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How Surplus Grade A Milk is Marketed in the Midwest

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FOREWORD

This is a study of the utilization and management of surplus Grade A milk in Midwestern markets. It will be of interest to anyone who must make decisions daily regarding the best way to market this milk.

Different types of surpluses and the way they were handled, special problems encountered in various situations, and the seasonality of use in the different manufactured products are shown here.

Brief summary descriptions of each market are presented in Tables XIII, XIV, and XV. (Pages 39, 40, 42).

Quantities of milk available to city markets for fluid use usually exceed quantities used in bottled milk products. The unbalance commonly shows up in surpluses which create marketing problems. This report is one of a series of studies by the North Central Regional Committee on Dairy Marketing Research of the handling and management of these surpluses.

First in the series was a survey of characteristics of the problem and arrangements for handling surplus milk in 104 Midwestern markets. That study classified surplus handling arrangements and provided a basis for selecting a smaller number of markets for more detailed investigation. The data reported in this publication provided information for a longer period of time and involved more comprehensive analyses of surplus problems, handling arrangements, and the institutional setting in which they developed. Other studies in the series analyzed costs of transporting and manufacturing surplus fluid milk under alternative arrangements in a variety of market situations. The effectiveness of supply-demand adjusters as pricing mechanisms for adjusting supplies of fluid milk to market needs also was investigated.¹

The generous cooperation of Federal milk market administrators, cooperative managers, milk dealers, agricultural experiment station representatives, and others who supplied the information is acknowledged with gratitude. The schedules used in obtaining the data and overall plans for the project were developed by the subcommittee in charge of the study.² They and other members of the North Central Regional Committee on Dairy Marketing Research collected data as well as offered many helpful suggestions for the analysis and presentation.

¹Other publications developed from this series of studies are listed in this bulletin.

²Elmer F. Baumer (chairman), Hugh L. Cook, Paul L. Kelley, E. Fred Koller, and Sheldon W. Williams.

SUMMARY

Some factors which influenced type of surplus handling systems were:

1. Size of milkshed. This also was related to the quantity of milk to be handled. Because of the distances involved and the amount of milk to be handled, the larger markets were more likely to employ a system which provided for manufacture of the surplus milk in the country relatively near the point of production.

2. Presence or absence of plants which depend primarily upon manufacturing milk. If present, size, location, and type of plants were important.

3. Degree of specialization of bottling plants. Could they easily obtain from specialized processors supplies of processed products to supplement their fluid product lines? Did they have in-plant facilities for manufacturing surplus milk?

4. Character of producers' cooperative association. A market with a strong, active bargaining cooperative was more likely to have centralized management of the surplus.

5. Methods employed for handling the milk used for fluid products. If country receiving stations were employed, then diversion of the surplus in the country was encouraged.

In most large markets in this study, a major part of the surplus milk was diverted to manufacturing facilities in the country. Because a large share of the surplus milk was in these large markets, diversion in the country was the major method employed for marketing surplus fluid milk. Williams and Kerchner³ found that 81 percent of the surplus milk covered by their study was in markets in which the dominant method of handling was diversion in the country. Another 11 percent was in markets which principally trucked it into the city and diverted it to local manufacturing plants without receiving it at the bottling plant.

The presence in a market or in its milkshed of plants which depended primarily upon manufacturing milk influenced the type of surplus handling system which developed. These plants usually provided a ready market for the excess milk. If they were located out in the milkshed, country diversion was encouraged. If in the city, then city diversion was the system adopted. The presence of many such plants in the Chicago milkshed provided a ready outlet for much of the surplus milk in that market. Detroit, with fewer of these plants in its milkshed, relied to a much greater extent on cooperative standby facilities.

During recent years bottling plants in some markets have tended to become more specialized. They have shunned the production of manufactured products or the handling of milk in excess of their bottling needs. This has been particularly true in those situations where they could easily obtain processed products,

³Sheldon W. Williams and Orval G. Kerchner, *Disposing of Surplus Fluid Milk in Midwestern Markets*, North Central Regional Publication 113, III. Agricultural Experiment Station Bulletin 664, 1960.

to supplement their fluid products lines, from specialized processors. The development of this specialization by bottlers was accompanied by the assumption of more responsibility for surplus milk management by producers' associations. This was particularly true in the Twin Cities and St. Louis markets.

Handlers in some other markets, however, considered that enough milk to meet bottling needs plus enough for cottage cheese and ice cream constituted their minimum needs. Such handlers took what they wanted for manufacturing cottage cheese and ice cream in their plants. In his study, MacPherson found this to be a common policy. Eighty percent of the 37 plants included in his study believed that a policy of procuring enough milk from their producers to meet bottling needs and enough additional for their cottage cheese and ice cream was best for their operation.⁴ Nevertheless, it appears that in most large markets the tendency is toward specialization.

Some producer associations assumed responsibility for managing the surplus in order to strengthen their bargaining position. Where they have done this, it has often resulted in centralized management of the surplus, with its presumed advantages.

On the other hand, some cooperatives were forced into surplus handling. A small error in pricing the surplus in some instances put pressure on the producers' association to provide processing facilities. If the price of surplus Grade A is such that handlers cannot purchase it, manufacture it, sell it, and make a profit, they will refuse to take it off the hands of the producers and their association. When this happens, the producers must either process it themselves or find another buyer. Such a situation has pushed some producers' associations into building or purchasing manufacturing facilities, thus modifying the system of handling the surplus milk.

In some markets, there appeared to be gains in efficiency of handling surplus milk by centralized management. This centralized control often was exercised through full supply contracts or similar arrangements whereby the bottler secured from a producers' cooperative association or other wholesale agency only the milk which he needed for bottling purposes. Often this agency also was responsible for obtaining any supplementary supplies which were needed in the market.

In a very large market, such as Chicago, there appeared to be little loss in efficiency of surplus handling due to the absence of a centralized agency to manage the milk supply. In the smaller markets this centralized control was necessary to bring together sufficient volume for efficient management. In Chicago, some of the handlers controlled a sufficiently large volume to make it economically feasible for each to manage his own surplus disposal. In conjunction with this arrangement, the cooperative took care of the surplus for those handlers who lacked sufficient volume for efficient processing.

The method employed for handling milk used for bottled products also exerted some influence on the surplus handling system which developed. A market

⁴D. D. MacPherson, *The Market for Class II Milk in Oklahoma, Kansas and Western Missouri*, United States Department of Agriculture, Marketing Research Report No. 263, Washington, D. C., August, 1958, p. 29.

with country receiving stations also tended to employ a system of surplus milk management which utilized country diversion. With routes owned or controlled by the bottlers and with the milk handled in cans, a market tended to have the surplus manufactured in the plants of the receiving processors or to have some type of city diversion. In ten of the markets in this study, the milk marketing cooperatives either owned or controlled part or all of the trucks used in assembling milk from farms. In the other four markets, city diversion was used.

Not many years in the past, each milk market was an isolated unit complete within itself. It made provision for production of enough milk to satisfy its needs during the season of lowest production. It also handled the extra milk produced during other seasons. As the milksheds of the very largest markets extended so far that it was no longer feasible to move the milk into the city on the trucks which collected it from farms, country receiving stations began to be established. From this point, it was but a short step to the development of the concept that only the milk needed for fluid consumption should be moved to the city. The remainder was kept at manufacturing plants nearer the area of production. Thus the system of country diversion of the surplus came into use.

As they became more intimately associated due to improved transportation, some markets began to maintain only enough local production to meet fluid needs during the flush season. They purchased milk from a larger market when needed. What had in effect actually happened was that the smaller market had transferred part of its surplus problem over to the larger one.

A modification of this practice has developed. A large St. Louis country plant owned by a producers' cooperative association furnished milk regularly to both the St. Louis market and the Ozark market. In addition to these regular shipments, it also furnished milk on an intermittent basis to several other markets. The handling of part of the surplus for several markets in one plant was more efficient than the operation of several plants.

If a market grew with a strong producers' cooperative, there was a tendency to furnish milk to handlers in the amounts and at the times desired by them. Probably the highest development of this concept occurred in the Twin Cities market. Here the cooperative association has furnished to handlers milk standardized to the desired butterfat content in the amount and at the time desired by them. Products supplementary to the fluid milk line also have been furnished in the same manner. Although the Twin Cities market showed the highest development of this concept, many of the markets had developed it to a degree. Over the period covered by this study, cooperatives assumed increasing responsibility for managing milk supplies. Since the end of the study period there have been further developments along this line in some of the markets.

With centralized management of the milk supply, and the technology now in existence, a really streamlined system of fluid milk processing and distribution could be developed. Standardized, cooled milk could be received in bulk from the central agency and pumped directly into the clarifier, through the continuous pasteurizer, and on to the bottling machine. From this point, the milk

could be loaded directly onto "plug-in" refrigerated delivery trucks.

The increased use of bulk milk handling has encouraged and brought about changes in methods of managing surplus milk. Because of the relative ease of handling and transporting milk in bulk, it has become more common to divert the surplus in the country, directly to the point of manufacture. To most nearly realize the potential benefits, it seems to be necessary for the central agency to control movement of the bulk pickup trucks and direct them to the point where the milk is to be processed.

Terre Haute provides a good example of a market that has revamped its surplus disposal system to take advantage of the potentialities of bulk handling. The cooperative formerly paid handlers for receiving and cooling surplus milk, but now routes it directly to manufacturing outlets on farm bulk pick-up trucks. Complete conversion to bulk handling and skillful traffic management contribute to success not only in moving the surplus but also in getting Class I outlets for some milk that would otherwise be surplus.

Because bulk milk handling has made it easier to divert a load to the point of use, it also will influence the use of surplus manufacturing facilities now in existence and the type of such facilities likely to be built in the future. Scattered, smaller surplus manufacturing plants are no longer necessary, and many are no longer used. Often a standby plant for surplus processing will not be necessary since surplus can be moved directly to a regular manufacturing plant. Because of the greater mobility of milk, the surplus milk handling facilities that are built in the future likely will be larger than many existing plants.

Bulk handling also will bring about changes in the use of country receiving stations. Already "reload points" are being used in place of receiving stations. About the only equipment is a clean sheltered place to reload the milk and facilities for properly cleaning the empty tanks.

The possibility of eliminating country receiving stations through the use of bulk handling is well illustrated by the Detroit market. During the period 1952-1957, 12 stations were closed. This was partly offset by the opening of seven stations in 1952 through 1955. No new stations were opened after 1955, however, but four were closed in 1956 and seven in 1957.

INTRODUCTION

This study describes the systems which were used to handle surplus Grade A milk in selected markets of the North Central Region in the years 1950 through 1957. It also shows the magnitude of the problem faced by producers and handlers during this period. Three general types of surpluses are considered: 1, seasonal; 2, year-round or chronic; and 3, day to day. The various surplus management systems found in markets of the North Central Region are considered in relation to the situations which existed in those markets.

Milk has many alternative uses. The best of these alternatives in terms of farm price is fluid consumption. Health ordinances have created and enforced a

distinction between milk for fluid consumption and milk for manufacturing purposes. These differences in sanitary requirements and the resulting differences in prices, influence marketing practices in the dairy industry. This distinction in quality, plus the seasonal variation in milk production, has resulted in serious problems associated with producing, pricing, and marketing fluid milk.

In recent years, about one-third of the milk received in Federal Order markets has been used for purposes other than bottled milk. Surpluses in the 14 North Central markets studied averaged 37 percent between 1950 and 1957. This surplus in some markets strains the capacity of plant equipment and the willingness of dealers and manufactures to receive it.

The efficiency with which this milk is handled may have substantial effects on farmers' returns. The seasonal nature of this surplus, its uncertain volume, and its dispersion among plants all contribute to a great range in costs and to a substantial element of risk in handling it. These in turn contribute to uncertainty about the proper price for this milk, and could adversely affect the net proceeds of agencies which take title to it.

Much of the surplus problem has arisen from the bulky and perishable nature of milk. These characteristics make it impractical to hold the excess production of the flush season for use during periods of shortage. In the past, they made transportation over any considerable distance expensive, so that each market tended to become associated with its own group of producers located in its own distinctive milkshed. Thus each market had its own supply and surplus problem. There was little interchange of milk among markets.

In the last few years, over-the-road bulk tank trucks and other developments have begun to break down the isolation that formerly existed. Milkshed boundaries are becoming blurred. As time goes on, surplus problems are becoming regional rather than local.

Many markets have organized their milk procurement systems so that only the milk needed for bottling purposes goes to fluid processing plants. The surplus on the periphery of the milkshed goes directly to manufacturing plants. Farm bulk handling has facilitated this.

The North Central Region will be defined in this study as Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. Fourteen markets in the North Central Region, with populations ranging from 78,000 to 6,183,000, were surveyed.⁵ These markets represented different types of surplus milk handling problems and various solutions which had been employed. Most of the time series data were obtained from Market Administrator records. Other data and information were furnished by producers' associations and milk handlers. Some data were obtained from United States Department of Agriculture compilations.

⁵See Table III for a list of these markets.

DEFINITION OF SURPLUS AS USED IN THIS STUDY

Surplus Grade A milk was defined as *milk*, inspected and approved by health department authority for fluid consumption, in excess of that used for bottled products. Many handlers, of course, do not look on milk used for ice cream, cottage cheese, and similar products as surplus. From the farmers' viewpoint, however, this milk usually is priced lower than bottled milk.

CHARACTER OF THE SURPLUS PROBLEM

During the study period, 1950 through 1957, 32.6 percent of the butterfat in the 14 markets studied was excess to bottling needs (Table I). In twelve markets for which data were available, 37.3 percent of the skim milk was surplus (Table II). Throughout the period, when expressed as a percent of producer receipts,⁶ the surplus was greater for skim milk than for butterfat. During 1950, 1951 and 1952, the ratio of surplus skim milk to butterfat was higher than during the later years. This shift may be attributed to the recent increased popularity of low-fat fluid products, and the reduced use of cream in the later part of the study period.

The data presented in Tables I and II were based upon producer receipts and volume of milk used in bottled products. In these tables, fluid utilization⁷ plus surplus equals producer receipts. Milwaukee data were first available for February, 1951, Detroit for January, 1952, and Sioux Falls for September, 1952. Skim milk data were not available for Milwaukee or Madison.

Surplus By Markets

During the study period, butterfat in excess of bottling needs is shown in Table III. In nearly half of these markets, over one-third was excess. In only three of them was the surplus less than one-fourth. Madison and Milwaukee, two of the markets with the lowest percentage of surplus, were closely associated with the Chicago market. It is likely that a part of their surplus was carried by the larger market.

Both this study and the earlier one by Williams and Kerchner showed that within the North Central area proportions of surplus were larger in the northern than in the southern markets, and in the eastern than in the western markets.

Surplus in Excess of Necessary Reserve⁸

The preceding discussion dealt with over-all surplus, that is the milk inspected and approved by a health department but not used in bottled products.

⁶"Producer receipts" is the term used in market administrator records to refer to milk received by handlers regulated by the market order, from regular producers approved by the municipal health department. Milk received from other markets or other sources is referred to as "Other source milk" or as supplementary supplies.

⁷Fluid utilization refers to the actual use of milk in bottled products such as whole milk, cream, flavored milk drinks, etc.

⁸This often is referred to as "operating reserve" since it refers to the extra supply of milk that a market finds necessary to carry to meet day-to-day fluctuation in sales of packaged milk, together with some day-to-day differences in milk receipts from producers.

TABLE I-BUTTERFAT EQUIVALENT OF PRODUCER RECEIPTS, FLUID
UTILIZATION AND SURPLUS COMPARED,
14 NORTH CENTRAL MARKETS

14 NORTH CENTRAL MARKETS					
Year	Producer Receipts	Fluid Utilization	Surplus	Percent of Producer Receipts Disposed as:	
				Fluid	
				Utilization	Surplus
(1, 000 pounds of butterfat)					
1950 ^a	234, 674	155, 077	79, 597	66.1	33.9
1951 ^a	241, 530	174, 283	67, 247	72.2	27.8
1952 ^a	303, 985	221, 754	82, 231	72.9	27.1
1953	346, 355	227, 935	118, 420	65.8	34.2
1954	361, 199	237, 250	123, 949	65.7	34.3
1955	358, 635	250, 378	108, 257	69.8	30.2
1956	383, 270	252, 999	130, 271	66.0	34.0
1957	404, 460	255, 366	149, 094	63.1	36.9
TOTAL	2, 634, 108	1, 775, 042	859, 066	67.4	32.6

^aMilwaukee data were first available in useable form for February, 1951; Detroit for January, 1952; and Sioux Falls for September, 1952.

TABLE II-SKIMMILK EQUIVALENT OF PRODUCER RECEIPTS, FLUID
UTILIZATION AND SURPLUS COMPARED,
12 NORTH CENTRAL MARKETS^a

12 NORTH CENTRAL MARKETS					
Year	Producer Receipts	Fluid Utilization	Surplus	Percent of Producer Receipts Disposed as:	
				Fluid Utilization	Surplus
(1, 000 pounds of skimmilk)					
1950 ^b	6, 033, 450	3, 611, 352	2, 422, 098	59.9	40.1
1951 ^b	5, 848, 648	3, 825, 670	2, 022, 978	65.4	34.6
1952 ^b	7, 472, 426	5, 002, 600	2, 469, 826	66.9	33.1
1953	8, 556, 479	5, 199, 800	3, 356, 679	60.8	39.2
1954	8, 933, 382	5, 485, 220	3, 448, 162	61.4	38.6
1955	8, 882, 194	5, 819, 888	3, 062, 306	65.5	34.5
1956	9, 445, 143	5, 911, 546	3, 533, 597	62.6	37.4
1957	9, 998, 219	6, 002, 205	3, 996, 014	60.0	40.0
TOTAL	65, 169, 941	40, 858, 281	24, 311, 660	62.7	37.3

^aSkimmilk data for Madison and Milwaukee were not useable.

^bDetroit data first available for January, 1952; and Sioux Falls for September, 1952.

A market, however, must have milk in excess of bottled use. This allows for day-to-day variation in consumption and receipts, and for less than perfect allocation of the milk among handlers in the market. For the purpose of this study, 10 percent of fluid uses was selected as the amount required to meet these needs. This has been termed necessary reserve.

When the excess over this reserve was computed, the average yearly excess amounted to about 25 percent (Table IV). On a monthly basis, the excess supply varied from 12 percent in the low month (October) to 37 percent in the high month (May). During a considerable portion of the year, the excess over necessary reserve was over half the amount actually consumed in fluid form.

TABLE III-SURPLUS BUTTERFAT BY MARKETS, 1950-1957^a

	Total Receipts	Surplus	Surplus as Percentage of Total Receipts
	(1, 000 pounds)		
Chicago	1,155,342	487,537	42.2
Cincinnati	124,617	51,334	41.2
Louisville	96,640	37,784	39.1
Twin Cities	234,713	90,462	38.5
St. Louis	208,175	77,724	37.3
Sioux City	19,797	7,023	35.5
Sioux Falls ^b	12,340	3,970	32.2
Kansas City	108,432	31,369	28.9
Dayton-Springfield	90,803	25,854	28.5
Detroit ^c	357,026	94,913	26.6
Topeka	17,301	4,538	26.2
Madison	22,043	5,193	23.6
Evansville	27,267	6,196	22.7
Milwaukee ^b	116,850	20,856	17.8

^aOnly first 6 months of 1957.

^bData for 1950 not available.

^cData for 1950-1951 not available.

Chronic or Year-round Surplus

Chronic or year-round surplus was arrived at by computing the surplus in excess of fluid use and necessary reserve during the low month, and converting it to an annual basis (Table V). These markets averaged a little more than 10 percent of producer receipts in chronic or annual surplus. To ensure ample supplies in the short season, a market likely will end up with some year-round surplus (not necessarily 10 percent). In some of the markets this was not much of a problem.

In most of the other markets, this type of surplus was manufactured in plants owned by cooperatives. In a few markets, dealers or the cooperative as-

TABLE IV-SURPLUS BUTTERFAT OVER NECESSARY RESERVE, 14 NORTH CENTRAL
MARKETS, BY MONTHS, 1950-1957 AVERAGE

MINNAPOLIS, 31 MONTHS, 1933-1934 AVERAGE						
Month	Fluid Use	Fluid Use Plus Necessary Reserve	Producer Receipts	Surplus Over Necessary Reserve	Surplus as Percentage of	
					Fluid	Producer Receipts
(1, 000 pounds)						
January	18, 550	20, 405	27, 347	6, 942	37.4	25.4
February	17, 204	18, 924	25, 980	7, 056	41.0	27.2
March	18, 858	20, 744	29, 388	8, 644	45.8	29.4
April	18, 019	19, 821	29, 306	9, 485	52.6	32.4
May	18, 419	20, 261	32, 183	11, 922	64.7	37.0
June	17, 400	19, 140	30, 142	11, 002	63.2	36.5
July	17, 125	18, 838	26, 503	7, 665	44.8	28.9
August	17, 649	19, 414	24, 643	5, 229	29.6	21.2
September	18, 498	20, 348	23, 350	3, 002	16.2	12.9
October	19, 591	21, 550	24, 457	2, 907	14.8	11.9
November	19, 003	20, 903	24, 269	3, 366	17.7	13.9
December	19, 418	21, 360	26, 672	5, 312	27.4	19.9
Average						
Year	219, 734	241, 708	324, 240	82, 532	37.6	25.5

TABLE V—GRADE A BUTTERFAT EXCESS TO BOTTLING NEEDS
SEGREGATED INTO NECESSARY RESERVE, CHRONIC SURPLUS
AND SEASONAL SURPLUS, 14 NORTH CENTRAL MARKETS,
1950-1957 AVERAGE¹

1. Producer receipts (1,000 pounds)	324,240
2. Fluid use (1,000 pounds)	219,734
3. Total surplus (1,000 pounds)	
Producer receipts minus fluid use	104,506
4. Necessary reserve (1,000 pounds)	
Fluid use X 10%	21,973
5. Year-round or chronic surplus (1,000 pounds)	
<u>Excess in low month (2,907,000 lbs.)</u> X 365	34,228
Days in that month (Oct.-31)	
6. Seasonal Surplus (1,000 pounds)	
Total surplus minus chronic surplus	48,305
minus necessary reserve	
	Percent of
	Producer Receipts
7. Necessary reserve	6.8
8. Chronic surplus	10.6
9. Seasonal surplus	14.9
10. Fluid Use	67.7
	Percent of
	Fluid use
11. Seasonal surplus	22.0

¹Basic data in Table IV.

sociations sold this milk to proprietary manufacturing plants. Only a small proportion was manufactured in the plants of receiving handlers. Some of these plants used part of this milk for making cottage cheese and ice cream. Where this was the case, the handlers looked upon it as part of their regular need and did not consider it a burden. MacPherson also found this to be true.⁹

This year-round excess is the only type of surplus which ordinarily is available for sale to other markets. Occasionally weekend surplus can be disposed of this way. Both the seasonal and the day-to-day surpluses are often referred to as reserves; they are maintained to assure adequate milk during peaks of consumption or troughs in production. A market should determine its type of surplus before seeking outside sales for fluid use as a solution to its surplus problem. During seasons of flush production, few markets need to purchase supplementary milk.

⁹D. D. MacPherson, The Market for Class II Milk in Oklahoma, Kansas and Western Missouri, United States Department of Agriculture, Marketing Research Report No. 263, Washington, D. C., August, 1958, p. 29.

Seasonal Surplus

The previous discussion dealt with the quantity of surplus milk. If the extra milk, even in existing quantities, were produced at a uniform rate throughout the year, the problem of dealing with it would be simplified considerably. Solution of the problem would entail principally the provision of manufacturing facilities to process this volume of milk. About the only waste would be the extra real costs incurred in producing Grade A milk above costs of producing manufacturing milk.

Fluid milk receipts were characterized by wide seasonal swings in volume (Figure 1). Skilled dairymen have demonstrated that it is possible to manage a herd so that reasonably uniform production can be maintained throughout the year. As a practical matter, however, most dairymen do not even out their production. Even though most of the seasonal variation in surplus was due to month-to-month changes in producer receipts, part of it was due to lower summer consumption of fluid milk.

Fifty percent of the butterfat in the fourteen markets, excess to fluid utilization and necessary reserve, was received during March, April, May, and June. Figure 1 shows the wide variation in quantity of surplus Grade A milk which must be handled from month to month. Figure 2 presents the greater percentage changes in the seasonality of surplus as compared to receipts. The fourteen market average surplus ranges from small amounts in September and October to over 60 percent of total quantity used for fluid consumption in May and June. In the five markets with the greatest seasonal variation of producer receipts, surplus butterfat in the peak month was four times that of the low month. In the five markets with least seasonality of producer receipts the peak month was three times that of the low month (Figure 3).

The relationship, by markets, between surplus in three spring months and three fall months varied from a low of 1.5 to a high of 3.5 (Table VI). The wide ratio which existed in the two Wisconsin markets of Madison and Milwaukee was not indicative of a large amount of surplus in these markets but of the very opposite. They had little surplus in the fall months, so that the excess which did appear in the spring resulted in a wide ratio because of the low base used for comparison.

Since the largest part of the surplus was received during a short part of the year, special difficulties in handling it were encountered in some markets. In others, these difficulties were avoided only by careful organization and provision of special facilities.

The problem of handling the seasonal surplus was one of concern to both cooperatives and dealers in the markets. In most of the markets, the cooperatives had assumed responsibility for managing this excess milk. In a few markets, dealers disposed of some of this surplus through proprietary manufacturing plants. Very little of the seasonal surplus was manufactured in the plants of receiving handlers.

MILLION POUNDS

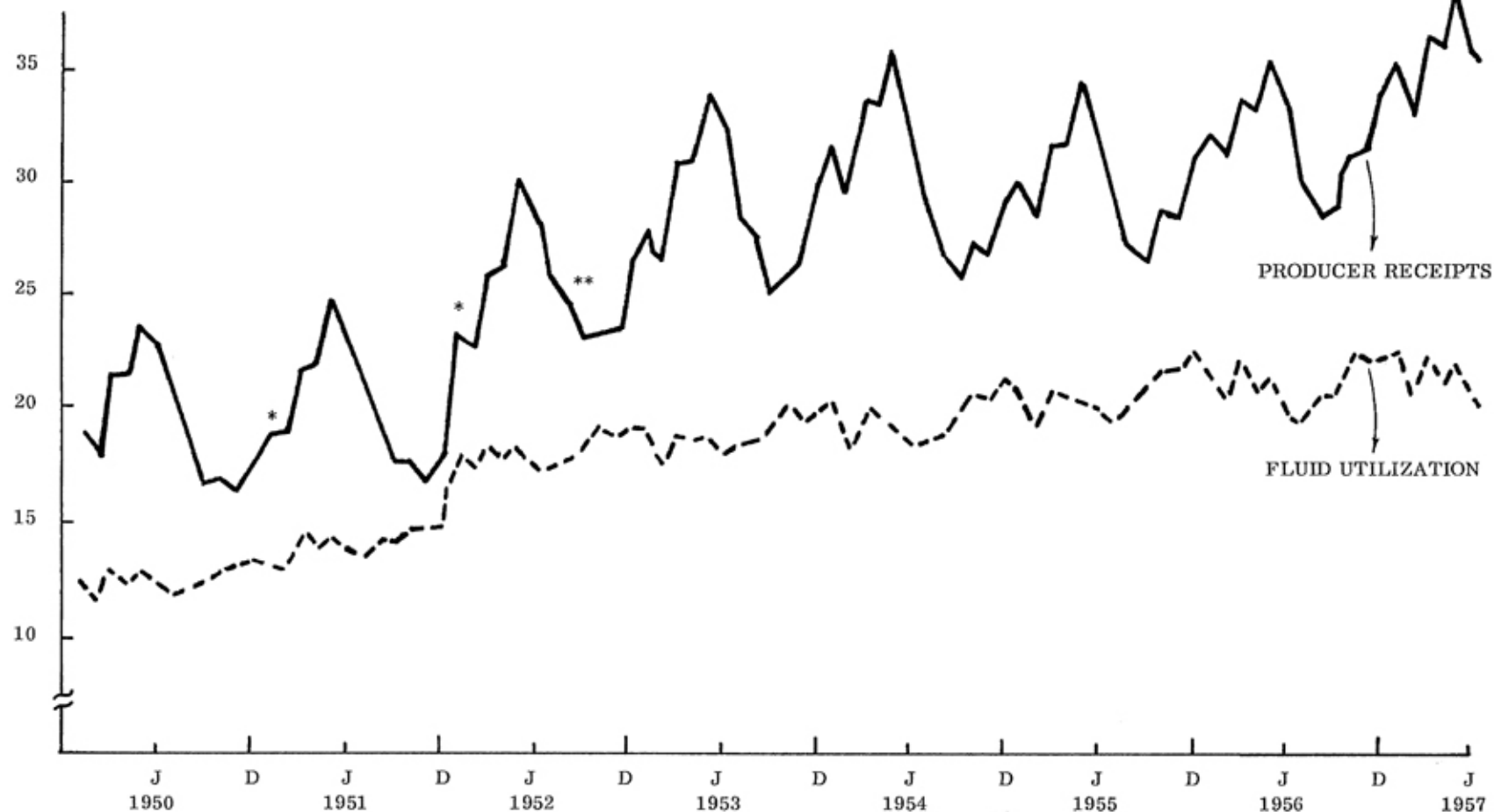


Figure 1. Producer receipts and fluid utilization of butterfat in the 14 markets.

*Detroit data first available this month.

/Inclusion of Milwaukee data for first time this month prevented the total from decreasing this February.

**Sioux Falls data first available this month.

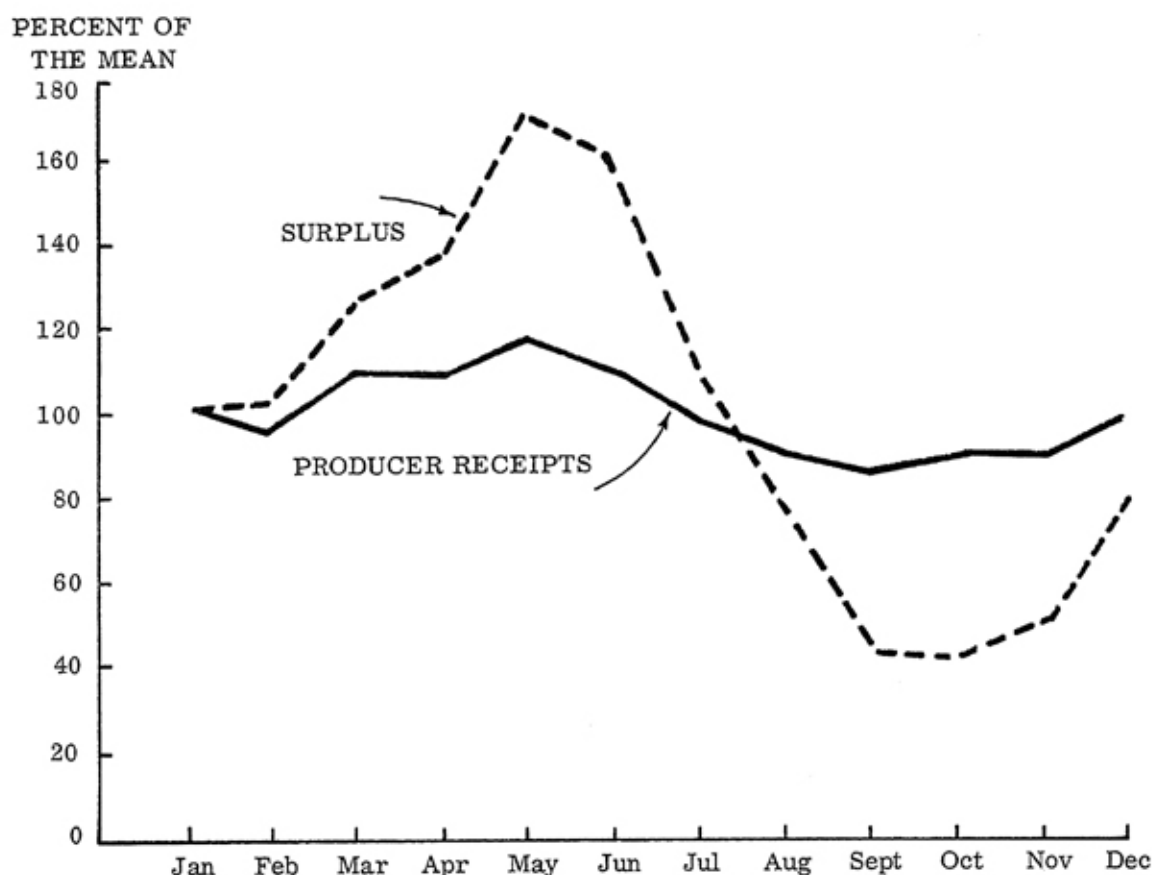


Figure 2. Seasonality of butterfat; in producer receipts, and in excess of fluid utilization and necessary reserve; 14 North Central Markets 1950-1957.

Day-to-Day Surplus

Personnel in several of the markets felt that their year-round and seasonal surplus problems were not particularly bothersome. However, every one of the markets had to cope with a day-to-day surplus problem of some magnitude. This problem arises mainly from day-to-day changes in sales of bottled milk and in less part from variation in producer receipts.

These variations in needs and milk receipts generate excesses or shortages on a day-to-day basis. In order to have enough milk all of the time, it is necessary for a plant manager to have too much a good part of the time. It generally is conceded that the problem is becoming more serious.

The day-to-day problem has been aggravated further by the change to a larger proportion of the milk being sold through grocery stores (Figure 4). Most shoppers purchase their groceries during the latter part of the week, and many of them purchase an entire week's supply of milk at that time.

In the St. Louis market, Friday is the heavy bottling day, but bottling on Thursday and Saturday are larger than in the early part of the week (Figure 5).

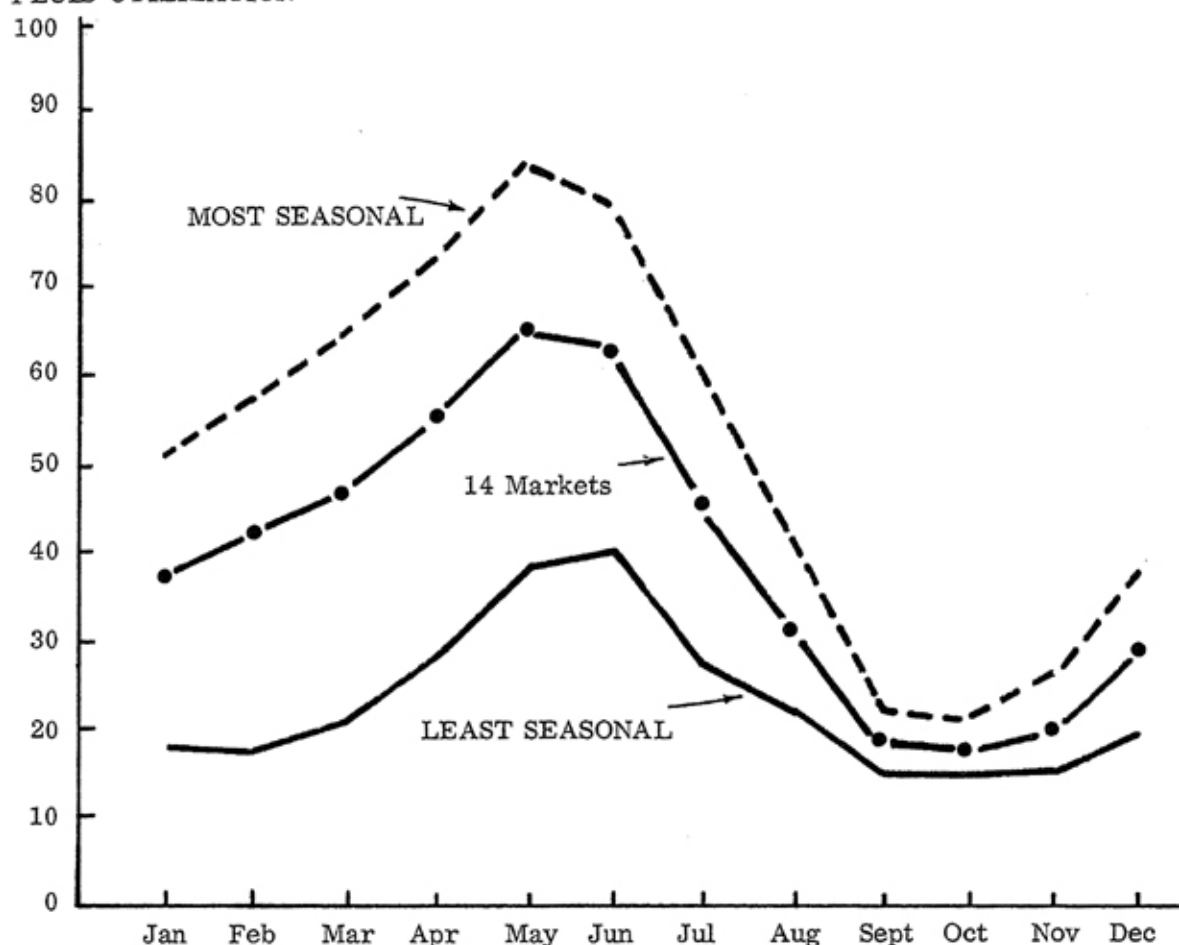
PERCENT OF
FLUID UTILIZATION

Figure 3. Seasonality of butterfat surplus in excess of fluid use and necessary reserve compared in five markets with greatest seasonality and five markets with least seasonality of producer receipts, and in the fourteen markets, 1950-1957 averages.

The proportion of milk bottled on Friday was 142 percent of that on Wednesday. Three-fifths of the week's supply was bottled on Thursday, Friday, and Saturday, and two-fifths during the rest of the week. These are bottling data. Data on sales would show an even greater variation since there is some equalization of the plant load by bottling ahead for the end of week rush.

Relationship Between Butterfat and Skim Milk in Surplus

During the early part of the 1950's, a larger part of the skim milk than of the butterfat was surplus (Table VII). In the later years, a greater part of the skim milk still was surplus, but the difference was smaller. With the proportion of skim and butterfat in fluid products more nearly the same as that in producer receipts, the surplus problems faced by some markets have changed.

Other data provided by this study show the same trend in a different manner. The butterfat test of fluid products in the fourteen markets declined each

TABLE VI-NON FLUID USE OF BUTTERFAT DURING SPRING AND FALL MONTHS COMPARED BY MARKETS, AVERAGE 1950-1957

Market	September, October,		Ratio- High:Low
	April, May, June	November	
(1, 000 pounds)			
Madison	94	27	3.48
Milwaukee	397	143	2.78
Chicago	7,460	3,076	2.43
Sioux Falls	90	41	2.20
Dayton-Springfield	402	185	2.17
Twin Cities	1,365	645	2.12
Sioux City	103	51	2.02
Cincinnati	800	420	1.90
Evansville	92	50	1.84
Topeka	62	36	1.72
Detroit	1,892	1,137	1.66
St. Louis	1,128	693	1.63
Kansas City	434	279	1.56
Louisville	542	364	1.49

PERCENT OF
HANDLERS SALES

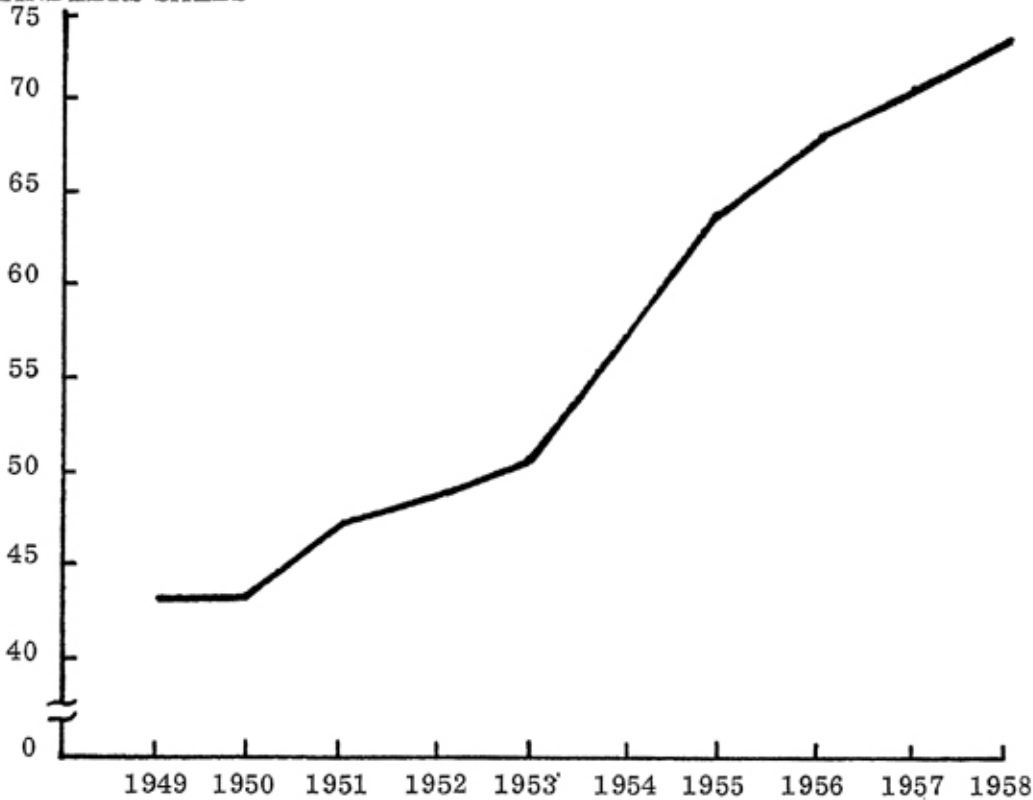


Figure 4. Percent of milksales by handlers in the St. Louis market which were wholesale, November of each respective year. Source: Market Administrator's Office.

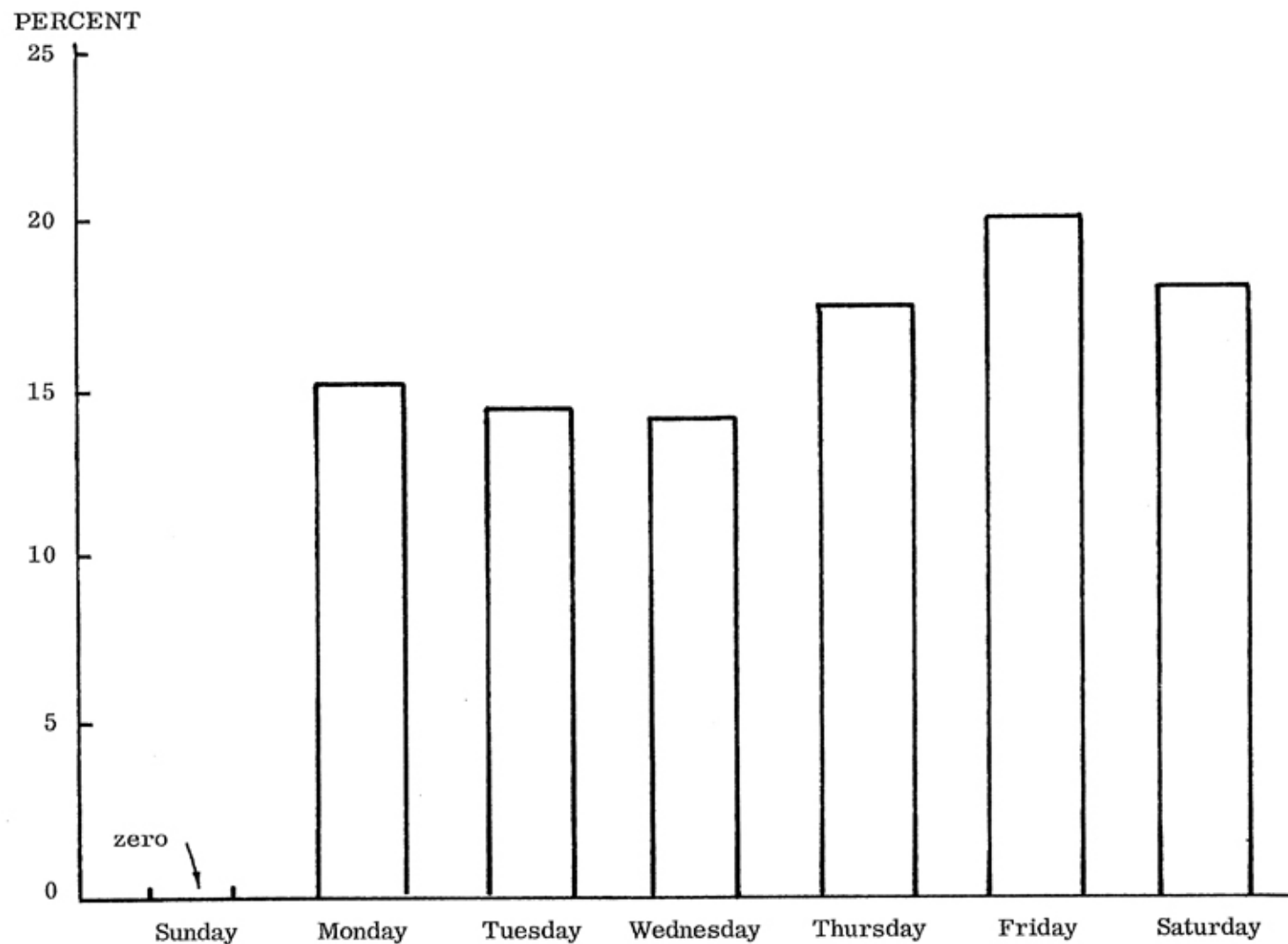


Figure 5. Percentage of milk bottled each day of the week by St. Louis handlers, September 1957.
Source: Market Administrator's Office.

TABLE VII-CHANGES IN AMOUNT OF SURPLUS BUTTERFAT AND SKIMMILK^a

Year	Nonfluid Utilization As a Percentage of Producer Receipts		Ratio of Skim Butterfat
	Butterfat	Skim milk	
1950	33.9	40.1	1.18
1951	27.8	34.6	1.24
1952	27.1	33.1	1.22
1953	34.2	39.2	1.15
1954	34.3	38.6	1.13
1955	30.2	34.5	1.14
1956	34.0	37.4	1.10
1957	36.9	40.0	1.08
Weighted Average	32.6	37.3	1.14

^aBasic Data in Tables I and II.

year from 1950 to 1957 (Table VIII). The trend depicted in the previous paragraph becomes even more meaningful in the light of a downward trend which also existed in the butterfat test of producer receipts. Since the average test of fluid products declined more rapidly than the test of producer receipts, the percent of butterfat in the surplus portion tended to increase.

Butterfat tests of fluid products and of producer receipts by markets show that the northern markets tended to have a greater proportion of surplus skim milk and the southern markets a larger proportion of butterfat (Table IX). When the markets within the eastern and western sections were studied individually the same north-south relationship was revealed. Handlers and cooperative personnel in the northern markets complained of the problems associated with handling their greater surplus of skim milk, while those in the south emphasized the excess butterfat.

TABLE VIII-BUTTERFAT TEST OF PRODUCER RECEIPTS, FLUID PRODUCTS, AND SURPLUS, 12 NORTH CENTRAL MARKETS, 1950-1957^a

Year	Fluid Products	Producer Receipts	Surplus
		percent	
1950	4.07	3.71	3.16
1951	4.01	3.70	3.13
1952	3.95	3.68	3.12
1953	3.91	3.67	3.30
1954	3.86	3.67	3.37
1955	3.83	3.66	3.33
1956	3.80	3.67	3.45
1957	3.78	3.66	3.51
Weighted Average	3.90	3.68	3.31

TABLE IX-BUTTERFAT TEST OF PRODUCER RECEIPTS AND FLUID PRODUCTS, 12 NORTH CENTRAL MARKETS, 1950-1957

	Producer Receipts	Fluid Products
	per cent	
North Mid-Section		
Chicago	3.61	3.97
Twin Cities	3.65	4.12
South Mid-Section		
St. Louis	3.83	3.71
Evansville	3.82	3.77
Eastern Section		
Cincinnati	3.87	3.68
Louisville	3.90	3.72
Dayton-Springfield	3.88	3.89
Detroit	3.67	3.90
Western Section		
Sioux City	3.56	3.71
Sioux Falls	3.42	3.76
Kansas City	3.77	3.67
Topeka	3.69	3.66
All markets	3.68	3.90

The excess skim milk seemed to be more bothersome to handle than the excess butterfat since it was more bulky in relation to its value and because of the limited uses which could be made of it. A plant with an excess of butterfat has a greater variety of alternative outlets.¹⁰

The total volume of both butterfat and skim milk for non-fluid utilization increased during the period studied. The amount of both when expressed as a percent of producer receipts also increased. However, this was at a very slow rate and the trend was not statistically significant. The increase in percent of butterfat in excess of fluid use was a little more rapid than for skim. The seasonality of nonfluid utilization of both components declined, mostly as a result of a more even seasonal pattern of producer receipts.

FACTORS WHICH INFLUENCE TYPE OF SURPLUS AND AMOUNT

Seasonality of Receipts

Consumption of fluid milk products varies less from month to month than receipts of milk from producers. Frequently, consumption varies in the opposite direction from receipts, thus compounding either the shortage or the surplus

¹⁰V. H. Nielsen, How to Utilize Fat Surplus Most Advantageously, *American Milk Review*, Vol. 22, Number 2, February, 1960, page 76.

problem. Because milk in excess of fluid needs cannot be held for use at a later date, it must be converted into a relatively non-perishable form soon after production. This usually removes it from the fluid market. Therefore, to assure the consumer an adequate supply during seasons of low production, it is customary to organize the market so enough milk is available during that period to meet fluid needs. When this is done there is excess milk during other seasons which must be disposed of in non-fluid form. The degree of variability in milk production from one season to another seems to have considerable influence on the amount of excess Grade A milk in any particular market.

Seasonality of producer receipts related to proportion of surplus. A significant relationship was found between seasonality of producer receipts and the proportion of butterfat disposed of in non-fluid form in the markets studied (Table X).

TABLE X-RELATIONSHIP BETWEEN SEASONALITY OF PRODUCER RECEIPTS AND OVERALL BUTTERFAT SURPLUS IN 14 NORTH CENTRAL MARKETS, 1950-1957

Market	Seasonality Index*	Surplus as Percentage of Total Receipts
Twin Cities	1.35	38.5
Chicago	1.30	42.2
Cincinnati	1.28	41.2
St. Louis	1.20	37.3
Sioux City	1.20	35.4
Milwaukee	1.17	17.8
Madison	1.16	23.6
Sioux Falls	1.15	32.2
Dayton-Springfield	1.14	28.5
Louisville	1.13	32.0
Topeka	1.10	26.2
Evansville	1.08	22.7
Detroit	1.08	26.6
Kansas City	1.06	28.9

*Receipts in April, May, June, divided by receipts in September, October, November.

In the left hand column of the table, the markets are arrayed in the order of seasonality of producer receipts. In the right hand column is shown the amount of surplus butterfat expressed as a percentage of total receipts of approved butterfat in that market. With few exceptions, the markets with the most highly seasonal receipts pattern also had the largest percentage of milk to be processed into nonfluid dairy products. About 45 percent of the variation in the proportion of the milk that was surplus was associated with differences in the amount of seasonal variation in producer receipts.

About twice the proportion of milk was in excess of necessary reserve and

fluid needs in the highly seasonal markets as compared to the less seasonal markets.

Markets	Surplus in excess of necessary reserve, 1950-1957 as percentage of:	
	Fluid Use	Producer Receipts
Five least seasonal	21.2	16.2
Five most seasonal	48.9	30.8
Fourteen markets	37.6	25.5

Producers in markets with the least seasonal pattern of production received fluid prices for over 10 percent more of their milk than producers in the most seasonal markets (Appendix Table I, Item 10).

Research people working with this phase of milk marketing frequently are concerned with the over-all percentage of producer receipts which should be allowed to provide for necessary reserves plus seasonal surplus. Bartlett and Whitted in their study of the St. Louis market¹¹ allowed 25 percent. With the information at hand, it is possible to throw some light on this problem as seen in the following tabulation.¹²

Markets	Necessary Reserve	Seasonal Surplus	Necessary Reserve Plus Seasonal Surplus
			Percent of Producer Receipts
Five least seasonal	7.6	6.4	14.0
Five most seasonal	6.3	18.3	24.6
Fourteen markets	6.8	14.9	21.7

The magnitude of this allowance is related to seasonality of milk production in the market. Of the markets included in this study, the average allowance would have been about 22 percent. The five markets with the least seasonality of production would have required 14 percent and the five with the greatest seasonality about 25 percent.

Seasonality of producer receipts related to seasonality of surplus. Most of the seasonality of surplus milk supplies results from monthly variation in milk receipts. When the indexes of seasonality of producer receipts and of surplus were correlated, the coefficient was 0.917. About 80 percent of the seasonality of the surplus was associated with the seasonality of producer receipts.

Changes over time in seasonality of receipts. As a measure of seasonality, the production in three fall months was compared with that of three spring months.

¹¹Bartlett, R. W. and S. F. Whitted, An Economic Analysis of Federal Regulation of the St. Louis Milk Marketing Area, Missouri Agricultural Experiment Station, Research Bulletin 684, January, 1959.

¹²Computations shown in Table V and Appendix Table I.

The total production of butterfat in 14 North Central markets during April, May, and June is compared with that during September, October, and November of each year. These ratios as shown below indicate that seasonality of milk production in the fourteen markets was reduced during the years 1950-1957.

Even if one assumes that the inclusion of data for Detroit (a market with even seasonal production) for the first time in 1952 caused part of the change shown in that year; a study of the data for 1952-1957 still would lead to the same conclusion.

During this entire period, the month of highest production was May. The month of lowest production, however, shifted back from November in 1950 and 1951 to September for the years 1952-1955 and to August for the years 1956 and 1957.

	1950	1951	1952	1953	1954	1955	1956	1957 ^a	Avg.
Ratio High to Low	1.37	1.35	1.22	1.25	1.29	1.17	1.12	1.17	1.23

^a1957 based upon 11 markets for which data were available for entire year.

In some milksheds, producers can reduce surplus and increase income by reducing seasonality of production. If production in the short season is insufficient to meet fluid use, a shift in seasonality would put more producer milk in the higher Class I price in the short season and less in the lower Class II price in the flush season.

In a market which has enough milk during the short season to meet all needs for fluid consumption, the only increase in price would be a slightly higher Class II price during the shortage period. In this event, the processors would benefit by a more uniform utilization of their facilities. This benefit would be reflected to some extent in the higher Class II price during the months of low production. However, in a growing market it would provide handlers with an assured supply and so they would have less incentive to bring in outside milk.

It is possible that in some markets, greater seasonality of production is the result of a large overall surplus rather than vice versa as is usually assumed. In the situation which exists when there is surplus milk during the months of low production, there is not much incentive to smooth the pattern of seasonal production by producing less milk in the flush season and more in the low season.

Changes in seasonality of surplus. Change in seasonality of the surplus, as shown below, was similar though more variable than changes in seasonality of receipts. The decline in the index expressed as a percentage of its mean was 7.9 percent per year. Throughout the period, May was the high month. During the early years November was the low month but in 1954 and the years following, the low month of nonfluid utilization was September.

	1950	1951	1952	1953	1954	1955	1956	1957 ^a	Avg.
Ratio High to Low	2.48	3.03	2.00	1.99	2.30	1.85	1.47	1.64	1.95

^a1957 based upon 11 markets for which data were available for entire year.

Seasonality by markets. Kansas City had the least seasonal pattern of production (Table XI). Twin Cities had the greatest seasonality. The entire fourteen

TABLE XI-SEASONALITY OF PRODUCER RECEIPTS OF BUTTERFAT BY
MARKETS, AVERAGE 1950-1957

Market	Ratio High to Low*	Market	Ratio High to Low*
Twin Cities	1.35	Sioux Falls	1.15
Chicago	1.30	Dayton-Springfield	1.14
Cincinnati	1.28	Louisville	1.13
St. Louis	1.20	Topeka	1.10
Sioux City	1.20	Evansville	1.08
Milwaukee	1.17	Detroit	1.08
Madison	1.16	Kansas City	1.06
		Average	1.22

*Quantity received in April, May, June divided by the quantity received in September, October, November.

markets received 22 percent more butterfat in the 3 spring months than in the three fall months. Seasonality of production was greatest in the North Mid-Section of the region and least in the Western Section.

St. Louis was the only market which failed to improve its seasonal pattern of receipts during the study period (Table XII). Five other markets, Milwaukee, Madison, Sioux Falls, Detroit, and Kansas City made but little improvement. The fact that Kansas City and Detroit had a low seasonality of receipts at the beginning of the study period no doubt influenced this. Madison and Milwaukee had only a small amount of surplus so that it did not present a problem serious enough to call forth much effort to correct it. The Twin Cities market took the greatest strides in reducing the seasonal differences in production.

TABLE XII-CHANGES IN SEASONALITY OF PRODUCER RECEIPTS
BY MARKETS, 1950-1957

Markets	Percent Last Half of period is of first Half*
St. Louis	100
Milwaukee, Madison, Sioux Falls, Detroit, Kansas City	97
Sioux City, Louisville	96
Evansville	95
Cincinnati, Dayton-Springfield	94
Chicago	92
Topeka	91
Twin Cities	80

*Seasonal indexes were computed for the first half of the study period and for the last half of the period in the same manner as in Table XI.

Seasonality of Fluid Sales

There is considerable seasonal variation in consumption of fluid milk products and this contributes to the seasonal surplus (Figure 6). An estimate of the quantity of surplus in these 14 markets due to variation in consumption is shown in Appendix Table II. The total amount for the year, 11,624,000 pounds, was nearly one-fourth of the total seasonal surplus of 48,305,000 pounds. Approximately 15 percent of market receipts was seasonal surplus (Table V). Surplus due to monthly variation in fluid consumption was 24.1 percent of this quantity or 3.6 percent of market receipts.

These figures show 76 percent of seasonal variation due to changes in producer receipts as compared to an 80 percent estimate by correlation analysis.¹³

Institutional Factors

The type of pooling arrangement employed by a market to distribute returns among producers may be associated with the amount of surplus milk. Williams and Kerchner found this.¹⁴ In the 104 midwestern markets which they studied, surpluses were larger in markets with market-wide pools than in those with individual handler pools, or those without any pooling arrangement.

When the 14 markets included in this study were arrayed according to seasonality of producer receipts, the four most seasonal markets either had no seasonal pricing plan or had had one for only a short period of time. The ten other

¹³Page 23 in section "Seasonality of producer receipts related to seasonality of surplus."

¹⁴Sheldon W. Williams and Orval G. Kerchner, *Disposing of Surplus Fluid Milk in Midwestern Markets*, North Central Regional Publication 113, University of Illinois Agricultural Experiment Station Bulletin 664, Urbana, Illinois, September, 1960.

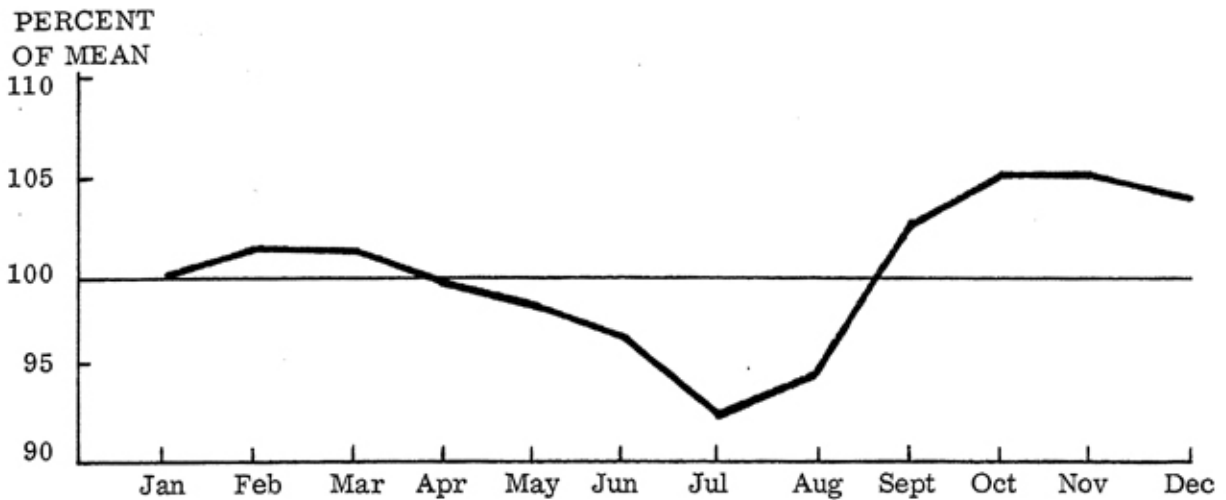


Figure 6. Seasonal variation in daily fluid consumption of butterfat in 14 North Central Markets 1950-1957*.

*Only first 6 months of 1957.

markets had had either a fall premium plan or a base-surplus plan before this study was initiated. Some had tried both plans. Sioux Falls had removed its fall premium plan from the order provisions in 1954, but the cooperative maintained a base-surplus pricing plan.

The cooperative associations in four of the markets had restrictions on acceptance of new members. These varied from one where the board met annually to determine the number of producers needed, to some where new members were accepted to replace those who had quit the dairy business. These markets did not have an appreciably lower percentage of surplus milk than the average of others in the survey. Their seasonality of receipts was lower. It was not known whether this was due to the tighter cooperative control or to other factors.

The idea of placing some kind of a quota provision in a Federal Order to help control the surplus problem has been considered. The Kansas City License contained such a provision in the early 1930's.¹⁵

UTILIZATION OF THE SURPLUS

In this section, different categories of surplus utilization are considered. The early part of the discussion is based on U. S. Department of Agriculture data on production and utilization of milk in the North Central Region. Later, parts are developed from data provided by this study.

Annual Variability of Utilization of Milk

Fluid utilization. To compare the variation of different types of utilization from year to year in the North Central region, it was necessary to compute a

¹⁵Edmond S. Harris, Early Development of Milk Marketing Plans in the Kansas City, Missouri, Area, United States Department of Agriculture, Marketing Research Report No. 14, Washington, D. C., May, 1952, pp. 72-80.

regional series of data on sales for fluid consumption (Appendix Table III). This does not give a precise measure of fluid milk *consumed* in the North Central Region. It does give a satisfactory indication of the quantity of milk produced in the region which is utilized in fluid products whether in the region or out of it. Considerable milk for fluid consumption moves out of the region and small quantities probably move into it. The quantity of manufacturing milk which moves into or out of the region is not sufficient to affect the estimate appreciably. This series shows a fairly steady upward trend in sales of milk for fluid use of about the same rate as indicated in similar data for the United States.

In the U. S., the annual increase in fluid consumption was closely related to annual increases in population. The average increased amount consumed in fluid form each year during the period 1950-1958 was 1,472 million pounds or 3.14 percent of the mean. The amount of increase each year was quite uniform. The coefficient of correlation between the observed values and the computed trend was 0.99. Fluid consumption has first call on the nation's milk supply and any differences between this amount and production were taken up by changes in other uses.

Trends shown in the following graphs are shown in percentages of the mean in order to facilitate comparisons. However, the reader should keep in mind that these graphs do show changes in percentages rather than in actual pounds. For example, in Figures 8 and 9, the line slopes much more rapidly for cottage cheese and ice cream than for the other manufactured products such as butter and cheese. The actual quantity of milk involved, of course, was much smaller for the cottage cheese and ice cream. The same caution holds true for Figures 11 and 12.

Data for the North Central Region in Figure 7 show an increase in fluid use of 2.9 percent of the mean per year which was near that for the United States. The average yearly increase between 1950 and 1958 was 502 million pounds. This quantity was just a little over one-third of the annual U. S. increase. This means that about one-third of the yearly increase in fluid milk consumption in the nation was furnished by dairy producers in the North Central Region.

When yearly variation in fluid use for the North Central Region is compared with that of the United States, an interesting relationship appears. In both 1953 and 1956, sharp drops occurred in North Central milk sold in commercial channels for fluid consumption. This situation was not matched in the United States as a whole. During both of these years, sharp increases in total milk production took place. It appeared likely that demand in markets outside the region for supplementary supplies was less in years of increased production. The primary result of this situation was that producers in the North Central Region were carrying a part of the surplus for other regions.

Data for the 14 markets showed a similar tendency. They did not show any declines in 1953 and 1956 (Appendix Table IV). There was an indication of a little greater variation from year to year. The coefficient of correlation was 0.92

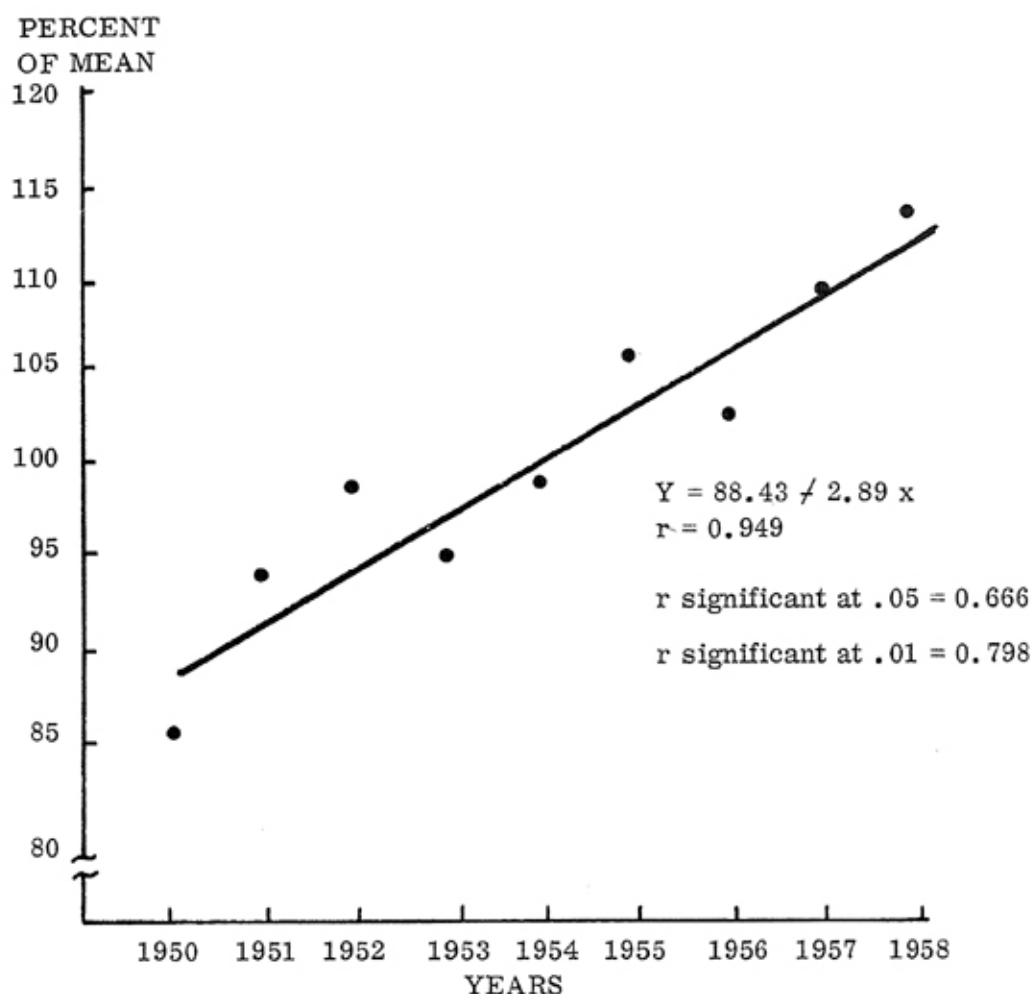


Figure 7. Trend in amount of North Central milk in commercial channels for fluid consumption and yearly variation about the trend.

for these markets as compared to 0.95 for the North Central Region and 0.99 for the United States. The trend in consumption also was quite similar. Fluid utilization in the study markets increased an average of 3.04 percent of the mean each year. This compared to 3.14 percent for the United States and 2.9 percent for the North Central Region.

Cottage cheese and ice cream. The utilization of milk in cottage cheese and ice cream within the North Central Region increased quite uniformly from year to year similarly to that for fluid milk (Figure 8). These products also are perishable and appear to be higher on the scale of demand than most other manufactured dairy products.

The rate of growth in the amount of milk allotted to these products exceeded the rate for fluid milk in the North Central Region; 3.3 percent of the mean annually from 1950 to 1958. The increase in the amount of milk used in these products averaged 117 million pounds per year over this period. The coefficient of correlation was 0.94.

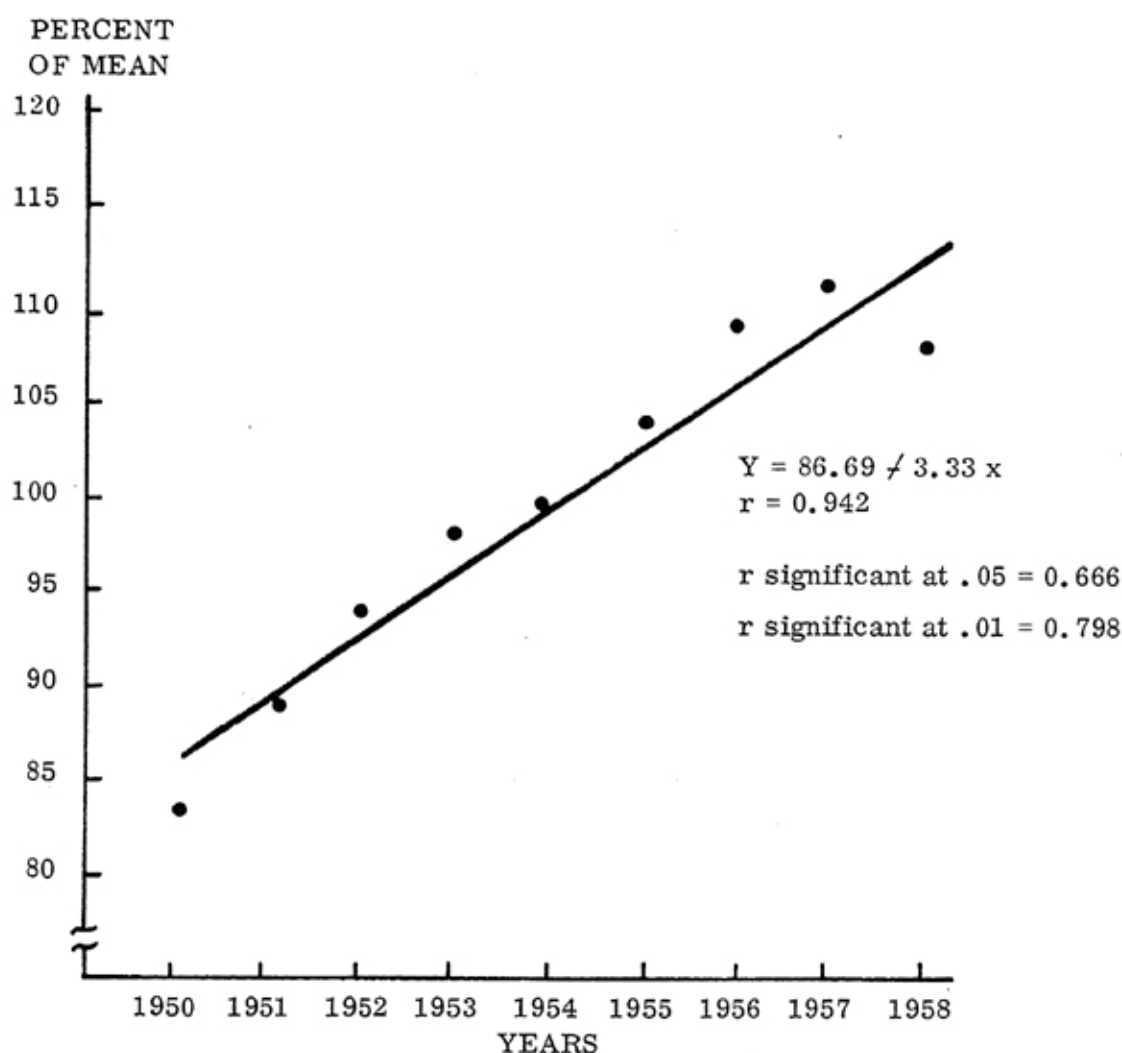


Figure 8. Trend in amount of milk used in ice cream and cottage cheese production in the North Central Region and yearly variation about the trend.

Other manufactured products. Most of the variation between the quantity of milk used for fluid consumption and the amount actually produced in any time period was made up in the production of butter, cheese and similar manufactured products. In 1951 and 1952 per capita milk production was low. Even so, consumption in fluid form, and in cottage cheese and ice cream remained near normal. Production of the other manufactured products was low in those years (Figure 9). In 1953, milk production increased drastically, and so did utilization in these other manufactured products. Over the period, utilization of milk in these other manufactured products increased. Expressed as a percent of the mean, utilization of milk in these products increased 1.4 percent per year in the North Central Region between 1950 and 1958. In physical terms the increase was 509 million pounds per year. The variability was quite high.

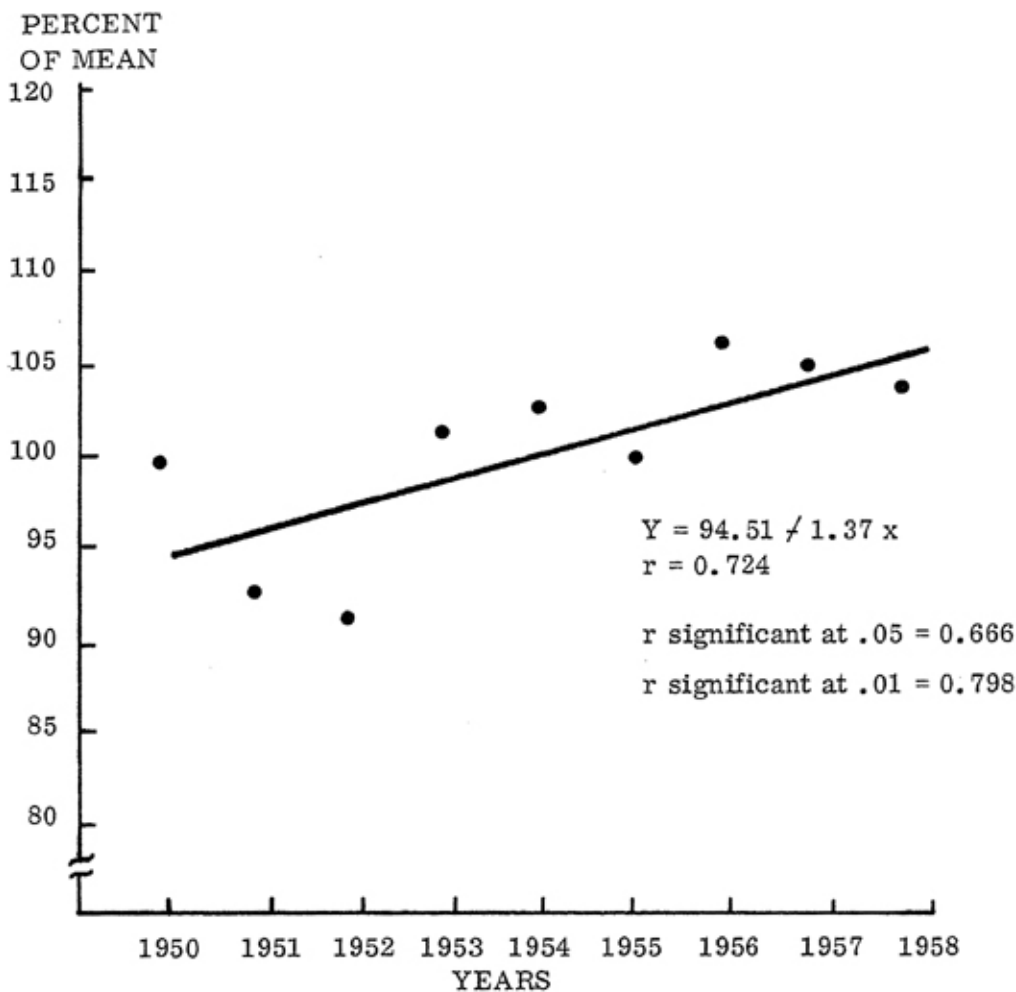


Figure 9. Trend in amount of milk used in manufactured dairy products other than cottage cheese and ice cream in the North Central Region and yearly variation about the trend.

Utilization of Surplus Grade A Butterfat in the 14 North Central Markets

The following section deals with the 14 North Central markets and is based upon utilization of Grade A milk, 1950 through midyear 1957.¹⁶ Figure 10 shows the use made of all butterfat receipts. Most noticeable is the increase in total quantity of butterfat used in these markets. However, the changes in relative amounts used in the various categories were not great enough to be readily apparent from this graph.

Part of the large increase in 1952 was due to the inclusion of data for the Detroit market first in that year. Milwaukee data were first available for February, 1951, and Sioux Falls data were first used for September, 1952. These data show that utilization of butterfat in each category increased during the study period.

¹⁶Enough of the markets furnished data for the entire year of 1957 so that in some instances it was possible to base the discussion upon the complete year.

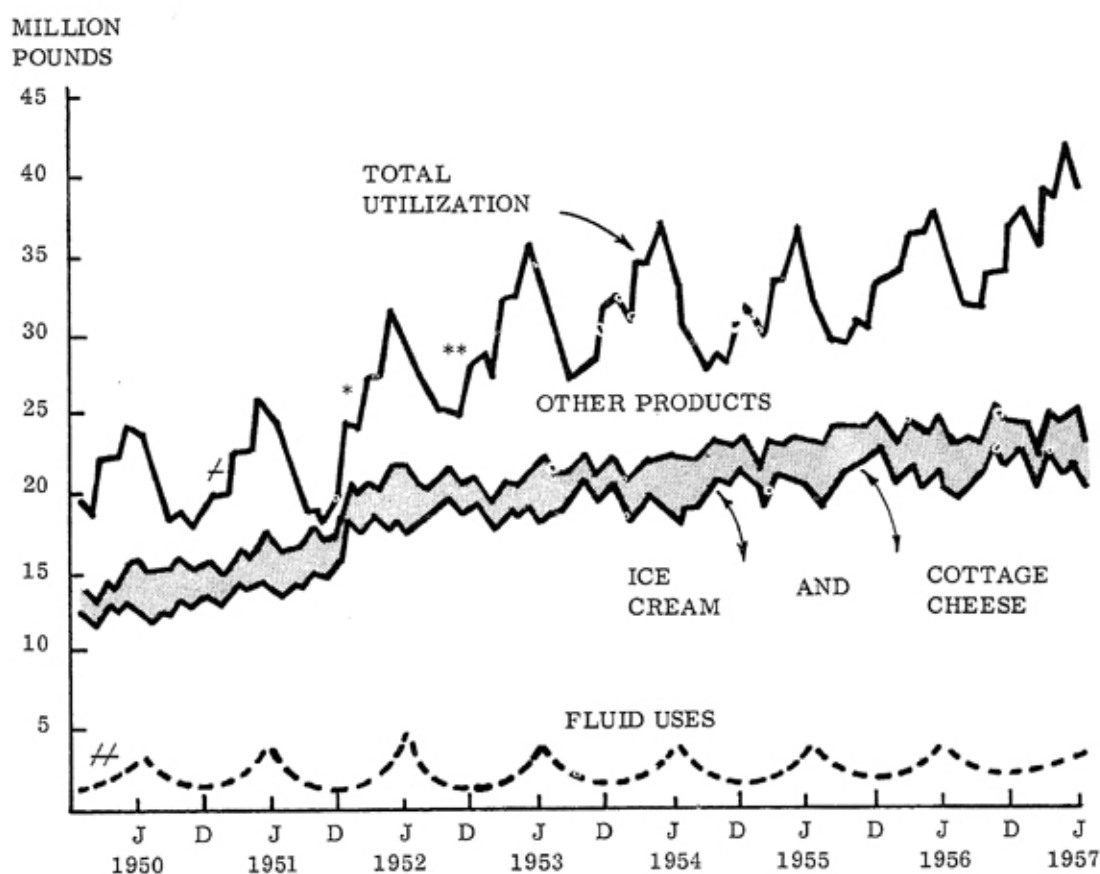


Figure 10. Utilization of Butterfat in Fourteen North Central Markets.

✓Inclusion of Milwaukee data for first time this month prevented the total from decreasing this February.

**Sioux Falls data first available this month.

*Detroit data first available this month.

✓Bottom dashed line is cottage cheese and ice cream as measured from base.

During the period 1950-1957, about 20 percent of the butterfat excess to bottling needs was used to produce cottage cheese and ice cream and about 80 percent was made into butter, cheese and other products (Appendix TABLE V).

There was a statistically significant decline in the proportion of the surplus butterfat used in cottage cheese and ice cream during the period 1950-1957 (Figure 11). Even though the proportion of the total used for cottage cheese and ice cream declined, the greater quantity received caused the actual amount used in this manner to increase somewhat.

A corollary to the decline in the proportion of the surplus butterfat used in cottage cheese and ice cream was the increase in the proportion used in butter, cheese, etc. (Figure 12 and Appendix Table V). The volume of butterfat manufactured into these products also increased, nearly doubling from 1952, when Detroit data were first available, to 1957.

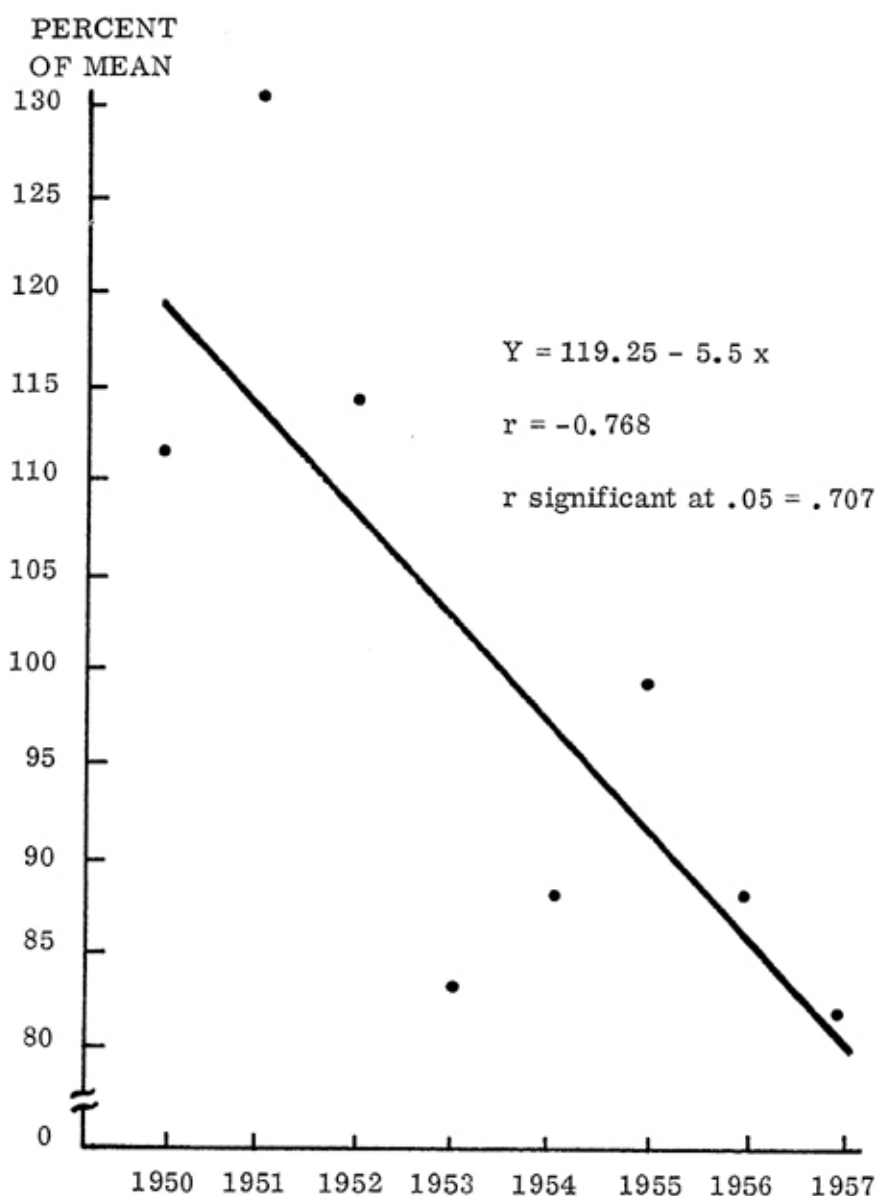


Figure 11. Trend in Proportion of Surplus Butterfat Used in Cottage Cheese, Ice Cream, etc. in the Study Markets.

Seasonality of Surplus Utilization of Skim Milk and Butterfat in the Various Categories

Seasonal changes in the surplus utilization of the two components of milk result from variation in milk production, and in consumption of fluid products from month to month during the year. In addition, there may be variations in the butterfat test of milk receipts and in the mix of fluid products sold in the different seasons.

The use of butterfat in cottage cheese and ice cream varies more than the use in butter and cheese (Figure 13 and Appendix Table VI). This likely is due to the increased consumption of ice cream, a high fat product, in the summer months. Ice cream is perishable and is produced when it is needed for consump-

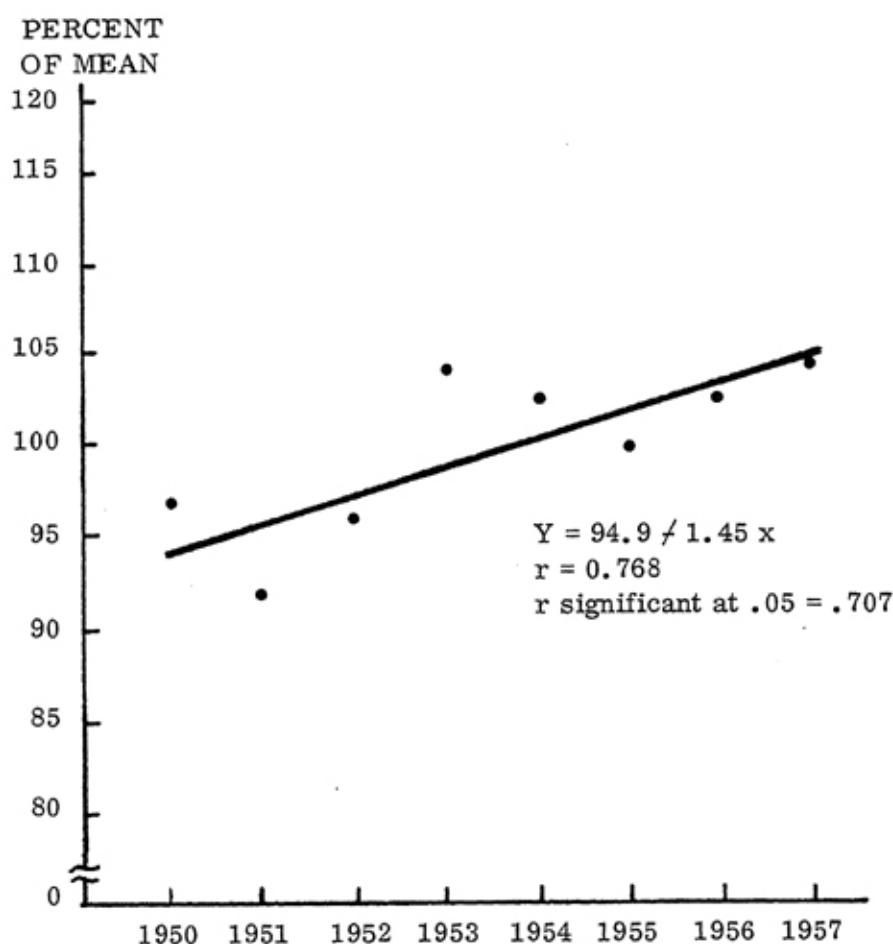


Figure 12. Trend in Proportion of Surplus Butterfat used in Butter, Cheese, etc. in 14 Study Markets.

tion with little or no storage from one season to another. Butter, cheese, and other similar products provided a residual use for surplus. Consequently the seasonality of utilization in these products was determined by the amount and test of milk remaining after needs for fluid products, cottage cheese, and ice cream had been satisfied.

Data on utilization of skim milk showed the same general seasonal pattern as for butterfat (Figure 14 and Appendix Table VII). The change in the consumption of cottage cheese and ice cream at different times of the year also showed here.

However, the amount of skim milk used in cottage cheese and ice cream did not increase in spring and early summer to as great a degree as butterfat.

The amount of seasonal variation in the quantity of skim milk contained in all surplus milk was slightly greater than the amount of seasonal variation in the quantity of butterfat in surplus milk (Appendix Table VIII).

Appendix Table IX shows the dissimilarities which existed in the seasonal pattern of utilization of butterfat and skim milk in the various categories of use. The relationship between skim milk and butterfat showed the greatest variation

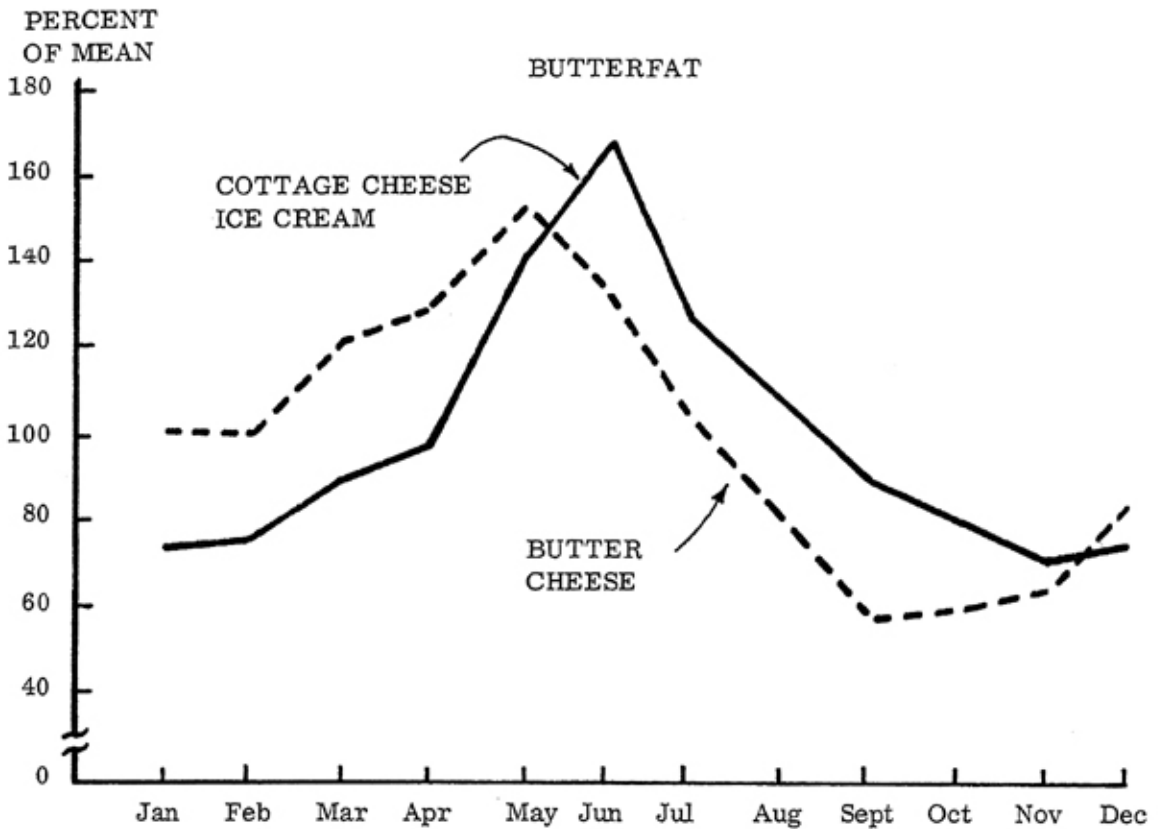


Figure 13. — Seasonality of Utilization of butterfat by category of product in 14 North Central Markets, 1950-1957.

for cottage cheese and ice cream. The low point in June, likely was due to the increase in production of ice cream.

The surplus residual for manufacture into butter, cheese, and related products was composed of the greatest proportion of skim milk in June. This apparently was the result of two coincident factors. At this time of year the butterfat test of market receipts was low. This also was the month when the largest proportion of butterfat was used in cottage cheese and ice cream.

SURPLUS HANDLING SYSTEMS

Each of the markets had developed a system of surplus milk handling unique to itself. Each was a product of the situation which existed in the market and of the personalities and institutions involved in its development.

Two principal criteria were considered by Williams and Kerchner in their development of categories of surplus milk handling arrangements.¹⁷ These were: (1) the place of processing the surplus milk and (2) the point of diversion if the surplus was diverted from the channels through which milk used in bottled products was marketed. If the milk was diverted in the country (category 1,

¹⁷Williams and Kerchner, *op. cit.*

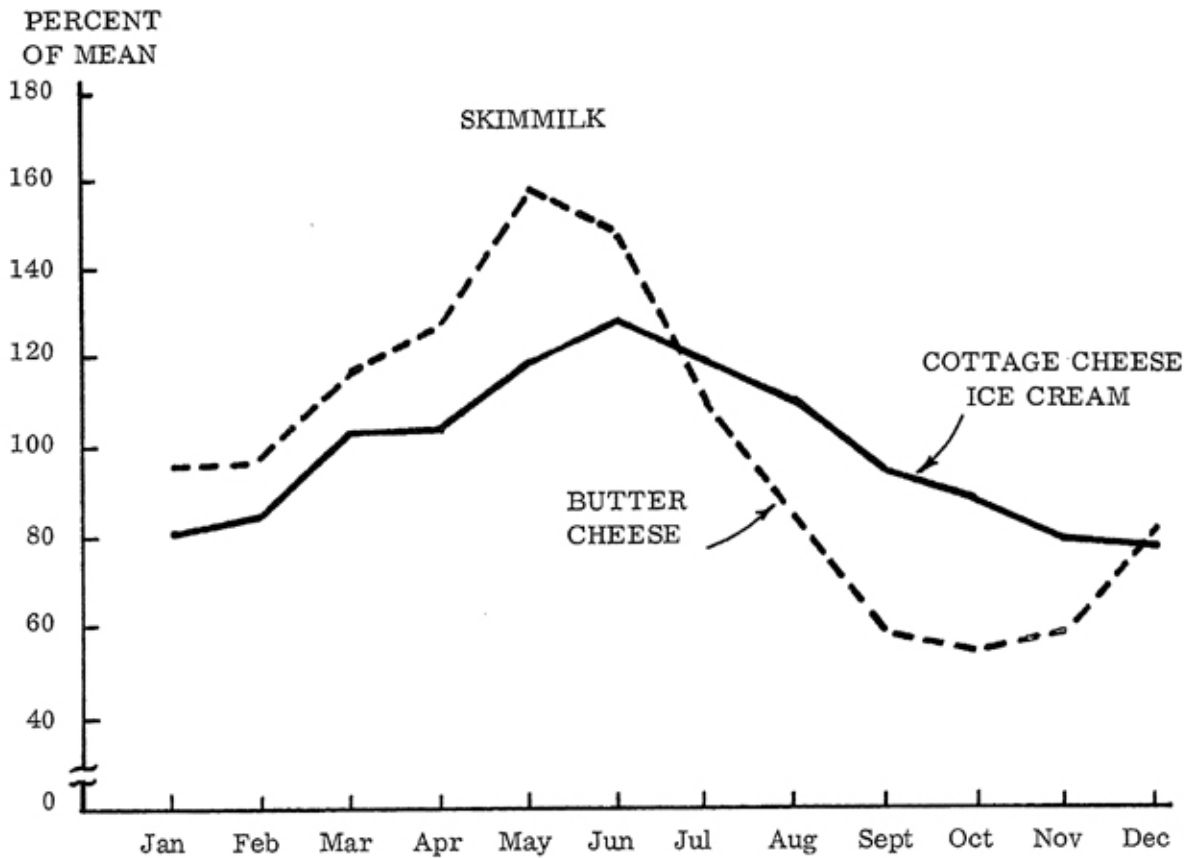


Figure 14. Seasonality of Utilization of Skimmilk by category of product in 12 North Central Markets, 1950-1957.

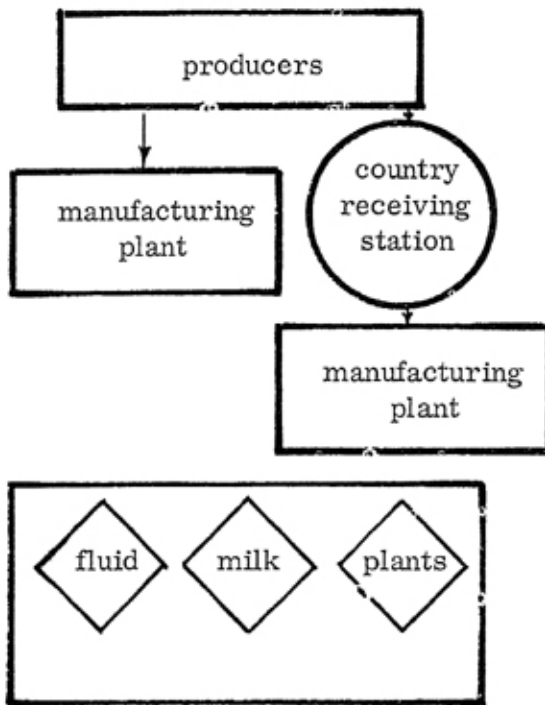
Figure 15), it was diverted directly to a manufacturing plant, or received at a country plant and transported in bulk to a manufacturing plant. Milk trucked into the city might or might not have been received by fluid handlers. The manufacturing plants to which it was diverted also might have been located in the city or out-of-town. Surplus milk manufactured in the plants of fluid milk handlers went through the same channels as milk for bottling purposes.

The flow lines on the chart (Figure 15) deal only with surplus milk and do not show the handling arrangements for that portion used for bottling purposes. In some instances, however, the channels through which the milk for bottling flowed influenced the method used in handling the surplus.

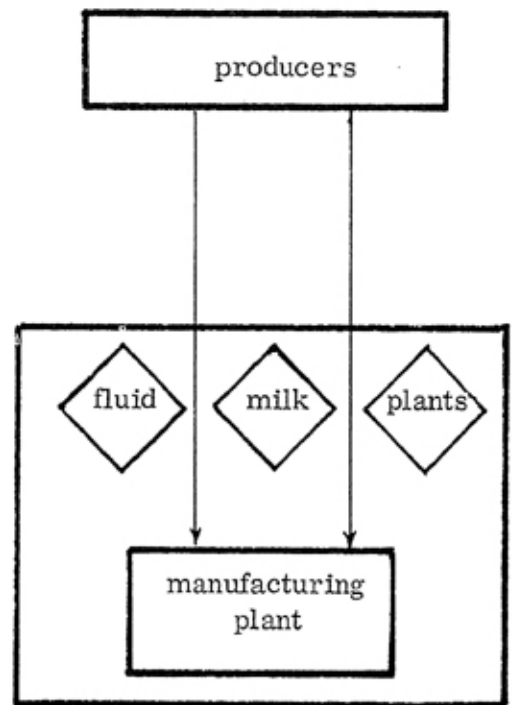
Usually not all of the surplus milk for a particular market was handled in the same way. The particular channel chosen for a specific lot of milk depended on the situation existing in the market at that time.

Year-Round or Chronic Surplus

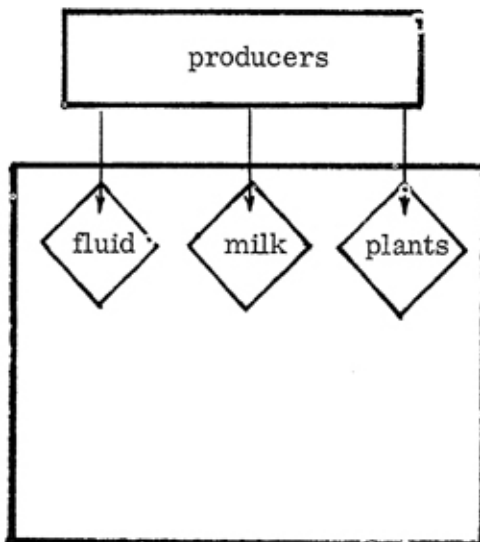
Some markets regularly had more Grade A milk than they needed for bottling purposes and operating reserves. Some of these markets were able during certain periods to ease the situation somewhat by furnishing milk for bottling purposes to other markets that were in short supply. Chicago and Twin Cities regularly furnished milk to other markets during the period covered by



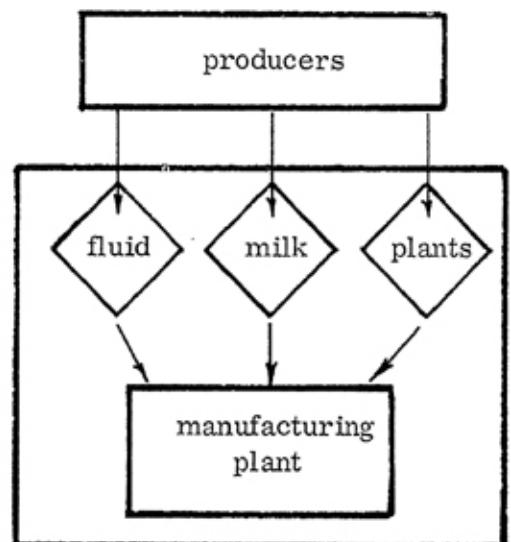
1. Diverted in the country.



2. Trucked into city and diverted to manufacturing facilities (either in or outside the city) but not received by fluid handlers.



3. Manufactured in plants of fluid milk handlers.



4. Trucked into city, received by fluid handlers, and diverted to manufacturing facilities (either in or outside the city).

Figure 15. Schematic representation of surplus milk handling arrangements.*

*Adapted from Williams and Kerchner.

this study. To utilize to the utmost such an outlet for additional fluid sales, a market should have a seasonal pattern of production opposite the average, that is, production should be high when that for other markets is low.

Of the year-round excess which could not be sold to other markets for bottling purposes, a large proportion was manufactured in facilities outside of handlers' plants. These facilities usually were furnished by producers' cooperatives, although private handlers in some markets had access to such facilities either by ownership or by tie-relations. The various methods for dealing with year-round surplus employed in the markets included in this study, and the agencies bearing the major responsibility are shown in Table XIII.

The evidence secured in this study indicates some producers' organizations may find it worthwhile to investigate the possibility of contracting disposal of the surplus for which they are responsible to the plant of an operating cooperative association, or to a specialized manufacturing firm. Where this is not feasible, part ownership of the manufacturing facilities may be satisfactory. These procedures may be just as satisfactory as full ownership of manufacturing facilities, and could avoid tying up large amounts of capital in plants not used to profitable capacity. A satisfactory handling arrangement, in some instances, could consist of some holding tanks and a large tank truck used to move the surplus to the most advantageous outlet currently available.

Seasonal Surplus

There were various methods employed to manage the seasonal surplus (Table XIV). Cooperatives played a major part in more than half the markets and participated in several others. Handlers assumed major responsibility for seasonal surpluses in several markets. Kansas City, Louisville, Milwaukee and Sioux City were examples. In Chicago, handlers and cooperatives about equally shared the responsibility.

Where facilities were provided to manufacture only Grade A surplus, seasonal variation in the volume of surplus caused operations, through much of the year, to be below capacity. In some markets these facilities, usually provided by cooperatives, were designated as "standby" plants, and sometimes were not used for manufacturing during the fall and winter months.

Distress pricing is a distasteful solution which occasionally has been employed. There are instances where a producers' association would be better off to sell its surplus at a distressed price than to acquire manufacturing facilities of its own. If the surplus is relatively small and if the distressed prices must be taken over a relatively short period of time during the year, then losses may be less than if large per-unit costs are incurred by operating a plant at considerably less than capacity over much of the year.

Day-to-Day Surplus

In 12 of the markets, cooperative associations had assumed a good part of the responsibility for day-to-day surplus. In seven markets, they had sole responsibility for it. In only two markets had handlers retained full responsibility for

TABLE XIII-METHODS EMPLOYED IN VARIOUS MARKETS FOR DEALING
WITH YEAR-ROUND SURPLUS, 1957

Market	No Prob- lem	Handled By:		Method
		Deal- ers	Cooper- atives	
Chicago		X	X	A large cooperative had facilities to handle surplus. Most of the dealers who did not depend on the cooperative had tie in with manufacturing plants.
Cincinnati	X			
Dayton-Springfield			X	Cooperative owned sufficient manufacturing facilities.
Detroit			X	Cooperative owned manufacturing facilities.
Evansville			X	Cooperative had contract with proprietary handlers to manufacture surplus.
Kansas City	X			
Louisville		X	X	Trend was toward more cooperative control of surplus. Cooperative installed holding tanks to get volume which could be sold and transported economically.
Madison			X	Cooperative owned manufacturing facilities.
Milwaukee		X		Dealers disposed of surplus through manufacturing plants which had adequate capacity.
St. Louis	X			
Sioux City		X		
Sioux Falls			X	Cooperative owned manufacturing facilities.
Topeka		X	X	Cooperative owned manufacturing facilities. Several proprietary manufacturing plants in area manufactured surplus for dealers.
Twin Cities			X	Cooperative owned manufacturing facilities.
Totals ^a	3	5	9	

^aTotals to more than 14 because responsibility was shared in some markets.

TABLE XIV-METHODS EMPLOYED IN VARIOUS MARKETS FOR DEALING WITH SEASONAL SURPLUS, 1957

Market	Handled By:		Method
	Deal- ers	Cooper- atives	
Chicago	X	X	Cooperative had sufficient facilities to handle surplus for which it was responsible except for two weeks or so in flush period when it occasionally sold a few loads at distress prices. Dealer's tie-in plants had plenty of capacity but were plagued with excess capacity during much of the year.
Cincinnati		X	Most of the large lots were diverted by the bargaining cooperative to proprietary manufacturing plants. The operating cooperative manufactures its own surplus.
Dayton-Springfield		X	Most was manufactured in cooperative plant. Main problem was seasonal labor.
Detroit		X	Cooperative owned sufficient facilities to handle surplus. This meant that it had tremendous investment in facilities for the amount of milk processed. Union labor was guaranteed a 40 hour week for permanent help. Only 8 weeks per year allowed for temporary help.
Evansville		X	Cooperative had contract with proprietary manufacturing plant to process surplus.
Kansas City	X	X	There were plenty of manufacturing plants in the area to care for dealers' surplus. Occasionally they would fail to recover handling and transportation costs. Cooperative diverted most of its surplus to manufacturing plants owned by operating coops.
Louisville	X	X	Sold to proprietary manufacturing plants.
Madison		X	Most of surplus was manufactured in cooperative owned plant. Occasionally some had to be sold to proprietary manufacturing plants in the area. In this case it sometimes took a little shopping to avoid loss but this usually was done.
Milwaukee	X		Dealers dispose of surplus through tie-in manufacturing plants.
St. Louis		X	Mostly manufactured in cooperative owned plants.
Sioux City	X		

TABLE XIV (Continued)

Market	Handled By:		Method
	Deal- ers	Cooper- atives	
Sioux Falls		X	Processed in cooperative owned plant. Also manufactured skim received from creameries year-round to utilize facilities more completely.
Topeka	X	X	Cooperatives owned sufficient facilities. There were also proprietary plants in the area for any surplus dealers must dispose of. Dealers could not recover full investment on a few loads of milk in peak season.
Twin Cities		X	Cooperative owned adequate facilities to handle peak load. Plants operate inefficiently during part of year.
Totals ^a	6	12	

^a Totals to more than 14 since responsibility was shared in some markets.

the day-to-day surplus (Table XV).

Storage for use in fluid form at a later time usually has not been considered as a means for disposal of surplus Grade A milk. In recent years, however, a day-to-day or weekend type of surplus has developed in nearly all markets. Storage capacity is part of the answer to this problem.

Some handlers have attempted to cope with it by installing holding tanks in their plants. Possession of these facilities makes it possible to hold Sunday's milk for bottling on Monday. Part of Monday's milk is held over for processing on Tuesday and so forth 'till late in the week. The principal objection to this solution is the heavy investment in plant space and holding tanks.

Many cooperative associations are employing the same method of dealing with the problem. In the case of a cooperative association, particularly if it is supplementing regular supplies of handlers, as is done in the St. Louis market, the problem may be even more onerous. It may sell but little milk during the first part of the week and it may be Wednesday before sales of any consequence are made. Occasionally, late in the week, the cooperative association may be scouring adjacent markets and states in search of supplementary supplies.

In the absence of holding facilities, about the only outlet for extra milk during the fore part of the week is to sell it to manufacturing plants. This method of disposal increases the amount of surplus which it is necessary for the market to carry as reserve, and it reduces the percentage of fluid utilization. If no milk is carried over, even in the season of short production one-seventh or more of the market receipts will be used for manufacturing purposes. If sufficient local supplies are developed to meet market needs during the last of the week, there is a heavy surplus during the other days. If there are insufficient local supplies

for last of the week bottling, supplementary supplies must be brought in. Often this is expensive from the handler's viewpoint; and it also represents lost fluid sales for local producers. This problem was discussed further under the heading "Short-time Surpluses" in a previous study of surplus handling.¹⁸ When all costs are considered, in some markets it may actually be as economical to divert the early week surpluses to manufacturing plants as to provide holding facilities. The relative attractiveness of the two alternatives would depend to a considerable extent upon the availability of nearby manufacturing facilities and upon the relationship between the price which could be obtained for this milk and the cost of supplementary supplies. A market such as Chicago with considerable surplus and sufficient manufacturing facilities, probably would not consider holding early week surpluses for bottling later.

Some markets with centralized control of milk supplies have developed unique methods of dealing with this problem. In Louisville, which was strategically located, early week surplus on occasion was shipped to southern markets and later in the week supplementary supplies were purchased from northern markets. This procedure necessitates extra handling, but reduces the distance of shipment for some markets, and so allows handlers to bottle fresher milk. For

¹⁸Williams and Kerchner, *op. cit.*

TABLE XV-METHODS EMPLOYED IN VARIOUS MARKETS FOR DEALING WITH WEEKEND AND DAY TO DAY SURPLUS, 1957

Market	Handled By:		Method
	Deal- ers	Cooper- atives	
Chicago	X	X	1. Cooperative manufactured milk on week-ends the year-round. 2. Some handlers a. held over b. sold to a manufacturing plant c. did not buy any weekend milk d. diverted directly to own manufacturing plant
Cincinnati		X	Cooperative had holding tanks and manufactured the excess. Most handlers did not take milk on Saturday or Sunday. Some even went to a 4-day bottling week. (Monday, Tuesday, Thursday, Friday).
Dayton-Springfield		X	Cooperative had holding facilities but most went into manufacturing products. A telephone call by handler diverted surplus to cooperative.
Detroit		X	Most manufactured by cooperative. Union had guaranteed 40 hour week. When some men used only 3 days per week, added to cost.

TABLE XV (Continued)

Market	Handled By:		Method
	Deal- ers	Cooper- atives	
Evansville		X	Cooperative sent surplus to manufacturing plant at 10¢ premium over manufacturing milk plus transportation and handling cost.
Kansas City	X	X	Several handlers had holding facilities. At least one had a full supply contract. Another diverted direct to country plant at manufacturing price. Milk under cooperative control was not brought to town unless needed. Excess directed to manufacturing plants, which sometimes complained about extra weekend milk during flush season.
Louisville		X	Quality problems and holding facilities limited the extent to which the cooperative could hold over. It sold some to other markets on flush days and bought some on short days.
Madison		X	Cooperative manufactured weekend surplus. Had problem of underemployed labor during rest of week.
Milwaukee	X		Held for bottling next day.
St. Louis	X	X	Some dairies held weekend milk for bottling next day. Two cooperatives manufactured weekend milk. Another cooperative held weekend milk for bottling later. Excess above anticipated sales was manufactured.
Sioux City	X		Handlers staggered bottling days so that all did not have same non-bottling days. Milk from closed plants diverted to those bottling on any particular day.
Sioux Falls		X	Except in flush season, holding facilities were adequate. In flush season, some was manufactured on Sunday. Handlers helped pay extra cost of handling weekend surplus.
Topeka	X	X	Several handlers had holding tanks. Other diverted to a proprietary manufacturing plant. The cooperative had manufacturing facilities.
Twin Cities		X	Cooperative had manufacturing facilities. Handled all surplus. Sometimes plant used only part of week.
Totals	6	12	

^aTotals to more than 14 because responsibility was shared in some markets.

this type of transaction to work, someone must have control of a considerable quantity of milk in the intermediate market.

In Sioux City, the day-of-the-week problem had been worked out by the handlers staggering non-bottling days so that some handler bottled each day of the week. The supplies from the closed plants were diverted to other plants.

All Surplus

Nine markets furnished data on the quantities of surplus Grade A butterfat and skim milk disposed of under each of various arrangements and manufactured into each of the two major classes of products made from surplus milk. Similar butterfat data for Chicago were not aggregated with those for the other markets. Chicago was so large relative to the others that data for that market would unduly have influenced the averages.

In the nine markets other than Chicago, receiving handlers processed more than two-thirds of the surplus which was made into cottage cheese and ice cream (Table XVI). On the other hand, the bargaining cooperative diverted

TABLE XVI-METHODS OF HANDLING GRADE A SURPLUS, 9 NORTH CENTRAL MARKETS, JULY 1956 - JUNE 1957^a

Method	Cottage Cheese, and Ice Cream		Butter, Cheese, and Similar Products	
	Skimmilk	Butterfat	Skimmilk	Butterfat
	Percent			
Processed by Receiving Handlers	70.0	66.5	22.3	12.6
Interhandler Transfer	0.2	0.8	0.9	1.0
Pool Plant to Non-Pool Plant	11.0	9.8	18.5	26.9
Diverted by Bargaining Association	18.8	22.9	56.8	57.8
Diverted by Operating Cooperative	0	0	1.5	1.7
Total	100.0	100.0	100.0	100.0

^aDetroit, St. Louis, Madison, Milwaukee, Sioux Falls, Sioux City, Louisville, Kansas City, Evansville.

most of that which was made into butter, cheese, etc. The handlers, however, retained responsibility for a sizeable portion, in total, about 40 percent.

The situation was quite similar in Chicago except that in this market the handlers had retained responsibility for a larger portion (Table XVII). Of the surplus which was made into cottage cheese and ice cream over 90 percent was processed in the plants of handlers. Of that made into butter, cheese, etc., approximately one-half was disposed of by handlers and half by producer cooperatives.

TABLE XVII—METHODS OF HANDLING GRADE A SURPLUS BUTTERFAT
IN THE CHICAGO MARKET, JULY 1956–JUNE 1957

IN THE CHICAGO MARKET, JULY 1933-JUNE 1934		
Method	Cottage Cheese and Ice Cream	Butter, Cheese, and Similar Products
	Percent	
Processed by Handlers	93.8	4.6
Pool Plant to Non-Pool Plant	5.1	43.8
Cooperative Standby Plants	0	10.6
Diverted by Operating Cooperatives	0	2.7
Processed in Plants Operated by Cooperatives	1.1	38.3
Total	100.0	100.0

It should be emphasized that the data presented in this study deal with the processing of Grade A milk into the various manufactured products and do not deal with the total production of these items. When it is pointed out that most of the Grade A milk made into cottage cheese and ice cream was processed in the plants of receiving handlers, this does not mean that most cottage cheese and ice cream was manufactured in these plants. Large quantities of these items were made in non-pool plants from manufacturing grade milk.

The foregoing material, showing the relative importance of different handling arrangements for surplus milk used in each of the two major product categories, was based on totals for the 12-month period July, 1956–June, 1957. To examine seasonal changes in arrangements, monthly data for the same period were summarized for eight markets for which comparable data were available.¹⁹

Of the surplus butterfat and skim milk used in cottage cheese and ice cream, the proportion processed by receiving handlers did not change much from month to month. The quantities of these components used by handlers in these products increased somewhat during the spring and summer months as did producer receipts. Nevertheless, during most months of the year handlers processed about 75 percent of the butterfat and 80 percent of the skim milk used in these items. Most of the remainder was sold to non-pool plants. These proportions also were relatively uniform from month to month.

In contrast, considerable seasonality was evident in the handling arrangements for surplus milk used in butter, cheese, and similar products. With both butterfat and skim milk going into these products, the proportions marketed by handlers (processed by handlers or sold by them to other handlers or to non-pool plants) declined in the late spring and summer months. On the other hand,

¹⁹Kansas City, St. Louis, Madison, Milwaukee, Sioux Falls, Sioux City, Louisville, and Evansville. Detroit was omitted from this analysis because a major surplus milk outlet in that market was purchased by the bargaining association from a proprietary handler during the period and this transaction distorted the seasonal pattern.

the proportions diverted by cooperatives increased in the late spring and summer months. An examination of the data for individual markets showed that in a number of them the cooperatives apparently took care of a considerable part of the surplus which would have been unduly burdensome to handlers. In some other markets the handlers themselves dealt with this increased spring and summer surplus.

For these eight markets, of the total of all surplus butterfat and skim milk disposed of by each of the several handling arrangements, the proportions varied seasonally in much the same manner as the proportions used in butter, cheese, and such products, though not quite as widely. The percentages which handlers either manufactured in their own plants or sold to other plants were lower in the late spring and summer than in the fall and winter. On the other hand, at the peak of their surplus handling activity in May and June, cooperatives diverted nearly twice as large a proportion as they did at their low point in these activities in October. In terms of quantities, these seasonal changes in surplus milk handled reflected the manufacture of fairly uniform amounts of both butterfat and skim milk from month to month by handlers themselves. Non-pool plants manufactured about half again as much butterfat, and twice as much skim milk, in the peak month as in the low month. Cooperatives diverted three times as much butterfat, and more than three times as much skim milk, in the peak month as in the low month.

Cooperative standby plants processed most of the surplus in the Twin Cities market (Table XVIII). These plants handled a larger share of the surplus during the spring months. This was particularly true of the skim milk, as was evidenced by the lower butterfat tests of the milk going to these plants during this period of the year. During June, July, August, September, and October, the test of surplus processed by regular bottling plants was considerably higher than in other months. This likely was due to the greater proportion of ice cream manufactured at that time of year.

In the eight markets, however, there was little indication that the cooperatives diverted a disproportionately large part of the skim milk (Table XIX). The butterfat content of surplus milk used in cottage cheese and ice cream showed little seasonal variation, though it appeared to increase slightly in the late spring and early summer. In that season, there seemed to be a compensating decline in the butterfat content of that portion of the surplus milk manufactured by handlers or sold to non-pool plants that was used in butter and cheese. A somewhat similar but less pronounced seasonal pattern was evident in the butterfat content of surplus milk diverted by cooperatives and made into products of this nature. In considering the quantity and seasonal character of the butterfat content of these disposals, it should be noted that three of the four comparatively large markets in the group were in the southern part of the region. Surpluses of butterfat are larger relative to surpluses of skim milk in this area than in the northern part of the region.

TABLE XVIII-TYPE OF PLANT IN WHICH SURPLUS WAS MANUFACTURED BY MONTH OF THE YEAR,
TWIN CITIES MARKET, 1954-1957^a

Month	Regular Milk Bottling Handlers		Cooperative Standby Plants		Non-Pool Manufacturing Plants	
	Butterfat + Skimmilk	Butterfat Test	Butterfat + Skimmilk	Butterfat Test	Butterfat + Skimmilk	Butterfat Test
	Million Lbs	Percent	Million Lbs	Percent	Million Lbs	Percent
Jan.	14.2	4.77	103.1	3.25	31.8	2.42
Feb.	14.2	4.68	122.0	3.19	39.2	2.80
Mar.	14.1	4.84	150.8	3.23	40.5	2.65
Apr.	13.4	4.90	124.8	3.41	42.1	3.27
May	14.2	4.86	154.1	2.81	34.4	3.86
June	13.1	5.18	141.4	2.77	38.3	3.63
July	10.8	5.18	105.8	2.68	27.4	4.20
Aug.	8.6	5.76	79.3	2.78	26.8	4.17
Sept.	7.8	5.59	74.9	3.07	23.8	4.00
Oct.	8.3	5.39	82.8	3.15	28.9	3.54
Nov.	9.9	4.95	86.9	3.12	30.2	3.08
Dec.	12.6	4.64	125.6	3.00	30.4	2.92
Total	141.2	5.00	1,351.5	3.01	393.8	3.33

^aQuantities shown are totals for the 4 year period.

TABLE XIX-AVERAGE BUTTERFAT TEST OF SURPLUS GRADE A MILK DISPOSED OF BY MAJOR HANDLING ARRANGEMENTS AND USED IN VARIOUS PRODUCT CATEGORIES, EIGHT NORTH CENTRAL MARKETS, JULY 1956-JUNE 1957^a

Year and Month	Used in Cottage Cheese and Ice Cream		Used in Butter, Cheese, and Similar Products			Used in All Products		
	Manufactured by Receiving Handlers	Sold by Pool Plants to Non-Pool Plants	Manufactured by Receiving Handlers	Sold by Pool Plants to Non-Pool Plants	Diverted by Producer Cooperatives	Manufactured by Receiving Handlers	Sold by Pool Plants to Non-Pool Plants	Diverted by Producer Cooperatives
	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent
<u>1957</u>								
Jan.	2.3	3.0	4.6	6.5	4.6	3.0	5.8	4.5
Feb.	2.4	3.4	3.8	5.9	4.0	2.8	5.4	4.0
Mar.	2.3	3.1	4.2	6.0	3.8	2.8	5.1	3.8
Apr.	2.4	4.0	3.1	5.7	3.9	2.5	5.2	3.9
May	2.6	3.9	2.6	4.4	4.0	2.6	4.3	4.0
June	2.6	4.0	2.4	4.8	4.2	2.5	4.6	4.2
<u>1956</u>								
July	2.6	2.9	2.6	6.3	4.6	2.6	5.3	4.6
Aug.	2.4	3.0	3.3	6.9	4.8	2.6	5.6	4.8
Sept.	2.4	2.8	4.2	7.8	4.8	2.8	6.1	4.9
Oct.	2.4	3.3	5.4	7.8	4.6	2.9	6.3	4.6
Nov.	2.4	2.8	6.8	6.9	3.9	3.3	5.7	3.9
Dec.	2.3	2.7	5.2	5.8	4.2	3.1	5.1	4.1
Average	2.4	3.2	4.0	6.2	4.3	2.8	5.4	4.3

^aKansas City, St. Louis, Madison, Milwaukee, Sioux Falls, Sioux City, Louisville, and Evansville. Although the data are for the last half of 1956 and first half of 1957, they have been arranged in the tables with the 1957 data first in order to preserve the normal sequence of the months.

CONCLUSIONS AND RECOMMENDATIONS

One of the first alternatives which will be explored by a market with chronic or year-round surplus will be to search for other markets to which bulk sales of milk for fluid utilization can be made. Two factors are of paramount importance here. One is health department acceptance and the other is price. Under the conditions which exist today, a deficit market can get milk from a wide area. The market which can deliver milk acceptable to the health authorities at the lowest price, likely will get the business. Stability of demand in the deficit market and of supply in the surplus market also will be important considerations.

The possibility of controlling the surplus should be investigated. Perhaps field representatives have been unduly active in stimulating manufacturing milk producers to convert their facilities to Grade A standards. Grade A prices that are too high in relation to the price of manufacturing milk in a milkshed also may encourage too rapid a development of Grade A supplies. Some markets may employ some type of quota system or "closed base". Some states have had fair success with such measures.

Lacking outside sales at the higher prices paid for milk consumed in fluid form or the ability to control the surplus, leaders in the market will seek to manage it so as to maximize returns to the productive resources involved. Methods should be devised to minimize the work involved in hauling and handling the milk. In larger markets with a considerable part of the milk collected by farm tank trucks, some type of country diversion to processing facilities should be established. Even in smaller markets or those with most of the milk collected in cans, possibilities exist for reducing surplus management costs. Administration of payments to producers should be organized so that the milk can be received directly by the plant which is to process it. A little planning can make it possible for the driver of a farm collection truck to report in by telephone and, if his load is not needed in the city, to divert it directly to a manufacturing plant.

Leaders in many markets, either large or small, if they have a surplus problem might well consider the initiation of some type of centralized management of the milk supply. Such a system should reduce the possibility of one handler importing milk, at a higher cost to himself, while another has an excess in his plant. Aside from the possibility of reducing the overall surplus by coordination, such a system could make possible better outlets for the surplus by being able to direct it to the most desirable outlets, and perhaps in some instances by being able to bargain for larger lots. Such planning also can reduce the cost of cross and back hauling of milk in the market.

In some markets, the producers' cooperative association can reduce milk collection expenses materially by controlling the movement of farm bulk trucks. In others, the acquisition of a large over-the-road tank truck and/or a contract with an operating cooperative association or a proprietary manufacturing plant may offer the best solution.

The purchase or construction of manufacturing facilities by a cooperative association involves a heavy investment which may be recovered only by long use. Also, in many instances, because of the great seasonality of the surplus, the plant may have to be operated at a loss during a portion of the year. This action is most likely to be necessary in a milkshed which does not have proprietary or cooperative manufacturing plants, or where these plants already are operated to near capacity during the flush season.

Leaders in a market with a seasonal surplus problem may profit by considering most of the recommendations for the market with a year-round or chronic surplus, except that outside sales for fluid consumption probably will not be a possibility for them. This is true because their surplus will occur at the same time of year when most other markets are flush with milk. Some additional actions, however, can be taken. First there is the possibility of initiating some form of seasonal pricing plan to encourage a more even seasonal production of milk. The two most common forms are: 1, some type of base-surplus or quota-excess plan; 2, a fall premium, or take-off—pay-back plan. Considerable research has been done on the effectiveness and relative merits of these plans. Data provided by this study indicated that a measure of success has been achieved in markets where these plans have been used.

Cottage cheese and ice cream constitute relatively high uses for surplus milk. The high point in the amount of milk used in these products coincides rather closely with the high point in the seasonal production. Some plants have expanded their outlets for milk during the flush season by specializing in the production of one or the other of these products. Cottage cheese, especially with new methods of packing, can be shipped relatively long distances. Many bottling plants no longer attempt to produce their own cottage cheese but purchase the curd directly from a specialized manufacturer. It needs to be made clear, however, that even though the seasonality of consumption of these products coincides with that of milk production, this alone cannot at present constitute a solution to the seasonal surplus problem, because the total amount of milk used in them is too small. A fruitful field for additional research might be in this area. If high value products could be developed which require large amounts of milk in spring and summer, much of the sting would be removed from the surplus problem.

The increase of milk sales through stores and the weekend shopping habits of consumers have created a new type of milk surplus problem. Whereas it used to be necessary to provide the housewife with a daily supply of milk, a modern household refrigerator makes frequent delivery unnecessary. Many families purchase the major portion of their week's supply during the regular weekend trip to the grocery store. This procedure creates a shortage of milk during the last of the week and a surplus during the forepart. Because of the bulkiness and perishability of milk, storage usually is not a solution to the surplus problem. Modern quality control methods in producing and processing milk and modern cold-wall storage tanks, however, make it possible to ease the day to day problem. In

some of the markets, storage was provided by the producers' association, in some by the handlers, and in some by both groups.

This bulge in the week's bottling output causes some fluid milk processors as much difficulty and added expense with their management of labor as with the supply of milk.

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APPENDIX

APPENDIX TABLE I—GRADE A BUTTERFAT EXCESS TO BOTTLING NEEDS
SEGREGATED INTO NECESSARY RESERVE, CHRONIC SURPLUS,
AND SEASONAL SURPLUS, 10 NORTH CENTRAL MARKETS,
AVERAGE YEAR, 1950-1957

	5 Least Seasonal Markets	5 Most Seasonal Markets
1. Producer receipts (1,000 pounds)	75,538	217,223
2. Fluid use (1,000 pounds)	57,564	136,743
3. Total surplus (1,000 pounds) Producer receipts minus fluid use	17,974	80,480
4. Necessary reserve (1,000 pounds) Fluid Use X 10%	5,756	13,674
5. Year-round or chronic surplus (1,000 pounds) ^a	7,399 ^b	27,032 ^c
6. Seasonal Surplus (1,000 pounds) Total surplus minus chronic surplus minus necessary reserve	4,819	39,774
	Percent of Producer Receipts	
7. Necessary reserve	7.6	6.3
8. Chronic surplus	9.8	12.4
9. Seasonal Surplus	6.4	18.3
10. Fluid use	76.2	63.0
	Percent of Fluid Use	
11. Seasonal surplus	8.4	29.1

^a $\frac{\text{Excess in low month}}{\text{Days in that month}} \times 365$

^bSurplus in excess of necessary reserve during low month. (Nov.) 608,000 pounds.

^cSurplus in excess of necessary reserve during low month. (Oct.) 2,296,000 pounds.

APPENDIX TABLE II-SURPLUS OF BUTTERFAT DUE TO MONTHLY VARIATION
IN CONSUMPTION OF FLUID MILK PRODUCTS IN 14 NORTH CENTRAL
MARKETS, 1950-1957

Month	Amount which Would Have Been Used at Highest Monthly Rate ^b	Actual Use	Surplus Due to Monthly Variation in Fluid Consumption
(1,000 pounds)			
January	19,636	18,550	1,086
February ^a	17,894	17,204	690
March	19,636	18,858	778
April	19,003	18,019	984
May	19,636	18,419	1,217
June	19,003	17,400	1,603
July	19,636	17,125	2,511
August	19,636	17,649	1,987
September	19,003	18,498	505
October	19,636	19,591	45
November	19,003	19,003	0
December	19,636	19,418	218
Total	231,358	219,734	11,624

^aAverage 28.25 days for time period covered.

^bBased on highest daily rate in November.

APPENDIX TABLE III-WHOLE MILK EQUIVALENT OF DAIRY PRODUCTS
NORTH CENTRAL REGION AND KENTUCKY

Year	Ice Cream, Cottage Cheese etc. ^a	Butter, Cheese, etc. ^a	Milk in Commercial Channels for Fluid Consumption ^c	Total Milk and Cream Sold to Plants and Dealers ^b
(1,000,000 pounds)				
1950	2,952	36,819	14,843	54,614
1951	3,154	34,279	16,215	53,648
1952	3,328	33,718	17,025	54,071
1953	3,469	37,515	16,438	57,422
1954	3,518	37,907	17,117	58,542
1955	3,689	37,068	18,315	59,072
1956	3,862	39,252	17,756	60,870
1957	3,921	38,904	18,862	61,687
1958	3,814	38,334	19,551	61,699
Total	31,707	333,796	156,122	521,625

^aProduction of Manufactured Dairy Products, 1950-1958.

^bMilk, Farm Production Disposition and Income, 1951-1959.

^cDifference between total milk sold to plants and dealers and milk equivalent of manufactured dairy products.

APPENDIX TABLE IV-UTILIZATION OF BUTTERFAT IN 14 NORTH CENTRAL MARKETS, 1950-1957

Year	Ice Cream, Cottage Cheese etc.	Butter, Cheese, etc.	Total Fluid Use	Total Utilization
(1,000 pounds)				
1950	21,562	70,688	155,077	247,327
1951 ^a	22,523	60,003	174,283	256,809
1952 ^b	24,502	77,686	221,754	323,942
1953	23,958	112,857	227,935	364,750
1954	26,286	115,407	237,250	378,943
1955	27,078	102,792	250,378	380,248
1956	28,902	128,034	252,999	409,935
1957	30,590	147,979	255,366	433,935
Total	205,401	815,446	1,775,042	2,795,889

^aMilwaukee data first available in 1951.^bDetroit and Sioux Falls data first available in 1952.

APPENDIX TABLE V-PROPORTION OF BUTTERFAT UTILIZED IN DIFFERENT CATEGORIES OF SURPLUS, 14 NORTH CENTRAL MARKETS, 1950-1957

Year	Cottage Cheese, etc.		Butter, Cheese, etc.		Total Surplus Utilization
	1,000 pounds	Percentage	1,000 pounds	Percentage	1,000 pounds
1950	21,562	23.4	70,688	76.6	92,250
1951	22,523	27.3	60,003	72.7	82,526
1952	24,502	24.0	77,686	76.0	102,188
1953	23,958	17.5	112,857	82.5	136,815
1954	26,286	18.6	115,407	81.4	141,693
1955	27,078	20.9	102,792	79.1	129,870
1956	28,902	18.4	128,034	81.6	156,936
1957	30,590	17.1	147,979	82.9	178,569
Total	205,401	20.1	815,446	79.9	1,020,847

APPENDIX TABLE VI-SEASONALITY OF UTILIZATION OF BUTTERFAT
IN 14 NORTH CENTRAL MARKETS, 1950-1957

Month	Ice Cream		Butter, Cheese, Etc.	
	Cottage Cheese, Etc.		Average	
	Average (1,000 lbs)	Percent of Mean	Average (1,000 lbs)	Percent of Mean
January	1,568.9	74.4	8,466.1	102.7
February	1,612.6	76.5	8,432.1	102.2
March	1,929.2	91.5	10,069.5	122.1
April	2,084.8	98.9	10,775.6	130.7
May	2,929.0	139.0	12,557.5	152.2
June	3,555.5	168.8	11,010.8	133.5
July	2,669.4	126.7	8,533.1	103.5
August	2,272.0	107.8	6,627.3	80.4
September	1,888.7	89.6	4,937.9	59.9
October	1,716.3	81.4	4,942.7	59.9
November	1,508.7	71.6	5,376.1	65.2
December	1,556.0	73.8	7,231.7	87.7
Total	25,291.1	1200	98,960.4	1200
Average	2,107.6	100	8,246.7	100

APPENDIX TABLE VII-SEASONALITY OF UTILIZATION OF SKIMMILK
IN 12 NORTH CENTRAL MARKETS, 1950-1957^a

Month	Cottage Cheese		Butter, Cheese, Etc.	
	Ice Cream, Etc.		Monthly Avg.	
	Monthly Avg. 1,000 pounds	Percent of Mean	Monthly Avg. 1,000 pounds	Percent of Mean
January	33,952.4	81.0	229,500.6	97.7
February	35,845.0	85.5	234,058.5	99.7
March	43,683.0	104.2	279,138.4	118.8
April	43,843.6	104.5	302,372.2	128.7
May	50,904.5	121.4	371,958.9	158.2
June	53,820.0	128.2	345,337.6	147.0
July	50,552.9	120.5	251,738.3	107.1
August	46,634.4	111.2	193,748.6	82.4
September	40,001.4	95.4	139,019.3	59.2
October	37,359.1	89.1	131,804.4	56.1
November	33,693.1	80.3	142,890.0	60.8
December	32,998.4	78.7	198,168.7	84.3
Total	503,287.8	1200	2,819,735.5	1200
Average	41,940.6	100	234,978.0	100

^aSkim milk data from Milwaukee and Madison not useable.

APPENDIX TABLE VIII-SURPLUS UTILIZATION OF BUTTERFAT AND SKIMMILK
 COMPARED BY MONTHS, 14 NORTH CENTRAL MARKETS
 1950-1957 AVERAGE

Month	Butterfat		Skimmilk ^a	
	Average 1,000 pounds	Percent of Mean	Average 1,000 pounds	Percent of Mean
January	10,035.0	96.9	263,453.0	95.1
February	10,044.7	97.0	269,903.5	97.7
March	11,998.7	115.9	322,821.4	116.6
April	12,860.4	124.2	346,215.8	125.0
May	15,486.5	149.5	422,863.4	152.5
June	14,566.3	140.7	399,157.6	144.0
July	11,202.5	108.2	302,291.2	109.2
August	8,899.3	86.0	240,383.0	86.8
September	6,826.6	65.9	179,020.7	64.7
October	6,659.0	64.3	169,163.5	61.1
November	6,884.8	66.5	176,583.1	63.8
December	8,787.7	84.9	231,167.1	83.5
Total	124,251.5	1200	3,323,023.3	1200
Average	10,354.3	100	276,918.6	100

^aData for 12 markets.

APPENDIX TABLE IX-SEASONALITY, RATIO OF SKIMMILK TO BUTTERFAT
IN NORTH CENTRAL MARKETS, 1950-1957

Month	Total Non Fluid		Cottage Cheese, Ice Cream, Etc.		Butter, Cheese, Etc.	
	Ratio ^a	Index ^b	Ratio ^a	Index ^b	Ratio ^a	Index ^b
January	26.2	98.1	21.6	108.5	27.1	95.1
February	26.9	100.7	22.2	111.6	27.8	97.5
March	26.9	100.7	22.6	113.6	27.7	97.2
April	26.9	100.7	21.0	105.5	28.1	98.6
May	27.3	102.2	17.4	87.4	29.6	103.9
June	27.4	102.6	15.1	75.9	31.4	110.2
July	27.0	101.1	18.9	95.0	29.5	103.5
August	27.0	101.1	20.5	103.0	29.2	102.5
September	26.1	97.8	21.2	106.5	28.2	98.9
October	25.4	95.1	21.8	109.5	26.7	93.7
November	25.6	95.9	22.3	112.1	26.6	93.3
December	26.3	98.5	21.2	106.5	27.4	96.1
Weighted Average	26.7		19.9		28.5	

^aThe ratios in this table were computed by dividing physical quantities of skim-milk in each of the categories (Appendix Table VII) by the physical quantities of butterfat in each of the categories (Appendix Table VI). This procedure makes it possible to compare the relationships between the two for each month of the year. The larger the ratio the greater the quantity of skimmilk used in relation to the butterfat.

These ratios cannot be used to compute the butterfat content of the various categories because only 12 of the markets provided skimmilk data.

^bThe indexes were constructed by dividing each of the ratios by the weighted average at the foot of the column.