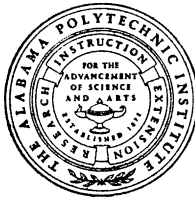


SUPPLIES *and* USE *of* MILK *in* ALABAMA



AGRICULTURAL EXPERIMENT STATION
of the **ALABAMA POLYTECHNIC INSTITUTE**

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SUPPLIES *and* USE *of* MILK *in* ALABAMA*

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HISTORICALLY ALABAMA, like most other Southern States, has produced less milk than it has consumed in the form of dairy products. As the State's agriculture has become more diversified, however, an increasing number of farmers have turned to milk production as a means of supplementing or replacing income from cotton and other cash row crops. This expansion of commercial dairying has speeded up during the past decade, when sharply increased sales of bottled milk and for a time high wartime demands for manufactured dairy products provided ready outlets for increased milk production.

Fluid milk is highly perishable and sells for a comparatively low price per pound. Costs of hauling fluid milk long distances are high in relation to its value. Consequently, in supplying fluid milk for bottling, producers near markets have considerable price advantage over producers in distant areas. Most manufactured dairy products are more concentrated and less perishable than fluid milk. Costs of shipping these products long distances are much less in proportion to value of the item shipped than costs of shipping fluid milk. Accordingly, prices paid for manufacturing milk do not vary greatly between areas close to the markets on which the products made from that milk are consumed and areas far from these markets. For these reasons, as long as bottled milk distributors in Alabama need more milk than is produced locally, commercial dairymen in the State generally will find production of fluid milk for bottling more profitable than production of milk for manufacture.

For similar reasons, a regional shortage or surplus of bottling

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milk in relation to needs of local markets is of greater significance than a comparable shortage or surplus in the production of milk for manufactured dairy products, or in the production of most any other farm product. This study, therefore, is concerned primarily with the adequacy of supplies of fluid milk for Alabama markets from regular, year-round milk shed sources.

Data were obtained for the years 1947, 1948, and 1949. Information for 1947 consisted in the main of monthly data on sales of whole milk by milk distributors under health department inspection and on those dealers' milk supplies by sources. For 1948 and 1949, information was also collected relative to sales by inspected distributors of bottled milk products other than whole milk. For 1949, additional data were obtained to complete an inventory of supplies and use of milk in the State. These included receipts and disposition of milk by all plants buying milk of manufacturing grade from farmers, and milk supplies and sales of bottled milk products of those milk dealers and producer-distributors operating on a commercial scale who were not under health department inspection.

As thus developed, the study had several objectives:

- (1) To determine, by areas and for the State, volume and seasonal pattern of sales of bottled milk products and of fluid milk supplies from Alabama and from other sources.
- (2) To relate supplies of fluid milk to sales of whole milk and of other bottled milk products.
- (3) To estimate average consumption per person of the several bottled milk products sold in Alabama, and to compare consumption rates with those in other sections of the United States.
- (4) To determine the volume and seasonal pattern of production of manufacturing milk, and use made of that milk.
- (5) To show milk supplies of Alabama plants and producer-distributors, utilization of those supplies, and the relationship between Alabama-produced milk supplies and purchases of milk in dairy products by Alabama consumers.
- (6) To analyze this and any other available information about supplies and use of milk in Alabama, in order to provide farmers, agricultural workers, and dairy plant operators with such information as will be helpful in guiding future development of the State's dairy industry.

Initially, names and locations of inspected fluid milk producers and bottled milk distributors, and available data on milk supplies and sales of bottled milk products were obtained from state and county health departments. With this as background, as complete information as possible was obtained from milk distributors,

though health department records were used in some cases, particularly for producer-distributors.

Records of monthly milk purchases from year-round sources of supplies were obtained from nearly all plants and dealers. For lack of records, quantities of supplementary milk purchased, and particularly of reconstituted skim milk used in standardizing whole milk, were more commonly estimated than milk receipts from regular sources. Likewise, many distributors who produced part or all of the milk they handled had to estimate their own production.

Records of quantities of bottled milk products sold were obtained from most large distributors and from a few small ones. Careful estimates were made of sales of the other distributors, especially the large ones. In some instances drivers' loadout sheets or similar detailed sales records for representative weeks were analyzed, and sales estimates were built up from them. In some cases in which detailed sales reports were unavailable, records of total dollar sales by months were used as an over-all control to supplement distributors' estimates of sales of individual bottled milk products.

In obtaining information about fluid milk supplies and sales of bottled milk products, the State was divided into nine market areas (Fig. 12, p. 27). The boundaries of these areas were drawn to cut through the fewest possible milksheds and sales territories. There was, however, some movement of bulk milk and bottled products across these boundaries in addition to that from country receiving stations in the Black Belt to the Birmingham, Mobile, and Tuscaloosa markets. When available, records of inter-area shipments were obtained for use in determining net production and net sales in each area. In numerous cases, however, these quantities had to be estimated. This was especially true of sales of bottled milk products outside of primary market areas, since these sales frequently represented portions of the deliveries on the routes concerned.

This study did not enumerate milk supplies and dairy product sales of family-cow owners who sold small quantities of bottled milk and cream. Producer-distributors operating on a commercial scale were defined as having six or more cows.

Plants receiving manufacturing milk generally had records not only of receipts but also of quantities of major dairy products produced. In some cases, however, sales of surplus butterfat by

those plants were estimated from the value of cream sold.

Fluid milk refers to milk produced for bottling purposes, although surplus quantities may be used in manufactured dairy products. Except as otherwise indicated, fluid milk refers only to fresh, whole milk produced under health department inspection. The small quantity of bottling grade milk not produced by inspected dairies is referred to as **ungraded fluid milk**.¹

Bottled milk products refer to fluid milk products sold by milk distributors. Items included were whole milk, various types of table cream, plain and whole buttermilk, chocolate flavored milk drinks, and skim milk. Sales of such items as goats milk and egg nog were of negligible volume and were not tabulated. Sales included were those in bottles and paper containers to consumers, stores, restaurants, schools, hospitals, and military establishments. Reported sales included small quantities in bulk to institutions and cafes, but did not include sales in bulk to other plants and milk distributors.

Whole milk or bottled whole milk refers to bottled "sweet" milk containing at least the legal minimum percentage of butterfat.² As commonly used in this report, the term refers only to milk under health department inspection.³ The types of whole milk sold in Alabama are creamline milk (standard milk, not homogenized), plain homogenized milk, and homogenized milk to which Vitamin D has been added.

Bottled table cream sold by milk distributors was of two types. More than half of it was **coffee cream**, which contained from 18 to 24 per cent butterfat. The remainder was **whipping cream**,

¹ Except in Jefferson County, counties and municipalities in which ordinances are in force have adopted regulations that are essentially those in the Standard Milk Ordinance of the United States Public Health Service. The Jefferson County ordinance, as interpreted by the Director of the Bureau of Food and Dairy Inspection, Jefferson County Health Department, "while incorporating the fundamentals of the Standard Milk Ordinance, provides for a single grade which applies to the total receipts in the market. Other requirements differ with the purpose of simplifying control and developing a positive quality control program."

² In Alabama, the legal minimum percentage of butterfat in milk is 3.25 per cent. Some local health departments require more butterfat than this in whole milk. During the period of this study, the legal minimum in Jefferson County was 3.5 per cent by resolution of the County Board of Health.

³ Outside of Jefferson County, approved whole milk is labelled "Grade A milk," with such descriptive terms as "raw," "pasteurized," "homogenized," and "Vitamin D" included in the label as are needed to define it properly. In Jefferson County, where pasteurization is compulsory, the various types are termed "special pasteurized milk," "special pasteurized homogenized milk," and "special pasteurized homogenized Vitamin D milk."

most of which was 30 to 34 per cent butterfat. For convenience, a small volume of "cereal cream" or "half-and-half," a mixture of milk and cream which contained 10 to 12 per cent butterfat, was classified as coffee cream in this report.

Buttermilk, or plain buttermilk, refers to the type buttermilk made in churning butter and to cultured buttermilk made from fresh or reconstituted skim milk. Nearly all of the buttermilk sold by large distributors was cultured. **Whole buttermilk** refers to a higher fat buttermilk, usually with a butterfat content similar to that of whole milk, which was sold by a few distributors.

Chocolate drink refers to chocolate flavored milk beverages sold by milk distributors. A few distributors sold chocolate milk, containing 3.25 per cent butterfat or more, but the volume was so small that it was included as chocolate drink. The butterfat content of the chocolate drink sold varied from zero to 3.0 per cent, and averaged about 1.5 per cent.

Reconstituted skim milk refers to the product obtained by recombining with powdered skim milk (non-fat dry milk solids) or unsweetened condensed skim milk approximately the amount of water removed in making the material used.

Standardization of milk (or cream) refers to adjustment of its butterfat content to a predetermined level. Most of the milk produced in Alabama is high in butterfat.⁴ Many distributors sell bottled whole milk that contains less butterfat than milk received from producers, though usually more butterfat than the minimum required by law.⁵ Commercial distributors commonly standardize milk by separating part of that received from producers and adding to the balance enough skim milk to adjust its butterfat content to the desired level.

DAIRYING in ALABAMA

Importance as a Source of Farm Income

During the quarter century 1925-49, farmers' sales of milk, cream, and butter were the source of 6.3 per cent of Alabama's cash farm receipts from the sale of crop and livestock products (Figure 1). During this period, the proportion of cash farm re-

⁴ In 1949, the average butterfat content of the fluid milk received from producers by fluid milk distributors was about 4.4 per cent. (Appendix Table 4, p. 74.)

⁵ The average butterfat content of whole milk sold by Alabama milk distributors in 1949 was about 4.0 per cent.

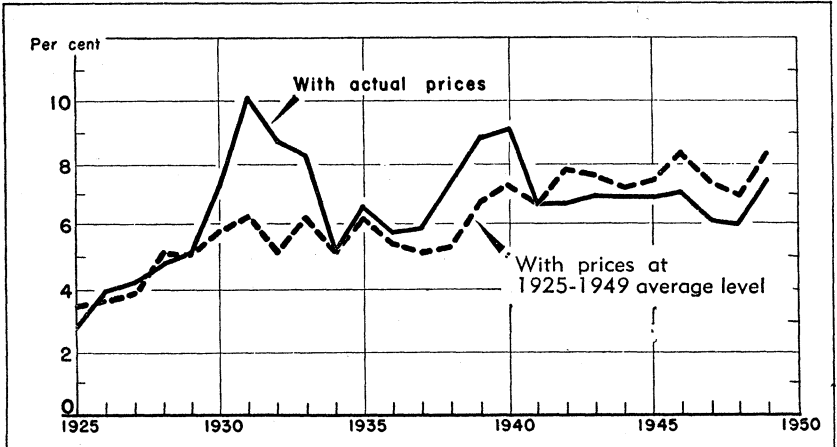


FIGURE 1. Percentage of cash farm receipts from dairy products and percentage that would have been obtained from them with prices of all products at their 1925-49 average levels, Alabama, 1925-49.

ceipts (exclusive of government payments) derived from the sale of dairy products was greatest in the 1930's, when prices received for dairy products were high in relation to prices of most other farm products. On the other hand, comparatively low prices for dairy products in the 1940's reduced the share of the State's agricultural income from dairying in that decade (3, 5, 11).

The quantities of milk sold or used in the dairy products sold by Alabama farmers increased quite steadily from the mid-1920's to the late 1940's (Table 1). These expanding sales would have contributed a generally increasing portion of the State's cash

TABLE 1. MILK COWS ON FARMS, MILK PRODUCTION PER COW, TOTAL MILK PRODUCTION, MILK FED OR USED ON FARMS WHERE PRODUCED, AND MILK SOLD OR USED IN PRODUCTS SOLD, BY 5-YEAR PERIODS, ALABAMA, 1925-49

Period	Number of milk cows on farms	Milk production		Milk fed or used on farms where produced	Milk sold or used in products sold
		Per cow	Total		
	Thousands	Pounds	Mil. lb.	Mil. lb.	Mil. lb.
1925-29	337	3,110	1,048	814	234
1930-34	395	3,030	1,194	900	294
1935-39	394	3,198	1,259	929	330
1940-44	391	3,236	1,266	842	423
1945-49	389	3,482	1,352	877	475

Source: "Farm Production, Disposition, and Income from Milk." 1924-40, 1940-43, and annual reports 1943-44 through 1949-50. B.A.E., U.S.D.A.

farm income had it not been for changing price relationships among farm products. With prices of all farm products held constant throughout the period at 1925-49 average levels, Figure 1 shows that the share of Alabama's cash farm income from dairy products would have increased from 4.2 per cent in 1925-29 to 7.7 per cent in 1945-49 (with no change in the quantities of the various products that were sold).⁶

Changes in Production and Disposition of Milk, 1925-49

Milk production in Alabama was approximately 30 per cent greater in 1945-49 than in 1925-29 (Table 1). Greater production resulted from increases both in number of cows milked and in production per cow.

Increased milk production went mainly into expanded sales of dairy products. The quantity of milk sold or used in products sold was twice as large in 1945-49 as in 1925-29. Consequently, while use on farms showed little change, the share of total production sold increased from 22 per cent in 1925-29 to 35 per cent in 1945-49.

The total amount of milk sold in farm butter, farm separated cream, and retail milk and cream increased during the fore part of the period and then declined (Figure 2). Thus, over the quarter century as a whole, the increase in sales of whole milk to plants was practically identical with the over-all increase in sales of dairy products. In proportion, sales of whole milk to plants increased from 29 per cent of all dairy product sales in 1925-29 to 65 per cent in 1945-49.

Complete information is not available about the uses made of the milk and cream wholesaled by farmers. However, from data collected by the United States Department of Agriculture, estimates can be made of quantities of milk used in certain manufactured dairy products made in Alabama.⁷

⁶ These percentages were computed by dividing receipts from dairy products in each year by the index of Alabama dairy products prices in that year, and receipts from all crops and livestock by the index of Alabama farm prices. For each year, the first quotient ("deflated" receipts from dairy) was then divided by the second ("deflated" cash farm receipts).

⁷ For the years 1938-49, estimates used were reports of whole milk equivalent of dairy products manufactured in factories as given in annual reports of "Production of Manufactured Dairy Products" for those years (16). For the years 1925-37, milk equivalents were estimated by the author. Data on production of manufactured dairy products for 1925-37 were from "Crops and Markets" and "Alabama Agricultural Statistics" (8,4).

According to these estimates, the milk equivalent of creamery butter made in Alabama reached a peak of about 45 million pounds per year in the early 1930's, but subsequently declined to practically nothing in the late 1940's (Figure 3). Little milk was

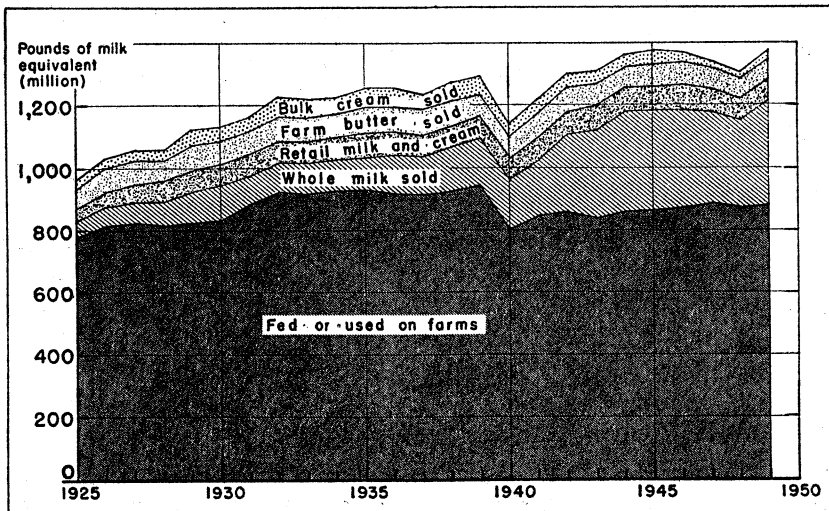


FIGURE 2. Disposition of milk produced in Alabama, 1925-49.

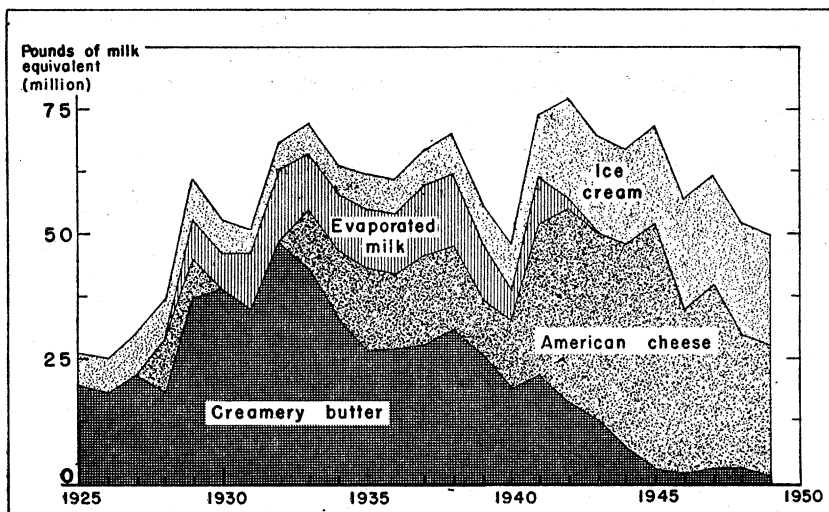


FIGURE 3. Estimated utilization of Alabama-produced milk in manufactured dairy products made in Alabama, 1925-49.

used in making American cheese before 1933. After being fairly stable in the 1930's, the quantity used in cheese reached a peak of nearly 50 million pounds per year in 1945, and then declined. During the 1930's, an average of 10 to 15 million pounds of milk per year was made into evaporated milk, but manufacture of this product in the State ended in the early 1940's. The quantity of Alabama-produced milk used within the State in frozen dairy products was estimated by the author from incomplete data.⁸ This estimate was of a generally expanding use of milk and cream in these products, from 5 or 10 million pounds of milk equivalent per year in the late 1920's to a little more than 20 million pounds in the late 1940's.

These approximations suggest that the quantity of Alabama milk used within the State in manufactured dairy products reached a peak of about 70 million pounds per year in 1932 and 1933 and another, slightly higher peak about 10 years later. During the late 1940's, however, use of milk in these products declined until in 1949 it was only two-thirds of what it had been early in that decade.

These calculations do not take into account an apparently large increase that occurred during the period in the amount of Alabama-produced manufacturing milk going to out-of-state plants, or the possibility of a similar increase in sales of bulk cream to plants outside the State. On the other hand, allowance also should be made for the decline in the quantity of milk marketed through farm butter, which would help to compensate for whatever increase occurred in sales of manufacturing milk and cream to plants in other states.

Considering all of these changes, it appears that the quantity of Alabama milk marketed in the form of manufactured dairy products, including farm butter, probably was at most not more than 25 or 30 million pounds per year greater in the late 1940's than in the early 1930's.⁹ As the net increase over that period in milk sold in all forms amounted to roughly 175 million pounds per year, it appears that the bulk of this increase must have been used in greatly expanded sales of bottled milk products. This conclusion is supported by the fact that in 1949 fluid milk (in-

⁸ This estimated quantity was not intended to include the milk equivalent of surplus cream from cheese and fluid milk plants used in frozen dairy products.

⁹ This would have meant a maximum increase in quantity of milk marketed through manufactured dairy products and farm butter of about 20 per cent.

cluding that from uninspected dairies) comprised nearly four-fifths of the whole milk sold by Alabama farmers, and about five-eighths of the milk equivalent of all dairy products reported sold by them (Appendix Table 14).

Geography of Commercial Milk Production

Because a large share of the dairy cows in Alabama are kept to produce milk for home use, neither dairy cow population nor total milk production shows a high degree of concentration in any particular area of the State. That is not true, however, of commercial dairying. Census data on quantity of whole milk sold by farmers in 1949 showed wide variations in density of sales (Figure 4). Sales of whole milk were large in the Black Belt and in counties close to the Birmingham and Mobile markets. While less highly developed, areas in the north-central and east-central parts of the State also showed above-average density of commercial production.

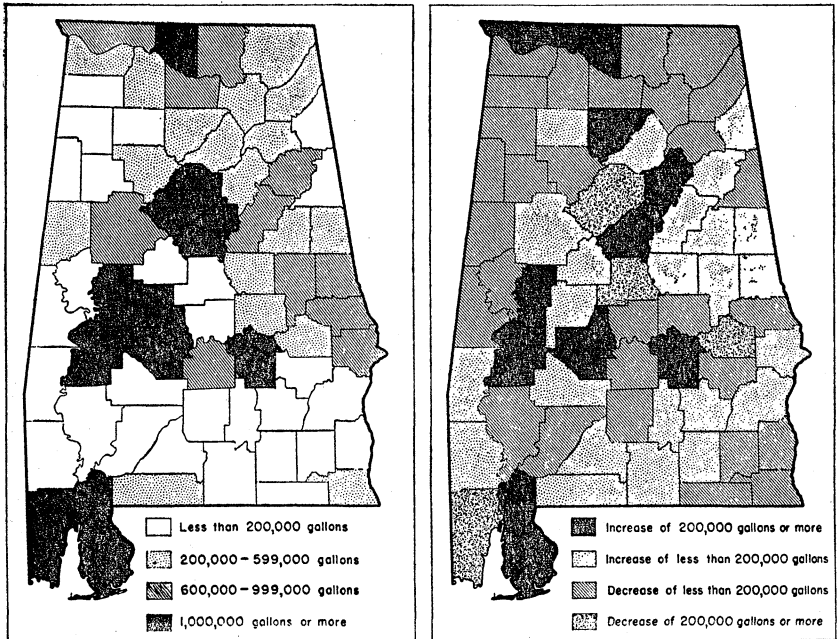


FIGURE 4 (left). Volume of whole milk sold by farmers, Alabama, 1949 (Census data). **FIGURE 5 (right).** Change in volume of whole milk sold by farmers between 1944 and 1949 (Census data).

Census data from 1919 to 1949 show a sixfold increase in whole milk sales in the State during that period, and a general tendency for sales to become concentrated in areas in which they are now most important. Except in Jefferson County, which reached its peak about 20 years ago, sales of whole milk in the leading dairy counties generally increased throughout the period from 1919 to 1944. For the State as a whole, sales of whole milk increased by 9 per cent between 1944 and 1949. Within the State, increases in some counties were partly compensated by reductions in others (Figure 5). Increases were greatest in the Black Belt and in Baldwin, Shelby, St. Clair, Cullman, Limestone, and Lauderdale counties. There was a sharp decrease in Jefferson County and appreciable declines occurred in Mobile, Chilton, and Macon counties.

Fluid Milk Sheds

Alabama supply areas of the major fluid milk markets in which the State's dairymen sell milk are shown in Figure 6. This map shows the approximate areas from which these markets draw the bulk of their Alabama-produced supplies. It gives no indication of the volume and density of production within the various areas. For example, in 1949 about two-fifths of Alabama-produced fluid milk came from the two Black Belt producing areas. Figure 6 likewise gives no indication of the distribution of supplies within a milk shed, as its boundaries were drawn to include, without excessive irregularities, substantially all of the producers comprising that shed.

Location of Plants and Producer-Distributors

In December 1949, fluid milk was being purchased regularly by about 80 milk distributors and at 7 country receiving stations located in Alabama (Figure 7).¹⁰ In addition, some producers in the eastern and southern parts of the State sold fluid milk to

¹⁰ In this section, the term milk distributor refers to a bottler who regularly handled milk from two or more dairies. A number of distributors produced part of the milk they handled. All of them sold pasteurized milk. Producer-distributors were dairymen milking six or more cows who normally produced all of the milk they bottled. Most of this group sold raw milk, but some of those with large volumes pasteurized part or all of their product. A few producer-distributors may not be accounted for, as it was difficult to obtain reliable listings of those not under health department inspection. The producer-distributors shown exclude a number of institutions that produced milk for their own use.

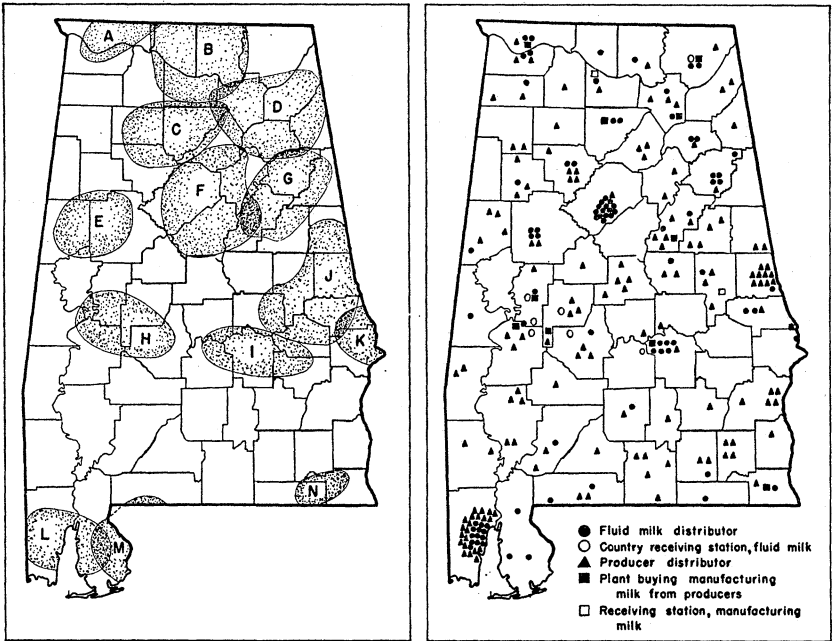


FIGURE 6 (left). Major fluid milk sheds in Alabama, 1951: (A) Tri-cities; (B) Huntsville-Decatur-Birmingham; (C) Cullman-Jasper; (D) Gadsden-Sand Mountain markets; (E) Tuscaloosa; (F) Birmingham (local); (G) Anniston-Talladega; (H) Black Belt receiving stations-Selma; (I) Montgomery-Burkeville (receiving station)-Dothan; (J) Opelika-Auburn-Valley; (K) Columbus, Ga.-Phenix City, Ala.; (L) Mobile; (M) Pensacola, Fla.; (N) Dothan. **FIGURE 7 (right).** Location of milk plants, receiving stations, and producer-distributors, Alabama, Dec. 1949.

distributors in Georgia and Florida. The number of milk distributors in an area depended largely on the size of its urban population, although there were small distributors in some rather sparsely populated areas. Six of the seven country receiving stations were in the Black Belt.

Data were obtained from about 160 producer-distributors. Except in Mobile, few of them sold on large markets. As a general rule, the share of bottled milk sold by them was largest in small towns at considerable distances from large cities.

Twelve plants and receiving stations purchased milk from producers for manufacture. Four of these were in the Black Belt. Most of the others were in the northern and northeastern parts of the State.

RELATIONSHIP BETWEEN FLUID MILK SUPPLIES *and* SALES *of* BOTTLED MILK PRODUCTS

Use of Fluid Milk by Distributors

In Alabama, as in other places, the primary market for fluid milk is bottled whole milk and cream. Some fluid milk is used in making buttermilk and chocolate drink, particularly in late spring and summer when supplies are at their seasonal peak. However, buttermilk and chocolate drink are made from powdered or condensed skim milk when fresh skim milk is not available.

Table cream is less important as an outlet for fluid milk than in most northern markets. There are two reasons for this. In the first place, the quantity of bottled cream sold is small. Furthermore, because local milk is high in butterfat, the bulk of the table cream sold by most Alabama milk distributors is obtained in standardizing whole milk. In Alabama, therefore, the "market" available for fluid milk in bottled whole milk and cream is more nearly represented by the total quantity of bottled whole milk and bottled cream sold than by the quantity of milk plus the milk equivalent of cream.

Past Relationships Between Milk Supplies *and* Sales *of* Bottled Milk Products

What information is available suggests that much of the time during the past two decades milk distributors in Alabama obtained about as much fluid milk from regular sources as was needed for bottled milk and cream, but not enough to supply all the milk used in other bottled milk products. In a survey of the milk situation in the 13 largest cities of the State in 1930, Bulmer and Kirchoff estimated that 46 per cent of the buttermilk sold by milk distributors in these markets was made from powdered and condensed skim milk (21).

Records from the Jefferson County Health Department for the years 1935-49 indicate that this general relationship held in the Birmingham area except during World War II (Figure 8).¹¹ In the late 1930's, after a sharp drop in sales during the depression, regular milk supplies in the Birmingham market exceeded con-

¹¹ These data consist of yearly averages of receipts and sales. Because seasonal shortages and surpluses are averaged, a greater excess of receipts over sales is needed to indicate an adequate supply on this basis than when receipts and sales for fall and winter months are compared.

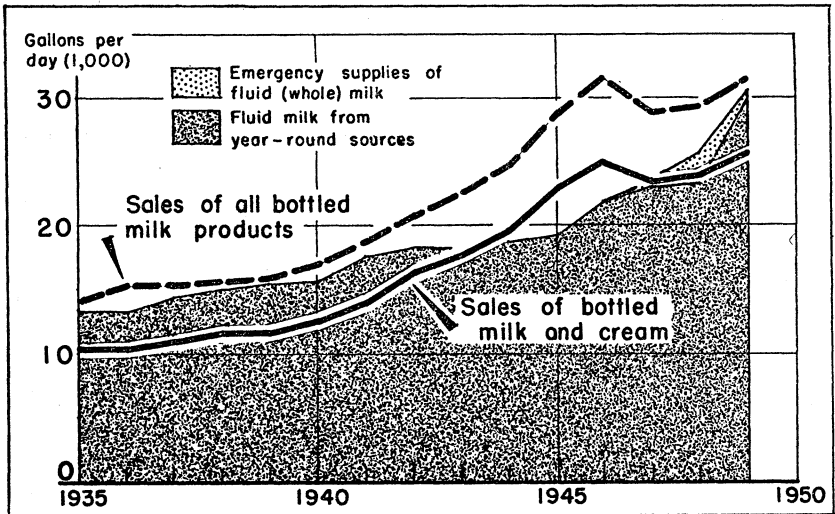


FIGURE 8. Relation between supplies of fluid milk and sales of bottled milk products, Birmingham area, Alabama, 1935-49. (Data from Bureau of Food and Dairy Inspection, Jefferson County Health Department.)

siderably sales of bottled whole milk and cream. Even then, however, on an annual basis receipts of fluid milk were less than sales of all bottled milk products.

In the early 1940's, rapidly increasing sales of whole milk soon outpaced fluid supplies. For several years in the mid-1940's, average daily sales of bottled milk and cream either exceeded average daily receipts of fluid milk or else so nearly equaled them as to indicate shortages during most of the year. It was during the latter part of this period, when shortages in the Birmingham market still were being met chiefly with shipped-in supplies of Grade A condensed skim milk, that the 3-year survey reported in this publication got underway.

Sales of Bottled Milk Products

Information about the volume and seasonal pattern of sales of individual bottled milk products as found in this study is presented elsewhere in this publication (pp. 39-44). At this point, sales of bottled goods are considered only in two categories, (1) sales of bottled whole milk and cream (which include the small quantity of bottled skim milk sold) and (2) sales of all bottled milk products. Reporting sales of bottled products in this manner permits comparing fluid milk supplies with (1) sales

of bottled milk products commonly derived only from fluid milk and (2) sales of all bottled milk products that represent important actual or potential outlets for fluid milk.

Although fluctuating seasonally, sales of bottled milk and cream increased materially over the 3-year period of this study (Figure 9, Appendix Table 1). Sales of these products rose from an average of about 71,000 gallons per day in 1947¹² to an average of about 81,000 gallons per day in 1949. The increase in sales was greater during late 1948 and 1949 than during the fore part of the period. Seasonally, sales of these products were lower in summer, when schools were closed, than during the remainder of the year. Each year, sales increased in early fall when schools opened. Commonly, the increase in sales at that time exceeded considerably the drop that took place the previous spring when schools closed.

Estimates of total quantities of all bottled milk products sold are presented only for 1948 and 1949. During these years, sales of all bottled products exceeded sales of bottled milk and cream by between 20 and 25 per cent. Sales of all products were generally similar in trend and in seasonal pattern to sales of bottled milk and cream. In proportion to volume, however, there was slightly less seasonal fluctuation in the aggregate sales of all dairy products than in sales of bottled milk and cream.

Supplies of Fluid Milk by Sources

The quantity of fluid milk obtained from inspected dairies in Alabama increased from an average of about 71,000 gallons per day in 1947 to an average of about 85,000 gallons per day in 1949 (Appendix Table 2). Most of this increase occurred in 1949. Volume of supplies varied seasonally, though less in 1949 than in the previous 2 years. In 1947, daily receipts were 44 per cent greater in May than in November; in 1949 they were 21 per cent greater.

Part of the Alabama-produced milk was not sold on Alabama markets. Considerable quantities were shipped to plants in Columbus and Rossville, Georgia, and in Pensacola, Florida, and smaller amounts to other plants in these states. These exports,

¹² The quantities of cream and skim milk sold in some markets in 1947 were estimated by the author. Estimates were based on trends in cream consumption found in markets for which 1947 data were available. Any error attributable to these estimates would be small, as the volume of bottled cream sold is little more than 1 per cent of the volume of bottled whole milk sold.

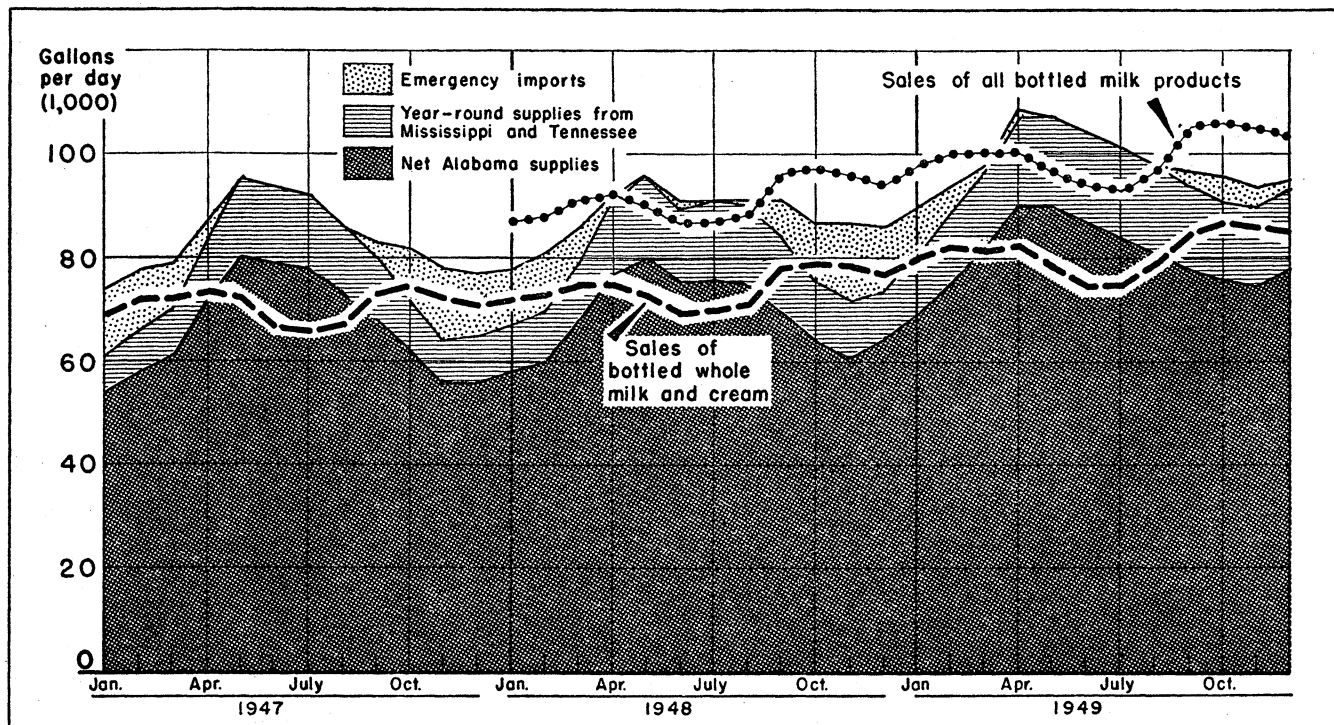


FIGURE 9. Supplies of fluid milk for Alabama markets, by sources, compared with sales of bottled milk and cream and of all bottled milk products, Alabama, 1947-49. (Supplies and sales are those of milk distributors under health department inspection. Sales do not include an allowance for plant loss and wastage.)

and small sales of bottled milk in these states by Alabama distributors, were partly offset by receipts at Alabama plants from producers in Georgia and Florida and by sales of bottled whole milk in Alabama by distributors from Georgia and Florida. After taking these various movements into account, Alabama's net exports to Georgia and Florida amounted to about 5 per cent of total Alabama supplies. The balance of Alabama supplies represented milk available for Alabama markets.

Just as some Alabama-produced fluid milk went to out-of-state markets, so also part of the regular supply of some Alabama markets came from adjacent states. The Tri-Cities (Florence, Sheffield, and Tuscumbia), Decatur, Huntsville, Gadsden, and one or two small markets received milk from Tennessee throughout the year. Likewise, Birmingham, Tuscaloosa, Mobile, and a number of small markets had regular sources of supply in Mississippi. A small quantity of bottled milk was sold in Mississippi by distributors in Mobile. The excess of imports from year-round sources in Mississippi and Tennessee over these sales of bottled milk in Mississippi increased from almost 11,000 gallons per day in 1947 to nearly 16,000 gallons per day in 1949. The volume of these imports varied seasonally, exhibiting a pattern generally similar to that in Alabama supplies. In most cases, distributors bringing in these supplies obtained milk from producers rather than buying from plants as they needed it.

If supplies of milk from Alabama producers and year-round sources in Mississippi and Tennessee had been distributed over the year and among markets in proportion to sales of bottled milk and cream, they would have been approximately adequate to meet needs in 1947 and 1948, and more than adequate in 1949. This, however, was not the case. Receipts of milk from producers were larger during the spring and summer than during the fall and winter. On the other hand, sales of bottled milk and cream were less during the summer than during the remainder of the year. Furthermore, some markets were more abundantly supplied with milk than others.

Because of this situation, many milk distributors had to obtain emergency supplies of fluid milk in the fall and winter months to supplement receipts from year-round sources. A few distributors were able to get supplementary milk from plants in Alabama, but in the main emergency supplies were imported. In this dis-

cussion, emergency supplies refer only to those brought in from other states.

In the early winter and late fall months of 1947 and 1948, emergency imports accounted for about 15 per cent of Alabama's milk supplies. In 1947, still larger amounts of emergency milk could have been used if available. In 1949, rapidly increasing local supplies in the winter, and considerably expanded local supplies the following fall, reduced sharply emergency imports. This was true despite a gain of about 10 per cent in sales of bottled milk and cream between 1948 and 1949. In October, 1949, the peak month for emergency imports that fall, they comprised 5 per cent of the total supply of fluid milk for Alabama markets.

Emergency milk supplies were of two types, (1) whole milk and (2) reconstituted skim milk used in standardizing local supplies of fluid milk (Appendix Table 3). Emergency imports of whole milk were obtained mostly from plants in Tennessee, Mississippi, and the North Central States. While some of the supplies obtained from other Southern States may have represented reshipments of milk that originated in the North, it was possible to determine the origin of the bulk of these imports. In 1947, when emergency supplies of whole milk were difficult to obtain and comparatively small, about half of them were drawn from the North Central States and half from near-by Southern States. In 1948, when these shipments were considerably larger, the North Central States were the sources of about five-eighths of the imports. On the other hand, in 1949, when the volume of these supplies was considerably reduced, nearly 60 per cent of them came from nearby Southern States.

Most of the reconstituted skim milk used in standardizing local milk was made from Grade A condensed skim milk that came from dairy plants in the North Central States. Even in 1947 when reconstituted skim milk comprised better than half of the emergency imports, its use in standardizing local milk supplies was not general in all markets. As supplementary supplies of whole milk became more readily obtainable, much less use was made of reconstituted skim milk. The quantity used fell off most sharply early in 1948, when the Jefferson County Health Department prohibited further use of reconstituted skim milk in bottled whole milk in the Birmingham area. After February, 1948, the quantity of reconstituted skim milk used in standardizing local supplies of fluid milk was small.

Adequacy of Regular Milk Supplies

To have an adequate volume of milk for use in bottled milk and cream, distributors must have an amount somewhat greater than the quantity of these products sold. An appreciable quantity of milk is lost in the various steps of receiving, processing, packaging, and distribution.¹³ In addition to milk thus lost, some may be used in products other than bottled whole milk and cream even when emergency supplies are being purchased. These diversions include any cream removed in standardizing that is in excess of the volume of table cream sold, and any route returns or fluid milk used in such products as buttermilk and chocolate drink. Some use of milk in this manner is likely because both milk supplies and bottled product sales fluctuate from day to day, making it impossible to forecast either exactly.

Analysis showed that purchases of fluid milk by large- and medium-sized distributors, in months when they bought considerable amounts of emergency milk, exceeded total sales of whole milk, bottled cream, and skim milk by about 10 per cent.¹⁴ While small distributors may not need quite this much margin, a 10 per cent operating margin appears definitely to be a minimum on a market or area basis. Milk supplies commonly are not distributed among dealers and markets exactly in proportion to needs. Consequently, even when milk supplies for the State exceed total sales of bottled milk and cream by 10 per cent, some distributors depend in part on supplementary milk from other dealers, and may have to go considerable distances to get it.

Inadequacies in local milk supplies may also reduce sales of bottled products. That was true in the winter and fall of 1947, and probably to a limited extent in 1948.

The 1947-49 state-wide relationships between supplies of fluid milk and sales (1) of bottled milk and cream and (2) of all bottled milk products, as shown in Figure 8, illustrate graphically

¹³ A loss in receiving, processing, and delivering milk of about 4 per cent of the quantity of milk handled was indicated in a recent study in Memphis (25).

¹⁴ Comparisons were limited to distributors whose supplies of milk from year-round sources apparently were inadequate throughout the period, who were not standardizing with reconstituted skim milk, and from whom complete records of supplies and sales of milk had been obtained. In all, 66 monthly comparisons were made, using data from 15 distributors. In making comparisons, bulk sales of milk to other plants were included with sales of bottled milk and cream.

how imports of emergency milk were used to meet shortages in local milk supplies. These shortages were severe in the winter and fall of 1947 and 1948, but fell off rapidly early in 1949. At its peak in the fall of 1949, the shortage was only about one-third as large as in the months of greatest deficit in 1947 and 1948.

By late 1949, supplies of fluid milk from year-round sources were nearly sufficient to meet the needs of Alabama markets for bottled milk and cream. However, they were considerably short of providing an adequate supply of milk for all bottled products. With all bottled milk products, as with fluid milk and cream, supplies must exceed the quantity sold in bottles if supplies are to be adequate. This necessary margin may not be quite as wide for all bottled milk products as for fluid milk and cream, but it appears that it should be at least 5 per cent of sales.

Fluid Milk Used in Buttermilk and Chocolate Drink

Quantities of fluid milk used in buttermilk and chocolate drink in 1949 were estimated by the author.¹⁵ These estimates indicated that fresh milk comprised about two-fifths of all milk used in these products during the year (Figure 10).¹⁶ In the spring and summer, the bulk of the milk used in buttermilk and chocolate drink was fresh milk. In January and February, and from September through December, however, two-thirds or more of the milk so used was reconstituted skim milk made from powdered or condensed skim milk.

Under present conditions, this potential market for more fluid milk in buttermilk and chocolate drink is not as attractive as the market provided by bottled whole milk and cream. The cost of skim milk reconstituted from powdered or condensed skim milk is considerably less than the cost of fresh skim milk obtained from fluid milk purchased at the base price, from which the butterfat has been marketed at prevailing prices for sweet

¹⁵ These estimates were made in determining the utilization of the milk received at Alabama plants. Methods used are described in Appendix B, Section I.

¹⁶ In the spring and summer, some distributors had more fresh milk available for buttermilk and chocolate drink than they could use in those products, while other distributors were short. Some surplus skim milk was fed to livestock or wasted by distributors in the former group, though the amount thus disposed of was apparently small. To the extent that such disposal was made of surplus skim milk, these state-wide estimates overstate use of it in buttermilk and chocolate drink.

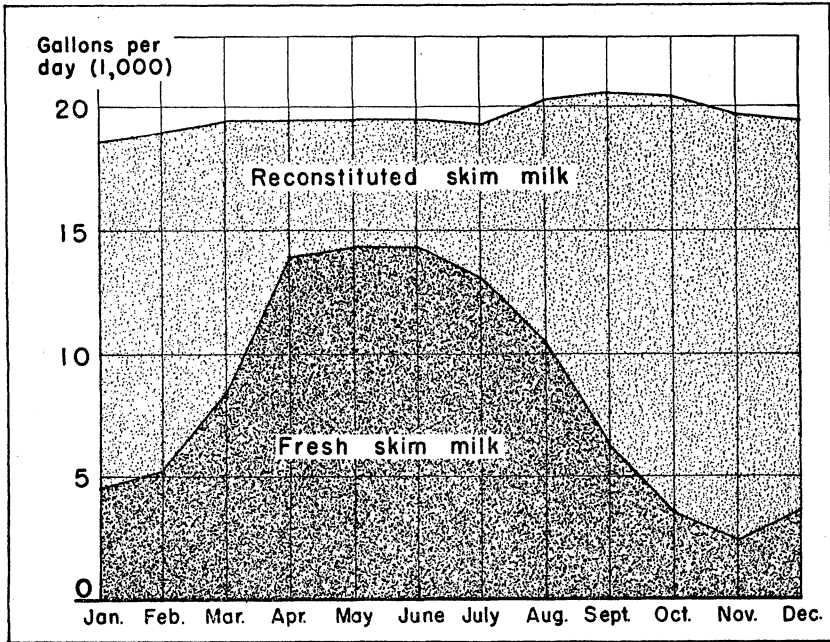


FIGURE 10. Estimated daily quantities of fresh milk (mostly skim milk) and of reconstituted skim milk used in buttermilk and chocolate drink, by months, Alabama, 1949. (Estimated use of milk in these products includes 5 per cent allowance for plant loss and wastage.)

cream.¹⁷ Unless dairymen supply the quantity of milk needed for use in low-fat products at prices below current prices for base milk, most distributors will be unlikely, of their own accord, to make these products primarily from fresh skim milk. Dairymen will be better prepared to supply milk at these lower prices if they can profitably level out production over the year so that the seasonal pattern of milk supplies more closely corresponds to that in sales of bottled milk products. Otherwise, with buttermilk and chocolate drink made throughout the year from fresh skim milk rather than serving mainly as outlets for surplus milk,

¹⁷ In 1949, prices paid by milk distributors for solids-not-fat in powdered and condensed skim milk averaged about 15 cents a pound. Distributors received, on the average, not quite 80 cents a pound for butterfat in sweet cream sold to ice cream plants. With surplus butterfat sold at that price solids-not-fat in milk purchased in Montgomery at the base price cost about 33 cents a pound. A price of nearly \$1.40 per 100 pounds below the base price would have been necessary to make solids-not-fat in fresh skim milk as cheap as those in powdered and condensed skim milk. There was an even greater difference in Birmingham and Mobile, where the price of base milk was higher.

serious surplus problems could be anticipated in some markets during periods of flush production.

Assuming no change in butterfat tests of milk supplies and of bottled products sold, use of larger quantities of fresh skim milk in buttermilk and chocolate drink would increase the quantity of surplus butterfat to be disposed of by milk distributors. Distributors with regular supplies of sweet cream of good quality now can sell it on out-of-state markets as well as in Alabama at premiums above its value for butter. It is possible, however, that the increased amount of surplus butterfat that would result from heavy use of fluid milk in buttermilk and chocolate drink might make it difficult for some distributors to sell all their surplus butterfat at premium prices.

On the favorable side, distributors can expect to obtain low-fat products of high quality from fresh skim milk of bottling grade. Consequently, if milk supplies increase relative to market needs, particularly in the fall and winter months, larger quantities probably will be channeled into use in buttermilk and chocolate drink. Thus, in the future as in the past, these products probably will serve as a cushion, providing an outlet for fresh skim milk when it is available, but being made from powdered or condensed skim milk when supplies of fresh milk are short.

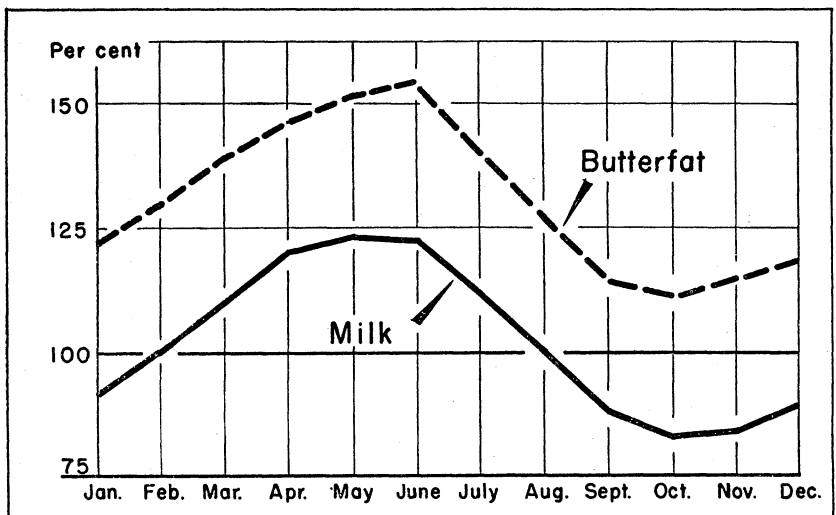


FIGURE 11. Milk and butterfat received in fluid milk from year-round sources of supply in percentage of sales of milk and butterfat in all bottled milk products, 14 plants, Alabama, 1949. (In these data, no allowance was made for plant loss and wastage.)

Situation with Respect to Butterfat

Butterfat is an important and high-priced constituent of milk. For this reason it is pertinent to consider briefly the adequacy of milk distributors' supplies of this item.

With local milk comparatively high in butterfat, small sales of bottled cream, and heavy sales of low-fat products, milk distributors' supplies of butterfat in fluid milk from year-round sources are more plentiful in relation to their needs than are their supplies of the other components of milk. Also, mainly because butterfat tests vary seasonally, changes over the year in the relation between supplies and needs are somewhat different for butterfat than for milk.

Shown in Figure 11 are the respective ratios of intake of milk and of butterfat in fluid milk from year-round sources of supply to outgo of milk and of butterfat in bottled milk products for 14 large- and medium-sized plants for which 1949 monthly butterfat data were available. Even with generous allowances for losses, in every month of the year these plants took in more butterfat in milk from year-round sources of supply than they used in bottled milk products.¹⁸ The average excess in the spring and summer was about one-third of all butterfat received. On the other hand, it was only during this period of flush production that these plants had enough milk for all bottled products.

While the two ratios showed generally similar seasonal patterns, the difference between them was proportionally greater in winter and fall than in spring and summer. The main reason they were not parallel was that the butterfat test of milk received from producers varied more or less inversely with quantity of milk delivered (Appendix Table 4). With tests highest in winter and fall, intake of butterfat was not reduced in proportion to the supply of milk in those periods.

The average relationship for the 14 plants studied was not representative of that for all milk distributors in the State. Small distributors, who generally sold proportionally less buttermilk and chocolate drink than large distributors, and frequently sold whole milk of higher butterfat content, had relatively less surplus butterfat than was shown in this analysis. Nevertheless,

¹⁸ Since this analysis is based on monthly data, it does not show the full effects of heavy demands for cream for Christmas and other holidays that may create temporary shortages.

during most of the year milk distributors as a group received more butterfat in milk from regular sources than they used in bottled milk products.

COMPARISON of ALABAMA-PRODUCED MILK SUPPLIES with SALES of BOTTLED MILK PRODUCTS by AREAS

The quantities of Alabama-produced local milk available for Alabama markets were compared with local sales of bottled milk and cream in 1947-49, and of all bottled milk products in 1948 and 1949, in each of the nine market areas of the State (Figure 12). The only areas in which available supplies of Alabama-produced milk differed materially from total supplies of Alabama-produced milk were Areas 7 and 9, from which considerable milk was marketed in Columbus, Georgia, and in Pensacola, Florida.¹⁹

This comparison gives some indication of the possible market for increased supplies of locally-produced milk in various parts of the State. It is not intended to suggest, however, that each area should be self-sufficient, or that fluid milk production in any area should be restricted to potential sales of bottled milk products in that area. Likewise, it is recognized that distributors in several of the large markets have developed out-of-state supplies to help meet local shortages, and that these are an integral part of the regular supplies of these markets.

The areas for which data are given are marketing areas. Where feasible, their boundaries were drawn to coincide with those of the various type-of-farming areas in the State (1). This could not be done in all cases, however, as it was necessary to establish boundaries that cut across the minimum number of milk-procurement areas and the fewest possible bottled milk delivery routes. Even with care taken in this respect and in adjusting for inter-area movements of bulk and bottled milk, these data must be considered somewhat less reliable than those for the State as a whole.

¹⁹ In all areas from which milk went to Georgia or Florida except Area 8, available supplies of Alabama milk were determined by deducting from supplies of milk from inspected dairies within the area net exports to Georgia and Florida. Thus, movements of bulk and bottled milk between the area and these states were taken into account, irrespective of their direction. In Area 8, from which small quantities of milk were shipped to Florida, no such adjustment was made because exports from this area were smaller than imports of producer and bottled milk from Florida.

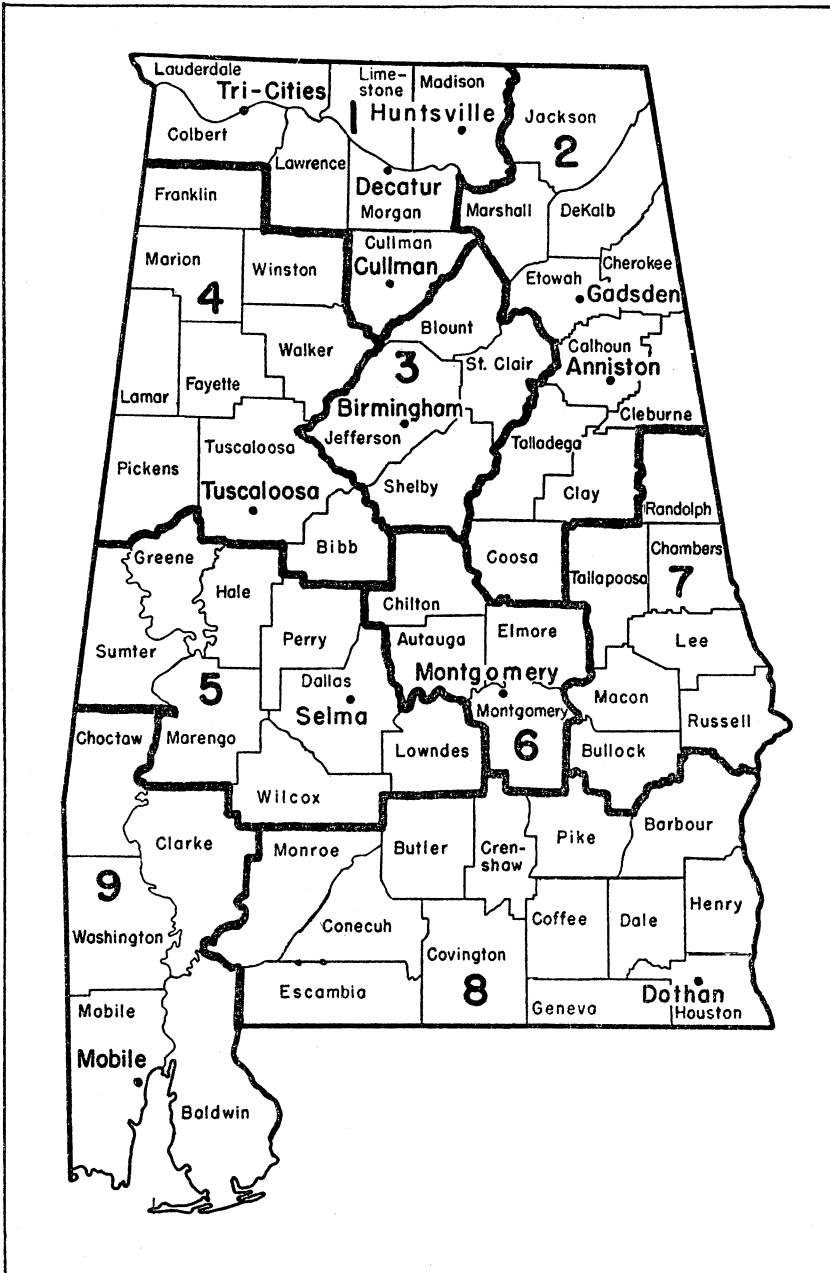


FIGURE 12. Market areas for fluid milk and for bottled milk products, Alabama.

In Area 1, which included all of the large Tennessee Valley markets and Cullman, local supplies of fluid milk were less than the quantity sold as bottled whole milk and cream (Figure 13). Local distributors met this deficit mainly by bringing in milk from near-by producing areas in Tennessee. Between 1947 and

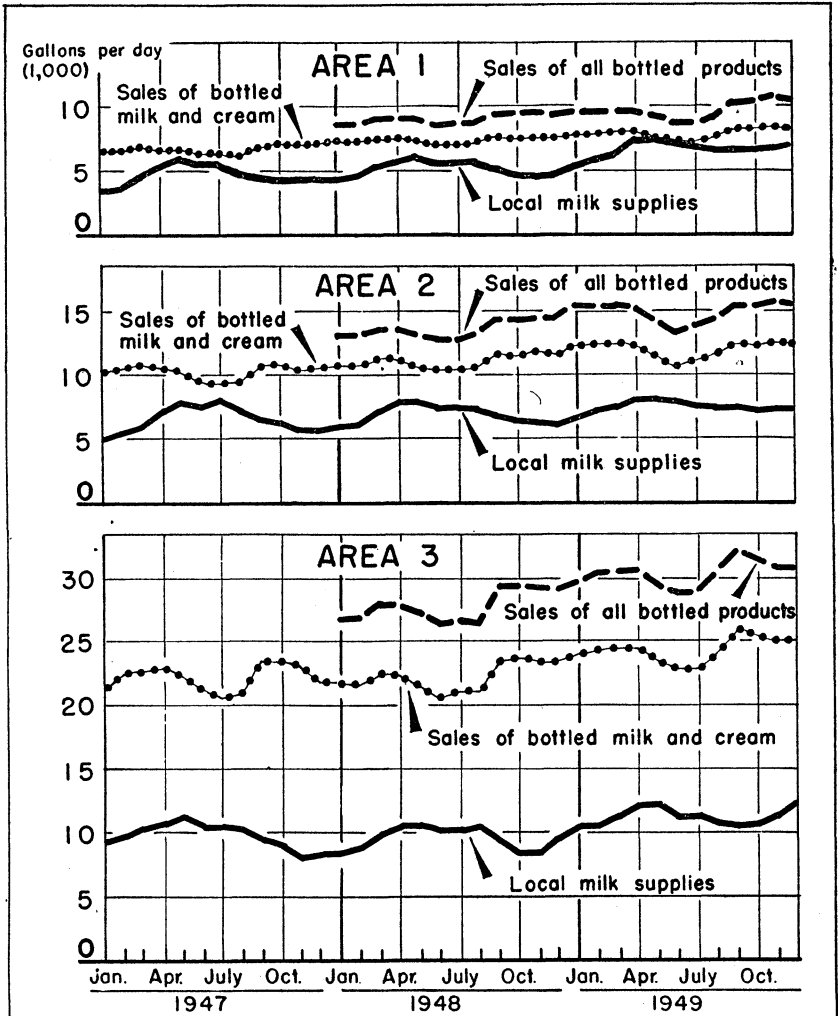


FIGURE 13. Relation between locally-produced milk supplies available for Alabama markets, sales of bottled milk and cream, and sales of all bottled milk products in Areas 1, 2, and 3, by months, 1947-49. (Supplies and sales are those of distributors under health department inspection. Sales do not include an allowance for plant loss and wastage.)

1949, supplies from within this area increased relative to its consumption of bottled products. Most of this increase went to the Birmingham market, for which an additional source of supplies was established in Limestone and adjacent counties in the summer of 1948.

An even larger shortage existed in **Area 2**, which consisted of 10 counties in northeastern Alabama in which Gadsden and Anniston were the largest markets. Seasonally, local supplies in this area were better adjusted to market needs in 1949 than in 1947. In quantity, however, they increased less during this period than sales of bottled milk and cream. On an annual basis, 1949 supplies of fluid milk produced in the area and available for Alabama markets were only 63 per cent of the quantity of bottled milk and cream sold, and only 51 per cent of the quantity of all bottled milk products sold. This shortage was met mainly by milk from regular, year-round sources in Tennessee. Smaller quantities of milk came in from adjacent parts of Alabama, including some bottled milk from Montgomery and Birmingham. Also, during the fall and winter months, emergency imports were obtained from out-of-state sources. Farmers in the northeastern corner of the area sold an appreciable quantity of milk to a plant serving the Chattanooga market, but approximately the same quantity of bottled milk was brought back into the area by distributors from that market.

Area 3, which included four counties around Birmingham, produced far less milk than it consumed as bottled milk and cream. Birmingham distributors supplemented this local milk with regular supplies from the Black Belt, from northeastern Mississippi and, after mid-1948, from the Tennessee Valley. Emergency supplies, mostly from the North Central States, were brought in as needed during the fall and winter. In 1947 these emergency supplies were composed largely of Grade A condensed skim milk, but after early 1948 they consisted entirely of whole milk. Emergency imports were heavy in the fall and winter until early 1949, but of little consequence thereafter. A major reason for this change was that Birmingham distributors took on many new producers in 1949, especially during the summer and early fall.

In 1949, 47 per cent of the regular supplies of Birmingham distributors came from the Black Belt and 37 per cent from local dairies, nearly all of which were in the four counties in

Area 3. Of the two, local supplies showed the least seasonal variation. In late fall and early winter, they were approximately nine-tenths as large as supplies from the Black Belt, but in late spring and early summer they were only about two-thirds as large.

Local production was far short of market needs throughout the year in Area 4, in which Tuscaloosa was the chief city (Figure 14). The deficit was greater in 1949 than in 1947. It was

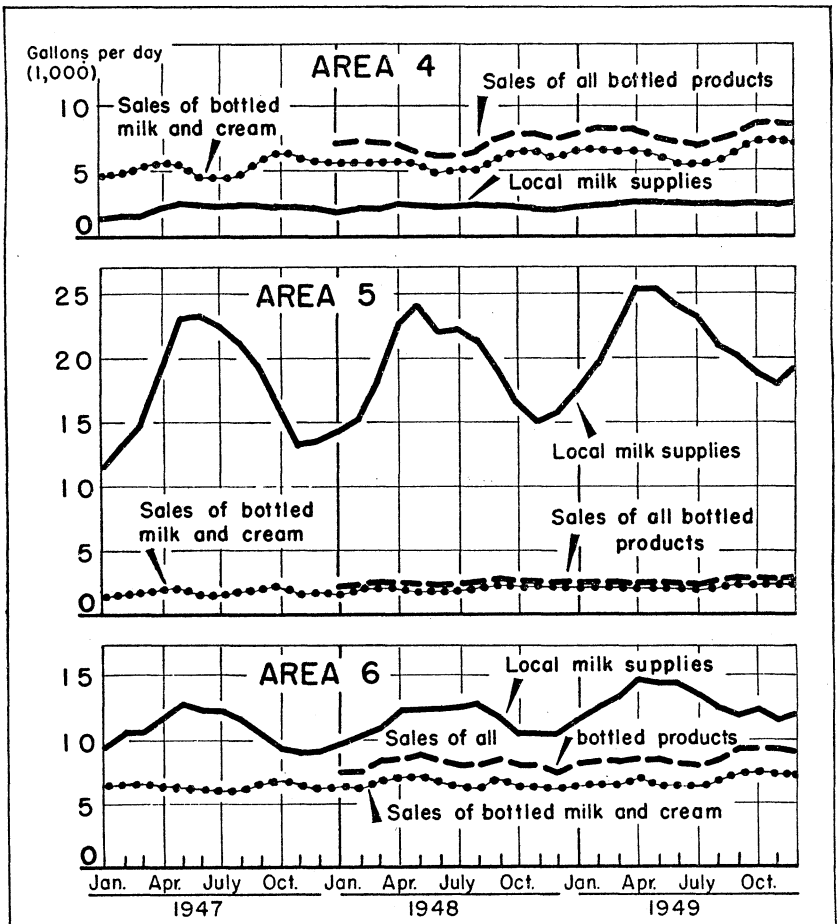


FIGURE 14. Relation between locally-produced milk supplies available for Alabama markets, sales of bottled milk and cream, and sales of all bottled milk products in Areas 4, 5, and 6, by months, 1947-49. (Supplies and sales are those of milk distributors under health department inspection. Sales do not include an allowance for plant loss and wastage.)

met mainly with milk from the Black Belt and from producers in eastern Mississippi. In the western part of the area, some bottled milk was brought in from Tupelo and Columbus, Mississippi.

Area 5, which consisted of that portion of the Black Belt west of Montgomery, supplied more milk than any other area, and about one-fourth of the total for the State. As these supplies far exceeded local sales of bottled milk products, the bulk of the milk from this area was shipped to other parts of the State. In 1949, 64 per cent was sold to distributors in Birmingham, 16 per cent to distributors in Mobile, and 6 per cent to distributors in Tuscaloosa. Seasonal variation in production was greater in this area than in any other, though it was reduced noticeably between 1947 and 1949.

Montgomery was the principal market in Area 6, and northern Montgomery County provided the bulk of its milk. This was another area of excess supplies, though by no such margin as Area 5. Some of its producers sold milk to distributors in Dothan, Opelika, and Anniston. Considerable bottled milk also was shipped out of the area on routes that served small markets 50 and even 100 miles from Montgomery. With these established outlets, and considerable seasonal variation in deliveries from producers, Montgomery plants experienced some moderate shortages that necessitated bringing in emergency supplies.

Area 7 included a number of relatively small markets in east central Alabama. Throughout the 3-year period, 1947-49, producers in this area supplied considerably more fluid milk than was sold in the area as bottled milk and cream (Figure 15). A large amount of this milk went to plants in Columbus, Georgia. As a result, during much of the year supplies remaining within the area were less than the quantity of bottled milk and cream sold. The additional supplies needed came largely from Area 6, both in bulk and as bottled milk.

There were many small markets in the 13 southern and southeastern counties that comprised Area 8. Supplies from within this area doubled between early 1947 and late 1949, but at no time equalled the quantity of bottled milk and cream sold.²⁰

²⁰ These data exclude milk sold on a commercial scale by producer-distributors and distributors not under health department inspection. Substantially all of the milk thus sold was produced locally. These sales were much larger in Area 8 than in any other, comprising, in 1949, about 15 per cent of its commercial milk distribution.

Other supplies were obtained mostly from the Montgomery area, both in bulk and in bottles. Also, during much of 1948 and 1949, this area obtained from Florida and Georgia somewhat more milk than it marketed in those states.

The Mobile market dominated the Gulf Coast and Piney Woods section that made up Area 9. This was another region of deficit milk supplies, although the shortage would have been appreciably smaller if the sizable quantity of milk from Baldwin County sold in Pensacola, Florida had been marketed within the area. The chief source of additional supplies was the Black Belt, from which in 1949 distributors obtained about one-fourth of their milk. Some milk was purchased from producers in southeastern Mississippi, but these imports were largely offset by sales

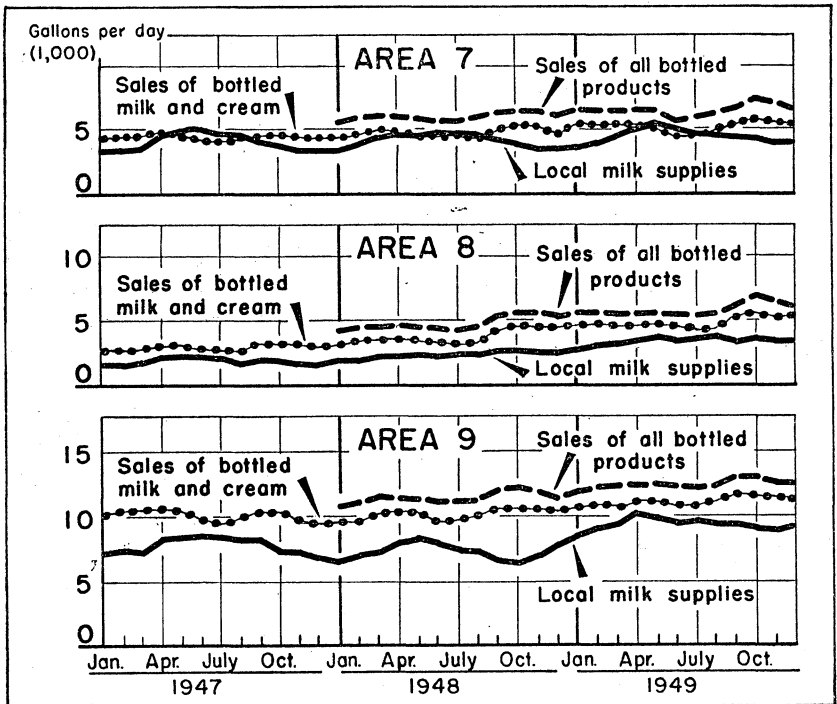


FIGURE 15. Relation between locally-produced milk supplies available for Alabama markets, sales of bottled milk and cream, and sales of all bottled milk products in Areas 7, 8, and 9, by months, 1947-49. (Supplies and sales are those of milk distributors under health department inspection. Sales do not include an allowance for plant loss and wastage.)

of bottled milk in that State. Emergency imports, chiefly of northern milk, were comparatively large in the winter and fall of 1947 and 1948, but of little consequence in 1949.

CHANGES *in* NUMBER of PRODUCERS and *in* PRODUCTION *per* DAIRY

State-Wide Data

Records of numbers of producers delivering milk were obtained for the years 1947-49 from some 60 plants.²¹ This group included most of the large plants in the State, and received approximately four-fifths of the Alabama-produced fluid milk supplies. The data most nearly represent changes in volume and seasonality of production of dairymen who sold milk to distributors. With minor exceptions, the only dairies owned by distributors that were included were those of pasteurized milk distributors who also purchased milk from other producers.

The number of producers supplying this group of plants increased from 716 in January 1947 to 1,349 in December 1949 (Figure 16, Appendix Table 5). The increase occurred at a fairly uniform rate, except that in 1949 distributors added more producers in the late summer and early fall than during other parts of the year. As year-round shortages disappeared, distributors added producers chiefly when fall and winter shortages were imminent and new producers could be assured of a base price for all or most of their initial milk deliveries.

Average daily deliveries per dairy were 9 per cent less in 1948, and 7 per cent less in 1949, than in 1947. The reason for this decline was not definitely established. Apparently the lower average reflected generally lower production per dairy among dairies added during the years 1947-49 than among those supplying milk early in 1947.²²

²¹ Data on numbers of producers were included for part of the 3-year period for a number of small distributors whose businesses were absorbed during the period by other distributors in the group. Likewise, they were included for a few plants that opened during the period, taking over producers from other plants in the group.

²² A sizable number of the original dairies were owned by men who were or previously had been milk distributors. Since such herds are likely to be larger than those of wholesale producers, reducing the proportion of them would result in a decline in average daily delivery per dairy. Thus, the shift that was taking place in that period from retailing of raw milk by producer-distributors to sale of pasteurized milk by specialized distributors may have contributed to the decline in production per dairy.

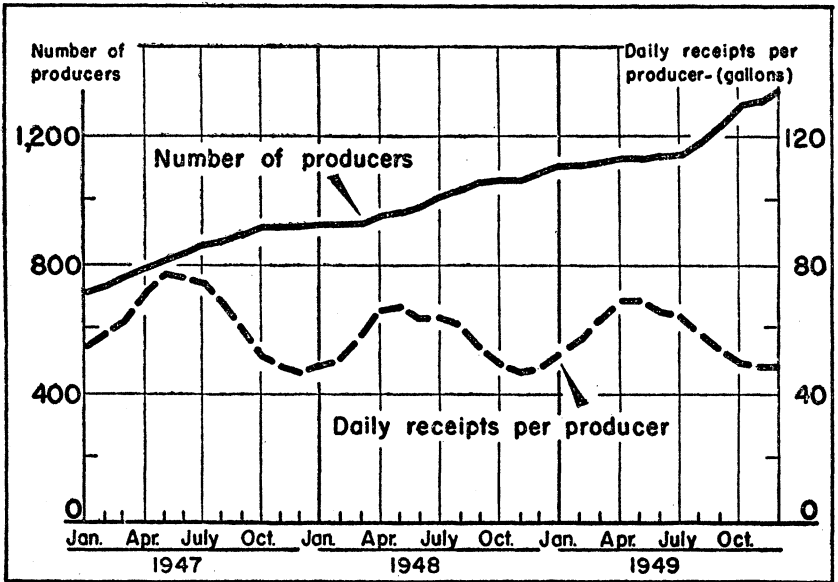


FIGURE 16. Changes in number of producers and in average daily receipts per producer at approximately 60 fluid milk plants, by months, Alabama, 1947-49.

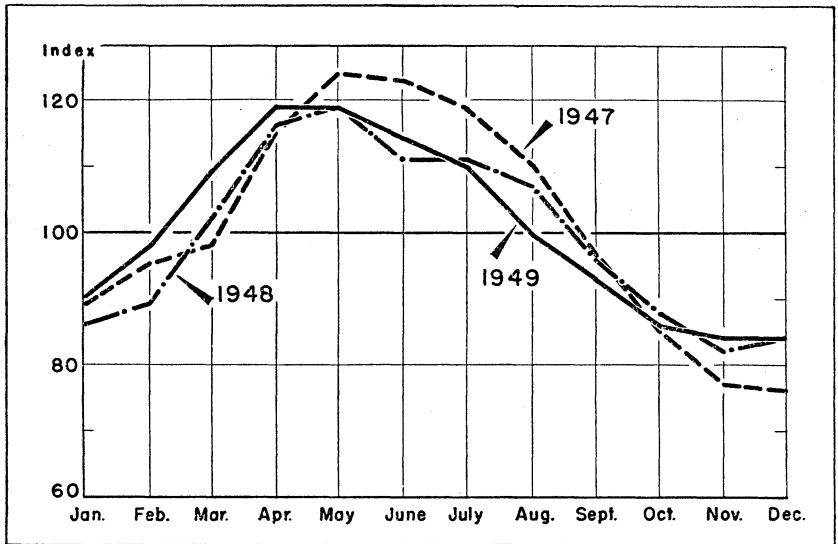


FIGURE 17. Index numbers of average daily receipts per producer at approximately 60 plants, by months, Alabama, 1947-49. (Annual averages = 100.)

Average daily deliveries per dairy showed less seasonal variation at the end of the 3-year period than at the beginning (Figure 17). In 1947, producers sold 64 per cent more milk in May than in December. In 1949, daily deliveries in the peak months of April and May were 41 per cent larger than in the low months of November and December.

Three years is too short a period to give conclusive evidence about factors responsible for these changes in seasonality of production. Without doubt, however, differences in weather contributed to them. Dry weather in late summer and early fall of 1947 and in late spring of 1948 adversely affected pasture conditions and milk production. On the other hand, weather was more than usually favorable for pastures in the fall of 1948 and throughout 1949, though by a smaller margin in the late spring of 1949 than in the remainder of that year (29,6,8). Exceptionally good fall and winter pastures in late 1948 and in 1949 were partly responsible for the increase that occurred in fall and winter milk production relative to spring and summer production.

Nevertheless, it appears that all changes in seasonality of production were not attributable to the weather. During the years of severe wartime milk shortages, dairymen could sell all the milk they produced for as high a price in spring and summer as in fall and winter. In the postwar period, however, as shortages became less acute, dairymen were again penalized through lower prices for spring and summer production that exceeded fall and winter production. The noticeable drop in production in late summer of 1949, when pastures were better than they had been in corresponding months of 1948, suggests increased emphasis on fall freshening and on fall and winter milk production.

Area Data

Month-to-month changes from 1947 through 1949 in numbers of producers and in average daily plant deliveries per producer are shown by areas in Figures 18, 19, and 20. Data for Area 8 are not shown because they are insufficient to give a dependable picture of the situation there.

Between January 1947 and December 1949, numbers of producers approximately doubled in Areas 2, 3, and 7 (northeastern, Birmingham, and east central market areas). Increases in Areas 1 and 4 (Tennessee Valley and Tuscaloosa areas) were propor-

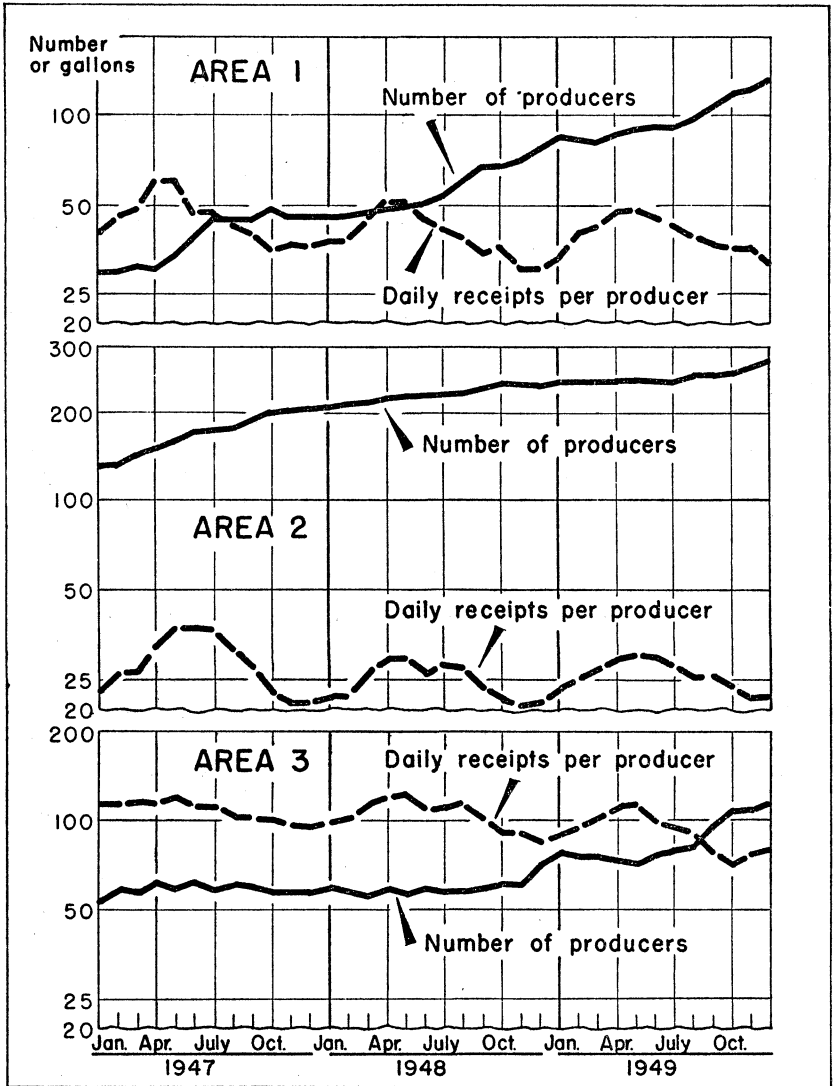


FIGURE 18. Changes in numbers of producers and in average daily receipts per producer, at certain plants in Areas, 1, 2, and 3, by months, Alabama, 1947-49. (Note: To show equal proportional changes in equal vertical distances, these data are plotted on a semi-logarithmic scale.)

tionally larger than this, while those in Areas 5, 6, and 9 (the two Black Belt areas and the Mobile area) were smaller.²³

²³ The relative increase in number of producers in Area 1 may be overstated. Data were not obtained from two large plants whose numbers of producers may have been more stable.

Slight increases occurred between 1947 and 1949 in average daily receipts per dairy in the three areas (5, 6, and 9) with smallest percentage increases in numbers of producers. Daily receipts per dairy declined 10 per cent or more in each of the other areas, with a maximum decrease of 26 per cent in Area 4 (Tuscaloosa area).

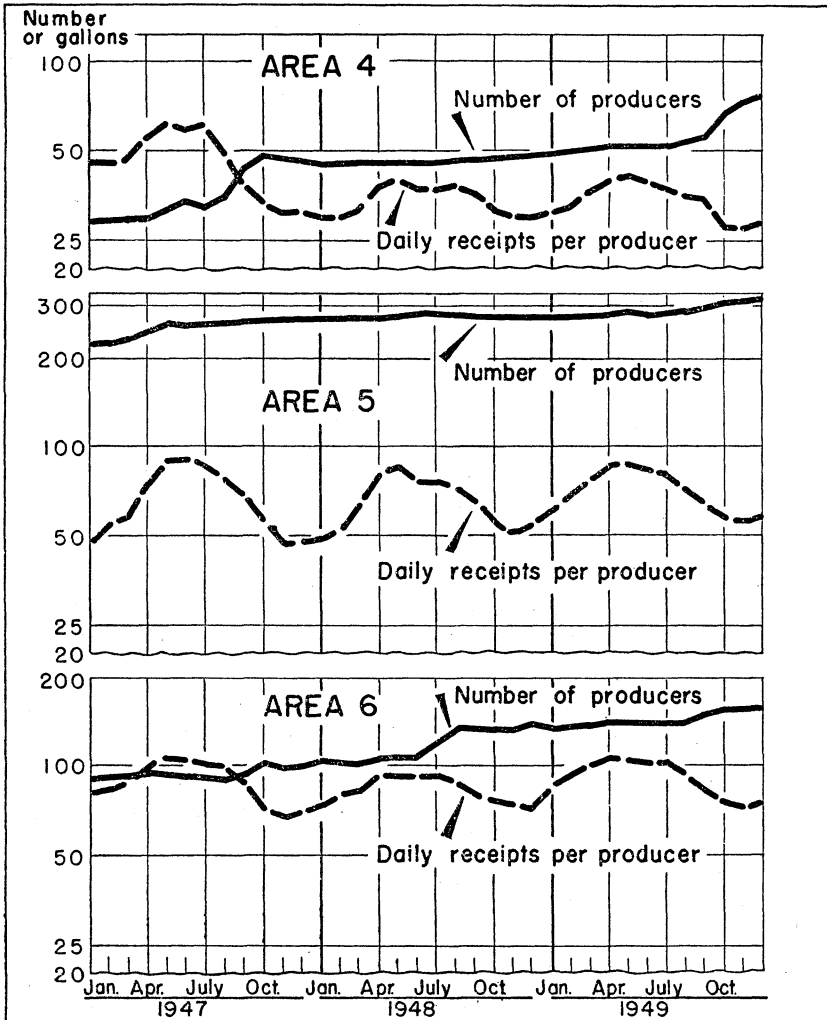


FIGURE 19. Changes in numbers of producers and in average daily receipts per producer at certain plants in Areas 4, 5, and 6, by months, Alabama, 1947-49. (Note: To show equal proportional changes in equal vertical distances, these data are plotted on a semi-logarithmic scale.)

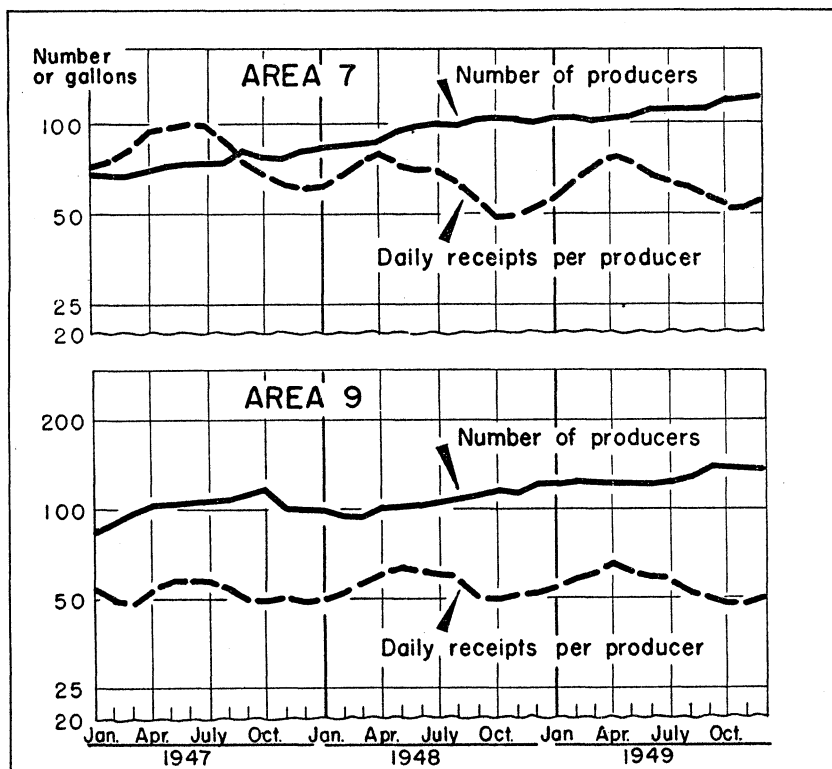


FIGURE 20. Changes in numbers of producers and in average daily receipts per producer at certain plants in Areas 7 and 9, by months, Alabama, 1947-49. (Note: To show equal proportional changes in equal vertical distances, these data are plotted on a semi-logarithmic scale.)

There were wide differences in producer volume among areas. In 1949, producers in Areas 3 and 6 (Birmingham and Montgomery areas) delivered an average of about 90 gallons per day, while those in Areas 2 and 4 (northeastern and Tuscaloosa areas) delivered only about one-third of this amount.

Reduction in seasonal variations in receipts between 1947 and 1949 was greatest in Areas 2, 4, and 5 (northeastern, Tuscaloosa, and western Black Belt areas). Some improvement also occurred in Areas 1, 6, and 7 (Tennessee Valley, Montgomery, and east central areas). Area 9 (Mobile area) showed no perceptible change in this respect, but in Area 3 (Birmingham area) seasonal variation was greater in 1949 than 1947. One reason for this increased seasonal variation in Area 3 apparently was the addi-

tion of new dairies in Shelby and Blount counties. The production of these dairies probably was less uniform than that of the longer established dairies close to Birmingham, many of whose owners had at one time been producer-distributors.

VOLUME and SEASONAL PATTERN of SALES of BOTTLED MILK PRODUCTS

Volume

The average quantities of individual bottled milk products sold per day in 1948 and 1949 by milk distributors under health department inspection are shown in Table 2. Sales of whole milk and buttermilk were about 10 per cent larger in 1949 than in 1948. Sales of all other products except cream also increased to some extent.

In all major respects, the relative importance of individual products was essentially the same in both years. Whole milk made up about 80 per cent of the total gallonage. Cream, of which about one-third was whipping cream, comprised approximately 1 per cent. Plain buttermilk accounted for about 15 per

TABLE 2. QUANTITIES AND RELATIVE IMPORTANCE OF BOTTLED MILK PRODUCTS SOLD BY DISTRIBUTORS UNDER HEALTH DEPARTMENT INSPECTION, ALABAMA, 1948 AND 1949

Item	1948		1949	
	Quantity per day	Percentage of total quantity	Quantity per day	Percentage of total quantity
	<i>1,000 gal.</i>	<i>Per cent</i>	<i>1,000 gal.</i>	<i>Per cent</i>
Whole milk	73.4	80.5	80.2	80.4
Coffee cream ¹	0.6	0.7	0.6	0.6
Whipping cream	0.3	0.3	0.3	0.3
All cream	0.9	1.0	0.9	0.9
Skim milk	²	²	0.2	0.2
All milk and cream	74.3	81.5	81.3	81.5
Plain buttermilk	13.8	15.1	15.2	15.2
Whole buttermilk	0.2	0.2	0.3	0.3
All buttermilk	14.0	15.3	15.5	15.5
Chocolate drink ³	2.9	3.2	3.0	3.0
ALL PRODUCTS	91.2	100.0	99.8	100.0

¹ Includes a small amount of cereal cream.

² Less than 0.05.

³ Includes a small amount of chocolate milk.

cent and chocolate drink (including a small amount of chocolate milk) 3 per cent of total sales volume. Small amounts of whole buttermilk were sold in both years, and by 1949 the quantity of skim milk sold had become appreciable.

The composition of sales was generally similar to that found in North and South Carolina and in Memphis, Tennessee (24, 25, 26). It differed radically, however, from the composition of sales in northern markets, where the volume of cream was larger and the volume of buttermilk, and perhaps that of chocolate drink, was smaller. In 1949, 28 northern markets with Federal marketing orders sold an average of 23 pounds of whole milk per pound of skim milk, buttermilk, and flavored milk drinks. In Alabama, the corresponding ratio was 4 to 1. On the other hand, while northern markets sold 117 pounds of whole milk per pound of butterfat sold in fluid cream, Alabama markets sold about 340 pounds (10).

Milk Consumption in Schools

In 1949, whole milk used in public schools of the State comprised nearly 7 per cent of the whole milk sold by commercial distributors (Figure 21).²⁴ Nearly all of this milk was consumed from September through May. In a number of months during this period, school milk represented nearly 10 per cent of the whole milk sold by commercial distributors.

Even though schools were an important outlet for bottled milk, in the 1949-50 school year, nearly 30 per cent of the public school pupils of the State attended schools that did not serve milk (30). A number of factors hinder the introduction of milk into these schools. Some are handicapped by lack of facilities. Others are small schools in rural areas where it is difficult for commercial distributors to serve them economically.

The seasonal character of school milk consumption is a problem to milk producers and distributors. Early in the fall, when milk supplies are likely to be decreasing, sales of bottled milk increase sharply when schools open. Late in the spring, when milk supplies usually are at a peak, sales decline when schools close.

²⁴ Monthly data on milk consumption in schools participating in the national school lunch program were supplied by the State Department of Education. Similar information was obtained for school systems not participating in the Federal Program. These included the Birmingham, Phenix City, Tarrant, and Piedmont schools and part of those in the Jefferson County system. Milk consumption in the Anniston City schools was estimated by the author.

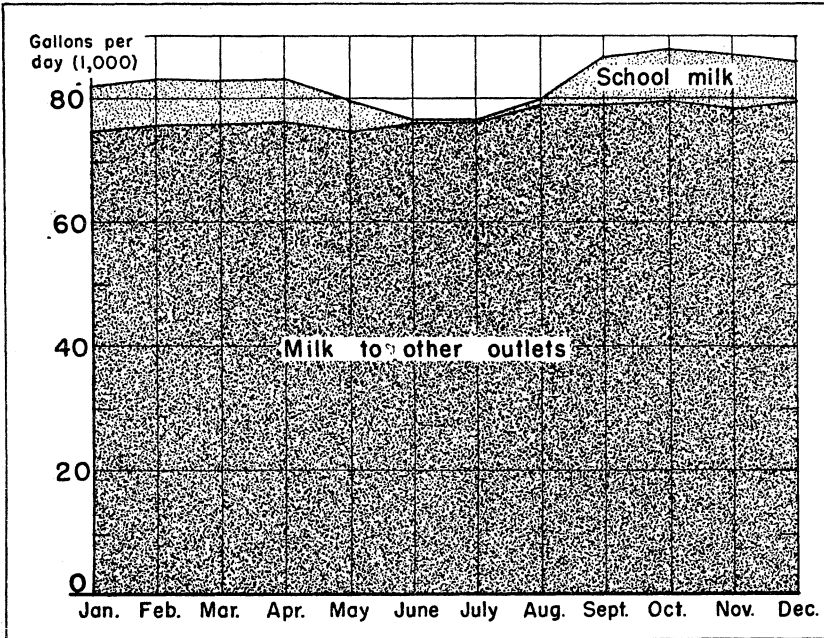


FIGURE 21. Average daily sales of whole milk to schools and to other outlets, by months, Alabama, 1949.

Far outweighing this objectionable feature is the potential effect of the school milk program on rates of milk consumption. It is generally believed that regular serving of milk in schools will increase milk consumption of children not only while they are in school but also in subsequent years (18).

Seasonal Sales Patterns

Consistent seasonal patterns were evident from year to year in sales of most bottled milk products (Figure 22).²⁵ Sales of whole milk were fairly uniform throughout the year. The only important seasonal change was a decline of between 5 and 10 per cent in summer months. In timing and in amount, this drop in sales was closely related to changes in milk consumption in

²⁵ It was not feasible to adjust these data on seasonality of sales to eliminate the influence of the expansion in sales that was evident in 1948 and 1949. In both years this expansion in sales apparently occurred mainly in the late summer and early fall at about the time schools opened.

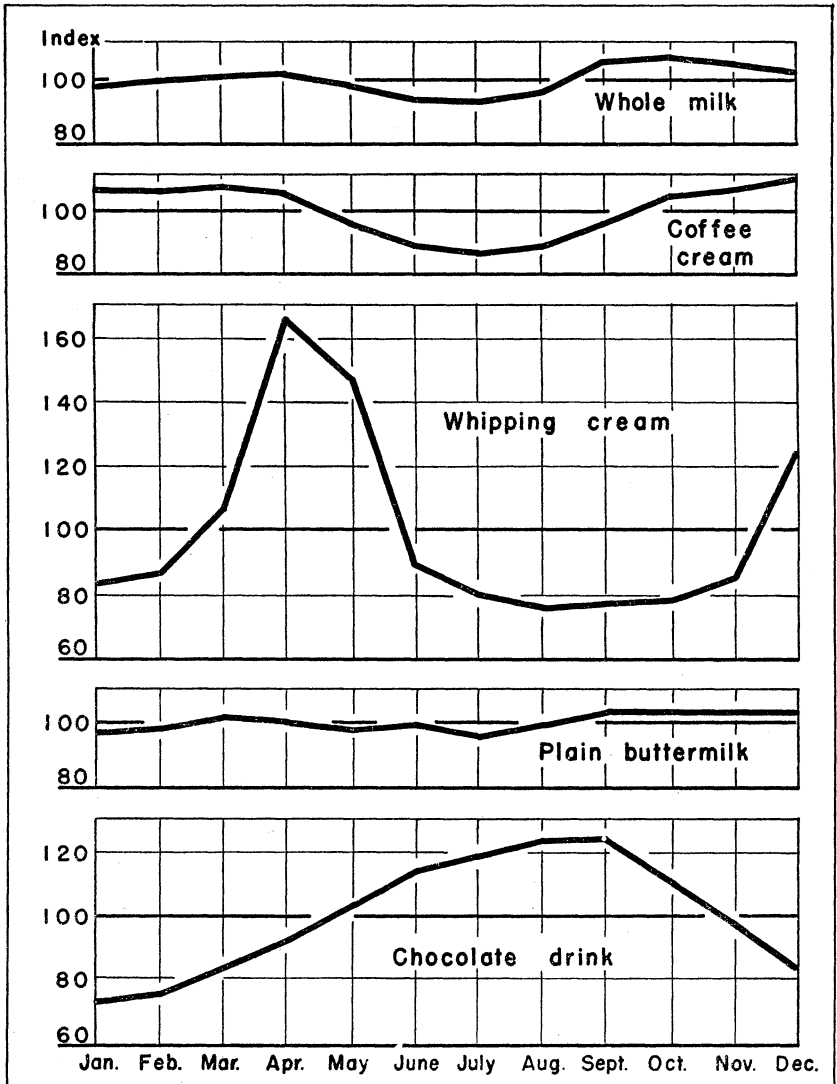


FIGURE 22. Index numbers of average daily sales by Alabama milk distributors under health department inspection of whole milk in 1947-49 and of other milk products in 1948 and 1949. (Indexes are simple averages of monthly seasonality indexes for the years indicated; monthly indexes for each year are based on annual average = 100.)

schools (Figure 21).²⁶ However, other factors probably contributed to it. Presumably, adults reduced milk consumption in hot weather when large quantities of iced tea and other cold drinks were used. In addition, vacation trips to rural and out-of-state places were probably responsible to some extent for the summer low in milk sales.

Sales of whole milk increased sharply when schools opened in the fall. Each year this increase exceeded the decline that occurred during the previous spring and early summer. The extent of this increase, and the comparatively high level of sales each fall, apparently were due in part to the expansion taking place in volume of milk sold. Without that expansion, sales in the fall months probably would not have been materially different from those in the preceding winter and early spring.

There was proportionally more fluctuation in cream sales than in sales of whole milk. Sales of coffee cream were inversely related to temperature. From June through August they were about 10 per cent below the average for the year, while from October through April they were from 5 to 10 per cent above. These seasonal changes appear to have been due to reduced coffee consumption during hot weather, particularly in restaurants.

Sales of whipping cream were highly variable. They ranged from roughly 50 per cent above the yearly average in April and May, to 20 or 25 per cent below in the months from July through October, and to about 25 per cent above in December. The spring peak came during the berry season; the peak in Mobile was about a month earlier than that in the Tennessee Valley. The lower peak in December reflected heavy use of whipping cream during the holiday season.

Sales of plain buttermilk were relatively uniform throughout the year. As with whole milk, slightly larger volume in the fall than in the spring probably was attributable to the general expansion taking place in sales. Increased competition from farm-churned buttermilk apparently was responsible for a decrease in sales in some small markets during spring and early summer.

²⁶ A considerable quantity of school milk was consumed by rural children. When schools closed, the source of much of the milk used by these children shifted from commercial to non-commercial supplies. This helped to account for reduced sales by commercial distributors.

For distributors as a group, sales of chocolate drink were roughly 1½ times as large in summer as in winter. The sales pattern of this product was more variable from distributor to distributor than that of other products. Peak sales of a few distributors came during the winter rather than during the summer. In 1949, winter sales of this product were proportionally larger, and summer sales proportionally smaller, than in 1948.

CONSUMPTION *per* PERSON, POPULATION GROWTH, and EFFECTS *on* MILK MARKETS

Per Capita Sales *by* Commercial Distributors, 1949

Per capita sales of bottled milk products in 1949 were estimated by dividing total sales of bottled products in the State and in the various areas by the population apparently buying products sold by plants and commercial producer-distributors, including distributors not under health department inspection.²⁷ Thus computed, average per capita sales of whole milk in Alabama cities and towns in 1949 were 0.44 pint per day (Table 3). Including buttermilk and chocolate drink, sales of whole milk and milk drinks amounted to 0.54 pint per day. Adding to this the milk equivalent of cream (on a butterfat basis) gave a total for all bottled milk products of 0.57 pint per day.

To help in evaluating consumption rates in Alabama, these estimates were compared with similarly computed estimates of sales per capita in 1948 or 1949 in Richmond, Baltimore, New York City, and Boston. Per capita sales of whole milk were nearly twice as large in New York and Boston as in Alabama, though sales of buttermilk and chocolate drink were smaller. Cream consumption was much heavier in New York and Boston. Accordingly, the milk equivalent of all bottled milk products sold per capita averaged about 85 per cent greater in those cities

²⁷ In general, estimates of per capita sales were based on the 1950 population of incorporated places of 500 or more plus that of unincorporated places of 1,000 or more (13). Census reports of "urbanized populations" were used, however, for the Birmingham, Mobile, and Montgomery areas (14). In using these estimates as indicators of per capita consumption in urban areas, it is recognized that milk distributors sold some milk to schools and stores in rural areas. On the other hand, some people in small towns and on fringes of cities kept cows or bought milk from neighbors. For all products except buttermilk, the influence of these two factors probably were largely compensating. Consumption of buttermilk may be somewhat understated, as some consumers, mainly in towns and small cities, apparently still buy "country" buttermilk (23).

TABLE 3. ESTIMATED AVERAGE PER CAPITA SALES OF WHOLE MILK AND OTHER BOTTLED MILK PRODUCTS IN CITIES AND TOWNS OF ALABAMA COMPARED WITH THOSE IN OTHER MARKETS

Market	Year	Average daily sales per capita					
		Whole milk	Butter-milk	Choco-late drink or milk	Milk and milk drinks	Milk equivalent of cream	All bottled products ¹
		<i>Pints</i>	<i>Pints</i>	<i>Pints</i>	<i>Pints</i>	<i>Pints</i>	<i>Pints</i>
Alabama	1949	0.44	0.08	0.02	0.54	0.03	0.57
Richmond, Va. ²	1948	.56	.04	.03	.63	.05	.68
Baltimore, Md. ²	1949	.61	.01	.06	.68	.06	.74
New York, N.Y. ²	1949	.84		.01	.85	.17	1.02
Boston, Mass. ²	1948	.82		.01	.83	.26	1.09

¹ Includes skim milk and milk equivalent of cream.

² O'Donnell, P. E. "Consumption of Fluid Milk and Cream in Northeastern Marketing Areas." Bur. of Agr. Econ., U.S. Dept. of Agr. pp. 12, 18, 31, and 33. 1950.

than in Alabama. On the other hand, the quantity of milk and milk drinks sold per person was only about 55 per cent greater. Per capita sales of various products in Richmond and Baltimore were, in general, intermediate between those in Alabama and those in New York and Boston (27).²⁸

Per capita sales of bottled milk products varied widely within the State (Figure 23). The quantity of whole milk sold per person was about 50 per cent larger in Areas 1, 2, and 4 in northern Alabama than in Area 8 in the southeastern portion. Per capita estimates for other areas fell about midway between these extremes, running slightly higher for areas around Mobile and Montgomery than for other areas. Per capita sales of buttermilk were about half as much in the southern part of the State as in the northern part. This was consistent with findings in the Carolinas where much heavier buttermilk sales occurred in the Piedmont and Mountain areas of those states than in the Coastal Plain (23, 26).

Very low sales per capita in Area 8 were associated with a

²⁸ Lower consumption of bottled milk products in Alabama was offset to some extent by heavier use of evaporated milk and skim milk powder. A recent food consumption study in Birmingham, Buffalo, Minneapolis-St. Paul, and San Francisco showed more than two and one-half times as much evaporated milk used in Birmingham as on the average in the other cities, and an appreciable amount of dry skim milk used in Birmingham as compared with none in the other cities. Reported total consumption of milk proteins and minerals in whole milk, buttermilk, evaporated milk, and dry skim milk averaged 84 per cent as high in Birmingham as in the other places (5).

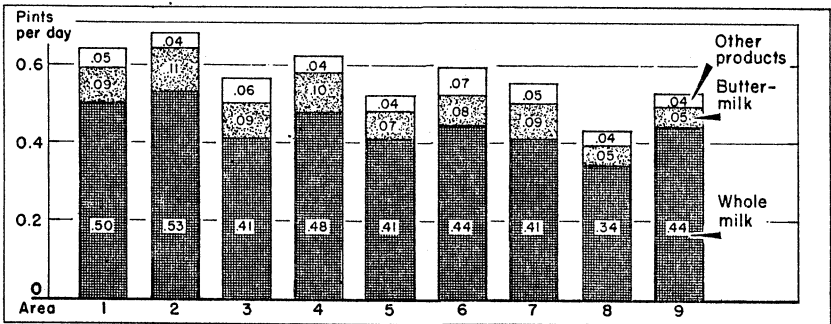


FIGURE 23. Estimated average per capita sales of whole milk, buttermilk, and other bottled milk products in Alabama cities and towns, by regions, 1949. (Other bottled milk products include chocolate drink and milk, skim milk, and milk equivalent of cream.)

general lack of development of dairying in that section. In the past, people there may not have had sufficient supplies of fresh milk regularly available to form the habit of using it extensively. The Census of 1945 showed considerably less farm butter sold per person on farms in Areas 8 and 9 than in any other area except Area 5. Consequently, a background of smaller available supplies of buttermilk may have helped to account for a less highly developed buttermilk-consuming habit in these areas.

Trends in per Capita Milk Consumption in Birmingham

The Bureau of Food and Dairy Inspection of the Jefferson County Health Department has obtained from milk distributors information pertaining to quantities of bottled milk products sold in the city of Birmingham since 1920. Estimates of per capita consumption derived from these reports are presented here to help in evaluating the estimates for 1949 obtained in this study, and to provide additional information for use in forecasting future changes in consumption rates.

During the 30-year period 1920-49, per capita consumption of whole milk in Birmingham fluctuated widely, but showed a definite upward trend (Figure 24, Appendix Table 6). After increasing about 70 per cent between 1920 and 1926, it declined steadily, reaching a level below that of 1920 in the severe depression of the early 1930's. With improved economic conditions, consumption per person increased greatly during the late 1930's

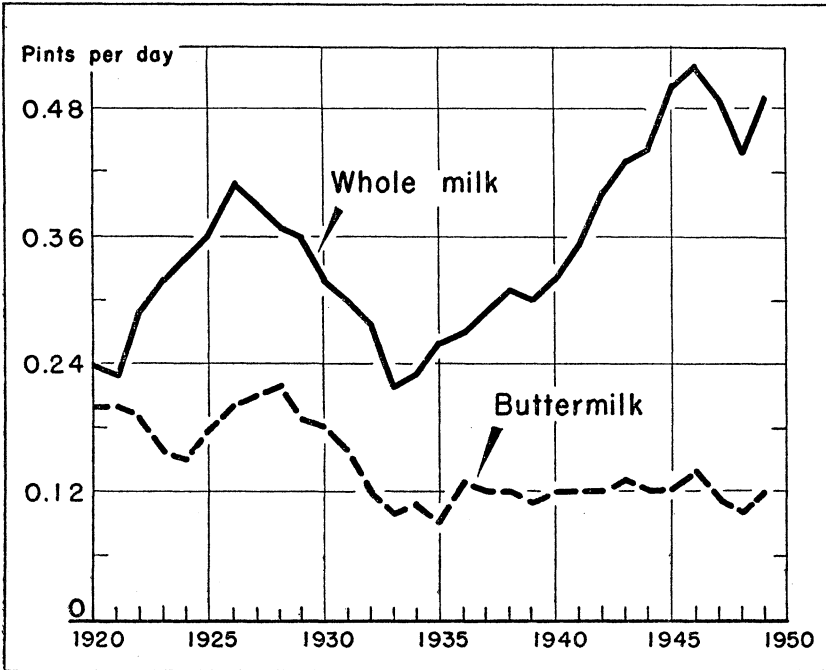


FIGURE 24. Estimated annual average per capita consumption of whole milk and buttermilk in Birmingham, Alabama, 1920-49. (Data from Bureau of Food and Dairy Inspection, Jefferson County Health Department.)

and during the 1940's. Despite a postwar decline, in 1949 it was nearly 0.5 pint per day or slightly more than twice what it had been 30 years before.

The per capita sale of buttermilk by commercial milk distributors fluctuated around 0.2 pint per day in the 1920's. It declined sharply around 1930 and subsequently has leveled out at a little more than 0.1 pint per day.

Several factors apparently contributed to the sharp increase in whole milk consumption during the latter half of this 30-year period.²⁹ A number of these factors were outgrowths of changes in economic conditions between the mid-1930's and the 1940's. Seemingly, the most important economic factors were (1) a greater rise in consumers' incomes than in the cost of living, and (2) a smaller increase in milk prices than in food prices gener-

²⁹ Relationships in the first half of this period could not be studied for lack of annual data on income per person.

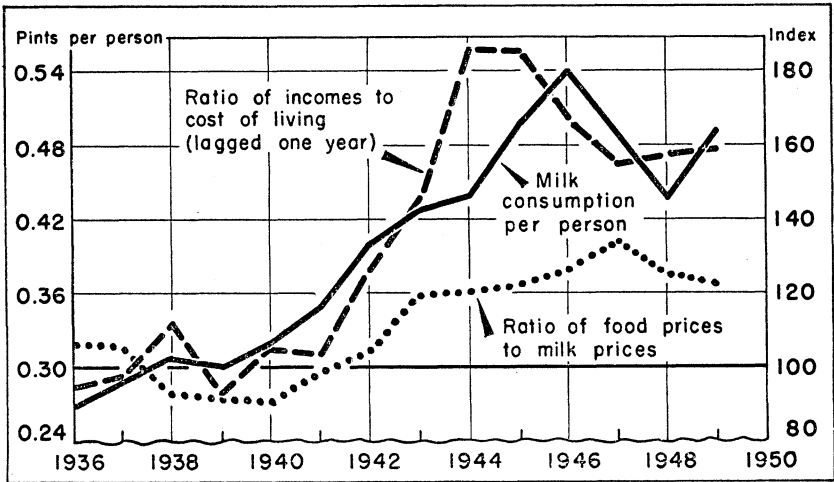


FIGURE 25. Relation between milk consumption per person, ratio of incomes to cost of living (lagged one year), and ratio of food prices to milk prices, Birmingham, Alabama, 1936-49. (Ratios are expressed as index numbers, 1935-39 = 100.)

ally. Changes in milk consumption per person were closely associated with changes in these two relationships (Figure 25, Appendix Table 7.)⁸⁰

A number of other factors strengthened this upward trend in milk consumption. Improvements in home refrigeration presumably facilitated the shift from buttermilk to whole milk, which is more exacting in its requirements for refrigeration. Likewise, more general knowledge of the importance of milk in the diet, improvements in the quality of milk, and sales promotion programs probably were responsible for long-time increases in consumption rates (18).

The percentage increase in per capita sales of whole milk in Birmingham during the 1940's was large, but in quantity the in-

⁸⁰ In statistical terms ($R^2_{1,23} = 0.85$), 85 per cent of the change in milk consumption per person during this period was associated with concurrent changes in (1) the ratio of disposable incomes per capita in Birmingham to consumer prices (cost of living) in Birmingham (lagged one year), and (2) the ratio of all food prices in Birmingham to milk prices in Birmingham. Superficially, this was a highly significant correlation. However, there was a high degree of interrelation between the two ratios, and their movement was closely related to over-all changes in economic conditions. Consequently it is impossible to provide indisputable evidence that they were fundamentally responsible for the changes in milk consumption per person that were associated with them.

crease was not outstanding when compared with that in northern markets. Between 1940 and 1949, reported per capita consumption in Birmingham rose from 0.32 to 0.49 pint per day, an increase of 0.17 pint or 53 per cent. During the same period, the average change in 10 northeastern markets was from 0.60 to 0.74 pint, an increase of 0.14 pint or 23 per cent. In 10 Illinois markets the corresponding rise was from 0.55 pint to 0.80 pint, an increase of 0.25 pint or 45 per cent (19).

Effects of Urban Population Trends on Milk Markets

In 1950, the urban population of Alabama was nearly one and one-half times that in 1940, and nearly two and one-half times that in 1920. This was a more rapid urban growth than that experienced in most other sections of the country (15).

Reported sales of whole milk and cream by Jefferson County milk distributors under health department inspection were nearly four times as large in 1949 as in 1920 (Table 4). An important part of this expansion was attributable to population growth in Birmingham, which amounted to about 72 per cent during that period.

If the experience in Birmingham was representative, there was a considerable relationship between the rate of population growth and the rate of change in consumption per capita. In the Birmingham market, a rapid population growth in the 1920's and 1940's, when economic activity was at a comparatively high level,

TABLE 4. SALES OF WHOLE MILK AND CREAM BY JEFFERSON COUNTY MILK DISTRIBUTORS, DAILY MILK CONSUMPTION PER CAPITA IN BIRMINGHAM, AND URBAN POPULATIONS OF JEFFERSON COUNTY AND OF ALABAMA, 1920, 1930, 1940, AND 1950

Year	Average daily sales of milk and cream by Jefferson County milk distributors ¹	Average daily sales of whole milk per person in city of Birmingham ¹	Population of Birmingham metropolitan district ²	Alabama urban population ³
	<i>1,000 gal.</i>	<i>Pints</i>	<i>Thousands</i>	<i>Thousands</i>
1920	6.6	0.24	291	509
1930	12.4	.32	383	744
1940	12.5	.32	408	856
1950	25.2 ⁴	.49 ⁴	500	1,228

¹ Data from Bureau of Food and Dairy Inspection, Jefferson County Health Department.

² 1920, 1930, and 1940 are Census data; 1950 estimated by writer.

³ Census data; 1950 is "old urban definition."

⁴ Data for 1949.

was generally accompanied by significant increases in consumption per capita. On the other hand, with depressed business in the 1930's, there was little growth in city population in that decade, and consumption per capita was no higher in 1940 than it had been in 1930. Obviously, the basic cause of these differences was changes in economic conditions. In a state of comparatively low incomes that is becoming industrialized, these changes in economic conditions are especially important because they markedly influence the rate of growth of cities as well as milk consumption per capita.

SUPPLIES *of* MANUFACTURING MILK *and* USE *of* MILK *in* MANUFACTURED DAIRY PRODUCTS

Milk Receipts at Manufacturing Plants

In 1949, Alabama had 10 dairy plants and 2 receiving stations handling milk of manufacturing grade that received whole milk from farmers (Figure 7, p. 14). In addition, farmers in the northern tier of counties sold a considerable quantity of manufacturing milk to plants in southern Tennessee.

Six of the 10 manufacturing plants in Alabama were cheese plants. One of these used the bulk of its milk for cottage cheese, while two others made small quantities of cottage cheese and of other products, though their chief product was American cheese. The other four manufacturing plants used their milk mainly, though not exclusively, to produce frozen dairy products or ingredients used in such products. Milk from the two receiving stations was shipped to an evaporated milk canning plant in northeastern Mississippi.

Receipts of milk at these plants and receiving stations were highly seasonal (Figure 26, Appendix Table 8). Daily receipts from producers were nearly three times as large in June and July as in January and December. Surplus fluid milk from bottling plants, most of which came in during the spring and summer, added to this wide seasonal fluctuation in receipts.

The amount of seasonal variation in receipts from producers was greater in the Black Belt than in other parts of the State (Figure 27). At the four plants in the Black Belt, receipts were about five times as large in the months of May through August as at the beginning and end of the year. At almost all plants and receiving stations in other parts of the State, receipts were be-

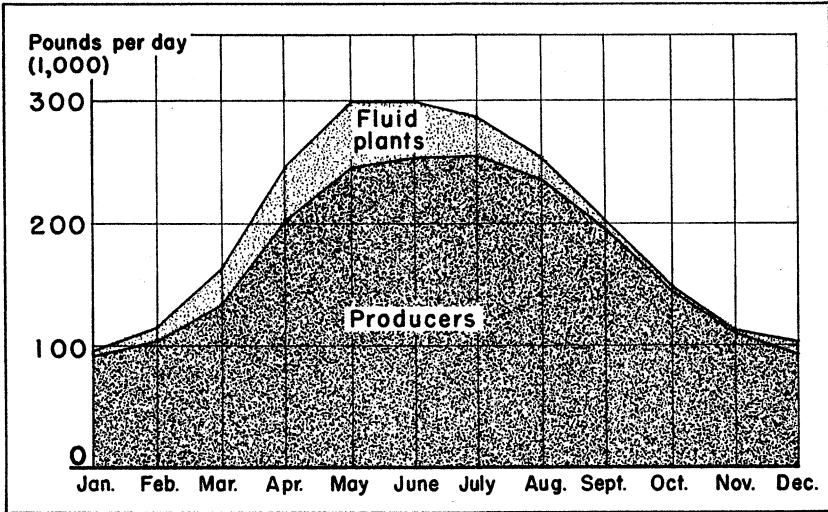


FIGURE 26. Pounds of milk received per day at 11 Alabama dairy manufacturing plants from producers and from fluid milk plants, by months, 1949. (Data for one plant which opened in February were omitted.)

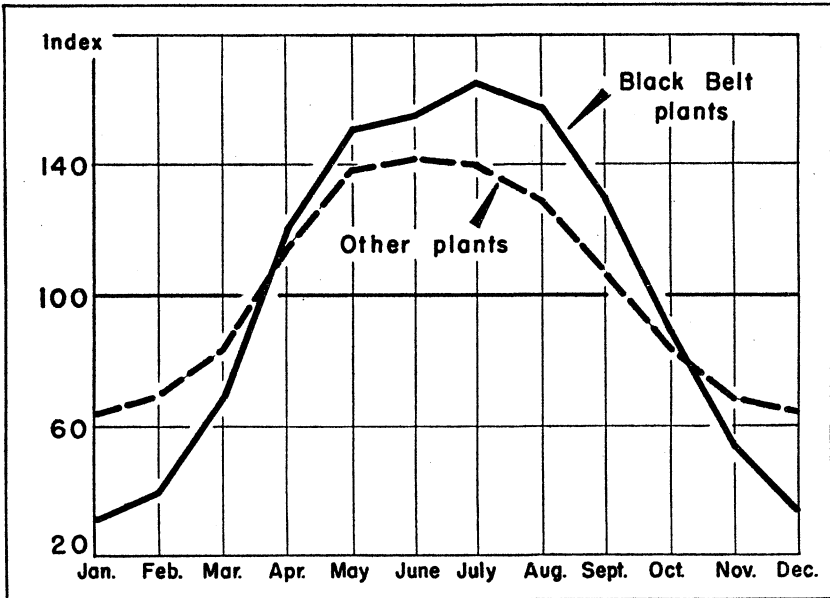


FIGURE 27. Index numbers of average daily receipts of manufacturing milk from producers at four Black Belt plants and seven plants in other parts of Alabama, by months, 1949 (Annual averages = 100).

tween two and two and one-half times as large in late spring and summer as in late fall and early winter.

Monthly information on butterfat content of milk from producers was available for receiving stations and for all plants except two. For these plants and receiving stations, average monthly butterfat tests declined from about 5.0 per cent in January to about 4.3 per cent from April through July (Appendix Table 4). They rose steadily during the late summer and fall to a peak of 5.2 per cent in November. The average test for all producer milk received during the year was slightly more than 4.5 per cent.

Cheese Made

About two-thirds of the manufacturing milk processed in Alabama was made into cheese. American cheese was made by all six cheese plants, and small amounts by a plant whose supplies went mainly into ingredients for frozen dairy products. Three of the six cheese plants also made cottage cheese.

The amounts of American cheese made were about four times as large in May, June, and July as in early winter and late fall (Appendix Table 9). Production of cottage cheese was less variable, but reached a peak in late spring and early summer. Sales of surplus butterfat were heaviest in the summer.

While only three plants made American cheese exclusively, approximate estimates of yields could be made. As a group, the plants apparently used for American cheese somewhere between 9.50 and 9.75 pounds of milk per pound of cheese manufactured. In addition to the cheese, they obtained from that milk about 0.1 pound of surplus butterfat. Some one-fifth or one-fourth of this butterfat was in whey cream, which was sold to butter plants. The rest was in cream that was obtained in standardizing milk used in making American and cottage cheese. The end use of most of this butterfat was in frozen dairy products.

Butterfat and Solids-Not-Fat Used in Frozen Dairy Products by Sources

The fresh milk supplies used in frozen dairy products by the four manufacturing plants that were devoted primarily to making such products, or materials used in them, were small when compared to the total quantity of milk equivalent used in frozen dairy products made in Alabama. Consequently, these milk sup-

plies were treated merely as one source of ingredients for frozen dairy products.

The monthly quantities of butterfat and milk solids-not-fat used in ice cream, ice milk, and sherbet made in Alabama in 1949 were estimated from reports of the State's output of these products (16).³¹ These quantities are shown graphically, broken down by apparent sources of supply, in Figures 28 and 29 and in Appendix Table 10. The sources of butterfat and milk solids-not-fat for these products were classified as (1) manufacturing milk received at plants making frozen dairy products or ingredients for frozen dairy products, (2) surplus cream and milk from fluid plants, (3) surplus cream from cheese plants, and (4) other. Quantities of butterfat and solids-not-fat obtained from all but the first of these sources were estimated.³² Nevertheless, the data provide an indication of the sources of milk solids used by the State's frozen dairy products industry and of seasonal changes in them.

The quantities of butterfat and solids-not-fat available from the first three of these sources varied seasonally in a pattern somewhat like that in the total use of these items in frozen dairy products. In the aggregate, however, the amount of seasonal variation in supplies of milk solids from these three sources was somewhat greater and the peak somewhat earlier than were the seasonal variation and peak in the use of these items in frozen dairy products. Variations were especially noticeable in the amount of butterfat and solids-not-fat available in surplus cream and milk from fluid plants.

Surplus cream from fluid milk and cheese plants, especially the former, was a major source of butterfat for frozen dairy products. Consequently, there was a greater deficit of solids-not-fat than of butterfat in milk solids available for use in frozen dairy products that originated in milk received at Alabama plants. Over the year as a whole, about two-thirds of the butterfat used in frozen products was available from sources in this category, but only about half of the solids-not-fat. The unbalance will become

³¹ The respective percentages of butterfat and milk solids-not-fat used in making these estimates were 10 and 10 for ice cream, 4 and 15 for ice milk and 1 and 2 for sherbet.

³² These estimates were made in determining the utilization of milk received at Alabama plants, and of the butterfat and solids-not-fat in that milk. Methods used are described in Appendix B, Section I.

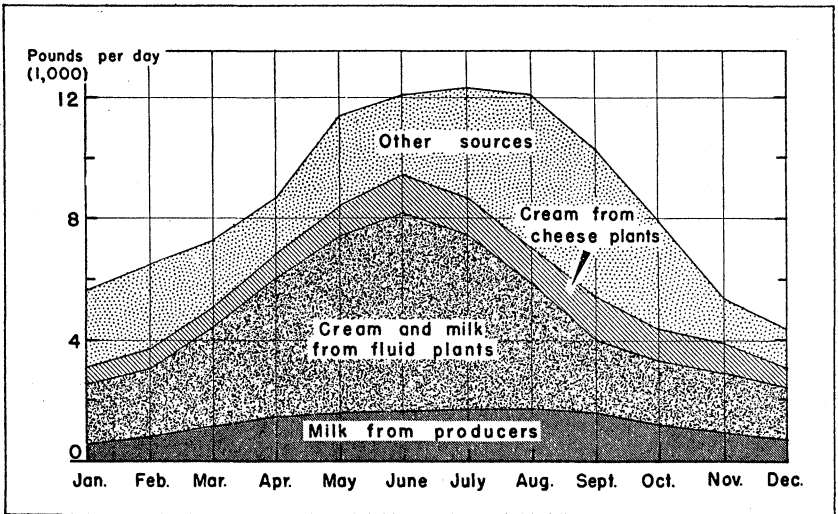


FIGURE 28. Estimated average daily quantities of butterfat used in frozen dairy products made in Alabama, and amounts available from various sources, by months, 1949. (Use includes allowance for plant loss and wastage.)

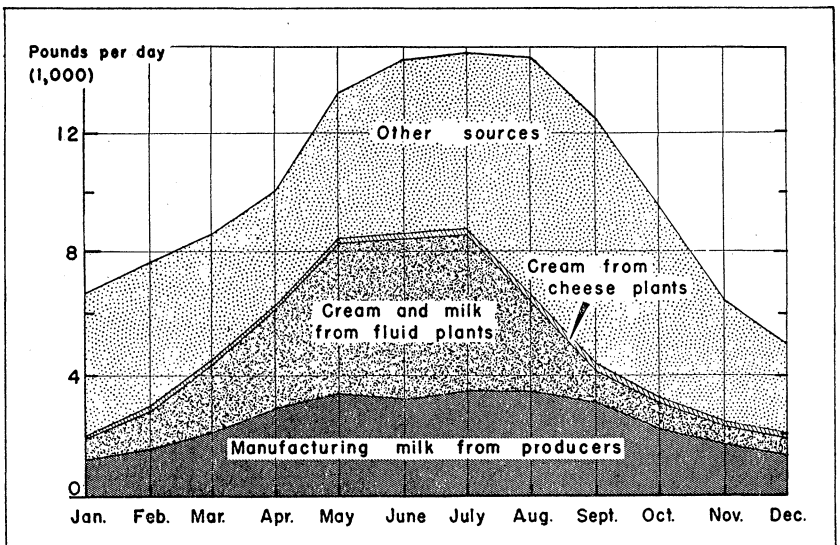


FIGURE 29. Estimated average daily quantities of milk solids-not-fat used in frozen dairy products made in Alabama, and estimated amounts available from various sources, by months, 1949. (Use includes allowance for plant loss and wastage.)

greater if the recent trend toward a higher ratio of ice milk production to ice cream production continues.³³

The OVER-ALL PICTURE

Milk Supplies

Total Alabama-produced commercial supplies of fluid and of manufacturing milk in 1949 and their relation to total fresh milk supplies of Alabama dairy plants and commercial producer-distributors are shown by months in Figure 30 and in Appendix Table 11. Total Alabama-produced supplies amounted to about 350 million pounds, an average of not quite 1 million pounds per day. Average daily supplies varied seasonally from a low of 748,000 pounds in January to a high of 1,139,000 pounds in May.

Over the year as a whole, fluid milk comprised 78 per cent of

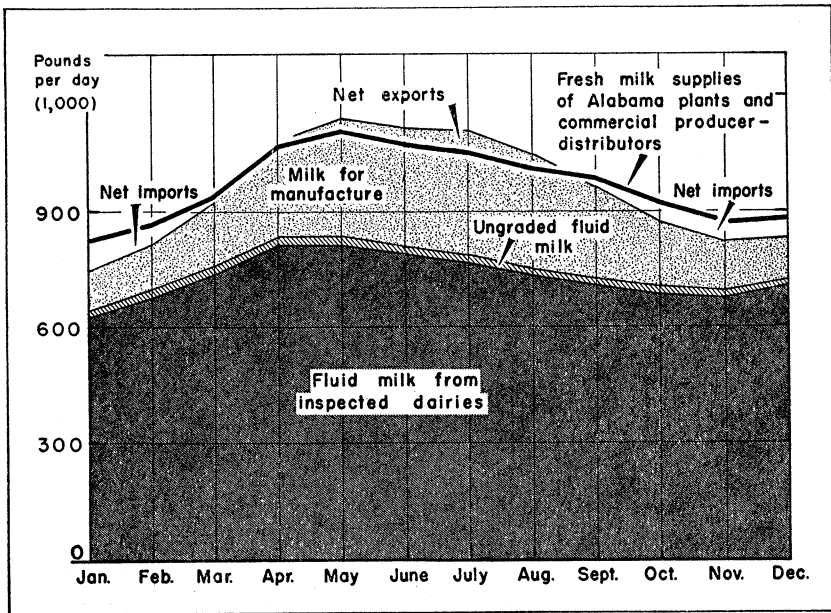


FIGURE 30. Average daily Alabama-produced supplies of fluid milk from inspected and uninspected dairies and of milk for manufacture, and fresh milk supplies of Alabama plants and commercial producer-distributors, by months, 1949.

³³ Early in the 1940's, ice milk production in the State was about 2 per cent of ice cream production. In 1949, it was 17 per cent (16).

the total. Within the year, however, the proportion that was fluid milk varied considerably because of the wider seasonal fluctuation in manufacturing than in fluid supplies. In winter and late fall, fluid milk comprised about 85 per cent of Alabama-produced milk supplies, while in summer it comprised little more than 70 per cent.

In total volume, fresh milk supplies of Alabama plants and producer-distributors did not differ greatly from supplies produced in Alabama. The difference between plant supplies and Alabama-produced supplies was the difference between (1) shipments of Alabama-produced fluid and manufacturing milk to out-of-state plants, and (2) imports of year-round and emergency supplies of fluid milk and of surplus milk that came in to dairy manufacturing plants. During winter and fall, exports were light and imports heavy. This resulted in a balance in favor of the latter, and a net addition to Alabama-produced supplies. During late spring and summer, the reverse was true. For the year as a whole, volume of imports slightly exceeded volume of exports.

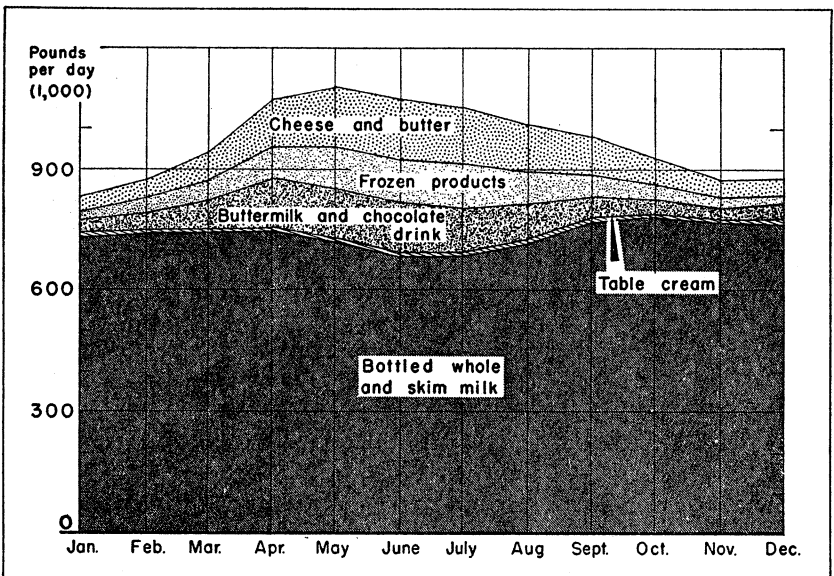


FIGURE 31. Estimated utilization of the fresh milk supplies of Alabama plants and commercial producer-distributors, by months, 1949. (Utilization includes allowance for plant loss and wastage.)

Utilization

The estimated use made of fresh milk supplies by the State's milk distributors and dairy manufacturing plants is shown by months in Figure 31 and Appendix Table 12. These estimates show the approximate volumes of whole milk, skim milk, or cream from these fresh milk supplies that were used in various products.³⁴

On an annual, basis, 76 per cent of these fresh milk supplies were used in bottled whole and skim milk. Eight per cent was used in buttermilk, chocolate drink, and table cream, and 9 per cent in cheese. This left 7 per cent for frozen dairy products and butter.

The total quantity of fresh milk used in bottled milk products was fairly uniform throughout the year. On the other hand, the amount used in manufactured dairy products was considerably larger during spring and summer than during fall and winter.

A limitation of this picture of milk utilization is that it ignores wide differences in the butterfat content of ingredients used in various dairy products. For that reason, estimates were made of the utilization of the butterfat and solids-not-fat in fresh milk supplies (Figures 32 and 33, Appendix Tables 13 and 14).

The conclusions drawn from this analysis were generally consistent with those brought out in other sections of this report. The bulk of the butterfat and of solids-not-fat received in fresh milk supplies were disposed of in sales of bottled whole milk (including the small amount of bottled skim milk sold). The ratio of butterfat to other solids in these sales did not differ greatly from the ratio in milk supplies, although some surplus butterfat was removed in standardizing milk. A much larger share of the butterfat than of the solids-not-fat was used in table cream. On the other hand, proportionally more of the solids-not-fat than of the butterfat was used in buttermilk and chocolate drink, particularly in spring and summer when these products were made largely from fresh skim milk. After taking into account the estimated quantities of salvaged and surplus butterfat from fluid milk and cheese plants made into butter, the ratio of butterfat to solids-not-fat in cheese and butter still was slightly

³⁴ Methods used in estimating utilization of fresh milk supplies and of butterfat and solids-not-fat in fresh milk supplies are described in Appendix B, Section I.

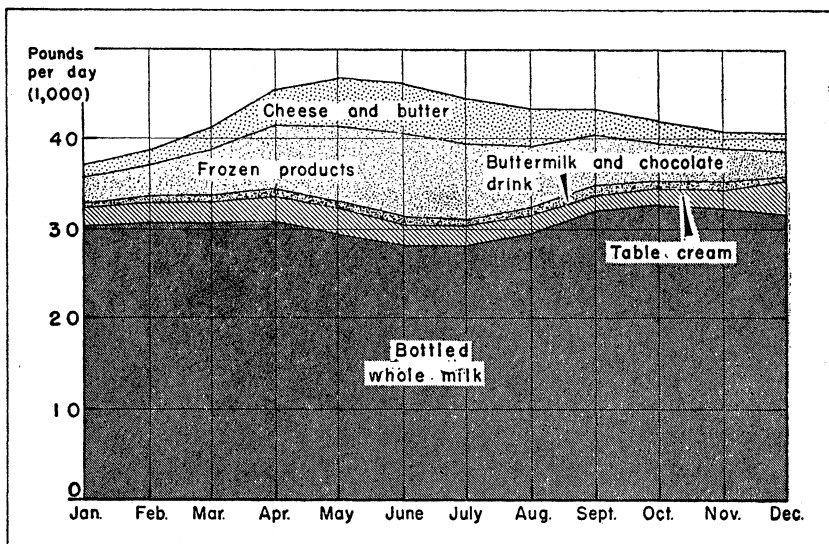


FIGURE 32. Estimated utilization of butterfat in fresh milk supplies of Alabama plants and commercial producer-distributors, by months, 1949. (Utilization includes allowance for plant loss and wastage.)

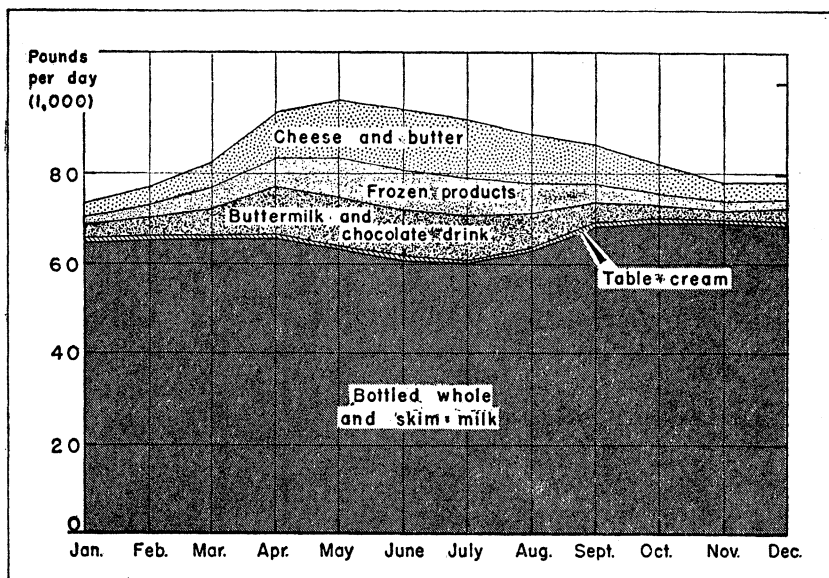


FIGURE 33. Estimated utilization of solids-not-fat in fresh milk supplies of Alabama plants and commercial producer-distributors, by months, 1949. (Utilization includes allowance for plant loss and wastage.)

lower than in milk supplies. With surplus butterfat thus available from cheese plants as well as from milk bottling plants, proportionally more of the butterfat received in fresh milk supplies than of the solids-not-fat in those supplies were used in frozen dairy products.

Relationship *between* Alabama-Produced Supplies and Alabama Purchases

Complete information was not available about the quantities of dairy products purchased by Alabama consumers. However, by supplementing the information obtained in this study with data from consumption studies in this State and in North Carolina, rough estimates were made of these purchases, and of the quantities of butterfat and milk solids-not-fat represented by them.³⁵ The estimated amounts of constituents purchased were then compared with the amounts available in supplies of milk, cream, and farm butter sold by Alabama farmers (Figure 34, Appendix Table 15).

For the year 1949 as a whole, the amount of butterfat in Alabama-produced fluid milk supplies (including "country" buttermilk) was about equal to the amount purchased by Alabama consumers in fluid milk products. On the same basis, supplies of solids-not-fat in fluid milk were about six-sevenths of the amounts purchased in fluid products. This analysis obviously disregards seasonal changes in the supplies-purchases balance of each constituent. Nevertheless, it shows in a general way that Alabama-produced supplies of fluid milk were about adequate in terms of butterfat to take care of existing purchases of fluid milk products by Alabama consumers, though moderately short in terms of solids-not-fat.

Alabama was far from self-sufficient in supplies of these constituents for manufactured dairy products. The quantity of butterfat purchased by Alabama users in manufactured dairy products was about four and three-fourths times the amount sold by Alabama farmers in milk of manufacturing grade, farm-separated cream, and farm butter. In the case of solids-not-fat, the ratio was more than 7 to 1.

Considering total supplies of Alabama-produced milk available for both fluid and manufactured dairy products, Alabama farmers

³⁵ Methods and data used are presented in Appendix B, Section II.

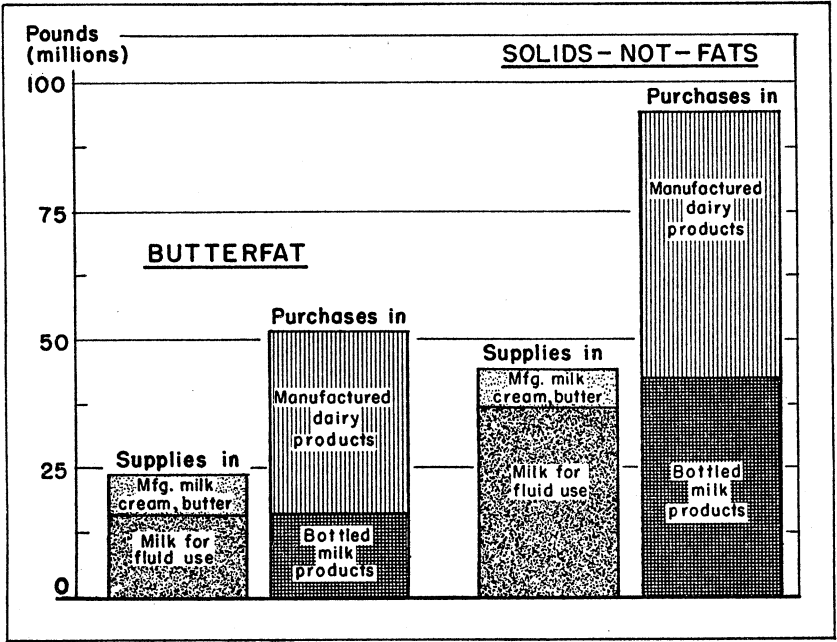


FIGURE 34. Estimated quantities of butterfat and solids-not-fat in milk, farm-separated cream, and farm butter sold by Alabama farmers compared with estimated quantities purchased in Alabama in bottled milk products and in manufactured dairy products, 1949. (Purchases include allowances for losses in processing and in distribution.)

sold in milk, cream, and butter about 45 per cent of the butterfat and 46 per cent of the solids-not-fat purchased by Alabama consumers in all dairy products. In other words, Alabama farmers could have more than doubled their sales of butterfat and of solids-not-fat without marketing more of these constituents than was being purchased by Alabama consumers.

This discussion is not intended to set as a goal any particular degree of self-sufficiency in dairying. Assuming that sanitary requirements are satisfied, from an economic viewpoint, the milk used in any dairy product purchased in the State should be produced in whatever area has the greatest comparative advantage in its production. In general, this will be the area for which the sum of production and marketing costs is a minimum. For a bulky and perishable product like whole milk, the area with the greatest comparative advantage is likely to lie within or close to the State because of high costs of shipping such a product from distant producing areas.

The State has no similar advantage in producing milk used in such manufactured dairy products as butter, cheese, and evaporated milk, which can be shipped long distances easily and cheaply, or that used in ice cream, for which ingredients can be obtained from distant areas in concentrated form at relatively low costs for transportation. For Alabama farmers to exploit their potential market for manufacturing milk, they must sell manufacturing milk at about the same price as dairymen in surplus milk-producing areas of the United States. On the other hand, once they produce manufacturing milk on a competitive basis, Alabama farmers will have available a market far larger than that represented by the quantity of manufactured dairy products purchased in Alabama. Any surplus of these products could be marketed in other parts of the Nation at little cost. Thus, the potential expansion in manufacturing milk production is far greater than that indicated by a comparison between Alabama purchases and Alabama supplies.

One other point that should be considered briefly is the relative shortage of butterfat and of solids-not-fat in Alabama-produced milk supplies. In 1949, approximately equal proportions of the total amounts of these constituents purchased in Alabama were available in the milk, cream, and butter sold by Alabama farmers. Nevertheless, Alabama-produced supplies of fluid milk contained more butterfat in proportion to solids-not-fat than was used by most large bottled milk distributors. In these supplies and those they obtained from other sources, many distributors obtained surplus butterfat that was diverted into frozen dairy products or butter. Because such surplus butterfat is marketed in competition with that purchased in manufacturing milk, milk distributors have to buy it at a comparatively low price if they are not to sell it for less than they pay for it. Fluid milk producers should recognize that the production of such surplus butterfat is likely to be relatively unprofitable.

SUMMARY and CONCLUSIONS

Summary

This study deals mainly with fluid milk supplies of Alabama markets, sales of bottled milk products in these markets, and the relationship between them. It is based largely on monthly information from milk distributors, including producer-distributors,

who were under health department inspection. With minor exceptions, data were obtained for the 3-year period 1947-49. For 1949, similar information also was obtained from milk distributors and producer-distributors who had six or more cows and who were not under health department inspection. Likewise, for 1949, data were collected on receipts and disposition of milk at plants that received milk of manufacturing grade from producers.

The 6 to 8 per cent of Alabama's cash farm receipts derived from the sale of dairy products in recent years has been somewhat less than the share during the early 1930's, when it reached a peak of 10 per cent. However, when changes in price relationships are taken into account, it appears that dairying has gradually attained increased importance in the commercial agriculture of the State. During the past quarter century, total milk production has expanded at about the national rate, and nearly all of the increase has gone into larger sales of whole milk to plants. The limited information available indicates that most of these increased sales have consisted of fluid milk for bottling purposes. In 1949, fluid milk comprised more than three-fourths of the whole milk sold by Alabama farmers.

The bulk of the fluid milk sold in Alabama reached consumers as bottled whole milk. Most of the small quantity of table cream sold was obtained in standardizing. When adequate supplies were available, important quantities of fresh skim or low-fat milk were used in buttermilk and chocolate drink. However, these products were considered secondary outlets for fluid milk because in a large measure they were made from powdered or condensed skim milk.

Sales of bottled whole milk and cream increased from an average of about 71,000 gallons per day in 1947 to an average of about 81,000 gallons in 1949. In addition 16,000 to 18,000 gallons per day of buttermilk and chocolate drink was sold. In comparing these sales with the amount of milk available, one should keep in mind that at any given time commercial distributors' supplies of fluid milk for use in bottled whole milk and cream apparently must exceed bottled sales of these products by about 10 per cent.

Alabama supplies of fluid milk increased from an average of about 71,000 gallons per day in 1947 to an average of about 85,000 gallons in 1949. Net exports of milk to Georgia and Florida took about 5 per cent of these supplies. These exports were more than compensated by imports from year-round sources in

Mississippi and Tennessee. Both net Alabama supplies and those from regular sources in Mississippi and Tennessee varied seasonally from a peak in spring and summer to a low point in late fall and early winter. This seasonal variation resulted in shortages in fall and winter that were met by bringing in emergency supplies.

At their peak in the fall, emergency imports comprised between 15 and 20 per cent of Alabama's supplies of bottling milk in 1947 and 1948, but only about 5 per cent in 1949. In 1947, more than half of these supplies consisted of reconstituted skim milk, but little of it was used after early 1948. Nearly all the reconstituted skim milk was made from Grade A condensed skim milk that originated in the North Central States. Over the 3-year period, a little less than half of the emergency supplies of fresh milk came from near-by Southern States. The rest was brought in from the North Central States.

Buttermilk and chocolate drink were made chiefly from reconstituted skim milk in fall and winter, but largely from fresh skim milk in spring and summer. Judging from past conditions in the Birmingham market, these products have long served as a cushion, providing an outlet for surplus fresh skim milk when it was available, but being made from powdered or condensed skim milk when supplies of fresh milk were short. For a period in the mid-1940's, however, supplies of fluid milk were so short that considerable reconstituted skim milk was used in bottled whole milk, and apparently little if any fresh skim milk was used in buttermilk and chocolate drink.

In 1947-49, milk distributors did not experience a shortage of butterfat similar to that of milk. Milk from regular sources was high in butterfat. Sales of table cream were small, while comparatively large amounts of low-fat products were sold. Consequently, regular milk supplies of most distributors furnished practically all of the butterfat needed for bottled milk products throughout the year. In many cases, milk distributors had surplus butterfat to sell, particularly in spring and summer. Most of the surplus butterfat went into frozen dairy products.

The relationship between locally-produced supplies of fluid milk and sales of bottled milk products varied widely within the State. About two-fifths of the Alabama-produced supplies originated in the Black Belt, which shipped large quantities of milk to Birmingham, Mobile, Tuscaloosa, and other markets. The only other specified market area in which locally-produced sup-

plies consistently exceeded local sales of bottled milk and cream was in east central Alabama; a considerable share of this area's production was sold to plants in Columbus, Georgia. Even though local production was substantial, distributors in Birmingham also obtained milk from year-round sources in the Black Belt, in northeastern Mississippi, and after mid-1948 in the Tennessee Valley. The second largest deficit was in the Gadsden-Anniston area, which regularly procured milk from Tennessee and from other sections of Alabama. Supplies produced within the area also were small in relation to sales of bottled milk and cream in the market area that included Tuscaloosa; this area depended in part on year-round supplies from the Black Belt and from Mississippi. In the 3-year period of this study, there was no marked change in the relationship between locally-produced milk supplies and sales of bottled milk products in any of the nine market areas into which the State was divided.

Data from a large share of the plants showed about 90 per cent more producers delivering milk in December 1949 than in January 1947. This change was accompanied by a moderate decline in average receipts per producer, and by a significant reduction in the average amount of seasonal variation in receipts. Favorable weather was partly responsible for this leveling out in production, but there were indications that changed management practices, such as increased emphasis on fall freshening, also contributed to it.

In composition, sales of bottled milk products (80 per cent whole milk, 15 per cent plain buttermilk, and 5 per cent other items) were generally similar to those in other Southern States. On the other hand, proportionally much less cream, much more buttermilk, and somewhat more chocolate drink was sold in Alabama than in northern markets.

The only important seasonal change in sales of bottled whole milk was a decline of between 5 and 10 per cent in the summer. In extent and in timing, this seasonal change in whole milk sales was practically identical with changes in school milk consumption. However, other factors may have been partly responsible for reduced summer sales of whole milk. Sales of coffee cream varied inversely with temperature, while sales of whipping cream reached a peak during the berry season and a secondary peak in December. There was practically no seasonal variation in sales of buttermilk, but for milk distributors as a group, sales of choco-

late drink were considerably larger in summer than in winter.

In 1949, estimated average daily per capita sale of whole milk in urban areas (0.44 pint) was little more than half of the per capita sale in New York and Boston, although per capita sales of all milk drinks (0.54 pint) were nearly two-thirds as large. For cream, the difference was much greater. Consumption rates in Alabama compared more favorably with those in Baltimore and Richmond. Per capita sales of whole milk were only about two-thirds as large in the southeastern part of the State as in the northern part. There were even greater differences within the State in buttermilk consumption.

Per capita consumption of whole milk in Birmingham in 1949 was about twice that in 1920, but consumption of buttermilk was somewhat less. While other factors contributed, changed economic conditions accounted for a large share of this change. The pronounced expansion in the use of whole milk in the 1940's was closely associated with a greater rise in incomes than in costs of living, and less increase in milk prices than in food prices generally.

An important part of the growth in Alabama's fluid milk markets in recent decades has been attributable to urban population growth. If the experience of Birmingham was representative, urban population growth, like increased consumption per capita, occurred mainly in periods of active business conditions.

In 1949, 10 plants and 2 receiving stations in the State purchased manufacturing milk from Alabama farmers. Receipts of manufacturing milk from producers were highly seasonal, especially in the Black Belt. Purchases of surplus fluid milk in spring and summer added further to seasonal variations in receipts at manufacturing plants.

About two-thirds of the manufacturing milk processed within the State in 1949 was used in cheese (mainly American cheese), while most of the remainder was used in frozen dairy products or ingredients for them. However, manufacturing milk from producers provided only about one-seventh of the butterfat and one-fourth of the solids-not-fat used in frozen dairy products made in Alabama. It supplied less butterfat than the surplus cream and milk available from milk bottling operations, and little more than the surplus sweet cream obtained from cheese plants. Manufacturing milk from producers was the most important in-state source of solids-not-fat used in frozen dairy prod-

ucts, but plants making frozen dairy products depended to a greater extent on out-of-state sources for solids-not-fat than for butterfat.

In 1949, total Alabama-produced supplies of milk (including fluid milk, ungraded fluid milk of plants and of producer-distributors having six or more cows, and manufacturing milk) amounted to about 350 million pounds. The two grades of fluid milk comprised the greater share of it, varying from about 85 per cent in winter and in late fall to about 70 per cent in summer. In winter and fall, supplies of Alabama dairy plants and commercial producer-distributors exceeded Alabama-produced supplies because shipments of fresh milk into the State exceeded out-shipments. In spring and summer, however, the reverse was true.

While milk utilization fluctuated seasonally, in 1949 as a whole a little more than three-fourths of the total fresh milk supplies of plants and commercial producer-distributors was used in bottled whole milk. Not quite one-tenth was used in other bottled milk products, nearly a tenth in cheese, and most of the balance in frozen dairy products. Separate analyses of the utilization of the butterfat and solids-not-fat in these fresh milk supplies brought out striking differences in the relative amounts of butterfat and solids-not-fat used in some of these products. Much butterfat in relation to solids-not-fat was used in table cream throughout the year. On the other hand, proportionally more of the solids-not-fat than of the butterfat in fresh milk supplies was used in buttermilk and chocolate drink, particularly in spring and summer when considerable fresh skim milk was available to use in these products. Cheese production also used less butterfat in proportion to solids-not-fat than was obtained in fresh milk supplies. While some of the surplus butterfat from fluid milk and cheese plants was used in butter, most of it was used in frozen dairy products.

The estimated quantities of butterfat and solids-not-fat in milk, farm-separated cream, and farm butter sold by Alabama farmers were compared with the estimated quantities of these constituents purchased in dairy products by Alabama consumers, including bakeries and other non-dairy establishments. The estimated quantities of butterfat and solids-not-fat purchased in dairy products by Alabama consumers were more than double the amounts sold by Alabama farmers. Most of the deficit represented the difference between Alabama-produced supplies of

butterfat and solids-not-fat available for use in manufactured dairy products and the quantities of these constituents purchased by consumers in manufactured dairy products.

Conclusions

(1) Despite increased sales to consumers, by 1949 most of the milk used in the State as bottled whole milk and cream was being obtained from year-round sources of supply in Alabama and in adjacent states. As long as economic activity is maintained at its present level, a growing urban population and increasing per capita consumption probably will result in further expansion in markets for fluid milk. Information obtained in this study suggests that, given price relationships similar to those in recent years, increasing supplies of fluid milk from regular milk shed sources are likely to provide enough milk for use in bottled milk and cream except for short periods in fall and winter. This does not rule out the possibility of shortages under unusual conditions, such as extended periods of weather unfavorable to milk production and periods of rapidly increasing sales of bottled milk and cream as occurred during World War II. The lack of an adequate reserve of milk in fall and early winter and in contingencies indicates that a somewhat wider ratio of fluid supplies to sales of bottled whole milk and cream would be desirable.

(2) During the 3-year period of this study, the amount of seasonal variation in deliveries of fluid milk was reduced. Still more increase in fall and winter production without an increase in spring and summer production is needed to fit supplies to market requirements and to permit more effective use of supplies by milk distributors. Without such an adjustment, an increase in milk shed supplies sufficient to eliminate emergency imports would add materially to seasonal surpluses in spring and summer.

(3) Buttermilk and chocolate drink offer a potential market for additional quantities of fresh skim or low-fat milk of bottling quality, though mainly in fall and winter months. Another possible market for more fluid milk is in frozen dairy products. The quantity used in frozen products could be somewhat greater in summer than in fall and winter. Under present conditions, it is unlikely that the price paid for milk used in any of these products will be as high as that paid for milk used in bottled whole milk and cream. If fluid milk becomes more plentiful, health authorities may find it feasible to require that some or all of these

products be made from milk of bottling quality. For the milk used in the products affected, such regulations would tend to reduce the price differential, but they might not wipe it out entirely.

(4) Successful operation of most types of dairy manufacturing plants that receive whole milk from farmers requires a relatively large volume of milk within a somewhat limited area. In areas where the needed concentration of supplies can be attained, however, manufacturing milk offers a much greater potential market than fluid milk for increased production. To supply manufacturing milk, Alabama farmers must be prepared to sell it at prices comparable with those received for manufacturing milk by farmers in such surplus milk-producing states as Wisconsin and Minnesota. If they are successful in doing this, they will be supplying milk for products that can be marketed not only in Alabama but also in other sections of the United States. Accordingly, they will have outlets on which they can sell much more milk than that used in manufactured dairy products consumed in this State.

(5) Distributors of fluid milk offer potential markets for proportionately more solids-not-fat in relation to butterfat than is found in Alabama-produced milk supplies. At present, the problem is not extremely serious, because a large share of the excess butterfat of fluid milk distributors is marketed in frozen dairy products at some premium above its value for butter, though it returns less to distributors in that form than in bottled milk and cream. It is possible that with expanded supplies of fluid milk the premium market for such butterfat conveniently available to milk distributors might become saturated, while supplies of solids-not-fat could still be used advantageously in buttermilk, chocolate drink, and frozen dairy products. Dairymen selling high-testing milk might then find themselves producing extra butterfat at comparatively high costs, while milk distributors could find no ready outlet for it except in butter.

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The generous cooperation of dairy plant operators and producer-distributors doing business in Alabama greatly facilitated this study and added materially to the reliability of its findings.

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Acknowledgment is due members of the Department of Agricultural Economics and R. Y. Cannon of the Department of Dairy Husbandry for counsel and constructive criticism. The author likewise is indebted to the leaders and other state workers in the Southern Regional Dairy Marketing Project for many stimulating ideas.

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APPENDICES

APPENDIX A

APPENDIX TABLE 1. AVERAGE DAILY SALES OF BOTTLED MILK PRODUCTS IN ALABAMA BY MILK DISTRIBUTORS UNDER HEALTH DEPARTMENT INSPECTION, BY MONTHS, 1947-49

Year and month	Average quantity per day								
	Whole milk	Coffee cream ¹	Whipping cream	Skim milk	Milk and cream ²	Plain butter-milk	Whole butter-milk	Chocolate drink	All bottled prod'cts
	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.
1947									
Jan.	68.5	3	3	3	69.4	3	3	3	3
Feb.	70.7	3	3	3	71.6	3	3	3	3
Mar.	71.5	3	3	3	72.5	3	3	3	3
April	72.1	3	3	3	73.2	3	3	3	3
May	70.5	3	3	3	71.5	3	3	3	3
June	66.2	3	3	3	67.1	3	3	3	3
July	65.1	3	3	3	65.8	3	3	3	3
Aug.	66.2	3	3	3	66.9	3	3	3	3
Sept.	72.6	3	3	3	73.4	3	3	3	3
Oct.	74.1	3	3	3	74.9	3	3	3	3
Nov.	71.6	3	3	3	72.5	3	3	3	3
Dec.	69.5	3	3	3	70.6	3	3	3	3
1948									
Jan.	70.9	0.6	0.3	4	71.8	13.2	0.2	1.9	87.1
Feb.	71.7	.6	.3	4	72.6	13.3	.2	2.0	88.1
Mar.	74.0	.6	.3	4	74.9	13.7	.2	2.3	91.1
April	74.3	.6	.5	4	75.4	13.8	.2	2.6	92.0
May	72.0	.6	.4	4	73.0	13.5	.2	3.1	89.8
June	69.0	.5	.3	4	69.8	13.7	.2	3.5	87.2
July	69.1	.5	.2	4	69.8	13.4	.3	3.7	87.2
Aug.	69.8	.5	.2	4	70.5	13.6	.3	3.7	88.1
Sept.	77.1	.6	.2	4	77.9	14.3	.3	3.6	96.1
Oct.	78.1	.6	.2	4	78.9	14.3	.3	3.2	96.7
Nov.	78.0	.6	.3	4	78.9	14.4	.3	2.8	96.4
Dec.	76.2	.7	.4	4	77.3	14.2	.3	2.3	94.1
1949									
Jan.	79.5	.6	.3	4	80.4	14.9	.3	2.5	98.1
Feb.	80.8	.6	.3	4	81.7	15.2	.3	2.5	99.7
Mar.	80.3	.7	.4	4	81.4	15.4	.3	2.7	99.8
April	80.6	.7	.6	0.1	82.0	15.2	.3	2.8	100.3
May	77.3	.6	.5	0.2	78.6	15.0	.3	3.0	96.9
June	74.1	.5	.3	.2	75.1	15.0	.3	3.2	93.6
July	74.2	.5	.3	.2	75.2	14.4	.3	3.4	93.3
Aug.	77.6	.5	.3	.2	78.6	14.9	.4	3.6	97.5
Sept.	84.0	.6	.3	.3	85.2	15.3	.3	3.7	104.5
Oct.	85.5	.6	.3	.2	86.6	15.5	.3	3.4	105.8
Nov.	84.8	.6	.3	.2	85.9	15.5	.3	3.0	104.7
Dec.	83.4	.7	.4	.2	84.7	15.5	.3	2.6	103.1

¹ Includes a small amount of cereal cream.

² In 1947, includes estimated sales of cream and skim milk.

³ Data not obtained.

⁴ Less than 50 gallons.

APPENDIX TABLE 2. AVERAGE DAILY SUPPLIES OF FLUID MILK FROM INSPECTED ALABAMA DAIRIES, QUANTITY AVAILABLE FOR ALABAMA MARKETS, AND SUPPLIES FROM OTHER SOURCES, BY MONTHS, 1947-49

Year and month	Average quantity per day					
	Supplies from Alabama dairies			Imported supplies		Total supplies for Alabama markets
	Total	Net exports to Georgia and Florida	Available for Alabama markets	Year-round sources in Mississippi and Tenn.	Emergency imports ¹	
	1,000 gallons	1,000 gallons	1,000 gallons	1,000 gallons	1,000 gallons	1,000 gallons
1947						
Jan.	57	3	54	7	13	74
Feb.	62	4	58	8	11	77
Mar.	65	4	61	9	9	79
April	77	5	72	12	3	87
May	85	5	80	15	²	95
June	85	6	79	15	²	94
July	84	6	78	14	²	92
Aug.	78	5	73	13	²	86
Sept.	72	4	68	12	3	83
Oct.	66	4	62	10	10	82
Nov.	59	3	56	8	14	78
Dec.	59	3	56	9	12	77
1948						
Jan.	61	3	58	9	11	78
Feb.	64	4	60	10	11	81
Mar.	72	4	68	11	8	87
April	81	4	77	14	1	92
May	85	4	81	15	²	96
June	80	4	76	14	1	91
July	81	4	77	14	²	91
Aug.	79	4	75	15	1	91
Sept.	74	4	70	14	7	91
Oct.	68	4	64	12	11	87
Nov.	65	4	61	11	15	87
Dec.	66	3	63	11	12	86
1949						
Jan.	72	3	69	12	9	90
Feb.	79	4	75	14	5	94
Mar.	86	4	82	16	1	99
April	95	5	90	18	²	108
May	95	5	90	17	²	107
June	92	5	87	17	²	104
July	90	5	85	16	²	101
Aug.	85	4	81	17	²	98
Sept.	82	4	78	17	3	98
Oct.	79	3	76	15	5	96
Nov.	78	3	75	15	4	94
Dec.	82	4	78	15	2	95

¹ Detailed in Appendix Table 3.² Less than 500 gallons.

APPENDIX TABLE 3. COMPOSITION AND SOURCES OF EMERGENCY MILK SUPPLIES, BY MONTHS, ALABAMA, 1947-49

Month	Average quantity per day								
	1947			1948			1949		
	Whole milk from		Reconstituted skim milk used in stand-ardizing ¹	Whole milk from		Reconstituted skim milk used in stand-ardizing ¹	Whole milk from		Reconstituted skim milk used in stand-ardizing ¹
	Other Southern States	North Central States		Other Southern States	North Central States		Other Southern States	North Central States	
1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	1,000 gal.	
Jan.	1.2	3.1	9.0	3.6	1.9	5.9	2.9	5.0	1.2
Feb.	1.1	2.4	7.9	2.9	4.6	3.5	2.3	1.8	0.9
Mar.	1.0	2.1	5.9	2.5	2.8	2.3	0.5	.2	.3
April	0.3	0.6	1.8	1.0	0.2	0.2	.1	0.1	.2
May	.1	.0	.0	0.1	.0	.2	²	.0	.2
June	²	.0	.0	.3	²	.2	.0	.0	.1
July	²	.0	.0	.1	.0	.4	.0	.0	.1
Aug.	.2	.0	²	.2	.1	.4	²	.0	.2
Sept.	1.6	.3	1.5	2.0	3.6	1.1	1.6	1.0	.5
Oct.	2.9	2.0	4.7	3.4	6.4	1.6	2.6	1.3	1.1
Nov.	4.2	3.7	6.5	3.5	8.8	2.6	2.2	.3	1.8
Dec.	4.4	2.5	5.3	2.8	7.1	1.7	1.3	.2	.9

¹ Mostly from Grade A condensed skim milk shipped in from North Central States.

² Less than 50 gallons.

APPENDIX TABLE 4. MONTHLY AVERAGE BUTTERFAT TESTS OF MILK RECEIVED FROM ALABAMA PRODUCERS, 18 FLUID AND 10 MANUFACTURING PLANTS, 1949

Month	Average butterfat tests		Month	Average butterfat tests	
	18 fluid plants	10 manufacturing plants		18 fluid plants	10 manufacturing plants
	Per cent	Per cent		Per cent	Per cent
January	4.55	4.97	August	4.30	4.39
February	4.48	4.75	September	4.40	4.60
March	4.38	4.55	October	4.52	4.89
April	4.29	4.32	November	4.62	5.24
May	4.27	4.27	December	4.60	5.09
June	4.29	4.30			
July	4.24	4.29	YEAR	4.41	4.53

APPENDIX TABLE 5. CHANGES IN NUMBERS OF PRODUCERS AND IN AVERAGE DAILY RECEIPTS PER PRODUCER AT ABOUT 60 FLUID MILK PLANTS, ALABAMA, 1947-49

Month	1947		1948		1949	
	Pro- ducers	Average daily receipts per producer	Pro- ducers	Average daily receipts per producer	Pro- ducers	Average daily receipts per producer
	<i>Number</i>	<i>Gallons</i>	<i>Number</i>	<i>Gallons</i>	<i>Number</i>	<i>Gallons</i>
Jan.	716	55	930	49	1,114	52
Feb.	732	59	934	51	1,117	57
Mar.	761	61	939	58	1,120	63
Apr.	786	71	957	66	1,130	69
May	819	77	968	68	1,127	69
June	840	76	981	63	1,135	66
July	856	74	1,010	63	1,147	64
Aug.	858	68	1,029	61	1,184	58
Sept.	890	60	1,057	55	1,232	54
Oct.	916	53	1,062	50	1,298	50
Nov.	915	48	1,062	47	1,318	49
Dec.	919	47	1,087	48	1,349	49
AVERAGE	834	62	1,001	56	1,189	58

APPENDIX TABLE 6. AVERAGE DAILY PER CAPITA SALES OF WHOLE MILK AND BUTTERMILK IN THE CITY OF BIRMINGHAM, ALABAMA, 1920-49¹

Year	Per person per day		Year	Per person per day		Year	Per person per day	
	Whole milk	Butter- milk		Whole milk	Butter- milk		Whole milk	Butter- milk
	<i>Pints</i>	<i>Pints</i>		<i>Pints</i>	<i>Pints</i>		<i>Pints</i>	<i>Pints</i>
1920	0.24	0.20	1930	0.32	0.18	1940	0.32	0.12
1921	.23	.20	1931	.30	.16	1941	.35	.12
1922	.29	.19	1932	.28	.12	1942	.40	.12
1923	.32	.16	1933	.22	.10	1943	.43	.13
1924	.34	.15	1934	.23	.11	1944	.44	.12
1925	.36	.18	1935	.26	.09	1945	.50	.12
1926	.41	.20	1936	.27	.13	1946	.54	.14
1927	.39	.21	1937	.29	.12	1947	.49	.11
1928	.37	.22	1938	.31	.12	1948	.44	.10
1929	.36	.19	1939	.30	.11	1949	.49	.12

¹Data from Bureau of Food and Dairy Inspection, Jefferson County Health Department.

APPENDIX TABLE 7. INDEX NUMBERS OF INCOMES, COST OF LIVING, FOOD PRICES, AND MILK PRICES IN BIRMINGHAM, ALABAMA, 1935-49
(1935-39=100)

Year	Disposable income per person ¹	Consumer prices (cost of living) ²	Ratio, incomes to cost of living (lagged one year) ³	Retail food prices ⁴	Retail milk prices ⁴	Ratio of food prices to milk prices
	<i>Index</i>	<i>Index</i>	<i>Index</i>	<i>Index</i>	<i>Index</i>	<i>Index</i>
1935	92	97		102	96	106
1936	95	98	95	103	97	106
1937	116	104	97	108	103	105
1938	94	101	112	96	103	93
1939	104	99	93	92	101	91
1940	103	100	105	93	103	90
1941	136	107	103	103	105	98
1942	172	118	127	122	117	104
1943	234	126	146	139	117	119
1944	239	129	186	140	117	120
1945	220	132	185	143	117	122
1946	220	142	167	164	130	126
1947	259	165	155	204	152	134
1948	279	175	157	212	170	125
1949	266	171	159	198	162	122

¹ Based on reports in annual "Survey of Current Buying Power" of "Sales Management, the Magazine of Marketing."

² "Consumers' Prices in the United States, 1942-48." Bur. of Labor Stat., U. S. Dept. of Labor. Bul. 966, pp. 45-46. 1949.

³ "Monthly Labor Review." Bur. of Labor Stat., U. S. Dept. of Labor. 70 (2): 240 and 243. 1950.

⁴ Index of disposable income per person in preceding year divided by index of consumer prices in preceding year.

⁵ Average of doorstep and store prices; data from reports of city milk prices by Bur. of Agr. Econ., U. S. Dept. of Agr.

APPENDIX TABLE 8. AVERAGE DAILY RECEIPTS OF MILK FROM PRODUCERS AND FROM FLUID MILK PLANTS AT 11 ALABAMA DAIRY MANUFACTURING PLANTS, BY MONTHS, 1949¹

Month	Average quantity per day						
	Milk received from			Month	Milk received from		
	Producers	Fluid plants	All sources		Producers	Fluid plants	All sources
	1,000 lb.	1,000 lb.	1,000 lb.		1,000 lb.	1,000 lb.	1,000 lb.
January	92	4	96	July	256	33	289
February	104	12	116	August	238	16	254
March	137	26	163	September	198	5	203
April	201	46	247	October	147	3	150
May	247	52	299	November	111	1	112
June	253	46	299	December	94	9	103

¹ Excludes receipts at one plant that opened in February.

APPENDIX TABLE 9. MILK USED IN MAKING AMERICAN AND COTTAGE CHEESE, CHEESE PRODUCTION, AND SURPLUS BUTTERFAT SOLD BY SEVEN ALABAMA DAIRY PLANTS THAT MADE CHEESE, BY MONTHS, 1949¹

Month	Milk used for cheese	Cheese made		Surplus butterfat sold ³
		American	Cottage ²	
	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.
January	934	81	22	16
February	1,079	102	37	16
March	1,914	182	31	23
April	3,382	338	33	29
May	4,481	430	45	40
June	4,460	420	49	46
July	4,266	405	41	45
August	3,570	343	37	44
September	2,758	282	33	44
October	1,866	187	28	35
November	1,248	119	21	29
December	1,206	109	17	21
YEAR	31,164	2,998	394	388

¹ One plant opened in February.

² In addition, some cottage cheese was manufactured by fluid milk distributors. Not all of the cottage cheese shown was made from fresh milk.

³ From cheese-making operations.

APPENDIX TABLE 10. ESTIMATED MONTHLY QUANTITIES OF BUTTERFAT AND OF MILK SOLIDS-NOT-FAT USED IN FROZEN DAIRY PRODUCTS, BY SOURCES, ALABAMA, 1949¹

Month	Quantity from					Total used 1,000 lb.
	Manufacturing milk from producers 1,000 lb.	Surplus cream and milk from fluid milk plants 1,000 lb.	Surplus cream from cheese plants 1,000 lb.	Other sources 1,000 lb.		
BUTTERFAT						
January	20	60	16	80		176
February	21	67	15	80		183
March	33	102	24	68		227
April	41	142	25	53		261
May	50	179	31	93		353
June	47	200	35	80		362
July	54	177	39	110		380
August	53	130	37	156		376
September	47	74	42	146		309
October	37	65	34	110		246
November	28	59	30	45		162
December	23	51	21	41		136
YEAR	454	1,306	349	1,062		3,171
MILK SOLIDS-NOT-FAT						
January	37	21	2	147		207
February	41	40	2	133		216
March	66	69	3	129		267
April	86	99	3	115		303
May	105	153	4	151		413
June	97	157	5	169		428
July	112	155	5	178		450
August	110	89	5	242		446
September	93	31	6	241		371
October	69	25	5	197		296
November	50	17	4	120		191
December	41	18	3	94		156
YEAR	907	874	47	1,916		3,744

¹ Includes allowances for plant loss and wastage.

APPENDIX TABLE 11. ALABAMA-PRODUCED SUPPLIES OF FLUID AND MANUFACTURING MILK, NET IMPORTS OR EXPORTS, AND FRESH MILK SUPPLIES OF ALABAMA PLANTS AND COMMERCIAL PRODUCER-DISTRIBUTORS, BY MONTHS, 1949

Month	Supplies produced in Alabama				Net imports ¹	Net exports ¹	Supplies of plants and commercial producer-distributors
	Fluid milk from		Manufacturing milk				
	Inspected dairies	Uninspected dairies					
	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	
January	19,331	543	3,300	2,536		25,710	
February	18,962	501	3,475	1,451		24,389	
March	22,945	576	5,118	564		29,203	
April	24,393	600	7,347		209	32,131	
May	25,243	638	9,439		1,146	34,174	
June	23,586	597	9,328		1,200	32,311	
July	23,846	573	9,733		1,460	32,692	
August	22,719	546	9,060		941	31,384	
September	21,164	528	7,349	469		29,510	
October	21,191	515	5,480	1,458		28,644	
November	20,243	486	4,027	1,489		26,245	
December	21,789	515	3,514	1,417		27,235	
YEAR	265,412	6,618	77,170	9,384	4,956	353,628	

¹ Net difference between (1) imports of whole fluid milk and of surplus fluid milk from out-of-state plants to Alabama manufacturing plants and (2) exports of fluid and of manufacturing milk.

APPENDIX TABLE 12. ESTIMATED UTILIZATION OF FRESH MILK SUPPLIES OF ALABAMA PLANTS AND COMMERCIAL PRODUCER-DISTRIBUTORS, BY MONTHS, 1949¹

Month	Quantity used in						
	Bottled whole and skim milk	Table cream ²	Butter-milk and chocolate drink	Frozen dairy products	American and cottage cheese	Butter	All products
	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.
January	22,495	252	1,196	741	994	32	25,710
February	20,716	241	1,229	1,003	1,170	30	24,389
March	22,959	289	2,258	1,657	1,995	45	29,203
April	22,383	328	3,616	2,280	3,469	56	32,132
May	22,208	313	3,851	3,142	4,587	73	34,174
June	20,592	239	3,708	3,122	4,551	99	32,311
July	21,277	228	3,482	3,277	4,337	91	32,692
August	22,204	229	2,801	2,463	3,620	67	31,384
September	23,226	323	1,631	1,576	2,791	54	29,510
October	24,232	250	993	1,196	1,914	58	28,643
November	23,090	265	672	868	1,293	57	26,245
December	23,660	489	1,015	754	1,258	59	27,235

¹ The quantities shown are approximate volumes of milk, skim milk, or cream from fresh milk used in these products. They include allowances for plant loss and wastage. (See Appendix B, Section I.)

² Includes egg nog.

YEAR	269,042	3,355	26,452	22,079	31,979	721	353,628
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APPENDIX TABLE 13. ESTIMATED UTILIZATION OF BUTTERFAT IN FRESH MILK SUPPLIES OF ALABAMA PLANTS AND COMMERCIAL PRODUCER-DISTRIBUTORS, BY MONTHS, 1949¹

Month	Quantity used in						
	Bottled whole and skim milk	Table cream ²	Butter-milk and chocolate drink	Frozen dairy products	American and cottage cheese	Butter	All products
	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.
January	939	63	19	96	29	10	1,156
February	863	60	17	103	35	9	1,087
March	950	74	21	159	62	14	1,280
April	923	89	22	208	115	18	1,375
May	915	85	24	260	150	21	1,455
June	846	62	24	282	145	25	1,384
July	875	58	26	270	136	20	1,385
August	915	58	26	220	113	19	1,351
September	960	58	25	163	81	16	1,303
October	1,008	63	24	136	54	16	1,301
November	966	66	21	117	37	17	1,224
December	982	105	20	95	39	18	1,259
YEAR	11,142	841	269	2,109	996	203	15,560

¹ Includes allowances for plant loss and wastage. Methods used in estimating are described in Appendix B, Section I.

² Includes egg nog.

APPENDIX TABLE 14. ESTIMATED UTILIZATION OF SOLIDS-NOT-FAT IN FRESH MILK SUPPLIES OF ALABAMA PLANTS AND COMMERCIAL PRODUCER-DISTRIBUTORS, BY MONTHS, 1949¹

Month	Quantity used in						
	Bottled whole and skim milk	Table cream ²	Butter-milk and chocolate drink	Frozen dairy products	American and cottage cheese	Butter	All products
	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.	1,000 lb.
January	2,001	17	109	60	91	2	2,280
February	1,840	16	112	83	106	2	2,159
March	2,031	20	206	138	178	3	2,576
April	1,974	22	329	188	307	3	2,823
May	1,956	21	350	262	405	5	2,999
June	1,816	16	337	259	404	7	2,839
July	1,872	15	317	272	385	6	2,867
August	1,958	16	255	204	323	4	2,760
September	2,059	16	148	130	252	3	2,608
October	2,161	17	90	99	175	4	2,546
November	2,070	18	61	71	122	4	2,346
December	2,120	35	92	62	116	4	2,429
YEAR	23,858	229	2,406	1,828	2,864	47	31,232

¹ Includes allowances for plant loss and wastage. Methods used in estimating are described in Appendix B, Section I.

² Includes egg nog.

APPENDIX TABLE 15. COMPARISON OF ESTIMATED QUANTITIES OF BUTTERFAT AND OF MILK SOLIDS-NOT-FAT IN MILK, FARM-SEPARATED CREAM, AND FARM BUTTER SOLD BY ALABAMA FARMERS WITH ESTIMATED QUANTITIES PURCHASED IN ALABAMA IN BOTTLED AND IN MANUFACTURED DAIRY PRODUCTS, 1949¹

Products	Estimated quantity of product in supplies or in purchases 1,000 lb.	Estimated quantities of constituents in supplies or purchases ²	
		Butterfat 1,000 lb.	Solids-not-fat 1,000 lb.
ALABAMA-PRODUCED SUPPLIES			
Fluid (whole) milk	359,454	15,926	31,741
Country buttermilk	48,568	100	4,469
Milk for fluid use		16,026	36,210
Manufacturing milk	77,170	3,473	6,845
Farm butter sold ³	3,583	2,925	37
Farm-separated cream sold ⁴	3,675	1,125	236
Supplies for manufacture		7,523	7,118
TOTAL SUPPLIES		23,549	43,328
ALABAMA PURCHASES			
Whole milk and cream	344,130	15,946	31,938
Buttermilk, chocolate, skim milk	105,468	371	10,065
Bottled milk products		16,317	42,003
Butter	17,858	14,611	181
Cheese ⁵	28,393	10,036	24,290
Evaporated milk ⁶	100,484	7,815	18,877
Condensed skim milk	2,128	-----	580
Dry skim milk	3,946	-----	3,865
Frozen dairy products		3,170	3,744
Manufactured dairy products		35,632	51,537
TOTAL PURCHASES		51,949	93,540

¹ Data and methods used in making estimates are shown in Appendix B, Section II.

² Include allowances for plant loss and wastage.

³ Estimated quantity butter obtained from 65,000,000 pounds milk.

⁴ Estimated quantity 30 per cent cream from 25,000,000 pounds milk.

⁵ Includes cottage cheese.

⁶ Includes sweetened condensed (whole) milk.

APPENDIX B

Section I. Methods Used in Estimating Utilization of Fresh Milk Supplies of Alabama Plants and Producer-Distributors

Estimated usage of fluid milk in bottled whole and skim milk and in table cream represents sales of these products plus 5 per

cent allowance for loss and wastage. Estimates of quantities of cream and milk from fluid milk plants used or sold for use in frozen dairy products, cottage cheese, and butter were built up largely from information obtained in a detailed study of the 1948 operations of 35 Alabama milk distributors, handling about three-fifths of the milk distributed in the State. Data on other diversions of surplus fluid milk to manufacturing plants in 1949 were obtained while gathering information about these plants' milk receipts. The estimated usage of fresh milk in buttermilk and chocolate drink was the residual of receipts at fluid milk plants neither used in bottled milk and cream nor diverted to manufacturing uses.

In the main, quantities used in cheese represent total milk receipts at cheese plants less the approximate amounts of milk and cream from these plants used in other products. To these were added the estimated quantities of milk and cream used in cottage cheese by fluid milk plants. Utilization in butter was based on the apparent quantity of cream sold to butter plants or used in butter by fluid milk and cheese plants. The estimates for frozen dairy products represent the sum of the quantity of manufacturing milk received from producers at ice cream plants plus estimated quantities of surplus cream and milk from fluid milk and cheese plants used in those products.

The amount of butterfat received in milk supplies was computed from reports of average monthly butterfat tests at nearly all manufacturing plants that purchased milk from producers and at a fairly representative sample of fluid milk plants (Appendix Table 4). Estimates of butterfat usage in bottled products were based largely on information about the butterfat content of various products sold by 35 fluid milk distributors in 1948. These data were supplemented with observations of practices of other distributors. Estimated usage in fluid items included an 8 per cent allowance for butterfat lost and unaccounted for, which was approximately the average rate found among the 35 distributors. Butterfat going into cheese was the butterfat in milk used in cheese less surplus and salvaged butterfat sold by cheese plants from their cheese-making operations. To this was added estimated use of butterfat in cottage cheese by fluid milk distributors. The quantities of butterfat from fluid milk plants estimated used in frozen dairy products and in butter were residuals of the butterfat received by them after deducting the

quantities used in products they distributed. Division of this butterfat between frozen dairy products and butter was based mainly on data obtained in the 35-distributor study.

Approximations of solids-not-fat usage were made from data on quantities and butterfat content of the milk and cream so used. Percentages of solids-not-fat in milk of various butterfat tests and in cream and butter were estimated from information in "The Market-Milk Industry" and in the "Accounting Manual for Milk Dealers" (28, 2).

Section II. Data and Methods Employed in Estimating Alabama's Supplies-Purchases Balance

Supplementary data on per capita consumption rates to which reference is made in this discussion were obtained from studies by the Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, United States Department of Agriculture, by Cotton, by Bulmer and Kirchoff, and by Blackstone and Inman (9, 22, 23, 21, 20).

The populations to which the various estimated consumption rates used were applied are:

(A) Essentially urban, 1,500,000. This was, in round numbers, the April 1, 1950, population in incorporated places of 500 or more plus that in unincorporated places of 1,000 or more, adjusted to include "urbanized" population in the Birmingham, Mobile, and Montgomery areas (13, 14).

(B) Essentially rural, 1,562,000. In using consumption rates reported in North Carolina Bul. 372 (22) for this group, the following divisions were made (the split between numbers of people in households where cows were kept and the number without cows was based on data reported in that study):

Group	Rural populations for which consumption rates used were those reported for—		
	<i>Piedmont</i>	<i>Coastal Plain</i>	<i>Total</i>
With cows	445,000	274,000	719,000
Without cows	335,000	508,000	843,000
ALL PERSONS	780,000	782,000	1,562,000

Given below are the estimates reviewed and those used as consumption rates for specified manufactured dairy products by urban people.

Year	Estimates reviewed				Estimates used
	(Code numbers refer to literature cited)				
	Birmingham (9)	North Carolina (23)	13 Alabama cities (21)	3 Alabama towns (20)	
	1948	1948	1930	1938-39	1949
Annual per capita consumption					
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Butter	5.2	10.2	10.0	10.7	6.0
Cheese ¹	12.0	7.7	7.4	5.1	10.0
Evaporated milk ²	47.3	42.6	20.7	7.3	42.0
Dry skim milk	2.6	.1			1.5

¹ Includes cottage cheese.

² Includes sweetened condensed (whole) milk.

³ Less than .05 pound.

The computed quantities of butterfat and solids-not-fat purchased by Alabama consumers (including purchases by bakeries, confectioneries, meat-packing and other non-dairy establishments) were then derived as indicated in the following tabular material (estimates of constituents purchased include allowances for plant loss and for constituents commonly lost in by-products not used for human consumption, such as whey):

Product	Code reference to or source of estimate used	Estimated purchases		Constituents	
		Per capita	Total product	Butter-fat	Solids-not-fat
		<i>Pounds</i>	<i>1,000 lb.</i>	<i>1,000 lb.</i>	<i>1,000 lb.</i>
ESTIMATES APPLICABLE TO ALL POPULATIONS					
Ice cream	{ U.S.D.A. reports of Alabama production, 1949 }		29,251	2,954	2,954
Ice milk			5,034	203	763
Sherbet			1,332	13	27
TOTAL				3,170	3,744
ESTIMATES APPLICABLE TO URBAN POPULATION					
Whole milk	{ Total sales of all commercial distributors }		257,602	11,145	23,982
Cream			3,195	841	229
Buttermilk			49,083	105	4,638
Chocolate drink			9,599	166	907
Skim milk		531	---	51	
Butter	{ Estimates selected as shown above }		6.0	9,000	7,363
Cheese			10.0	15,000	5,302
Evaporated milk			42.0	63,000	4,900
Dry skim milk			1.5	2,250	---
				---	2,204
ESTIMATES APPLICABLE TO RURAL POPULATION WITH COWS					
Cheese	(22)	5.7	4,098	1,449	3,506
At rates for Piedmont Group					
Evaporated milk	(22)	3.3	1,468	114	276
At rates for Coastal Plain Group					
Evaporated milk	(22)	8.5	2,329	181	437
ESTIMATES APPLICABLE TO RURAL POPULATION WITHOUT COWS					
Butter	(22)	10.4	8,767	7,173	89
Cheese	(22)	10.9	9,189	3,248	7,861
At rates for Piedmont Group					
Whole milk	(22)	179.0	59,965	2,850	5,560
Buttermilk and skim milk	(22)	85.0	28,475	62	2,751
Evaporated milk	(22)	49.0	16,415	1,277	3,084
At rates for Coastal Plain Group					
Whole milk	(22)	46.0	23,368	1,110	2,167
Buttermilk and skim milk	(22)	35.0	17,780	38	1,718
Evaporated milk	(22)	34.0	17,272	1,343	3,245

Estimated use of manufactured dairy products in the bakery and confectionery trade, in meat packing plants, and in other non-dairy establishments was based on reported use of such products in the 13 cities by Bulmer and Kirchoff (21). The quantity of butter estimated thus used was the same, and the quantities of other products twice what they found in the 13 cities.

Product and type of use	Total product	Butterfat	Solids-not-fat
	1,000 lb.	1,000 lb.	1,000 lb.
Bakery and confectionery products			
Butter	91	75	1
Cheese	106	37	91
Condensed skim milk	2,128	---	580
Dry skim milk	1,437	---	1,407
Packing house and other uses			
Dry skim milk	259	---	254

Amounts of butterfat and solids-not-fat in Alabama-produced commercial milk supplies were computed in a manner similar to that used in computing amounts of those constituents in total supplies of Alabama plants and producer-distributors, as described in Appendix B, Section I. Non-commercial sales of fluid milk products were assumed to be equal to purchases of these products by rural families without cows. Constituents sold in farm butter and farm separated cream were computed from estimates by the United States Department of Agriculture of the quantities of milk equivalent disposed of by farmers in these forms.