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MARKETING RESEARCH REPORT NO. 379

CLASS III MILK IN THE NEW YORK MILKSHED:
I - MANUFACTURING OPERATIONS

U. S. DEPARTMENT OF AGRICULTURE
U.S. Agricultural Marketing Service
Marketing Economics Research Division

CONTENTS

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PREFACE

This report is the first of a group dealing with Class III milk pricing in the New York-New Jersey milkshed. Particular emphasis is given to factors affecting the market for Class III products, and to the decisions which handlers make about the form in which they will dispose of Class III milk. The project under which this group of publications has been developed was carried out by the Marketing Economics Research Division, Agricultural Marketing Service. A substantial part of the cost was financed by a grant from the New York-New Jersey Milk Market Administrator.

This report provides in graphic form a summary description of the manufactured dairy products industry in this area. It describes the nature of Class III operations, including types and location of products manufactured. Interregional plant shipments of milk for manufacturing purposes and of manufactured dairy products are analyzed. Regional production patterns for both pool plants and the New York State nonpool plants are developed and estimates are made of the extent to which existing manufacturing capacity is utilized.

This report is based on a summary of statistical information and records of plant operation collected and made available by other agencies. The primary sources of these data are the New York-New Jersey Milk Market Administrator and the New York State Department of Agriculture and Markets. Donald G. Richards assembled most of these data. Anson J. Pollard, Assistant Market Administrator, New York-New Jersey Milk Marketing Area, furnished the material on nonpool manufacturing plants.

In the group of reports on "Class III Milk in the New York Milkshed," we hope to include an economic description of the manufactured dairy products industry and information on costs of manufacturing dairy products, processing margins, processors' decisions on the utilization of this milk, and economic aspects of pricing Class III milk.

The work on which the reports are based was done by a research team composed of Donald B. Agnew, F. W. Cobb, Jr., C. E. McAllister, and T. R. Owens, under the general supervision of D. A. Clarke, Jr. Additional assistance was obtained from Irving Dubov (on leave from the University of Tennessee).

The cooperation of representatives of the dairy industry is gratefully acknowledged. R. G. Bressler, Professor of Agricultural Economics, University of California, and consultant to the Marketing Economics Research Division, contributed substantially to the analysis of the problem with which the study deals and to the planning of the work. His article, "Pricing Raw Product in Complex Milk Markets" (Agr. Econ. Res. 10(4): 113. October 1958), embodies a part of this contribution. Louis F. Herrmann, Head, Dairy Section, Marketing Economics Research Division, contributed both to the inception and progress of the project and to the development and preparation of substantial parts of the study.

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SUMMARY

About 3.5 billion pounds of milk per year--roughly 40 percent of the total production for the New York-New Jersey pool--are available for use in manufactured dairy products. This is the Class III milk, which is in excess of the fluid milk and cream requirements of the market. As Class III, it takes the lowest price classification under the concurrent operation of Federal Milk Marketing Order No. 27 and New York State Official Order No. 126.

This Class III milk is used for cream (including storage cream), cheese (Cheddar, cream, and other) homogenized mixes (primarily for ice cream), butter, plain condensed milk, other concentrated products, candy products, evaporated milk, other Class III products, and sweetened condensed milk. There is substantial seasonal variation in the quantities of Class III milk; total quantities for manufacturing are typically 2-1/2 times greater in May than they are in November.

The seasonal pattern is also reflected in the production of the various manufactured dairy products. With the exception of butter, for which production has been quite erratic, there is an amazing uniformity in the production for the same months in the years 1954-57. In absolute quantities, the seasonal variation is greatest for storage cream and smallest for plain condensed milk.

There is substantial interplant and interregional shipment of both Class III milk and manufactured dairy products within the milkshed. Some whole milk travels relatively long distances between plants, particularly in the season of flush production. There are also considerable differences in the way some of these shipments--especially whole milk and cream--are utilized in the periods of high and of low Class III production. In May--the flush season--large quantities of Cheddar cheese and storage cream are produced at the plants of destination. Only small amounts of these shipments are used for these purposes during November when Class III milk is in relatively short supply. Similar differences are observed for other products. Large quantities of cream, condensed milk, and homogenized mixes--the ingredients for ice cream--are shipped to plants in regions outside the milkshed.

Frequently, several plants which receive milk from producers consolidate supplies at a single plant to gain economies in manufacturing. Plants which receive and then transship for further manufacturing are called "feeder plants." Many more plants operate as feeders during flush production than in short production periods. This increase in feeders reflects in part the fact that some plants divert whole milk from shipment to the city for fluid use to manufacturing plants in the country when supplies are relatively large. In many instances, milk bypasses manufacturing plants located near feeder plants and goes to relatively distant plants.

There is no evidence that the production of manufactured dairy products in the New York-New Jersey milkshed is limited by the capacity of the equipment. Most of the pool manufacturing plants can produce more than one product or combination of products. With the possible exception of facilities to produce dry skim milk powder, all of the manufacturing equipment in pool plants is being used at well below capacity.

Manufactured dairy products are produced in nearly all regions of the milkshed, but the type of products manufactured tends to differ between regions. Northern and northeastern New York are important primarily in the production of American cheese and butter. On the other hand, the western part of the milkshed relies heavily on the production of condensed products to dispose of surplus milk. Perhaps the most unusual aspects of the location of production is that butter is produced in its largest quantities in southeastern New York--a region adjacent to the metropolitan market area. It is usually most economical to produce butter in the more distant regions (since it is more highly concentrated in terms of the fat component of milk), and to produce the bulky products in relatively nearby regions.

CLASS III MILK IN THE NEW YORK MILKSHED.
I. MANUFACTURING OPERATIONS

By Fields W. Cobb, Jr., and D. A. Clarke, Jr.[1]

INTRODUCTION

The New York-New Jersey milkshed is the area which supplies the fluid milk and cream requirements of the marketing area defined in Federal Marketing Order No. 27. The marketing area consists of the New York metropolitan area (including 12 northern New Jersey counties) and parts or all of 35 counties in southeastern New York. Most of the milk produced in the milkshed is included in the New York-New Jersey pool. To be in the pool, milk must be delivered to certain plants which, under terms of the marketing order, are designated as "pool plants"; all other plants within the milkshed are "nonpool plants." Pooling is the arrangement for combining the payments made for milk at different class prices, and averaging them so that each producer in the group covered by the pool receives payment on the same basis.

The geographic area covered by the milkshed in 1958 extended throughout the State of New York and parts of Pennsylvania, New Jersey, Vermont, Connecticut, Delaware, and Maryland. The State of New York supplies by far the most milk to this market; it delivered about 72 percent of the total pool volume in 1958. Pennsylvania is second most important, having supplied approximately 19 percent of the 1958 deliveries. Next in importance is New Jersey with about 8 percent, and then Vermont, Connecticut, Delaware, and Maryland, which together contributed about 1 percent of the 1958 pool deliveries.

Figure 1 shows the location of milk plants in the New York milkshed that had pool plant status on August 1, 1955. To be a pool plant, a plant must ask to be so designated; it must be willing to sell milk for Class 1-A uses and be able to sell milk for Class 1-A. That is, it must have approval of a health authority in the marketing area and be free from commitments which would prevent selling its milk for Class I-A.

There is some variation from month to month in the number of pool plants, but for the most part the number of plants remains relatively stable. At the beginning of 1956, 391 plants had pool status. By May and June of that year there were 395, but by August the number had decreased to 383. By October, 4 more plants had entered the pool, raising the number to 387, but by December the number had again dropped to 385. There was an average of 389 plants in the pool during 1956.

As of August 1, 1957, the definition of the marketing area was substantially changed. A large number of smaller markets in northern New Jersey and upstate New York were brought under Order 27. (Many of the data used in this report were for periods before the change, but since both pool and nonpool plants were covered, the results are valid for the present milkshed.)

The enlargement of the marketing area naturally resulted in an increase in the number of plants with pool status. According to statistics issued by the Market Administrator's office, the number of pool plants was 785 in August 1957 (the first month of the expanded order). This was an increase of more than 100 percent from the 374 pool plants reported in July 1957. The plants that were added to the pool were much smaller, on the average, in volume than the plants that were previously in the pool. Total deliveries into the pool increased by approximately 21 percent, even though the number of pool plants more than doubled.

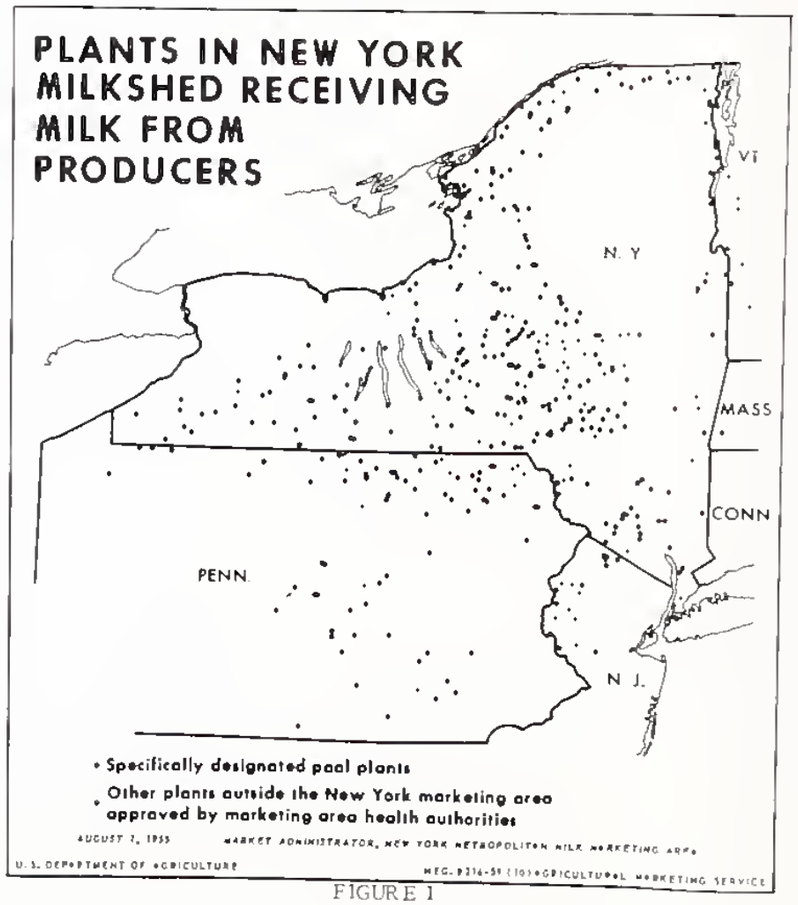


FIGURE 1

Most of the pool plants are country receiving and milk shipping plants. Part of the milk received at these plants is shipped directly to city bottling plants for use in meeting the fluid milk demand. A relatively small quantity of milk is processed in the form of cream, sour cream, and milk drinks and shipped to the metropolitan New York area for sale to consumers. The rest of the milk produced is Class III. Products comprising Class III include fluid cream for sale in areas other than the metropolitan New York area, cream for storage purposes, butter, cheese, condensed milk, frozen desserts and homogenized mixtures, evaporated milk, and milk used for candy manufacture.

Products containing only the skim or nonfat solids portion of the milk, such as nonfat dry milk and skim milk cheeses, are also manufactured in this area, but do not enter into the classification of milk under the orders. As most of the data relating to utilization and shipments of milk and dairy products in this report are based on pool plant records, the emphasis in this analysis is on the fat-containing products.

Class III milk is processed in manufacturing plants which may or may not have pool status. For example, if a manufacturing plant receives its entire supply from other plants, rather than directly from producers, it cannot become a pool plant. In another category, manufacturing plants may receive milk directly from producers but be ineligible to supply fluid milk to the marketing area because either the plant itself or its producers do not operate with approval by marketing area health authorities. Finally, some plants elect to remain out of the pool, although they receive milk from producers and have the necessary health approval. In 1956 there were 90 pool manufacturing plants. This number includes all pool plants which manufactured any dairy products during any of that particular year. In addition to these pool manufacturing plants, 263 nonpool plants in New York State manufactured dairy products during 1956.[2] Of this number, 46 used pool milk during May 1957.

[1] Mr. Cobb was formerly with the Agricultural Marketing Service. D.A. Clarke, Jr., Associate Professor of Agricultural Economics at the University of California, was employed by the Agricultural Marketing Service while on leave from the University.

[2] The relation of pool and nonpool plants will be discussed further in Part II (an economic description of the manufactured dairy products industry) of the reports on "Class III Milk in the New York Milkshed."

UTILIZATION OF POOL MILK SUPPLIES, 1940-58

In accordance with the legislation which underlies the Federal milk order program, all regulated milk is classified according to use. In the New York-New Jersey order three "use classes" have been established. Milk utilized for fluid, or bottling, purposes is designated Class I. Milk separated into cream and used for fluid cream, sour cream, and some milk drinks within the New York metropolitan district is designated Class II. All of the remaining milk in the pool is included in the Class III designation.

Total receipts of milk from producers declined slightly during the war, but began to increase after 1948 at a relatively rapid and steady rate (fig. 2). Class I sales showed some increase during 1940-46, then remained relatively constant--at least through 1954. In the same way, Class II sales (mainly fluid cream within the metropolitan New York area) remained stable. As a consequence, the increase in total milk production was reflected in the quantities of Class III available.

The sharp upturn in Class I sales in 1957 and 1958 is, in part, explained by the previously mentioned change in the geographic coverage of the order. In general, the new markets brought under the order were relatively higher in Class I sales than was the original area. This explains why the increase in Class I sales would be expected to be relatively greater than the increase in total receipts from producers in the pool. Sales of Class I-A milk during the first 7 months of 1957 were not appreciably greater than for the same period during 1956.

In 1958, about 10.1 billion pounds of milk were delivered into the New York pool. A little more than 5.5 billion pounds (or 55 percent) of this amount was utilized as Class I. About 0.6 billion pounds (or 6 percent) went into Class II uses. The remainder of 3.9 billion pounds (or 39 percent) was destined for Class III.

The annual totals do not indicate the seasonal variation in production and utilization that exists in this market. For this reason, figure 3 shows the same kind of information as figure 2--total receipts and the utilization by classes--by months, for the 5-year period, 1954-58. During this period, total receipts from producers in the pool increased slightly.

The seasonal variation in production during this period was typical of the Northeast. Peak production was reached in either May or June of each year, and the low production usually occurred in November. Roughly speaking, the peak production was more than 50 percent above production during the periods of low production. The smallest production was reached in November 1954 with about 520 million pounds of milk. The highest production (before the change in the geographic coverage of the order) was in May 1955, when approximately 920 million pounds of milk were produced.

Both Class I and Class II sales are relatively stable seasonally. The seasonal variation in receipts from producers shows up in the Class III utilization. Total quantities of Class III supplies are typically 2-1/2 times as great in May as in November. In general, the months of lowest Class III utilization have been from August through December and have been at a level slightly below 200 million pounds per month. In the highest months, Class III milk supplies have been more than 500 million pounds of milk. During the seasons of high milk production, utilization of Class III milk accounts for about 60 percent of the total milk delivered into the pool.

Statistics are available for only a short period since the order extending the market area became effective. From August through December 1957, total pool receipts increased about 27 percent. On the other hand, total Class I sales increased much more rapidly--37 percent over the same 5-month period of the previous year. Class II sales were unaffected by the change in the order. There seems to be little change in the pattern of Class III utilization that can be attributed to the expanded scope of the order.

UTILIZATION OF CLASS III MILK

Products Included in Class III

In order of their importance during 1958, the major uses of Class III milk fat were as follows: Cream (including storage cream), cheese (including Cheddar, cream, and other), butter, frozen desserts and homogenized mixes, plain condensed milk, evaporated milk, candy products, other concentrated products, and other Class III products.[3] Some of these products, in turn, were used for further manufacturing processes, particularly the homogenized mixes, plain condensed milk, and cream for the manufacture of ice cream.

Class III cream accounted for one-fourth of the total utilization of Class III milk fat in 1958. About three-fourths of this cream was sold in areas where fluid cream sales do not require Class II designation. Part of this fluid cream was destined for upper New York State and northern New Jersey markets, and the rest went into New England, Pennsylvania, and Maryland.

The remaining one-fourth of the Class III cream was frozen and stored. A large part of the storage cream is later manufactured into sour cream.[4] In 1955, the latest period for which such figures were reported by the market administrator, slightly more than 50 percent of the storage cream was used for sour cream. Ice cream manufacture accounted for about 35 percent of the cream withdrawn from storage in that year, and the remaining 15 percent went into the production of reconstituted cream and cheese.[5] Only a negligible amount of the cream stored was later churned into butter.

Frozen desserts and homogenized mixes accounted for 24 percent of the Class III milk in 1958. In addition, slightly less than 11 percent of the available Class III milk supplies was used for plain condensed milk. Both of these categories are "intermediate products" in the manufacture of ice cream. These intermediate products were sold to users[6] in the metropolitan New York area as well as in markets in other parts of New York State and New Jersey, and in New England.

Although evaporated milk was an important use of Class III milk in the New York-New Jersey milkshed in the past, it has accounted for only a relatively small amount of the total utilization in recent years. In 1958, 5.1 percent of the Class III milk fat was manufactured into evaporated milk.

Cheese, including Cheddar cheese, cream cheese, and other cheeses, accounted for 17.8 percent of the Class III use of fat in 1958. The amount that went into Cheddar cheese was 8.0 percent of the Class III use of fat. Butter accounted for 15.7 percent of the Class III milk fat available in 1958. The remaining products

[3] The reader is again reminded that the procedures used in accounting for utilization concern only the fat-containing products. For this reason, products containing only the skim milk portion--such as nonfat powder and skim milk cheeses--are not included.

[4] Milk used for cream going into storage is priced at Class III levels. If this cream is later utilized for Class II purposes--such as sour cream, half and half, or reconstituted cream distributed in the metropolitan district--handlers must then make an additional payment into the pool. In 1958 this payment to the producer settlement fund amounted to 9 cents per pound of butterfat if the milk was separated in the months of March through July, and 10 cents per pound of butterfat if the milk was separated in the months of August through February. In either case, the total payment for milk for cream which went into storage and was later sold as sour cream, half and half, or reconstituted cream (the Class III price plus the producer settlement fund adjustment) was less than the established Class II price.

[5] Reconstituted cream here includes frozen cream used for soup, whipped topping mixtures, candy, eggnog, and other milk drinks; and cheese includes cream cheese and other soft cheeses.

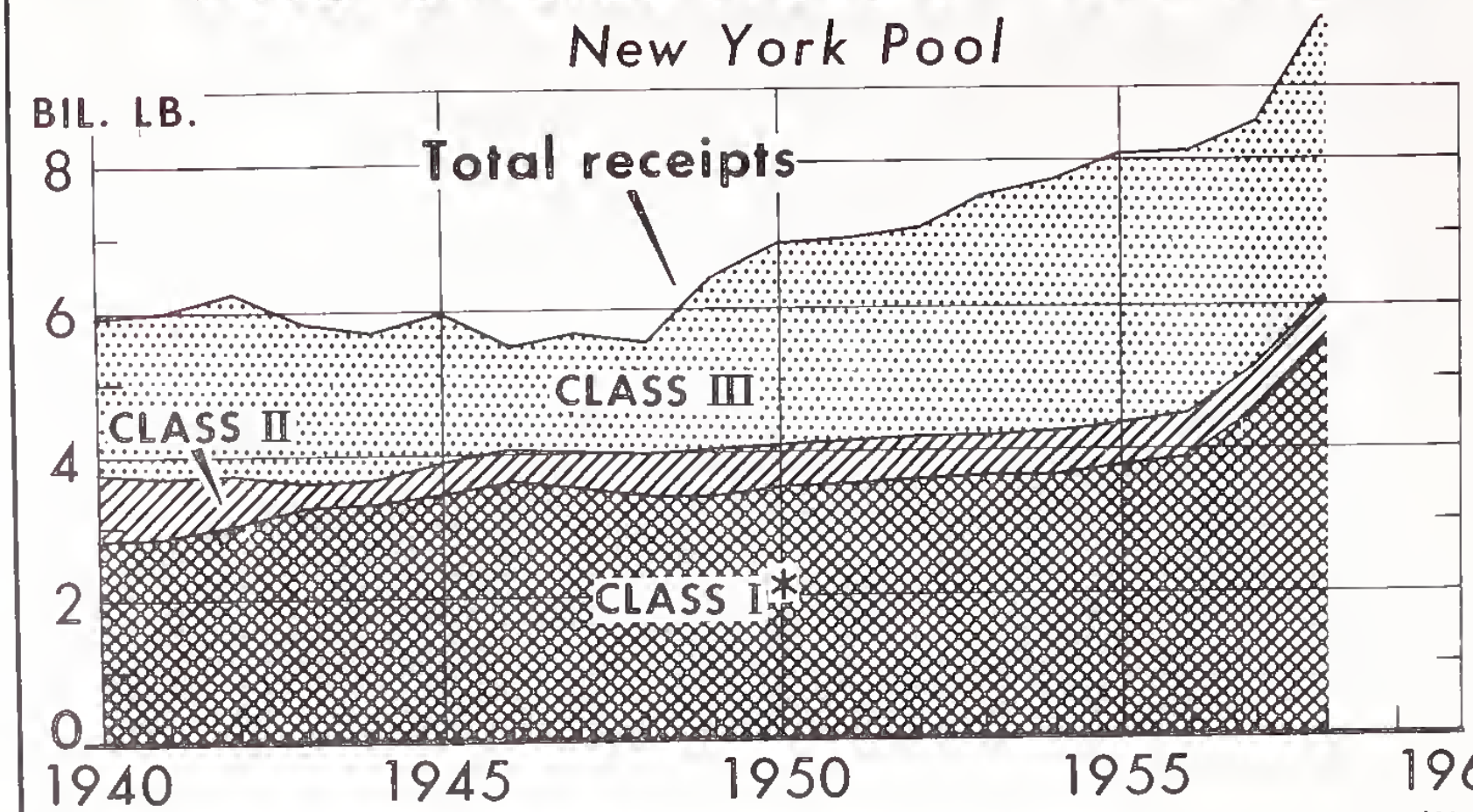
[6] In addition to ice cream manufacturers, "users" would include candy manufacturers, bakers, and soup manufacturers--firms that use dairy products as an intermediate product for further manufacture.

FIGURE 2

Annually

RECEIPTS OF MILK FROM PRODUCERS AND UTILIZATION BY CLASSES

New York Pool



SOURCE: REPORTS OF THE MILK MARKET ADMINISTRATOR, FEDERAL ORDER NO. 27, STATE ORDER NO. 126

*INCLUDES 1-A, 1-B, AND 1-C WHEN APPLICABLE

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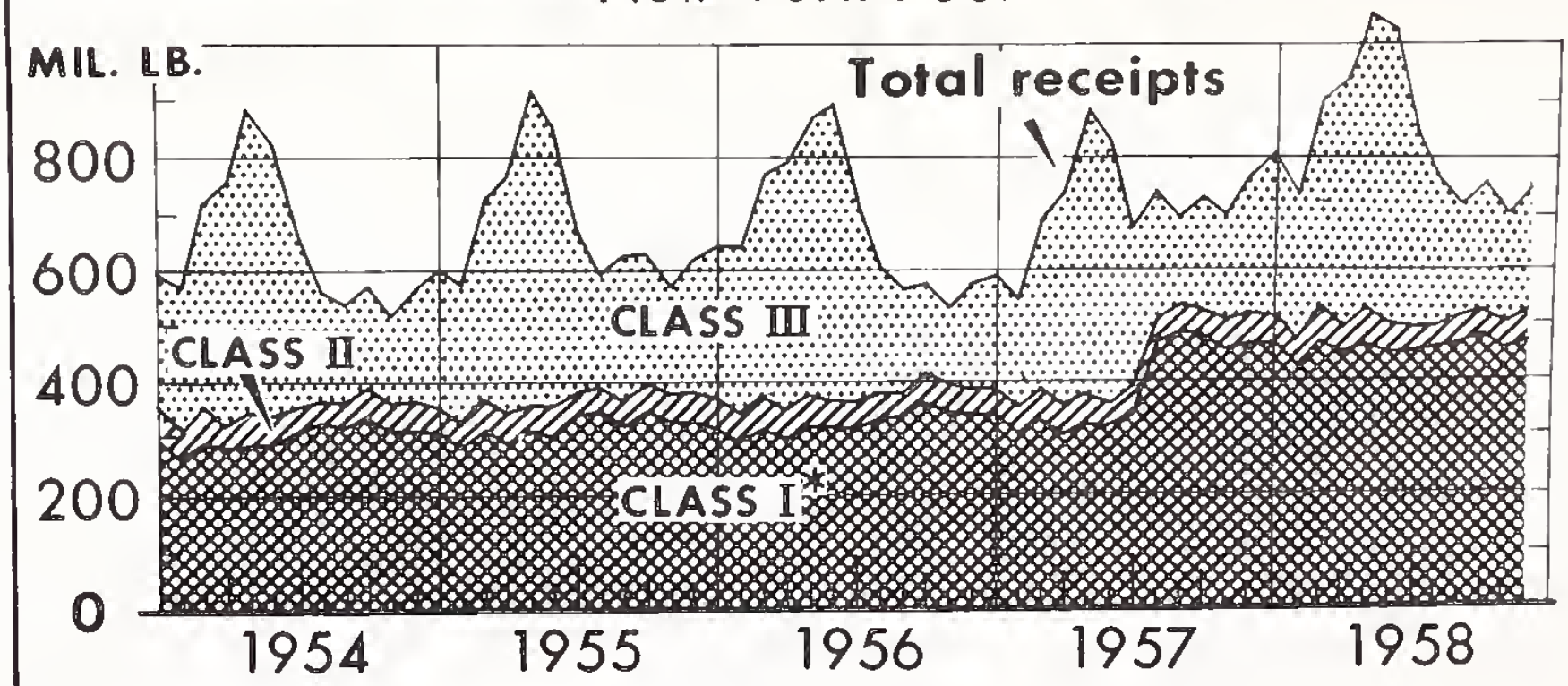
FIGURE 3

By Months

RECEIPTS OF MILK FROM PRODUCERS AND UTILIZATION BY CLASSES

New York Pool



SOURCE: REPORTS OF THE MILK MARKET ADMINISTRATOR, FEDERAL ORDER NO. 27, STATE ORDER NO. 126.

*INCLUDES 1-A, 1-B, AND 1-C WHEN APPLICABLE

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include sweetened condensed milk, milk chocolate, other concentrated products, and other Class III uses. In total, this group of products accounted for the remaining 12.8 percent of the Class III use.

Changes in Utilization, 1940-58

Figure 4 presents the percentages of total Class III utilization, by products, from 1940 to 1958. An attempt has been made to indicate in this figure not only the final utilization of the milk supplies but, for cream and ice cream, the ultimate market destination. For example, pool milk used for ice cream has been broken down between sales in New York City and sales to other markets. Milk used for both "frozen desserts and homogenized mixes" and for "plain condensed" have been combined for this figure, since the major use of both these products is for ice cream. Cream shipments to outside markets have also been segregated. This figure shows both the relative importance of the alternative uses of Class III milk and the changes in utilization over the 18-year period.

Utilization of Class III milk was affected by changes in the supply of Class III milk during the period. Class III milk supplies decreased during the period 1940 to 1946. In 1949 the total amount of Class III milk increased substantially, and it continued to increase through 1955. Since 1955 the total quantities of milk utilized for Class III purposes have leveled off and, to some extent, have declined. Milk utilization throughout the Nation was greatly affected by wartime restrictions, so that changes preceding 1946 cannot be attributed to normal market mechanisms.

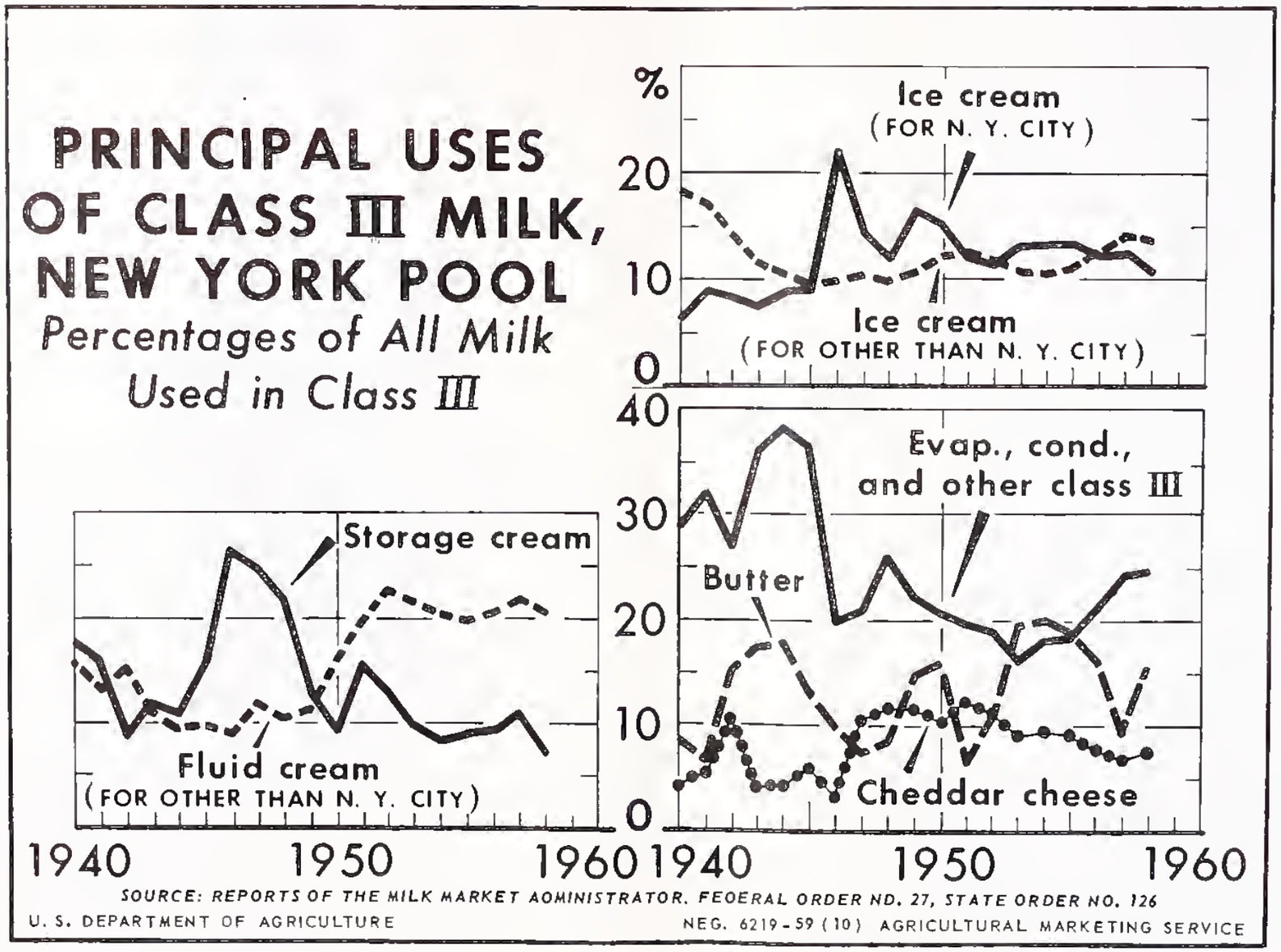


FIGURE 4

In recent years and particularly since the end of World War II, the sale of cream to outside markets has increased more rapidly than sales of any other product of Class III milk fat. While only about 10 percent of the total Class III milk fat was sold in the form of fluid cream to outside markets in 1947-48, such sales have accounted for more than 20 percent of the total Class III usage in the New York-New Jersey pool in more recent years.

The use of Class III milk fat for the manufacture of ice cream for sale in New York City was relatively low from 1940 through 1945, reflecting the wartime shortage and restrictions on cream usage.[7] In 1946, however, the relative importance of this outlet for Class III milk fat increased substantially. During that year, sales of ice cream in New York City accounted for nearly 22 percent of the total Class III milk fat available. In 1947 and 1948, however, this outlet decreased rapidly in importance, dropping to about 12 percent in the latter year. In 1949, both the health regulations on the use of cream for ice cream and the pricing provisions of Order 27 were changed. In particular, the change in the pricing provisions of the order made pool cream more attractive to ice cream manufacturers and, no doubt, was responsible for the increase in the utilization of milk fat for this product in 1949. Since 1949, there has been a slight decrease in the relative importance of this outlet.

In addition to providing ingredients for ice cream to be consumed in New York City, New York-New Jersey pool milk has been an important source of supplies for ice cream for distribution in other northeastern markets. Ice cream sales in these other markets have been increasing in the absolute quantities of milk fat involved since 1948. The rate of increase in sales through this outlet, however, has been approximately the same as the rate of increase in Class III milk supplies, with the result that the importance of this outlet in the disposition of pool milk supplies has remained relatively constant.

The products included in the category "evaporated, condensed, and other Class III uses" are: Evaporated milk, sweetened condensed milk, candy products (mainly for milk chocolate), other concentrated products (primarily whole milk powder), cream cheese, cheese other than Cheddar and cream cheese, and a miscellaneous group of other Class III products. During the 19-year period, evaporated milk, which had been important as a user of Class III milk fat, declined drastically. The decline in production of evaporated milk was most pronounced from 1942 to 1946. For part of the same period, other concentrated products were increasing rapidly. But, in 1946, these products also dropped rapidly with the result that the importance of this whole category was substantially reduced. Since that time, increases have occurred in the production of other concentrated products, candy products,

[7] The categories involving ice cream include frozen desserts and homogenized mixes as well as plain condensed milk, both of which are predominantly used in the manufacture of ice cream.

cream cheese, and cheese other than Cheddar and cream cheese, and so the category of "evaporated, condensed, and other Class III uses" has again increased in relative importance among uses for Class III milk fat.

Cheddar cheese, butter, and cream for storage have been somewhat erratic in their importance in the Class III picture. Cheddar cheese production was relatively high in 1942 and then it fell; the period of low production was reached in 1946. From 1947 to 1951 cheese production increased. From 1951 to 1955 milk utilized for cheese leveled off, amounting to approximately one-third of a billion pounds of milk per year. In 1956-1957, however, cheese production fell off until in 1957 it accounted for the equivalent of about one-quarter of a billion pounds of milk. It rose slightly in 1958.

Butter production has been even more erratic than cheese production. The low period of butter production was reached in 1946 to 1948. Output increased in 1949 and 1950, then fell rapidly in 1951. Production of butter again increased rapidly through the period ending 1955. In 1955 approximately 700 million pounds of milk were used for this purpose. By 1957 the utilization of milk for butter had dropped to below half of this rate, but by 1958 it returned almost to the 1955 level.

Storage cream reached its peak as a user of Class III pool milk in 1946 when it accounted for over 26 percent of the total milk in this class. During that year the equivalent of 367 million pounds of milk was utilized in storage cream. While the relative importance of this outlet declined in subsequent years, the peak in the absolute quantity of cream stored was reached in 1951 when the equivalent of 416 million pounds of milk was used in this manner. The total amount of Class III milk available in 1951, however, was nearly 93 percent more than in 1946. In more recent years, storage cream has accounted for approximately 10 percent of the total Class III pool milk.

Ice cream was the largest user of Class III milk from the New York-New Jersey pool in 1958. It accounted for more than 24 percent of the total supplies, with about 10 percent going for sale in the New York City market and 14 percent in markets other than New York City. The combined category of evaporated, condensed, and other Class III products accounted for nearly 25 percent of the total Class III milk fat. The sale of fluid cream to outside markets was next in importance with approximately 22 percent of the Class III milk fat used for this purpose. Storage cream accounted for 11 percent, butter 9 percent, and Cheddar cheese 7 percent of the total usage of New York-New Jersey pool Class III milk.

Seasonal Changes in Utilization, 1954-57

Figures 5 and 6 show the utilization of Class III milk fat for 1954 through 1957, by months, for major uses of Class III milk. These include the total Class III cream, storage cream, plain condensed milk, frozen desserts and homogenized mixes, Cheddar cheese, and butter. The most striking feature of these figures is the similarity from year to year in the pattern of utilization of milk for all of these products except butter.

Use of milk for total Class III cream and for storage cream shows a tremendous seasonal variation--almost all of which is explained by the seasonal variation in use for storage cream (fig. 5). This variation runs between 50 million pounds of milk used for cream in the low months to approximately 200 million pounds in the peak seasons. The lowest month for total Class III cream was February 1955 when only 41 million pounds of milk were used for this purpose. The high period in use for cream, as well as for storage cream, coincides with the months of high total milk receipts and high Class III use. The largest quantity of Class III milk was used for cream during May of 1957 when 222 million pounds were used for this purpose.

The amount of cream going into storage each month during the period analyzed has varied from 0 to the equivalent of nearly 155 million pounds of milk. Storage activity is greatest in March, April, May, and June. By July, in each of these years, the amount of milk used for storage cream was relatively low. In spite of the rather large seasonal variations, both total cream usage and the use of cream for storage purposes remain similar from year to year in corresponding months.

The use of Class III milk for frozen desserts and homogenized mixes also shows a substantial degree of seasonal variation although the variation is not as drastic as that for Class III cream (fig. 5). The lowest utilization is usually in November and the peak is reached in June. Again, there is a substantial correspondence in the month-by-month utilization between these years.

There is some evidence that homogenized mixes are being supplanted by "high-fat" condensed milk.[8] This high-fat condensed milk is classified as plain condensed milk. It is similar in composition to ice cream mix, except that it does not contain sugar or stabilizer. This evidence, which is by no means conclusive, is the fact that the use of milk in homogenized mixes declined from July 1956 to the end of the period for which data are available, while production of plain condensed milk increased. Reports from the industry indicated that high-fat condensed milk was replacing homogenized mixes in the manufacture of ice cream. Utilization of milk for frozen desserts and homogenized mixes was higher in October 1957, however, than it was in October 1956.

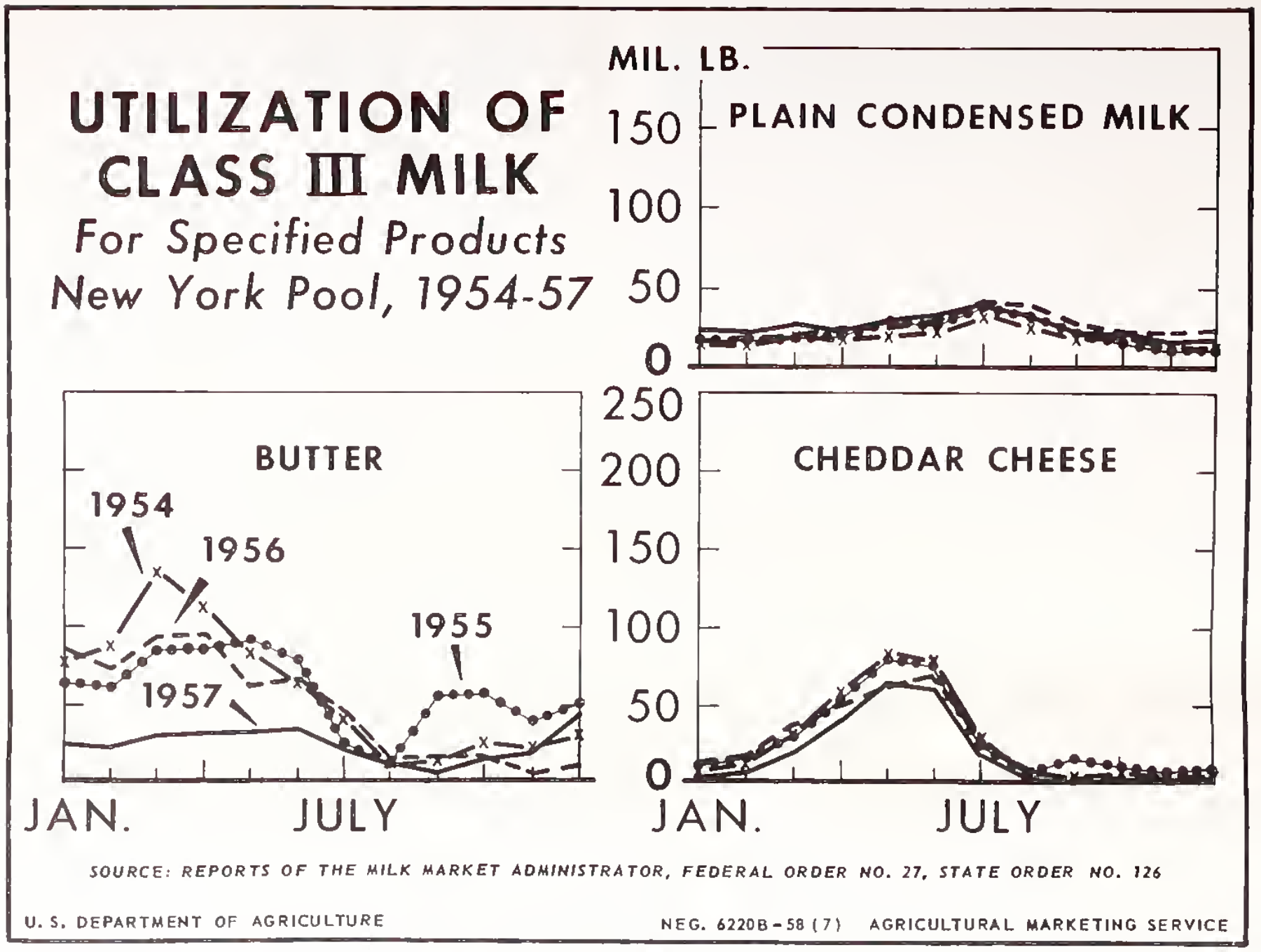
Utilization of Class III milk for plain condensed milk shows small seasonal variation relative to that for total cream and for frozen desserts and homogenized mixes (fig. 6). There is a peak, however, which is usually reached during July. Converse to the situation shown for frozen desserts and homogenized mixtures, the amounts of milk used for plain condensed milk apparently increased through these years.

Utilization of Class III milk for Cheddar cheese exhibits a substantial degree of seasonal variation (fig. 6). Some cheese was manufactured from pool milk during all the months from January 1954 through December 1957. Production remained low during August through February and rose until May. The peak was usually reached in May, but in 1956, when total milk receipts reached their maximum in June, the peak production of cheese was also in June. The total amount of Cheddar cheese produced in 1956 in the New York-New Jersey pool was substantially less after April than it was during the corresponding months of the previous years. Production of Cheddar cheese during May in both 1956 and 1957 used about 63 million pounds of milk compared with over 80 million pounds for the same month of 1954 and 1955. In spite of the fact that the peak Cheddar cheese production in 1956 occurred in June, the total quantity of Class III milk used for cheese during that month was below that of June in both 1954 and 1955.

The use of Class III milk for butter shows a more erratic pattern than the utilization of milk for the products discussed above (fig. 6). The quantity of butter produced varies considerably during the same months in different years. Although there is a definite seasonal variation in the use of milk for butter, the pattern changes widely from year to year. The month of lowest production of butter ranged from August through November. By March, production was at or near the seasonal peak each year. The month of highest butter production in 1954 was March, but in 1955 it was May; in 1956, April; and in 1957, June. The highest level of butter production in 1957 was, however, substantially below that for 1954. In June of 1957, the fat from about 45 million pounds of Class III milk was used for butter, whereas in March of 1954 approximately 135 million pounds of milk went for this purpose. Butter production was lowest in November 1956, when 5.2 million pounds of milk were used in this outlet, and was almost this low (5.5 million pounds) in September 1957. The third lowest period of butter production occurred during 1954, the same year in which the peak occurred; in August of that year 8.8 million pounds of milk went into butter.

[8] The term "high-fat" condensed milk is used to denote a product in which the ratio of fat to solids-not-fat is appreciably higher than in normal whole milk. In other words, this high-fat condensed product is made by adding cream (or removing skim milk) until a desired ratio of fat to nonfat solids is obtained.

FIGURE 5



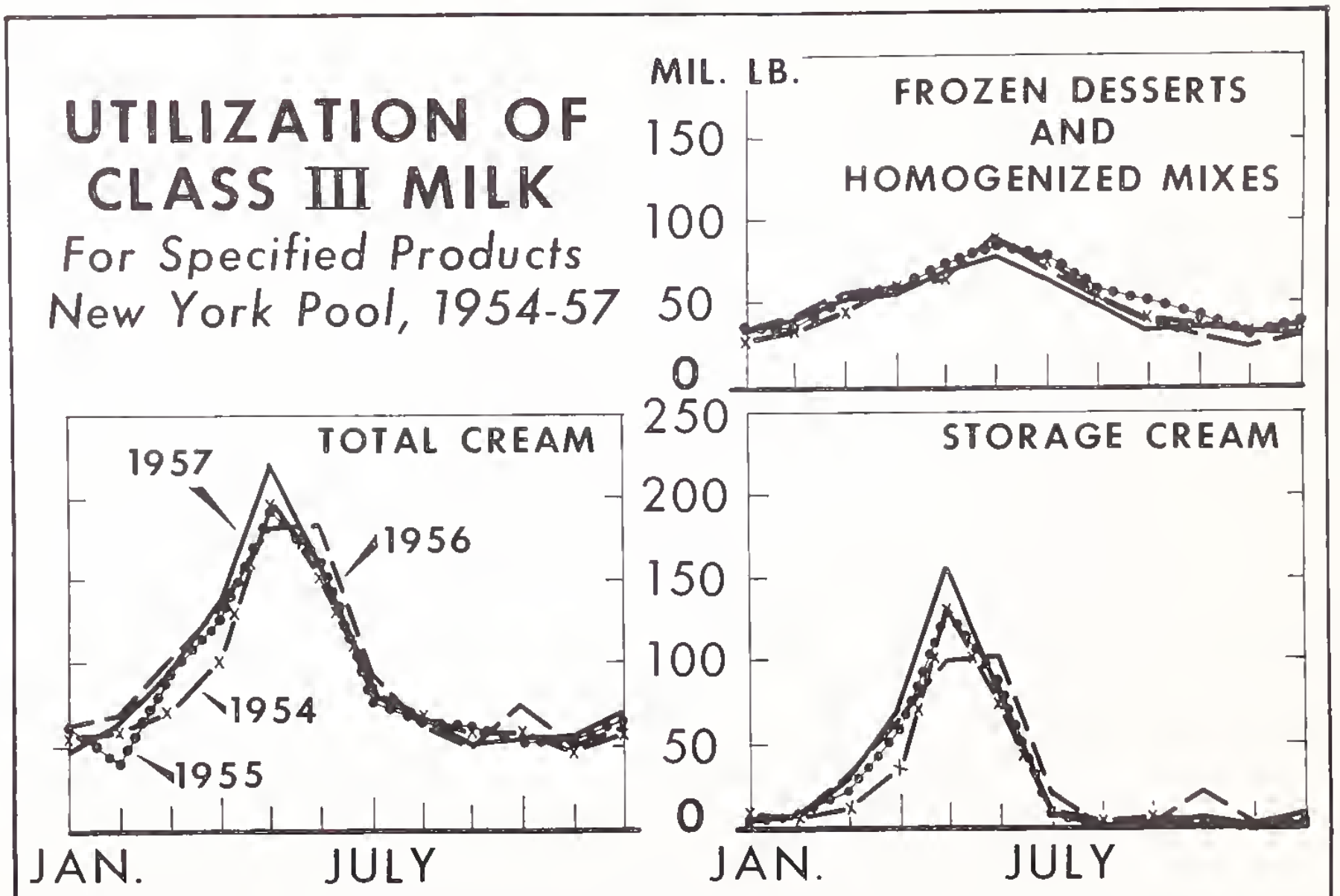


FIGURE 6

Class III products shipped from pool plants include whole milk for manufacture at other locations, cream (other than for sale as fluid cream in metropolitan New York City), condensed milk, homogenized mixes for ice cream and candy manufacture, evaporated milk, cheeses, butter and sour cream.[9] These interplant shipments may be used in the form of the product shipped or further processed into several alternative types of manufactured dairy products.

The origin, destination, and utilization of pool plant Class III shipments, by regions, are shown in figures 7 to 14. To illustrate the seasonal variation, these data are given for both November 1956 and May 1957. November represents the season of "short" production, while May represents the "flush" season. The milkshed has been broken down into 18 regions. Differences in the quantities and types of shipment, in utilization patterns, and in seasonal movements are illustrated. In general, these 18 regions conform to those used by the New York-New Jersey Market Administrator in reporting plant and production figures by regions. The State of New York is divided into 9 regions. Pennsylvania, with the exception of the southwestern and southeastern portions (which do not include any pool plants), is divided into 4 regions. Northern New Jersey is divided into 2 regions. The 3 remaining regions are the New England States of Connecticut, Massachusetts, and Vermont. These last 3 regions are included, not because of their pool manufacturing operations but because they are important outlets for surplus milk from the New York-New Jersey pool.

Shipments and receipts of the various products are indicated by circles which appear in the appropriate regions. The relative quantities of product shipped or received are indicated by the area of the circle. The direction of flow is shown by the arrows which connect regional shipments to regional receipts. In regions where shipments are made to plants in more than one region, the approximate amounts going to each region are indicated by the segments of the circles denoting shipments. Arrows connecting the circles originate at the segment of the shipment circle corresponding to the region of receipt, but the segment at which any arrow terminates represents the combined receipts from all regions for the specified use. Each kind of use is shown by distinctive shading.

The following example illustrates the way these maps may be read and interpreted. Figure 7 refers to shipments of Class III whole milk in November 1956. The size of the circle denoting shipments in region 4 indicates that the equivalent of approximately 800,000 pounds of milk fat was shipped in the form of whole milk for Class III purposes from pool plants located within region 4. Somewhat more than 75 percent of this milk was received at plants (both pool and nonpool) which were also located in region 4. Plants in region 2 received the second largest shipments (about 15 percent) from pool plants in region 4. Class III milk was also shipped from pool plants in region 4 to plants in region 7, and relatively small amounts were shipped from pool plants in region 4 to plants in region 6 and in region 3.

In this map, the circle on utilization of receipts shows that about 850,000 pounds of milk fat were received in the form of whole milk shipments by plants in region 4. The bulk of this originated in pool plants also located in region 4, but the equivalent of more than 160,000 pounds of milk fat was received in the form of whole milk which originated in pool plants located in region 6, adjacent to the north. In addition, and in relative order of importance, shipments of whole milk were received by plants in region 4 from pool plants located in regions 9, 2, 7, and 3.

The plants located in region 4 which received this whole milk, in turn utilized it in various forms. In this particular month, the most important use of these milk shipments was for "other cheeses"--here, principally cream cheese. A close second, as far as Class III milk is concerned, was the category "homogenized mixes and whole condensed," of which approximately two-thirds was homogenized mixes, and one-third was whole condensed milk. Another important user of these milk shipments was candy products, which accounted for approximately one-fourth of all of the milk received in this region. Whole milk powder accounted for a substantial segment of utilization, and relatively smaller quantities were utilized as fluid cream, butter, and miscellaneous products with volumes too small to be shown separately.

Seasonal variation in shipments and in utilization patterns can be seen by comparing the "short season" and "flush season" maps for the various types of products. As would be expected, substantially larger quantities of products are shipped in the flush period than in the short season. Furthermore, important differences occur in the utilization of these shipments.

During May 1957, substantial quantities of milk were shipped between plants to be manufactured into Cheddar cheese (fig. 8). This is particularly true of the milk shipped to plants located in regions 5 and 6. Very little milk was used for this purpose in November 1956. This, of course, reflects the fact that most Cheddar cheese in this area is made during the flush milk-production season.

The relative importance of storage cream during the flush period also is apparent. Only a small amount of milk (and this only in region 2) was used for storage cream during November 1956. This, again, is a general reflection of the utilization pattern for the milkshed. As will be seen in the discussion of cream shipments (figs. 9 and 10), storage is the dominant use of cream shipped from pool plants during May, while very little cream is shipped for storage in November.

Whole milk travels relatively long distances between plants in this market. In every instance, a part of the milk received within a region is shipped as whole milk to plants located in other regions. While to some extent these interregional shipments are made between plants in adjacent regions, in many cases the shipments are made across regions. This is particularly true in the flush season. For example, in May 1957, milk was shipped from plants located in region 4, not only to plants in the adjacent regions 2, 3, 5, 6, 7, and 9, but also to the nonadjacent regions 8, 12, and 13 (fig. 8). A considerable amount of duplication and crosshaul is also involved. During both the May and the November periods, milk was shipped from plants in region 4 to plants in region 6. At the same time, plants in region 6 were making similar shipments to plants in region 4.

Figures 9 and 10 refer to shipments of Class III cream which originate from pool plants. These maps are constructed in the same way as the maps showing milk shipments. Tbe bulk of the cream received from pool plants throughout the milkshed was utilized as cream in November 1956. In May, cream for storage was the dominant utilization of cream shipments. Fluid cream sales within region 1--metropolitan New York City--are designated as Class II use under the terms of Order 27, and, therefore, do not show up on these maps. Within the metropolitan area, the bulk of the Class III cream shipments are used for homogenized mixes.

Class III cream is also shipped from pool plants to plants located outside the New York-New Jersey milkshed. In November 1956 such shipments were made to plants in Connecticut and Massachusetts, as well as in Maryland and in Pittsburgh, Pa. Class III cream was also shipped to plants in these areas outside the milkshed in May 1957 and, in addition, some cream was shipped from region 9 to plants in Florida. Major shipments, however, were made to regions in New England. These were to regions 16, 17, and 18, and to Maine. The New England markets, particularly those in Massachusetts and Connecticut, are fairly substantial outlets for New York pool cream supplies on a year-round basis.

As was the case with the flush season shipments of milk, storage cream represents a substantial part of the total utilization of cream received in nearly all sections of the milkshed during May 1957. This again reflects the importance of storage of excess milk fat produced during the spring months within this milkshed.

Butter is produced from Class III cream shipments from pool plants in regions 7, 8, 12, and 13. While some butter was produced in these regions during November 1956 as well as in the following May, substantially greater quantities were produced during

[9] In addition to these fat-containing products, certain skim milk products are also shipped. Since skim milk for manufactured products does not affect classification, no comparable records of shipments of skim products are required by the market administrator and so no data on these movements are available.

SHORT-SEASON SHIPMENTS OF MILK

Origin, Destination, and Utilization of Class III Milk Shipped by New York Pool Plants, by Regions, November 1956

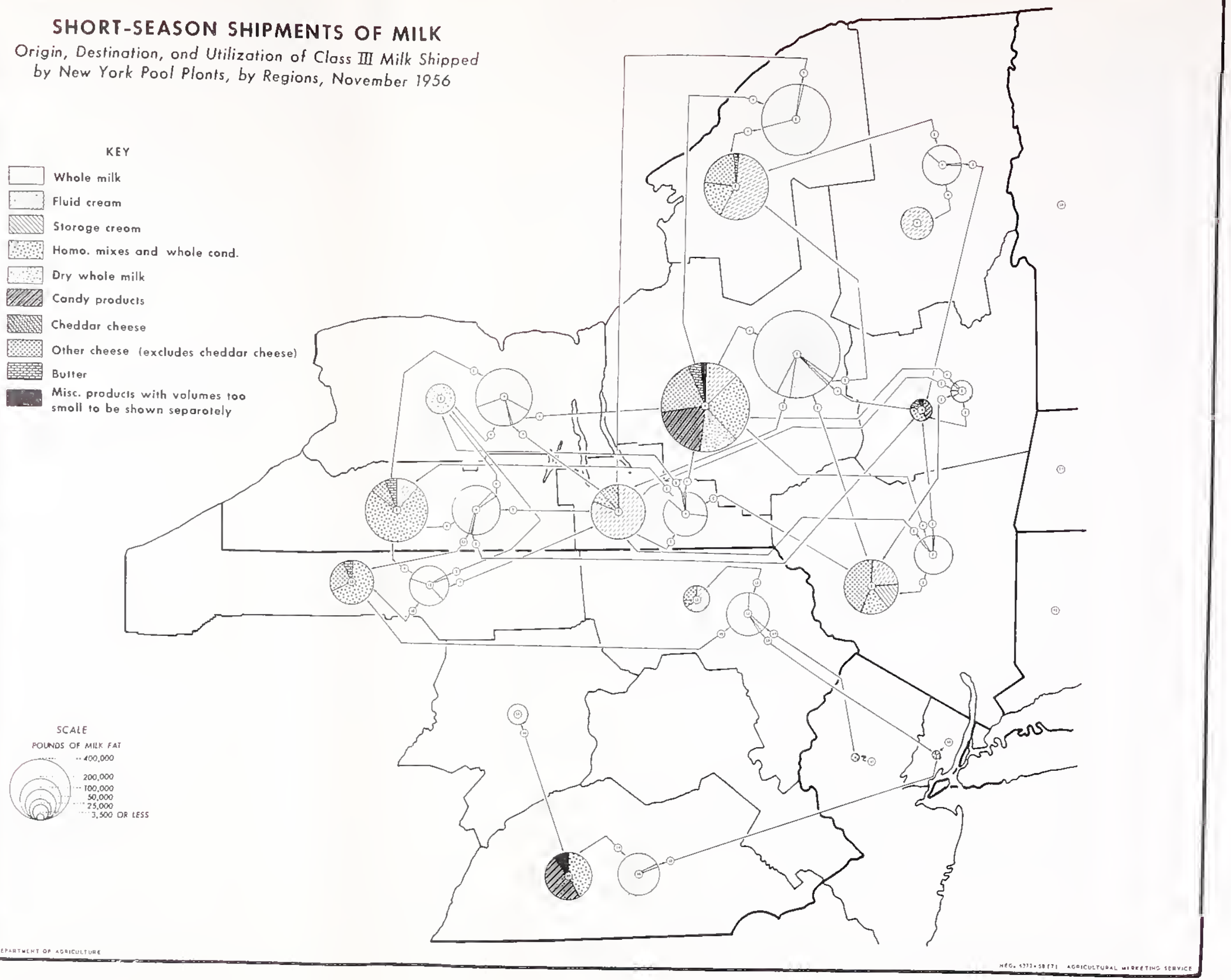


FIGURE 7

FLUSH-SEASON SHIPMENTS OF MILK

Origin, Destination, and Utilization of Class III Milk Shipped by New York Pool Plants, by Regions, May 1957

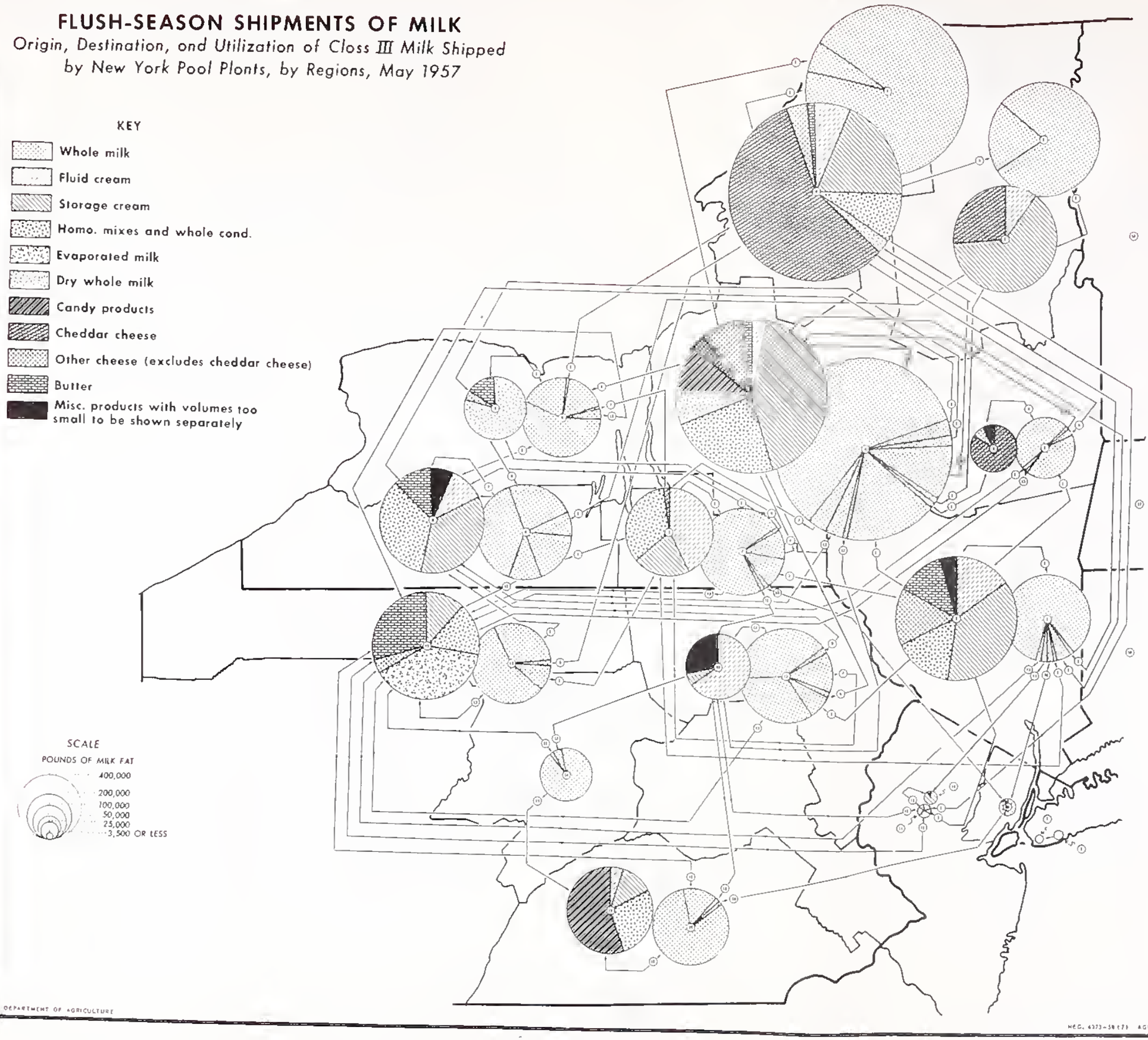


FIGURE 8

SHORT-SEASON SHIPMENTS OF CREAM

Origin, Destination, and Utilization of Class III Cream Shipped by New York Pool Plants, by Regions, November 1956

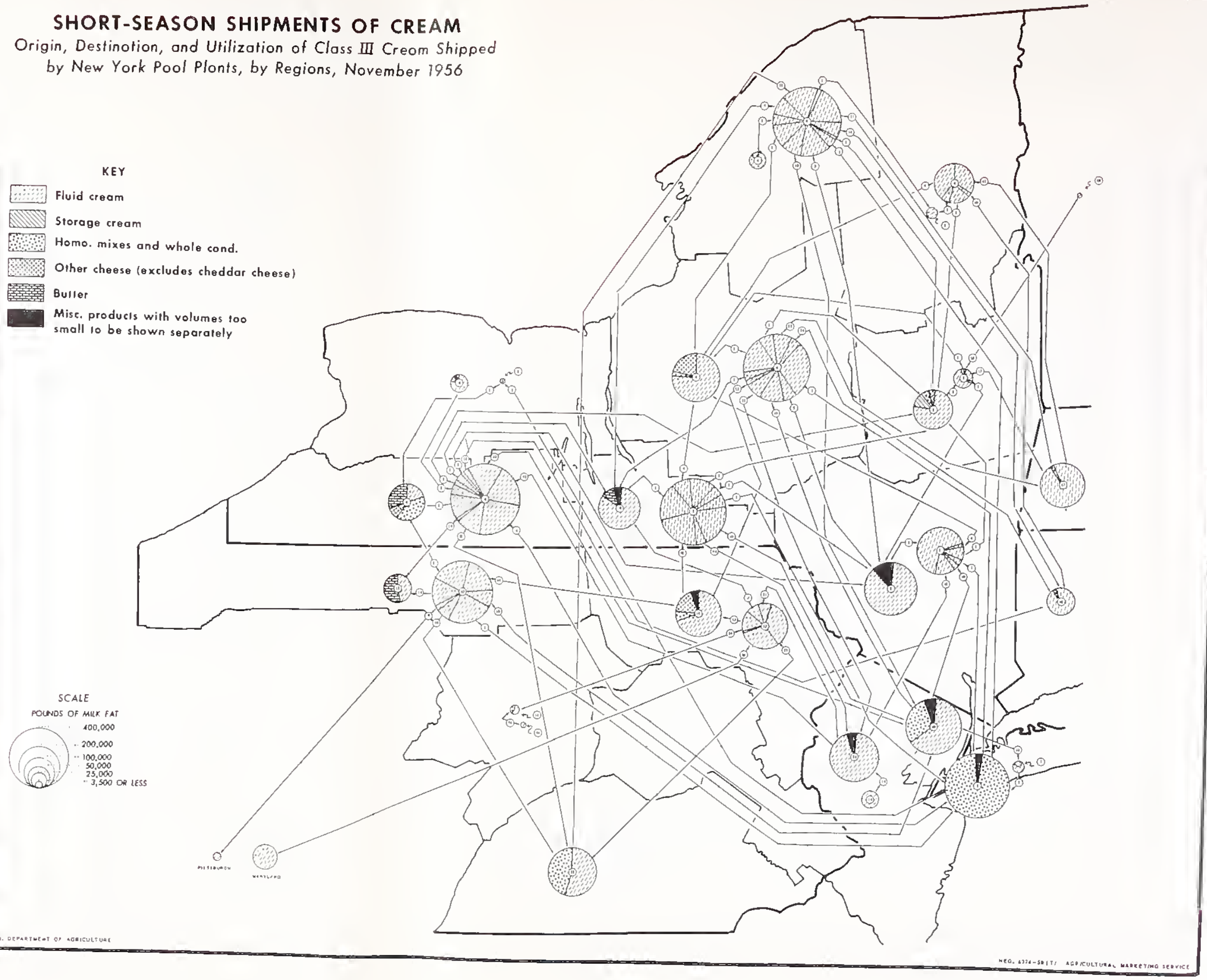


FIGURE 9

FLUSH-SEASON SHIPMENTS OF CREAM

Origin, Destination, and Utilization of Class III Cream Shipped by New York Pool Plants, by Regions, May 1957

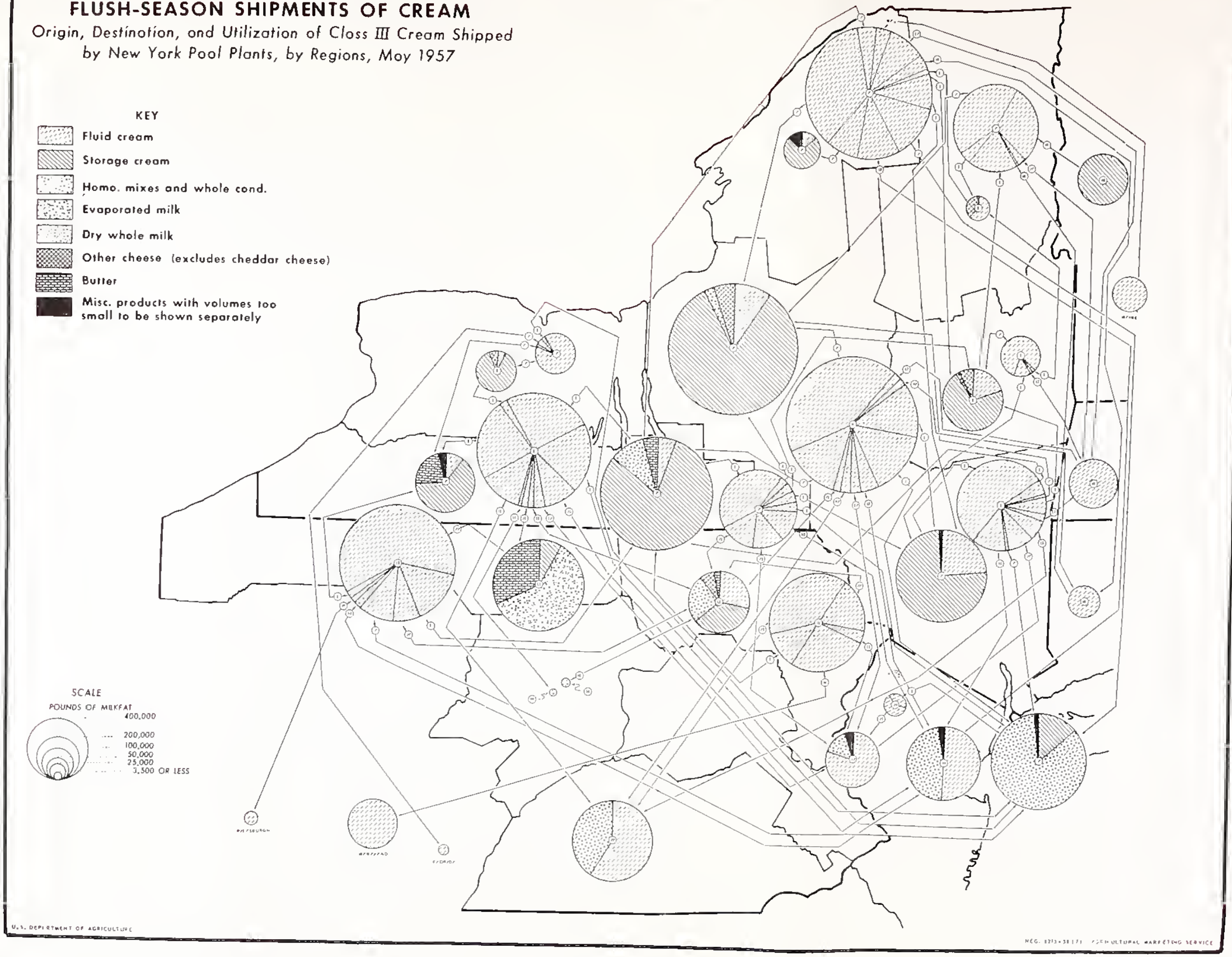


FIGURE 10

the flush season. Other cheese (including cream cheese) is made from cream shipments in regions 3, 4, and 12.

Figures 11 and 12 refer to shipments of condensed milk and homogenized mixes by pool plants. While the ultimate utilization of both of these products is primarily in ice cream, the reports to the market administrator do not require accounting for utilization beyond these classifications. The major purpose to be served by these maps, therefore, is to show the location of the pool plants from which these shipments of ice cream ingredients originate, and further to indicate the area of destination. As can be seen, the major outlets for these two products are metropolitan New York City (region 1), southern Pennsylvania (region 15), northern New Jersey (regions 10 and 11), and Connecticut (region 16), that is, these ingredients are shipped to population centers for local ice cream manufacture. In addition to these areas, relatively small quantities of condensed milk are shipped to plants in Rhode Island, Massachusetts, Vermont, and Maine. Plants in Pittsburgh also received shipments of condensed milk from pool plants during November 1956. In November plants in Connecticut received shipments of homogenized mixes, but no condensed milk. On the other hand, shipments of homogenized mixes to Connecticut plants were relatively small in May 1957, while shipments of condensed milk were substantial.

Shipments of most of the remaining major manufactured dairy products are shown on figures 13 and 14. These products include butter, sour cream, cream cheese, and other cheese (other than Cheddar and cream cheese). Data on evaporated milk shipments were also available, but plants reporting such shipments were insufficient to permit including this information on the map. This product was shipped from region 8 in November and from both region 8 and region 13 in May. As a result, May shipments of this product were considerably larger than those in November 1956.

In general, the information underlying these two maps is not as complete as for the previous ones. For these types of products, the market administrator does not require specific information on destination nor on final utilization. The data primarily show the location of plants reporting shipments of these products. In some instances, it was possible to trace the destination of these products, but where this was not possible, it was assumed that shipments were to plants located in the same region where shipments originated.

RELATION OF FEEDER PLANTS TO MANUFACTURING PLANTS

A large number of plants in the New York milkshed receive milk from producers, weigh and test it for purposes of accounting to individual farmers, and then transship it as whole milk to other plants for final disposition. In this sense, these receiving and shipping stations operate by "feeding" supplies of whole milk to other plants. A large proportion of the milk which arrives in the metropolitan area for fluid milk sales is handled in this fashion but, in addition, some of these receiving stations serve manufacturing plants in the producing area.

This section is primarily concerned with the relation between feeder plants and manufacturing plants in the New York milkshed. There are probably several reasons why the milkshed has been organized so that manufacturing plants supplement, in this manner, the supplies received directly from producers. In the first place, the size of the investment required in most types of modern plants for manufacturing dairy products is such that large operations are required for economical levels of production. Plants which may be large enough to assemble and receive milk efficiently from producers may be much too small to be efficient in manufacturing products.[10] Therefore, the output of several receiving plants may be consolidated for more efficiency in processing.

In addition, as previously mentioned, most of the fluid milk and cream for the metropolitan area is handled through receiving stations. The market requirements for fluid milk and cream remain relatively constant throughout the year. With wide variation in seasonal production of milk--and therefore in month-by-month receipts--the number of feeder plants that are required to supply the fluid needs of the market must vary. A part or all of the supplies at some of these plants must be diverted from fluid use to manufacturing use from season to season. This is why there is a much larger number of feeder plants supplying manufacturing plants in May than in November.

Feeder Plants Supplying Pool Manufacturing Plants

Pool plants operating as feeder plants serving manufacturing plants supply milk to other pool plants and also to nonpool plants. In the following sections, plants supplying pool manufacturing plants are considered separately from those pool feeder plants servicing nonpool manufacturing operations.

Figures 15 and 16 show the location of pool feeder plants relative to pool manufacturing plants for November 1956 and May 1957, respectively. On these maps, a distinction is made between two types of "feeding" operations--first, all Class III milk received by a plant is shipped out in the form of whole milk; and second, a plant ships whole milk but at the same time carries on some manufacturing operations. In some cases, the manufacturing operations considered here are relatively simple, possibly no more than that cream is separated and shipped. The difference in the relative numbers both of feeder plants and of manufacturing plants between the November short-supply season and the May flush-supply season is obvious from comparing these two maps. This, of course, is a direct reflection of the fact, previously mentioned, that in the fall some of these plants (both feeder and manufacturing) ship milk to the fluid market.

The relationships of feeder plants to manufacturing plants can be seen by the lines connecting plants. In general, the map for November indicates a relatively rational organization; that is, the feeder plants supply relatively nearby manufacturing operations and in this way the transportation costs of whole milk are kept to a minimum. Again, in a broad sense, milk in November generally flows from more distant points to points closer to market. In May, on the other hand, the milk generally travels longer distances from feeder plant to manufacturing plant. In many instances, manufacturing plants located near feeder plants with excess supplies are bypassed, and the milk goes to more distant plants. As would be expected, in May, plants located relatively close to the market have supplies in excess of Class 1 and Class II requirements and so divert milk to manufacturing plants farther from the market.

Feeder Plants Supplying Nonpool Manufacturing Plants

The relationship between pool feeder plants and nonpool manufacturing plants is shown in figures 17 and 18 which again refer to the short-supply season and the flush-supply season, respectively. As indicated, the plants which receive and manufacture this milk do not have pool status. One or more of the following reasons may explain this lack of pool status.

(1) Some manufacturing plants do not receive milk directly from producers, and, therefore, do not meet the definition of pool plants specified in Order 27.

(2) Some plants do not supply fluid milk or fluid cream within the marketing area set forth in the order.[11] In this case, it is not mandatory that they carry pool designation.

(3) The milk supply of some plants and the producers who supply the plants may not carry the approval of appropriate health authorities which would permit the sale of this milk in fluid form within the marketing area.

(4) Some plants are eligible for pool status, but choose to remain outside the pool for economic

[10] One of the factors leading to relatively small receiving stations is that milk in this area must be received before 10 a.m., which in turn limits the volume that can be received direct from producers.

[11] The data on these maps relate to the period before August 1, 1957, when the definition of the marketing area was expanded to include additional territory in upstate New York and northern New Jersey. Many plants which are designated as nonpool plants on this map, because they did not supply fluid milk or fluid cream to the original marketing area, were brought into the pool by expansion of the area.

SHORT-SEASON SHIPMENTS OF CONDENSED MILK AND MIXES

Origin, Destination, and Utilization of Shipments
by New York Pool Plants, by Regions, November 1956

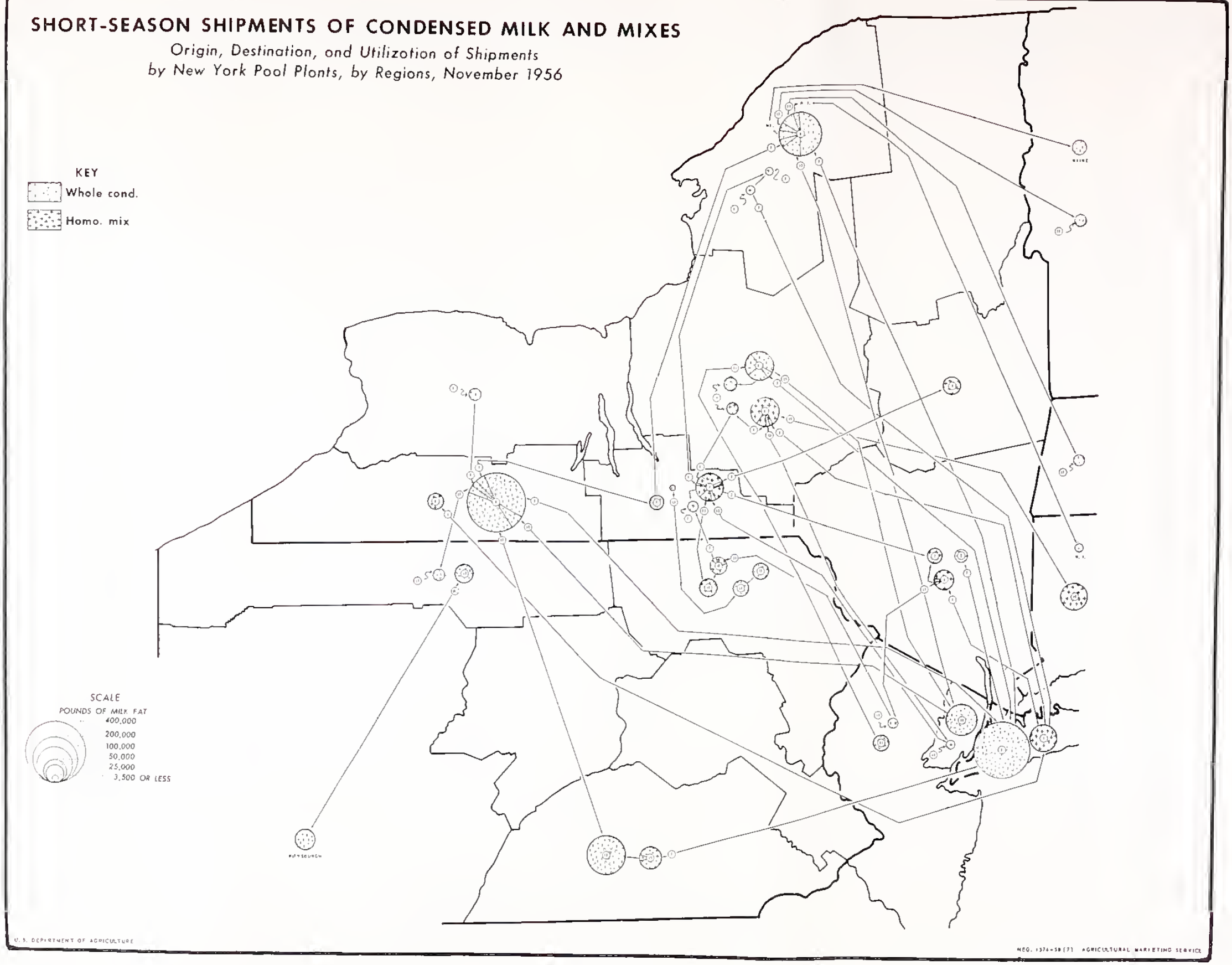


FIGURE 11

FLUSH-SEASON SHIPMENTS OF CONDENSED MILK AND MIXES

Origin, Destination, and Utilization of Shipments
by New York Pool Plants, by Regions, May 1957

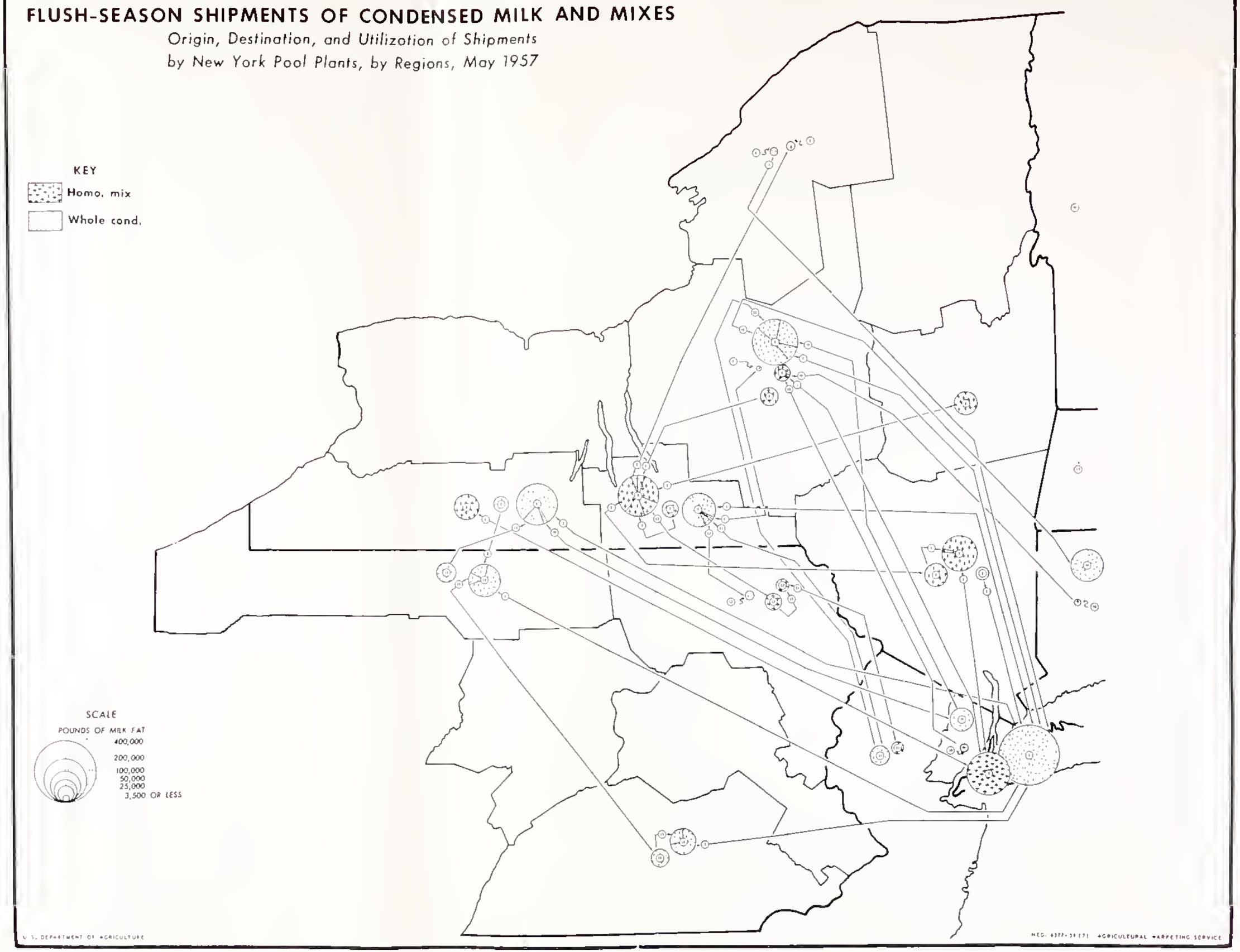


FIGURE 12

SHORT-SEASON SHIPMENTS OF SPECIFIED DAIRY PRODUCTS

Origin, Destination, and Utilization of Shipments
by New York Pool Plants, by Regions, November 1956

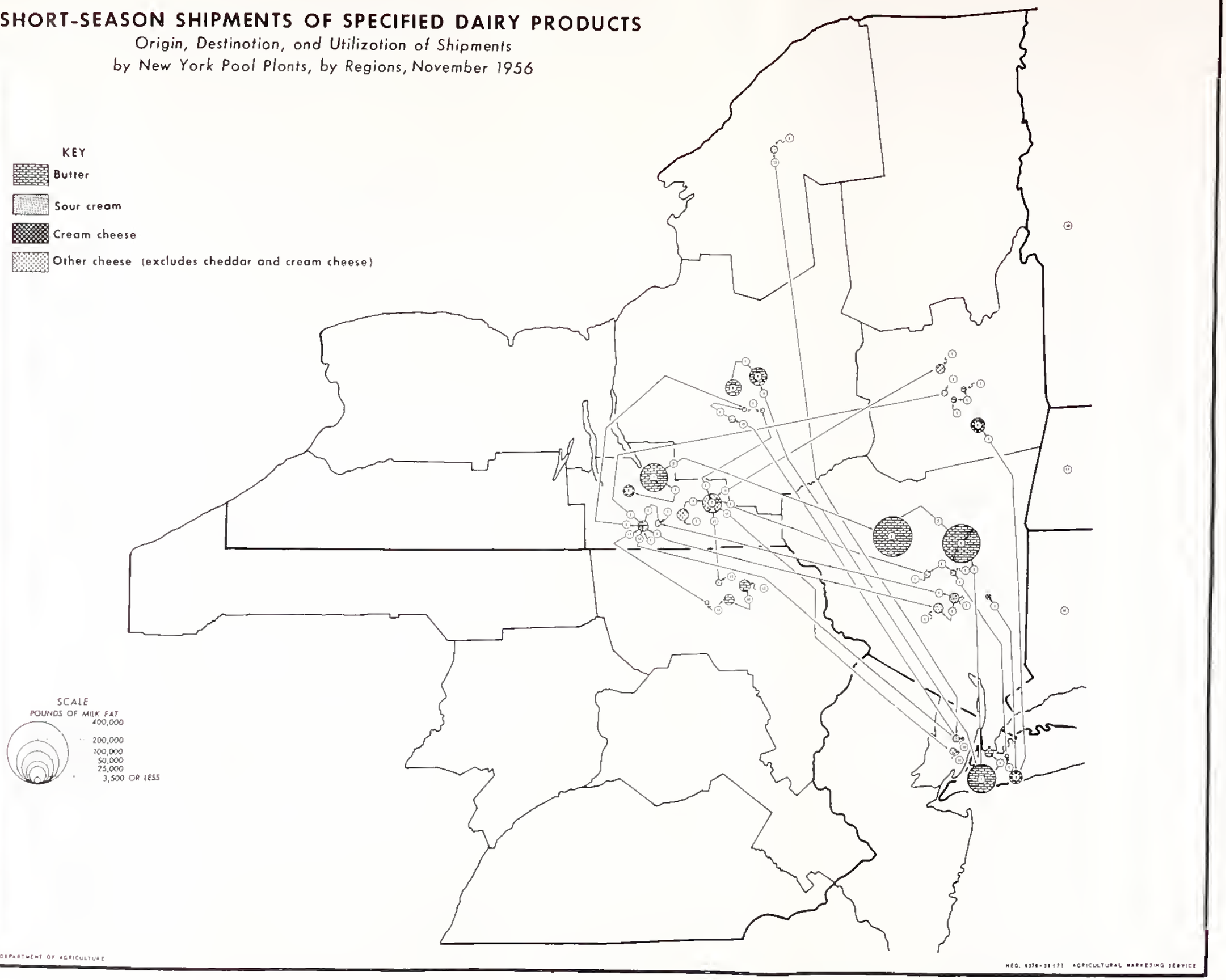


FIGURE 13

FLUSH-SEASON SHIPMENTS OF SPECIFIED DAIRY PRODUCTS

Origin, Destination, and Utilization of Shipments by New York Pool Plants, by Regions, May 1957

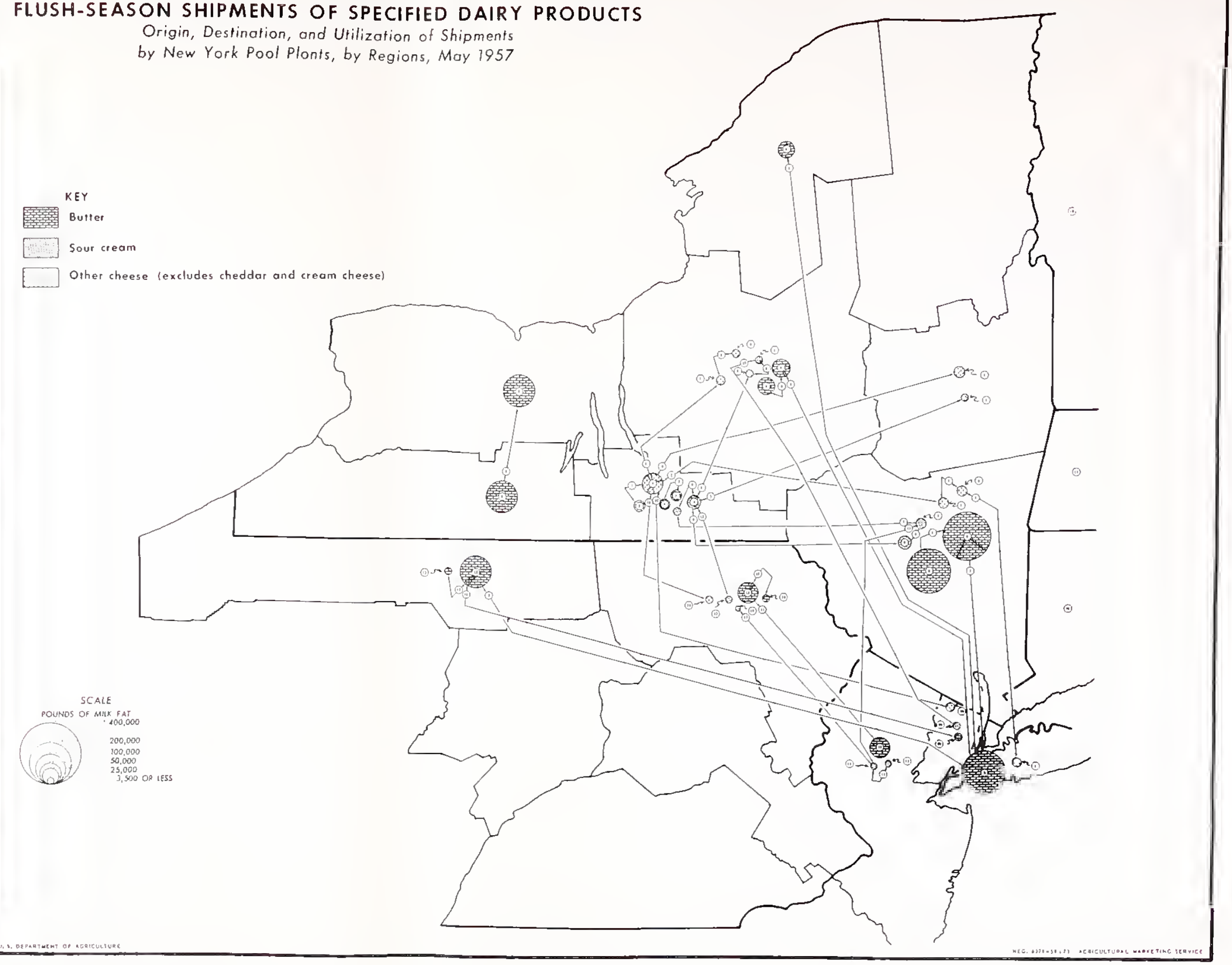


FIGURE 14

MOVEMENT OF CLASS III MILK TO POOL MANUFACTURING PLANTS, NOVEMBER 1956

From New York Pool Receiving Stations

○ Pool manufacturing plants receiving milk from pool "feeder" plants
◑ Pool manufacturing plants which manufactured and shipped whole milk *
● Pool "feeder" plants shipping whole milk to pool manufacturing plants
—— Denotes origin and destination of whole milk shipments

*WHERE NO SHIPMENTS ARE SHOWN TO ORIGINATE FROM THESE PLANTS, THE SHIPMENTS ARE MADE TO NONPOOL PLANTS; SEE FIG. 11a

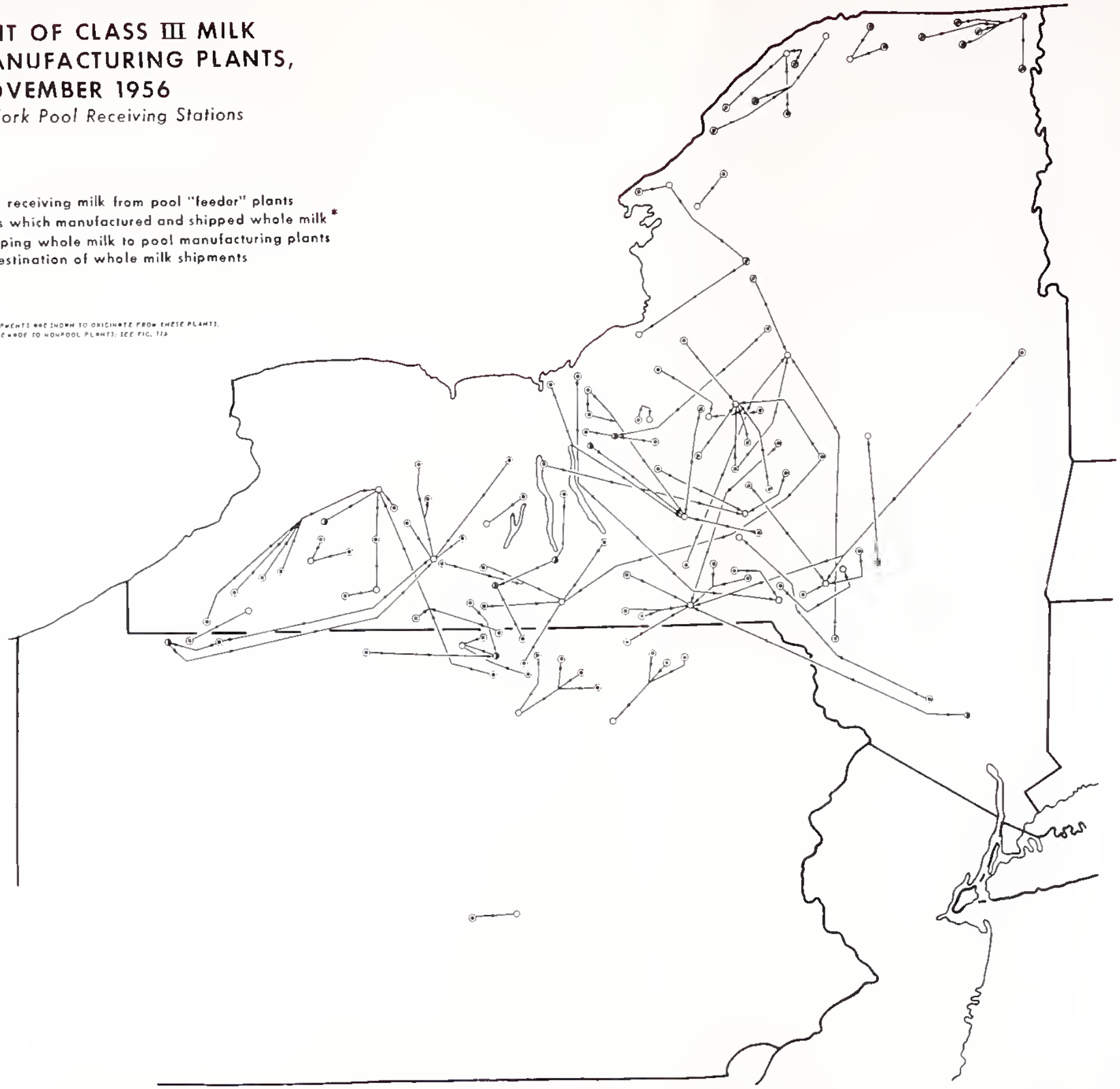


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FIGURE 15

MOVEMENT OF CLASS III MILK TO NONPOOL MANUFACTURING PLANTS, MAY 1957

From New York Pool Receiving Stations

△ Nonpool plants
● Pool feeder plants
◑ Pool manufacturing plants shipping whole milk
—•— Denotes origin and destination of whole milk shipments

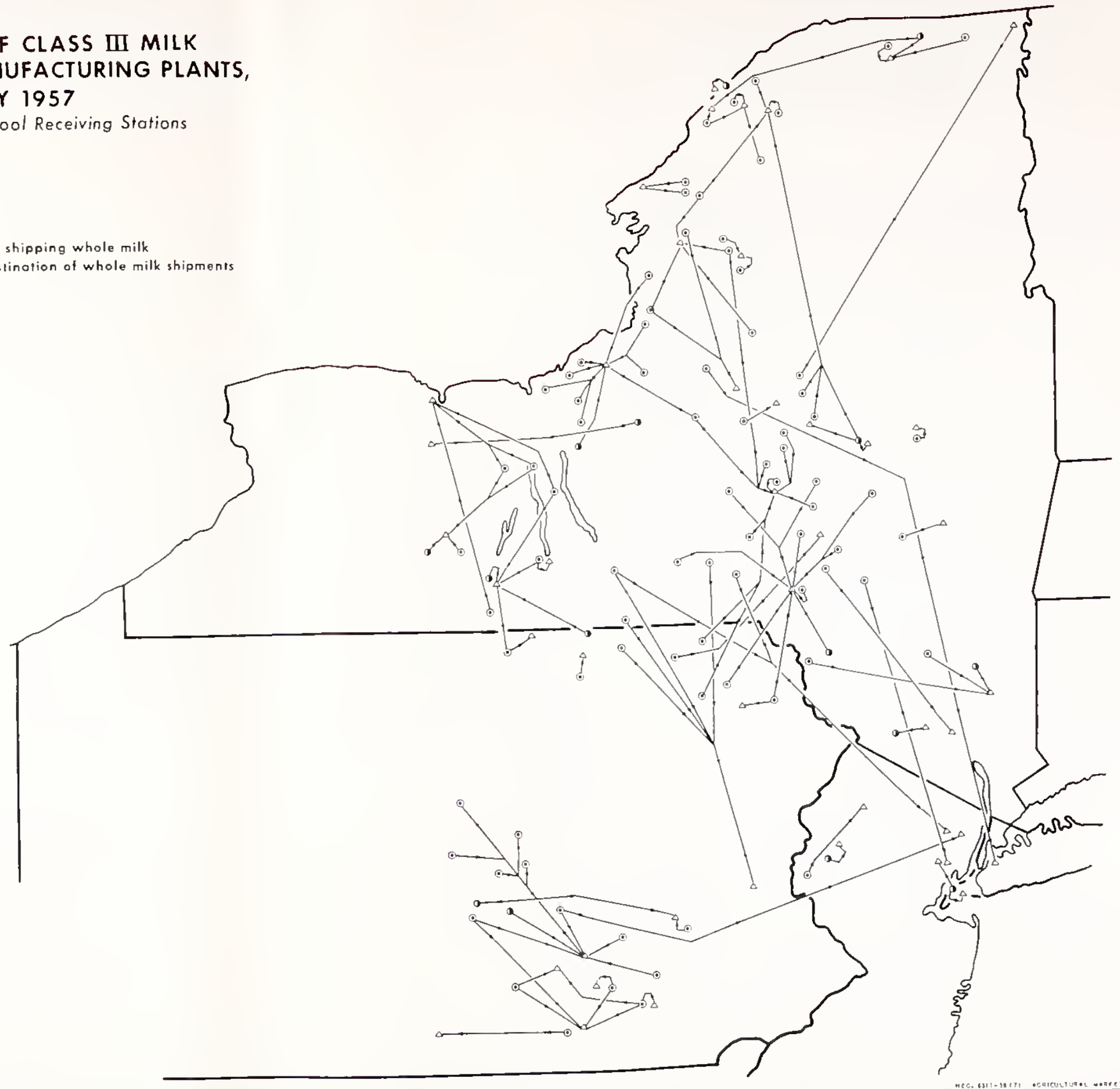

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FIGURE 16

MOVEMENT OF CLASS III MILK TO NONPOOL MANUFACTURING PLANTS, NOVEMBER 1956

From New York Pool Receiving Stations

△ Nonpool plants
• Pool feeder plants
◑ Pool manufacturing plants shipping whole milk
—•— Denotes origin and destination of whole milk shipments

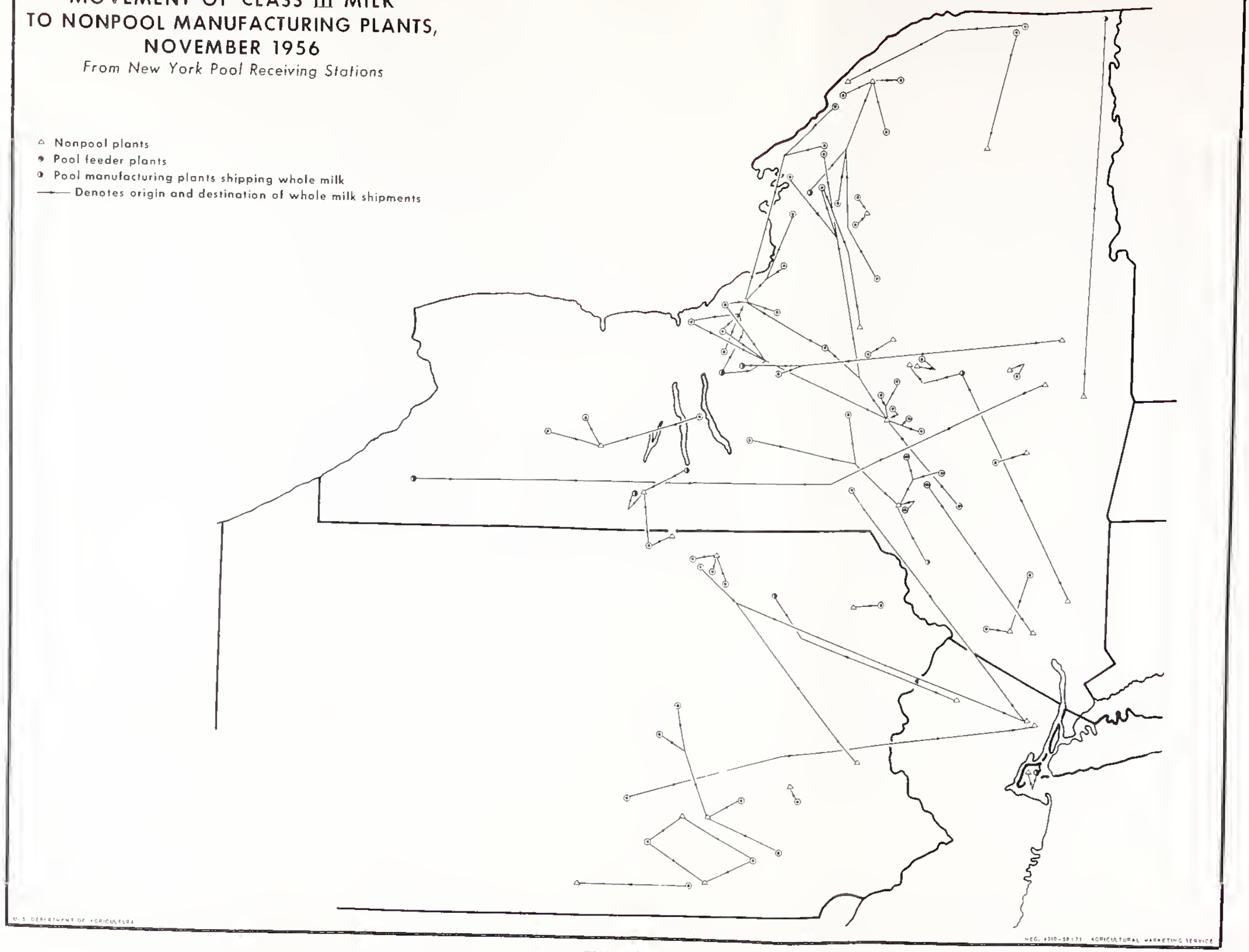

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FIGURE 17

MOVEMENT OF CLASS III MILK TO POOL MANUFACTURING PLANTS, MAY 1957

From New York Pool Receiving Stations

- Pool manufacturing plants receiving milk from pool "feeder" plants
- Pool manufacturing plants which manufactured and shipped whole milk*
- Pool "feeder" plants shipping whole milk to pool manufacturing plants
- —•— Denotes origin and destination of whole milk shipments

*WHERE NO SHIPMENTS ARE SHOWN TO ORIGINATE FROM THESE PLANTS, THE SHIPMENTS WERE MADE TO NONPOOL PLANTS. SEE FIG. 11B

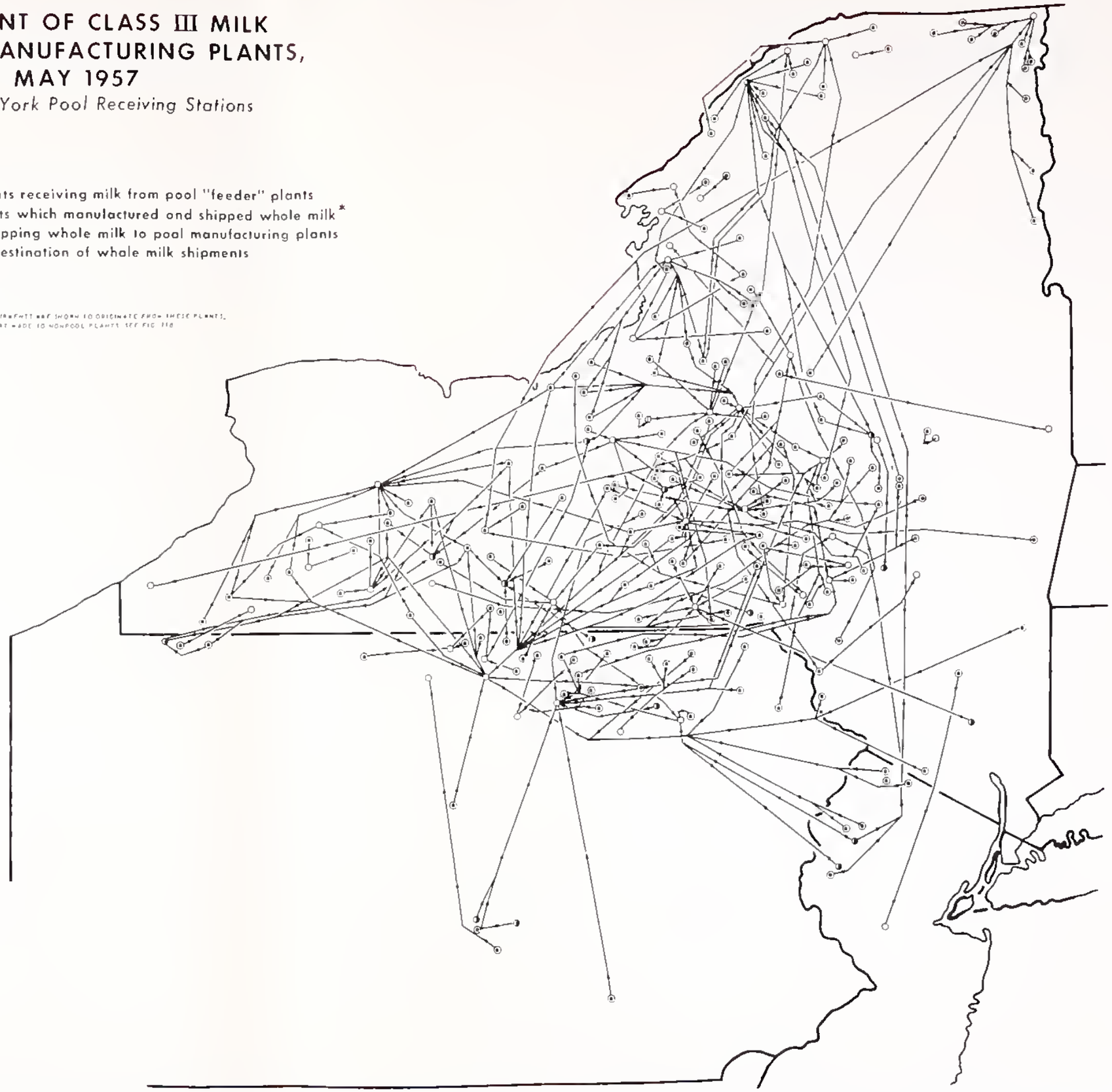

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FIGURE 18

The bulk of the milk used by these nonpool plants originated from pool plants. The nonpool plants received 65 percent of their total milk supplies from pool sources in November 1956 and 67 percent in May 1957.

Nonpool plants were classified into the following groups so that the utilization of pool milk through nonpool plants could be analyzed further:

Cheese plants.--Those which manufacture cheese--Italian-type or Cheddar--and which receive no milk direct from producers.

Pool handler plants.--Nonpool manufacturing plants operated by handlers who also control pool milk plants. Similar to the cheese plants, these manufacturing plants receive no milk direct from producers.

Nonpool fluid milk plants.--Those primarily engaged in distributing fluid milk in areas not included in the marketing area before August 1957. Most of these plants became pool plants with the change in the order.

Unapproved producer plants.--Nonpool manufacturing plants that receive milk from pool plants, and, in addition, receive part of their supply direct from producers who are not approved for sale of fluid milk.

Other manufacturers.--Plants which receive milk from both New York-New Jersey pool plants and from other plants--some of which are regulated under New York State orders in Rochester and Buffalo, and others under the Federal Order in Philadelphia. These plants receive no milk direct from producers.

Nearly half of the nonpool plants were classed as "cheese plants." Almost all of the milk received at these cheese plants was from pool plants.

Only four of the plants were classified as "pool handlers." These also operated almost completely on pool milk.

On the other hand, pool milk (included under Order 27) accounted for less than half of the milk handled by plants classed as "nonpool fluid milk plants" and "unapproved producer plants." In the "other manufacturer" group, the five plants which received pool milk in November 1956 received only 4 percent of their milk from other than pool sources, although the six plants of this type included in the May 1957 analysis drew over one-third of their total supply from other than Order 27 pool plants.

The seasonal pattern shown in figures 15 and 16 is repeated in the feeder plant shipments to nonpool manufacturing plants. The number of both feeder plants and manufacturing plants is larger in the spring flush season than during the fall months.

To a large extent the location pattern of nonpool manufacturing plants is similar to that of the pool manufacturing plants. The major difference appears to be that a proportion of nonpool manufacturing operations is carried on relatively close to the market. As indicated above, however, this may merely reflect the fact that these plants do not receive milk directly from producers.

From figures 15 through 18, it can be seen that whole milk is transported over relatively long distances from feeder plants to plants operating manufacturing facilities. Furthermore, in some instances, milk flowing from a feeder plant to a manufacturing plant bypasses other manufacturing plants located relatively near the feeder plant. The reason for this may be found in the ownership of the plant and in the business relations among different firms operating within the milkshed. On the other hand, the destination of these milk shipments may be determined by the availability of equipment required to manufacture dairy products within the milkshed.

To the extent that the availability of equipment in the market is not a limiting factor, it is apparent that the efficiency of the market could be improved.[12] Costs could be lowered by reducing the amount of whole milk transported. The inefficiencies are demonstrated by the fact that milk often bypasses nearby manufacturing plants. It is further shown by the backward movement of milk supplies; that is, the shipment of milk from nearby plants to those farther from the market. Part of this may be a more or less natural result of the interfirm and interplant relations which have been established over a period of years. In other words, a manufacturing plant needing additional supplies, or conversely, a plant with excess quantities of milk over regular requirements, may find its relations rather firmly established. In such a case, its operations may tend to be limited to transactions with plants owned by the same firm or at least restricted to relatively few plants of different ownership.[13]

Whatever the reasons for the existing pattern of interplant relationships, it is apparent from observation of the above maps that the efficiency of the market could be improved--that is, total transportation costs reduced--through a reorganization of the market. This reorganization, of course, would involve the assignment of feeder plants to manufacturing plants on a basis that would minimize total transportation costs of whole milk. While such a system of rationalization of the market would unquestionably increase economic efficiency, it is not the purpose of this report to explore such a reorganization. It is merely to indicate one area in which the market operates imperfectly and, therefore, to suggest a possible way of reducing costs.

[12] The availability of equipment in pool plants is considered in the following section.

[13] A later report will discuss further the extent to which firm or plant operations are limited by ownership and by other relationships within the industry.

CAPACITY OF POOL PLANTS IN THE NEW YORK MILKSHED [14]

The New York-New Jersey Metropolitan Milk Market Administrator's office records the type, kind, and size of equipment available at plants operating under the pool. A list of equipment is compiled by an auditor of the Administrator's office when a plant acquires pool status. The list is changed as changes occur in the plant organization and operations.

The equipment figures are not necessarily a complete and accurate inventory for the milkshed at any particular time. For the purposes of this report, however, these records give an adequate picture of the location of manufacturing facilities and the capacity for manufacturing dairy products in the market. What is perhaps most important, they indicate the degree of flexibility in the market--the extent to which plants are physically able to adjust production in reaction to either a change in Class III prices or a change in the prices of manufactured dairy products.

The data on equipment capacity are summarized in figure 19, which shows, by regions, the types and quantities of products that can be produced. These capacity estimates are based on the output rates specified by the manufacturer of the equipment. The definition of capacity used here is the production that can be accomplished in 30 days with three-shifts per day.[15]

As might be expected, more plants were equipped to manufacture dairy products than were operating these facilities during the period studied. To this extent the market, as a whole, was oversupplied with equipment relative to market requirements. Some of this excess capacity of equipment represents an "insurance" factor. A plant expecting to ship whole milk may add a separator and other equipment in anticipation of periods during which it may be unable to dispose of its supplies of fluid milk satisfactorily. It may also be that the possession of equipment for processing milk adds to the bargaining power of a plant in negotiating its annual contract for the disposal of supplies.

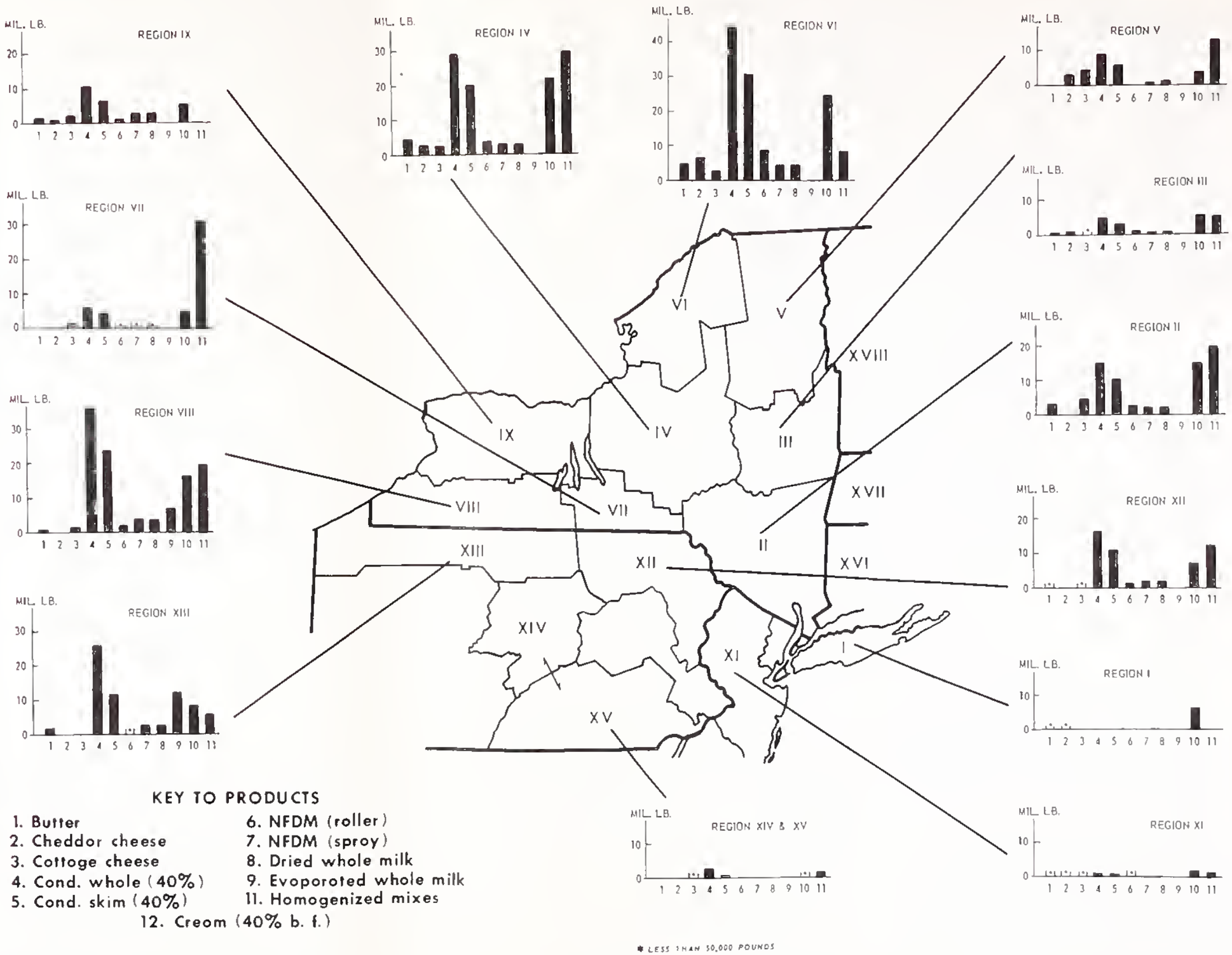
There are relatively few specialized plants in the New York milkshed. The majority of plants have the alternative of manufacturing more than one product--or combination of products. Some plants, however, are equipped with just a separator, permitting them only to separate whole milk into cream. A few other plants are equipped to handle only evaporated milk or condensed milk. Some plants have facilities for making

[14] The material in this section was developed by T. R. Owens.

[15] For a further discussion of the assumptions involved in compiling these capacity estimates, and also of the limitations of the data and the estimates, see the Appendix.

MONTHLY CAPACITY FOR MANUFACTURING DAIRY PRODUCTS IN POOL PLANTS

New York Milkshed, by Regions



KEY TO PRODUCTS

1. Butter
2. Cheddor cheese
3. Cottoge cheese
4. Cond. whole (40%)
5. Cond. skim (40%)
6. NFDM (roller)
7. NFDM (sproy)
8. Dried whole milk
9. Evoporoted whole milk
11. Homogenized mixes
12. Creom (40% b. f.)

* LESS THAN 50,000 POUNDS

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FIGURE 19

only homogenized ice cream mixes. Finally, there are some specialized Cheddar cheese manufacturing plants in this milkshed. These plants are equipped primarily to make cheese but may also have equipment that enables them to dispose of byproducts (such as whey).

In figure 19, total capacity in a plant is frequently less than the sum of the capacities for the separate products. For example, a plant equipped to condense milk might have a capacity of 100,000 pounds daily for either condensed skim milk or condensed whole milk but would not be able to produce 100,000 pounds of each. Similarly, a plant equipped to manufacture butter might also sell milk fat in the form of cream, but could not produce at capacity for both products simultaneously. In this analysis, estimates for each commodity are based on the assumption that all of the existing equipment is used for that specific product.

Pool plant facilities for the manufacture of dairy products exist in all 15 regions which make up the New York milkshed, with the exception of region 10, northeastern New Jersey. No one region is equipped to produce all of the types of products indicated on this map. The largest number of plants (20) is located in region 4, central New York, and, correspondingly, this is the region with the largest manufacturing capacity. This is also the largest milk production area. Historically, more than 25 percent of the total pool receipts from producers have been received from this region.

Cream can be produced in all regions having manufacturing facilities. Condensed milk, either whole or skimmed, can be manufactured in 12 regions. Eleven regions are equipped to manufacture cottage cheese, and the same number can produce homogenized mixes. Butter, roller process and spray process nonfat dry milk, and dried whole milk can be produced in 10 regions. Seven regions have the facilities required to process Cheddar cheese. On the other hand, evaporated whole milk can be produced in only two of the regions.

A comparison of the estimates of equipment availability with peak season production of pool plants indicates that for most products, equipment is not a limiting factor (table 1). Considering that the equipment is available for use 24 hours a day, the majority of products produced in most regions utilize only a small fraction of total capacity. The major exception to this is the facilities to handle spray process nonfat dry milk and dried whole milk. There is evidence that the available spray process drying equipment was utilized to near capacity during the flush season in most regions. On the other hand, spray process equipment was available in region 5 but was not used during May 1956.

Table 1.--Percentage of capacity of pool manufacturing plants used, by regions, May 1956[1]

Product	Region[2]												
	1	2	3	4	5	6	7	8	9-A	11	12	13	14 & 15
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Butter	2.3	19.3	13.5	9.3	(3)	8.4	(4)	7.9	0.4	(5)	11.3	28.9	(4)
American cheese	(5)	(4)	41.0	11.4	22.2	35.0	(4)	(4)	3.7	(5)	(4)	(4)	(4)
Cottage cheese	(3)	1.9	1536.3	11.0	(5)	33.8	122.2	1.0	26.5	2.3	18.6	(4)	2.8
Condensed whole milk	(4)	1.9	2.1	2.4	(5)	0.9	0.3	8.7	(5)	(5)	2.3	29.1	32.6
Condensed skim milk	(4)	6.2	4.3	3.7	(5)	13.2	26.6	25.9	(5)	(5)	4.5	6.2	(5)
Nonfat dry milk													
Spray	(4)	83.3	71.9	94.5	(5)	105.0	89.4	72.2	34.0	(4)	75.9	67.8	(4)
Roller	(4)	24.4	20.9	43.4	(4)	0.3	92.6	16.6	(5)	18.5	62.3	156.4	(4)
Dried whole milk	(4)	(5)	23.6	36.6	(5)	(5)	(5)	(5)	81.5	(4)	(5)	(5)	(4)
Frozen dessert mixes	(4)	6.1	(5)	1.8	(5)	1.2	7.4	4.6	(4)	(5)	2.9	(5)	2.3
Cream	0.8	27.6	19.4	32.3	38.2	25.5	38.2	31.3	23.2	9.9	31.2	25.2	1.2

[1] Capacity is based on the output rates specified by the manufacturer of the equipment. (See Appendix.) Also, the lists of equipment were not all current, which may account for some of the utilizations exceeding 100 percent.
[2] Regions 9-B and 10 have no pool manufacturing plants.
[3] Some production, but no capacity indicated.
[4] Capacity available, but no production in period.
[5] No production in period.

It can be concluded that New York pool plants are amply supplied with dairy processing facilities. With the possible exception of peak season spray powder requirements, desirable shifts between alternative products are therefore not precluded by the lack of equipment. Furthermore, this equipment is relatively well distributed throughout the milkshed, roughly conforming to the pattern of milk receipts. In each region there is adequate capacity to process all of tbe locally handled pool milk used for manufacturing purposes. For this reason, the relatively long-distance movements of milk previously referred to (p. 16) cannot be explained by equipment limitations. The shortage of spray drying facilities for peak season requirements also cannot explain whole milk movements over long distances. Before entering the drier the milk is commonly condensed to a minimum of 40 percent total solids. Ample equipment for tbis predrying, condensing operation exists in all regions. In most plants where drying facilities are not available, the milk can be precondensed; thus the weight and bulk of product requiring transportation can be minimized.

DAIRY PRODUCTS MANUFACTURED BY REGIONS

The New York Department of Agriculture and Markets obtains records of receipts and disposition of milk by plants licensed to manufacture dairy products within the State. Since both pool and nonpool plants are required to submit these records, a picture of the entire manufactured dairy products industry within this State can be obtained. Furthermore, data on production of manufactured dairy products within the State of New York are available for skim-containing products as well as for the fat-containing products.[16]

The records of the quantities of the various dairy products manufactured were summarized for May 1956 and November 1956. For this analysis the data for pool plants were summarized separately from those for nonpool plants. Also, for this analysis, region 9--western New York--was divided into two subregions. The B portion includes the milksheds for the Rochester and Niagara-Frontier marketing areas, which operate under New York State price regulations.

[16] In addition to the data from the New York Department of Agriculture and Markets--covering production in New York State plants--similar production data have been obtained for pool plants in Pennsylvania and in New Jersey. The records to follow, therefore, give a complete production picture for the pool plant manufacturing operations, while data for nonpool plants are shown only for the State of New York.

The production data described above are shown in figures 20, 21, 22 and 23. Figures 20 and 21 refer to the products manufactured by pool and nonpool plants, respectively, for May 1956. Figures 22 and 23 correspondingly show the products manufactured by these plants for November 1956. The purpose of these maps is to show the relation of pool to nonpool manufacturing operations in New York State, the relative importance of each type of product in the various geographic areas of the State, and the differences which result from the seasonal changes in production.

The heights of the bars in these diagrams represent the production of the several products within the various regions. Since some products are more concentrated than others (e.g., a hundredweight of milk will produce approximately 10 pounds of cheese while the same quantity will yield only 5 pounds of butter), the height of the bars does not necessarily represent the quantity of whole milk used in each product.

Some of these data are for individual products; in other instances similar products are grouped. Cottage cheese is shown as plain curd and as cottage cheese with milk fat added.[17] In "other cheese" (cheese other than Cheddar and cottage) a distinction is made between hard type, soft type, and other. Roller process and spray process nonfat dry milk also are shown separately.

There was a larger number of nonpool plants manufacturing each type of product except the condensed and dried products than of pool plants. No nonpool plants reported production of dried whole milk. The number of pool plants reporting the manufacture of roller and spray process nonfat dry milk was substantially greater than the number of nonpool plants making these products. Roughly twice as many pool plants reported condensing operations as did nonpool plants.

On the other hand, a much larger number of nonpool than of pool plants reported the production of cottage cheese and cheese other than Cheddar or cream cheese. The number of nonpool plants reporting the production of butter, Cheddar cheese, cream, frozen dessert mix, and "other" products exceeded the number of pool plants. Further, the number of nonpool plants reporting production in both November and May varies less than the number of pool plants. For example, 50 percent more nonpool plants were producing American cheese in May than in November. The number of pool plants producing American cheese in May was eight times as great as in November.

In line with the relative number of plants operating, and as shown by the maps, the pool plants produced considerably more of the condensed and dried products than the nonpool plants. On the other hand, in spite of the much larger number of nonpool plants, the quantities of cream produced are greater in the pool plants. In both months, nonpool plants produced substantially larger quantities of cottage cheese, "other cheeses," and "other products" than pool plants. While pool plants produced larger quantities of butter and Cheddar cheese than the nonpool plants in May, in November the nonpool plants produced substantially more than the pool plants.

The seasonal variation in production (as indicated by the ratio of May to November) appears to be greater for pool than nonpool plant operations, particularly for production of butter, cheese, and roller process nonfat dry milk.

The products for which relatively little seasonal variation is evidenced include cottage cheese, "other" cheeses, condensed whole milk, frozen dessert mix, and sour cream. The greatest seasonal variation is in production of American cheese. Other products that are highly seasonal include roller process nonfat dried milk, butter, and spray process dried milk (both nonfat and whole milk). The production of cream, frozen dessert mixes, and condensed skim milk show relatively moderate seasonal variations, with May production approximately one and one-half times greater than November.

Plants in region 9-B produced a substantial amount of the total dairy products manufactured by the nonpool plants. This subregion produced over 85 percent of the total condensed skim milk manufactured at nonpool plants, more than half of the nonpool cream, and a substantial proportion of the total nonpool supplies of butter, cheese, condensed whole milk, frozen dessert mixes, and--particularly in November--both roller and spray process nonfat dry milk. Region 9-B also produced nearly 30 percent of the total cottage cheese made by nonpool plants in the State of New York.

Figure 24 shows the major types of dairy products manufactured in each region. In this figure, data on production by pool plants and by New York State nonpool plants for May 1956 have been combined. For this purpose, cream was not considered to be a manufactured product.

The data were aggregated, by regions, using the same regions as in the preceding maps. Since the region is the basic unit and the principal dairy products manufactured characterize the entire region, two types of inferences must be guarded against. First, products produced in one part of the region--if in sufficient quantities to be the principal product within the region--are attributed to the region as a whole. For example, this map shows that Westchester County is in region 2, a butter manufacturing area, but, in fact, no butter was produced in this county during the period studied. Second, the manufacture of dairy products, as such, is unimportant in some regions. The map indicates the predominant type of products manufactured but does not show how small the production is in these regions compared with the other regions.

In spite of these limitations, however, this map gives a broad picture of differences in the types of production in the various areas of the milkshed. It can be seen that northern and northeastern New York (regions 5 and 6) are important primarily in the production of American cheese and butter. These are the outlets used in this area for disposing of surplus milk. On the other hand, the western part of the milkshed, including southwestern New York and the pool plants in Pennsylvania (regions 8, 13, and 14), tend to rely heavily on the production of condensed products.

Central New York (region 4) is an important producer of manufactured dairy products. This area is first in production of "other cheeses," principally cream cheese and Italian cheeses, and of nonfat dry milk (including both spray process and roller process). It is the second most important region in the production of dried whole milk and ranks third in the production of condensed whole milk. The products that predominate in this region, however, are the other cheeses, dried whole milk, and nonfat dry milk.

Northern New York (region 6) is by far the leading region in the production of American cheese, but butter production is also important in this area. This region ranked second in total butter produced within the milkshed during May 1956. Region 6 also ranked second in the production of condensed skim milk and third in the production of nonfat dry milk. It led in the production of spray process nonfat dry milk in that month.

Southwestern New York (region 8) ranked first in the production of condensed whole milk, condensed skim milk, and frozen dessert mix. This region ranked second in the production of nonfat dry milk (primarily spray process) and also in the production of other cheeses. Other cheeses, however, are not shown in region 8 in figure 24, since they were not the principal product in this region in this period.

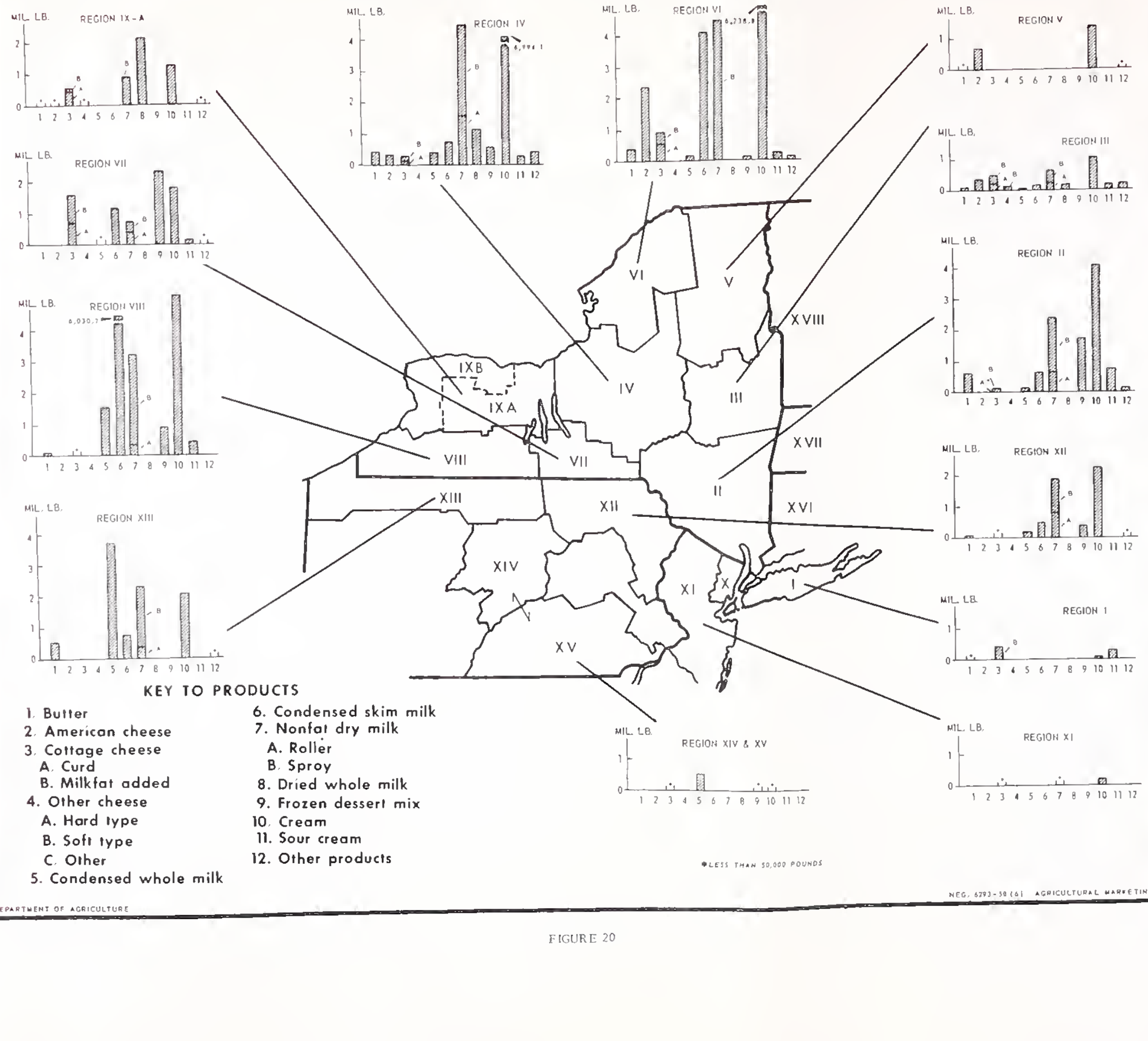
The northwestern part of New York (region 9-B) includes the milkshed for the Buffalo and Rochester markets. This is a heavy dairy manufacturing area and an important producer of several types of products. This is also the region which contains the largest number of nonpool plants in New York State. This region is the second largest producer of cottage cheese in the milkshed. It is also second in the production of condensed whole milk and ranks third in the manufacture of butter, American cheese, other cheese, condensed skim milk, and frozen dessert mix. Region 9-A, also located in western New York, produced all types of manufactured dairy products during May 1956, with the exception of condensed whole and condensed skim milk. This region was by far the most important producer of dried whole milk in the milkshed, and this single product was the principal outlet for milk for manufacturing in the region.

Perhaps the most unusual fact indicated by this map is that southeastern New York (region 2) produces butter as its principal fat-containing manufactured dairy product. In fact, more butter was produced in

[17] In this particular instance some, though probably not complete, duplication is involved. A substantial part of the cottage cheese reported as plain curd is later creamed and again reported in the other category. In this way, this amount is double-counted.

DAIRY PRODUCTS MANUFACTURED BY POOL PLANTS, FLUSH SEASON

New York-New Jersey Milkshed, by Regians, May 1956



KEY TO PRODUCTS

1. Butter
2. American cheese
3. Cottage cheese
   - A. Curd
   - B. Milkfat added
4. Other cheese
   - A. Hard type
   - B. Soft type
   - C. Other
5. Condensed whole milk
6. Condensed skim milk
7. Nonfat dry milk
   - A. Roller
   - B. Spray
8. Dried whole milk
9. Frozen dessert mix
10. Cream
11. Sour cream
12. Other products

*LESS THAN 50,000 POUNDS

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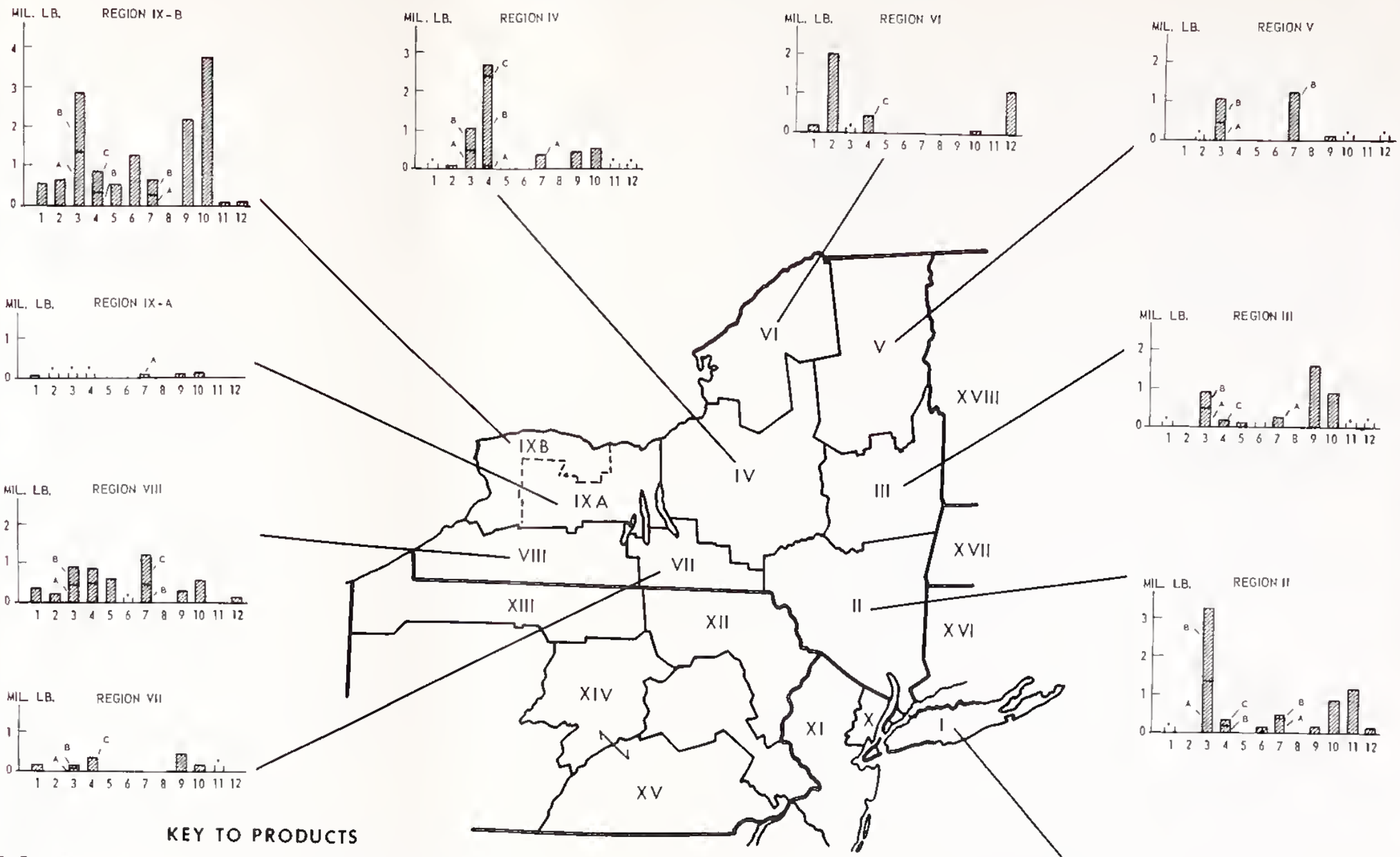
FIGURE 20

DAIRY PRODUCTS MANUFACTURED BY NONPOOL PLANTS, FLUSH SEASON

New York State, by Regions, May 1956



KEY TO PRODUCTS

1. Butter
2. Americon cheese
3. Cottoge cheese
   - A. Curd
   - B. Milkfot odded
4. Other cheese
   - A. Hord type
   - B. Soft type
   - C. Other
5. Condensed whole milk
6. Condensed skim milk
7. Nonfot dry milk
   - A. Roller
   - B. Sproy
8. Dried whole milk
9. Frozen dessert mix
10. Creom
11. Sour creom
12. Other products

* LESS THAN 50,000 POUNDS

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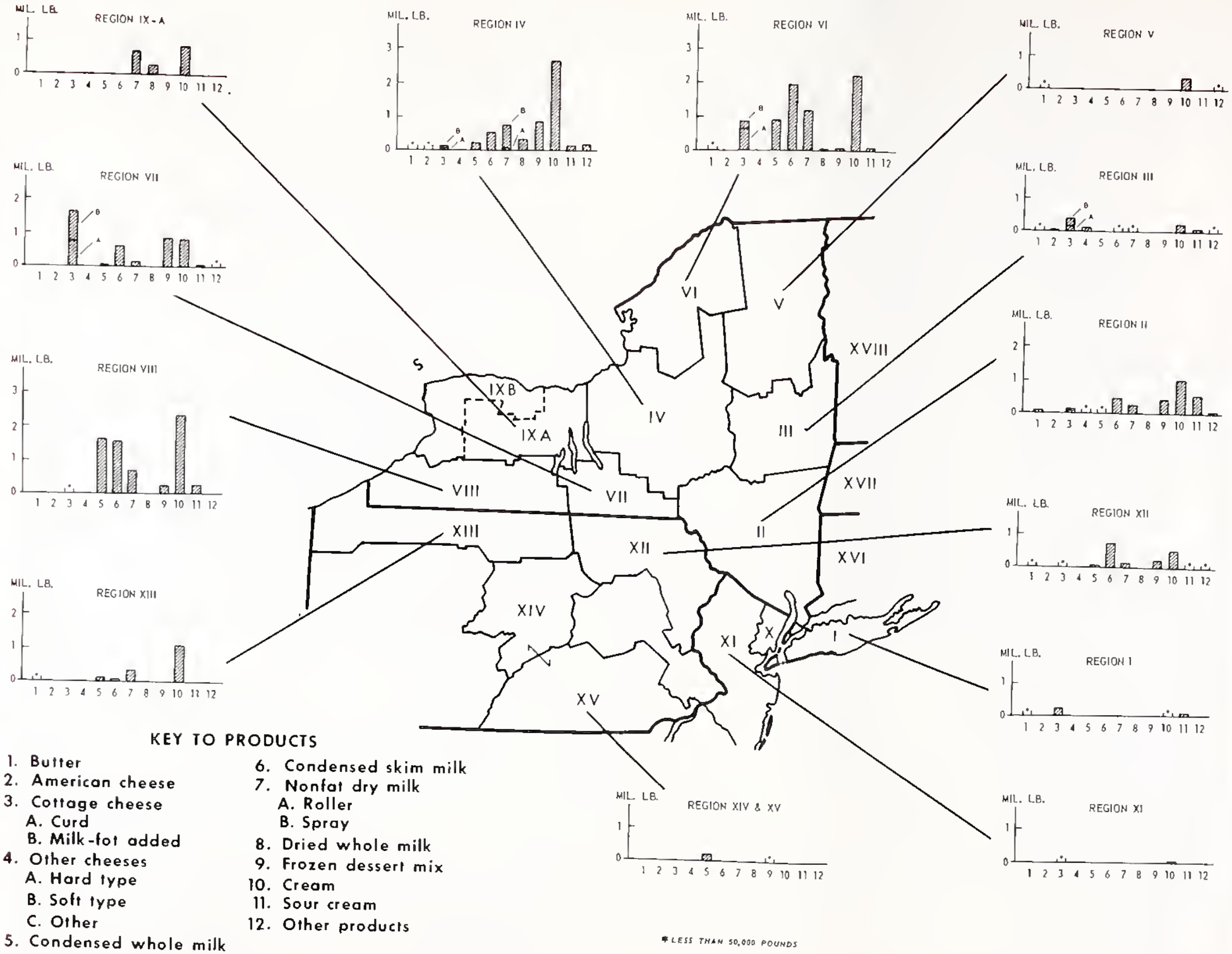
FIGURE 21

DAIRY PRODUCTS MANUFACTURED BY POOL PLANTS, SHORT SEASON

New York-New Jersey Milkshed, by Regions, November 1956



KEY TO PRODUCTS

1. Butter
2. American cheese
3. Cottage cheese
   - A. Curd
   - B. Milk-fat added
4. Other cheeses
   - A. Hard type
   - B. Soft type
   - C. Other
5. Condensed whole milk
6. Condensed skim milk
7. Nonfat dry milk
   - A. Roller
   - B. Spray
8. Dried whole milk
9. Frozen dessert mix
10. Cream
11. Sour cream
12. Other products

* LESS THAN 50,000 POUNDS

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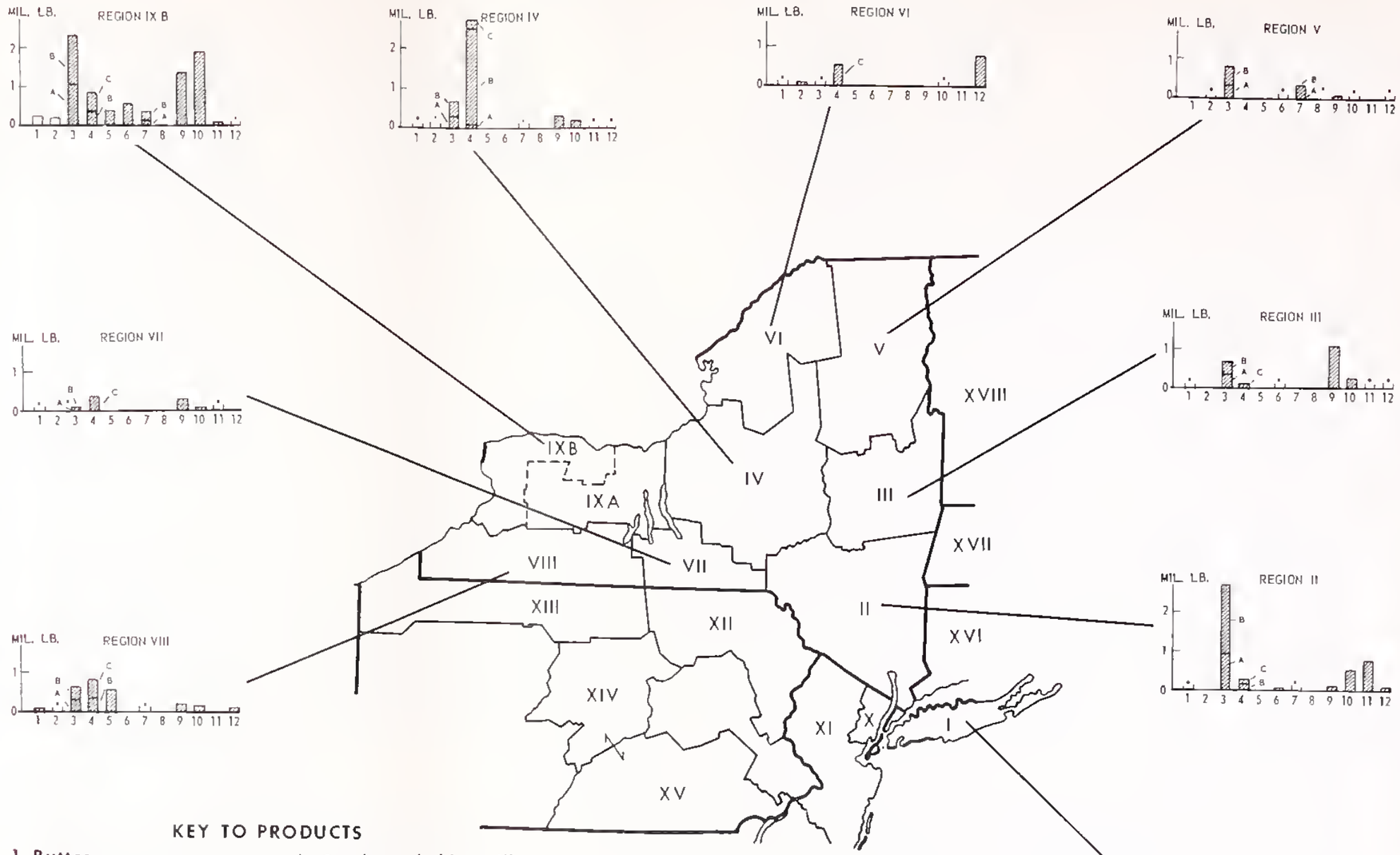
FIGURE 22

DAIRY PRODUCTS MANUFACTURED BY NONPOOL PLANTS, SHORT SEASON

New York State, by Regions, November 1956



KEY TO PRODUCTS

1. Butter
2. Americon cheese
3. Cottoge cheese
   - A. Curd
   - B. Milkfot odded
4. Other cheese
   - A. Hord type
   - B. Soft type
   - C. Other
5. Condensed whole milk
6. Condensed skim milk
7. Nonfat dry milk
   - A. Roller
   - B. Sproy
8. Dried whole milk
9. Frozen dessert mix
10. Creom
11. Sour creom
12. Other products

* LESS THAN 50,000 POUNDS

U. S. DEPARTMENT OF AGRICULTURE

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FIGURE 23

MAJOR TYPES OF DAIRY PRODUCTS MANUFACTURED, BY REGION

New York-New Jersey Pool Plants, New York State Nanpaal Plants, May 1956

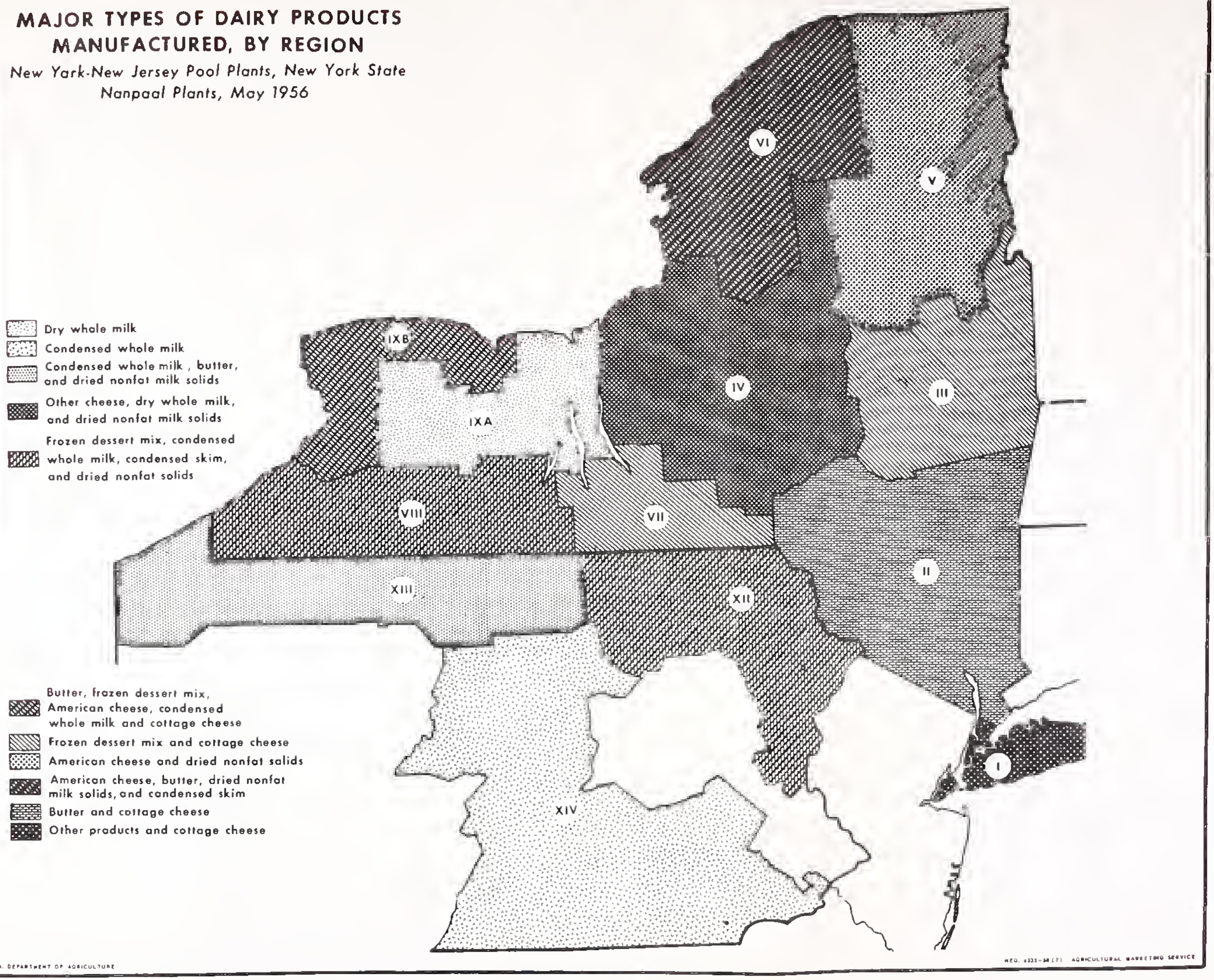

FIGURE 24

this near-market location in May 1956 than in any other region in the milkshed. This is unusual for a region so close to the metropolitan markets. Butter, being highly concentrated in terms of the fat component of milk, is usually most economically produced in the more distant parts of the milkshed and bulkier products tend to originate from relatively nearby sources.

In producing products of skim milk, the areas adjacent to markets, such as the metropolitan areas of New York-New Jersey, Buffalo-Rochester, and Albany-Troy-Schenectady, tend to emphasize cottage cheese. On the other hand, the distant areas rely on the more concentrated skim products such as nonfat dry milk. Southeastern New York (region 2) manufactures butter and also ships large quantities of cream and so has considerable skim milk for manufacture. This region is the most important producer of cottage cheese and, in addition, manufactures sizable quantities of nonfat dry milk. As mentioned earlier, the area surrounding the Buffalo and Rochester markets (region 9-B) ranks second in the manufacture of cottage cheese.

Southwestern New York (region 8), like southeastern New York (region 2), ships large quantities of cream and so has considerable quantities of skim milk for manufacture. Unlike region 2, however, region 8 utilizes the major part of this skim milk for condensed skim, and as previously mentioned, is the principal producer of this product. Large quantities of nonfat dry milk are also made in this region.

The regions in which nonfat dry milk is the predominant use of skim milk include central New York (region 4), northeastern New York (region 5), northern New York (region 6), northwestern Pennsylvania (region 13), and northeastern Pennsylvania (region 12). With the exception of region 12, the areas where dried skim milk is the major product are those relatively distant from the metropolitan markets.

APPENDIX

Measurement of Equipment Capacity

Theoretical capacities for most of the major products were developed on a daily basis and converted to a 30-day month. The basic information used was from equipment lists furnished by the New York Market Administrator. The following assumptions were made relative to the daily operating time for each individual piece of equipment:

A. Estimated maximum net time of operation per day:

1. Separator--20 hours.
2. Condensing pan--20 hours.
3. Spray drier--20 hours.
4. Roller driers--20 hours.
5. Homogenizers--20 hours.
6. Cottage cheese vats--4 production periods during 24 hours.[18]
7. Cheddar cheese vats--3 production periods during 24 hours.
8. Butter churns--9 production periods during 24 hours.

B. Other assumptions:

1. All capacity calculations assumed that milk tests 3.6 percent butterfat and 8.6 percent nonfat solids, or 12.2 percent total solids.
2. All cream for shipment is separated to 40 percent butterfat.
3. All skim milk is condensed to 40 percent total solids.
4. Whole milk for shipment is condensed to 40 percent total solids.
5. Spray boxes are fed with milk or skim milk condensed to 40 percent solids for both skim and whole milk powder.
6. Powder rolls are fed with fluid skim milk--8.6 percent solids.
7. Cheddar cheese yields are 9.5 pounds per hundredweight of whole milk.
8. Cottage cheese yields are 14 pounds per hundredweight of skim milk.
9. Butter is made from 35 percent cream.
10. Overrun on butter is 22 percent.
11. Homogenized ice cream mix is composed of 10.5 percent fat and 10.5 percent nonfat milk solids, or 21 percent total milk solids.

C. The lists of equipment have the following limitations:

1. The lists date over a period of approximately 10 years. Thus, in many instances, the kinds and capacities of equipment may have changed between the date that a plant was surveyed and the time of this study. These changes may range from increases in size and type of equipment to actual closing of the surveyed plant. The market administrator's office has tried to incorporate such changes in equipment as have occurred, but the lists are still incomplete.
2. Imperfections in the lists themselves were as follows:
   a. The capacity of some of the equipment was apparently incorrectly stated. For example, some equipment items were stated to have capacities smaller than the smallest piece of equipment manufactured.
   b. In some instances the capacity for certain items of equipment was not given. For these, capacities were estimated on the basis of capacities of related equipment in the plant.
   c. Two different forms were used for the equipment survey. On one form there was no place for recording the capacity of the plant for cooling the condensed products. Since the condensed product must be cooled for shipment, the lack of cooling capacity might serve as a bottleneck to the production of either condensed skim milk or condensed whole milk. Where the data were lacking, it was assumed that adequate refrigeration equipment was available.

D. Other considerations:

1. It would be possible to manufacture homogenized ice cream mix in any plant with a separator, homogenizer, and mixing vat. The mixing vat could be either a pasteurizing vat or a storage tank. In order to manufacture mix with a normal total solids content, it would be necessary for such a plant to use purchased condensed skim milk or nonfat dry milk to achieve the desired concentration of nonfat solids. Assuming that a plant could purchase the necessary cream and nonfat solids in the form of cream and condensed skim milk or nonfat dry milk, it would be possible to make homogenized mix in practically every fluid milk plant. The estimated capacities of equipment for homogenized mix were based on the assumption that a plant must be equipped with a separator, a condensing pan, homogenizer, and a storage tank or mixing vat to manufacture mix.
2. One limitation of these estimates of plant capacity is that the capacity for any individual product is determined independently of the capacity for any other product. For example, the separating process may yield 200,000 pounds of skim milk per day on a 20-hour basis, whereas the condensing pan may have a capacity for 300,000 pounds of skim milk in a 20-hour period. Thus, in terms of raw material the plant would be short 100,000 pounds of skim milk to reach the capacity of the condensing pan. Here it is assumed that the plant is able to obtain from other plants sufficient quantities of skim milk or raw cream to achieve capacity in any individual production process.
3. A more important limitation, related to the above, is that the capacities for products using the same items of equipment are determined independently. For example, a spray box may be used to dry either whole milk or skim milk powder. The separator can be used to produce cream for sale or for further processing into butter. In these estimates, the capacity for one product is determined by assuming that all of the equipment is available for use in producing that product. The capacity for the second type of product is then determined, assuming that the same item of equipment is again completely available for this second product. This, of course, means that

[18] A production period is defined as a complete cycle of operations in which the piece of equipment is involved. For example, in making cheese, the production period would be from the time when one batch of milk entered the cheese vat until the vat was ready for another batch of milk.

these estimates greatly overstate the capacities in terms of producing a combination of products, all of which use the same equipment.

4. When the theoretical capacity for each plant was estimated, no consideration was given to such elements as labor force or availability of milk. It was assumed that the plant could always obtain as much bulk milk and as much labor as necessary to fulfill its requirements.

Again, limitations resulting from so-called traffic conditions were ignored, since there was no information available about the physical organization of the plant facilities, and their effect on the flow of supplies and on product output. Finally, limitations resulting from the timeliness or untimeliness of various operations were ignored, since it was equally impossible to anticipate the schedule under which any individual plant would be required to operate by external forces beyond its control.

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