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Supply and Utilization of Milk In the St. Louis and Kansas City Fluid Markets

C. C. ERWIN

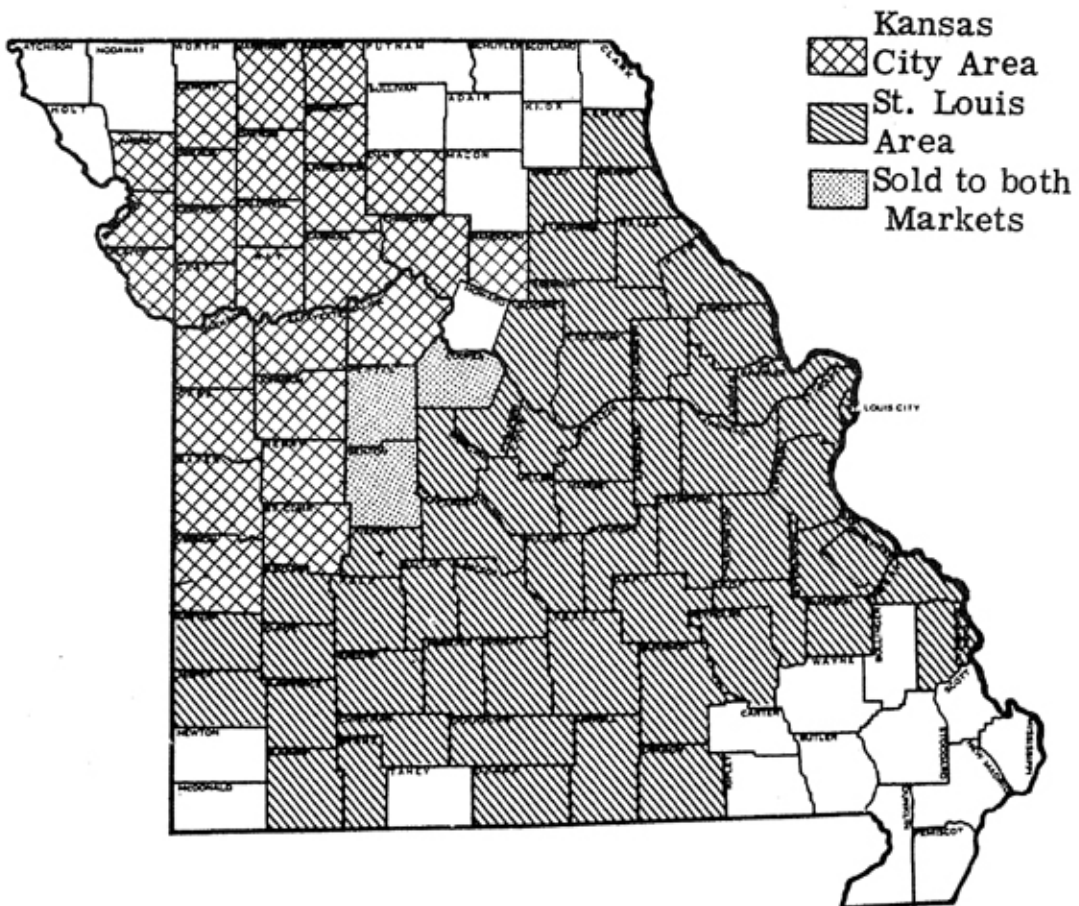


Fig. 1.—Milk producing areas within Missouri serving Kansas City and St. Louis markets, 1951.

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INTRODUCTION

The St. Louis and Kansas City fluid milk market obtain their primary milk supply from three different states—Missouri, Illinois, and Kansas. Due to its location, Missouri occupies a key position with respect to the supply in both markets (Fig. 1). In this study, therefore, an attempt was made to bring together as much information as possible concerning the production and consumption of milk in the St. Louis and Kansas City marketing areas, and to make such information available both to farmers and to leaders in the industry.

Objectives of the Study—The primary objectives of this study were: to determine the changes which have occurred in the supply and utilization of milk in the fluid markets of St. Louis and Kansas City in recent years; to determine the relative importance of the contribution of Missouri producers to these markets; and to assess the prospective demand for fluid milk in order to suggest such adjustments as may seem necessary to protect the capital investments of Grade A milk producers in Missouri.

Sources of Data—The primary data for this study were obtained from the records of the market administrators of the St. Louis and Kansas City Federal order markets. Other data were obtained from various sources, including the Census Bureau of the U. S. Department of Commerce; the Bureau of Agricultural Economics of the U. S. Department of Agriculture; and other miscellaneous reports.

MARKET AREAS

The metropolitan areas of St. Louis and Kansas City represent the principal outlets for the Grade A milk produced on Missouri farms. During the past 15 years, these markets became progressively more important as outlets for the farm supply. In 1950, more than 4,000 dairy farmers in more than 70 of the 114 Missouri counties delivered milk regularly to these markets. Although less than one-fifth of the Missouri milk sold to plants and dealers in 1950 was delivered to St. Louis and Kansas City, the influence of these markets extends to many smaller markets throughout the state. Therefore, in order to evaluate adequately their importance to the dairy farmers of Missouri, it seems desirable to analyze each of these markets in considerable detail.

The St. Louis Market Area

In 1934, the St. Louis milk marketing area¹, on the basis of its definition during the period for which the data apply, had a population of approximately 1,139,000 (Table 1). During the 1930's, the population re-

Table 1 -- Population, Annual Average Income per Person, Average Daily Sales of Whole Fluid Milk Within the Market Area, and per Capita Consumption, St. Louis Marketing Area, 1934-1950.

Year	Population* (000 omitted)	Average annual per capita income per person (\$ after taxes)†	Average daily sales of whole fluid milk** (thousand pints)	Per capita consumption daily (pints)
1934	1,139.3	---	499.6	.439
1935	1,145.2	---	486.3	.425
1936	1,151.2	910	474.3	.412
1937	1,157.1	910	468.6	.405
1938	1,163.1	---	468.0	.402
1939	1,169.0	---	498.7	.427
1940	1,175.0	763	504.4	.429
1941	1,193.4	1,043	546.8	.458
1942	1,211.8	1,266	608.2	.502
1943	1,230.2	1,702	689.3	.560
1944	1,248.6	1,705	711.8	.570
1945	1,267.0	1,443	760.7	.600
1946	1,285.4	1,493	803.2	.625
1947	1,303.8	1,716	778.0	.597
1948	1,322.2	1,639	743.5	.562
1949	1,340.6	1,738	757.7	.565
1950	1,359.0	---	787.6	.580

*Population was determined by taking the 1930, 1940 and 1950 Census enumerations of the various civil districts comprising the St. Louis Marketing Area as defined by Order No. 3, as amended, and then computing the population for all inter-census years by the straight-line method of interpolation. Note: estimates for military posts were not available.

†Figures were taken from *Sales Management* "Survey of Buying Power" issue of May 10 (formerly April 10) for St. Louis, for the years shown.

**Data computed from information furnished by the Market Administrator's Office, St. Louis, Missouri, Marketing Area. Note: sales to military posts within the marketing area were excluded.

mained relatively stable; however, during the 1940's, the population increased from 1,175,000 in 1940 to 1,359,000 in 1950. This amounts to a net increase of 15.7 per cent. Among the factors responsible for this rise in population were the increased rate of business activity resulting primarily from the manufacture of wartime supplies, especially during the

¹The St. Louis Marketing Area, during the period of time for which the data in this study are applicable, included "the territory within the corporate limits of the city of St. Louis, Kirkwood and Valley Park, Missouri; the territory within St. Ferdinand, Normandy, Clayton, Jefferson, Lemay, and Gravois Townships in St. Louis County, Missouri; the territory with Scott Field Military Reservation (excluded in this study), and East St. Louis, Centreville, Canteen, and Stites Townships in St. Clair County, Illinois.

Source: *Code of Federal Regulations Marketing Orders*, Part 903, Sec. 903.1.(e), Order No. 3, as amended, effective August 1, 1949.

first part of the decade, and the manufacture of larger quantities of civilian goods subsequent to the war period.

Along with the population increase in the St. Louis marketing area during the 1940's, the stimulus of wartime activities and the subsequent demand for consumer goods brought about a significant change in per capita income. The annual per capita income in the St. Louis areas rose from an average of \$763 in 1940 to \$1738 in 1949. With the exception of 1948, this represents a progressive yearly increase in per capita earnings throughout the past decade.

Principally because of the rise in population and per capita income, consumption of fluid milk in the St. Louis market increased considerably. During the past decade, according to the best estimates available, per capita consumption rose from 0.43 pint daily per person in 1940 to a peak of 0.62 pint in 1946, and then declined slightly to 0.58 pint in 1950. These figures indicate that approximately one third more fluid milk was consumed per person in 1950 than in 1940. While it must be kept in mind that these figures represent only estimates, they indicate clearly the existence of an upward trend in consumption of fluid milk in the St. Louis market. This has important future implications to dairy farmers in the St. Louis supply area, for it indicates the relative extent of the demand for fluid milk to which the farm supply must be adjusted.

The Kansas City Market Area

The Kansas City² milk marketing area presents more difficulty with respect to definition than that of St. Louis. This is due primarily to the fact that this area is not as clearly delineated as that of St. Louis. Therefore, it was necessary to estimate the population of the area by taking certain percentages of the counties involved rather than using the data obtained by a complete enumeration of the area by strictly defined civil subdivisions for census years. Despite these difficulties, the figures obtained are thought to be sufficiently accurate for comparative purposes.

On the basis of its present definition, the Kansas City marketing area³ had an estimated population of approximately 725,000 in 1940 (Table 2). By 1950, the population had risen to 847,000, an increase of 16.8 per cent during the past decade. This increase, like that in the St.

²Referred to technically as the Greater Kansas City Marketing Area.

³The Kansas City Marketing Area, during the period of time for which the data in this study are applicable, included "the territory in Jackson County, Missouri; that part of Clay County, Missouri, south of Highway 92, beginning at the Platte County and Clay County line, east to the west section line of section 26 in Washington Township, north to the north section line of said section 26, east to the Clay County, and Ray County line; Lee, Waldron, May and Pettis Townships in Platte County, Missouri; Wyandotte County, Kansas; Shawnee and Mission Townships in Johnson County, Kansas and Delaware, Leavenworth, and that part of Kickapoo and High Prairie Townships east of the 95th principal meridian in Leavenworth County, Kansas." Source: *Code of Federal Regulations Marketing Orders*, Part 913, Sec. 913.6, Order No. 13, as amended, effective January 1, 1951.

Louis area, appears to have been the result primarily of accelerated business activity which occurred in connection with the demand for war goods, during the first part of the decade, and that for additional consumer goods following the war period.

Accompanying the population increase, during the 1940's increased economic activities, brought about by wartime production and later by a greater demand for civilian goods, resulted in an upward trend in consumer incomes. Primarily as a result of the rise in population and in consumers' income, the consumption of fluid milk per person increased considerably during the period. According to the best estimates of those familiar with the Kansas City market, per capita consumption remained fairly stable at approximately one half pint per day during the late 1930's and early 1940's, and steadily increased from 0.45 pint in 1942 to 0.63 pint in 1950. This represents a net increase in consumption per person of about 40 per cent during the past eight years in the Kansas City market. Moreover, this represents a greater increase than took place in the St. Louis area. Perhaps this may be accounted for largely by the fact that per capita consumption was somewhat lower in the Kansas City market during the early 1940's than in the St. Louis market. At any rate, the consumption of milk per person in 1950 amounted to approximately the same in both markets.

In a preceding section, it was noted that there has been a general increase in per capita consumption of fluid milk in the St. Louis and Kansas City markets. However, per capita consumption of cream and miscellaneous milk drinks varied considerably in these markets (Table 3). In the St. Louis market, the consumption of cream per person decreased considerably during the past decade, while the consumption of miscellaneous milk drinks remained relatively stable. In the Kansas City market, per capita consumption of cream remained relatively stable; whereas, the consumption of miscellaneous milk drinks increased greatly.

Table 2 -- Population, Annual Average Income per Person, Average Daily Sales of Whole Fluid Milk Within the Market Area, and per Capita Consumption, Kansas City Marketing Area, 1940-1950.

Year	Population* (000 omitted)	Average annual per capita income per person (\$ after taxes)†	Average Daily sales of whole fluid milk** (thousand pts.)	Per capita consumption daily (pints)
1940	725.5	901	---	---
1941	373.7	982	---	---
1942	749.8	1164	335.6	.448
1943	762.0	1622	390.4	.512
1944	774.1	1634	413.0	.534
1945	786.3	1425	456.7	.581
1946	798.4	1690	492.6	.617
1947	810.6	2000††	486.8	.601
1948	822.7	1902	505.5	.614
1949	834.9	1880	521.8	.625
1950	847.0	---	533.9	.630

*Population was estimated by taking the 1940 and 1950 Census enumerations of the various civil districts comprising the Greater Kansas City Marketing Area, as defined by Order No. 3, as amended, and estimating a percentage figure with the help of the Market Administrator. The following percentages were used: In Missouri, Jackson County, 100 per cent; Clay County, 92 per cent; Platte County, 80 per cent; and in Kansas, Wyandotte County, 100 per cent; Leavenworth County, 93 per cent; Johnson County, 76 per cent.

†Figures were taken from Sales Management "Survey of Buying Power" issue of May 10 (formerly April 10) for Kansas City, for the years shown.

**Data taken from the Market Administrator's Bulletin, Volume VI, Number 5, March, 1951, Greater Kansas City Marketing Area. Data for years prior to 1942 were not considered representative due to changes in Marketing Area.

††Beginning with 1947, imputed rent from houses occupied by their owners was included, and thus the data are not strictly comparable with that shown for previous years.

Table 3 -- Per Capita Consumption of Cream and Certain Miscellaneous Milk Equivalents, St. Louis and Kansas City Marketing Area, 1941-1950*

Year	Per capita consumption in St. Louis Market		Per capita consumption in Kansas City Market	
	Cream†	Miscellaneous milk drinks**	Cream†	Miscellaneous milk drinks**
1941	---	---	.116	.026
1942	---	---	.119	.032
1943	.136	.052	.104	.038
1944	.118	.054	.102	.033
1945	.132	.054	.126	.037
1946	.131	.058	.148	.039
1947	.120	.050	.136	.035
1948	.110	.049	.122	.047
1949	.099	.047	.118	.053
1950	.091	.048	.115	.059

*Data computed from information obtained from the Marketing Administrators' offices, St. Louis and Kansas City Marketing Areas.

†Cream stated in terms of 3.5 per cent milk equivalent.

**Includes buttermilk, chocolate milk, and skim milk (skim milk reported for Kansas City market beginning in 1948), stated in pints of production irrespective of butterfat test, which averaged approximately 1.5 per cent.

SUPPLY AREAS

As fluid milk is a highly perishable commodity and must be moved promptly from the place of production to the place of consumption, the supply area of fluid milk market usually is located immediately adjacent to the market, while those for fluid cream and manufacturing milk are located in zones farther away from the market (Fig. 2). Not only does this make it possible for milk to be hauled from farms to plants in a minimum of time, but also it enables milk to be transported at minimum cost, thus effecting important savings for producers. With certain important modifications which will be considered later, the location of the supply areas of the primary fluid milk markets of Missouri conform closely to this principle.

Location of the Missouri Supply Areas

While the Kansas City milkshed, that is, the area from which the market receives the major part of its milk supply, conforms closely to the conditions usually set up for a supply area, the St. Louis milkshed is much greater in extent and production is much less concentrated. Although the Kansas City market received milk from only 24 Missouri

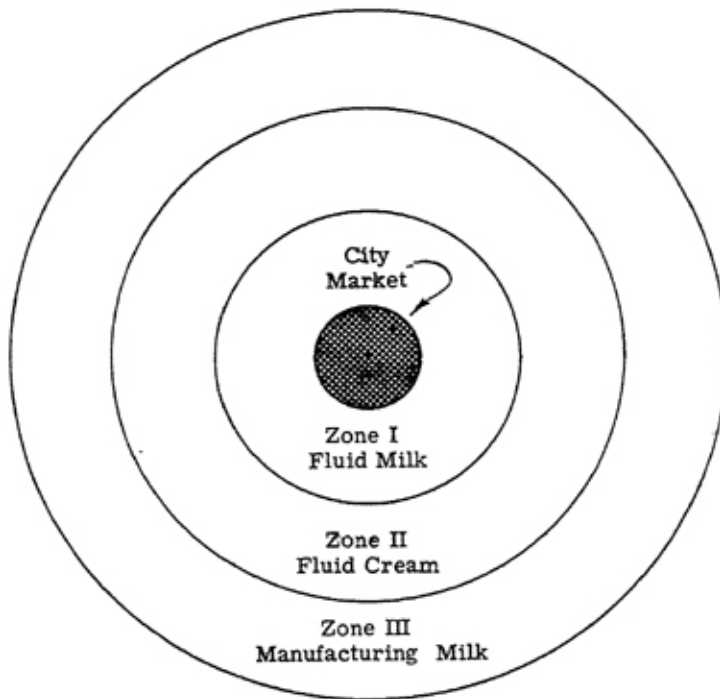


Fig. 2.—Theoretical milkshed where land adjacent to the city market is equally adapted for dairy and where transportation facilities are equally available from all directions.

counties in 1949⁴, the St. Louis market received milk from 59 Missouri counties during approximately the same period.

In order to clarify more specifically the difference in the characteristics of the St. Louis and Kansas City supply areas, it seems desirable to analyze them in more detail, particularly in regard to the systems of farming practiced in each of the respective areas. In the suburban areas immediately surrounding both the St. Louis and Kansas City markets, the production of fruit and truck crops is of prime importance. Nevertheless, the production of fluid milk is of great importance in these areas, especially in the outer fringes of the territory. The remainder of the Kansas City milkshed, as far as Missouri is concerned, is located in two rather distinct type-of-farming areas, the northern part of which is designated chiefly as a meat producing area and the southern part as a grain producing area (Fig. 3).

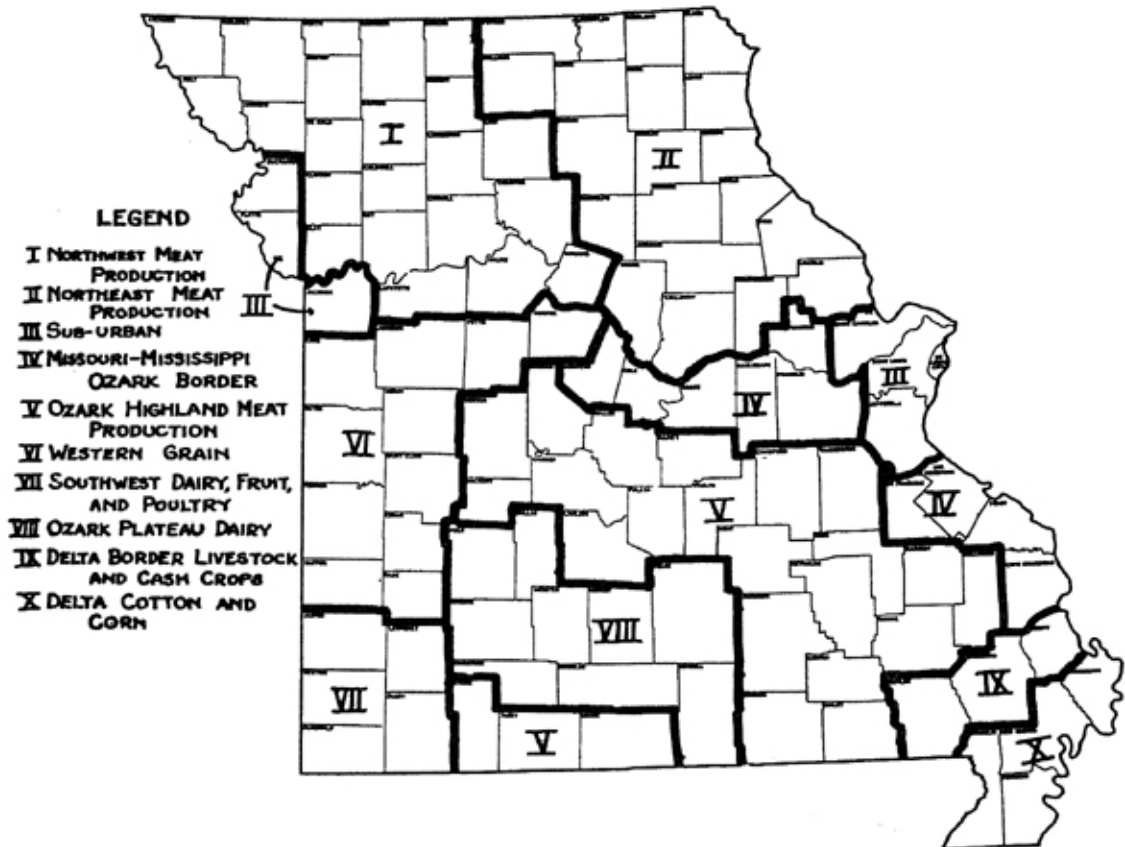


Fig. 3.—Types of farming areas in Missouri.

The remainder of the Missouri part of the St. Louis milkshed is comprised of a vast territory, approximately equal to one half of the total

⁴Producer numbers by their post office addresses are recovered by the market administrator of both the St. Louis and Kansas City markets during one month in the spring, the season of greatest production and one month in the fall, the season of least production. For the purposes of this study, it was thought that the fall enumeration was most representative.

area of the state, in which fluid milk for immediate consumption is produced rather sparsely on highly commercialized dairy farms. The northern part of this vast territory is primarily a meat producing area, similar to the northern part of the Kansas City milkshed, although the land is not as productive and livestock numbers are not as concentrated. South and west of the St. Louis suburban area are located two areas which may be described alike as dairy and wheat producing areas. These shade off into the Missouri and Mississippi river bottoms on the north and east, and the Ozark hills on the south. Moreover, the topography is broken to rough, and crop acreages per farm are restricted. Since pasture and hay crops dominate to a large extent, the system of land use, dairying offers the most intensive and ordinarily the most profitable type of livestock enterprise.

Farther to the southwest the St. Louis milkshed covers an area, designated in general as the Ozark highlands, in which meat production ranks first in the farming system. However, dairying and the production of poultry and fruit are of considerable importance. In much of this area the topography is so rough that only a small per cent of the land area lends itself to row crops, and, to a great extent, a non-commercialized, subsistence type of farming is practiced. During the last few years, the St. Louis market has secured an increasing amount of its fluid milk from Southwest Missouri, an area formerly known primarily for the manufacture of dairy products. Although the production of poultry and fruit are important, dairying occupies a unique position in this area. Since much of the area lies in the region known as the Ozark Plateau, where farms are small and adapted best to livestock production, dairying has been developed very intensively. At present, dairying, including the sale of veal calves and older cows, represents the most important source of cash farm income.

From the above considerations, it is apparent that the sources of the fluid milk supply, particularly those of the St. Louis market, are located in a vast area covering more than half of the state. It is necessary now to consider some recent changes in the number and location of dairy farmers who deliver milk regularly to the St. Louis and Kansas City markets.

Changes in the Location of Missouri Producers

As a result primarily of the increased demand for fluid milk for immediate consumption, significant changes have occurred during the past decade both in the location and number of producers delivering graded milk to the St. Louis and Kansas City markets. In the Missouri portion of the St. Louis milkshed, producer numbers have increased considerably since 1941 (Fig. 4). At that time, producers regularly supplying graded milk to the market were located mainly in an area or zone little more than 50 miles in radius extending westward from St. Louis. The counties in

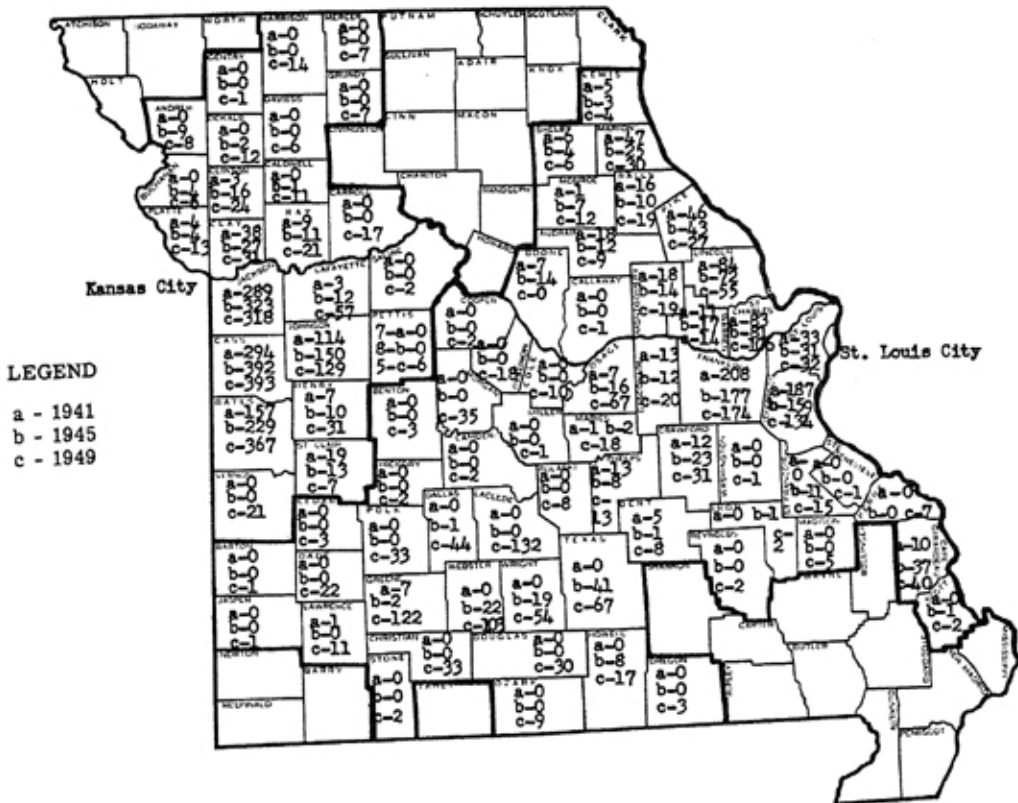


Fig. 4.—Number of Missouri producers supplying Grade A milk to the St. Louis and Kansas City markets, 1941, 1945, and 1949. (Source: Market Administration Offices, St. Louis and Kansas City, Missouri marketing areas.)

which the greatest number of producers were located include Franklin, Jefferson, St. Charles, and St. Louis in the order mentioned. By 1945, the number of producers had decreased slightly in these counties, but had increased in the counties located more distant from the market. The number of producers most advantageously located to the market decreased further by 1949, at which time a considerable number of producers located in several Southwest Missouri counties had been approved to supply fluid milk to the St. Louis market.

In the Kansas City milkshed, the number of producers located in Jackson, Cass, Johnson, and Bates counties, in Missouri, increased materially from 1941 to 1945. Producers most advantageously located to the market remained fairly stable from 1945 to 1949, but additional producers located farther out in the state came on the market. By that time, therefore, the Kansas City market received milk from producers in such counties as Daviess, Gentry, Harrison, Mercer, Grundy, and Carroll, north of the Missouri river, and Saline, Pettis, and Vernon, south of the river. Producers located in these outlying counties accounted for the steady increase in number of shippers delivering fluid milk to the Kansas City market during the late 1940's.

The changes in location of Missouri producers regularly supplying fluid milk to the St. Louis and Kansas City markets resulted undoubtedly from a complexity of economic factors. The central cause of the change, however, appears to have been the fact that other farm enterprises in the respective areas offered farmers more profitable alternatives as compared to milk production, especially in those segments located nearest to the marketing areas. In both areas, the sources of the milk supply have moved farther and farther away from the primary markets. It is possible also that the secondary markets, such as Alton in the St. Louis area, and St. Joseph in the Kansas City area, have been taking progressively more of the supply which otherwise would have been available to the primary markets. Moreover, a part of the outward movement of the milk supply doubtless has been due to the extension of the fresh vegetable producing areas immediately surrounding the metropolitan areas of St. Louis and Kansas City, brought about by the increased demand for fresh food accompanying the continuous rise in population in these areas. Finally, with recent improvement in transportation facilities, it now appears possible for farmers to select their enterprises more nearly in accordance with their relative comparative advantage, depending upon the particular circumstance of each farm situation.

TRENDS IN PRODUCTION

The increasing demand for fluid milk for immediate consumption in the primary markets of St. Louis and Kansas City has already been noted. It was pointed out also that this increasing demand for fluid products resulted from a continuous increase in the population and in the per capita consumption of milk in both markets. Due to these conditions, it has been necessary for handlers of fluid milk in both the St. Louis and Kansas City markets during the past several years constantly to seek an increasing volume of milk in order to supply their established outlets.

Trends in Supplies to the Fluid Markets

As a result of the increase in the demand for Grade A milk,⁵ total producer deliveries to the St. Louis market have increased almost continuously since 1938 (Table 4). During the preceding five years total deliveries had constantly declined, due primarily to restrictions imposed on local producers by the St. Louis Health Department. As a result of these restrictions, the number of producers delivering Grade A milk to the market declined from 12,172 in 1934 to 4859 in 1938. From 1938 to 1948, the number of producers declined further to 3297, but increased considerably during 1949 and 1950.

⁵In both the St. Louis and Kansas City markets, fluid milk approved by the respective Health Departments is designated as Grade A milk.

Table 4 -- Total Deliveries of Grade A Milk, Number of Producers, and Average Daily Deliveries of Producers, St. Louis Marketing Area, 1934-1950*

Year	Total Deliveries† of Grade A Milk (Millions of pounds)	Average Number of Producers	Average daily deliveries by Producers** (Pounds)
1934	432.1	12,172	98
1935	396.8	11,684	93
1936	370.8	9,946	102
1937	328.4	7,758	116
1938	302.0	4,859	171
1939	321.9	4,434	199
1940	327.8	4,115	218
1941	343.2	3,922	240
1942	330.7	3,806	238
1943	321.8	3,725	237
1944	343.3	3,691	254
1945	358.9	3,571	275
1946	355.1	3,411	285
1947	350.9	3,323	289
1948	345.6	3,297	286
1949	393.7	3,592	302
1950	479.9	4,299	305

*Data obtained from the Market Administrator's Office, St. Louis, Missouri, marketing area.

†Includes producers who were also handlers.

**Simple averages. Data computed by reducing the data in Column 2 to a daily basis, then dividing by data in Column 3.

In contrast to the declining trend in number of producers, the average daily producer deliveries to the St. Louis market increased from 98 pounds per producer during 1934 to 305 pounds during 1950. This represents a more than three-fold increase in the volume of Grade A milk deliveries of the average producer in the St. Louis supply area, and indicates clearly the trend toward greater specialization which has become imperative for the successful operation of the Grade A establishment.

With some exceptions, the trends in the Kansas City market have been similar to those in the St. Louis market. The changes which have occurred from time to time in the marketing area make it necessary for purposes of analysis to divide the period into two parts, that from 1934 to 1940, and that from 1941 to 1950. During the first period, the marketing area was confined in general to the territorial boundaries of the city of Kansas City, Missouri; whereas, during the second period, the marketing area included not only Kansas City, Missouri, but also Kansas City, Kansas, and certain other outlying territories in both Missouri and Kansas.

From 1934 to 1940, total producer deliveries of Grade A milk to the Kansas City market increased from 74,300,000 pounds to 88,300,000 pounds (Table 5). At the same time, the number of producers decreased from 1540 to 1252, and average producer deliveries remained relatively stable. From 1941 to 1950, total producer deliveries increased from 102,-

Table 5 -- Total Deliveries of Grade A Milk, Number of Producers, and Average Daily Deliveries of Producers, Kansas City Marketing Area 1934-1950*

Year	Total Deliveries of Grade A milk† (Millions of pounds)	Average Number of producers	Average daily deliveries of producers** (Pounds)
		<u>First Period</u>	
1934	74.3	1,540	175
1935	76.2	1,286	162
1936	74.7	1,329	154
1937	76.9	1,419	147
1938	87.6	1,476	162
1939	91.3	1,327	188
1940	88.3	1,252	193
		<u>Second Period</u>	
1941	102.9	1,261	224
1942	125.4	1,411	243
1943	137.0	1,506	249
1944	169.4	1,789	258
1945	187.0	1,881	272
1946	216.5	2,082	284
1947	238.1	2,289	285
1948	227.0	2,264	273
1949	261.5	2,466	290
1950	298.1	2,746	297

* Data obtained from the Market Administrator's Office, Kansas City, Missouri, marketing area.

† Includes producers who were also handlers.

** Simple average. Data computed by reducing the data in Column 2 to a daily basis then dividing by data in Column 3.

900,000 pounds to 298,100,000 pounds, or almost tripled. Although average daily producer deliveries increased from 243 pounds to 283 pounds, the number of producers increased from 1261 in 1941 to 2746 in 1950, which suggests a rapidly growing market, during which time, considerable conversion from the production of ungraded to graded milk took place.

In attempting to increase their supply of graded milk, plants are confronted not only with the small volume of small producers who are interested in improving their incomes but also with generally unsatisfactory sanitary conditions under which milk is produced. It should be noted in this connection that in general fluid milk plants can not offer sufficient incentive to make it profitable for small producers to convert their operations to Grade A production. Therefore, plants usually encourage only the largest and best equipped ungraded producers to qualify under the health ordinance as producers of Grade A milk. To do otherwise would not only result sooner or later in losses to the small producers but also would result in an unstable supply of milk as the small producers left the market.

Missouri's Contribution to the Fluid Markets

Although the production of milk and cream for use in the manufacture of the primary dairy products has predominated in the develop-

Table 6 -- Percentage of Total Local Receipts of Milk Delivered to the St. Louis Market, by States, 1934-1950.*

Year	Illinois (Per cent)	Missouri (Per cent)
1934	77.75	22.25
1935	77.06	22.95
1936	78.15	21.85
1937	77.87	22.13
1938	75.06	24.94
1939	73.97	26.03
1940	75.07	24.93
1941	74.77	25.23
1942	73.45	26.55
1943	72.32	27.68
1944	70.58	29.42
1945	69.22	30.78
1946	69.11	30.89
1947	67.12	32.88
1948	62.29	37.71
1949	57.32	42.68
1950	50.49	48.64

*Computed From Data Obtained From the Market Administrator's Office St. Louis, Missouri, Marketing Area.

ment of the state's dairy industry, Missouri occupies an important position as a source of supply of Grade A milk for immediate consumption in the fluid markets of St. Louis and Kansas City.

At the present time, more than two-fifths of the total supply of Grade A milk to the St. Louis market originates on Missouri farms (Table 6). The percentage contribution of Missouri producers to the St. Louis market increased from approximately 22 per cent in 1934 to 47 per cent in 1950. It is noteworthy that about two-thirds of this increase occurred from 1946 to 1950. A sizable part of the increase in Missouri's contribution during this period was due to wholesale shipments of a large producer cooperative association located in the Southwest area. Also, some of the large handlers in the St. Louis market established receiving stations in the Southwest area from which a considerable volume of milk has been assembled for direct shipment to the St. Louis market.

The contribution of Missouri producers to the Kansas City market averaged slightly more than 60 per cent of the total local producer deliveries during the 10-year period from 1941 to 1950 (Table 7). During this period, however, the percentage of milk originating on Missouri farms declined from 63 per cent to 58 per cent while that originating in Kansas increasing from 37 per cent to 42 per cent. This trend is evidence of the increasing emphasis on dairying in the old "bread basket" of the nation. Furthermore, it represents additional evidence of the westward movement of milk cows in line with the general shift of population.

Table 7 -- Percentage of Total Local Receipts of Milk Delivered to the Kansas City Market, By States, 1934-1950. *

Year	Missouri (Per cent)	Kansas (Per cent)
1941	63.08	36.92
1942	64.29	35.71
1943	64.31	35.69
1944	62.71	37.29
1945	62.34	37.66
1946	61.70	38.30
1947	59.73	40.27
1948	58.40	41.60
1949	58.64	41.36
1950	57.98	42.02

*Computed From Data Obtained From the Market Administrator's Office, Kansas City, Missouri Marketing Area.

UTILIZATION OF THE FLUID SUPPLY

Among the more important problems in connection with the utilization of the fluid milk supply in the St. Louis and Kansas City markets are the adequacy of handling facilities, classification and use, and seasonal deficits. An understanding of these problems is necessary on the part of farmers as well as handlers if solutions to these problems are to be formulated.

Handling Facilities in the Fluid Markets

The handling facilities in the primary fluid milk markets of St. Louis and Kansas City for the most part appear to be well organized and handle a large volume of milk daily. In the St. Louis market, 42 handlers operated under the Federal order in 1950. Of this total, at least a half dozen have distributed milk continuously for the past half-century. During this time, however, the number of handlers of fluid milk has declined considerably, due in part to the fact that many of the handlers in the early part of the century were also producers.⁶ Of the 52 handlers subject to Federal regulation in 1934, several discontinued their operations, especially during the late 1930's and early 1940's (Table 8). In 1949 and 1950, the number of handlers increased, due primarily to the extension of the marketing area. During the same period, the total volume of receipts of milk has increased. This suggests at least some association between the state of technological development at a given time and the size of the operation.

Progressing from a situation where much of the fluid milk was sold by producer-distributors, marketing facilities in the Kansas City market have developed both in size and in efficiency. Since 1940, the number of processing plants, operating in the market, has remained relatively stable, while the average daily sales of whole fluid milk has in-

⁶See Freemyer, Glenn W., History and Analysis of Milk Supply Problems in the St. Louis Market, U.S.D.A., P.M.A., Washington, D.C., Oct., 1950, pp. 118-119.

Table 8 -- Number of Handlers Operating in the Market and Average Daily Sales of Whole Fluid Milk, St. Louis Marketing Area, 1934-1950.*

Year	Number of handlers	Average daily sales of whole fluid milk (1000 pints)
1934	48	499.6
1935	43	486.3
1936	42	474.3
1937	42	468.6
1938	42	468.0
1939	42	498.7
1940	40	504.4
1941	38	546.8
1942	37	608.2
1943	35	689.3
1944	34	711.8
1945	33	760.7
1946	32	803.2
1947	31	778.0
1948	32	743.5
1949	40	757.7
1950	42	787.6

*Data Obtained From the Market Administrator's Office, St. Louis, Missouri, Marketing Area.

Table 9 -- Number of Handlers, Including Producer - Distributors, Operating in the Market and Average Daily Sales of Whole Fluid Milk, Greater Kansas City Marketing Area, 1940-1950.*

Year	Number of plants	Number of Producer-Distributors	Average daily sales of whole fluid milk (1000 pints)
1940	18	120	----
1941	18	102	----
1942	18	90	335.6
1943	20	57	390.4
1944	21	38	413.0
1945	24	25	456.7
1946	22	21	492.6
1947	22	21	486.8
1948	25	21	505.5
1949	26	21	521.8
1950	23	21	533.9

*Data Secured From the Market Administrator's Office, Greater Kansas City Marketing Area, Kansas City, Missouri.

creased 59 per cent (Table 9). During the same period, the number of producer-distributors has decreased from 120 in 1940 to 21 in 1950. Although about 20 handlers have operated continuously in the market during the past decade, it appears that a few large handlers accounted for the processing of approximately 85 per cent of the milk sold in the greater Kansas City area.

Classification of the Milk Receipts

Under the Federal orders existing in the St. Louis and Kansas City markets, milk is classified in accordance with the use which is made of it. At present, only two use classifications are recognized in these markets. In general, Class I includes all milk utilized for bottling purposes, such as fluid milk and cream, flavored milk drinks, buttermilk, and skim milk. Class II includes that milk used in the manufacture of various dairy products, such as butter, cheese, evaporated and dry milk, and other products. However, during the period for which the data in this study apply, the St. Louis market order at first provided for three classifications and, later, when only two classifications were authorized, evaporated milk was accounted for separately, which in practice amounted to the equivalent of three classifications. During the entire period in question, the Kansas City market order authorized three classifications of milk, as follows:

(1) Class I milk shall be all milk disposed of in the form of milk containing more than 1 per cent of butterfat irrespective of whether under the legal standard for milk and unaccounted for butterfat in excess of 3 per cent of the total receipts of butterfat other than receipts from other handlers converted to a 3.8 per cent milk equivalent, except such milk as is classified as Class II milk and as Class III milk pursuant to (2) and (3) of this paragraph.

(2) Class II milk shall be all milk, except skim milk, used to produce cream which is disposed of in the form of cream, other than for use in products specified in (3) of this paragraph, flavored milk, creamed cottage cheese, creamed buttermilk, products sold or disposed of in the form of cream testing less than 18 per cent of butterfat, aerated cream, and eggnog.

(3) Class III milk shall be all milk: used to produce butter, cheese (other than creamed cottage cheese), evaporated milk, condensed milk, ice cream, and powdered whole milk; used for starter churning, wholesale baking and candy making purposes; accounted for as salvage from products where the recovery of fat is impossible; and not accounted for but not in excess of 3 per cent of the total receipts of butterfat other than receipts from other handlers.⁷

Trends in Utilization of Milk

In the St. Louis market, the volume of milk utilized declined somewhat during the middle 1930's (Table 10). Producer deliveries in the St. Louis milkshed decreased to such an extent that it was necessary for handlers in 1938 to find some outside sources of milk. Thereafter, the total milk supply has consisted of a considerable volume obtained from areas outside the adjoining areas in both Missouri and Illinois. As a result, the total milk supply in the St. Louis market increased gradually from 304 million pounds in 1938 to approximately 400 million pounds in 1946, after which it again leveled off. Then, in 1950, the volume of milk received by St. Louis handlers increased to nearly 500 million pounds, which represents an all-time high.

Along with the general increase in the total volume of milk receipts in the St. Louis market, the percentage utilized in Class I (primarily

⁷Code of Federal Regulations, Marketing Orders, Part 913, Sec. 913.6 Order 13, as amended, effective January 1, 1951.

Table 10 -- Utilization of Fluid Milk in the St. Louis Market, 1934 - 1951*

Year	Reported Receipts of Milk			Use Classification		
	Producer deliveries	Other Sources†	Total receipts	Class I	Class II	Class III (Evap.)**
	(Millions of pounds)					
1934	432.0	---	432.0	196.0	72.1	163.8
1935	396.9	---	396.9	190.8	59.7	146.4
1936	370.7	---	370.7	186.7	153.8	30.2
1937	328.5	---	328.5	185.3	131.6	11.6
1938	301.9	2.1	304.0	186.4	108.8	8.8
1939	322.0	16.9	338.9	204.5	131.6	2.8
1940	327.8	14.5	342.3	211.2	122.5	8.6
1941	343.1	16.0	359.0	235.1	108.7	15.4
1942	330.5	32.4	362.9	267.7	88.6	6.5
1943	321.7	37.7	359.4	295.5	61.0	2.9
1944	343.3	17.9	361.2	298.3	62.0	0.9
1945	358.9	25.9	384.8	316.8	66.8	1.4
1946	355.2	44.6	399.8	324.0	75.3	0.7
1947	350.9	40.0	390.9	315.4	74.9	0.7
1948	345.9	34.4	380.3	303.6	76.3	0.4
1949	393.7	17.9	411.6	322.6††	87.7	1.3
1950	479.8	19.8	499.6	401.9	97.7	----
1951	443.2	29.2	472.4	410.5	61.9	----

*Data were obtained from "Statistical Information on Prices, Production, and Sales in the St. Louis, Missouri, Marketing Area" issued by the Marketing Administrator, June, 1948, and Statistical Summary issued monthly from 1948-1951.

†Includes approved milk, skim milk, and cream reported by handlers in the St. Louis Marketing Area.

**Reported as Class III until February 1, 1936, and Class II evaporated subsequently.

††Includes a considerable amount of milk which was included previously in Class II.

fluid milk sold in the bottled trade) increased materially, especially in the 1930's and early 1940's (Fig. 5). Class I accounted for only 45.4 per cent of the total utilization in 1934, as compared to 82.2 per cent in 1943. During this period, the percentage of milk utilized in Class II, including evaporated milk, decreased correspondingly. From 1943 to 1949, the percentage utilization in Class I decreased slightly and that utilized in Class II increased slightly. However, changes in the method of classification in 1949 seem to have brought about a reversal of these trends. Although much of the change which has taken place in the utilization of milk by classes in the St. Louis market may be attributed to arbitrary changes in classification, it is apparent that fluid utilization has increased significantly during the period in question. Some of the problems which this change entails will be considered after the Kansas City market situation has been presented.

Total receipts of milk in the Kansas City Market, unlike that of the St. Louis market, have increased consistently, except for a year or two, since 1934 (Table 11). However, some of this increase undoubtedly re-

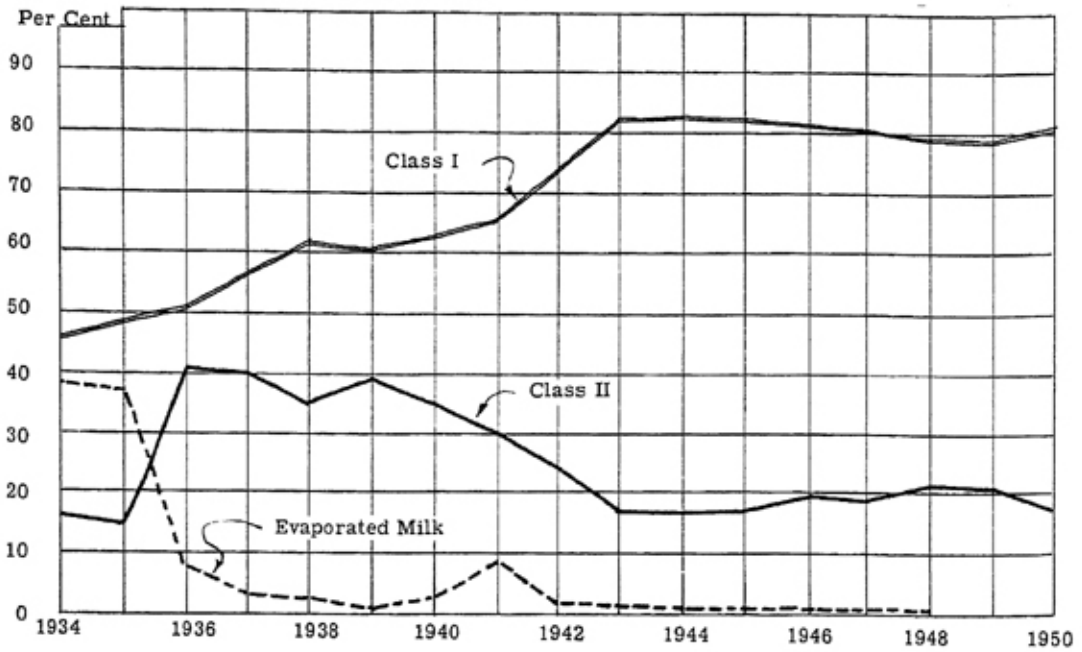


Fig. 5.—Percentage utilization of fluid milk in the St. Louis market, 1934-1950. (Computed from Table 9.)

Table 11 -- Utilization of Fluid Milk in the Kansas City Market, 1934-1951*

Year	Reported receipts of Milk			Use classification		
	Producer deliveries	Other sources	Total receipts	Class I	Class II	Class III
(Millions of pounds)						
1934	74.3	---	74.3	42.2	17.4	14.7
1935	76.1	---	76.1	42.1	20.8	13.2
1936	74.7	---	74.7	43.1	23.0	8.6
1937	75.8	---	75.8	43.0	20.2	12.6
1938	87.5	---	87.5	42.7	21.0	23.8
1939	91.4	---	91.4	41.9	21.2	28.3
1940	88.2	---	88.2	43.2	23.4	21.6
1941†	102.9	0.1	103.0	54.8	27.1	21.1
1942	125.4	1.0	126.4	85.8	27.7	12.9
1943	136.9	2.7	139.6	120.1	15.9	3.6
1944	169.3	1.8	171.1	140.8	19.9	10.4
1945	187.2	2.2	189.4	157.2	23.2	9.0
1946	216.5	1.7	218.2	169.1	33.4	15.7
1947	238.2	0.9	239.1	173.5	36.7	28.9
1948	226.1	1.7	227.8	178.6	27.5	21.7
1949	261.7	4.6	266.3	191.7	43.3	31.3
1950	298.1	2.3	300.4	204.0	44.2	52.2

*Data secured direct from the Market Administrator's Office, Greater Kansas City Marketing Area.

†Prior to October 3, 1941, the Kansas City Market was regulated by licenses which included only parts of the present area. Order NO. 13 was amended at that time to include the present marketing area.

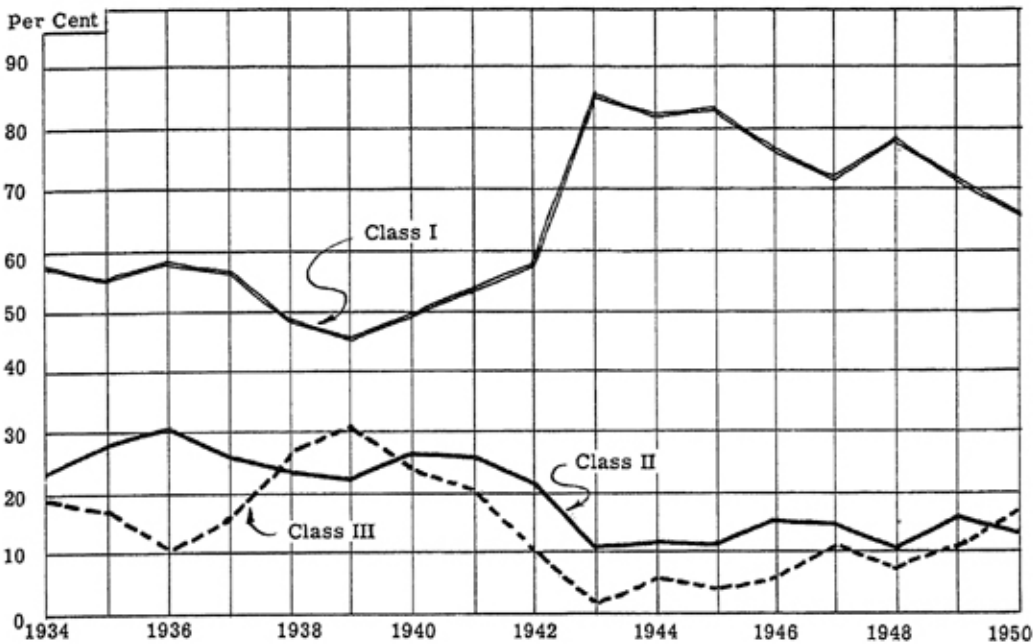


Fig. 6.—Percentage utilization of fluid milk in the Kansas City market, 1934-1950. (Computed from Table 10.)

sulted from periodic extensions of the market area.⁸ Moreover, along with this increase, the percentage utilized in Class I has increased, although the trend has not been continuous (Fig. 6). In fact, much variation is apparent in the percentage designated in all three classes. From 1934 to 1942, the level of utilization remained reasonably stable, except for a high Class III percentage utilization in the latter 1930's and early 1940's. However, in 1943, the percentage of the total utilized in Class I rose greatly, while that utilized in Class II and Class III dropped correspondingly. Since 1943, the percentage of total receipts utilized in Class I has declined from 86 per cent to 68 per cent in 1950. During the same period, the percentage utilized in Class III rose from 2.6 per cent of total

⁸The principal changes which have occurred in the Kansas City marketing area may be summarized briefly as follows:

(1) The first license was issued on March 16, 1934. This license defined the sales area as that territory included within Kansas City, Kansas, and all of Quindaro, Wyandotte, and Shawnee Townships in Wyandotte County, Kansas.

(2) Effective April 1, 1934, the license was amended to include Kansas City, Missouri, Independence, North Kansas City, and the territory within Mission and Shawnee Townships in Johnson County, Kansas, and all of Blue, Booking, and Washington Townships in Jackson County, Missouri, and that part of Gallatin Township south of the fifty-first township north line in Clay County, Missouri.

(3) As of July 1, 1935, the license was amended to include only that territory within the corporate limits of Kansas City, Missouri.

(4) Effective December 1, 1936, license No. 40 was cancelled and Order No. 13 was issued, but no change was made in the territory to which it applied.

(5) Effective October 3, 1941, Order No. 13 was amended to include all of the territory which at present is designated as the "Greater Kansas City Marketing Area." Source: Letter, dated June 26, 1951, from Max M. Morehouse, Market Administrator, Greater Kansas City Marketing Area.

receipts of 17.4 per cent, while that utilized in Class III remained relatively constant. An amendment to the federal order, effective January 1, 1951, provided only for two classifications of milk, in the Kansas City market. The extent to which this change in classification will influence the percentage utilization can not be determined as yet, but apparently the primary purpose of re-classification was to include in Class I a higher percentage of the total milk supply.

The Problem of Seasonal Deficits

Of all the problems encountered in the St. Louis and Kansas City fluid milk markets, the most complex and, therefore, the most difficult problem is that resulting from inadequate supplies of milk during the season of low production. As noted already, handlers in the St. Louis market have had to depend upon sources other than local producers for a considerable quantity of milk during the fall and winter months since 1938. The seriousness of the deficit problem is apparent from the fact that, on the basis of the most recent classification of milk receipts, average daily Class I sales in the St. Louis market have exceeded average daily producer deliveries in at least three months during each year since 1946 (Fig. 7).

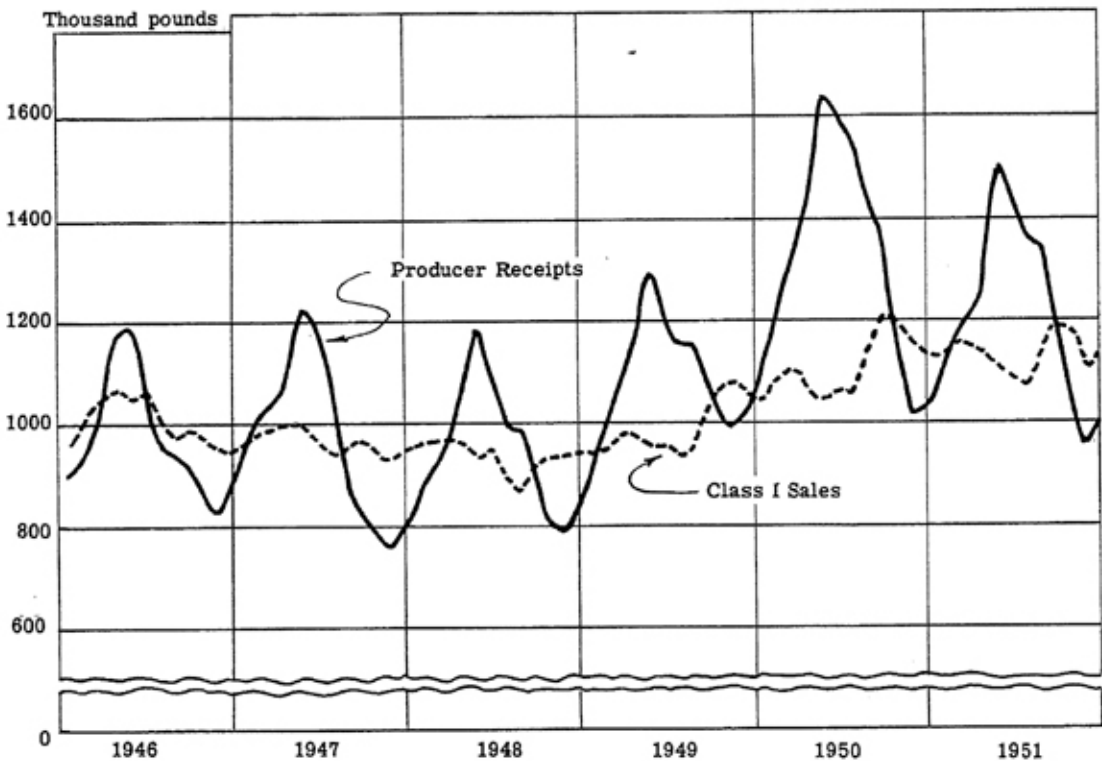


Fig. 7.—Average daily producer receipts of milk and average sales of Class I milk in the St. Louis, Missouri, marketing areas, 1946-1951. (Source: Market Administrators' Office, St. Louis marketing area, St. Louis Missouri.)

The deficit problem has two aspects, one relating to producers and the other relating to handlers. As milk prices are highest during the season of lowest production, it would seem that local producers do not take full advantage of their established market outlets during at least one-fourth of the time. Although it may be maintained that production costs are higher during this period, under the existing situation, it would seem that the greater returns provided by the higher milk prices would more than offset the additional costs involved. This may be demonstrated almost everywhere by reference to the records of dairy farmers who maintain a high rate of output during the usual season of low production.

The other aspect of the deficit problem relates to handlers. In periods of a deficit supply of milk, handlers are hard pressed to maintain the regular flow of milk and milk products to customers. This explains largely the tendency of handlers to adjust the volume of their sales to the regular supply of milk during the season of lowest production. Even this requires the maintenance of facilities by at least some handlers in the market to utilize the surplus milk during the season of flush production. However, this involves only the utilization of a part of the supply in the lower value products, and, since most organized markets⁹ provide that handlers must pay for milk in accordance with the value of the products into which it is utilized, no serious problem exists. On the other hand, in case of a deficit local supply, handlers must search for milk from other sources in order to maintain their market outlets. As milk from sources other than the regular local producers must be approved by the proper health authority and must be transported great distances in most cases, the problem becomes more complex and usually the procurement costs are increased. These additional costs must be recouped in higher margins, either immediately or at a later date. Assuming that handlers are selling their products at their full value (that is, at the point where supply equals demand in the schedule sense), the additional costs involved by the presence of seasonal deficits, sooner or later, will be reflected back to local producers in lower prices for their milk.

Historically, deficit seasonal supplies have been a greater problem in the St. Louis market than in the Kansas City market. More recently, however, the deficit problem has begun to plague the Kansas City market. The obvious solution to the problem in both markets is an extension of the local supply areas. However, this involves a balancing of many factors related to the production of milk on farms, which, as has already been pointed out, involves an adjustment of alternative farm enterprises on the basis of anticipated costs and returns.

⁹All Federal order markets provide for the payment of milk in accordance with the value of the products into which the milk is processed.

PROSPECTIVE TRENDS IN THE MISSOURI MILK INDUSTRY

One of the most important economic problems of dairy farmers and handlers alike has to do with the future prospects for their products. Many reasons may be listed for this, but perhaps the main reason is that it is necessary for them to anticipate as correctly as possible the physical volume of future sales and estimate the value of such sales in order to maintain their operations on a profitable basis over time. There are two aspects to this problem. One has to do with the expenditure of funds for fixed land (or plant) and equipment, and is essentially a long run problem. The other relates to expenditures for immediate services, and is primarily a short run problem.

It is essential to note that decisions as to future prospects must be made by each independent operator on the basis of the present knowledge, whether it is adequate or inadequate. Although there is no general rule by which future expectations may be anticipated with certainty, an understanding of the following factors should aid independent operators in the assessment of future trends in the fluid milk industry of Missouri: measures of the market for fluid products, price policies, and legal regulation.

Measures of the Market for Milk Products

It has been pointed out already that perhaps the most satisfactory explanation of the market has to do with the physical volume of goods which an economy, or a segment thereof, will demand at prices which will provide for the orderly movement of goods from producers to consumers. In this connection, the extent of the market at any given time for milk products, or other commodities for that matter, depends primarily upon the following considerations: population, income of consumers, the price of the product related to the prices of its substitutes, tastes or preferences of consumers, and a market organization to make the products available to consumers.

From an overall standpoint, the number of people in an economy, or a segment of an economy, provides the market potential for any product. Whether this market potential can be translated into effective demand for a particular product depends upon other factors which will be discussed subsequently. The relative extent of the market as measured by population, differs greatly for different dairy products. For example, the market for fluid products for immediate consumption usually is restricted to a relatively smaller geographical area than that of manufactured dairy products, such as butter, cheese, and evaporated milk. Hence, the markets for dairy products fall into two classifications: the fluid milk markets, which are restricted for the most part to the densely populated

Table 12 -- Population of the United States, 1810-1950*

Year	Total	Urban	Rural	Per cent of total	
	Population	Population	Population	Urban	Rural
1810	7,239,881	525,459	6,714,422	7.3	92.7
1820	9,638,453	693,255	8,945,198	7.2	92.8
1830	12,866,020	1,127,247	11,738,773	8.8	91.2
1840	17,069,453	1,845,055	15,224,398	10.8	89.2
1850	23,191,876	3,543,710	19,648,160	15.3	84.7
1860	31,443,321	6,216,518	25,226,803	19.8	80.2
1870	38,558,371	9,902,361	28,656,010	25.7	74.3
1880	50,155,783	14,129,735	36,026,048	28.2	71.8
1890	62,947,714	22,106,265	40,841,449	35.1	64.9
1900	75,994,575	30,159,921	45,834,654	39.7	60.3
1910	91,972,266	41,998,932	49,973,334	45.7	54.3
1920	105,710,620	54,157,973	51,552,647	51.2	48.8
1930	122,775,046	68,954,823	53,820,223	56.2	43.8
1940	131,669,275	74,423,702	57,245,573	56.5	43.5
1950†	150,697,000	88,028,000**	62,669,000	58.4	41.6

*1950 United States Census of Population, Department of Commerce, Bureau of the Census, Vol. I, Table 6, p. 18.

†1950 United States Census of Population, Department of Commerce, Bureau of Census, Series PC-7, No. 1, February 25, 1951, p. 6.

**According to census estimates, the enumeration of the urban population on the basis of a new definition was about eight million larger than on the basis of the old definition; therefore, the figures presented were adjusted accordingly for comparability.

and geographically restricted centers of consumption; and the markets for manufactured dairy products, which are regional or national in extent. It seems reasonable to conclude that in general the urban population of a particular geographical area provides the primary market potential for the fluid milk produced on farms for sale in the bottled trade.

Total market potential for milk products, the continuous increase in urban population of the United States during the past century (Table 12) will indicate the extent of this market potential. In 1850, the total population of the country amounted to little more than 23 million, 15 per cent of which was urban. A century later, however, population had increased to more than 150 million, 58 per cent of which has urban. The trend in the increase of population is still apparent, and while it is possible that the rate of increase may level off somewhat, the total population of the United States may reach 190 million by 1975.¹⁰ Assuming that the per capita consumption of dairy products will remain at the present level, this gain in population would provide a market for a quantity of milk approximately equal to one-fourth of the present production.

Likewise, the population of Missouri has increased greatly during the past century. In 1850, Missouri's population was 682,000 (Table 13).

¹⁰Hagood, Margaret J. and Siegel, Jacob S., *Projections of the Regional Distribution of the Population of the United States to 1975*, Unpublished manuscript, United States Department of Agriculture, Bureau of Agricultural Economics, 1950.

Table 13 -- Population of Missouri, 1810-1950*

Year	Total population	Urban† population	Rural population	Per cent		Total percent
				Urban population was of total	Rural population was of total	
1810	19,783	-----	19,783	---	100.0	100.0
1820	66,586	-----	66,586	---	100.0	100.0
1830	140,455	4,977	135,478	3.5	96.5	100.0
1840	383,702	16,469	367,233	4.3	95.7	100.0
1850	682,044	80,558	601,486	11.8	88.2	100.0
1860	1,182,012	203,487	978,525	17.2	82.8	100.0
1870	1,721,295	429,578	1,291,717	25.0	75.0	100.0
1880	2,168,380	545,993	1,622,387	25.2	74.8	100.0
1890	2,679,185	856,966	1,822,219	32.0	68.0	100.0
1900	3,106,665	1,128,104	1,978,561	36.3	63.7	100.0
1910	3,293,335	1,393,705	1,899,630	42.3	57.7	100.0
1920	3,404,055	1,586,903	1,817,152	46.6	53.4	100.0
1930	3,629,367	1,859,119	1,770,248	51.2	48.8	100.0
1940	3,784,664	1,960,696	1,823,968	51.8	48.2	100.0
1950	3,954,653	2,290,149	1,664,504	57.9	42.1	100.0

*United States Census of Population 1950, "Number of Inhabitants in Missouri,"

Department of commerce, Bureau of the Census, P-A25, Table 1, p. 8.

†Includes incorporated places of 2,500 or more.

By 1950, the population had risen to 3,955,000, almost a six-fold increase. During the same period, the percentage distribution between rural and urban groups followed essentially the same trend as that of the country as a whole. At the present time, the urban population of Missouri accounts for 58 per cent of the total, large enough to support a sizable fluid milk industry, and provide for a considerable potential for expansion in the future.

Aside from the necessary existence of a market potential, the income of consumers may be considered the most important measure of the market for milk products.¹¹ While it is difficult to establish any precise relationship between income and the amount of milk that will be purchased at a given time, most studies have indicated that there is a direct relationship. This seems also to be true of other types of dairy products.¹²

The consumption of milk products tends to follow closely the trend in consumer income. However, this throws little light on the income and consumption relationship, which is a question of income elasticity. The first studies along this line³ were made by Ernest Engel,¹³ who concluded that the greater the income, the smaller the percentage of the total which

¹¹Collins, W. E., *Factors Affecting the Demand for Fluid Milk*, Department of Agricultural Economics, University of Illinois, Urbana, AE-2770, Dec., 1950.

¹²Shepherd, Geoffrey, *Changes in the Demand for Meat and Dairy Products in the United States Since 1910*, Iowa Agricultural Experiment Station, Research Bulletin 368, November, 1949.

¹³An eminent Nineteenth Century German statistician.

would be spent for food.¹⁴ According to more recent statistical studies, this principle holds true for any sizable group of individuals.¹⁵ In this connection, Adam Smith observed that:

. . . The rich man consumes no more food than his poor neighbor. In quality it may be very different, and to select and prepare it may require more labour and art; but in quantity it is very nearly the same . . . the desire for food is limited in every man by the narrow capacity of the human stomach. . . .¹⁶

A third measure of the market for milk products has to do with price and its relationship to the prices of substitute goods. It seems obvious that, at any particular time, a greater quantity of an economic good will be bought at a low price than at a high price. But, given time, production will increase with higher prices, for commodity price relationships indicate to producers the relative demand for particular goods, including food products. Thus, production tends to vary directly with price in the long run. Nevertheless, as consumption tends to vary inversely with price in the short run, consumers tend to substitute the lower priced commodities for the higher priced commodities, which tends to keep prices of goods with similar uses in reasonable balance. Although the demand for food in the aggregate appears to be relatively stable, there would seem to be considerable substitution of one type of food for another, especially if prices of particular food items varied greatly.

Another measure of the market for dairy products, from the individual consumer's point of view, is tastes or preferences. As individuals are not endowed with specific wants, a variety of products may be substituted to meet their needs. The extent of the possible substitution of foods, however, is a problem for which very unsatisfactory techniques have been developed to formulate a conclusive solution. Nevertheless, sufficient information exists to indicate that tastes differ from one individual to another, and preferences for different goods to satisfy the same need are exemplified daily in the market place. In spite of the fact that fluid milk is considered widely as one of nature's most nearly perfect foods, approximately the same food elements may be obtained from a variety of other foods, although perhaps not from any single item.

From the standpoint of farmers, perhaps the most important measure of the market is a market organization to make products available to consumers. Such an overall market organization must consist not only of adequate and efficient physical facilities, which has been considered

¹⁴Dummeier, E. F., Heflebower, R.B., and Norman, T., *Economics with Application to Agriculture*, Third Edition, McGraw-Hill Book Company, Inc., New York, 1950, p. 204.

¹⁵*Consumer Expenditures in the United States*. The National Resources Planning Board, Government Printing Office, Washington, D. C., 1939.

¹⁶Smith, Adam, *The Wealth of Nations*, Cannen Edition. Random House, New York, 1937, p. 164.

previously, but it also must provide the means for the diffusion of knowledge of the product or products to consumers. During the past quarter century, many outstanding advances have been made in improving the overall organization of the market for milk products. Perhaps the most important advance has been the organization and development of a vertically integrated system of mass distribution of dairy products represented by the chain stores and the specialized dairy corporations, including both proprietary firms and cooperative organizations. Before World War I, the major dairy products were distributed primarily by means of a functionally specialized system of independent handlers.¹⁷ The policy of integration and direct purchase from processors of these regional and national organizations, together with the widespread use of the paper carton in fluid milk distribution, has extended considerably the market for milk products, thus resulting in a material gain to dairy farmers everywhere.

Price Policies in the Fluid Markets

Under competitive economic conditions, the pricing system serves as the mechanism by which the supply of and the demand for economic goods is equated and rationed to consumers. In the milk industry, perhaps the most important function of the marketing system is the pricing of milk products at every level at which these products are bought and sold. Some requirements of a pricing mechanism should be noted and some of the characteristics of formula pricing of fluid milk discussed. A pricing system should perform the following functions:

1. Develop prices which reflect to producers the basic demands of consumers as to kind, quantity, and quality of goods and thereby guide production accordingly;
2. Reflect prices which will move existing and forthcoming supplies through the channels of trade and into consumption at the highest possible net returns;
3. Provide a price structure that maintains economically justified stocks both within and between marketing seasons;
4. Be impartial and treat all producers and consumers alike;
5. Reflect the quality differences recognized by the trade and by consumers;
6. Not be subject to manipulation; and
7. Perform the above function economically and efficiently.¹⁸

These criteria are applicable as measures of efficiency to any type of pricing system, regardless of the presence or absence of regulation or administration. For most commodities, it would seem that a relatively

¹⁷Nicholls, W.H., *Post-War Developments in the Marketing of Butter* Research Bulletin 250, February, 1939; *Post-War Developments in the Marketing of Cheese*, Research Bulletin 261, June, 1939, Iowa Agricultural Experiment Station, Ames.

¹⁸Norton, L. J., "Economic Considerations in the Marketing of Agricultural Products," Unpublished Manuscript, Department of Agricultural Economics, University of Illinois, Urbana.

free pricing system would meet these requirements to a higher degree than either a publicly or privately negotiated or administered set of prices. Since competitive pricing has been modified considerably in most of the larger fluid milk markets, however, it seems necessary to recount some of the conditions which brought this about.

As milk is a highly perishable product, it must be moved promptly from producers to consumers. This is a relatively simple process in the smaller markets, involving perhaps only a few farmers who deliver the milk which they produce direct to consumers, but in the larger markets, such as St. Louis and Kansas City, the marketing process is more complex. Milk must be picked up daily at farms and hauled to processing plants where it is pasteurized and bottled before it can be delivered to consumers at their homes. In this process, the primary objective is to create conditions which will maintain at all times a balance between the quantity of milk which consumers are willing to purchase at given prices and that which farmers produce. Under competitive conditions, milk prices tend to fluctuate widely from season to season. Since consumer demand for fluid milk is more stable than supply, this price variation has been the result primarily of seasonal surplus supplies. Some surplus milk, however, is necessary in a highly organized market. A market requires a daily surplus, or reserve, of about 10 per cent more milk than average daily sales in order to take care of the variation in the demand of consumers. This surplus becomes greater during the high producing season, spring and early summer, resulting in drastically lower prices and a disorganized market condition.

In order to reduce the harmful effects of this situation, bargaining arrangements have been negotiated from time to time between dealers and farmers through their organizations. During the depression of the 1930's, these bargaining arrangements failed, and farmers turned to the government for aid. Local and state regulatory agencies were established in many communities, but federal authority was necessary to regulate markets where any part of the milk entered into interstate commerce. This authority was provided by the Agricultural Adjustment Act in 1933 and later amended in 1937. As a result of this legislation, federal milk marketing orders were issued in several of the large fluid milk markets, among which were St. Louis and Kansas City, Missouri. Under the federal order marketing technique, certain requirements have been placed on the pricing of milk. These requirements in effect have resulted in an administrative pricing system, with the provision for adjustment periodically by means of a public hearing at which all groups affected may be represented.

Formula pricing of milk in fluid markets has been a gradual development. For the past two decades, it has been a common practice in many

markets to employ a classification-price plan, under which milk is paid for in accordance with the use which is made of it. As an illustration, that part of the milk supply which is bottled for immediate consumption is designated as Class I and commands the highest price, while that which is used for manufacturing purposes is designated as Class II (or lower) and commands a lower price. Generally speaking, in Missouri markets, Class I includes all milk used for bottling purposes, such as fluid milk and cream, flavored milk drinks, buttermilk, and skim milk. Class II includes milk used for manufacture into the various dairy products, such as butter, cheese, evaporated and powdered milk:

At the present time, price levels generally are set by means of formulas which are designed to permit minimum prices to change automatically in accordance with changes in the market conditions for milk. These formulas are of two general types: the basic-price type of formula and the new-type or Boston formula.

In Missouri markets, as well as most other markets under federal regulation in the Midwest, the basic-price type of formula is employed. Under this formula, the basic price is determined by the value of milk used for manufacturing purposes or the price of certain manufactured dairy products (Table 14). To this, certain differentials which are designed to reflect the additional cost of producing Grade A milk, are added. However, provision is made in the federal orders for changing these formula prices, provided the need for such changes is made evident at a public hearing of all interested parties.

In some of the eastern markets, formulas for pricing fluid milk have been based upon general economic factors during recent years (Table 15). Although the particular factors differ from one market to another, the primary purpose of this type of formula appears to be to provide prices to dairy farmers which will result in the stabilization of milk production in line with demand conditions. At the time that these new-type formulas were initiated, many of the eastern markets were deficit markets, and therefore their primary concern was to institute a pricing mechanism which would result in the production of an adequate supply of milk for Class I utilization. Arguments for the new-type formula are many and varied, but the main core of the argument appears to run something like this: in markets which continually experience seasonal deficits, it is difficult to maintain the flow of milk to consumers in adequate amounts, due primarily to the fact that milk for immediate consumption must be approved by local health authorities. This procedure often becomes cumbersome when areas outside of the regular milkshed have to be depended upon for additional supplies, all of which results in unstable market conditions. The new-type formula represents an attempt to develop a pricing

Table 14 -- Basis of Class I Price Determination Under Federal Milk Marketing Orders, November 1, 1950.

	Class I price formula based* on				
	Prices paid for milk at 18 Midwest mfg. plants†	Other mfg. plants	Butter- powder prices	Butter- cheese prices	General economic factors
<u>NORTH ATLANTIC</u>					
Philadelphia**	-	-	-	-	-
Boston	-	-	-	-	X
Fall River	-	-	-	-	X
New York	-	-	-	-	X
Lowell-Lawrence	-	-	-	-	X
Springfield	-	-	-	-	X
Worcester	-	-	-	-	X
<u>WEST NORTH CENTRAL</u>					
Chicago	X	-	X	X	-
Quad Cities	-	X	-	X	-
Fort Wayne	-	X	X	X	-
South Bend-LaPorte	X	-	X	X	-
Cincinnati	-	X	X	-	-
Toledo	X	X	X	X	-
Suburban Chicago	X	-	X	X	-
Payton-Springfield	X	-	X	X	-
Tri-State	X	-	X	X	-
Columbus	X	-	X	-	-
Cleveland	X	-	X	X	-
Lima	X	-	X	X	-
Rockford-Freeport	X	-	X	X	-
<u>WEST NORTH CENTRAL</u>					
Milwaukee	X	-	X	X	-
Minneapolis-St. Paul	X	-	-	X	-
St. Louis ††	X	-	X	-	-
Omaha-Council Bluffs	-	X	X	-	-
Kansas City	X	-	X	-	-
Sioux City	-	X	X	-	-
Wichita	X	-	X	-	-
Topeka	X	-	X	-	-
Dubuque	-	X	-	X	-
Duluth-Superior	-	-	X	-	-
Clinton	-	X	-	X	-
<u>SOUTH CENTRAL</u>					
Knoxville	X	X	X	X	-
New Orleans	-	-	-	-	X
Louisville	X	X	X	X	-
Oklahoma City	X	-	X	-	-
Tulsa	X	-	X	-	-
Nashville	X	X	X	X	-
Paducah	X	X	X	-	-
Memphis	X	X	X	-	-

*Where more than one basis is market "X" the price is determined each month from the alternative which results in the highest price. Temporary suspensions of pricing provisions have not been indicated.

†As specified in Order NO. 41 for Chicago.

**Fixed price with adjustment for changes in butter prices.

††Plus 5 local plants. Source: Fluid Milk Market Orders, Dairy Branch, Production and Marketing Administration, U. S. Department of Agriculture, Washington, D.C.

Table 15 -- Comparison Between Economic Factors Selected as a Basis for Class I Milk Prices Under the New-Type Formulas.*

Economic Factors	Boston	New York	Philadelphia
Demand indicators --	Index of New England department store sales, Class II utilization.	Monthly estimate of percentage Class I utilization.	Average daily Class I sales.
Supply requirement indicators --	Calculated grain and labor cost index Class II utilization	Monthly estimate of percentage Class I utilization	Prices paid by Pa. farmers for mixed dairy feeds. Prices received by Pa. farmers for products other than milk and milk products. Prices paid by Midwest condenseries for 3.5 per cent milk.
Relationship to the general price level --	Index of wholesale commodity prices of the United States.	Index of wholesale commodity prices of the United States.	Index of wholesale commodity prices of the United states.

*For a more extensive elaboration and analysis of the new-type formulas, - see Roberts, John B., and Grayson, Grant, *Formula Pricing of Milk*, Kentucky Agricultural Experiment Station, Bulletin 558, November 1950, p. 15.

mechanism which would stabilize milk prices at a level that would assure an adequate supply of milk.¹⁹

On the other hand, in areas of surplus production, it is necessary to maintain Class I milk prices in close relationship with the prices of milk in other uses. Thus, most markets in the Midwest have employed the basic-price type of formula, which provides a flexible system of pricing in line with the prices of milk in other uses. Thus, indirectly, the prices of milk under the basic-price type of formula are subject to the pricing criteria stated previously. Notwithstanding the type of formula employed, it should be noted that, in a given market at a given time, minimum prices of milk may be high or low, depending upon general economic conditions existing in that market and upon the level of the base prices to which the formula is related.

Legal Regulation Concerning the Milk Supply

As the sanitary conditions under which milk is produced are important to the safety of the milk supply, most towns and cities have passed health ordinances which require the inspection of farm conditions under which the milk is produced. The usual procedure is to permit only milk from farms which have been inspected and approved by the local health

¹⁹For a more extensive elaboration and analysis of the new-type formulas. see Roberts, John B., and Grayson, Grant, *Formula Pricing of Milk*, Kentucky Agricultural Experiment Stations, Bulletin 558, November 1950.

authority to enter the market. As a result, each city and town has its own standards for the approval of milk for consumption in the fluid trade.

With the trend increasingly toward inter-market shipment of milk, the problem of inspection becomes more acute. The authority of any city or town to pass ordinances for protection of the health of its residents may be granted, but when such ordinances tend to become discriminatory, they may be questioned. In the case of *Higgins vs. City of Galesburg*, in 1948, the Illinois Supreme Court stated that:

The legislature has not delegated power to municipal corporations to pass a regulatory and license ordinance which assumes to regulate dairy farm or bottling plants outside their corporate limits.

It does not follow that because the city has the right to regulate the sale of and inspect milk sold within the corporate limits it is empowered to license milk producing farms and milk plants in Peoria and elsewhere.²⁰

On the basis of the above decision, it would seem that milk can not be excluded from a market merely on the basis of the area in which it is produced. Thus, there would seem to be no reason why milk of high quality should not be produced in the areas where it has the greatest comparative advantage and shipped to outside markets for final consumption.

The legality of such inter-market shipment was further substantiated in a recent decision by the United States Supreme Court. In the case of *Dean Milk Company vs. the City of Madison* in 1951, a majority of the Court held that "even in the exercise of its unquestioned power to protect the health and safety of its people," the city could not impose "an economic barrier protecting a major local industry against competition from without the state," provided "reasonable non-discriminatory alternatives adequate to conserve legitimate local interests are available."²¹

In Missouri, these local health regulations relative to the supply of milk are of interest primarily to farmers located in the Southwest area. As a sizable number of Southwest Missouri farmers depend upon markets located outside the area, regulations as to the approval of milk for inter-market shipment are of considerable importance to the future of the industry in the area.

²⁰Hannah, H. W., "Milk Marketing — A Discussion of *Higgins vs. City of Galesburg*," *Illinois Farm Economics*, No. 166, March, 1949, p. 807.

²¹Bartlett, R. W., "Marketing Concentrated Milk," *Illinois Farm Economics*, No. 190, March, 1951, p. 1136.

SUMMARY

The fluid milk markets of St. Louis and Kansas City obtain their milk supply primarily from Missouri, Illinois, and Kansas. Due to its location, however, Missouri occupies an important position in the supply of both markets. Therefore, the primary purpose of this study was to ascertain the charges which have occurred in the supply and utilization of milk in these markets and to determine the future implications of such changes to Missouri milk producers located in the St. Louis and Kansas City supply areas.

The findings of this study may be summarized briefly as follows:

1. The metropolitan areas of St. Louis and Kansas City represent the principal markets for the grade A milk produced on Missouri farms. During the past decade and a half, these markets have become progressively more important as outlets for the farm supply.

2. During the decade of the 1940's, average daily sales of whole fluid milk increased more than 50 per cent in both the St. Louis and Kansas City markets. Also, per capita consumption of fluid milk in both markets has increased by about one-third.

3. Significant changes have occurred in the location of Missouri producers supplying Grade A milk to the St. Louis and Kansas City markets. The most important of these changes have to do with the outward extension of the supply areas of both markets. With the improvement of rural roads and the techniques of assembling milk, this trend may be expected to continue.

4. In spite of a declining number of producers, total deliveries of Grade A milk to both the St. Louis and Kansas City markets have increased materially, especially during the past decade. As a result, the average daily delivery of milk per producer has doubled in the St. Louis supply area and tripled in the Kansas City supply area.

5. At the present time, almost half of the total supply of Grade A milk delivered to the St. Louis market and almost two-thirds of that delivered to the Kansas City market originate on Missouri farms. The contribution of Missouri producers to the St. Louis market increased from 22.2 per cent of the total supply in 1934 to 48.6 per cent in 1950. On the other hand, the contribution of Missouri producers to the Kansas City market has remained relatively stable at approximately 60 per cent during the past decade.

6. Under the federal marketing orders existing in both the St. Louis and Kansas City markets, milk is classified in accordance with the use which is made of it. At present, only two classifications are recognized. In general, Class I includes all milk utilized for bottling purposes, such as fluid milk and cream, flavored milk drinks, buttermilk, and skim milk. Class II includes that part of the milk used in the manufacture of various

dairy products, such as butter, cheese, and evaporated milk. However, during the entire period for which the data presented in this study apply, three classifications, or their equivalents, were employed in both markets. This system of classification differed from that of the present system primarily in that some of the fluid products now included in Class I were then included in Class II, and much of the milk used in the manufacture of the various stable dairy products was designated as Class III.

7. The percentage of milk utilized in Class I has increased generally in both markets during the past decade and a half. In the St. Louis market, the percentage of milk which was utilized in Class I increased from less than 50 per cent of the total receipts in 1934 to more than 80 per cent in 1950. In the Kansas City market, the level of Class I utilization remained relatively stable during the 1930's, but increased sharply in the early 1940's, while that utilized in Class II and Class III decreased correspondingly. However, since 1943, the percentage utilized in Class I decreased considerably, and that utilized in Class II and Class III increased proportionately. Recently, steps have been taken in both the St. Louis and Kansas City markets which likely will result in the inclusion of a higher percentage of the total utilization in Class I.

8. The most difficult of all the problems encountered in both the St. Louis and Kansas City markets is that resulting from deficit supplies of milk during the season of low production. In the St. Louis market, handlers have had to depend upon sources other than local producers for a considerable quantity of milk during at least three of the fall and winter months since 1938. More recently, the deficit problem has affected the Kansas City market. The obvious solution to this problem is to encourage greater local production, but this involves the balancing of many factors, and a complete solution can not be expected immediately.

9. Future prospects for the development of the Missouri milk industry appear bright. The population is growing, and per capita consumption of fluid milk is increasing. Assuming current projections as to the probable increase in population and the present level of per capita consumption of dairy products, the population by 1975 will provide a market for an additional quantity of milk approximately equal to a fourth of the current rate of production.