August 4, 1965

To the Graduate Council:

I am submitting herewith a thesis written by Paul Thurman Cantrell entitled "Supply, Disposition, and Marketing Channels for Tennessee Milk and Milk Products." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Economics.

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SUPPLY, DISPOSITION, AND MARKETING CHANNELS FOR TENNESSEE MILK AND MILK PRODUCTS

A Thesis

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Paul Thurman Cantrell

December 1965

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CHAPTER I

INTRODUCTION

I. DEVELOPMENT OF TENNESSEE'S MILK INDUSTRY

The development of Tennessee's milk production, processing, and distributing industries in the last quarter century has been of a dynamic nature. However simple the industry may have been prior to 1925, it is very complex at present. Many of the greatest changes took place after World War II. The basis for change from a technological standpoint was available earlier, but World War II gave impetus for use of laborsaving inventions and improved methods of producing, processing, and distributing milk. Even then much milk was produced mainly for home consumption. However, as the population began to shift from rural to urban areas, there was a commercial market for milk and milk products. Therefore, farmers began to increase the size of their dairy herds to supply the market places with the products desired. Hence, milk that was once produced for family consumption is now being produced for the revenue it will produce for the farm family.

Today the industry is characterized by many relatively large farms and a few processing firms; therefore, the complete competitive structure has changed. Bargaining cooperatives are relatively strong in Tennessee and create a situation where a few large firms bid with a single local cooperative. On the selling side these processing firms

bid with a few large chains and, in some cases, numerous home delivery customers.

Since 1925, the numbers of all cattle and calves on farms have continually increased in Tennessee. From 1925 to 1965 the number of all cattle increased approximately 2.2 times. During the period from 1925 to 1955, the number of milk cows and heifers increased 1.5 times. Since 1955 the trend has been downward in number of dairy cattle on farms. There was a total decrease of 29 per cent during this period (Table I).

The value of milk used for home consumption and farm butter is presented in Figure 1 by 5-year intervals from 1925 to 1964. There was a 51 per cent decrease in the value of milk used for these purposes during this period. Gross cash receipts from the sale of dairy products increased 2.7 times during this same 40-year period (Figure 1).

The number of dairy cows on farms in Tennessee have been decreasing while milk production per cow is steadily increasing. This trend indicates, at least in one respect, the highly competitive environment within which producers and processors are currently operating. The relative competitive position of small milk producers and processors has been impeded by advances in technology. Almost as soon as a new technology is developed, it becomes an innovation in the dairy industry. Only the larger, more efficient producers and processors can economically justify the adoption of the most modern techniques developed.

TABLE I

NUMBER OF CATTLE AND CALVES, NUMBER OF MILK COWS AND HEIFERS, AND PER CENT MILK COWS OF ALL CATTLE, TENNESSEE, 1925-1965

Year	All cattle and calves (000)	Milk cows and heifers 2 yrs. + (000)	Per cent milk cows of all cows and calves (%)
1925	996	458	45.9
1930	992	468	47.1
1935	1,233	594	48.1
1940	1,211	564	46.5
1945	1,483	666	44.9
1950	1,490	668	44.8
1955	1,771	695	39.2
1960	1,858	532	28.6
1965[a]	2,219	495	22.3

[a]Tennessee Market Bulletin, Vol. XXXVII, No. 5, June 1965.

Source: Tennessee Department of Agriculture, Agricultural Trends in Tennessee, Fourth Edition, Tennessee Crop Resporting Service, Nashville, Tennessee, September 1964, p. 101.

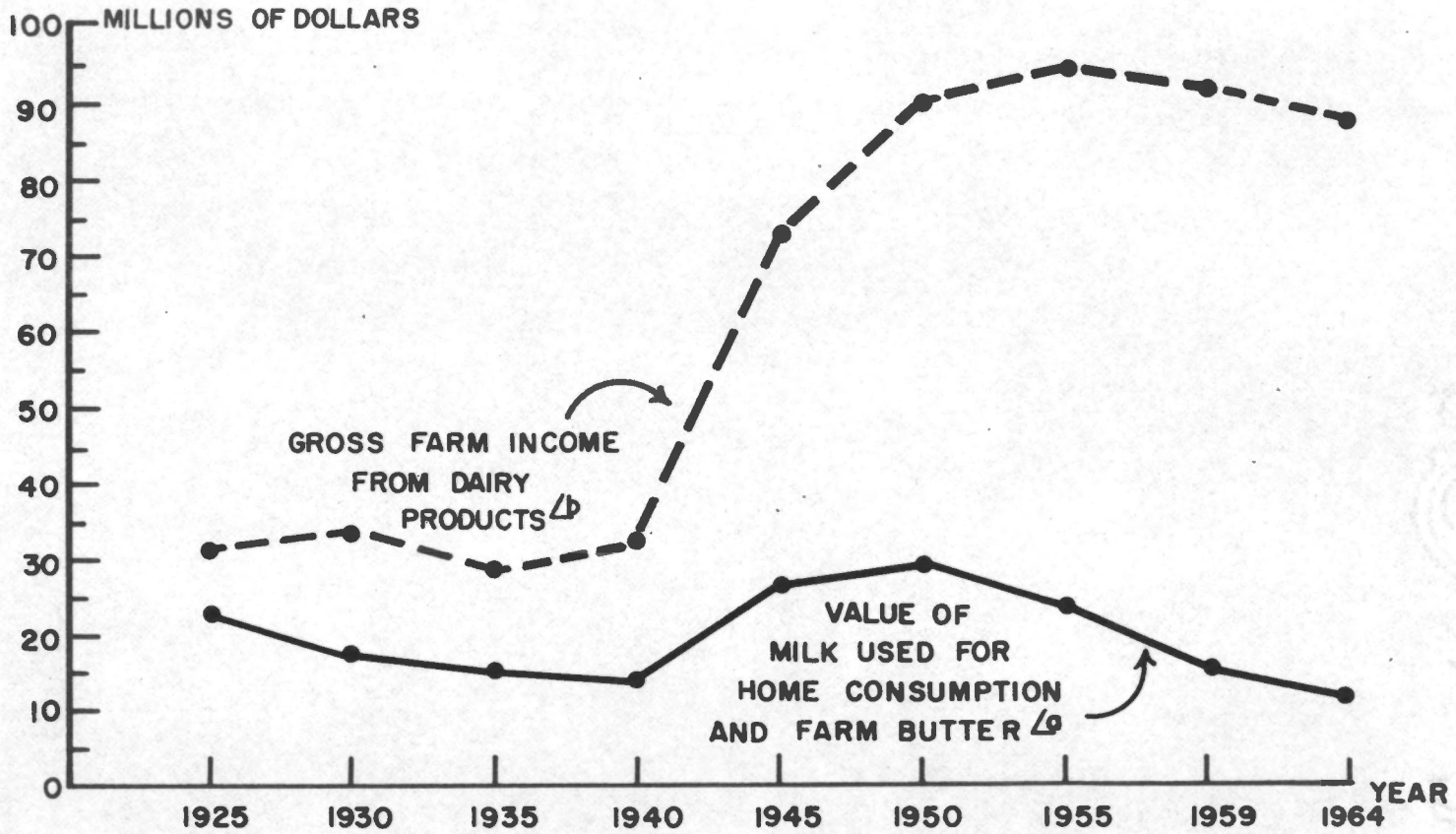


Figure 1. Value of milk used for home consumption and farm butter, and gross income from dairy products, Tennessee, 1925-1964. (From Tennessee Department of Agriculture, Agricultural Trends in Tennessee, Fourth Edition, Tennessee Crop Reporting Service, Nashville, Tennessee, September 1964).

[a]Valued at average return per 100 pounds of milk in combined marketings of milk and cream. Prior to 1951, excludes value of farm-churned butter sold.

[b]Cash receipts from marketings of milk and cream plus value of milk used for farm consumption, and farm-churned butter.

Thus, the smaller, less efficient producers and processors are constantly being forced from the industries. This seems to explain why there are fewer but larger firms in both the production and processing industries.

The total number of establishments in the dairy processing industry has declined since 1954. In that year there were 171 such establishments in Tennessee as compared to 118 in 1963. This is a 31 per cent decrease. Table II shows changes in number of establishments, employees, and amount of payrolls for 1954, 1958, and 1963.

II. IMPORTANCE OF MILK TO TENNESSEE'S AGRICULTURAL ECONOMY

The Tennessee dairy industry contributed $84,495,000 or 15.3 per cent of all cash receipts to Tennessee farmers in 1963.[1] During this same year, milk production for the State was 2,242,000,000 pounds.[2] The average price paid per hundredweight of milk was $3.76. The estimated value of all milk at the retail level in Tennessee was 192 million dollars. From this estimate the marketing margin* for milk and milk products can be derived. This margin was found to be $107,505,000, or approximately 44 per cent of the retail value.

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[1]United States Department of Agriculture, Economic Research Service, Farm Income Situation, Supplement 195 (Washington: Government Printing Office), p. 97.

[2]United States Department of Agriculture, Statistical Reporting Service, Milk Production and Dairy Products, Annual Statistical Summary (Washington: Government Printing Office, 1964), p. 8.

*Marketing margin is considered to be retail price less farm price equivalent.

TABLE II

GENERAL STATISTICS, TENNESSEE DAIRY INDUSTRY:
1954, 1958, AND 1963

Year	Establishment number		All employees	
	Total	20 or more employees	Number	Payroll ($1,000)
1954	171	72	5,460	18,903
1958	154	75	5,615	22,484
1963	118	70	4,877	23,581

Source: U. S. Bureau of the Census, 1954 Census of Manufactures, Vol. III, and 1958, Vol. III, Area Statistics (Washington: Government Printing Office, 1954 and 1958), pp. 141-6 and 141-1, respectively, and 1963 Preliminary Report, p. 8.

III. STATEMENT OF PROBLEM

The supply, processing, and distribution industries for Tennessee milk and milk products have shown considerable change. Changes in supply areas have come about as a result of shifts in comparative advantage. As supply patterns vary from area to area, processing centers may also shift. Relocation of processing centers has changed the market channels for products from processors to consumers. Such changes in the pattern of distribution influence the marketing margin. The problem arises as to what the conditions will be 5-10 years hence if economic conditions continue to change. An analysis of the current organizational characteristics of supply, processing, and distribution activities of Tennessee producers and processors will provide a basis that will enable those concerned to adapt their operations to meet changing conditions. More specifically, the problem associated with this study is the deficiency of benchmark information. A distinct deficiency exists in regard to characteristics of the industry and its current organizational structures. Various research projects have been conducted in the dairy industry at the farm level, but none are concerned with the marketing firm level. Also, while several studies in Tennessee have recently considered the contribution of the Grade A milk industry, only one has considered manufacturing milk and

its contribution to Tennessee's economy.[3] Future predictions with respect to change can be improved by use of the foregoing type of descriptive information.

IV. JUSTIFICATION OF STUDY

Knowledge with respect to origin of supply, processing characteristics, and channels of distribution becomes more and more important as the Interstate Highway System nears completion. Completion of the Interstate Highway System could change the comparative advantage that suppliers, processors, and distributors of Tennessee milk and milk products now enjoy over other areas in milk production. In the main, they will be affected by cheaper transportation costs and faster shipment from major production areas to the North and West of Tennessee. Should this occur, Tennessee farmers, processors, and handlers could be forced into a program of reorganization of their present local market structure. On the other hand, the Interstate Highway System may open up new markets to the East and South. This could lead to production expansion for Tennessee producers, processors, and handlers.

This study should provide benchmark data and information adaptable for future research designed to estimate the cost of marketing

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[3]Irving Dubov, Manufacturing Milk Prices in Tennessee and Other Areas, University of Tennessee Agricultural Experiment Station Bulletin No. 317, August 1960; William Givan and Stanton Parry, Characteristics, Expansion Plans, and Projections for the Tennessee Grade A Milk Industry, University of Tennessee Agricultural Experiment Station Bulletin No. 382, September 1964; Stanton P. Parry and Donna G. Greiner, Changes in the Structure of the Tennessee Dairy Industry, University of Tennessee Agricultural Experiment Station Bulletin No. 348, August 1963.

milk through the various channels. It should also aid farmers and marketing firms in adapting their operations to changes and anticipated changes in the marketing channels. And it is designed so educational institutions, both formal and informal, will be provided data requested by various clients.

V. OBJECTIVES

The general objective of this study was to provide benchmark data for use by the Tennessee dairy industry in making marketing decisions. More specifically these objectives include:

(1) To derive density of production for milk, by county, for the State.
   (a) Fluid milk
   (b) Manufactured milk
(2) To present characteristics of various milk processing and distributing plants.
(3) To describe marketing channels for fluid and manufactured milk.
(4) To estimate future demand for milk, both fluid and manufactured.

VI. METHODOLOGY

The specific factors studied were characteristics of processing plants, areas of production, origin of supply, regulation of milk, and marketing channels. Information with respect to density of production

for milk was secured from secondary sources, such as Census of Agriculture, Census of Manufactures, and Tennessee Agriculture Statistics. Density of production is presented as number of commodity units per square mile, by county, for Tennessee. Further, secondary data were derived from various USDA Situation Reports, other published governmental sources and special commodity reports.

Data pertaining to Grade A milk were derived from Market Administrator's Records. Data used to show the location and characteristics of the manufacturing milk plants were obtained from a survey taken by personal interview between June 1 and September 1, 1963. Plants receiving farm products and processing them for distribution or further processing were interviewed. The type of processing plants studied were:

(1) Fluid milk plants

(2) Manufactured milk plants

  (a) Cheese processors

  (b) Evaporated milk processors

  (c) Butter

There were 56 fluid milk handlers regulated by federal orders in Tennessee as of December 1, 1964. Broken down into marketing areas, they were as follows: Appalachian, 10 handlers, Chattanooga, 8; Knoxville, 12; Memphis, 12; and Nashville, 14.[4]

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[4]United States Department of Agriculture, Dairy Division, Consumer and Marketing Service, Federal Milk Order Market Statistics, Bulletin No. 361 (Washington: Government Printing Office, 1964), p. 23.

Representatives of four evaporated milk processing plants, eighteen cheese processing plants and the principal butter manufacturer in Tennessee were interviewed. The characteristics of these plants were presented with respect to estimated per cent of total output, number of hours operated per day, type of ownership, and volume processed per day.

Data with respect to origin of supply were also derived from schedules taken by personal interview. Both in-state and out-of-state data are presented with regard to origin of supply. Data with respect to marketing channels were obtained for movement from processors to consumers when available. Data to describe the complete marketing channels for cheese were not available in this case. Much of the cheese was processed into a raw form and shipped to other plants for further processing. A follow-up survey was not conducted in this instance.

CHAPTER II

CHARACTERISTICS OF TENNESSEE GRADE A MILK INDUSTRY

I. ORGANIZATION OF MARKET SUPPLIES

Receipts of producer milk are given by zones up to 100 miles distance from each area for 1964 in Figure 2. For distances greater than 100 miles from the marketing centers, the areas were not zoned.

Receipts of milk to the marketing centers varied as distances increased. Markets located in the State derived an average of 21.3 per cent of their supply from milkshed areas less than 25 miles from the marketing centers. Approximately 32 per cent was derived from zone 2, 25 to 49 miles. Zone 3, 50 to 74 miles, supplied approximately 24 per cent of the demand. Zones 4 and 5, 75 to 100 and greater than 100 miles, respectively, supplied 9 and 10 per cent. The Chattanooga marketing area received no milk from zone 5, and Nashville received only .34 per cent from this zone. Memphis was the largest receiver from zone 5, obtaining approximately 40.5 per cent of its milk from this area.

The utilization of in-state milk varied greatly among the 5 marketing areas. The Knoxville milkshed received 100 per cent of its supply from within the State. The other marketing areas were Chattanooga, Nashville, Memphis, and Appalachian receiving 81.4, 78.9, 44.0,

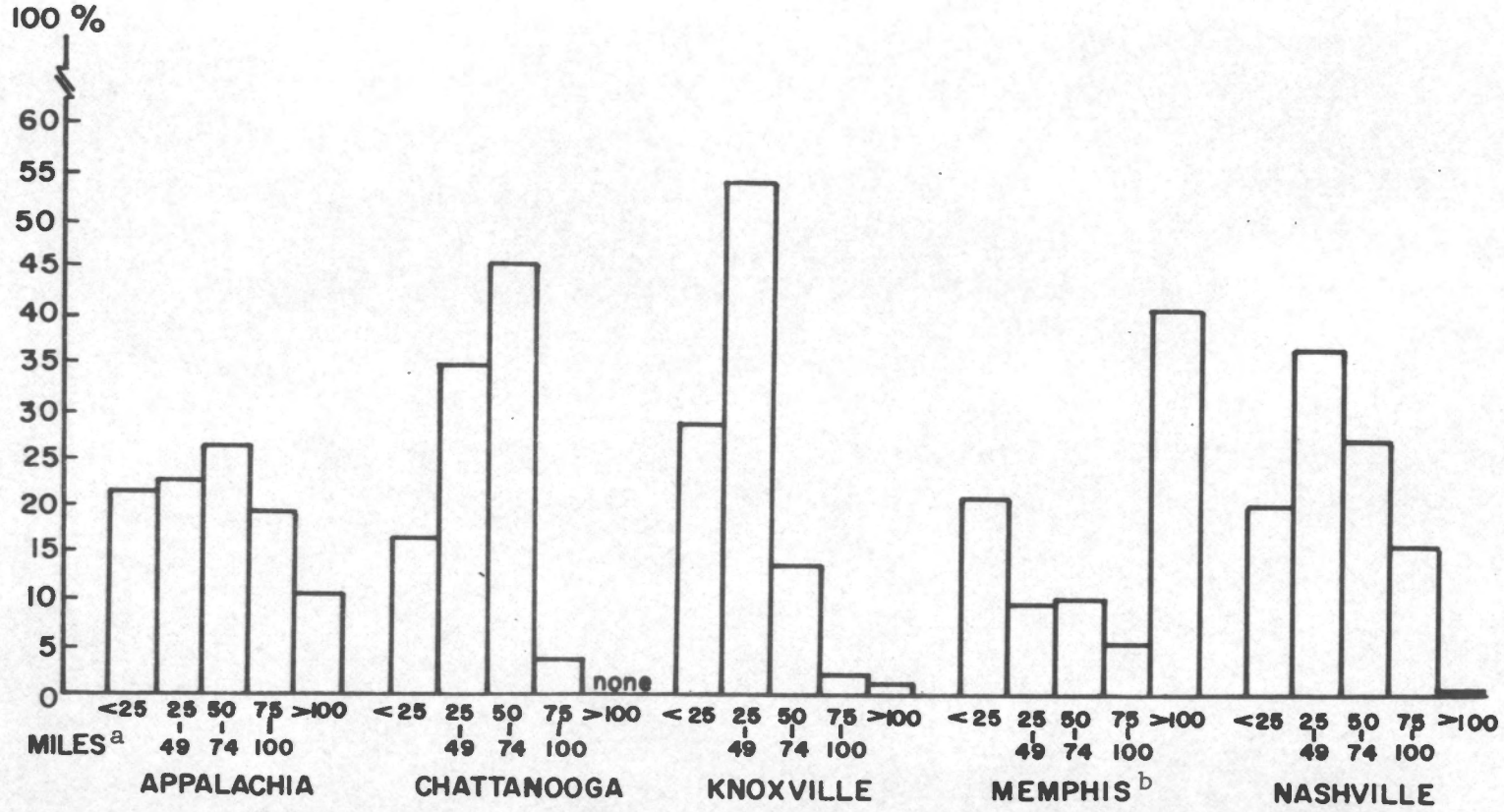


Figure 2. Per cent of handler supply derived from specific areas for each federal order in Tennessee, 1964. (From Market Administrator's Reports for Appalachia, Chattanooga, Knoxville, Memphis, and Nashville, 1964. Data used was for December 1964 in all marketing areas except Memphis and Appalachia, for which annual data for 1964 was used.

[a]Distance was determined by measuring distances from county seat of county of origin to city hall of marketing centers. Air miles were converted to road miles by using this formula: 1.19 road miles equals 1 air mile.

[b]Does not total 100 per cent; 13.3 per cent was derived from areas not specified.

and 37.3 per cent, respectively, from in-state sources.* Regulated handlers in Tennessee derived an average of 62.3 per cent of their supply from producers within the State.

Location of Production

Grade A milk is produced in 84 of the 95 Tennessee counties. The number of regulated producers is presented, by county, for 1964 in Figure 3. The 5 counties with the largest number were: McMinn, Rutherford, Williamson, Bradley, and Knox. There were 3,012 regulated producers in the State in 1964. The Nashville marketing area had the largest number, 1,059, or approximately 35 per cent. The other areas in descending order were: Knoxville, Chattanooga, Memphis, and Appalachia.

The number of all producers delivering to handlers in Federal Order Markets with territory in Tennessee is presented in Table III, by marketing area, from 1954 through 1964. During that decade, the number of producers in the Appalachian marketing area increased from 578 to 820, or approximately 42 per cent.** Chattanooga decreased by 19 per cent; Knoxville increased from 732 to 739; Memphis decreased 14 per cent; and the Nashville marketing area showed a decrease of 6 per cent.

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*Data used was for December 1964 in all marketing areas except Memphis and Appalachia for which annual data for 1964 was used.

**This was largely due to a merger increase in 1961.



Figure 3. Number of Tennessee Grade A producers, by county, December 1964. (From Milk Market Administrator's Reports for Appalachia, Chattanooga, Knoxville, Memphis, and Nashville.)

TABLE III

NUMBER OF ALL PRODUCERS DELIVERING REGULATED MILK TO TENNESSEE HANDLERS BY MARKETING AREA, 1954-1964

Year	Appalachian	Chattanooga	Knoxville	Memphis	Nashville
1954	578	(NA)	732	1,127	1,383
1955	579	(NA)	922	1,447	1,503
1956	599	830	968	1,183	1,525
1957	672	802	1,017	1,134	1,554
1958	692	786	996	1,041	1,471
1959	769	736	949	989	1,395
1960	936[a]	700	928	990	1,351[b]
1961	894[a]	681	876	1,023	1,413[b]
1962	847	677	784	1,075	1,367
1963	832	689	762	1,064	1,296
1964	820	673	739	970	1,294

[a]Combined with Bluefield order March 1, 1961.

[b]Added territory in November 1960.

(NA) Not available.

Source: United States Department of Agriculture, Dairy Division Agricultural Marketing Service, Federal Milk Order Statistics, 1954-1964.

Grade A milk production density varies from county to county and from marketing area to marketing area throughout the State. The average milk production per square mile of milkshed area is given in Table IV. Some counties market their milk in two different marketing areas. When this situation occurred, the county was included with the marketing area that received the highest per cent of that county's production. The data presented are for 1964.

Relatively speaking, the West Tennessee counties had the least dense production. The Eastern portion of the State had greater density and Middle Tennessee followed with a slightly lower density. Figure 4 shows the location and number of counties in each production group.

Changes Over Time

While the number of producers decreased substantially during the past 10-year period, average daily pounds of producer deliveries to handlers increased approximately 2.2 times. The average daily production per Grade A producer is given in Table V. The Memphis order had the highest average production per producer, 997 pounds and had the greatest increase during this period, approximately 2.4 times. The Chattanooga and Knoxville orders had the smallest relative increase of any of the orders.

Seasonality of Producer Deliveries to Handlers

Grade A milk production still shows seasonal variation; however, much has been done to control this and to bring the supply and demand into balance throughout the year. The use of a centered 12-month

TABLE IV

COMPARISON OF MARKETING AREAS WITH RESPECT TO GRADE A MILK PRODUCTION DENSITY, TENNESSEE, 1964

Marketing area	Total pounds of production	Square miles in area	Milk density lbs. per sq. mile
Appalachian[a]	116,608,835	2,517	46,328
Chattanooga[b]	162,238,084	4,737	34,248
Knoxville[c]	219,591,061	6,675	32,897
Memphis	129,227,461	8,657	14,927
Nashville[d]	308,784,768	12,657	24,396

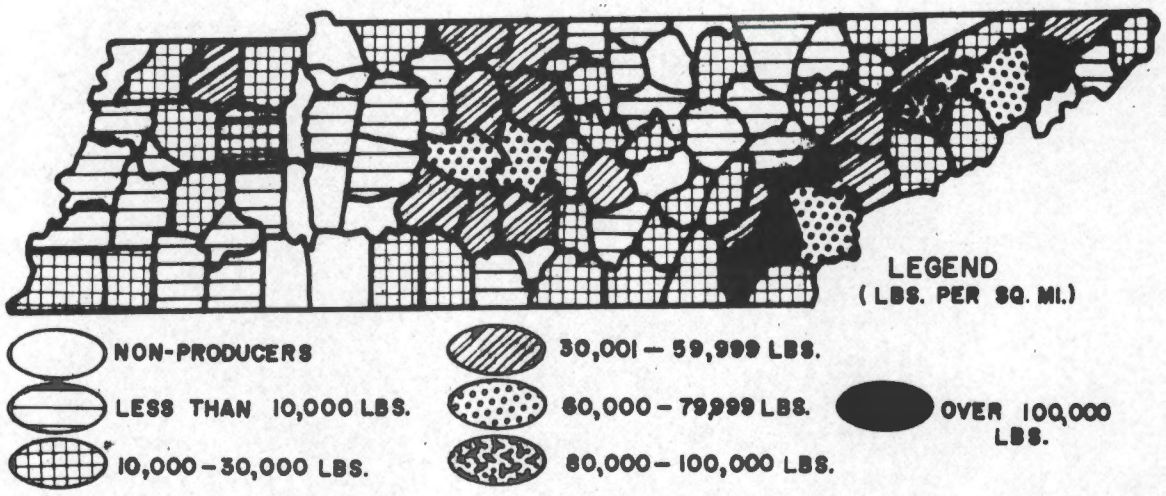
[a]Includes Grade A milk produced in Greene, Hawkins, and Washington counties but sold in the Knoxville area. Excludes milk produced in Hamblen and Jefferson counties.

[b]Excludes production in Monroe, Loudon, and Coffee counties but sold to Chattanooga milkshed. Includes production in Franklin, McMinn, and Meigs counties but marketed in other milksheds.

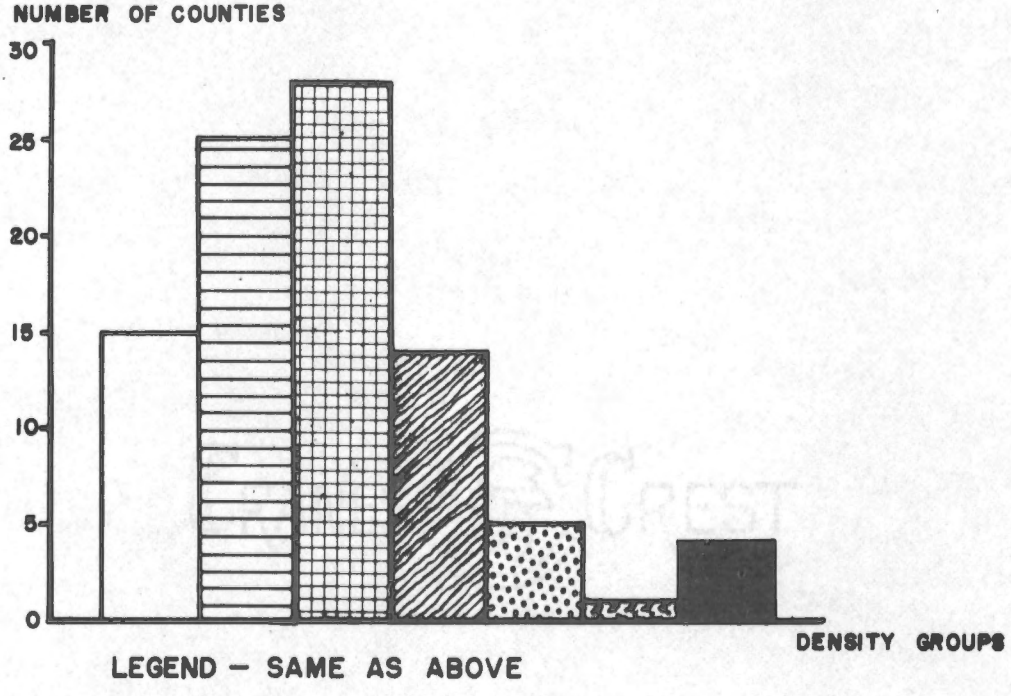
[c]Excludes Greene, Hawkins, McMinn, Meigs, Morgan, Rhea, and Washington counties. Includes Hamblen, Jefferson, Loudon, and Monroe counties.

[d]Includes Coffee County and excludes Franklin County.

Source: Summary Reports of Milk Market Administrator of each federal order, 1964.



(a)



(b)

Figure 4. Grade A milk production density, Tennessee, 1964. (a) Production density, (b) Number of counties in each density group. (From Annual Summary of Milk Market Administrator in each federal order, 1964.)

TABLE V

AVERAGE DAILY POUNDS OF PRODUCER MILK DELIVERIES TO HANDLERS BY MARKETING AREAS, TENNESSEE, 1954-1964

Year	Appalachian	Chattanooga	Knoxville	Memphis	Nashville	Average[a]
1954	395	(NA)	409	414	351	392
1955	447	(NA)	408	414	354	406
1956	503	440	434	483	394	451
1957	555	488	470	513	427	491
1958	545	496	467	514	441	493
1959	590	556	509	580	494	546
1960	626	608	545	626	538	589
1961	711	689	624	701	638	673
1962	787	737	714	769	701	742
1963	810	767	744	858	749	786
1964	866	832	783	997	807	857

[a]Unweighted average.

(NA) Not available.

Source: United States Department of Agriculture, Dairy Division, Consumer and Marketing Service, Federal Milk Order Market Statistics, 1954-1964.

moving average was employed in this study to indicate the seasonality of producer deliveries to handlers. Data were used for 1960-1964. The original data were converted to an index which reflects the seasonality of production. The various indexes for the 5 principal marketing areas are given in Figure 5. The Nashville federal order had the largest degree of variation, ranging from a low index of 87 in August to a high of 108 in April. The Memphis order showed the least amount of variation throughout the year with a range of 13 points.*

Grade A Milk Movement Patterns

Grade A milk movement into manufacturing uses is dependent upon supply and demand conditions. Since production is relatively more seasonal than demand, a higher percentage of handler receipts is utilized as Class I milk during low production periods.

Handler receipts, pounds utilized as Class I and per cent of handler receipts used for Class I purposes are given in Table VI. An average of 90 per cent of the handler receipts in the Appalachian order was utilized as Class I during 1964. This was the largest percentage for orders operating in the State and the Knoxville order represented the lowest figure, 81 per cent.

A 12-month centered moving average of the most recent 5-year period was again employed to show the seasonality of handler receipts

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*An index value less than 100 for a particular month is indicative of depressing seasonal influence, while one greater than 100 shows that seasonal factors are inflating the values.

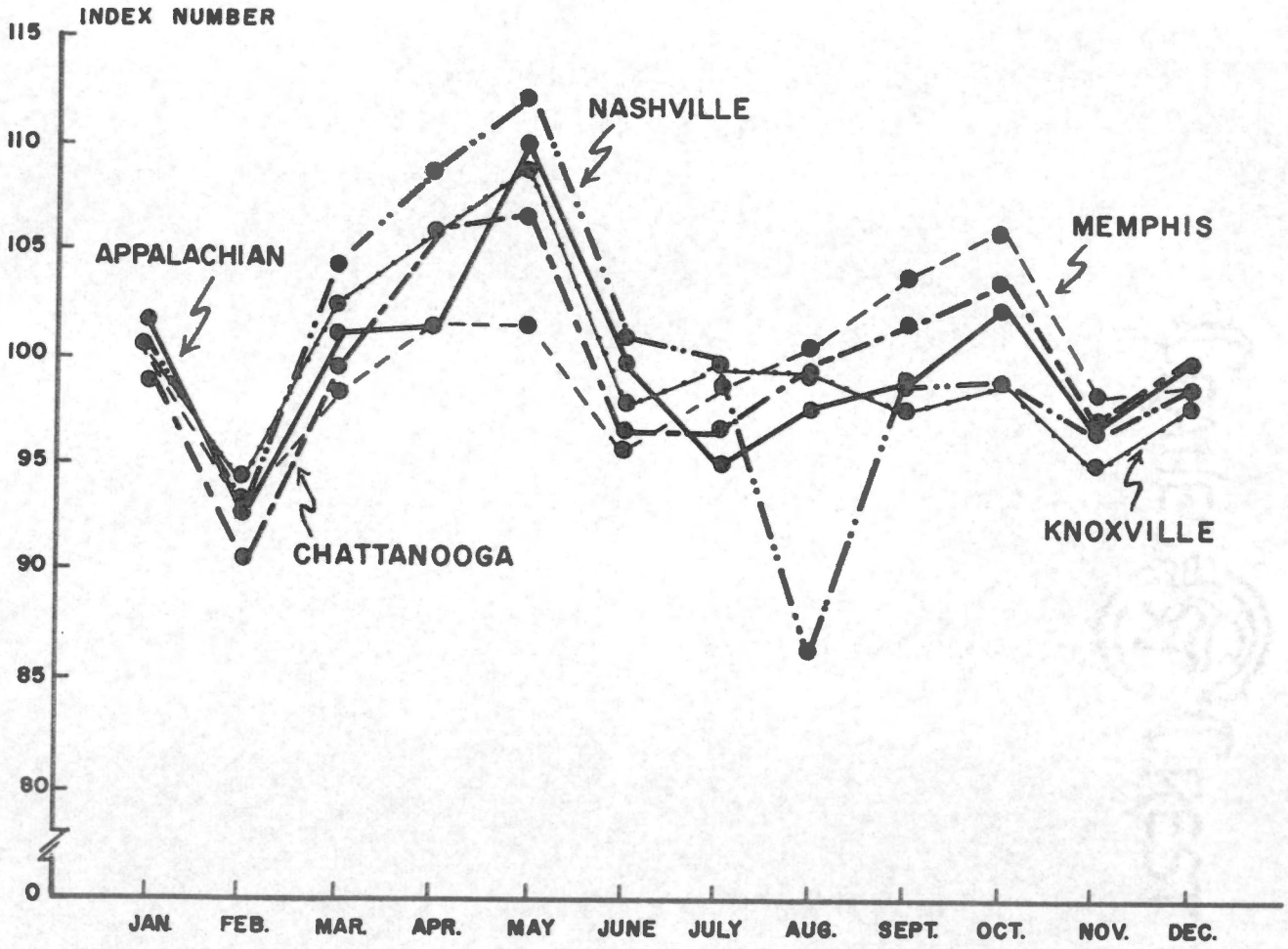


Figure 5. Centered 12-month moving average showing seasonality of producer deliveries to handlers by marketing areas, Tennessee, 1960-1964. (From Federal Milk Order Market Statistics, 1960-1964.)

TABLE VI

RECEIPTS OF MILK FROM PRODUCERS AND AMOUNTS USED AS CLASS I BY HANDLERS REGULATED UNDER FEDERAL MILK ORDERS, BY MONTHS, TENNESSEE, 1964

Month	Appalachian			Nashville			Memphis		
	Producer milk received by handlers	Producer receipts used as Class I	% used as Class I	Producer milk received by handlers	Producer receipts used as Class I	% used as Class I	Producer milk received by handlers	Producer receipts used as Class I	% used as Class I
Jan.	21,589,000	19,311,000	89.4	30,455,000	26,656,000	87.5	22,759,000	21,613,000	94.9
Feb.	20,309,000	18,154,000	89.4	29,596,000	25,499,000	86.2	22,015,000	20,323,000	92.3
Mar.	21,721,000	19,488,000	89.7	31,506,000	25,791,000	81.9	22,925,000	21,156,000	92.2
Apr.	21,927,000	19,595,000	89.4	32,375,000	24,512,000	75.7	24,348,000	21,832,000	89.6
May	23,691,000	19,496,000	82.3	33,835,000	24,390,000	72.1	24,147,000	21,463,000	88.8
June	21,014,000	18,676,000	88.9	31,205,000	24,476,000	78.4	22,890,000	20,085,000	87.7
July	20,060,000	18,085,000	90.2	31,788,000	25,585,000	80.5	23,822,000	21,278,000	89.3
Aug.	21,690,000	19,377,000	89.3	32,828,000	25,934,000	79.0	24,476,000	20,952,000	85.4
Sept.	21,646,000	20,749,000	95.9	32,933,000	28,508,000	86.6	24,825,000	22,583,000	90.9
Oct.	21,870,000	21,236,000	97.1	32,142,000	28,842,000	89.7	25,099,000	23,367,000	93.1
Nov.	21,527,000	20,243,000	94.0	31,270,000	26,010,000	83.2	24,617,000	21,363,000	86.7
Dec.	22,796,000	20,253,000	88.8	32,295,000	25,839,000	80.0	25,926,000	23,030,000	88.8
1964 Total	259,846,000	234,663,000	90.3	382,228,000	312,042,000	81.6	287,885,000	259,050,000	89.9
1964 Avg.	21,653,833	19,555,250	90.3	31,852,333	26,003,000	81.6	23,990,416	21,587,500	89.9

TABLE VI (CONTINUED)

Month	Knoxville			Chattanooga		
	Producer milk received by handlers	Producer receipts used as Class I	% used as Class I	Producer milk received by handlers	Producer receipts used as Class I	% used as Class I
Jan.	17,321,000	14,873,000	85.9	16,502,000	15,065,000	91.3
Feb.	16,741,000	13,886,000	82.9	15,474,000	14,241,000	92.0
Mar.	17,682,000	14,271,000	80.7	16,527,000	14,654,000	88.6
Apr.	18,120,000	14,083,000	77.7	16,684,000	14,474,000	86.7
May	18,745,000	13,914,000	74.2	17,315,000	14,345,000	82.8
June	16,878,000	12,850,000	76.1	15,914,000	13,488,000	84.8
July	16,720,000	13,621,000	81.5	16,640,000	13,842,000	83.2
Aug.	17,113,000	13,754,000	80.4	18,328,000	14,299,000	78.0
Sept.	18,036,000	14,875,000	82.5	18,563,000	16,383,000	88.2
Oct.	17,888,000	15,359,000	85.9	17,952,000	16,658,000	92.8
Nov.	17,768,000	14,797,000	83.3	17,319,000	15,032,000	86.8
Dec.	18,653,000	14,909,000	79.9	17,904,000	15,189,000	84.8
1964 Total	211,665,000	171,192,000	80.9	205,112,000	177,670,000	86.6
1964 Avg.	17,638,750	14,266,000	80.9	17,092,666	14,805,833	86.6

Source: United States Department of Agriculture, Consumer and Marketing Service, Dairy Division, Federal Milk Order Market Statistics, Statistical Bulletin No. 361 (Washington: Government Printing Office, 1964), pp. 38-49.

being utilized as Class I in the 5 federal orders. The data were converted to index numbers and are shown in Figure 6.

II. FIRM CHARACTERISTICS

Handlers of Grade A milk in Tennessee have shown considerable change in recent years. These changes have occurred more rapidly in some areas of the operation than in others. Firm characteristics are presented with respect to number by markets, changes in numbers over time, size of firms, and ownership of firms.

Number of Firms by Markets

The number of handlers is given by marketing area from 1954 through 1964 in Table VII. The Chattanooga marketing area did not become regulated by a federal order until 1956. In 1954 there were 49 regulated handlers in the State, and 56 in 1964, an increase of 14 per cent. During this period the Chattanooga order exhibited a considerable decrease in the number of regulated handlers, from 20 in 1956 to 8 in 1964, or a 40 per cent decrease. The Knoxville order decreased from 17 to 12 handlers, and the Memphis order decreased by 1 handler. The Appalachian and Nashville orders showed increases over the same period of 11 to 14 and 8 to 10 handlers, respectively. However, these last two areas added several handlers with new territory expansion in 1960 and 1961.

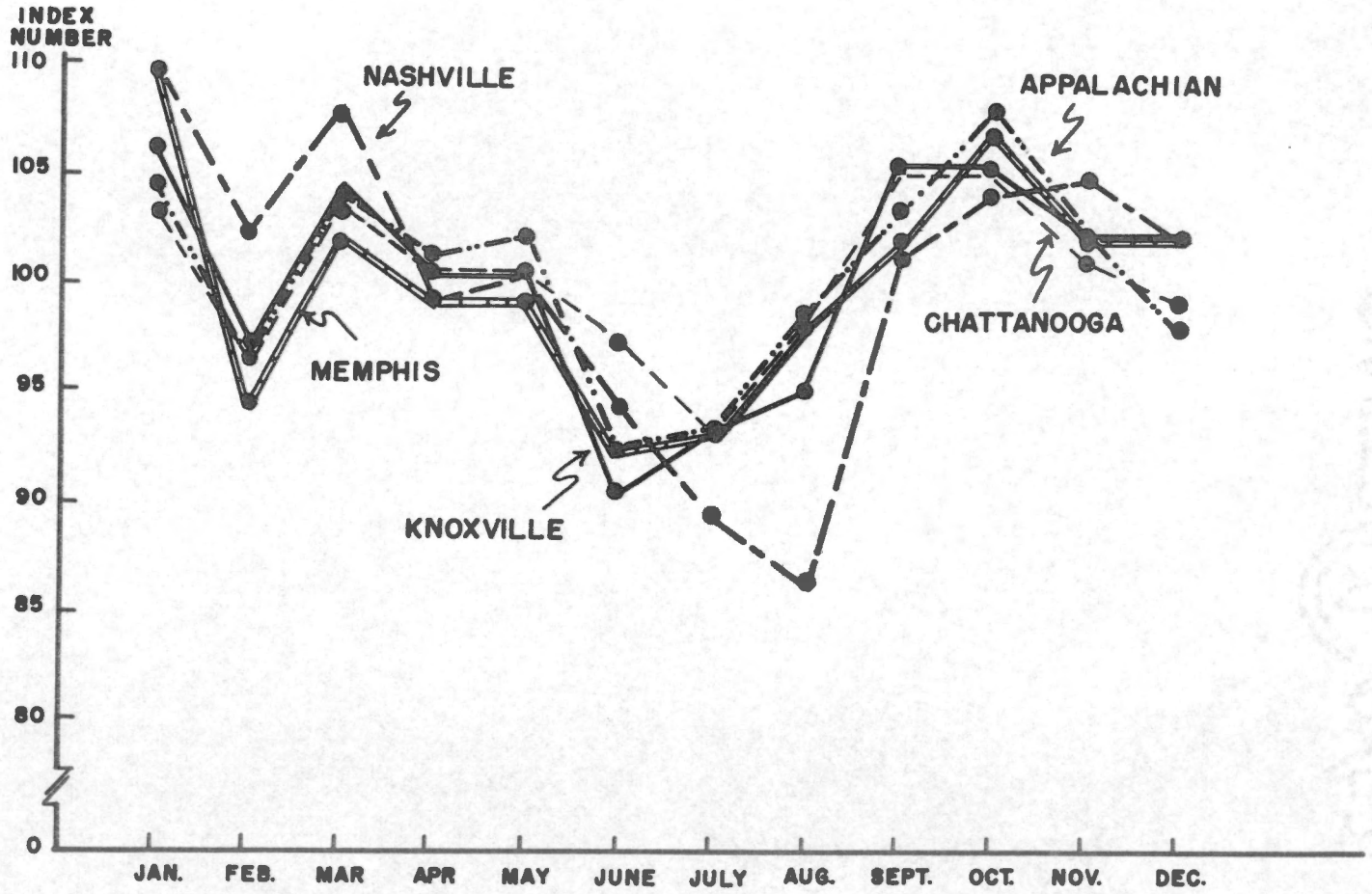


Figure 6. Centered 12-month moving average of seasonality of handler receipts utilized as Class I, Tennessee, 1960-1964. (From Federal Milk Order Market Statistics, 1960-1964.)

TABLE VII

NUMBER OF REGULATED HANDLERS, BY MARKETS, FOR TENNESSEE, 1954-1964

Year	Appalachian	Chattanooga	Knoxville	Memphis	Nashville	Total
1954	8	(NA)	17	13	11	49
1955	7	(NA)	15	13	11	46
1956	8	20	14	13	11	66
1957	8	22	14	11	11	66
1958	8	20	13	10	11	62
1959	7	15	14	10	11	57
1960	7	15	13	9	17	61
1961	10[a]	12	12	13	16[b]	63
1962	10	10	11	14	16	61
1963	10	8	11	12	15	56
1964	10	8	12	12	14	56

[a]Combined with Bluefield order March 1, 1961.

[b]Added territory in November 1960.

(NA) Not available.

Source: United States Department of Agriculture, Milk Marketing Orders Division, Federal Milk Order Market Statistics, Statistical Bulletin No. 248, 335, and 361, 1960, 1962, and 1964, respectively.

Changes Over Time

Number of firms in the industry and size of firms have shown considerable change since 1957. Firms were grouped into 5 size categories and the number of firms in each category was shown from 1957 to 1965 (Table VIII). In 1957, 37 handlers were classified in category 1, as compared to 14 in 1965, or a 62 per cent decrease. No net change was apparent in the number of handlers in size category 2 (25,000 to 49,999 pounds) from 1957 to 1965. The number of firms in category 3 increased from 8 to 13, and the number in category 4 decreased from 4 to 3 over the period. Category 5, receiving 150,000 pounds and over daily, increased from 4 handlers in 1957 to 9 handlers in 1965. The total number of firms in the industry decreased from 63 to 49, or a 22 per cent decrease.

These data seem to indicate the economic pressures under which many milk producing and processing firms are currently operating. The rapid decline in number of small firms would tend to indicate that internal economics of scale are present in dairy processing.

Ownership of Firms

In 1956, 30 handlers were incorporated as compared to 45 in 1964, a 50 per cent increase over the period, and proprietory-owned firms decreased by 50 per cent over this same period. The number of partnerships decreased from 5 to 1 and cooperatives increased 2.5 per cent.[1]

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[1]Market Administrator's Reports from Appalachian, Chattanooga, Knoxville, Memphis and Nashville, 1956-1964.

TABLE VIII

CHANGES IN SIZE OF REGULATED HANDLERS IN TERMS OF PRODUCER RECEIPTS, TENNESSEE, 1957-1965[a]

Size category Lbs.	1957	1958	1959	1960	1961	1962	1963	1964	1965
	Number of firms								
Less than 25,000	37	37	34	29	32	27	21	16	14
25,000-49,999	10	10	13	12	13	11	10	11	10
50,000-99,999	8	8	8	9	7	6	9	8	13
100,000-149,999	4	4	3	5	6	8	4	4	3
150,000 and over	4	4	4	4	4	4	7	8	9
Total number of handlers[b]	63	63	62	59	62	56	51	47	49

[a]Based on average pounds of daily receipts of handlers in 5 marketing areas.

[b]As of January 1 each year.

Source: Special report from Milk Market Administrator's Five Marketing Areas in Tennessee, August 10, 1965.

The handlers were also classified with respect to local and national ownership. The number of plants owned by each is given in Table IX by marketing area. The number of locally owned firms in 1956 was 56 and 44 for 1964, or a decrease of approximately 21 per cent. Nationally owned firms increased from 9 to 12.

III. MARKETING OF GRADE A MILK IN TENNESSEE

The marketing of Grade A milk can be thought of as taking place in 3 general areas. This discussion will be focused on intra-area sales, sales outside the federal order and inter-order sales. In-area sales would lie within the area of the defined federal order market. Inter-order sales will denote sales to other regulated or nonregulated federal order areas (Table X).

In 1960 in-area sales accounted for 65* per cent of fluid sales for handlers in 5 areas of Tennessee and 62* per cent in 1965. Sales outside the Federal order amounted to 35 per cent of product pounds in 1960 and had decreased to 33 per cent by 1965. No inter-order sales were recorded before 1963 and subsequently accounted for only a small per cent of total product pounds sold by handlers. In area sales decreased from 1960 to 1965 in every order except the Nashville order where in-area sales increased from 61 to 73 per cent over the period. Sales outside the Federal order in Nashville have decreased over the

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*Unweighted average.

TABLE IX

CLASSIFICATION OF TENNESSEE HANDLERS WITH RESPECT TO OWNERSHIP, LOCAL OR NATIONAL, 1956-1964, BY MARKETING AREAS[a]

Marketing area	1956		1958		1960		1962		1964	
	Local	National	Local	National	Local	National	Local	National	Local	National
	Number									
Appalachian	5	2	6	2	6	4	4	4	6	4
Chattanooga	19	1	19	1	18	1	13	1	7	1
Knoxville	12	2	11	2	11	2	8	2	10	2
Memphis	10	3	8	3	6	3	11	3	9	3
Nashville	10	1	10	2	9	1	13	3	12	2

[a]January was considered as the representative month.

Source: Market Administrator's Reports for Various Federal Orders, 1956-1964.

TABLE X

PER CENT OF FLUID MILK SALES BY HANDLERS REGULATED UNDER FEDERAL MILK ORDERS AND PERCENTAGE OF SUCH SALES IN OTHER FEDERAL ORDER AREAS AND OUTSIDE FEDERAL ORDER AREAS, TENNESSEE, 1960-1965

Marketing area	1960	1961	1962	1963	1964	1965
	- - - - Per cent of product pounds - - - - -					
Appalachian						
In-area sales	50.1	48.6	67.8	48.0	50.2	48.2
Outside federal order	49.9	51.4	32.2	50.1	34.3	46.0
Inter-order[b]	--	--	--	1.9	--	5.8
Chattanooga						
In-area sales	69.3	69.5	71.1	69.2	58.3	60.3
Outside federal order	30.7	30.5	28.9	28.8	40.8	36.1
Inter-order[b]	--	--	--	.7	--	--
Knoxville						
In-area sales	62.8	61.3	60.7	57.9	55.8	55.3
Outside federal order	37.2	38.7	39.3	37.1	37.3	40.4
Inter-order[b]	--	--	--	3.1	2.3	2.2
Memphis						
In-area sales	79.7	75.1	64.3	63.4	76.0	74.3
Outside federal order	21.3	24.9	35.7	30.8	17.5	19.1
Inter-order[b]	--	--	--	5.8	6.5	6.6
Nashville						
In-area sales	61.3	80.3	74.6	72.8	73.2	73.3
Outside federal order	38.7	21.7	25.4	22.2	23.7	24.6
Inter-order[b]	--	--	--	5.0	3.1	2.1

[a]Per cent for some markets do not total 100 per cent because some bulk milk was restricted for various reasons.

[b]Inter-order sales--sales to other regulated areas or to non-regulated areas.

Source: Milk Market Administrator's Reports for Five Marketing Areas in Tennessee, 1960-1965.

period from 39 per cent to 25 per cent. The Memphis order had the highest per cent of in-area sales of the 5 orders operating in Tennessee and the highest per cent of inter-order sales. One reason inter-order sales have entered the picture is that chain handlers transfer specialized products between plants in different marketing areas.

Type and Size of Containers Used for the Distribution of Whole Milk

Whole milk is disposed of in 5 different sizes of containers and in bulk form. Glass and paper containers were used to package whole milk. The distribution of whole milk, by size and type of containers, is given in Table XI for the 5 Tennessee marketing areas.

Handlers operaring in the Memphis order packaged no milk in gallon containers in 1963. The use of paper containers seemed to be preferred slightly over glass for packaged gallons in the areas reporting except in Chattanooga where all gallons were packaged in glass. Paper was the dominant type of container used to package all the other sizes. The Nashville order packaged 93 per cent of its half gallons in paper which was the high for all orders in the State. Chattanooga packaged the largest per cent of quarts in paper containers, 85.3 per cent, whereas the Appalachian, Chattanooga, Memphis, and Nashville orders packaged 100 per cent of the pint size in papers. The percentage utilization of paper containers for half pints varied from a high of 99.6 per cent in the Chattanooga order to a low of 87.2 per cent in Knoxville.

TABLE XI

DISTRIBUTION OF WHOLE MILK, BY SIZE AND TYPE OF CONTAINER, FIVE TENNESSEE MARKETS, 1963

Size of container	Appalachian		Chattanooga		Knoxville		Memphis		Nashville	
	Type of container		Type of container		Type of container		Type of container		Type of container	
	Glass	Paper	Glass	Paper	Glass	Paper	Glass	Paper	Glass	Paper
	%	%	%	%	%	%	%	%	%	%
Gallon	48.8	51.2	100	0	23.2	76.8	0	0	21.8	78.2
Half gallon	8.2	91.8	7.8	92.2	35.5	64.5	7.6	92.4	6.8	93.2
Quart	46.4	53.6	14.7	85.3	33.6	66.4	15.3	84.7	27.5	72.5
Pint	0	100	0	100	8.2	91.8	0	100	0	100
Half pint	5.4	94.6	.4	99.6	12.8	87.2	2.8	97.2	6.9	93.1

Source: United States Department of Agriculture, Dairy Division, Consumer and Marketing Service, Packaged Fluid Milk Sales in Federal Milk Order Markets (Washington: Government Printing Office, May 1965), pp. 6-18.

Fluid Milk Marketing Channels

The marketing channels for fluid milk products were studied with respect to both wholesale and retail outlets. The time period included the following years: 1958, 1961, and 1964, and the study included the 4 major marketing areas in the State (Table XII). Commodity channels observed were for whole milk, skim milk, buttermilk, and cream items. During this period there has been a considerable decrease in the percentage of fluid milk items sold on retail routes, and an increase in wholesale deliveries to stores, restaurants, and institutions. The decline was noted for all 4 Tennessee markets analyzed.

Whole milk. Whole milk items marketed through retail outlets in the 4 major markets declined from 32* per cent in 1958 to 18 per cent in 1964. However, whole milk items sold through wholesale outlets increased from 68 to 82 per cent over that time period.

Skim milk. Wholesale outlets again dominated in skim milk sales. The decline in retail route sales was not as great for this item as it was for whole milk. The decline was from 30.5 per cent for all markets to 21.5 over the period. The Chattanooga area showed the greatest decline (24.5 to 12.8) during the 7-year interval, and the Memphis order showed the least amount of decrease (17.6 to 13.9).

Buttermilk. Buttermilk marketed through wholesale outlets has shown a considerable increase in all major Tennessee markets. The increase for all markets was from 80 to 87 per cent from 1958 to 1964.

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*Unweighted average for 4 major markets.

TABLE XII

FLUID MILK PRODUCT SALES BY WHOLESALE AND RETAIL OUTLET, FOUR TENNESSEE MARKETS[a] 1958, 1961, AND 1964

Market	Whole milk[b]		Skim milk[c]		Buttermilk[d]		Cream items[e]	
	Retail	Wholesale	Retail	Wholesale	Retail	Wholesale	Retail	Wholesale
	Per cent of product pounds							
1958								
Chattanooga	24.3	75.7	24.5	75.5	15.2	84.8	14.3	85.7
Knoxville[f]	33.0	67.0	39.2	60.8	24.4	75.6	18.8	81.2
Memphis	39.1	60.9	17.6	82.4	18.1	81.9	12.6	87.4
Nashville	32.3	67.7	40.7	59.3	24.5	75.5	25.2	74.8
1961								
Chattanooga	19.1	80.9	21.7	78.3	12.5	87.5	8.4	91.6
Knoxville[f]	27.3	72.7	32.7	67.3	18.2	81.8	14.5	85.5
Memphis	18.7	81.3	14.6	85.4	9.2	90.8	10.7	89.3
Nashville	26.8	73.2	32.7	67.3	18.9	81.1	17.0	83.0
1964								
Chattanooga[g]	9.3	90.7	12.8	87.2	7.2	92.8	5.8	94.2
Knoxville[f]	24.0	76.0	29.9	70.1	13.5	86.5	13.6	86.4
Memphis	17.3	82.7	13.9	86.1	8.7	91.3	9.2	90.8
Nashville	22.3	77.7	29.6	70.4	21.5	78.5	15.3	84.7

[a]Comparable data not available for Appalachian marketing area.

[b]Includes standard homogenized and extra rich.

[c]Includes fluid skim and flavored drinks.

[d]Includes Bulgarian and plain.

[e]Includes half and half (cream mixture), light, heavy, and sour cream.

[f]Knoxville wholesale includes sales to distributors.

[g]Data for 1963.

Source: Market Administrator's Reports, data for May of each year.

The Nashville marketing area showed the fastest rate of increase, 13 per cent, and Chattanooga increased the slowest, 8 per cent, over the period.

Cream items. Retail sales of cream items decreased at a faster rate than did the other commodities. The decrease was from 18 to 11 per cent over the time period considered. The Nashville order showed the largest decrease (25 to 15 per cent) and Memphis the smallest (13 to 9 per cent).

Volume of fluid milk movements through the various channels are given in Figure 7. Approximately 20 per cent of handler receipts in Tennessee was diverted to Class II uses in 1964, 14 per cent was distributed to consumers via home deliveries or retail routes, and 66 per cent was marketed through stores, schools, restaurants, hospitals, and institutions.

Competition Within the Fluid Milk Industry

The marketing of milk and milk products is usually characterized by a few firms controlling a relatively large share of the market. Small fringe firms are usually large in number and competition is felt more strongly by them.

In 1954 National Dairies and Borden controlled 37 per cent of the bottled fluid milk industry in Tennessee (Table XIII). National Dairies increased its share of the market from 22 per cent to 30 per cent during the 1954-58 period. Pet and Foremost together made up a smaller percentage of the market in 1958 than Borden had in 1954.

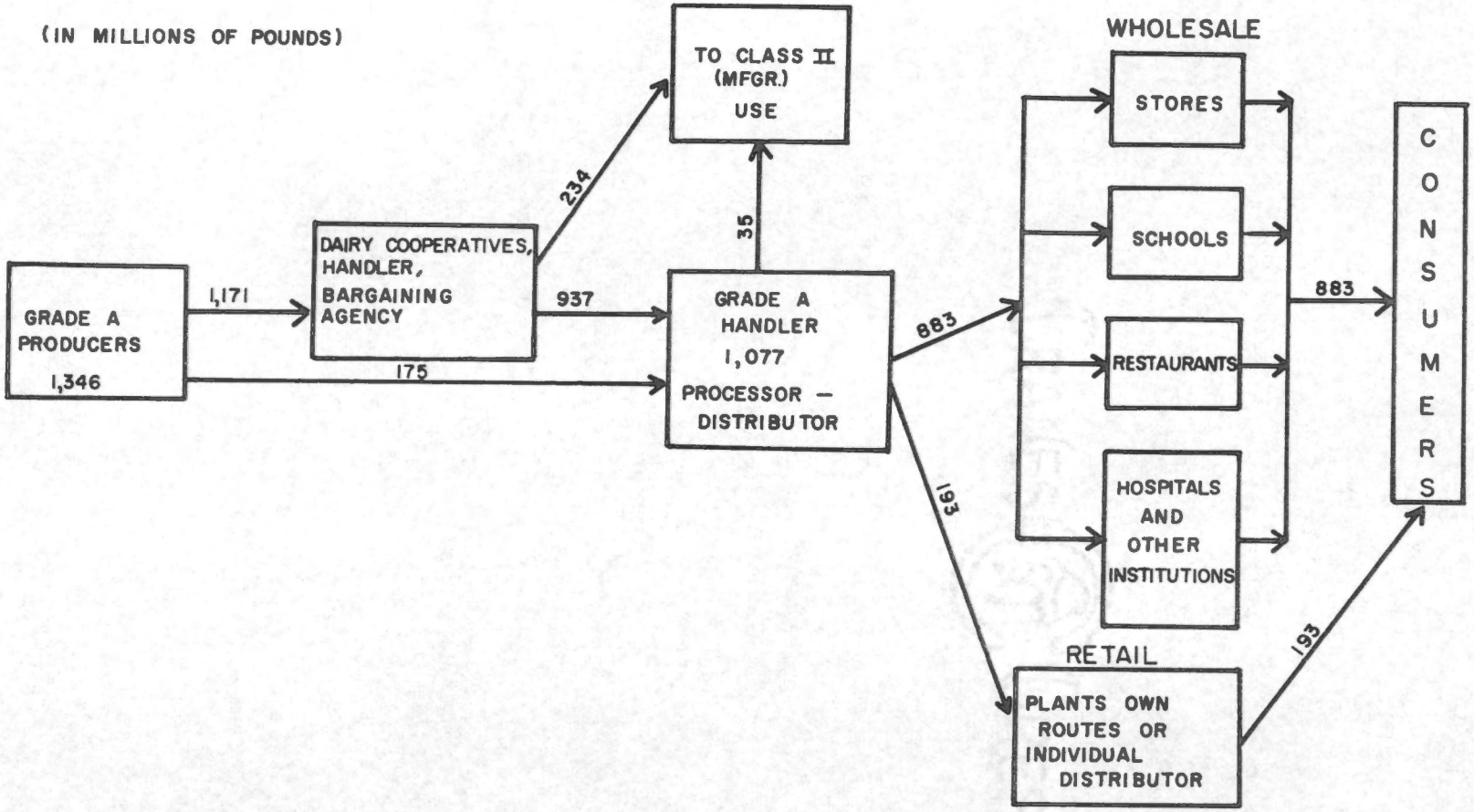


Figure 7. Estimated volume of fluid milk movements through the various channels, from producers to consumers in Tennessee, 1964. (From United States Department of Agriculture, Dairy Division, Dairy Production and Dairy Products; Packaged Fluid Milk Sales in Federal Milk Order Markets (Washington: Government Printing Office, February 1965 and May 1965, respectively); and Market Administrator's Reports, 1964.

TABLE XIII

VALUE OF FLUID MILK (BOTTLED AND BULK) AND MARKET SHARE PER FIRM, TENNESSEE, 1954 AND 1958

Firm name	Bottled fluid milk and cream		Bulk fluid milk	
	1954	1958	1954	1958
	Per cent of market			
National Dairies	21.9	30.2	9.8	16.5
Pet Milk	--	9.4	--	--
Borden	14.9	--	--	--
Foremost	--	2.5	9.7	.7
Swift	--	--	--	--
Carnation	--	--	5.0	--
Total	36.8	42.1	24.5	17.2
Value of all shipments	$43,908,000	$62,146,000	$15,091	$14,458

Source: Beatrice case before the Federal Trade Commission, Docket No. 6651.

National Dairies, Pet Milk, and Foremost companies controlled 42 per cent of the bottled fluid milk market in Tennessee in 1958. The value of bottled fluid milk and cream shipped in Tennessee was $43,908,000 and $62,146,000, respectively, for 1954 and 1958.

Large firms control a smaller portion of bulk fluid milk sales in the State. In 1954, 3 firms accounted for 24.5 per cent of the market, and 2 firms controlled 17.2 per cent in 1958. National Dairies increased its market share from 9.8 per cent to 16.5 per cent over the period.

Regulation of Grade A Milk

Federal regulation of milk was first initiated by the passage of the Agricultural Adjustment Act of 1933. However, only a few years later in 1936 the Supreme Court declared portions of this act unconstitutional. The two portions declared unconstitutional were the production control features and the processing tax feature of the Act. The Agricultural Marketing Act was passed in 1937. This Act provides the legal basis from which the milk marketing orders and agreements of today were developed.

Prices paid and volume of milk sold in Tennessee are given in Figure 8 for census reporting years from 1924-1964. During this period the average price per hundred pounds of milk increased approximately 1.2 times and volume sold to handlers increased approximately 17 times. The period from 1924 to 1934 showed considerable fluctuation both in price and total pounds sold.

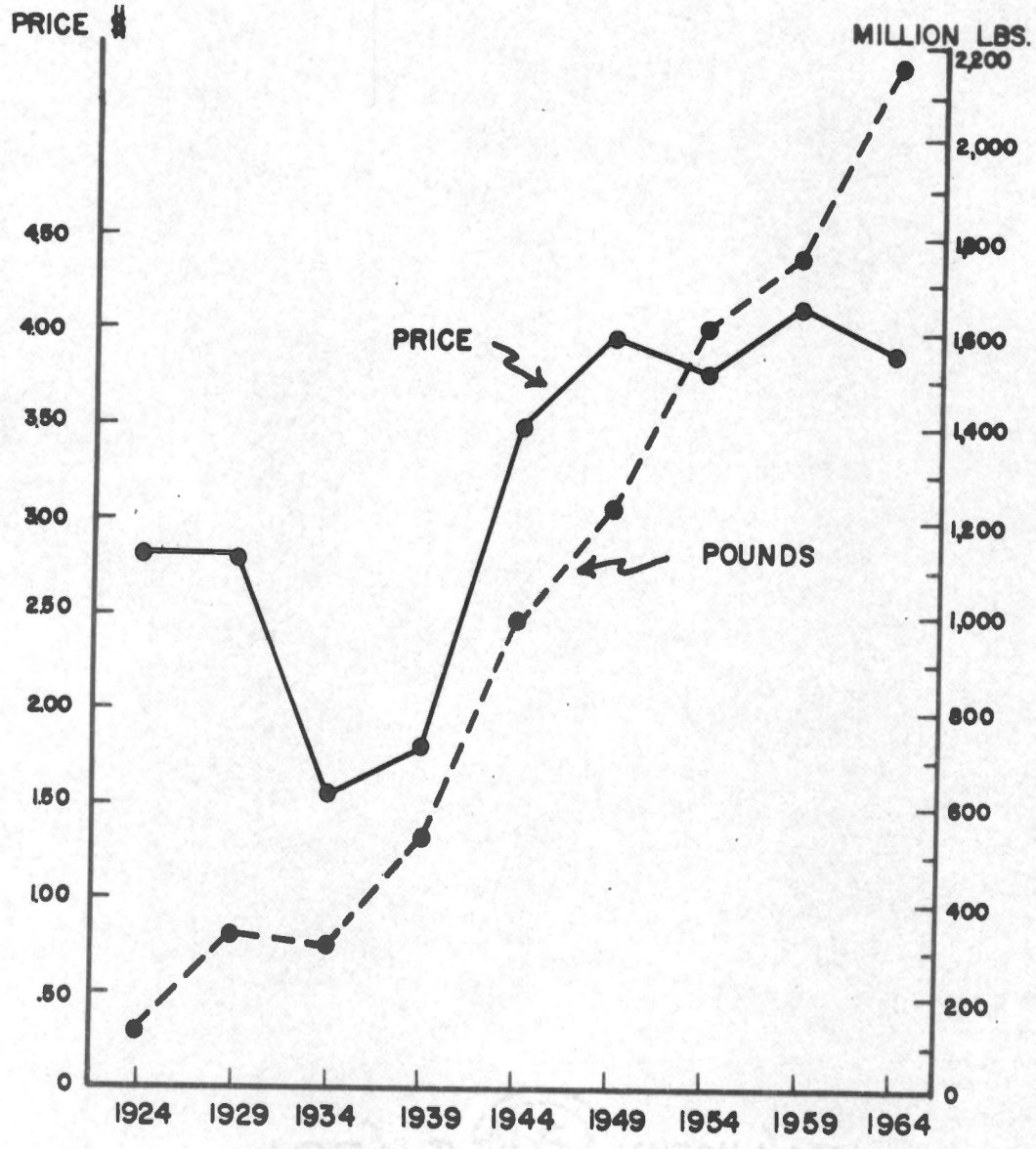


Figure 8. Prices paid and volume of milk sold to dealers in Tennessee, 1924-1964. (From United States Department of Agriculture, Agricultural Trends in Tennessee (Washington: Government Printing Office, September 1964).)

The purpose of the federal order was to stabilize price and to assure a sufficient supply to meet the Class I demand in the market place. To assure this a classified pricing policy and a blend price technique was developed, used, and is still being used. Federal orders fixed the minimum prices that producers would receive for milk classified according to its use. Milk for fluid uses commands a higher price than does milk for manufacturing uses; therefore, the price of Class I milk was determined by the price of manufacturing milk plus a specified differential. Under current conditions, all producers regulated by one federal order receive the same price for their milk, determined by its use. This was not always true during earlier periods and resulted in many producers trying to deliver milk to handlers with a high percentage of Class I utilization.

Future of the Tennessee Grade A Milk Industry

Past changes within the industry have made it what it is at present. When projecting into the future one must recognize the significance of the independent and dependent variables and how these variables will behave in different situations. Two important factors to consider when projecting supply and demand are economic growth and population.

There were approximately 3,798,000 people in Tennessee in July, 1964, and current estimates indicate that there will be approximately

4,285,000 people by 1975.[2] Per capita disposable income has increased approximately 27 per cent in Tennessee since 1955.[3]

Per capita consumption of milk is another important variable to consider in projections of this type. Per capita consumption of fluid milk and cream in the United States was 305 pounds in 1964, 2 pounds below 1963, and a further decline is expected for 1965.[4] Assuming similar decreases in the future, per capita consumption of fluid milk and cream is expected to be approximately 285 pounds by 1975.

Estimated Demand for Grade A Milk

In attempting to estimate demand for fluid milk and cream the following variables were considered: per capita consumption, per capita income, birth rate, and price of the product. These relationships are given in Figure 9 from 1950 to 1964, excluding birth rate for 1964 which was not available. The price of a half gallon of milk was 40 cents in 1950 and was 41 cents in 1964.* Birth rate has declined from 25.5 births per thousand population in 1950 to 24.4 births in 1963. Per capita income has been increasing each year since 1950.

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[2]United States Department of Commerce, Bureau of the Census, Population Estimates (Washington: Government Printing Office, 1965), p. 4.

[3]United States Department of Commerce, Statistical Abstract of the United States (Washington: Government Printing Office, 1964), p. 324.

[4]United States Department of Agriculture, Economic Research Service, National Food Situation (Washington: Government Printing Office, May 1965), p. 32.

*Median price from the 4 major milk markets in Tennessee.

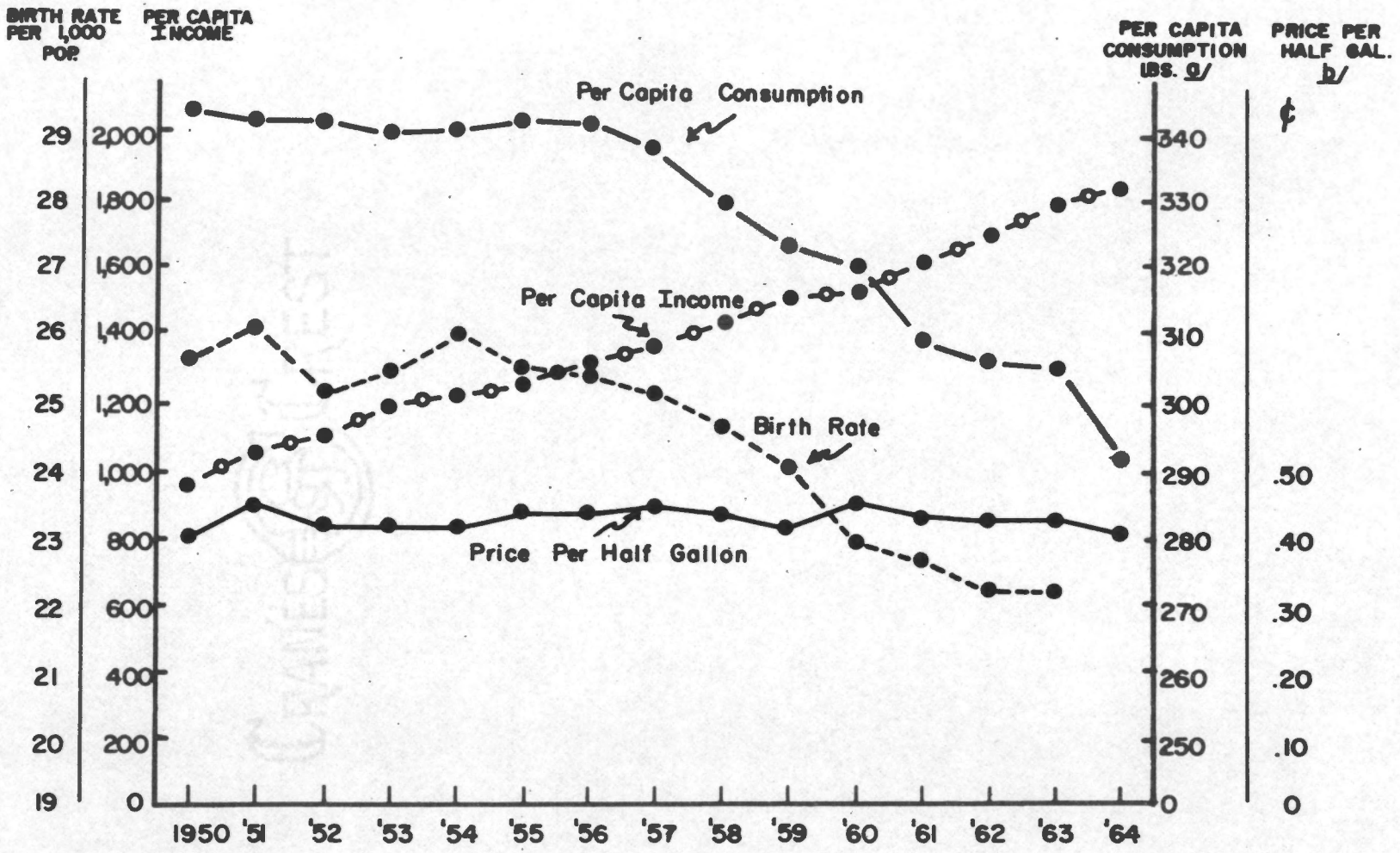


Figure 9. The relationship between per capita income, birth rate, price of fluid milk, and per capita consumption of fluid milk and cream, Tennessee, 1950-1964. (From United States Department of Commerce, Statistical Abstract of the United States, and Fluid Milk and Cream Report (Washington: Government Printing Office, 1950-1964).)

[a]Estimated.

[b]Median price of 4 major markets in Tennessee.

Per capita consumption of fluid milk and cream has decreased from 349 pounds in 1950 to 292 pounds in 1964.

Per capita consumption of fluid milk and cream was not available for Tennessee; therefore, it was estimated from aggregate statistics for the United States. In 1964, per capita consumption for the United States was 305 pounds.[5] Per capita income was $2,550 for the United States and $1,852 for Tennessee in 1964.[6] Income elasticity of milk has been found to be approximately 0.16.[7] By application of these data and the income elasticity formula, per capita fluid milk and cream consumption was estimated to be 292 pounds for Tennessee in 1964. By 1975 this figure is expected to decline to approximately 272 pounds.

Total demand for fluid milk and cream in Tennessee for 1975 can be estimated by multiplying the estimated 1975 population by the estimated per capita consumption for that year. By employing this type of projection technique, the total demand for fluid milk and cream in 1975 is estimated to be 1,165,520,000 pounds. This is approximately a 5 per cent increase over the figure for 1964. This estimated demand in 1975 is 23 per cent greater than Grade A milk produced under federal orders in Tennessee during 1964.

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[5] Ibid.

[6] United States Department of Commerce, Office of Business Economics, Survey of Current Business, Vol. 45, No. 4 (Washington: Government Printing Office, April 1965), p. 15.

[7] G. E. Brandow, Interrelations Among Demand for Farm Products and Implications for Control of Market Supply (University Park: Pennsylvania State University, August 1961), p. 17.

Future Supply of Grade A Milk

The future supply of milk is dependent upon a number of factors including demand for milk and its products, prices paid at the farm level, number of producers, comparative advantage, personal preference of present and potential producers. The following postulation is set forth in regard to potential producers in the Grade A industry. Producers of manufacturing grade milk are considered as potential producers of Grade A milk. Other factors to consider would include age of operator, availability of capital, and alternative uses of productive resources. No attempt was made to project the supply of fluid milk in this study.

CHAPTER III

CHARACTERISTICS OF THE MANUFACTURED MILK INDUSTRY IN TENNESSEE

I. ORGANIZATION OF MARKET SUPPLIES

Three geographical zones were used to indicate the general area from which cheese processing plants derived their supply. The proportion of total supply derived from each zone is given in Table XIV. Five plants received over 75 per cent of their supply from distances less than 25 miles from the plant.* Eight of the plants received between 50 and 75 per cent of their supply from zone 1, and only 4 plants received less than 50 per cent from this zone. Processing plants received an average** of 62.5 per cent of their supply from zone 1, 26.5 per cent from zone 2, and 11 per cent from zone 3. Seven of the responding plants received no milk from zone 3.

Four zones were utilized to show organization of market supplies for evaporated milk. Four evaporated milk plants were interviewed, and they received an average** of 39.3 per cent of their supply from zone 1, 33.7 per cent from zone 2, 14.5 per cent from zone 3, and 12.5 per cent from zone 4. One of the plants received no milk from zone 3, and 2 plants received none from zone 4 (Table XV).

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*All mileages are from county seat to county seat.

**Unweighted average.

TABLE XIV

ORGANIZATION OF MARKET SUPPLIES FOR RESPONDING CHEESE MANUFACTURERS, TENNESSEE, 1963

Plant code	Zone 1 25 miles	Zone 2 25-49 miles	Zone 3 50-100 miles
	Per cent		
8	80	15	5
25	85	10	5
9	70	25	5
16	85	15	--
15	88	12	--
17	60	40	--
22	65	25	10
1	33	37	30
4	30	30	40
5	--	--	--
11	70	20	10
18	30	20	50
19	60	40	--
20	70	30	--
21	45	55	--
24	50	30	20
12	65	25	10
6	77	23	--

TABLE XV

ORGANIZATION OF MARKET SUPPLIES FOR EVAPORATED MILK PROCESSORS, TENNESSEE, 1963

Plant code	Zone 1 25 miles	Zone 2 25-49 miles	Zone 3 50-100 miles	Zon 4 100 miles
	Per cent			
28	35	12	18	35
2	30	35	20	15
29	67	33	--	--
13	25	55	20	--

Manufacturing milk plants derived an average of 62.5 per cent of their supply from zone 1, as compared to 21.3 per cent for Grade A plants. Manufacturing milk plants received no milk from zone 4, while 10.0 per cent of the Grade A supply was derived from this zone. Grade A plants received only 53 per cent of their milk from zones 1 and 2 while manufacturing milk plants obtained 89 per cent from those two zones (Table XVI).

Production Density of Manufactured Milk

Density of production for manufactured milk is an important factor in determining the location of processing plants. Many producers do not own facilities designed to preserve the output produced for long periods of time. Also very few of the haulers own trucks that are insulated for distant hauling. These factors impede long shipments of raw milk.

In 1964, Greene, Hamblen, and Lincoln counties produced over 100,000 pounds of milk per square mile of land area, and Bedford, Giles, Wilson, Sumner, and Trousdale produced over 70,000 pounds. Milk production density is given in Figure 10 (a) by county for 1964. Production was divided into 5 groups, and the number of counties in each group is presented in Figure 10 (b). Group 1, producing less than 10,000 pounds per square mile, included 47 Tennessee counties. Groups 2 and 3, producing between 10,000-39,999 and 40,000-69,999, included 26 and 14 counties, respectively.

TABLE XVI

COMPARISON OF TENNESSEE GRADE A AND MANUFACTURING MILK PLANTS WITH RESPECT TO ORGANIZATION OF MARKET SUPPLIES[a]

Zone	Manufactured milk	Grade A milk[b]
	Per cent	
1[c]	62.5	21.3
2[d]	26.5	32.0
3[e]	11.0	33.0
4[f]	None	10.0

[a]1964 data for Grade A milk and 1963 data for manufactured milk.

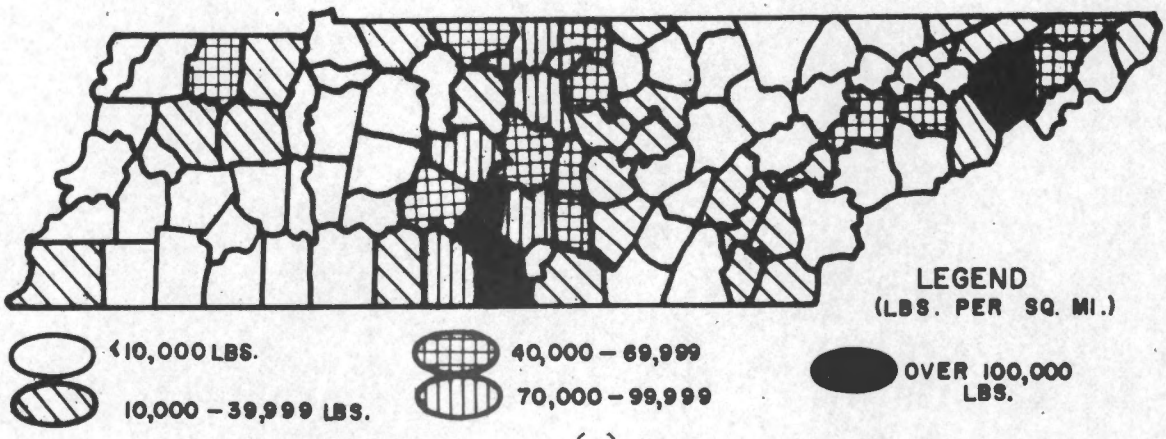
[b]Does not total 100 per cent due to the reporting of data for the Memphis order.

[c]Less than 25 miles.

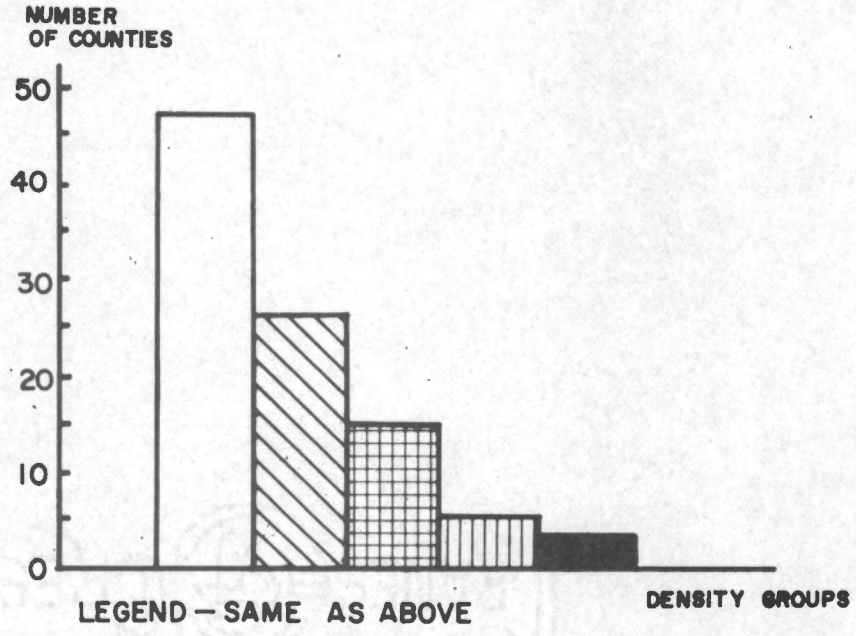
[d]25-49 miles.

[e]50-100 miles.

[f]Over 100 miles.



(a)



(b)

Figure 10. Estimated production density. (a) Milk density for manufacturing purposes; (b) Number of counties in each density group, Tennessee, 1964. (From United States Bureau of the Census, 1964 Census of Agriculture (Washington: Government Printing Office, 1965).)

II. FIRM CHARACTERISTICS

Volume of milk processed is dependent upon volume of milk produced. Milk production is seasonal; therefore, processing plants operate at full capacity during peak production periods and with excess capacity the remainder of the year. Characteristics of cheese processing plants and evaporated milk plants are presented with respect to type of ownership, estimated per cent of total output, and average number of hours operated per day.

Location of Processing Plants

There were 18 cheese processing plants which responded to the questionnaire. They represented production in 16 different Tennessee counties. Four evaporated milk processors were interviewed. Three of these plants, however, were located in counties that also contained cheese processors. Fifteen of the 18 respondents were located in Middle Tennessee. The geographic location of Tennessee cheese and evaporated milk processors is depicted graphically in Figure 11.

The number of processing plants in the industry have shown considerable change since 1960 (Table XVII). The number of creamery butter plants decreased from 11 to 7 between 1960 and 1964, a 43 per cent decline. The number of cheese plants remained constant during the same period. Cottage cheese curd plants declined from 23 to 18 over the period. The number of condensed milk plants remained constant, and evaporated plants increased from 3 to 4 over the period.

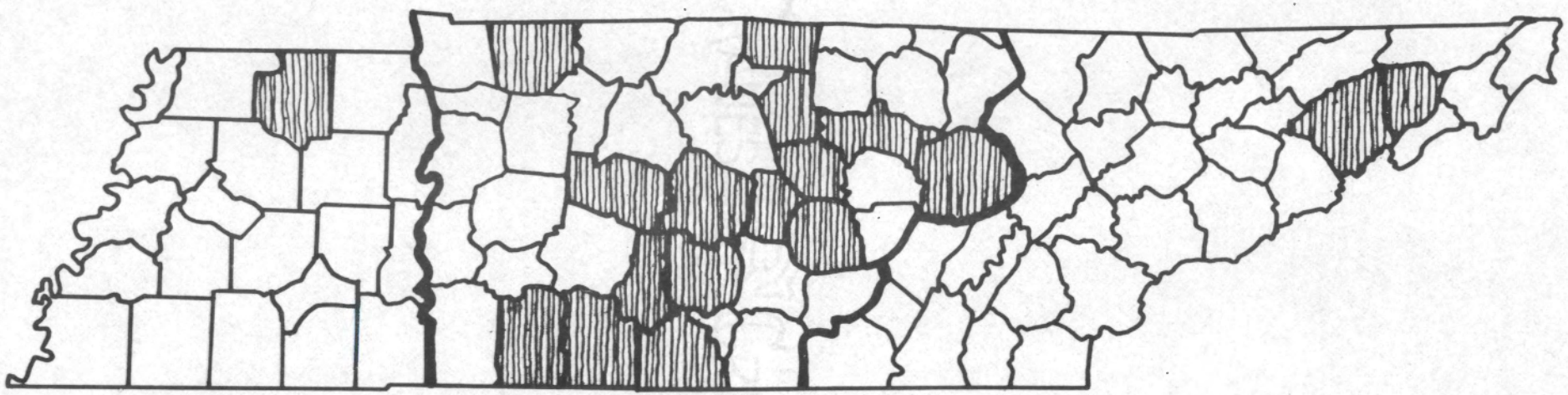


Figure 11. County of location of evaporated milk and cheese processing plants interviewed in Tennessee, 1963.

TABLE XVII

NUMBER OF PLANTS AND PRODUCTION OF MANUFACTURED DAIRY PRODUCTS, TENNESSEE, 1960 AND 1964

Product name	Number of plants		Thousands of pounds produced		1964 as a per cent of 1960	
	1960	1964	1960	1964	Plants	Lbs. Produced
					- - Per cent - -	
Butter creamery	11	7	9,628	7,949	63	82
Cheese[a]	18	18	47,929	44,114	same	92
Cheese[b]	18	18	37,621	33,636	same	89
Cheese[c]	18	18	37,080	31,776	same	86
Cottage cheese curd	23	18	12,019	8,493	78	71
Cottage cheese creamed	26	18	17,028	12,361	69	73
Condensed milk[d]	6	6	9,719	10,027	same	104
Evaporated milk[e]	3	4	165,629	154,336	133	93

[a]Excluding full skim, American, and cottage.

[b]Total American made from whole milk.

[c]Cheddar made from whole milk.

[d]Whole unsweetened bulk goods.

[e]Whole unsweetened case goods.

Source: United States Department of Agriculture, Statistical Reporting Service, Production of Manufactured Dairy Products (Washington: Government Printing Office, July 1961 and 1965), pp. 35-49.

The production of manufactured milk has shown considerable decreases except for condensed milk. Production of condensed milk increased 4 per cent from 1960 to 1964. Creamery butter production decreased 18 per cent, cheese* decreased by 11 per cent, cottage cheese** production declined 29 per cent. Evaporated milk production decreased 7 per cent in Tennessee between 1960 and 1964 (Table XVII).

Ownership of Cheese and Evaporated Milk Firms

The corporate type of ownership predominated in the cheese industry with 13 of the 18 plants possessing this form. Three of the responding firms were proprietorships, while the remaining 2 firms were under partnership and cooperative ownership.

The four evaporated milk plants were owned by national corporations.

Degree of Specialization in Manufacturing Plants

Fifteen of the 18 responding cheese processors indicated that 100 per cent of their output was cheese. Two firms indicated that cheese amounted to 90 per cent of their total output and 1 firm did not respond to this question (Table XVIII).

Two of the evaporated milk plants processed this product only. In the other 2 plants, evaporated milk amounted to 88 and 95 per cent of the firms' total output (Table XIX).

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*Excludes full skim and cottage cheese, includes American and cheddar made from whole milk, and is an unweighted average.

**Cottage cheese curd.

TABLE XVIII

GENERAL CHARACTERISTICS OF TENNESSEE CHEESE PROCESSING PLANTS, 1963

Plant code	Type of ownership	Cheese as % of total output	Average number of hours operated per day			
			Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.
4	Corporation	100	9.3	18.6	18.3	11.0
5	Corporation	a	a	a	a	a
8	Proprietorship	100	8.0	10.0	10.0	8.0
9	Corporation	100	8.0	8.0	8.0	8.0
11	Corporation[b]	100	8.0	8.0	8.0	8.0
15	Partnership[b]	100	8.0	9.6	9.6	8.3
17	Corporation	100	8.0	8.0	8.0	8.0
18	Corporation[b]	100	8.0	8.0	8.0	8.0
19	Proprietorship	100	12.0	12.0	12.0	12.0
20	Proprietorship	100	4.0	9.3	9.3	5.3
21	Corporation	100	8.0	8.0	8.0	8.0
22	Corporation	100	None	12.0	11.3	None
24	Corporation	100	8.0	8.0	8.0	8.0
1	Corporation	100	8.0	8.0	8.0	8.0
12	Corporation[c]	100	8.0	8.5	8.3	8.0
25	Corporation	90	6.0	11.3	15.3	9.3
16	Cooperative	90	8.0	9.0	9.0	8.0
6	Corporation	100	8.0	9.3	11.3	8.6

[a]No response.

[b]Plants operating 7 days per week.

[c]Operating 7 days per week during summer, every other day during winter months.

TABLE XIX

GENERAL CHARACTERISTICS OF TENNESSEE EVAPORATED MILK PROCESSING PLANTS, 1963

Plant code	Type of ownership	Evaporated milk as % of total output	Average number of hours operated per day			
			Jan.-Mar.	Apr.-June	July-Sept.	Oct.-Dec.
13	Corporation	100	NA	NA	NA	NA
28	Corporation	88	8.6	14	15.3	10
2	Corporation	100	9	11.3	11.3	8.6
29	Corporation	95	8.6	22.6	22.6	11.0

NA - Not available.

Average Number of Hours Operated Per Day

The seasonality of production and processing is implied by the seasonality of plant utilization in the industry. Production of milk for manufactured products is more seasonal in nature than is the production of Grade A milk. The seasonality of hours operated per day is given in Table XVIII. The average number of hours operated per day was reported quarterly. The first and last quarters were similar with respect to number of hours operated. The second and third quarters indicate the seasonality of production and processing, with 9 of the 18 firms increasing the number of hours operated per day.

The seasonality of evaporated milk processing is similar to that of cheese (Table XIX). One of the firms was a non-respondent in this respect, but the other 3 showed considerable increases in average number of hours operated during the second and third quarters.

III. MARKETING OF MANUFACTURED MILK

Cheese. Information with respect to the volume and movement of cheese from the processors to consumers was not available. Processors in this phase of the marketing process were primarily concerned with processing the cheese into an intermediate product form and shipping it to other plants for further processing.

Evaporated milk. Evaporated milk did not move through a complex marketing channel after being processed. From the 4 responding plants, 10 per cent of the product was moved directly to a warehouse for dis-

tribution. National and regional chain stores received 77.5 per cent of the industry's output, and local chains received the remaining 10 per cent.*

It was noted that the output was marketed not only in Tennessee but in many of the other Southeastern States. These states included Virginia, North Carolina, South Carolina, Georgia, and Florida. In one instance the canned product moved as far Southwest as Texas. A total of 45 per cent of one firm's output was marketed in Texas and the lower Atlantic States.

The flow of manufactured milk through the channels from production to consumption is estimated in Figure 12. The limitations of reporting this type of information are severe; therefore, these figures are not applicable in every case. The analysis of this study indicated that 175 million pounds of evaporated milk reached consumers via chain stores and 32.4 million pounds of cheese was marketed through this same outlet. Approximately 163 million pounds of creamery butter were marketed through chain stores, and 18.7 million pounds of other manufactured milk products reached consumers via this outlet. Commodity Credit Corporation purchased approximately 164 million pounds** of milk products produced in Tennessee in 1964.[1]

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*Unweighted averages.

**Milk equivalent.

[1]Tom Luna, Dairy Marketing Division, Tennessee Department of Agriculture, Ellington Agricultural Center, Nashville, telephone conversation.

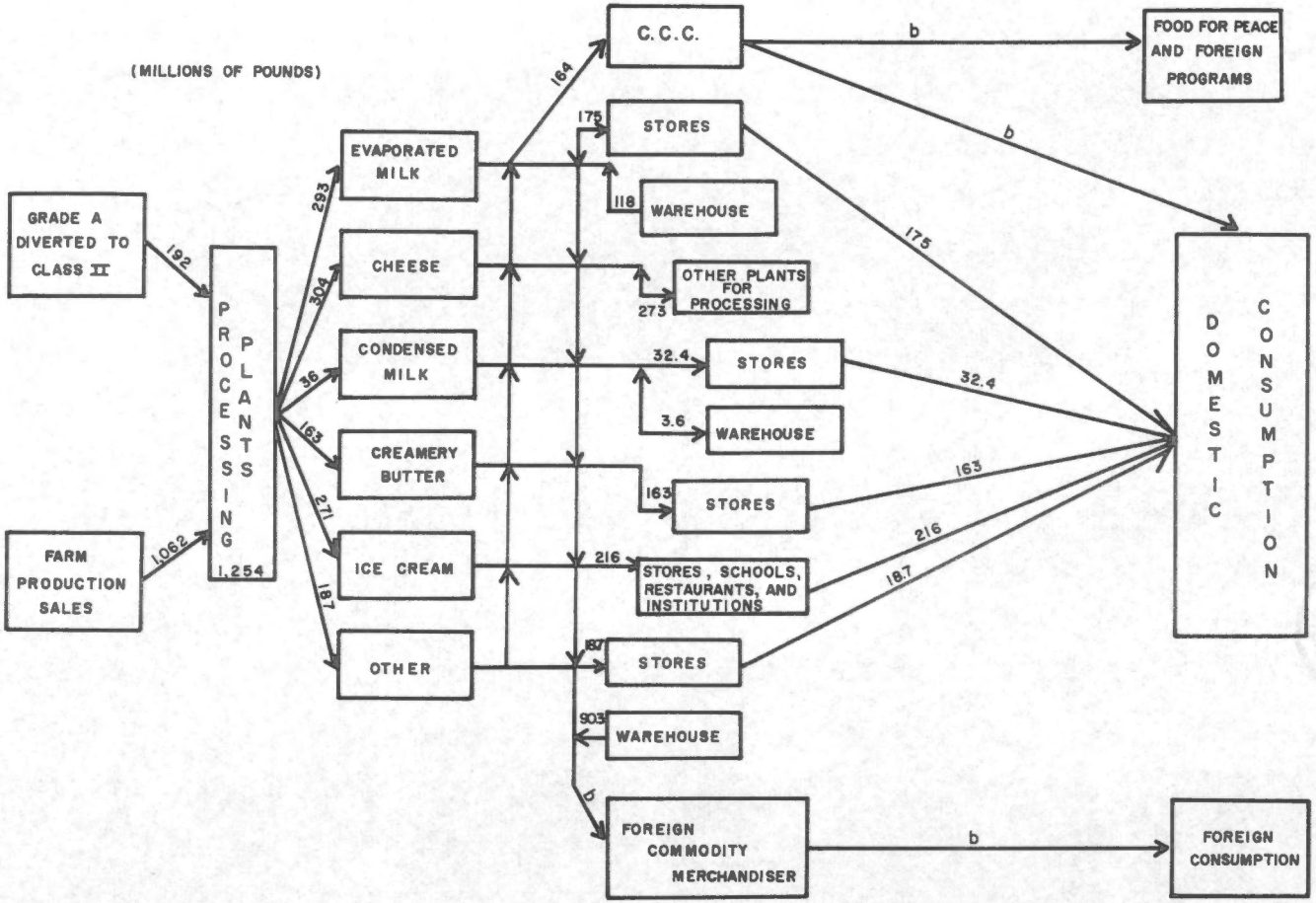


Figure 12. Channels for manufactured milk movement: production to consumption, Tennessee, 1964. (From United States Department of Agriculture, Production of Manufactured Dairy Products, 1965; 1959 Census of Agriculture (Washington: Government Printing Office) and Market Administrator's Reports.)

[a]Milk equivalents.

[b]Not available by states.

Competition in the Manufactured Milk Industry

National Dairies controlled 36.5 per cent of the State's natural cheese sales in 1954. Swift controlled 5.1 per cent and the two large firms together, 41.7 per cent. The value of natural cheese shipments in 1954 was $16,105,000 for the State. Comparable data with respect to cheese shipments for 1958 were not available.

Shipments in the frozen desserts industry were also dominated by a few large firms. Four firms controlled 62.5 per cent of shipments in 1954. However, this figure decreased to 41.6 per cent in 1958. All 4 firms showed a decrease. National Dairies decreased by the greatest amount, 19.5 per cent to 6.8 per cent of the industry's shipments. The value of all frozen desserts shipped was $17,351,000 and $23,665,000, respectively, for 1954 and 1958 (Table XX).

Seasonality of Processing

The production of milk for manufacturing purposes is highly seasonal and imposes associated problems upon the processing industry. Seasonality of processing is given with respect to creamery butter, cheddar cheese, cottage cheese, evaporated milk, and condensed milk in Figure 13.

A centered 12-month moving average was used to isolate the seasonality of production of the various products. The original data were converted to a seasonal index, and depicted graphically in Figure 13. Data used were for the years 1960-1964.

TABLE XX

SHARE OF FROZEN DESSERT MARKET CONTROLLED BY 4 LARGEST FIRMS, TENNESSEE, 1954 AND 1958

Firm name	1954	1958
	Per cent	
National Dairies	19.5	6.8
Pet Milk	20.6	15.1
Swift	12.4	10.4
Beatrice	9.9	9.3
Per cent of total market	62.5	41.6
Value of all shipments	$17,351,000	$23,665,000

Source: Beatrice case before the Federal Trade Commission, Docket No. 6651.

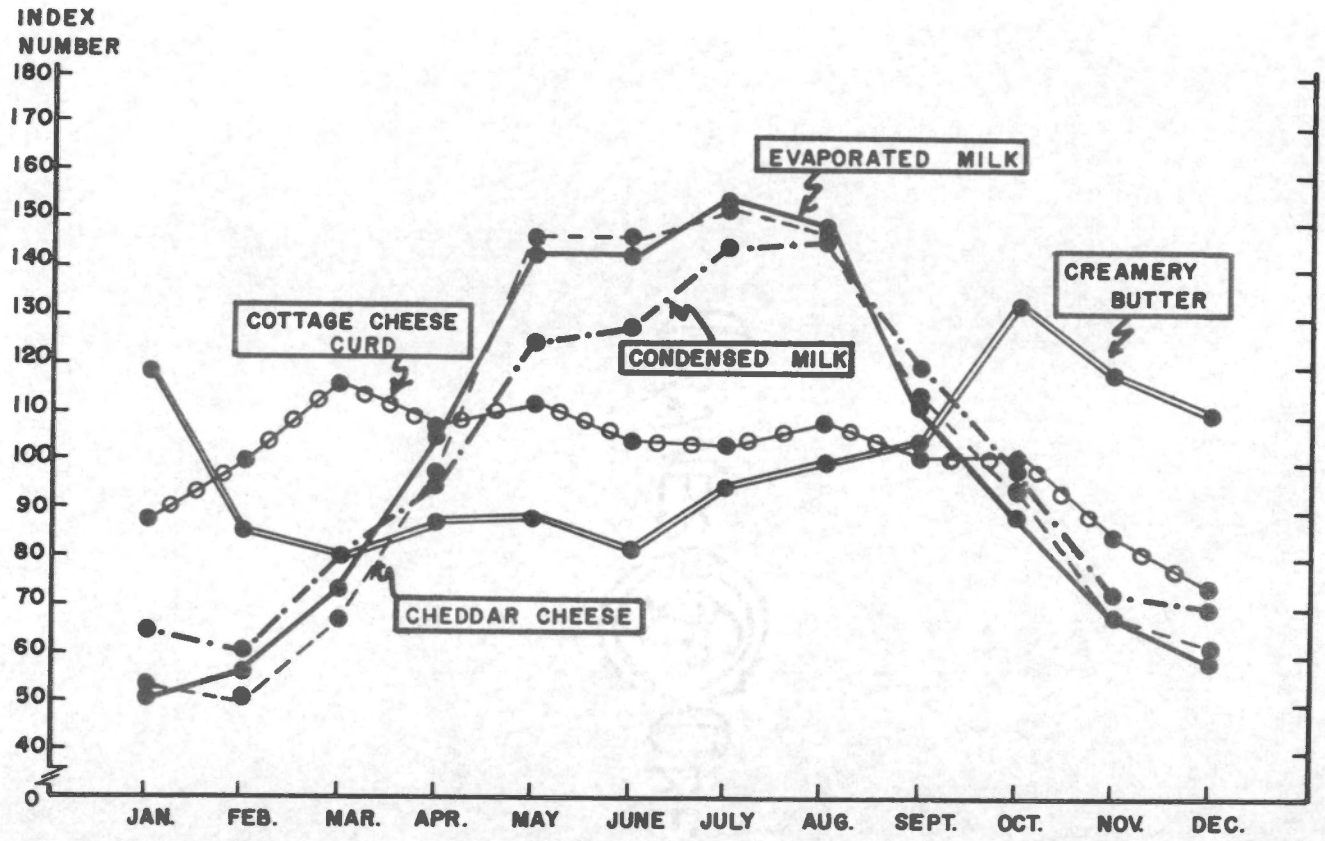


Figure 13. The relationship of season of the year to production of manufactured milk products, Tennessee, 1960-1964. (From United States Department of Agriculture, Production of Manufactured Dairy Products (Washington: Government Printing Office, July 1960 through 1964).)

Creamery butter. Creamery butter production fluctuated from an index low of 80 in March to an index high of 132 in October.

Cheddar cheese. The production of cheddar cheese was highly seasonal, ranging from an index low of 50 in February to an index high of 151 in July. This product showed more seasonal fluctuation than the rest of the products produced from manufacturing milk.

Cottage cheese curd. Cottage cheese curd showed the smallest amount of seasonal fluctuation. Production of this product ranged from an index high of 117 in March to an index low of 74 during the month of December.

Evaporated milk. Seasonal variation was very distinct in the production of evaporated milk. The seasonal index varied from a low of 50 in January to a high of 154 in July.

Condensed milk. Considerable change was noted in the production of condensed milk. Seasonal variations were isolated and ranged from an index low of 60 in February to an index high of 154 during the month of July.

Factors Affecting Demand

Demand for manufactured dairy products is dependent upon many factors. One factor that is thought to be quite significant is consumer preference and is not included in this study due to its qualitative nature. Other factors thought to affect demand are: price of

the product, price of substitute products, and per capita income.

Butter consumption. Factors thought to have a considerable affect on per capita butter consumption are given in Figure 14. During the period from 1953 to 1963, per capita butter consumption decreased approximately 19 per cent while the price of butter decreased 5 per cent. Margarine price concurrently decreased 6.5 per cent, and per capita income increased approximately 36 per cent. In 1964 total butter consumption in Tennessee was estimated to be 23,547,600 pounds (Table XXI).

Evaporated milk consumption. Per capita consumption of evaporated milk has shown considerable decrease over the past decade. The decrease was from 17.4 pounds in 1953 to 9.9 pounds in 1963 or a 43 per cent decrease. The price has increased from 14.6 cents to 15.4 cents or a 5 per cent increase during this period. In 1964 per capita consumption was 9.1 pounds and estimated consumption for the State was 34,561,800 pounds. The relationship of per capita consumption, price of evaporated milk, and per capita income for the United States is given in Figure 15.

Demand for cheese. The demand for cheese was found to be influenced by a number of factors such as: (1) per capita income, (2) price of cheese, and (3) lagged birth rate for 10 years.

Per capita cheese consumption increased from 7.5 pounds to 9.2 pounds from 1953 to 1963 while the price of cheese decreased from 37.2 cents to 36.4 cents per pound (Figure 15).

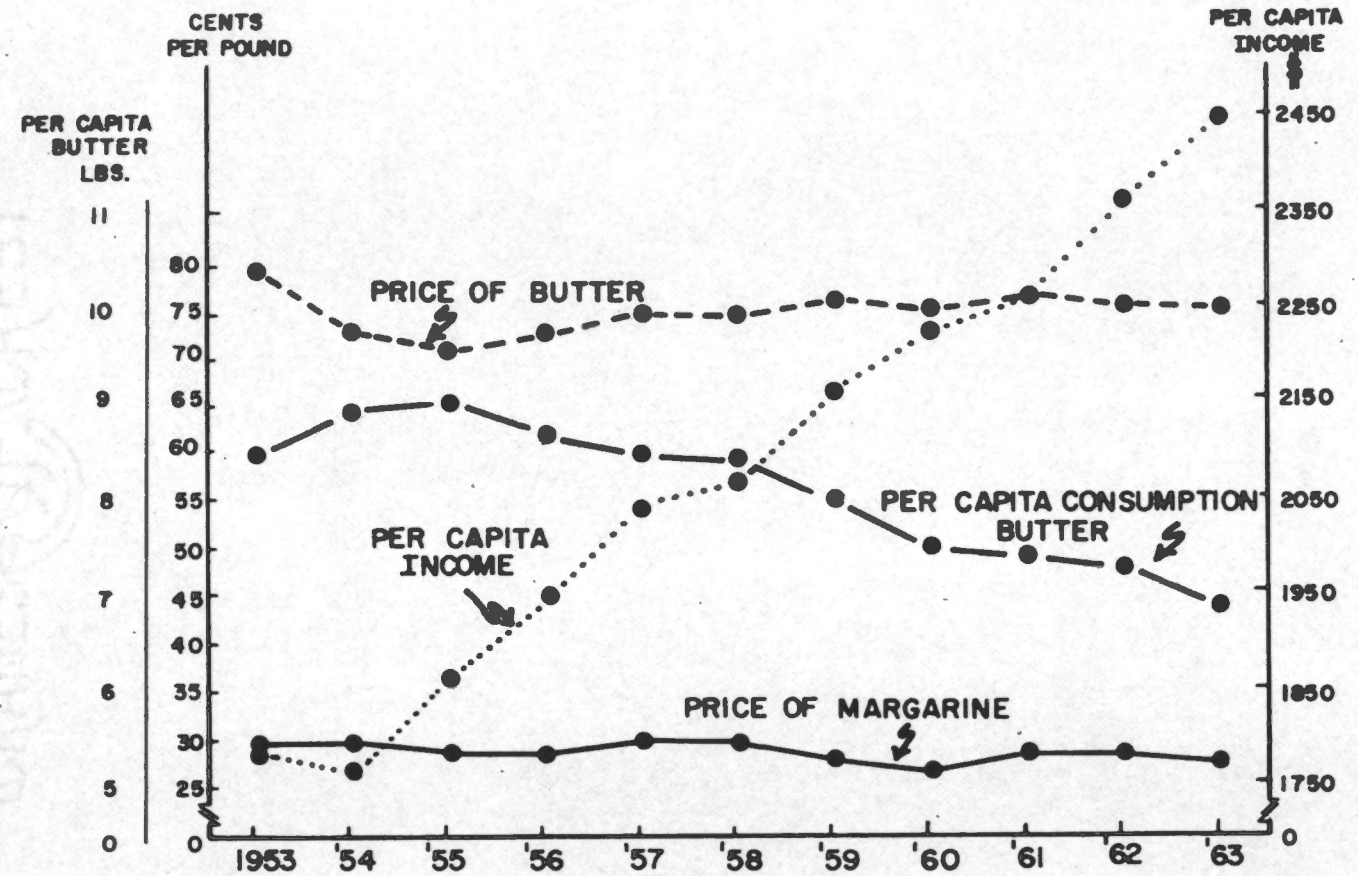


Figure 14. The relationship of per capita income, price of butter and margarine to per capita consumption of butter, United States, 1953-1963. (From United States Department of Agriculture, Dairy Statistics, Statistical Bulletin 303 and Supplements; and United States Department of Commerce, Statistical Abstract of the United States (Washington: Government Printing Office, 1953-1963).)

TABLE XXI

TENNESSEE AND UNITED STATES PRODUCTION AND CONSUMPTION OF MANUFACTURED MILK, 1964

Product	U. S. per capita production[b]	U. S. per capita consumption[b]	Estimated income elasticity[c]	Tennessee per capita consumption[a]	Tennessee total consumption 1964
	Lbs.	Lbs.		Lbs.	Lbs.
Cheese	8.8	9.4	.45	8.27	31,409,460
Evaporated milk	9.8	9.1	0	9.1	34,561,800
Frozen dairy products	52.7	52.1	.35	47.41	180,063,180
Butter	7.5	6.8	.33	6.2	23,547,600
Margarine	9.6	9.6	0	9.6	36,460,800
Condensed milk	2.5	2.2	0	2.2	8,355,600

[a]Estimates based on income elasticity.

[b]United States Department of Agriculture, Economic Research Service, 1965 Outlook Issue, Dairy Situation, 303 (Washington: Government Printing Office, October 1964), p. 21.

[c]G. E. Brandow, Interrelations Among Demands for Farm Products and Implications for Control of Market Supply, Bulletin 680 (University Park: The Pennsylvania State University, College of Agriculture, Agricultural Experiment Station, August 1961), p. 17.

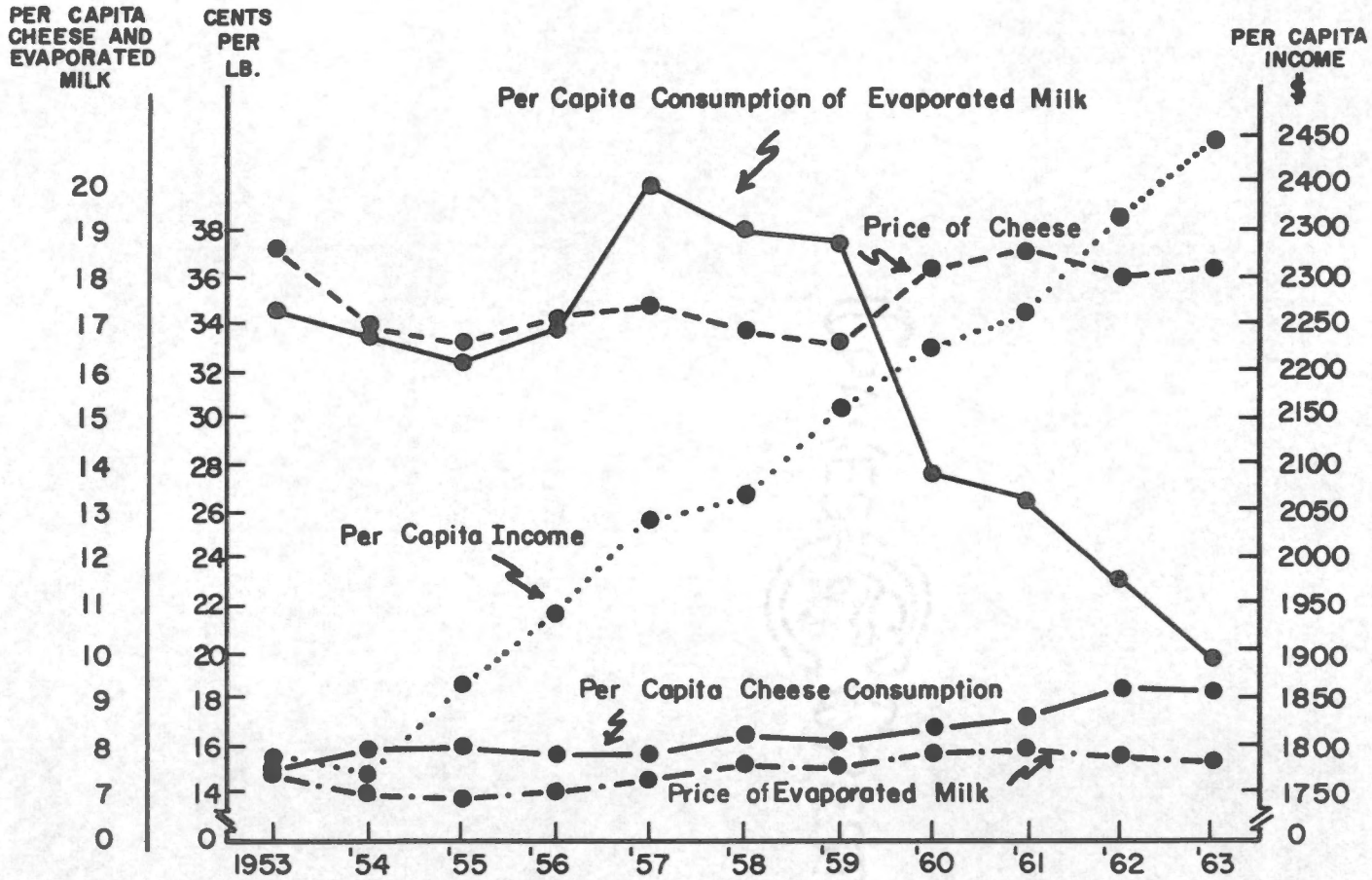


Figure 15. Per capita income, price of cheese and price of evaporated milk; their relationship to per capita consumption of evaporated milk, United States, 1953-1963. (From United States Department of Agriculture, Dairy Statistics, Bulletin 303 and Supplements; and United States Department of Commerce, Statistical Abstract of the United States (Washington: Government Printing Office, 1953-1963, Tables 346 and 448, respectively).)

Income elasticity of demand for cheese has been found to be approximately .45 at the retail level (Table XXI). By application of this figure and the elasticity formula, per capita consumption of cheese for 1964 was estimated to be approximately 8.3 pounds. Total consumption for the State was estimated to be 31,409,460 pounds by multiplying total population by the per capita consumption figure.

CHAPTER IV

SUMMARY

The dairy industry has been one of continuous change in the recent past. Milk cows as a per cent of all cattle have shown considerable decreases since 1930 in Tennessee. The total number of milk cows has declined since 1955 from 695,000 to 495,000 while total pounds of milk produced has increased.

Production density varied from county to county and from marketing area to marketing area. Pounds of milk produced per square mile of land area was the least dense in West Tennessee. There were no counties with a production density greater than 100,000 pounds in Middle Tennessee. Counties that had high production density for Grade A milk were also high in regard to manufactured milk production density.

The number of Tennessee fluid milk handlers regulated by federal order declined from 63 to 49 for the period from 1957 to 1965. Processing cheese plants were concentrated in the Middle Tennessee area. Fifteen of the 18 responding plants were located in this area. Characteristics of processing plants were presented with respect to (1) average number of hours operated per day, (2) size of plant and changes over time, (3) product as per cent of total output, and (4) type of ownership.

Handlers in the 5 Tennessee milksheds received approximately 21 per cent of their supply from distances less than 25 miles. Memphis received more than 40 per cent of its supply from zones 100 miles or more from the processing center.

Supply from in-state sources was: Knoxville, 100 per cent; Chattanooga, 81 per cent; Nashville, 79 per cent; Memphis, 44 per cent; and Appalachian, 37 per cent. The 5 federal orders received an average supply of 62 per cent from in-state sources.

The home delivery outlet as a means of distribution of fluid milk products has declined in recent years, and sales through stores have shown considerable increase.

Total demand for fluid milk and cream was estimated to be 1,112,054,400 pounds for Tennessee in 1964. Tennessee is a surplus processing state and a deficit production state for fluid milk and cream products.

Consumption of cheese was estimated to be 31,409,460 pounds, for Tennessee in 1964. Estimated demand for evaporated milk in Tennessee was 34,561,800 pounds, frozen dairy products 180,063,180 pounds, butter 23,547,600 pounds, margarine 36,460,800 pounds, and condensed milk 8,355,600 pounds in 1964.

Without further market expansion, Tennessee producers and processors must continue to market milk at a price comparable to the price in other areas plus transportation to this area. Seasonal variation in production presents problems to the processing industry; however, in recent years much has been done to alleviate these problems.

Total demand for all milk products is expected to increase during the next decade, and per capita consumption is expected to decline. It was estimated that the demand for fluid milk and cream would be 23 per cent greater in 1975 than 1964 production in Tennessee under federal orders. Therefore, producers and processors should expect substantial change in their operations during the next decade.

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