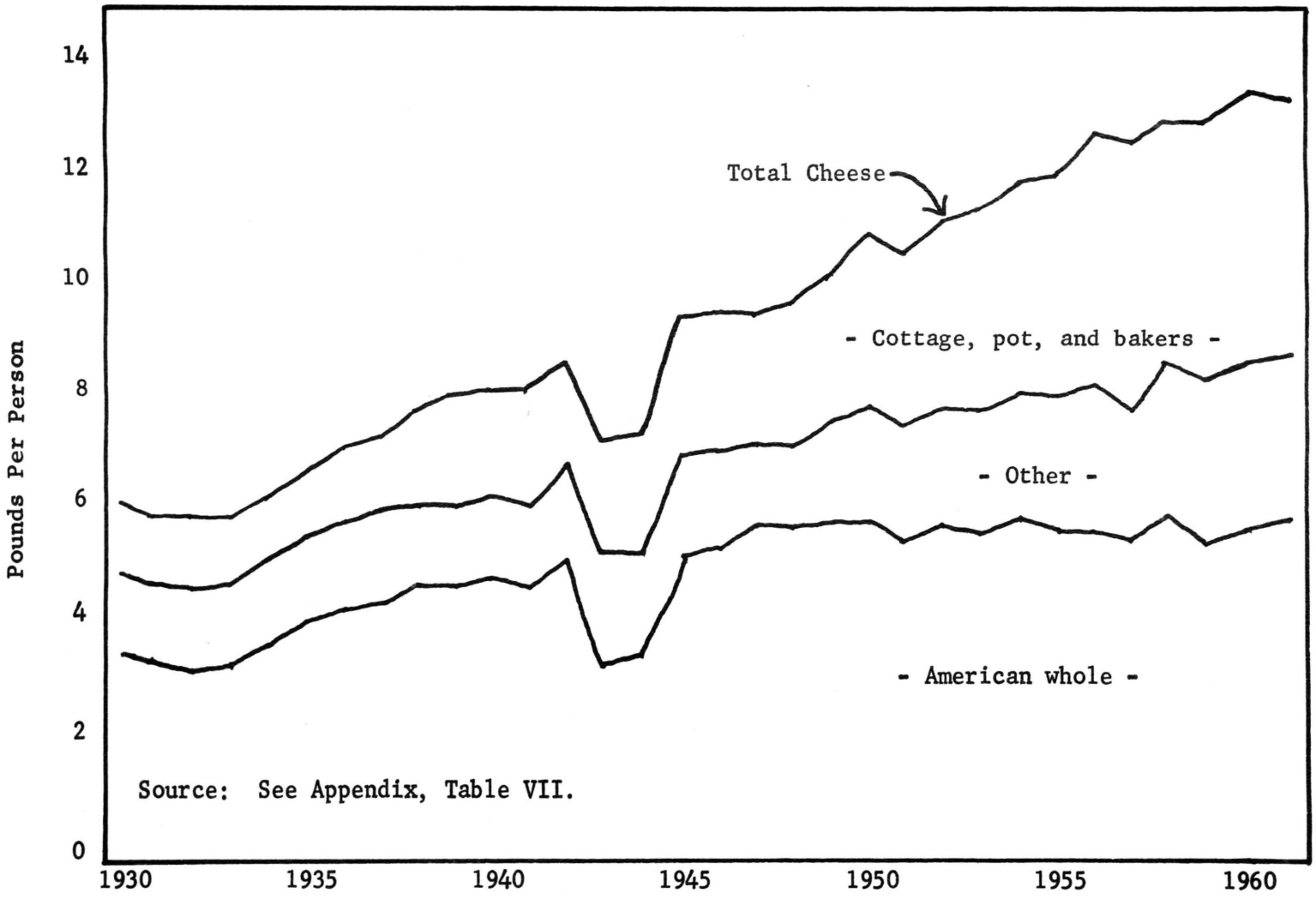

Figure V. Civilian consumption of cheese per person by type, United States, 1930-61

of cheese. The study also showed that three-fourths of all housewives sometimes used cheese in planning meatless meals.

Mize, Thompson, and Bland[12] found in Georgia that 40 per cent of the families in the study used cheese as purchased, including use in sandwiches; while 29 per cent reported using cheese for food preparation alone (in cooked foods). Cheese was considered one of the staple foods since 69 per cent of the families reported that they would do without (substitute no other food) until they could get cheese again.

Review of Nonfat Dry Milk Consumption

From 1930 to 1961, there have been only four years when civilian per capita nonfat dry milk consumption showed declines from the preceding years, and two of those years were affected by the demands of World War II. Over this 32 year period, per capita use has increased from 1.3 pounds to 6.2 pounds. Within the last decade, consumption has increased 2.0 pounds per person.

The nonfat dry milk supply has shown a greater increase over the years than any of the other manufactured dairy products. Total production in 1961 was 2,013 million pounds; an increase of 128 per cent over 1950 and 525 per cent greater than 1940. Production has, since 1941, exceeded consumption, and thus the government has played a major

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[12] Jessie J. Mize, Doris W. Thompson, and Frankye E. Bland, Consumer Marketing Practices and Uses of Dairy Products, Bulletin N.S. 39, College of Agriculture, Agricultural Experiment Station, University of Georgia, January 1957.

role in the equating of supply and demand. Figure VI shows per capita production and consumption of nonfat dry milk, while Table 10 in the Appendix shows the supply, distribution, and consumption of the same product.

Government Price Support Program

The Federal Government first purchased nonfat dry milk under the price support program in 1949. From that year to 1961, 7,797.9 million pounds have been delivered into federal storage. This quantity represents 44 per cent of total production during this period. Over the last five years, deliveries have, however, averaged about 50 per cent of production.

Nonfat Dry Milk and Its Use

The proportion of nonfat dry milk utilized domestically by various outlets shows the importance of food processors in the total utilization. For example, in 1960 the domestic non-government use was made up largely of quantities used by four types of food processors. The relative importance of each of these processors was: bakery, 312.7 million pounds; dairy, 209.7 million; meat processing 81.3 million; and prepared dry mixes 47.9 million. These four types of processors thus used 72.1 per cent of the total nonfat dry milk utilized domestically by non-government users. This proportion is down, however, about 15 per cent from 1950.

A major reason for this decline of nonfat use by these major food processing industries is because of the substitution of cereal

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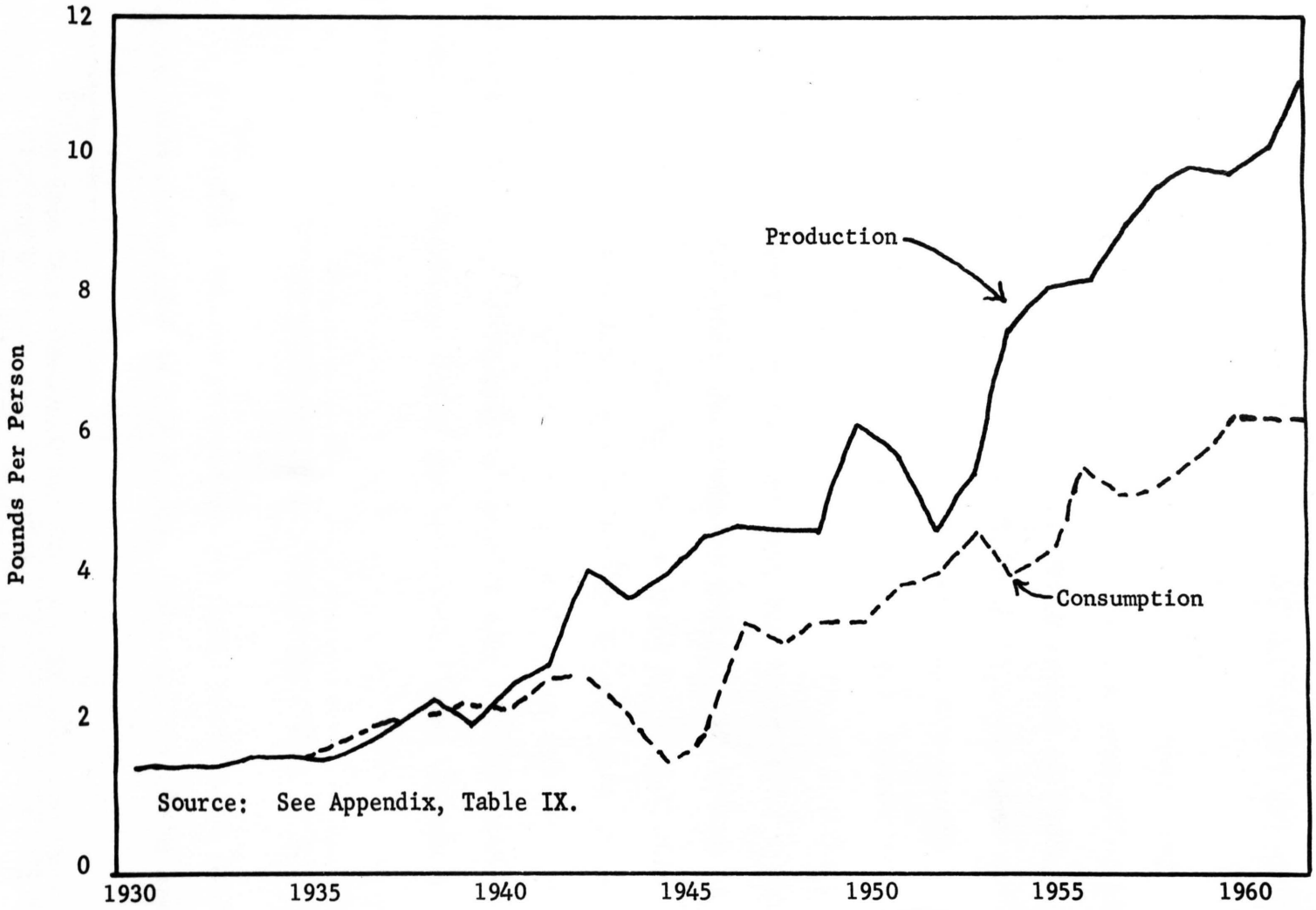

Figure VI. Civilian production and consumption of nonfat dry milk per person, United States, 1930-61

by-products as fillers for nonfat dry milk. This substitution has been mainly due to the relatively high prices of nonfat dry milk compared with prices of the other filler products.

The milk-drying industry has also channeled more nonfat powder into the instantizing process, which results in a product of higher quality and of higher value. Household utilization of instant nonfat dry milk was 184.4 million pounds in 1960 or 20.4 per cent of total domestic non-government use. From 1950 to 1960, the quantity of nonfat packaged for home use increased 514 per cent. Figure VII shows graphically the domestic utilization of nonfat dry milk sales.

The data show that nonfat dry milk continues to be a more popular dairy product with the consuming public. According to a study conducted in the Spring of 1957,[13] 30 per cent of nonfat users mentioned specific advantages of the product. Of the 30 per cent, 39 per cent thought the greatest advantage was that nonfat was not fattening, 27 per cent listed ease of storage as an advantage, 27 per cent listed its economy as an advantage, and 10 per cent listed ease of use as an advantage.

Review of Fluid Whole Milk Consumption

Per capita civilian consumption of fluid whole milk declined 2.8 per cent during 1961 to 279 pounds. This was the fifth successive

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[13] American Dairy Association, Public Attitudes and Uses of Dairy Products, Highlights Study No. 7, Consumer study conducted Spring, 1957 by Alfred Politz Research, Inc., Chicago, Illinois.

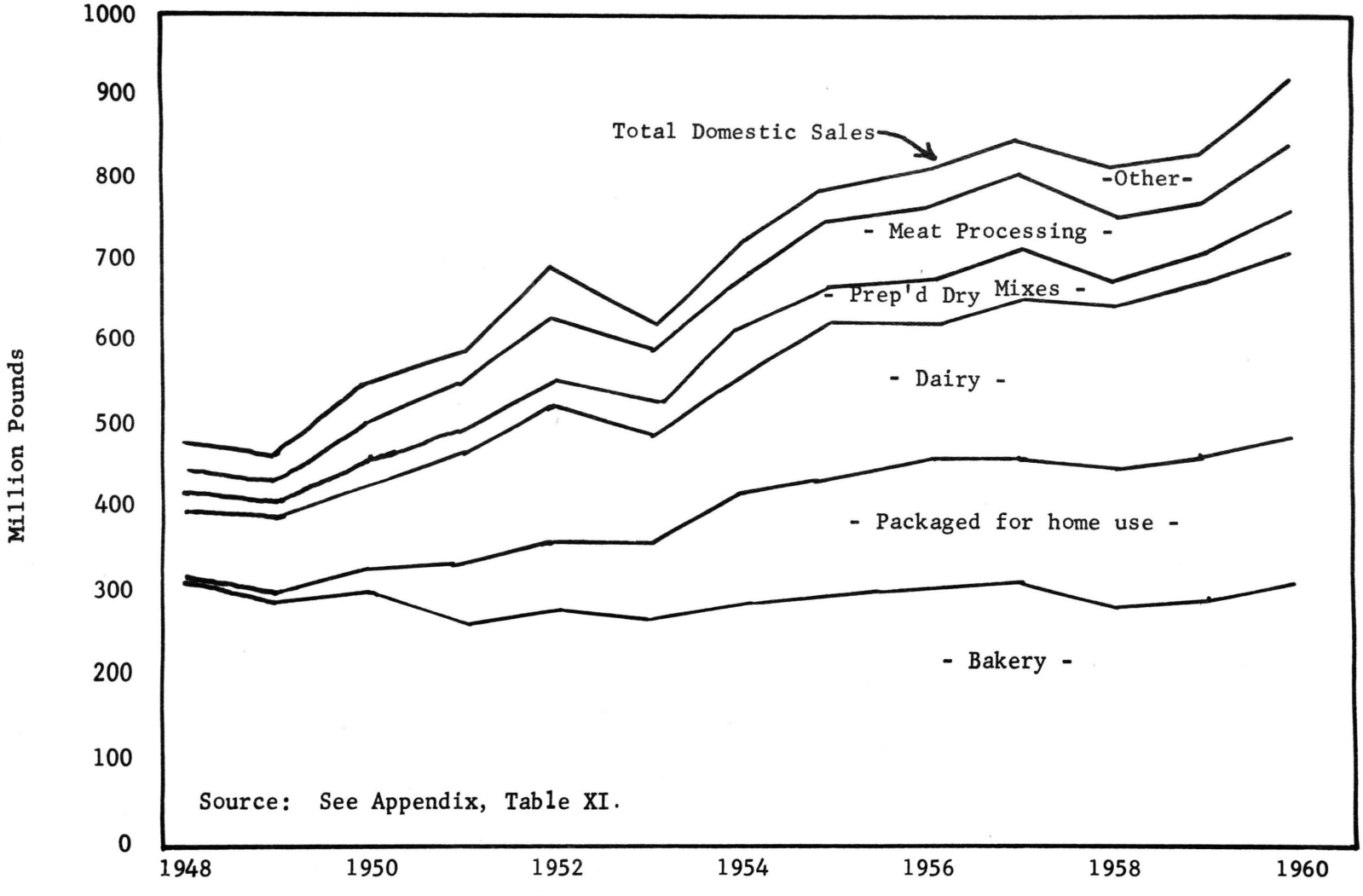

Figure VII Domestic sales of nonfat dry milk by end use, United States, 1948-60

year that per capita fluid milk consumption per person has shown a decline. Consumption reached its peak in 1945, when it was 335 pounds, but it has shown a steady decline since. Figure VIII graphically portrays per capita use of fluid milk.

Fluid Milk Marketing and the Federal Government

The Federal Government specifically enters into the marketing of whole milk under the authority of the Agricultural Marketing Agreement Act of 1937. Under this Act, Federal Milk Marketing Orders can be established. On June 1, 1962, there were 83 such orders.[14]

According to Hinds and Johnstone,[15]

> Federal orders define the terms under which dairymen sell their milk to handlers. The purpose is to maintain marketing conditions that will assure consumers a dependable supply of pure and wholesome milk and be in the public interest. Orderly marketing is sought by spelling out in advance the terms for both buyers and sellers. These terms are developed largely through public hearings where producers, handlers, and consumers have an opportunity to participate. Once an order is in effect, information about supply and demand is collected and made available to all interested parties.

From the total of 48.8 billion pounds of Grade A milk marketed through Federal orders in 1961, 29.8 billion pounds was utilized as

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[14] Dairy Situation - 280, op. cit.

[15] Max K. Hinds and William F. Johnstone, Dairy Economics Handbook, p. 28, Agriculture Handbook No. 138, Federal Extension Service, U. S. Department of Agriculture, Washington, D. C., November 1958.

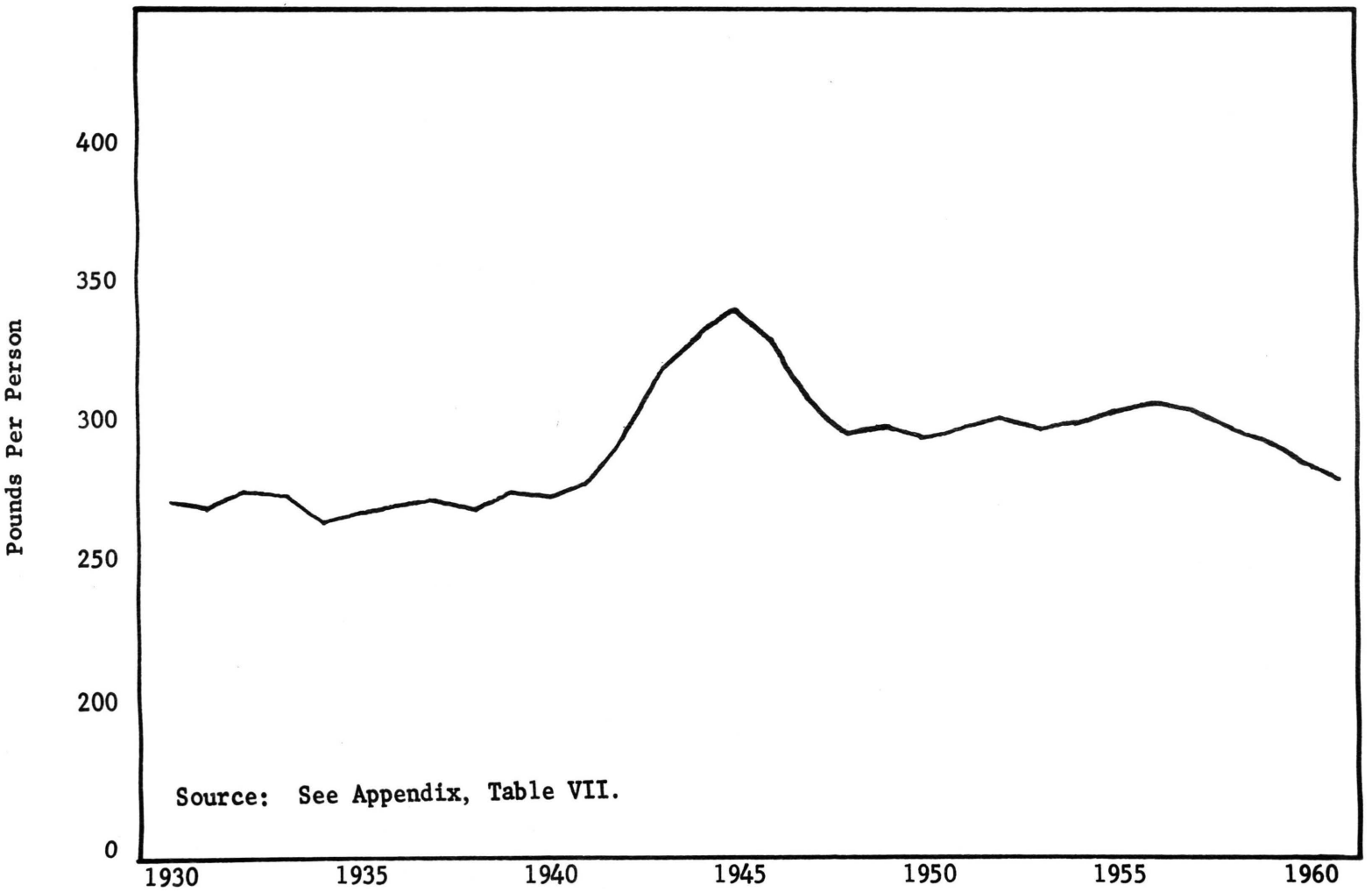

Figure VIII. Civilian consumption of fluid milk per person in the United States, 1930-61

Class I or fluid milk. Class I use was 16.2 billion pounds in 1954 and 9.8 billion in 1947.

The Federal Government also sponsors programs that have contributed to greater utilization of fluid whole milk in non-profit schools. The "Penny Milk Program," introduced in 1940 on a trial basis, was the first program under which the Federal Government supported the distribution of fluid milk to school children.

The National School Lunch Act came into being in 1946. This Act gives Congress authority to assist the states in the operation of a non-profit school lunch program. The program utilizes agricultural commodities to safeguard the health and well-being of the school children of the United States. Fluid milk was one of the commodities used in the school lunch program.

An additional school distribution program for fluid milk, commonly referred to as the "Special Milk Program," was made a part of the Agricultural Act of 1954. Under the Act, the Commodity Credit Corporation has authority to use $50 million annually to increase the consumption of fluid milk by children in non-profit schools.

Distribution of fluid whole milk under these latter two programs totaled 2.6 billion pounds in 1961 compared with 1.4 billion in 1955 and 0.4 billion in 1947.

Fluid Whole Milk and Its Substitutes

There appear to be numerous and varied opinions as to the substitutability of products such as evaporated milk, instant nonfat dry

milk, concentrated milk, and dry whole milk for fluid milk. Although the amount of research done in this area has been quite extensive, no clear postulates have been formulated and accepted by all as to when and how much consumers will substitute any of these products for fluid whole milk.

Mize, Thompson, and Bland[16] found in their survey that canned evaporated milk was the principal substitute for fresh fluid milk. Families accounting for 14 per cent of the 501 families interviewed substituted evaporated milk, while eight per cent of the families substituted dry milk.

Purcell[17] after also doing research on this matter in Georgia wrote the following:

> The statistical evidence is rather strong to support the hypothesis that relatively high fluid milk prices induce consumers to substitute less expensive dried and canned milk for fresh fluid milk. This relationship seems to hold true even though households of all levels of income vary considerably in the level of consumption of both fluid milk, canned and dried milk.

There have been other studies, however, that tend to show non-fat dry milk and evaporated milk as supplementary products of fluid

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[16]Mize, Thompson, and Bland, op. cit.

[17]Joseph C. Purcell, Analysis of Demand for Fluid Milk and Fluid Milk Substitutes In The Urban South, p. 58, Technical Bulletin N. S. 12, College of Agriculture, Agricultural Experiment Station, University of Georgia, October 1957.

milk rather than as substitutes. Zawadski[18] found in his Rhode Island study that most buyers of nonfat dry milk also reported buying some fresh fluid milk. Only 15 per cent of the purchasers of nonfat dry milk indicated they substituted nonfat for fluid milk.

When total purchases of nonfat and fluid milk were divided by total number of persons in the sample, weekly per capita use of 2.08 quarts of nonfat and 2.04 quarts of fluid milk was indicated. The combined total was nearly one quart higher than the indicated average per capita use of 2.64 quarts of fluid milk and .33 quart of nonfat per week in 1950 to 1954. Zawadski contends that such results indicate that nonfat dry milk is used in addition to, rather than a substitute for fluid milk.

A study conducted in the Spring of 1957[19] tends to show that the use of fluid milk for drinking did not decline when purchases of evaporated milk and nonfat dry milk are made. The report shows, however, that use of fluid milk in cooking and adding to coffee does decline when the other two products are present.

Evaporated milk consumption has declined 7.4 pounds per person since 1950, while per capita use of dry whole milk was only .3 pound in 1961 and its highest level of consumption per person has only been .5 pound.

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[18] M. I. Zawadski, Fluid Milk, Dry and Evaporated Milk Consumption in Rhode Island, Bulletin 350, Agricultural Experiment Station, University of Rhode Island, June, 1960.

[19] American Dairy Association, Public Attitudes and Uses of Dairy Products, Highlights Study No. 7.

Due to the lack of common agreement on the substitutability of evaporated milk for fluid milk and because per capita use of the former product has been declining, evaporated milk consumption data were not included as an independent variable in the 1975 projection of fluid whole milk. Dry whole milk consumption figures and concentrated milk consumption figures were also not included as variables in the least-squares regression analysis of fluid milk consumption. The former was not included because of its small consumption, and the latter was not included because sufficient data were not available on either its price or consumption. Nonfat dry milk was included, however, because of its apparent increasing acceptance by consumers as shown by its increasing consumption.

CHAPTER V

PROJECTION OF DEMAND FOR DAIRY PRODUCTS TO 1975

The intent of this chapter is to develop projections of the quantity of butter, cheese, nonfat dry milk, and fluid milk which will be consumed in the United States in 1975. The steps employed in obtaining these projections were (1) projection of past consumption rates to 1975 by consideration of the demand shifters: changes in income, relative prices, and tastes and preferences; and (2) conversion of these per capita rates to total consumption by combining with projected total United States population to 1975.

A moment's reflection will reveal the hazardous nature of projections of this type. The processes of growth and change in our economy over time do not lend themselves to the intensive type of statistical analysis that is usually necessary to make such projections.

Most projections involve essentially two main steps: (1) The establishment of past behavior patterns, and (2) some inference from this past behavior which will help to define future behavior within certain defined limits. The first of these two steps is a matter of empiricism and is testable with available statistical techniques. Although statistical techniques are well developed for the task of discovering or imputing order to past events, some types of analysis are more frequently successful than others.

The demand projections derived in this paper were obtained by using least-squares regression analysis. Although there may be differences of opinion as to the merits of this approach, the use of it was based upon the support given it by certain authorities of demand analysis.

Foote and Waugh analyzed constructed data in an experiment to test the relative merits of least-squares and limited information coefficients for forecasting under specified conditions. They concluded, "In comparing some of the alternative methods, either (a) no consistent superiority was in evidence, or (b) the results, although slightly superior for one method or the other, were not sufficiently different to be of practical significance."[20]

Fox[21] after considering the various aspects of the single-vs.-simultaneous equation argument and conducting several simultaneous analyses, concluded that the least-squares and simultaneous equations method was reasonably satisfactory for demand analysis of commodities of farm origin.

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[20]Richard J. Foote, Analytical Tools for Studying Demand and Price Structures, p. 141, Agricultural Handbook No. 146, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C. August 1958.

[21]Karl A. Fox, The Analysis of Demand For Farm Products, Technical Bulletin 1081, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C.

Wold and Jureen contend that regression analysis is essentially sound. In demand analysis, at least, it can still be safely recommended.[22]

Although least-squares regression analysis can contribute to a reasonable expression of past demand patterns in the dairy industry, it places undefined limits on what can be inferred to future change. The second step in projection, therefore, is not provided in absolute terms. In the words of one source:[23]

> A system based on classical theory is not statistically operational (for projections). Such demand constructs identify the relevant variables and impose broad limits on likely functional forms and systems of determination. However, neither the determinants of temporal changes nor their interrelationships are specified. In consequence, there is no general agreement with respect to methods of projection. The effects attributed to preferences, population and income changes appear in fact to be interrelated in most demand projections. But, again, demand theory imposes no stringent limits on likely forms of such relationships. It seems impossible to derive operational hypotheses for projection from the limited propositions of orthodox demand theory . . . Most published projections of farm demands seem to involve similar assumptions and operations. Per capita consumption rates are usually projected (from a statistical demand relation) from income and price assumptions with shifts in preference reflected in the income elasticities employed. With an assumption of the level

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[22]Herman Wold and Lars Jureen, Demand Analysis: A Study in Econometrics, John Wiley and Sons, Inc., New York, 1953.

[23]Norman R. Collins and George L. Mehren, Demand Functions and Prospects, A paper delivered at the Conference on Adjusting Commercial Agriculture to Economic Growth, sponsored by the North Central Farm Management Research Committee in cooperation with the Farm Foundation, Chicago, Illinois, March 1957.

> of total population aggregate requirements are then defined. . . The explicit variables then are size and income of population. Other attributes of both series which may affect preferences may be explicitly introduced. . . Net export and nonfood demands are usually projected separately and often quite arbitrarily. Commodity projections are adduced separately and revised as necessary to achieve consistently among themselves, with past relationships and with the separately developed global projections. Thus base period consumption rates are assumed to change as fairly simple functions of population and income with constant base period price ratios. Population projections are taken from demographers.

This discussion of the problems involved in projection of demand, will set the stage for the projections accomplished in this study. It will be concluded from the previous discussion that projection procedures are not to be anticipated as being precise and impeccably logical calculations.

Now that enough data have accumulated since World War II to permit running analyses for the postwar years, demand analyses are usually run for either (1) the years between World War I and World War II, (2) the years following World War II, or (3) the entire period. If conditions were such that the years of World War II had no abnormal effects upon the demand or supply of the commodity, the use of the entire period is probably the best predictor for the future. With regard to the products studied in this presentation, however, butter was affected directly by rationing during World War II and this also had an indirect effect upon the supply and demand of cheese, nonfat dry milk, and fluid milk. The years included in this study were, therefore, from 1946 through 1961.

To project consumption rates to 1975, the researcher must consider those factors that shift the demand of the individual products. Table 3 shows the relation between income and purchases of four dairy products in the United States on a cross sectional basis. The table suggests that consumption of butter, cheese and fluid milk increase with an increase in income, while consumption of nonfat dry milk tends to show a slight decline as income increases. That consumption in the aggregate will also increase or decrease with an increase in income, simply because the tendency is indicated in a cross sectional study, should not be immediately concluded, however. Behavior of the aggregate through time is affected not only by average per capita income but by changing distribution of income and several other factors. Nevertheless, the tendency seems strong enough to suggest the use of income as a demand shifter.

Table 3. United States Per Capita Consumption of Four Dairy Products Per Week As Related To Income

Income	Butter	Cheese	Fluid Milk	Nonfat Dry Milk
	Pounds	Pounds	Quarts	Pounds
Under $1,000	.24	.18	2.46	.10
$1,000 - 1,999	.36	.19	3.87	.08
$2,000 - 2,999	.45	.23	6.62	.06
$3,000 - 3,999	.52	.24	9.21	.06
$4,000 - 4,999	.62	.25	10.91	.05
$5,000 - 5,999	.67	.23	11.20	.04

Table 3. (Continued)

Income	Butter	Cheese	Fluid Milk	Nonfat Dry Milk
	Pounds	Pounds	Quarts	Pounds
$6,000 - 7,999	.75	.29	10.99	.04
$8,000 - 9,999	1.00	.31	10.33	.07
$10,000 and over	1.22	.35	11.68	.06

Source: Food Consumption of Households in the United States, p. 36, 37, and 47, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., December 1956.

The income projection used to project 1975 consumption was developed by Rex Daly.[24] His method of projection will not be explained in detail here since the multiplicity of assumptions, considerations, and adjustments involved in making such a projection prevents a complete presentation of the entire procedure.

Basically, the projection assumed a continuation of a rapidly growing economy. Projection of productivity was based on an assumed continued increase in innovations and growth in capital per man-hour of labor, as well as increases in the training, ability and general efficiency of labor. The productivity assumption, together with assumed trends in population, labor force, employment, and hours worked per week determined the Gross National Product by 1975. From this projection of the 1975 Gross National Product was abstracted its

[24] Rex F. Daly, "The Long Run Demand For Farm Products," Agricultural Economics Research, Vol. VIII, No. 3, U. S. Department of Agriculture, Washington, D. C., July 1956.

different components, with specific assumptions regarding tax rates, corporate profits, government revenues and expenditures, consumption, saving and investment. With additional assumptions regarding the general price level, the 1975 per capita disposable income was estimated at $2,449. This figure was deflated by the 1961 Consumer's Price Index to result in a figure of $2,350, which was used in the present study to project United States average per capita consumption of four dairy products.

Price is another factor that affects the consumption of a product. A 15-year projection of the price of each of the relevant products would be difficult, so it was assumed that retail prices in 1975 would be the same as those that prevailed in 1961. Some support for this assumption is found in the results of a study by the United States President's Materials Policy Commission.[25] In this study of future requirements of total agricultural production, the supply-demand situation for groups of commodities was projected to 1975 and an estimate was made of their prices resulting from the projected equilibrium. The results of this study indicate that only minor changes in the prices of most commodities are expected to occur by

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[25] U. S. President's Materials Policy Commission, Resources For Freedom, Vol. 5, (Washington, D. C. Government Printing Office, 1952). This publication is better known as the "Paley Commission Reports" after the name of the Chairman of the Commission, William S. Paley.

1975. Such small changes in relative prices, along with believed low price elasticities of most dairy products,[26] indicates a possibility of only minor changes in per capita consumption by 1975. Derivation of elasticity coefficients was not necessary in this study, since coefficients of partial regression which explain the effects of given independent variables upon a dependent variable are considered adequate.

The different price support programs that have been in effect during the base period from which these projections were made, made it difficult to measure quantitatively the effect each program had upon retail prices of dairy products. The role that government will take in pricing dairy products in 1975 is unascertainable, and thus it was further assumed that the effects of government price support programs in 1975 would be the same as those that prevailed from 1946 to 1961.

Time was included as an independent variable in each of the analyses because such a variable would contain those conditions for which no data were available or those conditions that were unmeasurable. The lack of historical data on promotion and advertising of dairy products or the difficulty of measuring changes in tastes and preferences would be examples of conditions that could be explained by the time variable.

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[26] Magnitudes of elasticity coefficients for dairy products as obtained in various studies are listed in Table 4.

Table 4. Magnitudes of Elasticity Coefficients For Selected Dairy Products, United States

Author	Period Analyzed	Market	Price Elasticities			Income Elasticities		
			Fluid milk and cream	Cheese	Butter	Fluid milk and cream	Cheese	Butter
Fox[1]	1922-41	National	-.30		-.25			
Johnson[2]	1938-51	National	-.40			.30		
Kriesal[3]	1924-41	National	-.40			.20		
Ross[4]	1920-22	Chicago	-.10					
Cassels[5]	1922-31	Boston	-.06					
Cassels	1922-31	Connecticut	-.14					
Cassels	1922-31	Baltimore	-.28					
Rojko[6]	1947-54	National	-.32	-.75	-1.37	.27	-.99	.36

[1]Karl A. Fox, "Factors Affecting Farm Income, Farm Prices, and Food Consumption," p. 76, Agricultural Economics Research, Vol. III, U. S. Department of Agriculture, Washington, D. C.

[2]Stewart Johnson, Dairy Marketing, p. 1, University of Connecticut, Storrs, Connecticut, 1951.

[3]Herbert C. Kriesel, "Expenditures for Fluid Milk and Cream Compared With Consumer Incomes," p. 14, Dairy Situation, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., December 1946.

[4]H. A. Ross, The Marketing of Milk in the Chicago Dairy District, p. 509, Bulletin 269, Agricultural Experiment Station, University of Illinois, 1925.

[5]John M. Cassels, A Study of Fluid Milk Prices, p. 108, Economic Study 54, Harvard University, 1937.

Table 4. (Continued)

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[6]Anthony S. Rojko, The Demand and Price Structure for Dairy Products, p. 105, Technical Bulletin 1168, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., May 1957.

The major assumptions on which these projections were based are as follows:

(1) World conditions will remain as they currently are with United States output devoted to national defense remaining at about the same proportion to total output as in the past.

(2) A high-employment economy was assumed with unemployment averaging around four to five per cent of the labor force.

(3) Productivity of the labor force will grow much as in the past.

(4) Retail prices for 1975 of the commodities analyzed in this study were assumed at 1961 levels.

(5) Prices in general for 1975 were assumed at 1961 levels both for agriculture and for the economy as a whole.

(6) Supply of the analyzed commodities was always sufficient during the 1946-61 base period to meet consumer demand for the same products.

(7) Government programs affecting the demand and supply of the relevant products will not be discontinued.

Projection of Butter Consumption to 1975

Complete data on per capita consumption of butter, retail price of butter and margarine, per capita disposable income, and time

permitted the formulation of a statistical demand relationship for the consumption of butter. After the application of least-squares regression analysis and solving of equations simultaneously, the multiple regression equation derived was:

$$X_{1c} = 14.18598 - .062833X_2 + .000832X_3 + .0262X_4 - .300261X_5$$

where, X_1 = United States average per capita butter consumption.

X_2 = United States index of retail prices of butter deflated by the Consumer Price Index of the Bureau of Labor Statistics.

X_3 = United States average per capita disposable income deflated by the Consumer Price Index.

X_4 = United States index of retail prices of margarine deflated by the Consumer Price Index.

X_5 = Time, 1946 = 1 and 1961 = 16.

The coefficient of multiple correlation was .967, while the standard error of estimate was .292. Data on which this analysis was based are given in the Appendix, Tables 5, 12 and 13.

The 1975 consumption rate was projected by substituting into the regression equation the 1975 projection of per capita disposable income, extending the time period to 1975, holding X_2 and X_4 at their 1961 values, and computing the value for the dependent variable. The projected 1975 United States average per capita consumption resulting from this procedure was 3.43 pounds. When this figure is combined with Daly's[27] population projection of 220 million United States citizens in 1975, total consumption of butter would be about 755 million pounds in 1975.

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[27] Rex F. Daly, op. cit.

Projection of Cheese Consumption to 1975

Complete data on the relevant variables affecting cheese (cheddar, whole and part whole milk) consumption were also available, and thus a statistical demand relationship was formulated. The multiple regression equation derived was:

$$X_{1c} = 11.497866 - .012336(X_2) - .001871(X_3) - .005048(X_4) + .139567(X_5)$$

where, X_1 = United States average per capita cheese consumption.

X_2 = United States index of retail prices of cheese deflated by Consumer Price Index.

X_3 = United States average per capita disposable income deflated by Consumer Price Index.

X_4 = United States index of retail prices of meat deflated by Consumer Price Index.

X_5 = Time, 1946 = 1 and 1961 = 16.

The coefficient of multiple correlation was .928, while the standard error of estimate was .191. Data on which this analysis was based are given in the Appendix, Tables 8, 12 and 13.

The 1975 consumption rate was estimated by using the same procedure as for the butter estimate. The projected United States average per capita consumption for 1975 was 9.49 pounds or about 12 per cent above 1961 consumption per person. Total domestic requirements in 1975 would thus be about 2,088 million pounds.

Projection of Nonfat Dry Milk Consumption to 1975

The multiple regression equation derived for nonfat dry milk was:

$$X_{1c} = -.945273 + .004005(X_2) + .002291(X_3) - .004719(X_4) + .166692(X_5)$$

where, X_1 = United States average per capita nonfat dry milk consumption.

X_2 = United States index of retail prices of nonfat dry milk deflated by Consumer Price Index.

X_3 = United States average per capita disposable income deflated by Consumer Price Index.

X_4 = United States average per capita consumption of low fat items.

X_5 = Time, 1946 = 1 and 1961 = 16.

The coefficient of multiple correlation was .981, while the standard error of the estimate was..213. Data on which this analysis was based are given in the Appendix, Tables 7, 10, 12, and 13.

The 1975 consumption rate was estimated by using the same procedure as for the butter estimate. The projected United States average consumption for 1975 was 9.72 pounds per person. Total nonfat dry milk requirements in 1975 would thus be about 2,138 million pounds.

Projection of Fluid Whole Milk Consumption to 1975

The multiple regression equation derived for fluid milk was:

$$X_{1c} = 124.261874 + .205809(X_2) + .105063(X_3) + .216432(X_4) - 4.33176(X_5)$$

where, X_1 = United States average per capita fluid milk consumption.

X_2 = United States index of retail prices (average of grocery and home delivery sales) of fluid milk deflated by Consumer Price Index.

X_3 = United States average per capita disposable income deflated by Consumer Price Index.

X_4 = United States average per capita nonfat dry milk consumption.

X_5 = Time, 1946 = 1 and 1961 = 16.

The coefficient of multiple correlation was .839 and the standard error of estimate was 5.01. Data on which this analysis was based are given in the Appendix, Tables 7, 10, 12, and 13.

The projected consumption rate was estimated by substituting in the 1975 projection of per capita disposable income, the projected per capita consumption of nonfat dry milk, extending the time period to 1975, holding X_2 at its 1961 value, and computing the value for the dependent variable. The 1975 projection of average per capita consumption of fluid milk was 282.84 pounds.

Implications of Demand Projections for South Dakota Dairy Industry

From the foregoing analysis, it is apparent that by 1975 United States consumers could be consuming a substantially smaller quantity of butter but a larger quantity of cheese, nonfat dry milk, and fluid milk.

South Dakota has traditionally been a major butter producing state with production totaling 39 million pounds in 1961 or 2.3 per cent of total United States production. In 1975 total United States butter consumption could be 579 million pounds less than 1961 consumption, and thus South Dakota butter plants will have an increasingly difficult time in maintaining their share of the shrinking butter market. There will continue to be, therefore, a declining need for butter plants in South Dakota. Plants that remain in operation will need to be more sensitive to quality specifications of the declining

market. Research at South Dakota State College, which was reviewed in this paper, points the way for procurement and manufacturing adjustments that will be necessary for the remaining plants to follow if they are to remain competitive with butter suppliers of other states. A continuation of research on the development and marketing of a low-fat butter, at a more competitive price with margarine, could, however, completely alter the declining need for butter plants.

According to the projection, total domestic cheese requirements could be about 2,088 million pounds in 1975; an increase of 549 million pounds over 1961 consumption. Sufficient market demand should thus be present in future years that South Dakota cheese plants will find it feasible to enlarge their volumes of operation and to induce some butter plants having operational difficulties to convert their plants to whole-milk cheddar or part-skim milk cheese manufacturing.

Assuming that the Federal Government does not discontinue purchases of nonfat dry milk under the price support program for foreign donation, the apparent domestic demand of 2,138 million pounds in 1975 should be sufficient inducement to South Dakota drying plants to increase their volumes of operation. This is an increase of 1,013 million pounds over 1961 consumption but only an increase of 128 million pounds over 1961 production. The plants should be increasingly quality conscious, as those plants that can supply a high quality product for further processing into instant nonfat dry milk for household use should be able to demand a price premium.

Although the projected per capita fluid milk consumption in 1975 is about 4 pounds over 1961 use, it is doubtful if South Dakota will increase production of this product beyond that amount necessary to supply its own demand. If interstate marketing possibilities of fluid Grade A milk should arise, South Dakota farmers and milk processing plants may find it advantageous to produce this product for consumers beyond its own borders.

These are implications, and implications of change are defined within the limits and assumptions of this study. Despite the fact that the projections are bound by the assumptions under which they are made, they highlight the underlying trends that affect the dairy industry of South Dakota. Within this framework some indication of the problems that are likely to emerge in the local dairy industry, the direction of the research needs, and the potential markets for the analyzed products, can be appraised. The projections thus gave some basis on which implications were drawn as to what changes South Dakota's dairy industry might find necessary in order to remain competitive with other milk surplus producing states. Additional research on production practices will be needed, however, to point out those specific adjustments that will help to keep South Dakota milk processing and dairy product manufacturing plants competitive.

CHAPTER VI

EXPANDING MARKETS THROUGH OLD AND NEW DAIRY PRODUCTS

Although the South Dakota dairy industry is primarily interested in the consumption patterns of the previously analyzed products, consumption changes taking place in other products and the impact of new dairy products on consumption patterns are developments of which the local industry should also be aware.

Attractive packaging, extensive promotion, greater uniformity of product, and many alternatives for its use have helped make cottage cheese a big and growing sales item. The data show that consumers are increasing their purchases of this product each year. South Dakota's dairy industry should not overlook the sales potential of this product.

The use of nonfat dry milk and condensed skim milk for fortifying fluid milks and for reconstitution has been approved in some states, when the products are properly labeled. Sales per person of low-fat milks --- natural and cultured buttermilks and skim milk as such or including quantities used in flavored drinks --- have remained stable the last decade, but the total market has increased substantially because of the ever-rising population.

Concentrated milk, first marketed in several cities during the early 1930's, aroused considerable interest among consumers and members of the food trade when it was reintroduced in 1950 and 1951. Although the product has not met with enthusiastic consumer acceptance, it does

have many appealing features and should not be overlooked when evaluating future sales potential of milk and milk products. For example, concentrated milk is processed under high vacuum and low heat and, unlike evaporated milk, it retains the full flavor of the fresh whole milk from which it is made.

Consumers have the advantage of a product which can be carried from the store more easily and which requires only one-third the storage space. Concentrated milk tends to keep longer than whole milk. There is the inconvenience of having to dilute the product for use as milk but the fact that consumers can control the proportions of water to the concentrate, offers some advantage.

Roland W. Bartlett[28] makes the following points with regard to concentrated milks: (1) By 1970 milk concentrates, including fresh, sterile, and those in dry form, may make up 25 per cent of the total milk market. (2) Competition of low-cost milk concentrates may bring about an increase of 15 to 20 per cent in per capita milk sales during the next decade. (3) Competition of low-cost milk concentrates may lower milk distribution margins as much as 3 to 4 cents a quart and save consumers over one billion dollars a year if low-cost distribution methods now in limited use come into general use. (4) Large volume sales of milk concentrates are likely to increase prices paid to

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[28] Roland W. Bartlett, "The Probable Impact of Milk Concentrates Upon the Fluid Milk Industry," Coming Competition of Milk Concentrates, p. 6, Bulletin No. 2, Department of Agricultural Economics, University of Illinois, June 1961.

producers in the low-cost manufacturing areas and also surpluses in fluid milk markets, and to decrease both Class I and blend prices in all high-cost fluid milk areas of the country. (5) The need for federal milk orders will be even greater as a result of competition of low-priced milk concentrates with fresh whole milk.

A dairy product possibility under development is instant whole milk powder. The Eastern Utilization Research and Development Division of the United States Department of Agriculture developed in its laboratory a method of drying whole milk in such a way that it would reconstitute readily. This new type of whole dry milk product was envisaged as one which had great potential for widening the sale of milk by reducing its cost to consumers. Since the process would reduce the weight of fresh whole milk to roughly 1/8 of its original weight, instant dry whole milk could be shipped at much lower cost than whole milk. As a result, consumers' cost of whole milk equivalent from whole milk powder would be considerably lower than the retail price of fresh whole milk. Research on this product continues, however, in order to work out a satisfactory method by which the successful laboratory techniques can be applied in a commercial process.

The United States Department of Agriculture also recently developed a potato wafer which uses a mixture of 1/3 skim milk and 2/3 riced boiled potatoes, dried sweet low-acid cheese whey and dried cottage cheese whey. The latter two products can be used in other food products as cheese foods, soups and bakery products.

Sweetened cream is another new product which the United States Department of Agriculture thinks has considerable possibilities for ice cream manufacture. The new product, which can be stored without deterioration, is expected to make as high quality ice cream as fresh cream. Cream therefore may be sweetened and stored in the flush season for use when it is needed.[29]

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[29]Mathis, A. G. and Treadway, R. H., (Speech presented March 12 and 14, 1962 to Dairy Herd Improvement Association) Economic and Statistical Analysis Division, Economic Research Service, U. S. Department of Agriculture, Washington, D. C.

CHAPTER VII

SUMMARY AND CONCLUSIONS

There have occurred and are presently occurring important changes in the social and economic environment affecting the marketing of dairy products. These changes have mainly had their effect upon demand for various products.

South Dakota has traditionally been a milk surplus producing state, and thus a major portion of its milk supply is utilized in the manufacture of butter, cheese, and nonfat dry milk. A large portion of the production of these products is then shipped to out-of-state markets.

The objectives of this study were to project probable future United States consumption of butter, cheese, nonfat dry milk, and fluid whole milk to 1975 and to recommend the type of milk products that should be produced in South Dakota. The projections were obtained by using least-squares regression analysis.

Due to the lack of some quantitative information and knowledge on future conditions, the projections are bound by certain assumptions. The major assumptions are as follows: (1) Retail prices in 1975 for the commodities used in the projections were assumed at 1961 levels, (2) prices in general in 1975 were assumed at 1961 levels, (3) supply of each of the relevant commodities was always sufficient during the 1946-61 base period to meet consumer demand, (4) government programs affecting the demand and supply of the relevant products would not be discontinued.

United States butter consumption has declined appreciably since 1930 and according to the projection, could be 3.43 pounds per person in 1975. Total consumption in 1975 could be about 755 million pounds or 579 million pounds less than 1961 consumption.

According to the projection, total consumption of cheese ("American" cheddar, whole and part whole milk) could approach 2,088 million pounds or 9.49 pounds per person in 1975. The former figure is 549 million pounds higher than 1961 consumption.

Projected average consumption of nonfat dry milk for 1975 was 9.72 pounds per person or about 2,138 million pounds in total. Total domestic use in 1975 could thus be about 1,013 million pounds over 1961 consumption but only 128 million pounds over 1961 production.

The 1975 projection of average per capita consumption of fluid milk was 282.84 pounds.

From the projections, it is apparent that future national demand for the projected products will not be a static demand. South Dakota's dairy industry would thus benefit by continuing those adjustments that help keep it competitive with other dairy product producers of the United States. Such adjustments could be increased procurement of whole milk by bulk truck assembly. Increased conversion to whole milk procurement should mean more diversification within plants, and thus greater ability to follow the changing demand patterns.

Despite the adjustments made by the state industry, there will continue to be a declining need for butter plants in South Dakota.

Plants that produce a high-quality product will find it easier to maintain their share of the shrinking market than those plants that manufacture a low-quality product.

Demand for cheese should be sufficient in future years that South Dakota cheese plants could increase their production and not have difficulty in finding markets for their product. Many butter plants that are having difficulties but have the advantage of whole milk supplies could find the conversion to cheese manufacture feasible.

Although United States production of nonfat dry milk in 1961 was 94 per cent of projected 1975 consumption, the continued major role of the Federal Government in donating nonfat to foreign governments would indicate that total demand in 1975 could be greater than the projection shows. Milk drying plants in South Dakota could thus continue to increase their production.

Projected per capita fluid milk consumption in 1975 is up slightly over 1961 consumption, but fluid milk processors of South Dakota should satisfy local demand before contemplating the sale of fluid milk to out-of-state markets.

Although the projected products are of primary concern to South Dakota's dairy industry, increasing sales potential of other dairy products and the continued research on new products will also have their effect on potential markets for South Dakota milk and milk products.

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APPENDIX

Table 1. Total Annual Milk Production and Sales by Farmers, South Dakota, 1930-61 (million pounds)

Year	Total Sales	Total Production
1930	1,700	2,197
1931	1,700	2,180
1932	1,555	2,051
1933	1,625	2,118
1934	1,221	1,668
1935	1,186	1,603
1936	1,264	1,640
1937	1,125	1,472
1938	1,229	1,570
1939	1,297	1,642
1940	1,405	1,746
1941	1,493	1,827
1942	1,542	1,867
1943	1,502	1,804
1944	1,422	1,710
1945	1,344	1,650
1946	1,283	1,600
1947	1,208	1,489
1948	1,147	1,417
1949	1,117	1,369
1950	1,160	1,402
1951	1,155	1,389
1952	1,078	1,297
1953	1,152	1,369
1954	1,151	1,360
1955	1,172	1,368
1956	1,224	1,411
1957	1,274	1,436
1958	1,281	1,427
1959	1,328	1,453
1960	1,275	1,394
1961	1,334	1,442

Source: A Century of South Dakota Livestock, p. 22 and South Dakota Agriculture 1961, p. 72, South Dakota Crop and Livestock Reporting Service, Sioux Falls, South Dakota.

Table 2. Milk Disposition By Farmers, South Dakota, 1930-61 (million pounds)

Year	Delivered to Plants and Dealers		Used on farms	Retailed as whole milk
	As Whole Milk	As Farm-Skimmed Cream		
1930	50	1,582	497	68
1931	52	1,581	480	67
1932	47	1,441	496	67
1933	44	1,515	493	66
1934	35	1,127	447	59
1935	39	1,088	417	59
1936	48	1,158	376	58
1937	49	1,021	347	55
1938	55	1,119	341	55
1939	57	1,187	345	53
1940	59	1,294	341	52
1941	66	1,378	334	49
1942	83	1,412	325	47
1943	90	1,367	302	45
1944	95	1,282	288	45
1945	92	1,207	306	45
1946	95	1,143	317	45
1947	100	1,068	281	40
1948	102	1,007	270	38
1949	110	970	252	37
1950	118	1,004	242	38
1951	120	1,000	234	35
1952	115	930	219	33
1953	145	982	217	25
1954	170	961	209	20
1955	195	960	196	17
1956	259	950	187	15
1957	345	915	162	14
1958	460	813	146	8
1959	558	765	125	5
1960	635	635	119	5
1961	750	580	108	4

Source: A Century of South Dakota Livestock, p. 22 and South Dakota Agriculture 1961, p. 72, South Dakota Crop and Livestock Reporting Service, Sioux Falls, South Dakota.

Table 3. Total Annual Production of Major Dairy Products, South Dakota, 1930-61
(thousand pounds)

Year	Creamery Butter (Including Whey Butter)	American Cheese Whole-Milk	Cottage, Pot and Bakers Cheese	Nonfat Dry Milk
1930	40,406	420	51	--
1931	42,080	601	78	--
1932	39,700	442	34	--
1933	43,393	965	50	--
1934	38,948	1,375	65	--
1935	36,122	1,088	90	--
1936	38,741	1,040	130	--
1937	33,896	859	184	--
1938	36,105	993	228	--
1939	41,022	1,038	310	--
1940	43,759	982	467	--
1941	46,665	1,199	495	--
1942	45,525	1,731	427	--
1943	43,357	1,472	187	--
1944	36,622	1,559	174	--
1945	34,306	1,649	225	--
1946	36,655	1,648	518	--
1947	35,136	1,421	458	--
1948	31,369	1,141	758	--
1949	31,483	1,464	748	--
1950	32,429	1,664	875	--
1951	33,678	1,539	2,149	--
1952	30,254	1,565	2,091	--
1953	33,131	1,944	2,561	--
1954	32,470	2,723	2,952	--
1955	34,237	3,206	3,474	1/
1956	36,520	4,217	4,524	1/
1957	38,269	5,320	4,960	1/
1958	39,116	6,866	5,498	18,285
1959	41,480	8,159	6,016	27,634
1960	37,176	10,748	5,926	32,364
1961	38,891	15,216	5,927	40,623

1/ Production data are not shown when volume is not consistently significant or when less than 3 plants are in operation.

Table 3. (Continued)

Source: South Dakota Dairying, p. 33 and South Dakota Agriculture 1961, p. 72, South Dakota Crop and Livestock Reporting Service, Sioux Falls, South Dakota; and Production of Manufactured Dairy Products 1961, p. 31, Statistical Reporting Service, U.S. Department of Agriculture, Washington, D. C., July 1962; and Dairy Statistics Through 1960, p. 218-220, Statistical Bulletin 303, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., February 1962.

Table 4. Total and per capita civilian consumption of milk fat and milk solids-not-fat, United States, 1930-61

Year	Milk fat		Milk solids-not-fat	
	Total	Per Capita	Total	Per Capita
	Million Pounds	Pounds	Million Pounds	Pounds
1930	3,951	32.1	4,395	35.7
1931	4,076	32.9	4,390	35.4
1932	4,077	32.7	4,443	35.6
1933	4,012	31.9	4,459	35.5
1934	4,048	32.0	4,424	35.0
1935	4,022	31.6	4,541	35.7
1936	4,003	31.2	4,650	36.3
1937	4,052	31.5	4,753	36.9
1938	4,081	31.4	4,816	37.1
1939	4,264	32.6	4,935	37.7
1940	4,294	32.5	5,033	38.1
1941	4,219	32.0	5,061	38.4
1942	4,371	33.2	5,392	41.0
1943	3,875	30.1	5,517	42.8
1944	3,940	30.6	5,530	43.0
1945	4,076	31.6	5,887	45.6
1946	4,343	31.4	6,491	46.9
1947	4,373	30.7	6,274	44.0
1948	4,188	28.8	6,156	42.4
1949	4,298	29.1	6,243	42.3
1950	4,413	29.4	6,414	42.7
1951	4,257	28.2	6,467	42.8
1952	4,193	27.3	6,688	43.6
1953	4,178	26.8	6,692	42.9
1954	4,305	27.1	6,889	43.3
1955	4,412	27.2	7,190	44.3
1956	4,442	26.9	7,421	44.9
1957	4,378	26.0	7,460	44.3
1958	4,404	25.7	7,542	44.0
1959	4,365	25.0	7,695	44.1
1960	4,349	24.5	7,806	44.0
1961	4,328	24.0	7,829	43.4

Table 4. (Continued)

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 78-79, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., September 1962.

Table 5. Part 1, Butter, actual weight: Supply and distribution, United States, 1930-61

Year	Production 1/	Beginning commercial stocks 2/	Imports 3/	Total Supply
	Million pounds	Million pounds	Million pounds	Million pounds
1930	2,149	82	3	2,234
1931	2,239	63	2	2,304
1932	2,307	27	1	2,335
1933	2,375	22	1	2,398
1934	2,286	111	1	2,398
1935	2,211	47	23	2,281
1936	2,168	40	10	2,218
1937	2,135	61	11	2,207
1938	2,252	43	2	2,297
1939	2,210	129	1	2,340
1940	2,240	55	1	2,296
1941	2,268	41	4	2,313
1942	2,130	114	20	2,264
1943	2,015	7/ 24	3	2,042
1944	1,818	8/ 35	2	1,855
1945	1,699	9/ 21	4	1,724
1946	1,502	10/ 28	7	1,537
1947	1,640	23	4	1,667
1948	1,504	22	6/	1,526
1949	1,688	32	6/	1,720
1950	1,648	26	6/	1,674
1951	1,443	39	6/	1,482
1952	1,402	24	6/	1,426
1953	1,607	64	6/	1,671
1954	1,628	30	1	1,659
1955	1,545	35	1	1,581
1956	1,553	28	13/ 3	1,584
1957	1,533	23	13/ 3	1,559
1958	1,486	32	13/ 2	1,520
1959	1,411	28	13/ 2	1,441
1960	1,435	20	13/ 3	1,458
1961	1,536	21	13/ 2	1,559

Table 5. Part 2, Butter, actual weight: Supply and distribution, United States, 1930-61

Year	Distribution									
	Ending commercial stocks 2/	Commercial exports and shipments 3/	Department of Agriculture				Use in margarine	Domestic disappearance		
			Beginning stocks 4/	Ending stocks 4/	Deliveries 5/	Net purchases		Military	Civilian	
									Total	Per capita
	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Lb.
1930	63	7	---	---	---	---	2	---	2,162	17.6
1931	27	7	---	---	---	---	6/	---	2,270	18.3
1932	22	7	---	---	---	---	6/	---	2,306	18.5
1933	111	6	---	---	---	---	6/	---	2,281	18.2
1934	47	6	---	---	---	---	6/	---	2,345	18.6
1935	40	7	---	---	---	---	6/	---	2,234	17.6
1936	61	6	---	---	---	---	---	---	2,151	16.8
1937	43	6	---	---	---	---	---	---	2,158	16.8
1938	129	8	---	---	---	---	---	---	2,160	16.6
1939	55	9	---	---	---	---	---	---	2,276	17.4
1940	41	11	---	---	---	---	---	---	2,244	17.0
1941	114	13	---	---	---	---	---	70	2,116	16.1
1942	7/ 24	9	---	1	14	15	---	124	2,092	15.9
1943	8/ 35	6	1	123	88	210	---	266	1,525	11.8
1944	9/ 21	6	123	7	91	-25	---	321	1,532	11.9
1945	10/ 28	11/ 8	7	12/ 13	11/47	53	---	222	1,413	10.9
1946	23	11/ 6	12/ 13	---	11/11	-2	---	54	1,456	10.5
1947	22	11/17	---	---	---	---	---	28	1,600	11.2
1948	32	8	---	---	---	---	---	36	1,450	10.0
1949	26	6	---	107	---	107	---	32	1,549	10.5

Table 5. Part 2, (continued)

Year	Distribution									
	Ending commercial stocks 2/	Commercial exports and shipments 3/	Department of Agriculture: Beginning stocks 4/	Department of Agriculture: Ending stocks 4/	Department of Agriculture: Deliveries 5/	Department of Agriculture: Net purchases	Use in margarine	Domestic disappearance: Military	Domestic disappearance: Civilian: Total	Domestic disappearance: Civilian: Per capita
	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Lb.
1950	39	5	107	66	23	-18	---	34	1,614	10.7
1951	24	4	66	3	20	-43	---	52	1,445	9.6
1952	64	2	3	9	---	6	---	38	1,316	8.6
1953	30	2	9	252	24	267	---	43	1,329	8.5
1954	35	3	252	344	53	145	---	65	1,411	8.9
1955	28	8	344	135	216	7	---	77	1,461	9.0
1956	23	24	135	2	160	27	---	70	1,440	8.7
1957	32	6	2	55	7	60	---	55	1,406	8.3
1958	28	7	55	41	31	17	---	51	1,417	8.3
1959	20	9	41	11	20	-10	---	51	1,371	7.9
1960	21	8	11	56	3	48	---	50	1,331	7.5
1961	20	6	56	205	4	153	---	46	1,334	7.4

1/ 1917-38, annual estimates of factory production based on data from Census of Manufactures, State Departments of Agriculture, and from data received directly from creameries by the Crop Reporting Board, United States Department of Agriculture, 1939-date data are as published by Crop Reporting Board in Production of Manufactured Dairy Products. Farm butter production from 1924-date from reports by farmers, in addition to Census data, and published by Crop Reporting Board. 2/ Stock data cover quantities in commercial storage warehouses, reported beginning 1916 in Cold Storage Reports, Crop Reporting Board. 3/ Imports, exports, and shipments are those published by the Department of

Table 5. (Continued)

Commerce, except for the period during World War II when this information was supplemented and partially replaced by data from Department of Agriculture records. Shipments to Alaska and Hawaii excluded starting with April 1948. 4/ Government stocks as reported in Cold Storage Report beginning December 31, 1950. 5/ Includes donations beginning 1950; in 1954-60, also includes donations and deliveries of butter oil (in terms of butter). 6/ Less than 500,000 pounds. 7/ Cold storage stocks of 25 million pounds include about 1 million pounds owned by Department of Agriculture and the Armed Forces. 8/ Total of 35 million pounds includes approximately 30 million pounds in cold storage and 5 million pounds outside cold storage. Cold storage figure of 155 million pounds includes about 125 million pounds of Department of Agriculture and military stocks. 9/ Cold storage total of 60.5 million pounds includes approximately 39.6 million pounds of Department of Agriculture and military stocks. 10/ Includes 3 million pounds in process of transfer as of January 1 from military holdings to civilian channels via Production and Marketing Administration. 11/ Includes butter equivalent of butter spread and butter oil. 12/ In process of transfer from the military as of January 1. 13/ Includes butter equivalent of butter oil. 14/ Preliminary.

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 80, Economic Research Service, U. S. Department of Agriculture, Washington, D. C. September 1962.

Table 6. Consumption of Fats and Oils in the United States Per Capita, 1930-61 (pounds)

Year	Butter	Margarine	Lard	Shortening	Other Edible Oils	Total
1930	17.6	2.6	12.7	9.8	5.9	48.6
1931	18.3	1.9	13.6	9.4	5.1	48.3
1932	18.5	1.6	14.4	7.5	4.8	46.8
1933	18.2	1.9	14.0	7.5	5.3	46.9
1934	18.6	2.1	13.0	9.5	5.4	48.6
1935	17.6	3.0	9.6	12.1	5.9	48.2
1936	16.8	3.1	11.3	12.3	6.0	49.5
1937	16.8	3.1	10.5	12.3	6.6	49.3
1938	16.6	3.0	11.1	11.5	6.9	49.1
1939	17.4	2.3	12.7	10.7	7.2	50.3
1940	17.0	2.4	14.4	9.0	7.4	50.2
1941	16.1	2.8	13.8	10.4	8.2	51.3
1942	15.9	2.8	12.8	9.4	7.6	48.5
1943	11.8	3.9	13.0	9.6	6.7	45.0
1944	11.9	3.9	12.3	8.9	6.9	43.9
1945	10.9	4.1	11.7	9.1	6.2	42.0
1946	10.5	3.9	11.8	10.2	6.4	42.8
1947	11.2	5.0	12.6	9.4	6.9	45.1
1948	10.0	6.1	12.7	9.7	7.1	45.6
1949	10.5	5.8	11.8	9.7	7.9	45.7
1950	10.7	6.1	12.6	11.0	8.6	49.0
1951	9.6	6.6	12.3	9.0	7.7	45.2
1952	8.6	7.9	11.8	10.2	8.7	47.2
1953	8.5	8.1	11.4	10.2	9.1	47.3
1954	8.9	8.5	10.2	11.8	9.5	48.9
1955	9.0	8.2	10.1	11.5	10.5	49.3
1956	8.7	8.2	9.8	10.9	10.9	48.5
1957	8.3	8.6	9.4	10.4	10.8	47.5
1958	8.3	9.0	9.6	11.3	10.5	48.7
1959	7.9	9.2	8.8	12.6	11.2	49.7
1960	7.5	9.4	7.7	12.6	11.5	48.7
1961	7.4	9.5	7.8	12.8	11.1	48.6

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 39, Economic Research Service, U. S. Department of Agriculture, Washington, D. C. September 1962.

Table 7. Dairy products: Per capita consumption, approximate retail weight, 1930-61 1/

Year	Fluid Whole Milk	Low-fat Milks 2/	Cheese 3/		Evaporated Whole Milk	Cottage Cheese	Nonfat Dry Milk 4/	Dry Whole Milk
			American	Other				
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1930	270	48.1	3.2	1.5	11.3	1.2	1.3	.1
1931	268	49.2	3.1	1.4	11.5	1.2	1.4	.1
1932	271	50.1	3.0	1.4	12.4	1.3	1.4	.1
1933	270	50.4	3.1	1.4	12.4	1.2	1.4	.1
1934	258	50.3	3.4	1.5	13.5	1.2	1.5	.1
1935	261	49.3	3.8	1.5	14.7	1.3	1.6	.1
1936	264	48.6	3.9	1.5	14.1	1.4	1.8	.1
1937	265	47.8	4.0	1.6	15.0	1.5	1.9	.1
1938	263	47.5	4.3	1.6	15.6	1.6	2.1	.1
1939	266	47.7	4.3	1.6	16.3	1.9	2.2	.1
1940	265	47.3	4.4	1.6	17.5	1.9	2.2	.1
1941	267	47.1	4.3	1.6	16.8	2.0	2.5	.2
1942	290	46.5	4.7	1.7	16.5	2.0	2.5	.2
1943	315	45.3	3.0	1.9	17.1	2.1	2.1	.4
1944	328	43.1	3.1	1.8	13.8	2.2	1.5	.3
1945	335	41.7	4.8	1.9	16.3	2.6	1.9	.4
1946	323	39.7	4.5	2.2	17.1	2.5	3.3	.5
1947	306	37.4	5.2	1.7	18.2	2.3	2.9	.5
1948	295	35.5	5.2	1.7	18.4	2.5	3.3	.3
1949	296	33.8	5.3	2.0	17.8	2.7	3.3	.2
1950	293	33.1	5.5	2.2	18.1	3.1	3.7	.3
1951	298	32.2	5.1	2.1	16.3	3.3	4.2	.3
1952	300	31.3	5.3	2.3	15.7	3.4	4.6	.5

Table 7. (Continued)

Year	Fluid Whole Milk	Low-fat Milks 2/	Cheese 3/		Evapo-rated Whole Milk	Cottage Cheese	Nonfat Dry Milk 4/	Dry Whole Milk
			American	Other				
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
1953	298	29.4	5.1	2.4	15.4	3.6	4.2	.2
1954	299	31.0	5.5	2.4	14.8	3.8	4.5	.2
1955	303	31.1	5.4	2.5	14.2	3.9	5.5	.2
1956	306	33.0	5.4	2.6	13.7	4.5	5.2	.3
1957	303	32.6	5.1	2.6	13.1	4.6	5.3	.2
1958	298	32.2	5.5	2.6	12.3	4.6	5.6	.3
1959	292	32.5	5.2	2.8	11.9	4.7	6.2	.3
1960	287	32.6	5.4	3.0	11.3	4.8	6.2	.3
1961 5/	279	33.5	5.6	2.9	10.7	4.6	6.2	.3

1/ Civilian consumption only, 1941-to date. 2/ Includes natural and cultured buttermilk and all fluid skim items, including quantities used in flavored drinks. 3/ Whole and part-whole milk cheeses (excluding cottage, pot and bakers). 4/ Includes duplication of quantities used in dairy products other than ice cream. Duplication in ice cream avoided by use of "net milk" series in deriving the dairy component of ice cream. 5/ Preliminary.

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 38, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., September 1962.

Table 8. All cheese: Supply and distribution, United States, 1930-61

Year	Supply			
	Production 1/	Beginning commercial stocks 2/	Imports 3/	Total Supply
	Million pounds	Million pounds	Million pounds	Million pounds
1930	510	86	68	664
1931	499	83	62	644
1932	491	78	56	625
1933	548	69	48	665
1934	587	92	48	727
1935	628	102	49	779
1936	650	100	60	810
1937	653	110	61	824
1938	726	104	54	884
1939	710	120	59	889
1940	785	109	33	927
1941	956	130	20	1,106
1942	1,112	159	24	1,295
1943	993	7/ 119	25	1,137
1944	1,017	9/ 79	9	1,105
1945	1,117	10/ 75	8	1,200
1946	1,106	87	21	1,214
1947	1,183	121	9	1,313
1948	1,098	147	24	1,269
1949	1,199	148	32	1,379
1950	1,191	168	56	1,415
1951	1,161	181	52	1,394
1952	1,170	221	49	1,440
1953	1,344	237	56	1,637
1954	1,383	190	50	1,623
1955	1,367	192	52	1,611
1956	1,388	240	54	1,682
1957	1,407	250	51	1,708
1958	1,399	240	56	1,695
1959	1,383	282	64	1,729
1960	1,478	284	63	1,825
1961 12/	1,630	332	76	2,038

Table 8. (Continued)

Year	Distribution								
	Ending commercial stocks 2/	Commercial exports and shipments 3/	Department of Agriculture				Domestic disappearance		
			Beginning stocks 4/	Ending stocks 4/	Deliveries 5/	Net purchases	Military 6/	Civilian	
								Total	Per capita
	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Pounds
1950	181	13	23	31	46	54	12	1,155	7.7
1951	221	46	31	1	39	9	23	1,095	7.2
1952	237	8	1	2	1	2	23	1,170	7.6
1953	190	6	2	242	17	257	21	1,163	7.5
1954	192	9	242	357	29	144	16	1,262	7.9
1955	240	8	357	279	144	66	16	1,281	7.9
1956	250	18	279	191	163	75	16	1,323	8.0
1957	240	16	191	170	165	144	11	1,297	7.7
1958	282	10	170	11	156	-3	12	1,394	8.1
1959	284	6	11	20	15	24	11	1,404	8.0
1960	332	13	20	1	1	-18	9	1,489	8.4
1961	419	13	1	54	2	55	12	1,539	8.5

1/ Includes all types of cheese except full-skim American and cottage, pot and bakers cheese. Data for factory production, 1918-to date, are published by the Crop Reporting Board, U.S. Department of Agriculture. 2/ Stock data cover quantities in commercial storage warehouses, reported beginning 1916 in Cold Storage Report, Crop Reporting Board. 3/ Data on imports, exports, and shipments are those published by the Department of Commerce, except for the period during World War II when this information was supplemented and partially replaced by data from U.S. Department of Agriculture records. Import data prior to 1934 are "general imports" while for 1934 and following years they are

Table 8. All cheese: Supply and distribution, United States, 1930-61

Year	Distribution								
	Ending commercial stocks 2/	Commercial exports and shipments 3/	Department of Agriculture				Domestic disappearance		
			Beginning stocks 4/	Ending stocks 4/	Deliveries 5/	Net purchases	Military 6/	Civilian	
								Total	Per capita
	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Pounds
1930	83	4	----	----	----	----	----	577	4.7
1931	78	4	----	----	----	----	----	562	4.5
1932	69	3	----	----	----	----	----	553	4.4
1933	92	3	----	----	----	----	----	570	4.5
1934	102	4	----	----	----	----	----	621	4.9
1935	100	4	----	----	----	----	----	675	5.3
1936	110	4	----	----	----	----	----	696	5.4
1937	104	4	----	----	----	----	----	716	5.6
1938	120	4	----	----	----	----	----	760	5.9
1939	109	4	----	----	----	----	----	776	5.9
1940	130	6	----	----	----	----	----	791	6.0
1941	159	8	----	56	92	148	11	780	5.9
1942	7/119	8	56	8/ 20	305	269	56	843	6.4
1943	9/ 79	3	8/ 20	142	168	290	128	637	4.9
1944	10/ 75	4	142	35	297	190	212	624	4.9
1945	87	8	35	11/ 66	182	213	31	861	6.7
1946	121	10	11/ 66	9	202	145	8	930	6.7
1947	147	137	9	----	45	36	4	989	6.9
1948	148	94	----	----	----	----	22	1,005	6.9
1949	168	102	----	23	1	24	10	1,075	7.3

Table 8. (Continued)

"imports for consumption." 4/ Government stocks as reported in Cold Storage Report beginning December 31, 1950. 5/ Includes donations, beginning 1950. 6/ Includes any quantities used by military in civilian feeding programs abroad. 7/ Cold-storage stocks of 131 million pounds include approximately 12 million pounds held by U.S. Department of Agriculture and military. 8/ The total stocks of 20 million pounds include about 8 million pounds held outside commercial cold storage. 9/ Cold-storage stocks of 176 million pounds include about 102 million pounds held by Department of Agriculture and military. U.S. Department of Agriculture holdings outside of commercial cold storage estimated at 40 million pounds and commercial holdings at 5.5 million pounds. 10/ Cold-storage total of 145 million pounds includes 75 million pounds held by U.S. Department of Agriculture and military. U.S. Department of Agriculture holdings outside commercial cold storage total approximately 11 million pounds and commercial holdings were about 5 million pounds. 11/ Includes 23 million pounds transferred from military stocks. 12/ Preliminary.

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 72, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., September 1962.

Table 9. Per Capita Production and Consumption of Nonfat Dry Milk, United States, 1930-61 (pounds)

Year	Production	Consumption
1930	1.4	1.3
1931	1.4	1.4
1932	1.4	1.4
1933	1.5	1.4
1934	1.5	1.5
1935	1.5	1.6
1936	1.7	1.8
1937	1.9	1.9
1938	2.2	2.1
1939	2.0	2.2
1940	2.4	2.2
1941	2.7	2.5
1942	4.1	2.5
1943	3.7	2.1
1944	4.2	1.5
1945	4.5	1.9
1946	4.6	3.3
1947	4.6	2.9
1948	4.6	3.3
1949	6.2	3.3
1950	5.7	3.7
1951	4.5	4.2
1952	5.4	4.6
1953 1/	7.6	4.1
1954	8.2	4.5
1955	8.3	5.5
1956	8.9	5.2
1957	9.5	5.3
1958	9.8	5.6
1959	9.7	6.2
1960	10.1	6.2
1961	11.0	6.2

1/ Per capita production data for 1953-61 derived by dividing production by total resident population July 1.

Table 9. (Continued)

Source: Agricultural Outlook Charts 1955, p. 57, Agricultural Marketing Service, U. S. Department of Agriculture, Washington, D. C., October 1954. Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 75, Economic Research Service, U. S. Department of Agriculture, Washington, D.C., September 1962.

Table 10. Part 1, Nonfat dry milk: Supply and distribution, United States, 1930-61

Year	Supply			
	Production 1/	Beginning commercial stocks 2/	Imports 3/	Total Supply
	Million pounds	Million pounds	Million pounds	Million pounds
1930	169	17	---	186
1931	170	22	6/	192
1932	176	14	6/	190
1933	187	9	6/	196
1934	192	16	6/	208
1935	188	19	6/	207
1936	224	6	20	250
1937	245	22	1	268
1938	289	21	6/	310
1939	268	28	1	297
1940	322	9	6/	331
1941	366	26	6/	392
1942	565	19	6/	584
1943	510	26	6/	536
1944	583	22	6/	605
1945	643	38	6/	681
1946	653	14	6/	667
1947	678	39	---	717
1948	682	15	3	700
1949	935	44	5	984
1950	881	49	3	933
1951	702	22	1	725
1952	863	42	1	906
1953	1,214	128	6/	1,342
1954	1,334	74	1	1,409
1955	1,366	56	2	1,424
1956	1,490	88	1	1,579
1957	1,624	78	2	1,704
1958	1,710	86	2	1,798
1959	1,723	88	2	1,813
1960	1,819	97	1	1,917
1961 9/	2,013	103	2	2,118

Table 10. Part 2, Nonfat dry milk: Supply and distribution, United States, 1930-61

Year	Distribution									
	Ending commercial stocks 2/	Commercial exports and shipments 3/	Animal feed 4/	Department of Agriculture				Domestic disappearance		
				Beginning stocks	Ending stocks	Deliveries	Net purchases	Military 5/	Civilian	
									Total	Per capita
	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Pounds
1930	22	3	---	---	---	---	---	---	161	1.3
1931	14	6	---	---	---	---	---	---	172	1.4
1932	9	2	---	---	---	---	---	---	179	1.4
1933	16	1	---	---	---	---	---	---	179	1.4
1934	19	1	---	---	---	---	---	---	188	1.5
1935	6	1	---	---	---	---	---	---	200	1.6
1936	22	2	---	---	---	---	---	---	226	1.8
1937	21	3	---	---	---	---	---	---	244	1.9
1938	28	7	---	---	---	---	---	---	275	2.1
1939	9	3	---	---	---	---	---	---	285	2.2
1940	26	10	---	---	---	---	---	---	295	2.2
1941	19	8	---	---	3	30	33	7	325	2.5
1942	26	4	---	3	72	133	202	17	335	2.5
1943	22	1	---	72	47	234	209	31	273	2.1
1944	38	1	---	47	96	220	269	104	193	1.5
1945	14	5	---	96	7/74	193	171	243	248	1.9
1946	39	12	---	7/74	24	174	124	41	451	3.3
1947	15	72	---	24	8/16	102	94	119	417	2.9
1948	44	33	---	8/16	17	85	86	52	485	3.3
1949	49	30	---	17	251	56	290	134	481	3.3

Table 10. Part 2, (Continued)

Year	Distribution									
	Ending commercial stocks 2/	Commercial exports and shipments 3/	Animal feed 4/	Department of Agriculture				Domestic disappearance		
				Beginning stocks	Ending stocks	Deliveries	Net purchases	Military 5/	Civilian	
									Total	Per capita
	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Pounds
1950	22	21	10	251	263	315	327	4	549	3.7
1951	42	48	17	263	52	182	-29	10	637	4.2
1952	128	39	7	52	38	23	9	12	711	4.6
1953	74	20	2	38	466	158	586	11	649	4.2
1954	56	8	571	466	268	253	55	3	716	4.5
1955	88	3	15	268	162	531	425	4	889	5.5
1956	78	3	18	162	123	651	612	4	864	5.2
1957	86	5	21	123	137	680	694	3	895	5.3
1958	88	5	46	137	155	685	703	3	953	5.6
1959	97	7	43	155	60	684	589	3	1,074	6.2
1960	103	6	12	60	280	468	688	1	1,107	6.2
1961 9/	132	6	23	280	335	751	826	6	1,125	6.2

1/ Production for food uses prior to 1935 based on proportion produced for food in 1936-40 applied to total output, as reported by the Crop Reporting Board, U.S. Department of Agriculture for 1920-34. Beginning 1935, data are as published by the Crop Reporting Board in Production of Manufactured Dairy Products. 2/ Manufacturers' stocks as reported by Crop Reporting Board in Evaporated, Condensed, and Dry Milk Report. 3/ Imports are imports for consumption, Department of Commerce. For the years 1920-31 the Department of Commerce reported a composite figure on exports of milk and cream, powdered or dried. For this period, exports of dry skim milk were assumed to be 43 per cent of the reported

Table 10. (Continued)

composite, the portion which dried skimmed represented of the total dried whole and dried skimmed milk in 1932-34. Likewise, shipments of dry skim milk for the period 1928-31 were assumed to be 61 per cent of the combined shipments of dried whole and dried skimmed milk, the relationship which prevailed when the items were reported separately in 1932-34. Beginning 1932, exports are those published by the Department of Commerce, except for the period during World War II when this information was supplemented and partially replaced by data from Department of Agriculture records. 4/ Sold domestically by U. S. Department of Agriculture. 5/ Includes quantities used in civilian feeding programs abroad. 6/ Less than 500 thousand pounds. 7/ Includes 12 million pounds transferred to UNRRA and FMA from military stocks in 1946. 8/ Includes 5 million pounds purchased by Dairy Products Marketing Association during 1947 and transferred to FMA during 1948. 9/ Preliminary.

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 75, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., September 1962.

Table 11. Domestic Sales of Nonfat Dry Milk By End-Use, United States, 1948-60 (million pounds)

End-Use	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Bakery	306.1	281.5	292.0	261.8	275.3	263.0	276.2	298.7	301.1	303.5	272.8	287.1	312.7
Packaged for Home Use	2.4	6.0	30.0	58.8	84.9	96.4	141.7	136.8	154.2	155.0	169.4	177.6	184.4
Dairy	88.6	100.5	106.5	149.0	160.1	125.9	146.0	183.6	180.1	197.7	195.7	210.8	209.7
Prepared Dry Mixes	15.0	12.6	19.8	19.0	30.3	42.0	47.9	50.4	40.4	48.1	40.6	30.7	47.9
Meat Processing	35.9	34.4	58.3	58.8	87.6	64.5	67.5	80.8	92.9	99.6	74.7	68.1	81.3
All Other Uses	29.0	30.3	43.9	46.2	51.9	34.5	39.9	42.7	38.7	41.4	58.6	55.6	67.7
Total Domestic Non-Government Use	477.0	465.3	550.5	593.6	690.1	626.3	719.2	793.0	807.4	845.3	811.8	829.9	903.7

Source: Census of Dry Milk Distribution and Production Trends, 1951, 1953, 1955, 1958, and 1961, American Dry Milk Institute, Chicago 1, Illinois.

Table 12. Average Annual United States Index of Retail Prices of Butter, Margarine, Cheese, Meat, Fluid Milk, and Nonfat Dry Milk, 1946-61
(current and constant dollars)
1957-59 100

Year	Butter	Butter	Margarine	Margarine	Cheese	Cheese	Consumer Price Index 1957-59 100
	Current dollars	Constant dollars	Current dollars	Constant dollars	Current dollars	Constant dollars	
1946	94.1	138.4	98.6	145.0	74.4	109.4	68.0
1947	106.7	137.1	142.0	182.5	87.5	112.5	77.8
1948	114.9	137.1	143.8	171.6	97.4	116.2	83.8
1949	96.2	115.9	106.8	128.7	89.3	107.6	83.0
1950	96.7	115.4	104.8	125.1	88.6	105.7	83.8
1951	108.5	120.0	117.4	129.7	100.9	111.5	90.5
1952	113.3	122.5	99.9	108.0	103.7	112.1	92.5
1953	105.3	113.0	100.4	107.7	103.4	110.9	93.2
1954	96.5	103.1	101.3	108.2	98.7	105.4	93.6
1955	94.5	101.3	98.2	105.3	98.7	105.8	93.3
1956	96.7	102.1	99.0	104.5	99.1	104.6	94.7
1957	999.6	101.6	102.7	104.8	99.9	101.9	98.0
1958	99.5	98.8	100.8	100.1	100.1	99.4	100.7
1959	101.0	99.5	96.3	94.9	100.0	98.5	101.5
1960	100.5	97.5	92.9	90.1	103.9	100.8	103.1
1961	102.6	98.5	99.0	95.0	110.4	105.9	104.2

Table 12. (Continued)

Year	Meat	Meat	Fluid 1/ Milk	Fluid Milk	Nonfat Dry Milk 2/	Nonfat Dry Milk	Consumer Price Index 1957-59 100
	Current dollars	Constant dollars	Current dollars	Constant dollars	Current dollars	Constant dollars	
1946	57.0	83.8	69.6	102.4	69.0	101.5	68.0
1947	81.1	104.2	77.7	99.9	51.9	66.7	77.8
1948	92.2	110.0	86.3	103.0	72.9	87.0	83.8
1949	86.7	104.5	82.8	99.8	59.0	71.1	83.0
1950	91.4	109.1	80.8	96.4	65.2	77.8	83.8
1951	103.6	114.5	89.9	99.3	84.3	93.1	90.5
1952	102.6	110.9	94.3	101.9	96.7	104.5	92.5
1953	95.8	102.8	93.5	100.3	96.7	103.8	93.2
1954	95.3	101.8	91.8	98.1	102.4	109.4	93.6
1955	87.7	94.0	92.1	98.7	100.5	107.7	93.3
1956	84.8	89.5	95.3	100.6	102.4	108.1	94.7
1957	94.2	96.1	98.5	100.5	101.9	104.0	98.0
1958	104.9	104.2	100.4	99.7	100.0	99.3	100.7
1959	101.0	99.5	101.1	99.6	98.6	97.1	101.5
1960	99.2	96.2	103.7	100.6	97.1	94.2	103.1
1961	100.5	96.4	104.5	100.3	113.8	109.2	104.2

1/ Index represents average of retail prices for fluid milk sold in groceries and for fluid milk delivered to households. 2/ Index for 1946-47 represents manufacturers selling prices of nonfat dry milk. Beginning 1948, index represents manufacturers selling prices combined, according to volume utilized, with grocery retailer prices derived by adding a margin of $.33 to the manufacturers selling prices.

Source: Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C.

Table 13. Disposable Personal Income in the United States Per Capita, 1946-61

Year	Amount	Amount	Consumer Price Index 1957-59 100
	Current dollars	Constant dollars	
1946	1,136	1,671	68.0
1947	1,181	1,518	77.8
1948	1,291	1,541	83.8
1949	1,271	1,531	83.0
1950	1,369	1,634	83.8
1951	1,473	1,628	90.5
1952	1,520	1,643	92.5
1953	1,582	1,697	93.2
1954	1,582	1,690	93.6
1955	1,660	1,779	93.3
1956	1,742	1,839	94.7
1957	1,804	1,841	98.0
1958	1,826	1,813	100.7
1959	1,904	1,876	101.5
1960	1,934	1,876	103.1
1961	1,980	1,900	104.2

Source: Supplement for 1961 to Consumption of Food in the United States 1909-52, p. 57, Economic Research Service, U. S. Department of Agriculture, Washington, D. C., September 1962. Bureau of Labor Statistics, U. S. Department of Labor, Washington, D. C.