

1937

## Some economic aspects of marketing fluid milk in Worcester, Massachusetts

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SOME ECONOMIC ASPECTS OF  
MARKETING FLUID MILK IN WORCESTER, MASS.

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SOME ECONOMIC ASPECTS OF MARKETING FLUID MILK  
IN WORCESTER, MASSACHUSETTS

by

Chester Smith

Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Master of Science

Massachusetts State College  
Amherst, Massachusetts  
June 1, 1937

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Cheerful assistance of many has enabled this study. The following helped plan the project or aided in solving problems that ensued: Dr. A. H. Lindsey, Dr. Frank A. Hays, Dr. Jacob K. Shaw, Dr. Alexander E. Cance, Mr. Alfred A. Brown, Mr. Ellsworth W. Bell and Miss J. Elizabeth Donley of the Massachusetts State College Staff, and Dr. Roger B. Corbett of the New England Research Council. Field work was made possible by the cooperation of officials of the Massachusetts Milk Control Board, the Worcester County Extension Service, City of Worcester Board of Health, the New England Milk Producers Association and several Worcester milk companies. The author is especially grateful for the valuable efforts of Miss Eleanor Bukoski and Miss Marion Bullard who helped edit the thesis.

Table of Contents

	<u>Page</u>
Title	i
Acknowledgment	ii
Contents	iii
Table of Contents, Tables	v
Table of Contents, Figures	viii

Introduction

Objectives	2
Scope	3
Sources of Information	4
Definition of Terms	5

Characteristics of the Worcester Milk Market

The City Milk and Cream Supply	9
Relationship to Other Markets	12
Primary Markets	14
Secondary Markets	15
Summary	20
Distributing Agencies	20
Types of Dealers	21
Variations in Size of Business	22
Variations in Buying Price Plans	23
Seasonal Variations in Purchases and Sales	25
Variation in Total Receipts by Price Plans	27
Variations in Fluid Sales	28
Surplus Milk in the Market	30
Division of Surplus among Types of Dealers	31
Summary	42

Organization of the Worcester Market

Transportation	43
Services Performed by Dealers	44
Grades of Milk	45

Table of Contents (cont.)

	<u>Page</u>
Organized Cooperation	46
Extent of the N.E.M.P.A.	46
How the Association Functions	47
Summary	49
The Massachusetts Milk Control Board	50
<u>Economic Structure of the Geographical Milk Shed in 1935</u>	
Distribution of Total Supply by Zones and Sub-Zones	54
The 1935 Milk Shed Compared to that of 1932	55
Producer Variations in the Milk Shed	57
Variations in Size of Producers	58
Part Year Producers in the Milk Shed	63
Producer Shifts Among Dealers	68
Variations in Seasonal Production	69
Rates Charged for Hauling Milk	73
Average Milk Shed and Zone Rates	73
Distribution of Rates Within Zones	73
Changes in Rates in 1935	74
Factors Affecting Local Rates	77
Comparative Rates for Massachusetts and Vermont Milk	77
Summary of Hauling Rates	79
Price Structure	80
Prices Paid in the Market - 1935	82
Distribution of Producers by Price Plans	82
Comparative Prices Received among Zones	82
Comparative Prices Received among Price Plans	85
Relationship between Net Price and Hauling Rates and Dealer's Surplus	89
Summary of Price Structure	91
Summary	92
Summary Discussion	96
Bibliography	102



Table of Contents

Tables

	<u>Page</u>
Table 1. The Worcester Milk and Cream Supply by State of Origin January 1935.	11
Table 2. Division of the Worcester Milk Market Among Types of Dealers in January, 1935.	21
Table 3. Variations in Size of Business of Worcester Milk Dealers, January, 1935.	23
Table 4. Division of the Worcester Market Among Dealers According to Price Payment Plans, January, 1935.	25
Table 5. Average Daily Total Purchases of Milk by Months by Worcester Dealers - 1935.	26
Table 6. Variation in Daily Purchases of Milk by Months by Different Types of Worcester Dealers, 1935.	27
Table 7. Comparison of Average Daily Fluid Sales of Milk by Months Among Worcester Dealers - 1935.	29
Table 8. Variation by Months in Surplus Milk Handled by Rating Plan and Use Plan Dealers in Worcester - 1935.	31
Table 9. Volume and Percent Class I Sales by Months of 13 Use Plan Dealers in Worcester - 1935.	34
Table 10. Volume and Percent Class I Sales of Milk by Months of 10 Use Plan Dealers in Worcester, 1936.	35
Table 11. Volume and Percent Class I Sales of Milk by Months of 10 Rating Plan Dealers in Worcester - 1935.	36
Table 12. Proportionate Distribution of Worcester Milk Supply by 5 Mile Zones.	54
Table 13. Proportionate Distribution of Worcester Milk Supply by Geographical Quarter Zones.	55
Table 14. Worcester Milk Supply from Massachusetts in Percentage Division Among Geographical Quarters for 1932 and 1935.	57
Table 15. Worcester Milk Supply in Percentage Division among States 1932 and 1935.	57



Table of ContentsTables (cont.)

	<u>Page</u>
Table 16. Division of Worcester Milk Supply Among Producers by Size Groups - 1935.	58
Table 17. Summary of Average Daily Deliveries of Milk per Producer in the Massachusetts Area of the Worcester Milk Shed, 1935.	60
Table 18. Percentage Part-Year Producers are of All Producers by Months in the Massachusetts Area of the Worcester Milk Shed - 1935.	64
Table 19. Numbers and Production by Months of Producers Added to and Dropped from the Massachusetts Area of the Worcester Milk Shed - 1935.	64
Table 20. Numbers and Production by Months of Part-Year Producers in the Massachusetts Area of the Worcester Milk Shed - 1935.	66
Table 21. Seasonal Distribution of Massachusetts Milk Producers Supplying Worcester Who Changed from One Worcester Dealer to Another in 1935.	69
Table 22. November-June Ratios of Producers in the Massachusetts Area of the Worcester Milk Shed, 1935.	70
Table 23. Average Zone Rates for Hauling Milk in the Massachusetts Area of the Worcester Milk Shed - 1935.	74
Table 24. Changes in Milk Hauling Rates in the Massachusetts Area of the Worcester Milk Shed - 1935.	75
Table 25. Rates Charged for Hauling Milk in the Massachusetts Area of the Worcester Milk Shed - 1935.	76
Table 26. Farm to Country Plant Hauling Rates for 48 Vermont Producers in the Worcester Milk Shed - 1935.	77
Table 27. Comparative Costs of Transporting Vermont and Massachusetts Milk from Farm to Dealers' Plants in Worcester - 1935.	79
Table 28. Butter Fat Differentials and Gross Prices Paid at Dealers Plants by Worcester Milk Dealers in 1935.	82
Table 29. Average Net Prices for Milk Received by Use, Rating, and Flat Plan Producers in the Massachusetts Area of the Worcester Milk Shed by 5-Mile Zones - 1935.	84

Table of ContentsTables (cont.)

	<u>Page</u>
Table 30. Distribution of Producers by Number and Percentage of Net Prices Received by All Producers by Zones in the Worcester Market - 1935.	88
Table 31. Successive Zone to Zone Changes in Net Producer Prices, Hauling Rates, and Percentage of Class I Milk in the Massachusetts Area of the Worcester Milk Shed, 1935.	89

Table of ContentsFigures

	<u>Page</u>
Figure 1. The Worcester, Massachusetts Milk and Cream Supply for January, 1935, by State of Origin.	11
Figure 2. Base map showing location of producers.	13
Figure 3. Secondary Milk Markets in Massachusetts.	16
Figure 4. The Worcester Milk Shed and Other Adjoining Secondary Markets.	17
Figure 5. Worcester Milk Shed Overlapping Springfield Milk Shed.	19
Figure 6. Total Daily Purchases of Milk by Months by Worcester Dealers - 1935.	26
Figure 7. Percentage Variations in Total Daily Deliveries of Milk by Months to Worcester Dealers by Price Plan Groups - 1935.	28
Figure 8. Percentage Variations by Months in Class I Sales of Worcester Dealers by Price Plans - 1935.	30
Figure 9. Average Daily Purchases and Surplus by Months of 13 Use Plan Dealers in Worcester - 1935.	32
Figure 10. Average Daily Total Class I Sales and Surplus of 10 Rating Plan Dealers in the Worcester Market - 1935.	32
Figure 11. Percent Surplus Milk Handled by Months by Use and Rating Plan Dealers in Worcester - 1935.	33
Figure 12. Percent Class I Sales by Months of Individual Milk Dealers in Worcester, 1935 and 1936.	38, 39
Figure 13. Percent Class I Sales and Surplus Milk by Semi-Monthly Pay Periods for 10 Use Plan Dealers in Worcester - 1936.	41
Figure 14. Producers who are Members of Cooperative Associations.	48
Figure 15. Diagram showing Worcester Milk Shed Division by Zones and Quarter Zones.	53
Figure 16. Zone and Quarter Zone Divisions of the Milk Shed, 1932 and 1935.	56



Table of ContentsFigures (cont.)

	<u>Page</u>
Figure 17. Proportions of the Worcester Milk Market Supplied by Different Size Groups of Producers.	59
Figure 18. Diagrammatic Presentation of Average Daily Deliveries of Worcester Milk Producers by Zones and Quarter Zones, 1935.	61
Figure 19. Average Daily Deliveries of Milk to Dealers by Producers.	62
Figure 20. Trend in Numbers and Production of Part Year Producers in the Worcester Milk Shed, 1935.	65
Figure 21. Diagram showing geographical distribution of part year producers in the Worcester Milk Shed in 1935.	67
Figure 22. Distribution of November-June ratios of Production among 530 Producers in the Massachusetts Area of the Worcester Milk Shed - 1935.	70
Figure 23. November-June ratio of Production Among Producers.	71
Figure 24. Proportionate Distribution of Trucking Rates for Milk within zones, Worcester Milk Shed, 1935.	75
Figure 25. Hauling Rates Among Producers.	78
Figure 26. Dealers' Price Plans in the Milk Shed.	83
Figure 27. Average and Range of Prices by Zones in the Massachusetts Area of the Worcester Milk Shed, 1935.	84
Figure 28. Percentage Distribution within Zones of Net Yearly Prices Received by Milk Producers in the Massachusetts Area of the Worcester Milk Shed - 1935.	86
Figure 29. Diagrammatic Distribution Within Zones of Net Yearly Prices Received by Milk Producers in the Massachusetts Area of the Worcester Milk Shed - 1935.	86
Figure 30. Percentage Distribution within Zones of Net Prices Received by Producers by Price Plans, Worcester Market, 1935.	87
Figure 31. Net Prices Received at the Farm for 3.7% Milk.	90

SOME ECONOMIC ASPECTS OF MARKETING FLUID MILK  
IN WORCESTER, MASSACHUSETTS

Introduction

In November, 1935, a New England-wide program of milk marketing research was inaugurated under the leadership of the New England Research Council. This program as tentatively outlined placed major emphasis on secondary markets.<sup>1</sup> The outline of procedure that was accepted, as drawn up by Mr. H. B. Rowe of the Bureau of Agricultural Economics, divided the projects meriting consideration into four groups: (1) Preliminary Studies, (2) Supply Side of the Market, (3) Consumption and Demand, and (4) City Distribution.

Considerable research in the first group, Preliminary Studies, has already been completed.<sup>2</sup>

A study of "Secondary Milk Markets in Massachusetts" under the outlined New England-wide program has been in progress since December, 1935. Objectives of the Program are: (1) to assemble an accurate body of data descriptive of the market, and (2) to provide data essential to the accurate forecasting of the effects of price changes in the market. Work under way at present is divided into two sections covering six secondary markets. Section I comprises the Connecticut Valley group

---

1. Secondary markets in New England are organized markets other than the one primary market, Boston.

2. Schoenfeld, W. A., Some Economic Aspects of the Marketing of Milk and Cream in New England, U.S.D.A., Cir. 16, Oct. 1927.

Fielding, J. G., A Study of Milk and Cream Supplies for Greater Providence, 1929-1931, Agr. Exp. Sta. of R. I. State College, Bul. 237, Aug. 1932.

Lindsey, A.H., Sources of Milk Supply in Twenty-Nine Secondary Markets in Massachusetts, mimeographed report, Mass. Agr. Exp. Sta., March 1934.

of markets including Springfield, Westfield, Holyoke, Chicopee and Northampton. Section II comprises the Worcester market.

This thesis is the first report on Section II of the study of "Secondary Milk Markets in Massachusetts".

Objectives:

As this project is only one section of a state program which in itself is part of a larger New England program, a separately developed set of objectives for a study of the Worcester market would conflict with the synthesis of the finished products. One purpose of this report is to maintain consistency with the outline of the New England program and the specific objectives of the Massachusetts program. A detailed descriptive analysis of the economic structure of the Worcester milk shed is the ultimate aim. It is hoped that in following such procedure there will be presented a picture, historically valuable in itself, that will serve as foundation for further development of the same analysis in an effort to determine production response to price changes in the market.

In 1932 and 1933 the quite universal breakdown of established milk marketing procedure caused much concern. The aftermath of that part of the upheaval that took place in Massachusetts is the Massachusetts Milk Control Board, created by an act of the Massachusetts legislature in July, 1934. This board, which still functions, establishes producer prices for milk in the Commonwealth. But in the interests of orderly marketing, no amount of authority can compensate for a lack of understanding of the respective magnitudes of economic forces at work in a particular market.



Correct differentials depend on proper interpretation of accurate market information. Though controversy still exists over the value of so-called "unit cost of production and distribution studies" as an aid to setting prices, the consensus of opinion is that it is sound economics to set the price at a point where just the right volume of milk enters the market. An accurate understanding of production-price response and demand-price response can become one of the greatest aids to determining that price whether it is regulated by government or competition.

To this end the New England-wide study of milk marketing sets up as a major consideration in its hypothesis the gathering and proper analysis of accurate and detailed information. It is hoped that this evolving of specific information from general can be of material benefit in helping to solve particular situations. In turn, an understanding of these situations will help to refine the general principles of milk marketing, the final draft of which is probably still in the formative stage.

#### Scope

Under Section II of the inclusive outline, "Supply Side of the Market", are listed seven sub-projects as follows:

1. Organization of the Market.
2. Economic Structure of the Milk Shed.
3. Trucking.
4. Operation and Organization of Country Plants.
5. Production Response to Price.
6. Interrelationships between Markets.
7. Concluding Appraisal of Marketing up to the beginning of City Distribution.

The end hoped for is an understanding of production response to price and market interrelationships. The first four sub-projects

constitute basic research prerequisite to the larger goal. They lay the foundation and point the way for the final projects; thus, inclusive conclusions on the economics of milk marketing from the initial studies are not expected. Their respective aims will be summary rather than conclusion.

This study of the Worcester market covers the first two sub-projects; Organization of the Market, and Economic Structure of the Milk Shed. Descriptive treatment of the first project serves as background for the second project, towards which major emphasis has been directed. This part is an attempt to describe, map, and analyze in detail many of the economic variations existent in the Worcester milk shed in 1935.

#### Sources of Information

Basic data for this study consist of records of milk dealer payroll audits of the Massachusetts Milk Control Board for the calendar year 1935. For all agencies licensed to distribute milk in the City of Worcester, records include the following:

1. Dealer purchases of milk from producers by semi-monthly pay periods.
2. Milk purchases divided between base and surplus for rating plan dealers.
3. Gross Class I, Class II, and blended prices paid for milk by semi-monthly pay periods.
4. Net amounts (dollars) received for milk by producers by semi-monthly pay periods.
5. Records of deductions.
  - a. Milk Board Assessments.
  - b. Can charges.
  - c. Cooperative Association fees.
  - d. Transportation rates.
  - e. Other deductions.
6. Total purchases by dealers by semi-monthly pay periods and Class I and Class II division of sales.

Investigation has revealed the above-outlined price and purchase information to be incomplete for certain dealers. Insofar as possible these omissions have been filled in from actual payroll records through personal contacts with such dealers. Other omissions have necessitated study of a large sample rather than conclusive tabulation.

By using lists of producers and dealers thus secured from the Milk Control Board's files, maps have been constructed showing geographical locations of producers. This work was enabled by maps made available by the Worcester County Agricultural Extension Service. Interpretation and evaluation of all data have been materially enhanced by information gained through personal contacts or correspondence with personnel of the office of milk inspection of the City Health Department of Worcester, State Milk Control Board officials, New England Milk Producers Association officials, and State and County Extension Service workers. No contacts with individual producers have been made specifically for this study. However, the author spent three weeks in the field in September, 1936, securing farm survey records from producers in one part of the Worcester milk shed in connection with the current cooperative study of "Inter-regional Competition" being conducted jointly by the Bureau of Agricultural Economics, Harvard University, and several cooperating state experiment stations.

#### Definitions of Terms

Secondary and Primary Markets: Size of the market, measured by the population of the consuming area, and relationship to adjoining markets determine its classification. In Massachusetts, Boston is the



only market considered primary; others are secondary.

Worcester Market refers in general to the area served by milk distributors licensed by the City of Worcester to sell milk. In addition to the city, it includes the business in adjoining towns of dealers located in the city. It also includes total business of distributors located in adjoining towns with sales in Worcester. In the case of distributors who are located in towns outside the general sales area but operate in the city, only Worcester sales are included.

Worcester Area refers to Sales Area Number 8 as determined by the Massachusetts Milk Control Board and includes the towns of Rutland, Holden, West Boylston, Boylston, Paxton, Worcester, Shrewsbury, Spencer, Leicester, Auburn, Millbury, and Grafton.

Classification of Milk. Reference to milk in this study is as follows:

Class I milk refers to fluid milk distributed to consumers for human consumption. Pasteurization is the only change from the natural form allowed for such milk.

Class II milk refers to fluid milk which is purchased from producers supplying Class I milk but is not marketed in fluid form. A synonymous term for such milk is surplus.

Distributing Agencies: The following designations are made in this study: Dealer refers to agencies purchasing milk for fluid sale from one or more producers, the dealer's major business activity being selling and not producing. Agencies buying milk for fluid sale from producers and also producing part of their supply are called Producer-Dealers. Agencies selling at retail or wholesale delivery

milk produced only on their own farms are called Producer Distributors. Agencies purchasing from other dealers milk only which is intended for delivered resale are called Intermediate Dealers.

Producer refers to the combination of farmer and farm producing milk for sale to dealers or producer-dealers. It is taken to mean one producing unit.

Worcester Milk Shed refers to the geographical area in which producers for the Worcester market are located.

Price Buying Plans. Three methods of paying producers for milk purchased are employed among dealers:

Flat Plan refers to payment at the established Class I price for all milk purchased. Such purchase may be on a straight volume basis at the price for milk containing 3.7% butter-fat, or on a weight and test basis with adjustment above or below 3.7% according to an established butter-fat differential.

Use Plan refers to payment according to the percentage division of a dealer's sales between Class I and Class II milk. Such percentage division is periodically applied equally to all producers of a single dealer.

Rating Plan is essentially a use plan with base ratings established by the dealer for every producer. A rating is a quantity of milk produced daily for which the producer is allowed a Class I price and is based on average daily production for the previous year. Milk produced in addition to the rating allowance is called excess. When the dealers' purchases of rated milk exceed their Class I sales, the price paid for rated milk is blended downward

from the established Class I price and all excess milk is paid for at the established Class II price. When their Class I sales exceed rated milk purchases, all rated milk is paid for at the Class I price and the excess milk price is blended upward from the Class II price.

Composite Price refers to the average price paid by dealers for all milk purchased. It is a weighted average of the Class I and Class II prices determined by the proportions of milk sold in the respective classes.

Butter-fat Differential refers to a premium or a deduction for milk testing above or below 3.7% butter fat. It is expressed as cents per hundred pounds of milk for each one-tenth percent of butter fat.



### Characteristics of the Worcester Milk Market

As an organized milk market, Worcester is unique in many respects. It is the third largest city in New England, being exceeded by only Boston and Providence. The 1935 Census reported a population of 190,471, a decrease of 2.5% from the peak of 195,311 reached in 1930.

Worcester is centrally located, serving as a shopping center for approximately 400,000 people. Population is further increased a large part of the year by the presence of four colleges and two preparatory schools. There are 600 industrial establishments in the city of such diversity that employment is fairly stable except in times of extreme business inactivity. Steel and wire, machine tools, leather, and textiles comprise the major portion of the industrial units.

### The City Milk and Cream Supply

In 1935, eighty-one distributing agencies purchased from farmers a total of 60,679,838 pounds of fluid milk. This represents average daily deliveries by producers of 172,883 pounds. Information on cream supplies is unavailable for the entire year, but in January, cream dealers purchased an average of 5,325 quarts daily. This amount is a milk equivalent of 114,490 pounds compared to average daily purchases of milk in January of 161,267 pounds. One large cream dealer operates a branch plant in Providence. In January, 1935, this concern averaged to reship 920 quarts (19,781 pounds, milk equivalent) to this plant daily so that total purchases of cream for sale in the Worcester

area amounted to a milk equivalent of only 94,711 pounds.

Total daily purchases of milk and cream by Worcester milk dealers equaled 255,978 pounds in a city numbering 190,471 persons. Though this daily volume indicates a per capita consumption of more than one pound, such is not the case because of temporary increases in population and the fact that part of the supply is delivered to consumers in neighboring towns. Inadequate information on these variations makes a satisfactory estimate of per capita consumption impossible.

Ninety percent of the fluid milk supply is produced in Massachusetts, but nearly all the cream purchased as such comes from outside the state. Figure 1 and Table 1 show origin of milk and cream supplies in January, 1935. The 8.0% of milk supplied from outside the state is nearly equally divided between Vermont and New York, with a negligible amount coming from Connecticut. Cream was shipped from seven states, the largest proportion (43.6%) coming from Michigan.

Source of milk supplies remains fairly constant. City milk inspectors serving Worcester for the past several years report that since 1930, shifts in supply area have been comparatively slight.<sup>1</sup> Cream per unit of fat is much cheaper to transport to market than fluid milk. This enables milk production for cream use in areas of naturally low production costs, and accounts for a widely fluctuating cream shed. Certain Worcester dealers' records indicate that this geographical picture presented for January may imperfectly represent the following months' situation.

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1. Informal interview with Worcester milk inspectors.

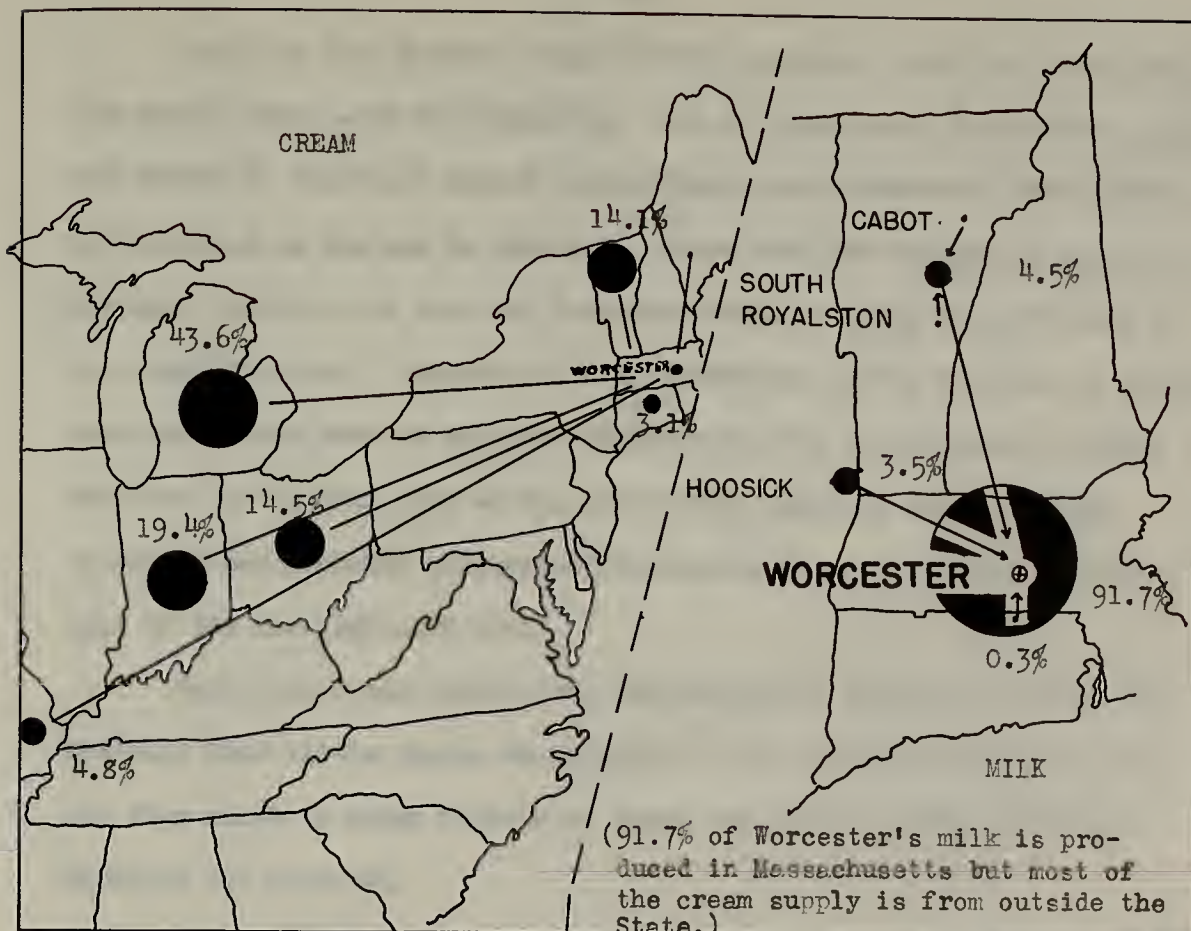


Figure 1. The Worcester, Massachusetts Milk and Cream Supply for January, 1935, by State of Origin.

Table 1. The Worcester Milk and Cream Supply by State of Origin January, 1935.

Milk			Cream		
Origin	Pounds	% of Total	Origin	Quarts	% of Total
Massachusetts	4,596,805	92.0	Maine	880	0.5
Vermont	216,121	4.3	Connecticut	5,000	3.1
New York	167,000	3.4	Vermont	23,200	14.1
Connecticut	16,623	0.3	Ohio	24,000	14.5
			Indiana	32,000	19.4
Total Milk	4,997,241	100.0	Michigan	72,000	43.6
			Missouri	8,000	4.8
Total Cream	3,549,220 lbs. (equiv.)		Total	165,080	100.0
Total	8,546,461	100.0			
Milk Equivalent - 3,549,220 lbs.					



Supplies from Vermont remain fairly constant; this state comprises the normal cream shed for Worcester. But in late years, Mid-Western cream has become an important factor in New England milk markets. This factor is reflected on the map in Figure 1. Cream from New York State will not normally find its way into the Worcester market because New York City is its logical outlet. Increase of milk production in the Mid-West in recent years has given rise to supplies in parts of that territory not rigidly confined to the milk shed of any particular organized market. This situation has probably encouraged Mid-Western dairymen to seek a market east of the New York milk shed.

Worcester cream dealers who secure part of their supply from the Mid-West find little choice among states. As a result, the actual supply from month to month fluctuates among the states of Ohio, Indiana, Michigan and Missouri.

#### Relationship to Other Markets

Nearly all of the 92.0% of Worcester's milk that is produced in Massachusetts is produced in Worcester County (see Figure 2).<sup>1</sup> With the geographical milk shed divided into five-mile zones, production for Worcester is limited to the 10-mile zone on the East, and the 15-mile zone on the North and South, but extends to the 25-mile zone on the West. The area of most concentrated production lies west and slightly northwest of the city between the 10 and 20-mile zones and comprises the towns of Spencer, North Brookfield, New Braintree and Oakham.

---

1. The map in Figure 2 shows geographical location of farms. Due to inability to locate all farms, the map includes only 89.9% of all Massachusetts producers representing 90.6% of total milk production.

# KEY TO TOWNS

1. PETERSHAM
2. HUBBARDSTON
3. PRINCETON
4. STERLING
5. LANCASTER
6. BOLTON
7. BARRE
8. RUTLAND
9. HOLDEN
10. WEST BOYLSTON
11. CLINTON
12. BOYLSTON
13. BERLIN
14. HARDWICK
15. OAKHAM
16. PAXTON
17. SHREWSBURY
18. WESTBOROUGH
19. NEW BRAintree
20. N. BROOKFIELD
21. SPENCER
22. LEICESTER
23. AUBURN
24. MILBURY
25. GRAFTON
26. UPTON
27. NORTHBOROUGH
28. W. BROOKFIELD
29. WARREN
30. BROOKFIELD
31. E. BROOKFIELD
32. CHARLTON
33. OXFORD
34. SUTTON
35. NORTHBRIDGE
36. SOUTHBRIDGE
37. DUDLEY
38. WEBSTER
39. DOUGLAS

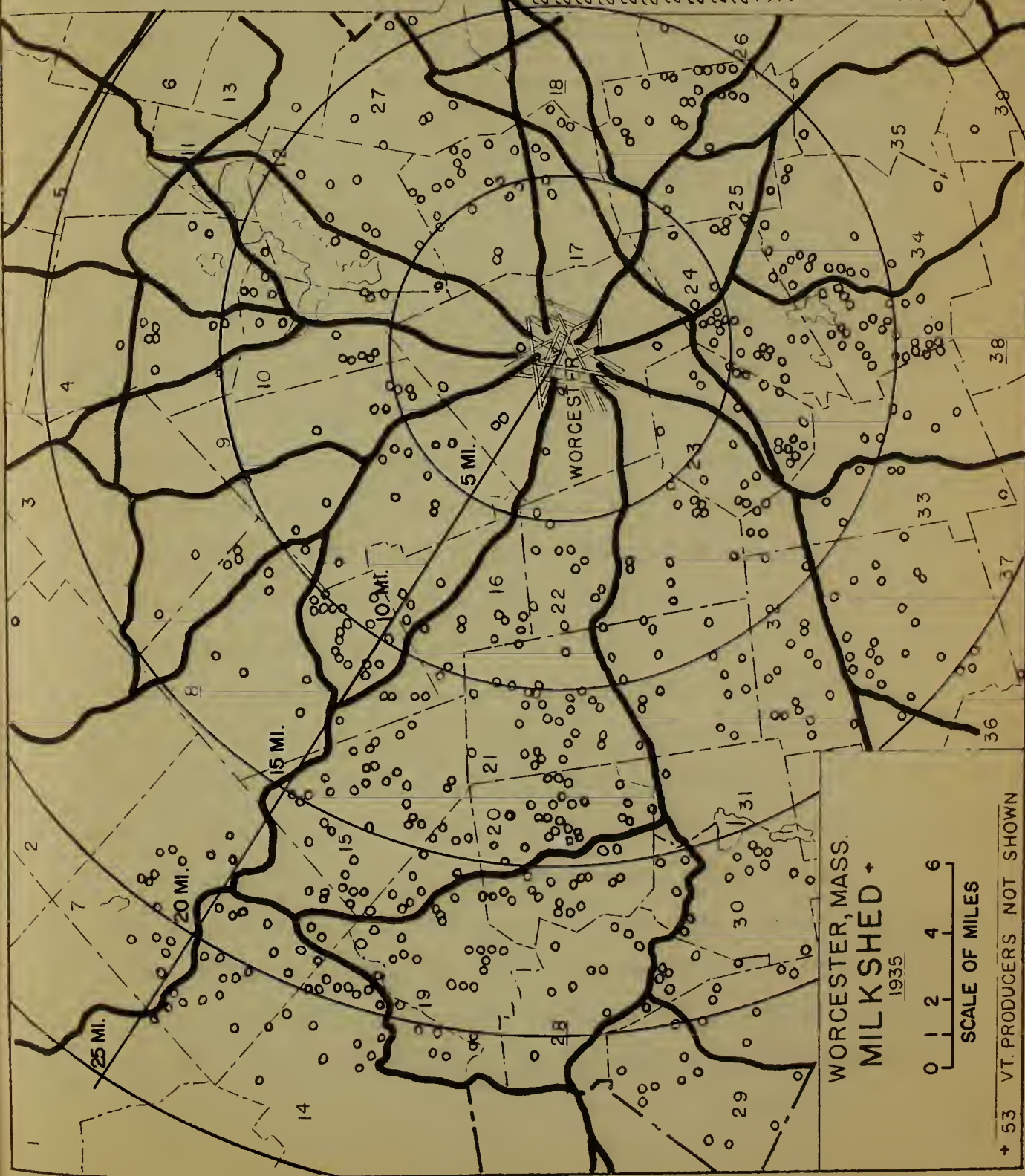


Figure 2. Base map showing location of producers.



### Primary Markets

Worcester is 40 miles west of Boston, the one primary milk market in New England, and about 160 miles east of New York City, another primary market. Though 3.5% of Worcester's milk comes from a country plant at Hoosick, New York, on the eastern edge of New York City's milk shed, the Worcester market is not influenced to any great extent by this milk shed because of the intervening secondary markets of Springfield, Chicopee, Holyoke, and Pittsfield.

The Boston market is directly related to the Worcester market in at least three respects. (1) Milk production for Worcester from territory east of the city is practically confined to the nearby towns of Grafton, Shrewsbury, and Northborough, due partly to competition exerted by the Greater Boston market for milk produced in towns farther east. (2) The Boston market is large and near enough to the entire Worcester supply area to enable some Worcester producers for lack of a satisfactory market elsewhere, to compete occasionally in that market. (3) Two of the largest milk distributing concerns in New England with their major business operations in Boston operate branch plants in Worcester.

A large proportion of producers in the Worcester milk shed are members of the New England Milk Producers' Association, a producers' bargaining cooperative that is active in the Boston market. Much of the cream shipped to Worcester from Vermont is purchased through the New England Milk Producers' Association. In addition, the intensive dairy regions of Vermont, from which more than 50% of the total Boston supply comes, can be considered a potential source of milk for Worcester. This factor, at least under unrestricted marketing conditions, can nearly always be depended upon to prevent the success of any organized efforts



of Worcester County producers to secure benefits of place monopoly.

In spite of these several inter-relationships, the two markets are essentially different and sufficiently isolated to facilitate separate detailed study of either market.

#### Secondary Markets

A study of secondary milk market supplies in 1932 by the Massachusetts Agricultural Experiment Station,<sup>1</sup> recognizes 29 such markets. (See Figure 3) The Worcester supply area is influenced by the size and location of 10 of these other secondary markets. Nine are comparatively small markets to the north, east and south of Worcester, ranging in size from Clinton with a population of 12,373 to Fitchburg with a population of 41,700 (see Figure 4). Springfield, with a population of 149,642 in 1935, although located 50 miles west of Worcester, is large enough to bear a relationship to the Worcester market.

The smaller secondary markets bordering Worcester form the links of an imaginary chain describing a semi-circle east of the City from Gardner on the North through Framingham on the East to Southbridge on the South (see Figure 4). They act collectively as a natural boundary of the Worcester milk shed. Figure 4 indicates that the supply area for the city does not extend far enough to include any of these smaller markets. Along the outer edge of the eastern half of the milk shed there is some overlapping with the supply areas of these markets, making possible some producer choice between markets.

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1. Lindsey, A. H., Sources of Milk Supply in Twenty-Nine Secondary Markets in Massachusetts, Mass. Agr. Exp. Sta., March, 1934.

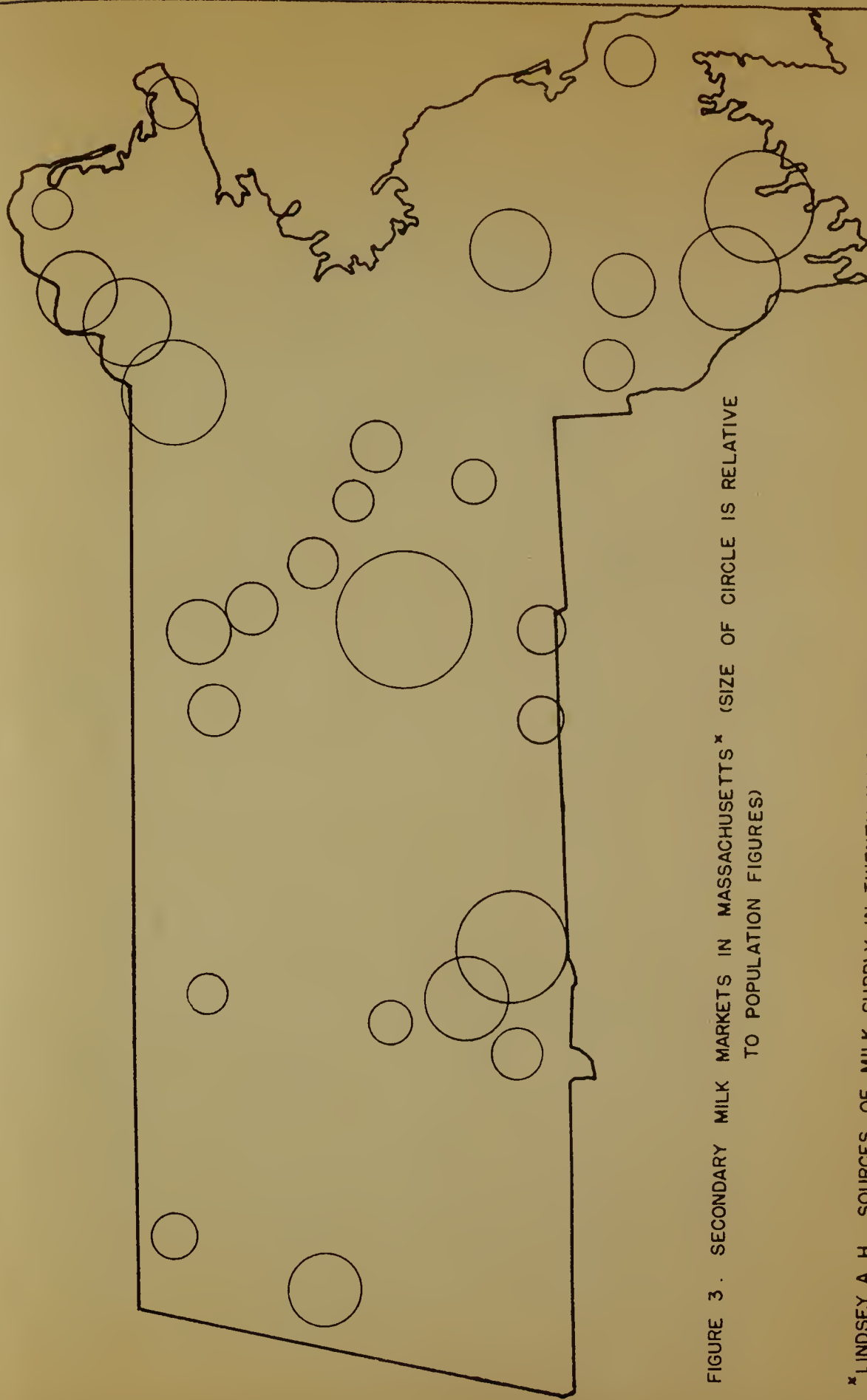


FIGURE 3. SECONDARY MILK MARKETS IN MASSACHUSETTS\* (SIZE OF CIRCLE IS RELATIVE TO POPULATION FIGURES)

\* LINDSEY, A. H., SOURCES OF MILK SUPPLY IN TWENTY-NINE SECONDARY MARKETS IN MASSACHUSETTS, MASS. AGR. EXP. STA., MARCH 1934

# WORCESTER COUNTY

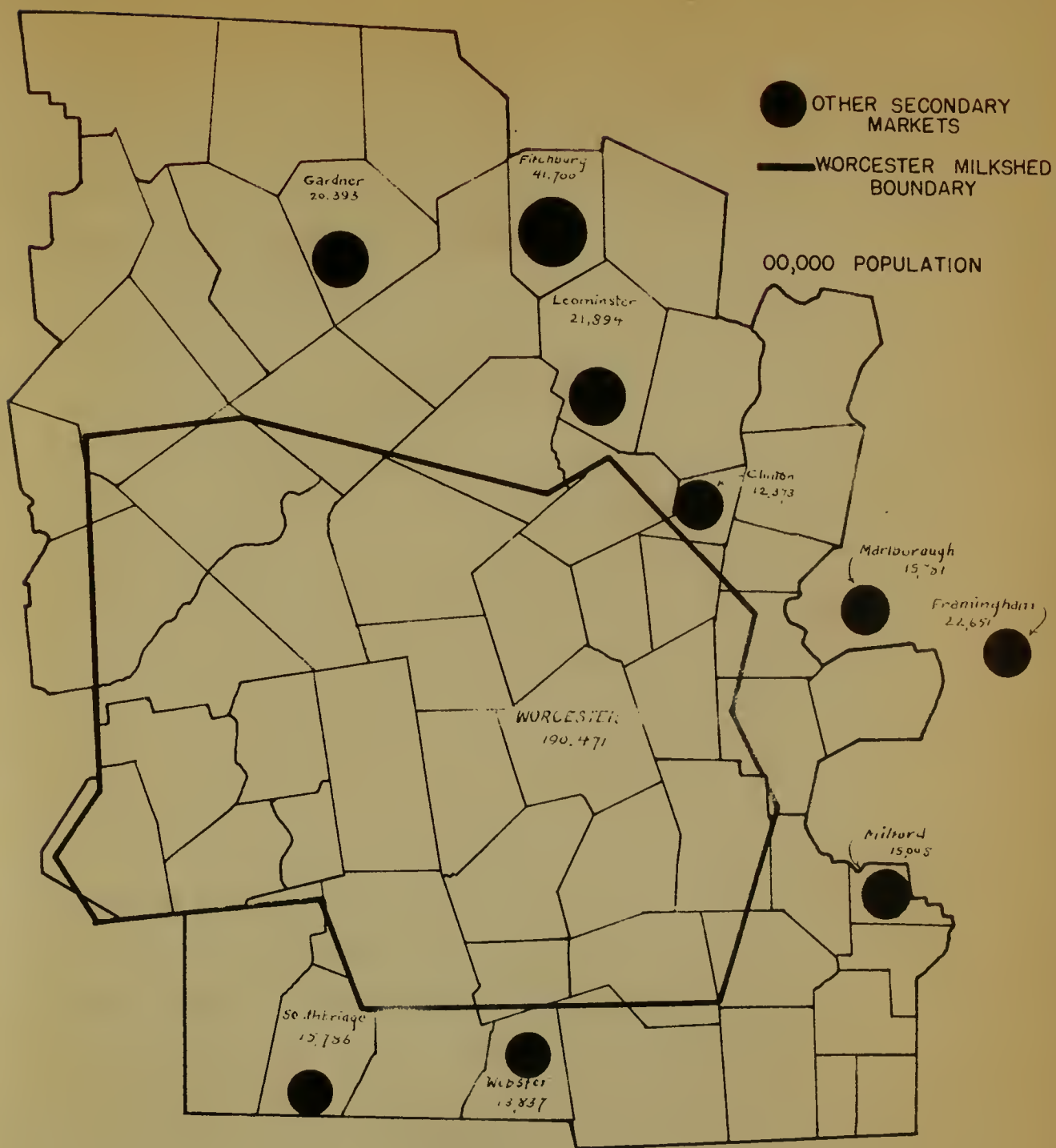


FIGURE 4

THE WORCESTER MILK SHED AND OTHER ADJOINING SECONDARY MARKETS

A large part of the milk business of these markets is of the producer-distributor type. Except for Fitchburg and possibly Gardner and Framingham, these markets are not large enough to enable dealers buying from wholesale producers to exert much influence on the Worcester market.

Investigation of inter-market dealer activities discloses that a comparatively large dealer in Marlborough operates one milk route in Worcester and a comparatively large dealer in Webster also operates one route in Worcester. The activities of this Webster dealer in Worcester account for the small amount of Connecticut milk that is sold in Worcester.

Of 54 primary milk dealers<sup>1</sup> selling milk in Worcester in 1935, 13 were located outside the city in surrounding towns. Of these 13 dealers, two were in Boylston and two in West Boylston. Their location enables them to be potential if not actual competitors in the Clinton market.

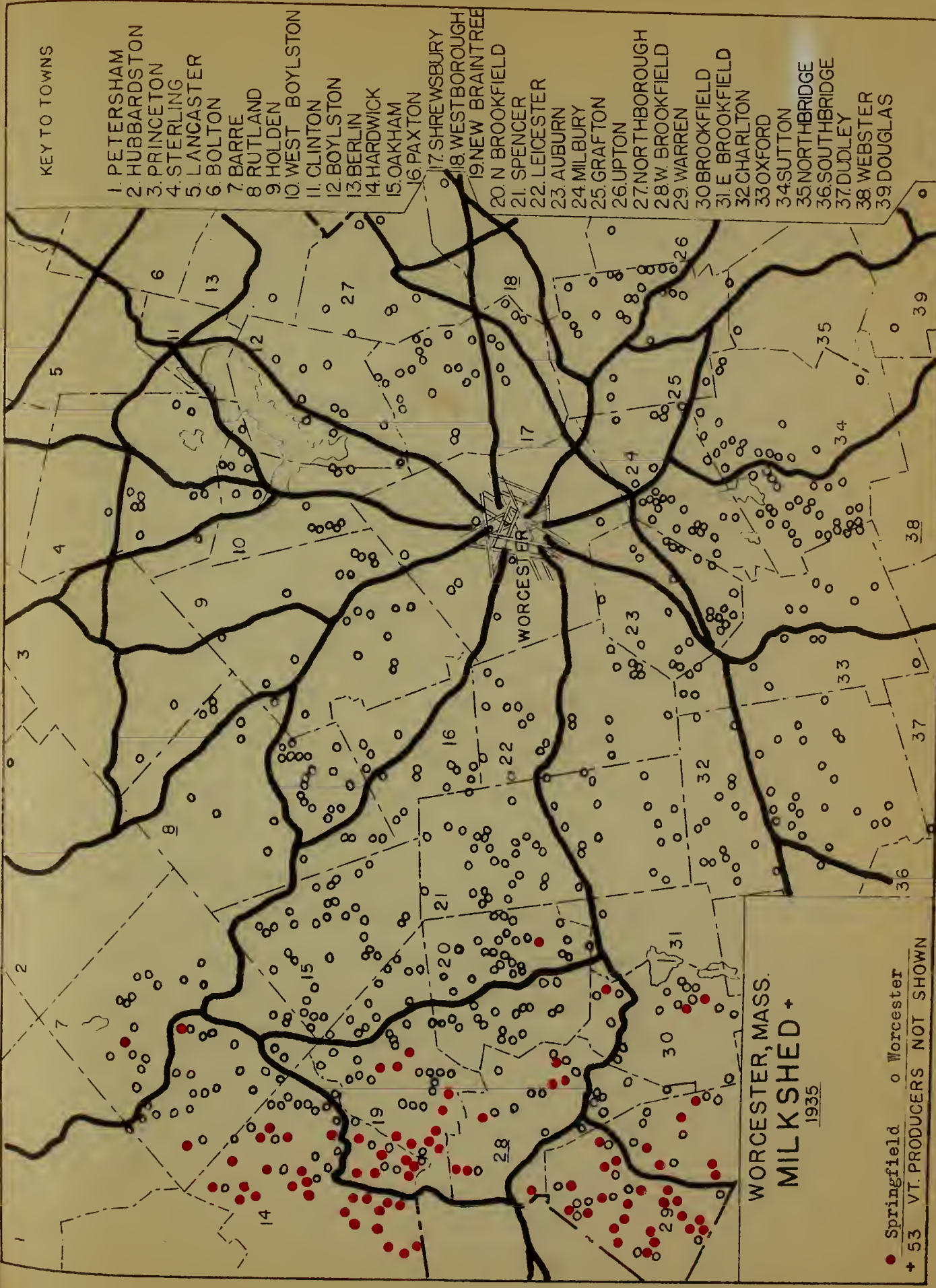
The relationship between the Worcester and the Springfield markets is seen in a "corridor area" comprising Hardwick, New Braintree, West Brookfield, and Warren, where wholesale dairymen are about equally divided between the two milk sheds. (See Figure 5) Although some producers are so situated in this overlapping zone that they can shift from one market to the other, the two markets are sufficiently isolated to prevent many shifts except when conditions in the respective markets are radically different.

One dealer with a plant in Spencer operates in both markets but is

---

1. Does not include producer dealers and producer distributors.





KEY TO TOWNS

- 1. PETERSHAM
- 2. HUBBARDSTON
- 3. PRINCETON
- 4. STERLING
- 5. LANCASTER
- 6. BOLTON
- 7. BARRE
- 8. RUTLAND
- 9. HOLDEN
- 10. WEST BOYLSTON
- 11. CLINTON
- 12. BOYLSTON
- 13. BERLIN
- 14. HARDWICK
- 15. OAKHAM
- 16. PAXTON
- 17. SHREWSBURY
- 18. WESTBOROUGH
- 19. NEW BRAINTREE
- 20. N. BROOKFIELD
- 21. SPENCER
- 22. LEICESTER
- 23. AUBURN
- 24. MILBURY
- 25. GRAFTON
- 26. UPTON
- 27. NORTHBOROUGH
- 28. W. BROOKFIELD
- 29. WARREN
- 30. BROOKFIELD
- 31. E. BROOKFIELD
- 32. CHARLTON
- 33. OXFORD
- 34. SUTTON
- 35. NORTHBRIDGE
- 36. SOUTHBRIDGE
- 37. DUDLEY
- 38. WEBSTER
- 39. DOUGLAS

WORCESTER, MASS.  
MILKSHED +  
1935

• Springfield    o Worcester  
+ 53 VT. PRODUCERS NOT SHOWN

Figure 5. Worcester Milk Shed Overlapping Springfield Milk Shed.

not representative of other dealers as the total business is special milk at special prices. One large Boston dealer with a branch plant in Worcester operates another branch plant in Springfield. One producing-selling cooperative with main offices in Springfield operates a branch plant in Worcester. These instances constituted all of the direct inter-market relationships in 1935.

#### Summary

Worcester's geographical location with reference to Boston and the Boston milk shed is such that in times of maladjustment in Boston, some Vermont milk naturally destined for Boston may seek a market in Worcester, but milk produced in the Worcester milk shed in Worcester County will probably never constitute a very important factor in the Boston market. Worcester is so hemmed in on the East, North and South by smaller secondary markets that the milk shed east of the city is confined to the 10 and 15-mile zones. West of the city large quantities of milk as far out as the 25-mile zone reach the market. It is in this zone that Worcester's milk shed overlaps that of Springfield.

#### Distributing Agencies

Fluid milk finds its ultimate consumer in numerous places. Milk is delivered by dealers direct to the consumer's door. The transaction may be an over-the-counter affair at milady's grocer's. It is consumed as a beverage or incorporated in other food in restaurants. It is delivered to workmen in factories, and to schools, hospitals, and other institutions, and is purchased directly by the consumer at the dealer's plant or salesroom.



### Types of Dealers

This variety of methods of buying milk accounts for several types and sizes of dealer businesses in any sizeable market. In Worcester, dealers are divided into four classes: primary dealers, producer dealers, producer distributors, and intermediate dealers.

The lines of demarcation are not rigid. Some of the largest dealers in the city own and operate dairy farms. Strictly speaking, such businesses are of the producer-dealer type, but for the purpose of this study are classed as dealers because they better represent that classification. Dealers are thought of as the larger businesses where major attention is focussed on processing and distributing the total product of several producers who themselves do no retailing. Producer dealers focus attention on marketing their own production. A study of the history of milk companies will disclose that many of the largest strictly-dealer businesses of today started on the producer-distributor scale several years ago and increased to the point where the farm was abandoned in favor of the distributing business.

In January, 1935, fifty-eight regular dealers handled 92.8% of all fluid milk in the market, while twenty-three producer dealers and producer distributors combined handled the remaining 7.2%. Eleven intermediate dealers purchased 2.5% of the total supply for resale. (See Table 2)

Table 2. Division of the Worcester Milk Market  
Among Types of Dealers in January, 1935

Number	Type of Dealer	Milk Purchased (Pounds)	% of Total
54	Regular Dealers	4,637,481	92.8
23	Producer Dealers and Distributors	359,762	7.2
11	Intermediate Dealers	121,789*	2.5*
77	TOTAL	4,997,241	100.0
*Not included in Total			

Sales of fluid milk are divided into four classes:

1. Direct retail sales to families.
2. Wholesale sales to stores.
3. Sales to institutions.
4. Sales to other dealers.

Many dealers handle all four types of sales while a few specialize in one type of selling. Some smaller dealers handle only retail sales, while one large dealer in the market handles only wholesale sales to stores. One notable exception to the established channels of milk distribution in Worcester is one grocery store that handles milk only in over-the-counter sales and buys direct from a country plant in Vermont.

#### Variations in Size of Business

Individual businesses vary from small producer distributors selling less than 100 pounds of milk daily to the market's largest distributor who sells 13,931 pounds daily. Table 3 shows distribution by size groups of all primary dealers in the market in January, 1935. Seventy-nine dealers averaged 2040.5 pounds of milk daily per dealer. The average for 23 producer dealers and distributors was only 504.6 pounds daily compared to 2755.3 pounds daily for 54 regular dealers.

Forty of the 54 regulars were below the average in daily sales and collectively handled only 30.4% of the total market, while the four largest dealers accounted for 32.4% of the total market. These four dealers constituted the only businesses in Worcester with daily sales of more than 10,000 pounds each. Four dealers handled 32.4% of the market, six dealers handled 41.6% of the market, while ten dealers out of 54 handled 52.4% of the market.



Table 3. Variations in Size of Business  
of Worcester Milk Dealers, January, 1935  
(all amounts in pounds)

Av. Daily Sales	No. of Dealers	Total Sales in January	Av. Daily Per Dealer	% Total Dealers	% Total Sales
Less than 1000	19	309,508	525.5	24.0	6.2
1000-1999	14	645,390	1,487.1	17.7	12.9
2000-2999	7	564,257	2,600.3	8.9	11.3
3000-3999	4	472,571	3,811.1	5.1	9.5
4000-4999	4	540,699	4,360.5	5.1	10.8
5000-9999	2	458,272	7,391.5	2.5	9.2
Over 10,000	4	1,621,666	13,077.9	5.1	32.4
Total	54	4,612,363	2,755.3	68.4	92.3
Producer Dealers and Distributors	23	359,762	504.6	29.1	7.2
Irregular*	2	25,118	405.2	2.5	.5
Total All Dealers	79	4,997,243	2,040.5	100.0	100.0

\*Two dealers not located in Worcester with some sales in Worcester.

#### Variation in Buying Price Plans

Of more significance than distribution of total milk in the market among dealers according to size are the variations among dealers in price plans for paying producers for milk. Previous to the inception of the Massachusetts Milk Control Board, dealers were free to devise their own payment plans. Some small dealers paid on a straight volume basis allowing no differential for fat content. Among larger dealers, various combinations of payments according to weight, fat test, and use of the milk were employed.

From 1917 to 1931, the N.E.M.P.A. employed a straight "Use" plan of payment for its members in the Boston milk shed.<sup>1</sup> Probably the expansion

1. Schoenfeld, W. A., Some Economic Aspects of the Marketing of Milk and Cream in New England, U.S.D.A. Cir. 16, Oct. 1927, P. 54.



of that organization from 1922-1930 to include in its membership many producers in the Worcester milk shed was the greatest stimulus toward the adoption of the "Use" plan of payment in the Worcester market. In practice, this plan consists of paying producers a fluid milk price for only that proportion of their milk that has been sold for fluid purposes with the price of succeeding portions based on their ultimate "use".

Since 1931, the Use plan of payment has been modified by the "Base Rating" feature in an effort to even out seasonal variation in production and provide an automatic checking influence on production during the season of excessive surplus. The Inter-State Milk Producers' Association of Philadelphia was a pioneer in developing the "Base Rating" plan.<sup>1</sup> For that reason it has often been referred to as the Philadelphia plan. The feature of this plan is the establishment of a base quantity of milk for each producer, for which daily amount he is allowed a Class I or fluid milk price. All production in excess of this amount is paid for at a surplus price, usually based on a cream or butter price.<sup>2</sup>

The success of the Base Rating plan in the Philadelphia and Baltimore markets served as incentive for its adoption by the N.E.M.P.A. in 1931. Since its introduction at that time various modifications have ensued. In 1934, when the Massachusetts Milk Control Board became active, it found the Base Rating plan, the Use plan, and the straight volume or

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1. Lininger, F. F., The Relation of the Basic-Surplus Marketing Plan to Milk Production in the Philadelphia Milk Shed, Penn. State College, Bul. 231, Aug., 1928.
  2. See Schoenfeld, W. A., Some Economic Aspects of the Marketing of Milk and Cream in New England, U.S.D.A. Cir. 16, Oct., 1927, Pp. 51-57, and Jensen, Einar, The Boston Milk License, Aug., 1934, for more detailed explanation of the "Use" and "Base Rating" plans.

Flat plan all being used. One of the first regulations of that agency consisted in requiring all milk distributing agencies in the Commonwealth to pay producers according to one or another of the three plans. Specific details of procedure under each plan were established. Since September, 1934, milk dealers in Worcester have thus had to conform to the payment plans established by the Milk Control Board.

In January, 1935, there were 22 dealers in Worcester buying on the Flat plan, and 23 buying on the Use plan, with the remaining 11 dealers employing the Base Rating plan. Table 4 shows division of the entire market among dealers according to these price plans. The 22 Flat plan dealers served only 13.1% of the market compared to 35.0% served by the 23 Use plan dealers and 44.7% served by the 11 Rating plan dealers. The remaining 7.2% was served by producer dealers.

Table 4. Division of the Worcester Market Among Dealers According to Price Payment Plans, January, 1935

No. of Dealers	Price Plan	Total Jan. Purchases (Pounds)	Average Per Dealer (Pounds)	Percent of Total
22	Flat	655,018	29,774	13.1
23	Use	1,750,586	76,112	35.0
11	Rating	2,231,877	202,898	44.7
23	Other*	359,762	15,642	7.2
79	All Plans	4,997,243	63,256	100.0
*Producer Dealers and Distributors				

#### Seasonal Variations in Purchases and Sales

As in most milk markets, total receipts of milk at Worcester are highest in June and lowest in November. In 1935, average total daily receipts of milk by months varied from 159,693 pounds in November to 195,119 in June. Using the average daily receipts for the year as a

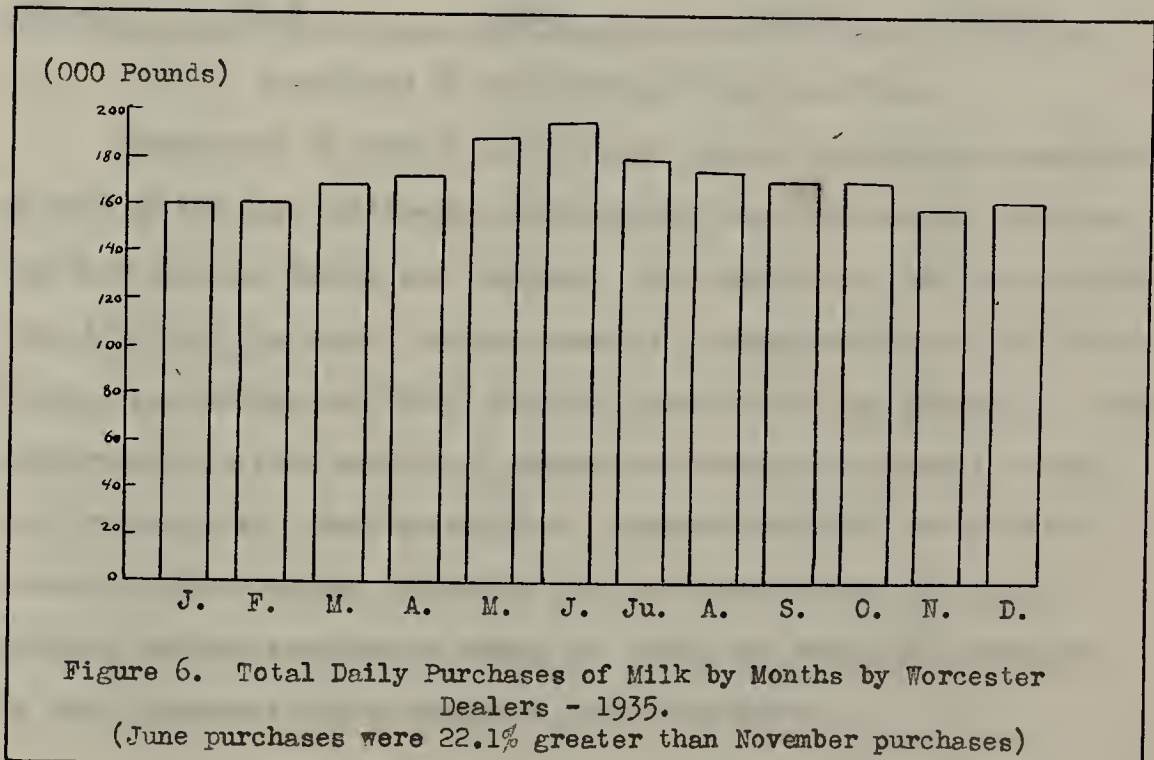


base, November receipts were 92.3% of the yearly average compared to 112.7% in June. June receipts were 22.1% greater than receipts in November.

Table 5 shows average total daily receipts by months for 1935 and

Table 5. Average Daily Total Purchases of Milk by Months by Worcester Dealers - 1935.					
	Flat Plan 22 Dealers (Pounds)	Use Plan 21 Dealers (Pounds)	Rating Plan 11 Dealers (Pounds)	23 Producer Dealers* (Pounds)	Total (Pounds)
Jan.	21,130	56,471	72,061	11,605	161,267
Feb.	21,366	56,900	71,680	11,605	161,551
March	20,872	60,035	77,150	11,605	169,662
April	21,947	61,141	78,897	11,605	173,590
May	21,517	72,324	84,551	11,605	189,997
June	22,808	74,352	86,354	11,605	195,119
July	21,452	66,302	80,900	11,605	180,259
Aug.	21,366	63,045	79,828	11,605	175,844
Sept.	21,883	60,342	79,194	11,605	173,024
Oct.	21,926	59,113	78,379	11,605	171,023
Nov.	20,699	53,460	73,929	11,605	159,693
Dec.	21,237	53,890	76,829	11,605	163,561
Average	21,517	61,448	78,313	11,605	172,883

\*Based on January Purchases, assumed, no variation.





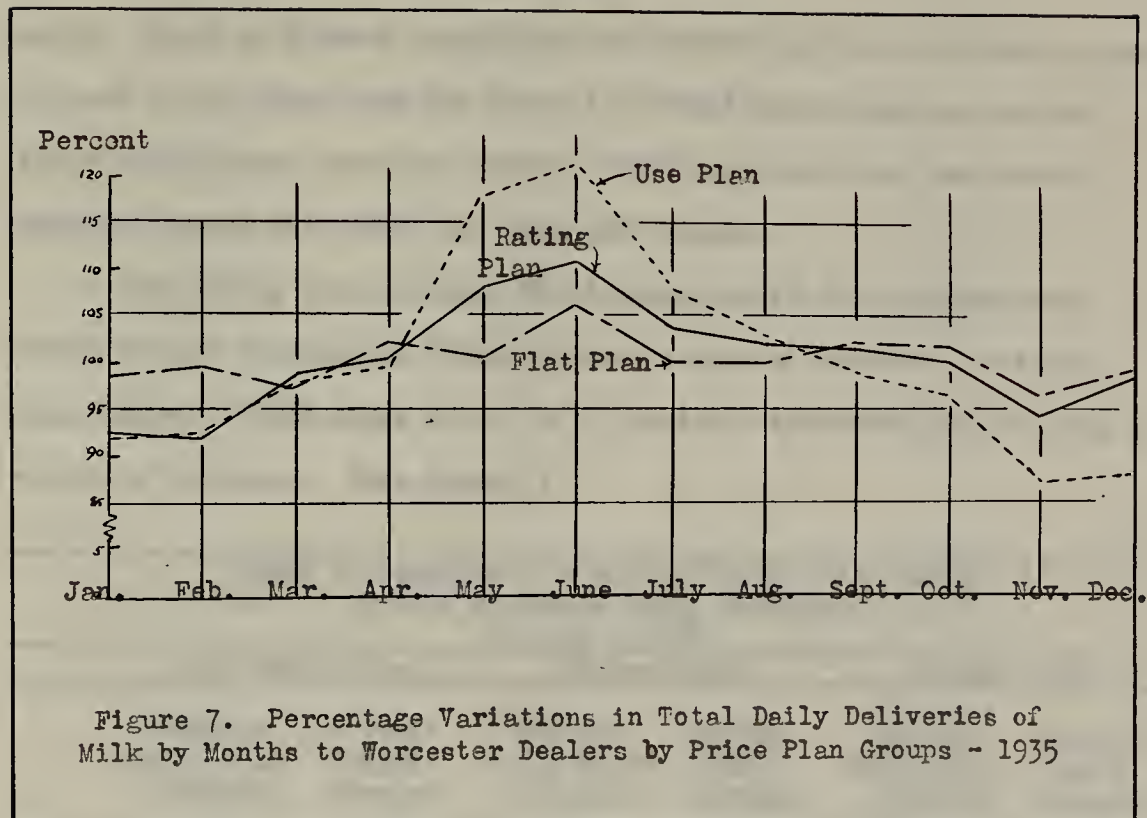
distribution of the total among dealers by price plan groups. Table 6 converts Table 5 to a percentage basis with the yearly average as 100%. Figure 6 is a bar graph presentation of the totals in Table 5.

Table 6. Variation in Daily Purchases of Milk by  
Months by Different Types of Worcester Dealers  
1935  
(Percent of Yearly Average)

	Rating Plan (Percent)	Use Plan (Percent)	Flat Plan (Percent)	Total (Percent)
Jan.	92.0	91.9	98.2	93.6
Feb.	91.5	92.6	99.3	93.0
March	98.5	97.7	97.0	98.2
April	100.7	99.5	102.0	100.2
May	108.1	117.7	100.0	110.0
June	110.4	121.0	106.0	112.7
July	103.3	107.9	99.7	104.3
Aug.	101.9	102.6	99.3	101.9
Sept.	101.1	98.2	101.7	100.2
Oct.	100.0	96.2	101.9	99.0
Nov.	94.4	87.0	96.2	92.3
Dec.	98.1	87.7	98.7	94.6
Average	100.0	100.0	100.0	100.0

#### Variations in Total Receipts by Price Plans

Examination of Table 6 reveals that seasonal variation in receipts of milk by Use plan dealers was much greater than the seasonal variation for Flat plan and Rating plan dealers. June receipts of Use plan dealers were 121.0% of the yearly average compared to June receipts of 110.4% for Rating plan dealers and 106.0% for Flat plan dealers (see Figure 7). This difference is a fair measure of comparative results of attempts to even out production by a Base Rating plan. Seasonal variation was smallest among Flat plan dealers indicating that such dealers went far toward avoiding surplus supplies by simply not buying the total milk produced by their producers during months of higher production.



### Variations in Fluid Sales

Although fluid sales information was unavailable for all dealers in the market, an analysis of a fairly large sample of dealers under each price plan indicates that the sample used is representative of the total. In this study fluid sales are considered to be the quantities of milk for which the various dealers pay producers Class I price. Due to slight discrepancies, this amount does not always truly represent actual fluid sales for all dealers. From the producer's standpoint, however, the quantity purchased at the Class I price is the most important consideration.

For Flat plan dealers, the amount of milk paid for at the Class I price is 100% of purchases. For these dealers, variation in total purchases of milk from producers also represents variation in fluid

sales. Under milk board regulations only Rating and Use plan dealers are allowed to pay other than the Class I or fluid prices for any part of their milk supply. For that reason, fluid sales are less than total purchases among only those two types of dealers.

For Rating plan dealers, fluid sales for 10 of 11 dealers were available and represented 87.9% of total volume of business. For Use plan dealers, fluid sales for 13 of 23 dealers represented 58% of total volume of business. (See Table 7)

Table 7. Comparison of Average Daily Fluid Sales  
of Milk by Months Among Worcester  
Dealers - 1935

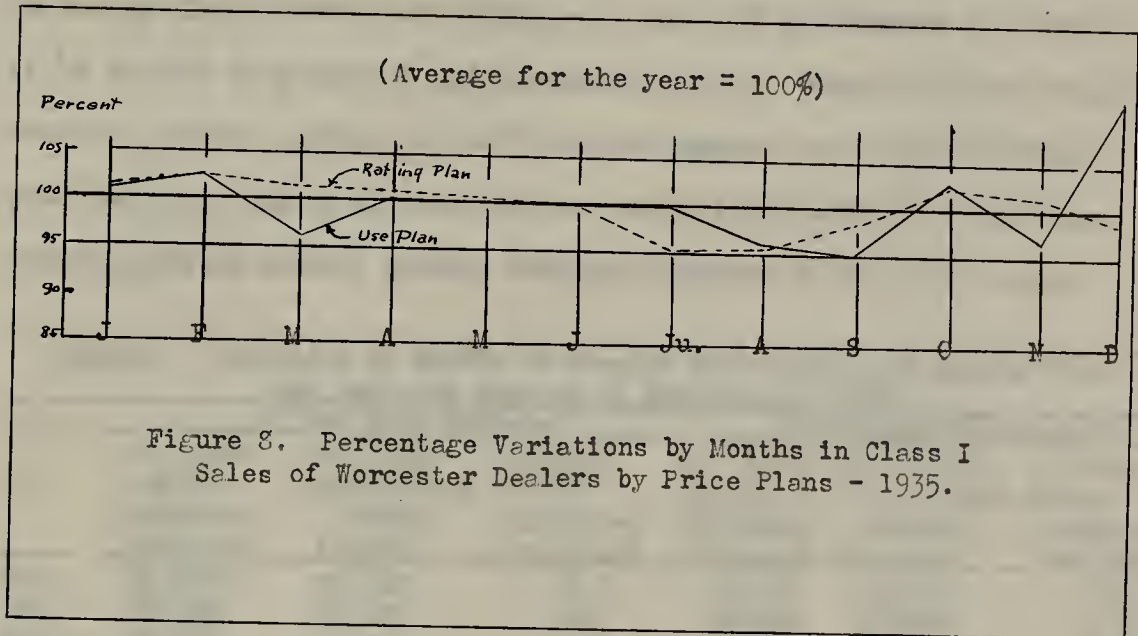
	10 Rating Plan		15 Use Plan		13 Flat Plan	
	Average Daily Sales (Pounds)	Percent Yearly Average	Average Daily Sales (Pounds)	Percent Yearly Average	Average Daily Sales (Pounds)	Percent Yearly Average
Jan.	63,280	101.5	40,900	101.1	10,159	98.2
Feb.	63,684	102.2	41,566	102.7	10,284	99.3
March	63,543	101.9	39,132	96.7	10,042	97.0
April	63,333	101.6	40,617	100.4	10,552	102.0
May	62,765	100.7	40,745	100.8	10,351	100.0
June	62,221	99.8	40,540	100.3	10,970	106.0
July	59,797	95.9	40,515	100.1	10,296	99.7
Aug.	59,728	95.8	38,951	96.3	10,276	99.3
Sept.	60,741	97.4	38,737	95.3	10,520	101.7
Oct.	64,085	102.8	41,528	102.7	10,548	101.9
Nov.	63,594	102.0	39,217	96.9	9,960	96.2
Dec.	61,370	98.4	43,129	106.7	10,221	98.7
Average	62,345.1	100.0	40,464.8	100.0	10,348	100.0

With yearly average daily sales representing 100%, the fluid sales of 10 Rating plan dealers varied from a low of 95.9% in July to a high of 102.8% in October. The 15 Use plan dealers varied from a low of 95.3% in September to a high of 106.7% in December. These variations are comparable to the variations of 13 Flat plan dealers which extended from a low of 96.2% in November to a high of 106.0% in June. In Figure 8,



variations of Rating and Use plan dealers are shown.

It can quite reasonably be concluded from this comparison that fluid sales fluctuate from month to month within a rather narrow range and exhibit no noticeable seasonal peak. Variation among dealers by price plan groups is so slight that a constancy of fluid sales is maintained throughout the market.



#### Surplus Milk in the Market

Unfortunately, natural production of milk through the year does not remain as constant as the demand for fluid milk. Where dealers are organized to handle the total production of all their producers they must necessarily find a market for part of the milk at other than fluid use. This amount of "surplus" is greatest in June, the month of peak production on most farms. The analysis of total receipts of milk in Worcester revealed June receipts to be 22% above those of November (see Table 5 and Figure 6).

# Division of Surplus Among Types of Dealers

In Table 8, fluid sales and total purchases of milk by months for Rating and Use plan dealers are compared. Average daily sales by months are used as a base, and the excess of purchases over sales is considered as surplus milk. On this basis, the surplus of 13 Use plan dealers varied from a low of 7.3% in November to a high of 27.0% in June. The surplus of 10 Rating plan dealers varied from a low of 3.7% in November to a high of 21.4% in June (see Table 8 and Figures 9 and 10). These Use plan dealers carried a yearly average of 16.7% surplus compared to 11.6% for Rating plan dealers. Figure 11 shows percent surplus by months of Rating plan dealers plotted against percent surplus by months of Use plan dealers.

Table 8. Variation by Months in Surplus Milk Handled by Rating Plan and Use Plan Dealers in Worcester - 1935

	13 Use Plan Dealers			10 Rating Plan Dealers		
	Av. Total Daily Purchases (Pounds)	Av. Total Daily Fluid Sales (Pounds)	% Sales Below Purchases (Surplus)	Av. Total Daily Purchases (Pounds)	Av. Total Daily Fluid Sales (Pounds)	% Sales Below Purchases (Surplus)
Jan.	32,842	29,947	8.8	66,358	63,280	4.6
Feb.	34,348	30,610	10.9	68,284	63,684	6.7
March	35,516	28,410	20.0	70,893	63,543	10.4
April	37,119	30,207	18.6	72,126	63,333	12.2
May	39,210	30,218	22.9	77,409	62,765	18.9
June	42,221	30,071	27.0	79,118	62,221	21.4
July	37,279	30,152	19.1	71,128	59,797	16.0
Aug.	34,396	28,812	18.6	71,065	60,696	16.0
Sept.	34,322	28,855	15.9	70,247	60,741	13.5
Oct.	34,173	31,071	9.1	69,851	64,085	8.3
Nov.	30,907	28,666	7.3	66,009	63,594	3.7
Dec.	32,191	28,779	10.6	64,837	61,370	5.3
Average	35,359.0	29,649.8	16.7	70,610.4	62,425.8	11.6

Although this analysis of surplus milk covers the operations of 75.8% (by volume) of all milk marketed by Use and Rating plan dealers, the results are not a very reliable index of surplus in the market. Two dealers, one not included in the analysis of each price plan group, are

(000 Pounds)

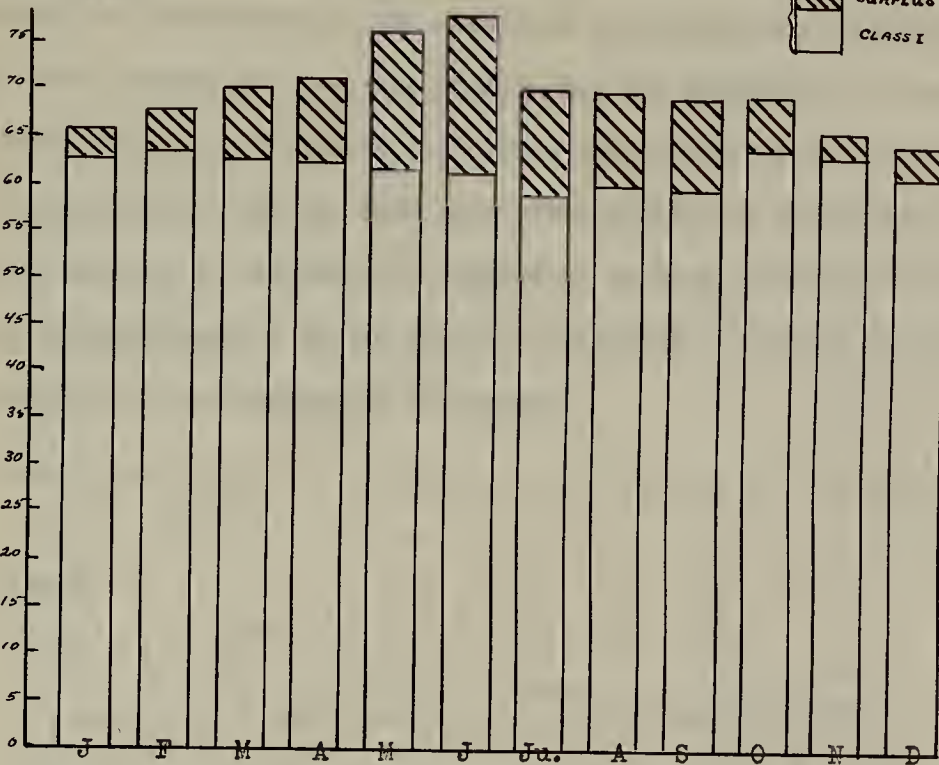


Figure 10. Average Daily Total Class I Sales and Surplus of 10 Rating Plan Dealers in the Worcester Market - 1935.

(000 Pounds)

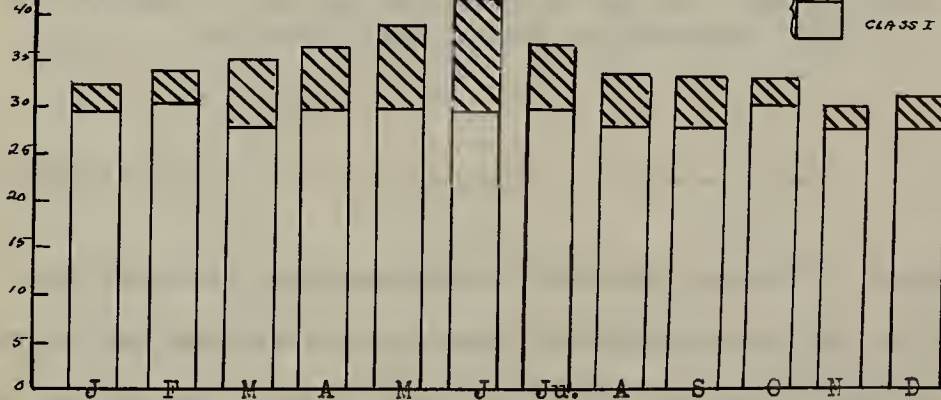
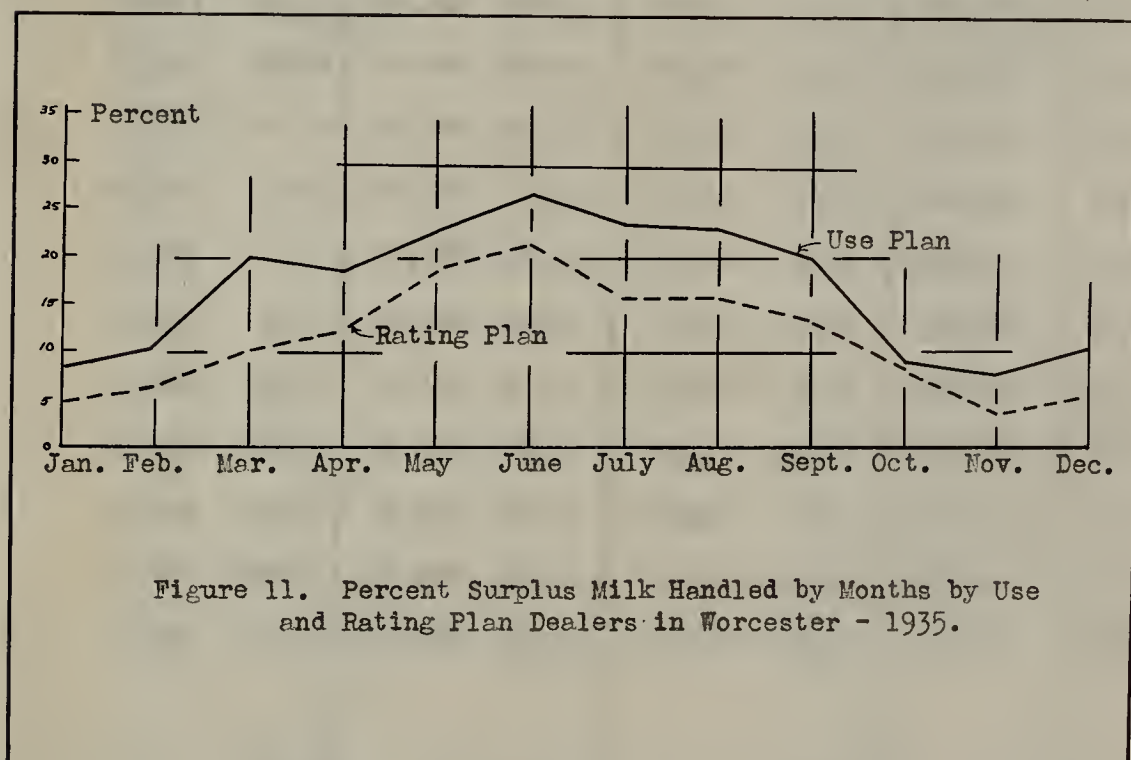


Figure 9. Average Daily Purchases and Surplus by Months of 13 Use Plan Dealers in Worcester - 1935.



in the largest size group and are the only dealers in the city who deal extensively in out-of-state milk. Accurate and comparable information on surplus milk handled by these two dealers was not available, but preliminary investigation seems to indicate that these dealers may have carried much higher percentage of surplus than most other dealers in the market. More detailed analysis of surplus milk handled by dealers purchasing their milk outside of Massachusetts should be made to furnish a basis of comparison with the rest of the dealers in the market.



More important than the average surplus by periods of a group of dealers are the variations and extremes within the group that collectively produce the average. This is shown for the 13 Use plan dealers and the 10 Rating plan dealers in Tables 9 and 11 as the percentages from month to month that sales of Class I milk were of total purchases. This comparison

Table 9. Volume and Percent Class I Sales by Months of 13 Use Plan Dealers in Worcester - 1935.

Dealer:	1		2		3		4		5		6		7		8		9		10		11		12		13		Total 13 Dealers	% of Total	
Period	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total			
Jan.	13,520	86.0	125,345	88.2	94,181	81.8	128,208	91.7	6,743	64.5	73,304	83.8	73,736	99.2	131,610	94.5	103,109	93.0	29,138	100.0	45,016	100.0	68,536	92.5	35,900	100.0	328,346	91.2	
Feb.	23,478	84.5	112,483	81.4	79,135	71.2	113,195	93.9	9,654	98.8	69,312	81.8	65,467	92.7	120,125	94.6	93,043	93.0	30,133	100.0	40,721	100.0	67,521	100.0	32,822	91.6	857,089	89.1	
March	27,121	92.6	126,108	73.6	85,716	69.3	116,967	93.3	7,233	66.8	79,002	80.5	71,368	82.2	136,822	88.0	101,103	92.3	38,538	100.0	45,014	100.0	60,082	100.0	38,399	91.6	933,473	80.0	
April	28,667	94.1	125,345	72.2	77,730	68.8	108,335	85.5	17,148	77.1	78,382	78.5	68,742	77.2	131,827	79.9	95,084	91.4	35,062	93.8	44,579	93.9	59,520	100.0	35,802	80.3	906,223	81.4	
May	36,321	86.2	128,572	65.5	78,811	62.8	112,863	89.7	17,067	78.1	82,613	69.7	71,494	73.4	131,541	73.2	96,694	85.2	36,702	94.5	45,846	89.2	62,060	99.5	36,159	81.9	936,743	77.1	
June	35,278	87.6	122,645	60.7	75,009	57.3	97,454	77.9	11,919	56.1	93,221	69.9	67,627	72.7	123,257	66.8	96,917	86.7	36,974	90.3	45,331	89.4	59,764	100.0	36,721	85.5	902,137	73.0	
July	31,049	78.6	140,244	77.7	82,034	71.9	90,400	74.8	15,596	74.3	93,193	77.7	68,994	84.2	124,724	71.9	100,912	94.6	37,961	100.0	49,100	98.6	61,766	100.0	38,722	88.9	934,695	80.9	
Aug.	27,445	82.0	131,868	82.6	81,841	73.3	87,516	71.1	12,829	78.7	87,679	77.2	67,607	82.5	119,617	71.4	98,145	91.8	37,008	97.0	45,062	100.0	60,160	100.0	36,385	91.3	893,162	81.4	
Sept.	28,789	88.2	128,383	86.4	75,143	67.6	99,257	87.6	13,626	85.5	80,695	77.6	64,255	77.0	120,860	78.3	91,276	88.9	36,887	96.9	41,524	100.0	56,624	100.0	28,344	100.0	865,663	84.1	
Oct.	29,220	91.6	135,319	89.6	77,160	73.6	127,852	96.6	15,093	92.7	66,354	83.4	67,516	80.9	131,240	85.2	126,887	100.0	33,972	80.2	46,347	100.0	58,639	100.0	27,606	100.0	963,205	90.9	
Nov.	30,128	87.5	130,950	95.2	69,410	86.6	102,433	100.0	14,179	98.0	73,227	91.0	62,709	87.4	123,127	92.6	93,906	94.2	33,023	94.9	40,557	100.0	54,175	100.0	27,170	100.0	859,994	92.7	
Dec.	31,359	87.3	135,964	89.3	66,982	78.8	97,851	98.1	15,147	98.4	33,104	86.4	61,309	84.6	124,459	81.7	92,564	92.4	32,267	87.1	46,186	100.0	59,585	98.3	34,377	100.0	892,154	89.4	
Av.		87.2		80.2		71.9		88.4		80.8		79.8		82.8		81.5		92.0		94.6		97.6		99.2		92.6			84.3



Table 10. Volume and Percent Class I Sales of Milk by Months of  
10 Use Plan Dealers in Worcester, 1936

Dealer:	1		2		3		4		5		6		7		8		9		10		Total 10 Dealers	Average %
Period	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total		
Jan. 1-15	14,341	90.4	65,550	89.9	32,643	76.2	54,782	89.3	9,512	95.4	40,157	83.3	29,962	81.0	61,880	77.7	52,960	87.8	15,766	82.3	757,408	86.1
16-31	15,896	93.2	69,921	89.9	34,542	75.2	64,891	95.4	10,071	94.3	42,835	83.3	32,401	84.0	66,006	77.7	56,490	87.8	16,802	88.3		
Feb. 1-15	15,742	94.4	65,868	90.8	31,955	76.3	61,032	97.5	9,269	99.4	42,276	79.3	29,915	87.6	61,464	74.4	48,313	80.9	15,151	85.7	744,380	89.3
16-29	13,725	86.2	61,476	90.8	29,188	71.2	55,775	90.5	8,559	98.4	39,412	79.3	27,944	79.2	57,367	74.4	45,093	80.9	14,856	87.2		
Mar. 1-15	15,597	91.4	67,190	88.9	40,568	78.2	58,435	91.0	9,404	100.0	46,718	75.2	29,386	72.8	60,596	68.6	54,669	90.1	15,993	84.2	826,266	81.0
16-31	18,812	90.0	71,670	88.9	32,825	70.7	61,644	84.2	9,890	100.0	49,832	75.2	33,553	70.3	72,821	69.6	58,314	90.1	18,349	91.4		
Apr. 1-15	16,221	84.6	65,906	79.7	32,467	70.4	53,365	74.3	9,019	100.0	47,652	75.9	31,048	64.3	60,907	61.4	54,708	89.8	16,745	88.8	784,023	82.1
16-30	16,214	96.9	65,906	79.7	34,074	72.2	59,541	82.8	9,218	94.4	47,651	75.9	31,057	63.1	59,944	61.1	54,707	89.8	17,673	93.4		
May 1-15	12,507	95.4	67,534	73.9	36,835	77.1	64,265	89.1	9,432	92.8	49,420	72.2	32,917	66.4	61,585	60.8	56,097	83.9	20,540	100.0	839,344	73.8
16-31	10,198	89.4	72,037	73.9	36,683	67.8	68,435	82.5	9,976	88.8	52,715	72.2	34,542	63.6	62,709	55.2	59,837	83.9	21,079	78.6		
June 1-15	8,574	81.5	67,276	70.9	37,098	75.3	56,772	74.5	9,703	96.5	51,055	71.2	35,580	73.4	60,093	61.0	59,531	90.7	21,192	83.1	799,768	73.5
16-30	6,000	58.4	67,277	70.9	34,437	69.1	51,374	76.0	9,357	91.6	51,055	71.2	34,058	75.7	60,093	61.0	59,531	90.7	19,713	79.2		
July 1-15	6,046	66.0	61,260	73.1	37,391	81.9	46,005	76.2	8,974	89.6	51,011	74.8	33,225	80.3	55,541	62.1	56,793	90.0	21,233	92.1	775,683	77.3
16-31	5,986	72.5	65,343	73.1	38,158	77.9	48,345	89.5	9,688	89.3	54,412	74.8	34,071	80.5	59,114	65.3	60,579	90.0	22,459	99.6		
Aug. 1-15	5,938	74.0	57,058	80.6	37,915	83.1	45,082	86.6	9,163	92.6	46,182	75.9	32,082	76.8	57,536	70.5	54,023	88.6	20,696	95.1	744,897	79.5
16-31	5,650	81.6	60,862	80.6	37,934	90.4	44,403	90.3	9,406	85.3	49,261	75.9	34,037	75.1	58,850	69.7	57,624	88.6	21,195	94.1		
Sept. 1-15	5,520	94.5	53,627	76.9	37,796	89.9	47,514	97.3	9,773	91.5	43,543	79.9	32,403	81.2	55,924	70.4	56,243	90.6	20,064	93.4	732,156	84.1
16-30	4,122	85.7	53,627	76.9	37,499	81.5	51,166	100.0	10,159	91.5	43,544	79.9	32,214	86.2	60,877	76.9	56,243	90.6	20,298	95.7		
Oct. 1-15	4,282	85.7	58,473	87.0	35,891	75.4	58,738	95.3	9,988	91.0	43,713	82.3	31,700	78.4	60,138	77.6	54,558	89.9	20,505	97.2	779,877	86.4
16-31	4,724	91.8	62,371	87.0	41,949	85.5	55,759	88.7	11,233	99.1	46,627	82.3	34,770	93.5	65,923	84.1	58,196	89.9	20,339	98.6		
Nov. 1-15	5,637	89.2	60,422	92.2	38,113	83.9	53,369	100.0	9,653	100.0	40,486	90.0	31,928	92.3	60,032	86.0	52,056	99.2	16,321	89.0	725,588	89.9
16-30	5,945	68.8	60,422	92.2	32,914	81.1	50,968	100.0	8,651	100.0	40,486	90.0	29,031	89.4	58,968	89.4	52,056	99.2	18,130	100.0		
Dec. 1-15	6,267	61.6	59,620	88.4	33,148	83.7	60,766	100.0	9,837	100.0	36,639	86.3	28,414	89.1	59,323	88.2	52,330	99.8	19,032	100.0	745,721	90.9
16-31	6,981	61.6	60,017	88.4	35,235	79.3	59,279	100.0	10,990	100.0	39,082	86.3	29,831	89.0	62,621	85.7	55,819	99.8	20,490	98.0		
Av.	82.7		82.7		78.0		89.6		95.1		78.9		78.9		72.0		90.1		91.5		88.2	



Table 11. Volume and Percent Class I Sales of Milk by Months  
of 10 Rating Plan Dealers in Worcester - 1935

Dealer:	A		B		C		D	
Period	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total
Jan.	249,956	98.9	80,657	93.1	367,779	94.3	62,811	100.0
Feb.	230,668	98.1	72,279	96.0	335,970	90.9	59,342	100.0
March	250,383	95.5	81,407	98.3	377,813	88.3	67,111	100.0
April	233,935	93.2	77,538	95.0	350,396	80.3	65,425	98.0
May	238,082	86.8	85,076	99.5	360,495	72.8	65,946	87.9
June	240,000	86.9	81,852	94.7	339,391	70.9	64,180	93.3
July	242,903	90.1	89,322	87.4	335,868	88.0	63,882	98.7
Aug.	267,426	98.3	90,565	90.6	339,272	79.6	63,733	93.5
Sept.	235,584	93.5	84,203	87.1	358,173	88.4	60,507	91.2
Oct.	258,981	95.1	87,591	87.6	398,441	93.5	63,390	99.0
Nov.	253,838	98.9	82,345	92.3	370,916	95.8	59,125	96.1
Dec.	247,990	92.3	87,340	92.6	368,074	87.9	61,288	95.1
Av.		93.9		92.9		85.9		96.1

E		F		G		H		I	
Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total	Cl. I Sales (lbs.)	% of Total
121,385	96.4	90,134	99.2	91,089	93.7	75,714	100.0	452,506	98.2
114,460	98.2	81,073	97.6	87,074	98.2	82,603	100.0	391,885	93.8
124,986	94.8	86,161	90.7	90,263	91.0	80,392	100.0	443,267	93.3
122,023	91.2	83,424	90.7	85,426	92.0	78,941	100.0	440,155	93.0
125,757	87.7	85,744	80.0	87,542	87.3	89,898	100.0	423,195	83.5
116,081	81.3	85,503	77.4	85,105	88.8	82,658	93.6	409,155	80.6
114,615	88.2	81,748	83.7	86,120	91.4	72,147	89.2	398,474	80.6
118,938	90.3	81,925	90.0	85,383	89.4	68,727	96.7	403,082	84.2
116,949	93.0	82,732	87.2	82,631	86.9	69,298	97.9	390,247	86.9
130,743	95.5	91,746	91.5	86,486	85.1	75,811	96.2	427,016	95.3
114,292	97.5	87,916	98.4	84,511	93.1	70,026	100.0	425,949	96.9
123,027	95.3	89,110	89.4	85,290	92.0	71,019	97.2	417,496	97.0
	92.5		89.7		90.7		97.6		90.3

J		Total 10 Dealers	Average %
Cl. I Sales (lbs.)	% of Total		
369,636	89.0	1,961,667	95.4
327,786	86.0	1,783,140	93.3
368,042	80.2	1,969,825	89.6
362,735	82.4	1,899,998	87.8
383,975	78.8	1,945,710	81.1
362,713	75.6	1,866,638	78.6
368,624	83.6	1,853,703	84.0
362,517	80.0	1,881,568	84.0
341,896	77.5	1,822,220	86.5
366,406	83.3	1,986,621	91.6
358,903	94.3	1,907,821	96.3
351,823	100.0	1,902,457	94.7
	84.2		88.6

reveals a decided lack of uniformity among dealers in seasonal trend of surplus milk handled. (See Figure 12) Though each group averaged to reach the peak surplus point in June, in the Use plan group peak surplus for individual dealers varied from May to August. In the Rating plan group, three dealers reached their peak surplus point in May compared to six in June and one in July. There was even less uniformity among dealers in the low surplus point for the season. This is partly due to the fact that in January and February, and October, November, and December, the average percentages of surplus were naturally low and exhibited only small deviations from each other. (see Table 8) It is also partly due to the fact that some dealers, notably smaller dealers, carried no surplus during some months, there being a considerable range of months among dealers when such condition existed.

The somewhat higher May and June surplus carried by the 13 Use plan dealers (23.1% and 27.0% compared to 18.9% and 21.4% for Rating plan dealers) is well demonstrated in the individual dealer analysis. The highest surplus in any month in 1935 carried by a Rating plan dealer did not exceed 30% (Dealer C in Table 11 had Class I sales of 70.9% in June) while three Use plan dealers each handled more than 40% surplus during the same month.

An attempt has been made to show how seasonal trend in surplus milk varies from year to year for different dealers. Figure 12 shows this trend for ten Use plan dealers for the two-year period 1935 and 1936 (see Tables 9 and 10). The ten dealers analyzed for 1936 are dealers 1 to 10, respectively, in Table 9. The other three were omitted from the comparison because they changed to the Flat plan in 1936.

The charts covering the two-year period indicate that in general,

FIGURE 12. PERCENT CLASS I SALES BY MONTHS OF  
INDIVIDUAL MILK DEALERS IN WORCESTER,  
1935 AND 1936

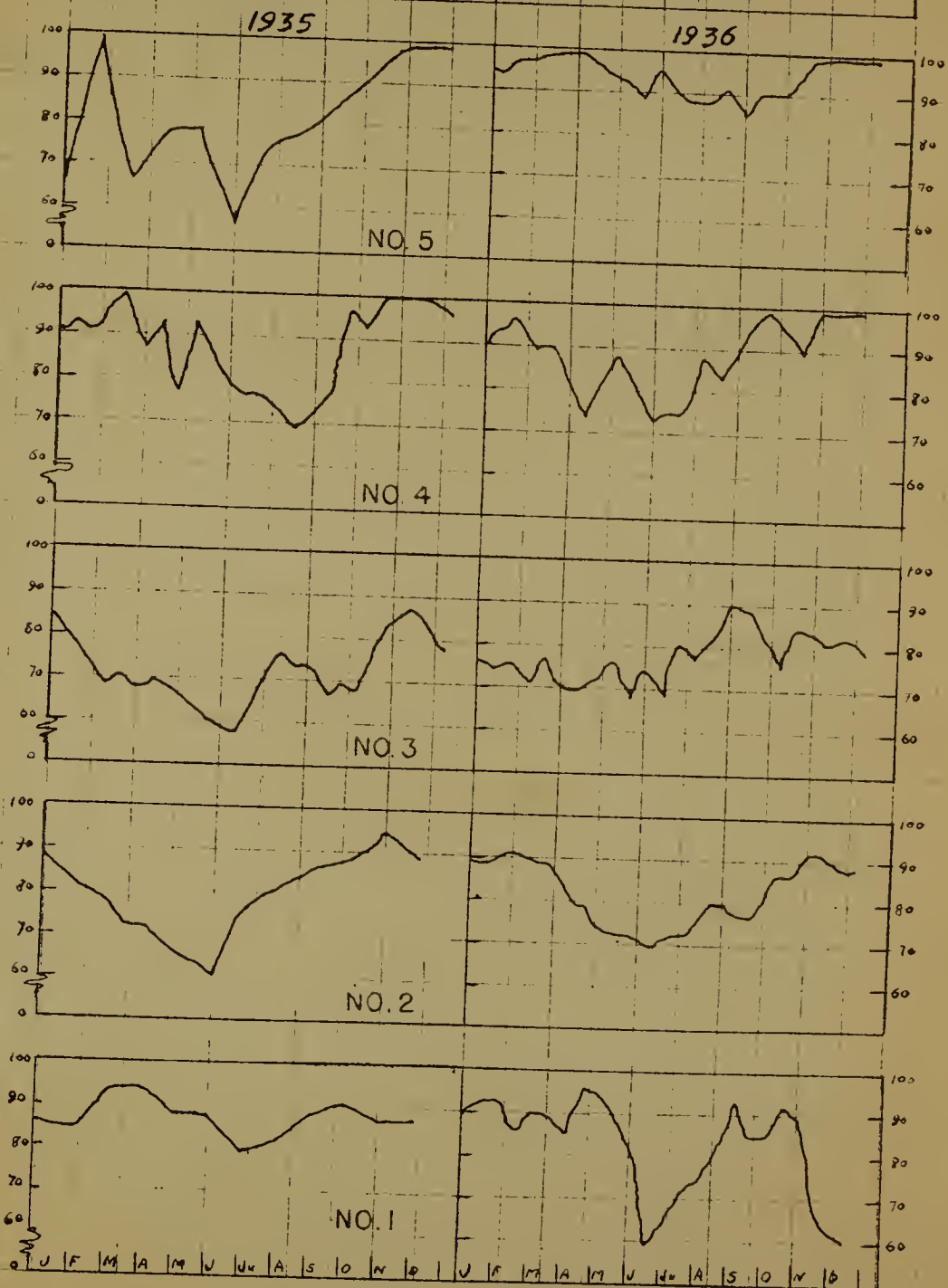
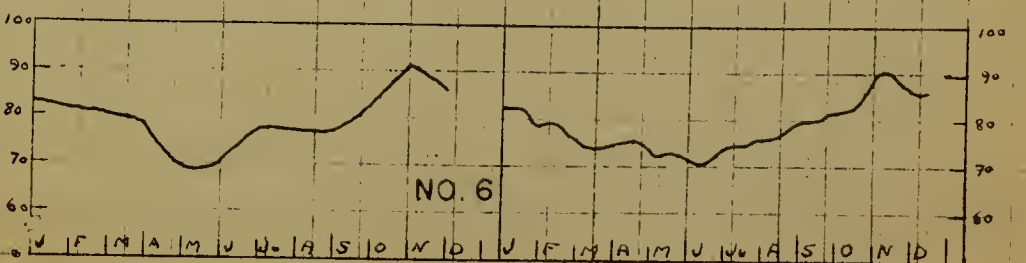
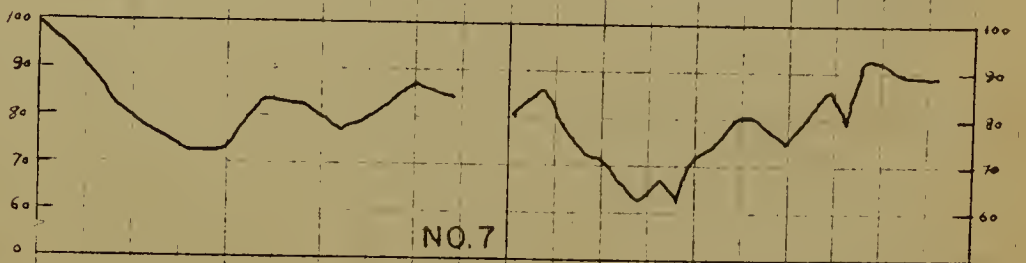
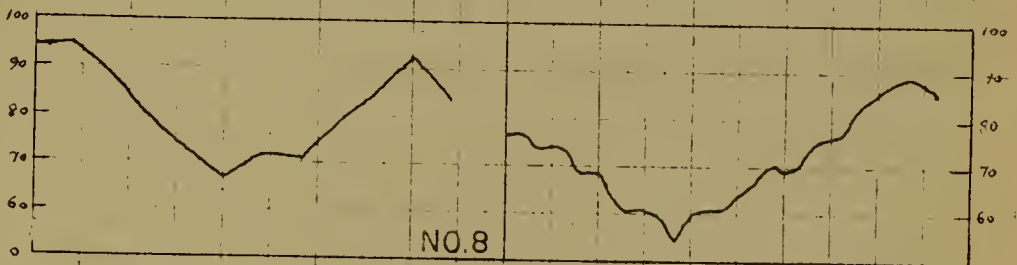
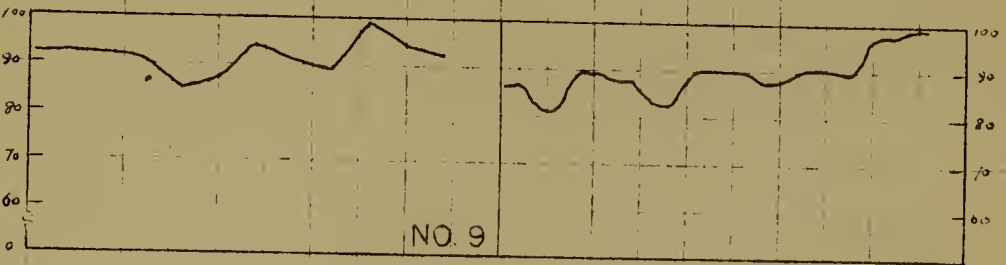
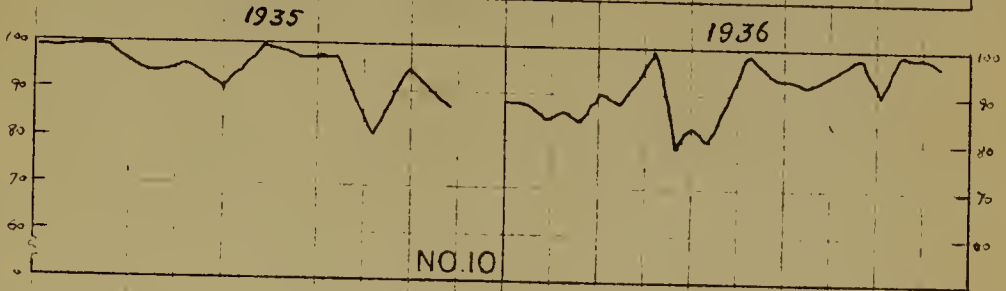
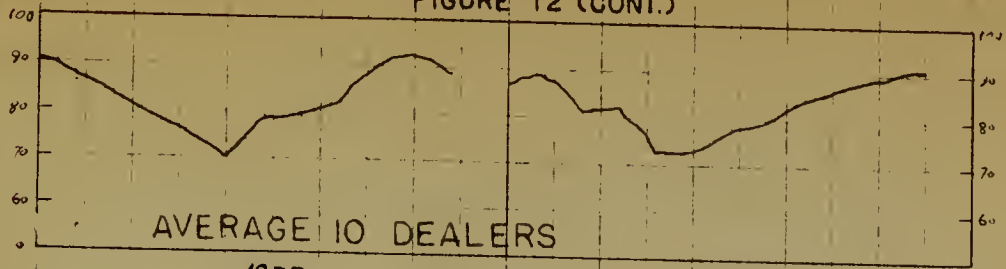




FIGURE 12 (CONT.)



individual dealers had the same seasonal trend in surplus in 1936 that they did in 1935. Dealers Number 1 and 5 are exceptions to the general picture, the former having much more surplus in 1936 than in 1935, with the opposite situation prevailing for Dealer Number 5. The charts show that great differences exist among dealers in surplus handled, both total and month by month.

These differences are further emphasized in Figure 13. This is a weighted bar graph array of percentage division of Class I and surplus milk handled by ten Use plan dealers for semi-monthly periods in 1936. Each bar represents an individual dealer. They show a very unequal distribution among the group of total amount of surplus handled at a particular time. Such a situation may constitute a tense condition in the market. It probably contributes toward strained inter-dealer relationships. Since the situation as shown cannot be taken as an accurate measure of all market surplus, the causes of unstable market conditions cannot be expected to be found here. The chart does give a general picture of surplus division among dealers.

For the first half of May, Dealer No. 4 had Class I sales of nearly 90%, while dealers 2, 3, 6, 7 and 8 varied from 60-75%. One month later (June 1-15) Dealer No. 4 had dropped down to the general group level (75%) while Dealer No. 9 whose Class I sales were 83% in May had Class I sales of over 90% in June. Class I sales of Dealer No. 9 never fell below 83% throughout the year, compared to several other dealers in the group with sales down to 60 and 55% in May and June. Following both the group, and individual dealers within the group through the year shows how dynamic the changes in proportionate



Figure 13. Percent Class I Sales and Surplus Milk by semi-monthly Pay Periods for 10 Use Plan Dealers in Worcester-1936



Class I sales among dealers really are.

#### Summary

Total milk receipts by dealers in Worcester varied 22% in 1935 from June to November. Fluid sales remained fairly constant through the year for all types of dealers. Thirteen Use plan dealers averaged to carry 16.7% surplus in 1935 compared to 11.6% surplus for 10 Rating plan dealers. Within each group proportion of surplus milk handled varied considerably among dealers. There appears to be no relationship between size of dealers' business and percentage of surplus milk handled. Because the analysis of surplus milk did not include that of two large dealers purchasing out-of-state milk, averages and details for the groups studied should not be taken as a complete measure of percentage of surplus milk in the market. The analysis does give some insight into the general nature of division of surplus milk among individual dealers, different sized dealers, and different types of dealers.

### Organization of the Worcester Market

Analysis of market organization is intentionally brief. It is entirely descriptive, and aims to serve as background for the economic analysis of the milk shed which follows. In this section the following points are described: transportation, services performed by dealers, grades of milk, cooperative membership, and activities of the Massachusetts Milk Control Board.

#### Transportation

All milk produced in Massachusetts for Worcester dealers in 1935 was trucked to market. The small amount from New York was shipped from a country plant in Hoosick, New York, via the Boston and Maine railroad. That part of the supply from Vermont also reached Worcester via the Boston and Maine railroad. Connecticut milk in Worcester represented a small part of the sales of one Webster dealer. This dealer's supply was trucked to his plant in Dudley from producers in the vicinity of Somers, Connecticut.

Trucking operations are organized in four ways. The largest dealers hire some of their own producers as truckers. These "truckmen-producers" have their businesses organized to enable them to make one trip to the dealer's plant each morning, hauling milk from a definite route. The common capacity of trucks is two tons and truckers own their trucks. Other dealers perform their own trucking operations. Many dealers whose receipts can be handled with one truck on one route find this method very advantageous. Several of them by managing their truck routes personally, are enabled to make daily producer-dealer contacts not possible for larger dealers.

A few producers, living close to dealers' plants, perform their own trucking operations, thus avoiding the hauling charge. Such cases are quite numerous among small dealers with plants located in towns neighboring Worcester. Several producer-dealers with only one or two patrons have them truck their own milk. Finally, there are a few instances where the producers of a single dealer are so scattered that their milk is shipped via custom truckers.

#### Services Performed by Dealers

All milk is handled in cans, as there is not sufficient concentration of production in any part of the milk shed to permit economical operation of tank trucks. Most dealers furnish the cans in which milk is transported, charging  $3/4\text{¢}$  per hundred pounds of milk for their use. This is the standard rate allowed by the Milk Control Board.

During 1935, one large dealer changed from this plan to producer-owned cans. The dealer sold cans to his producers, receiving payment in three installments deducted from the milk checks of succeeding months, and eliminated the can charge. Since this change, some producers have complained that their cans received unnecessarily rough treatment.

Occasionally, dealers perform credit services. They assume both the role of banker and bill collector. In some instances, dealers make regular deductions from producers' milk checks on the accounts of their producers' creditors. In other instances, dealers advance money to producers on the account of the producer's next milk check. Many times dealers have rendered valuable assistance in this manner to producers with poor security.

On the other hand, there are cases of producers performing a banking



service for dealers. Though the Milk Control Board has set up regulations concerning promptness of dealer payments to producers, in times of stress, some dealers have allowed their payments to producers to be in arrears. This, in effect, is a loan to the dealer.

To protect producers from loss on such activities by dealers, there are dealer bonding regulations. Requiring dealers to post bonds representing substantial security is now a rather common practice in the milk distributing business. Since the advent of the Massachusetts Milk Control Board, such regulations have been rigidly enforced.

In addition to can service and various credit services, some of the larger dealers perform merchandise delivery service for producers for such articles as strainer pads, milk pails, and washing powder. A few dealers sell producers butter and cheese.

#### Grades of Milk

The three common grades of milk sold in Worcester are pasteurized Grade B, pasteurized Grade A and an intermediate grade. In addition to these grades, two dealers sell only special grades of milk. The following list suffices to illustrate the different grades that can be purchased if desired:

5% Natural milk at 17¢ per quart

4% Natural milk at 15¢ per quart

Vitamin D milk at 17¢ per quart

5% Pasteurized milk at 15¢ per quart

4% Pasteurized milk at 15¢ per quart

Natural milk, unless produced under special conditions, is not allowed to be sold in Worcester. The major part of regular fluid sales

are Grade B, but many dealers standardize part of their product at a slightly higher fat test and sell it under some special name at a one cent per quart premium. Sales of this grade of milk comprise a fairly large proportion of total market sales. In 1935, one dealer reported that four or five years ago his sales of this higher grade constituted about 50% of total sales but have since declined.<sup>1</sup>

Data on sales of Grade A milk are not available. Of approximately 630 full-time producers in the Worcester milk shed in 1935, only 22 were Grade A or special milk producers, indicating that Grade A sales represented only a small part of total sales.

#### Organized Cooperation

Two producer cooperatives and one dealers' association are active in the Worcester market. Of major importance is the New England Milk Producers' Association already mentioned. The other association of producers is the Worcester division of the United Dairy System. This concern is a combined producing and selling cooperative whose members also belong to the N.E.M.P.A.

Another producers' cooperative, Massachusetts Dairies Incorporated, was organized in 1935 and has some members in the Worcester milk shed. This concern sells its product to dealers in Boston; thus does not constitute a factor in the market organization of Worcester.

#### Extent of the N.E.M.P.A.

Of an average of 653 producers in Massachusetts producing milk

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1. Personal interview with dealer.

for Worcester dealers in 1935,<sup>1</sup> payroll audit records of the Massachusetts Milk Control Board indicate that 365 or 55.9% of all producers were N.E.M.P.A. members. The proportion of members to non-members is highest in the towns of most concentrated milk production (see Figure 14). Local associations established along town lines are organization units and account for the fact that members are numerous in some towns and scarce in others. Towns to the North and East of the city have fewest members.

The association's work in secondary markets is divided into three districts: the Northern, the Southern and the Western. Worcester was formerly part of the Western district. On May 1, 1935, it was made a separate district with a district manager with his office in the city.

#### How the Association Functions

Before the advent of the Milk Control Board, the N.E.M.P.A. was the only organized sales representative of producers in the market. The presidents and secretaries of all the local associations constitute the Worcester Marketing Association which meets once each year and elects a sales committee of seven members. "Under the by-laws under which marketing associations are set up, a member of the central association must serve as a member of each sales committee."<sup>2</sup> In theory, the general manager of the central association is its representative, but in practice the responsibility is delegated to a minor official. This sales committee meets periodically with a sales committee of the Dealer's Association to settle price differences.

Since the Milk Control Board has taken over the task of establishing

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1. Does not include 53 Vermont producers.

2. Brown, F. Leon, Report on Secondary Markets, New England Dairymen, November, 1934, Page 13.



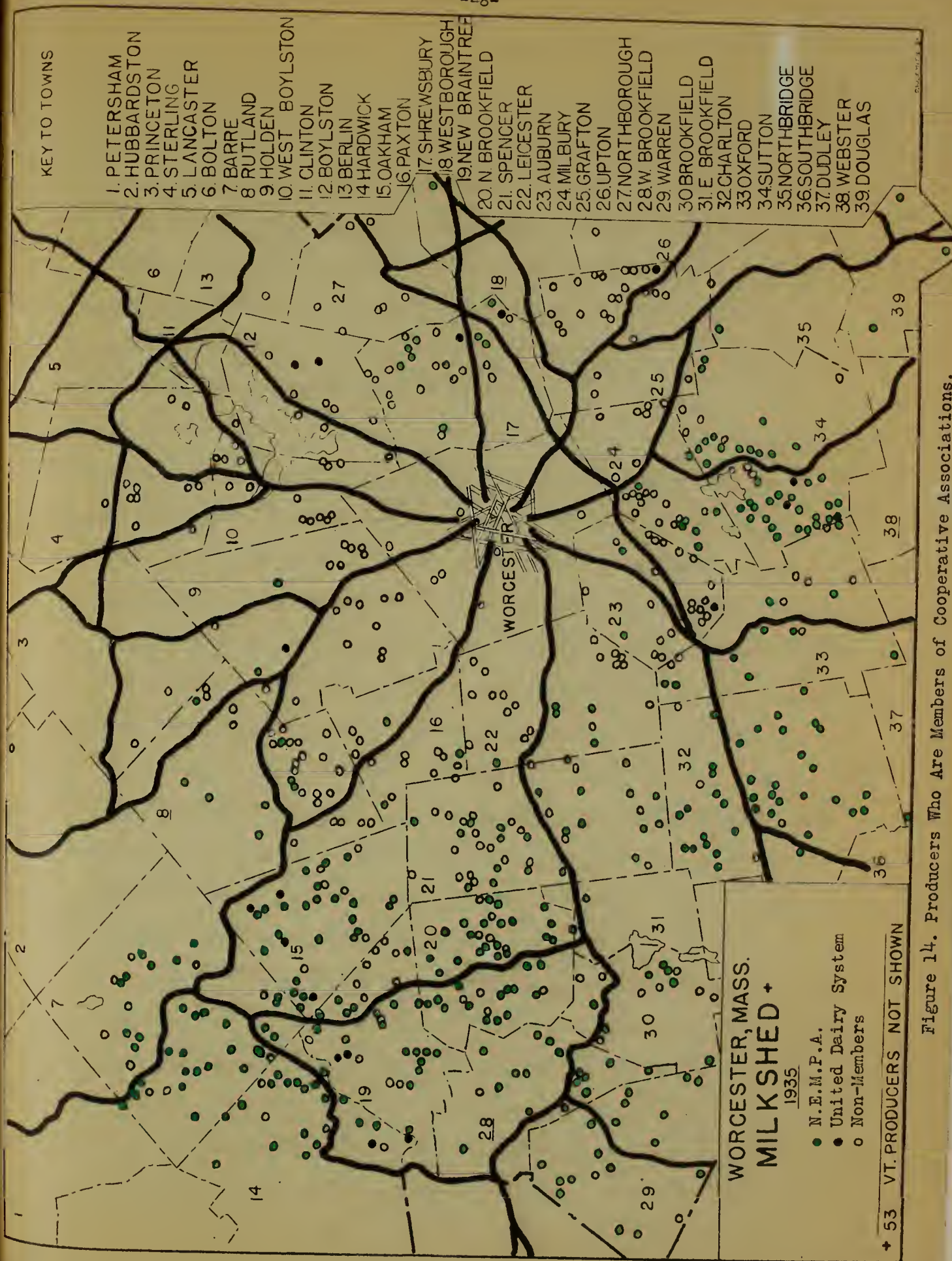


Figure 14. Producers Who Are Members of Cooperative Associations.

producer prices, the N.E.M.P.A. sales committee has been the producer's representative in petitioning the Control Board for price increases when conditions seem to justify such action. The association has been a strong supporter of governmental price regulation. In 1933, it petitioned the A.A.A. for marketing agreements for certain secondary markets in Massachusetts. When plans for marketing agreements were abandoned, the association rallied to the cause of State control. It has many times since requested the assistance of the Milk Control Board.

The N.E.M.P.A. attempts to maintain a Class I market for all its producers. In cases of producers dropped by their dealer, the association has reimbursed them from reserve funds for the difference between the Class I and cream price of milk. At one time in 1934, a production of 2000 quarts daily was being reimbursed in this manner. The association continues to carry its producers until a satisfactory market can be found. In 1934, a total of 16 producers in Worcester were paid \$6,092.37 from the reserve fund. Such reimbursement tends to maintain a more stable market.

Besides these activities, the district manager quite frequently performs check fat tests on milk. When members are dropped because of poor quality milk, the association helps them solve the difficulty. When the market is carrying a large surplus, members are urged to keep at home their excess production over ratings.

In 1935, the association was supported by an assessment of 3 cents per hundred pounds of milk sold, doubled in October to increase the reserve fund. These assessments are collected through the dealers.

#### Summary

The N.E.M.P.A. with its membership comprising 55.9% of all Worcester milk producers in Massachusetts is the principal cooperative association in



the Worcester market. It is of the price bargaining type and its sales committee meets with a dealers' sales committee to determine prices. Under governmental price control, the association cooperates as much as possible with the Milk Control Board and takes the initiative in requesting price advances.

#### The Massachusetts Milk Control Board

By an act of the legislature in 1934, the Massachusetts Milk Control Board was established. Briefly, it is empowered to set schedules of producer and retail prices in response to a sufficiently large producer petition. It has authority to investigate dealers' records, summon offenders to hearings, and inflict penalties necessary to the proper enforcement of price schedules. The temporary law under which the board operated was extended by an act of legislature in 1936. Since the first milk marketing law, the Worcester market, along with other secondary markets in the Commonwealth, has been under the Milk Control Board's jurisdiction.

This study does not aim to trace the history of the Milk Control Board but merely recognizes its presence and function in the Worcester market. To facilitate the Board in its work, the State has been divided into "marketing areas" of similar conditions, the city of Worcester and surrounding towns constituting Area 8.<sup>1</sup> Separate price schedules are issued for each area according to local needs. Producers are paid according to the area in which their milk is marketed if such area is not the area in which they live.

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1. See definition of terms, Page 6.



The Board has power to set retail as well as producer prices. Thus far, this power has not been used in the Worcester area. In the Springfield area, retail prices were set in 1935, but the less complex marketing situation in Worcester has enabled the Control Board to maintain a stable market without resorting to retail price-setting.

During 1935, the price to the producer was changed twice. On March 10, it was raised from  $6\frac{1}{2}$  cents per quart to  $7\frac{1}{4}$  cents per quart where it remained until October 20, when it was reduced to 7 cents per quart.

The Milk Board has carried on other activities besides enforcement of price schedules. It has forced some dealers to make up payments that have been in arrears. A few dealers have been required to reduce excessive trucking rates. The Board has attempted to prevent dealers from dropping producers without reasonable notice and cause and to require some dealers to keep more adequate records of their business.

The Board is supported by a dealer license fee of \$5.00 and an assessment of 2 cents per hundred pounds on all milk sold. The full amount of the assessment is paid by the dealer who is allowed to deduct half of this amount from producers' checks.

Hearings and prosecutions conducted by the Milk Control Board in the Worcester Area up to June 2, 1937, are listed as follows:<sup>1</sup>

Hearing held, violation corrected, case filed	15
Hearing held, license revoked	
Out of business	4
Appealed - pending	1
Reinstated after compliance	1
Operating within appeal period	1
Hearing held, conditional license issued	7
	6

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1. Personal letter from J. C. Cort, Administrator, Milk Control Board, June 2, 1937.

According to the Administrator, "The charges at these hearings include failure to submit reports and pay assessments to the Board, failure to make payments to producers for milk, and failure to make payment to producers in accordance with the Official Orders of the Board fixing minimum prices to be paid to producers."\*

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\*See footnote on Page 51.

Economic Structure of the Geographical Milk Shed in 1935

The map in Figure 2 showing geographic location of producers has been used as a basis for showing numerous economic variations among producers in the milk shed. This map shows 89.9% of all Massachusetts producers by number and 90.3% of all Massachusetts milk by volume. In addition, the files of the Massachusetts Milk Control Board list 31 producers selling to Worcester dealers for which no information on deliveries or size of business was available. These producers represent such a small proportion of the entire market that an analysis of that portion for which information is available is a fairly reliable analysis of variations of all Massachusetts milk entering the Worcester market.

For comparative purposes, the milk shed has been divided into 5-mile wide zones extending from the center of the city outward. Each zone is divided into quarter zones by a line running north and south and a line running east and west. (see Figures 2 and 15)

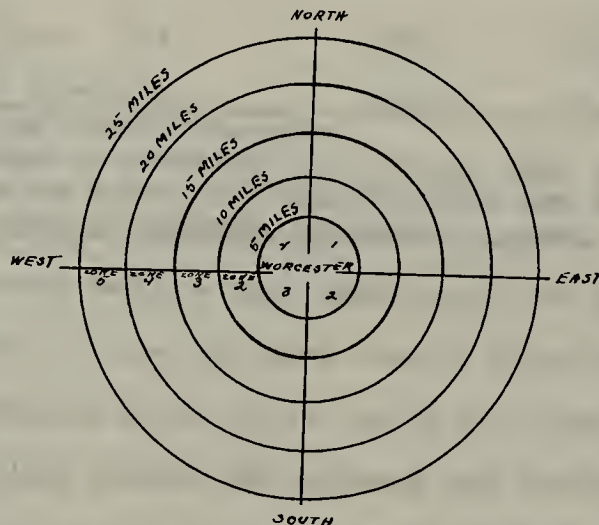


Figure 15.

Diagram showing  
Worcester milk  
shed division by  
zones and quarter  
zones.



Distribution of total supply by zones and sub-zones

Producers are fairly well distributed among the 10, 15, and 20 mile zones. Zone 2, the 10 mile zone, has the largest percentage of both producers (35.3%) and total production (32.6%). The local 5 mile zone supplied 4.6% of total milk, while the most distant zone (20-25 miles) supplied 9.3% of total milk. On a zone basis, 90.7% of total milk was produced in the first four zones, or within a radius of 20 miles from the center of the city (see Table 12).

Table 12. Proportionate Distribution of Worcester Milk Supply by 5 Mile Zones\*

Zone No.	Av. No. Pro-ducers**	% of Total	Accumulative %	Av. Daily Deliveries Per Producer (lbs.)	Total Daily Deliveries (lbs.)	% All Deliveries	Accumulative %
1. less-5 miles	35.1	6.0	6.0	181.3	6,360.0	4.6	4.6
2. 5-10 mi.	206.1	35.3	41.3	219.3	45,199.9	32.6	37.2
3. 10-15 mi.	174.9	29.9	71.2	220.0	38,480.2	27.7	64.9
4. 15-20 mi.	125.2	21.4	92.6	285.2	35,715.6	25.8	90.7
5. 20-25 mi.	43.1	7.4	100.0	299.6	12,918.8	9.3	100.0
Sub-Total	584.5	100.0		237.4	138,674.5	100.0	
Zone Unknown	73.1	11.1		203.1	14,846.6	9.7	
Total	657.6***	100.0		233.6	153,521.1	100.0	

\*Does not include out-of-state milk.

\*\*Does not include 31 producers whose average daily deliveries are unknown.

\*\*\*Producers in the market less than 12 months have been considered fractional parts of producers according to number of months in the market.

On a quarter basis, a much larger proportion of milk is produced in the western half of respective zones than in the eastern half (see Figure 2). Nearly all production in the 15, 20, and 25 mile zones is located west of the city. By total quarters the northwest area produces by far the largest portion of total milk for the market having 41.7% of all producers producing 48.7% of all Massachusetts milk. (see Table 13) The northeast quarter produces

Table 13. Proportionate Distribution of Worcester Milk Supply by Geographical Quarter Zones

Quarter	Av. No. Producers	% of Total	Av. Daily Deliveries Per Producer (Pounds)	Total Deliveries (Pounds)	% all Deliveries
Northeast	54.9	9.4	183.8	10,094.3	7.3
Southeast	76.3	13.0	216.8	16,533.2	11.9
Southwest	209.6	35.9	213.2	44,684.6	32.1
Northwest	243.7	41.7	277.9	67,718.7	48.7
Total*	584.5	100.0	237.4	139,030.8	100.0

\*Does not include 31 producers whose average daily deliveries are unknown, and 73.1 producers comprising 11.1% of all producers whose location is unknown.

the least milk with only 9.4% of all producers and 7.3% of all milk produced.

#### The 1935 Milk Shed Compared to that of 1932

A direct comparison of 1935 with 1932 from the same source of information is impossible. Data for 1932 is from "Sources of Milk Supply in Twenty-Nine Secondary Markets in Massachusetts."<sup>1</sup> This study shows daily supply by towns for 1932 as recorded in the files of the city milk inspector. A rough quarterly division along town lines has been made to compare with the quarter divisions of the 1935 milk shed (see Figure 16).

This comparison reveals a considerable shift in production from the eastern half of the milk shed to the western half (see Table 14). In 1935, 80.8% of all Massachusetts milk for Worcester was being produced west of the city compared to 70.5% in 1932. Probably more detailed analysis than this general comparison is not justified because of the

1. Lindsey, A. H., Sources of Milk Supply in Twenty-Nine Secondary Markets in Massachusetts, Massachusetts Agr. Exp. Sta., March 1934.



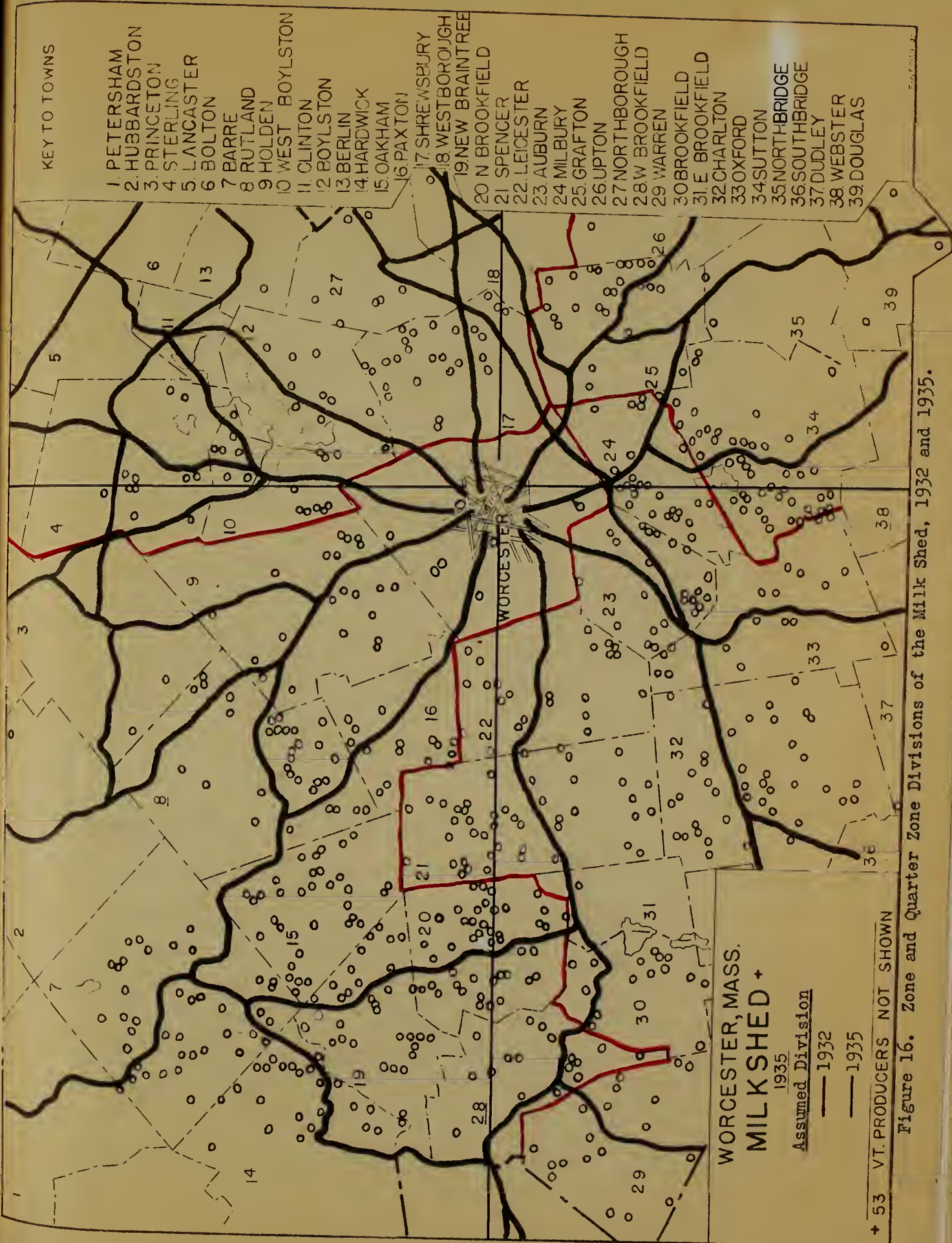


Figure 16. Zone and Quarter Zone Divisions of the Milk Shed, 1932 and 1935.



Table 14. Worcester Milk Supply from Massachusetts in Percentage Division Among Geographical Quarters for 1932 and 1935

Quarter	1932 (%)	1935 (%)
Northeast	14.6	7.3
Southeast	14.9	11.9
Southwest	29.8	32.1
Northwest	40.7	48.7
Total	100.0	100.0

difference in source of data.

The proportion of the total supply from Massachusetts has increased at the expense of out-of-state milk (see Table 15). Massachusetts' share of the market was 92.0% in 1935 compared to 80.0% in 1932, mostly at the expense of Vermont and Connecticut milk.

Table 15. Worcester Milk Supply in Percentage Division among States 1932 and 1935

State of Origin	1932 (%)	1935 (%)
Massachusetts	80.0	92.0
Vermont	11.7	4.3
New York	4.4	3.4
Connecticut	3.9	0.3
Total	100.0	100.0

#### Producer Variations in the Milk Shed

In 1935, an equivalent of 657.6 twelve-month producers<sup>1</sup> averaged to produce 233.6 pounds of milk daily.<sup>2</sup> The following analysis shows the extremes and variations that collectively make up this average. These

1. The term "producer" is used to designate one dairy farm producing milk or one producing unit.
2. All analyses of average daily deliveries is based on average deliveries for June and November, the high and low months of total purchases of milk by Dealers.

are discussed from three angles: (1) variations in size of producers; (2) variations in seasonal production; and (3) producer shifts and part-year producers.

### Variations in Size of Producers

When all the producers in the milk shed are divided into size groups with a class interval of 100 pounds, the largest proportion of all producers (37.2%) fall in the 100-199 pound group (see Table 16). This group supplies 23.4% of the milk produced in Massachusetts for Worcester. The largest share of the market is supplied by producers with over 400 pounds or more daily production. This group includes only 12.2% of all producers but accounts for 31.5% of total milk.

Table 16. Division of Worcester Milk Supply Among Producers by Size Groups - 1935.

Size Group (lbs.)	Average No. of Producers	% Total Producers	Av. Daily Deliveries (lbs.)	Total Deliveries	% Total Deliveries
Less 100	95.7	16.4	68.1	6,518.4	4.7
100-199	217.3	37.2	149.6	32,503.0	23.4
200-299	126.5	21.6	244.4	30,916.1	22.2
300-399	73.5	12.6	343.7	25,274.4	18.2
400 and over	71.3	12.2	614.5	43,785.7	31.5
Total*	584.3	100.0	237.4	138,997.6	100.0

\*Does not include 73.1 producers comprising 11.1% of all producers. Location of these producers is unknown.

12.2% of Producers Supply 31.5% of the milk.

24.8% of Producers Supply 49.7% of the milk.

One fourth of all the producers supply one-half the total market while three fourths of the producers supply the other half. (see Figure 17).

Examination of the distribution of different sized producers among zones and quarter zones shows that size of farms as measured by average daily deliveries of milk per farm increases steadily from the inside to

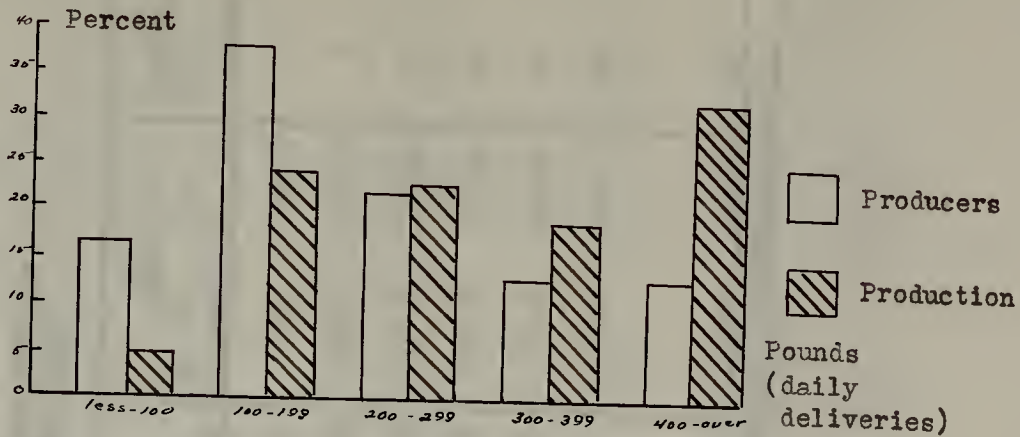


Figure 17. Proportions of the Worcester Milk Market Supplied by different Size Groups of Producers.

the outside of the milk shed. (see Table 17) Average daily deliveries of all producers in Zone 1 were 181.3 pounds per farm in 1935 compared to 219.3 in Zone 2, 220.0 in Zone 3, 285.2 in Zone 4, and 299.6 in Zone 5.

By quarter zones, average daily deliveries per farm are smallest in the northeast quarter (183.8 pounds) and largest in the northwest quarter (277.9 pounds) compared to 216.8 and 209.6 pounds, respectively, in the southeast and southwest quarters. (see Figure 18)

In Figure 19, producers are plotted on the base map according to size. This map reveals a decided lack of size uniformity among producers in most localities.

In Sutton, a majority of producers fall in the 100-199 pound class, while in New Braintree, Hardwick and Rutland, 300 and 400 pound producers predominate. In most other areas large producers are well intermingled with medium sized and small ones. In spite of the fact that average daily deliveries per farm increase proportionately with distance from the city, except in the areas noted such increase is hard to detect from examination



Table 17. Summary of Average Daily Deliveries of Milk per Producer in the Massachusetts Area of the Worcester Milk Shed, 1935

	Northeast			Southeast			Southwest			Northwest			Total		Producers (size unknown)
	Av. No. Producers	Av. D. D.	Av.	Av. No. Producers	Av. D. D.	Av.	Av. No. Producers	Av. D. D.	Av.	Av. No. Producers	Av. D. D.	Av.	Av. No. Producers	Av. D. D.	
Zone 1	4.5	108.1		12.6	156.6		8.0	199.9		10.0	230.4		35.1	181.3	0
Zone 2	38.7	176.1		56.0	217.0		69.6	229.2		41.8	245.8		206.1	219.3	9
Zone 3	11.8	238.2		5.7	316.2		69.2	188.4		88.2	240.0		174.9	220.0	4
Zone 4	-	-		2.0	308.9		49.8	223.4		73.5	326.6		125.2	285.2	4
Zone 5	-	-		-	-		13.0	229.2		30.1	330.3		43.1	299.6	2
Average and Total	55.0	183.8		76.3	216.8		209.6	213.2		243.6	277.9		657.5*	233.6	12
Av. D. D. - Average Daily Deliveries.	*Does not include 31 producers of unknown size.														

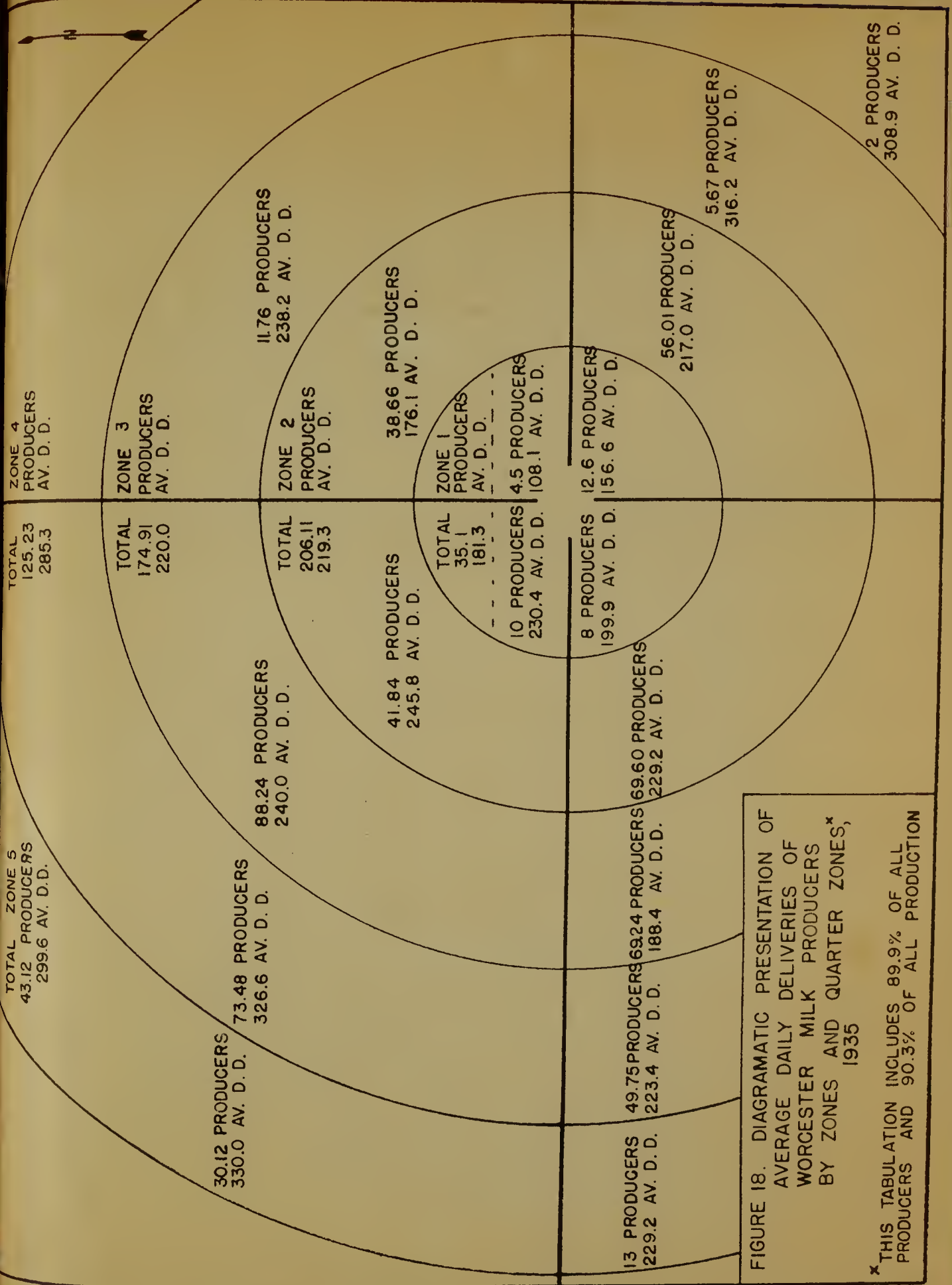


FIGURE 18. DIAGRAMATIC PRESENTATION OF AVERAGE DAILY DELIVERIES OF WORCESTER MILK PRODUCERS BY ZONES AND QUARTER ZONES,\* 1935

\* THIS TABULATION INCLUDES 89.9% OF ALL PRODUCERS AND 90.3% OF ALL PRODUCTION



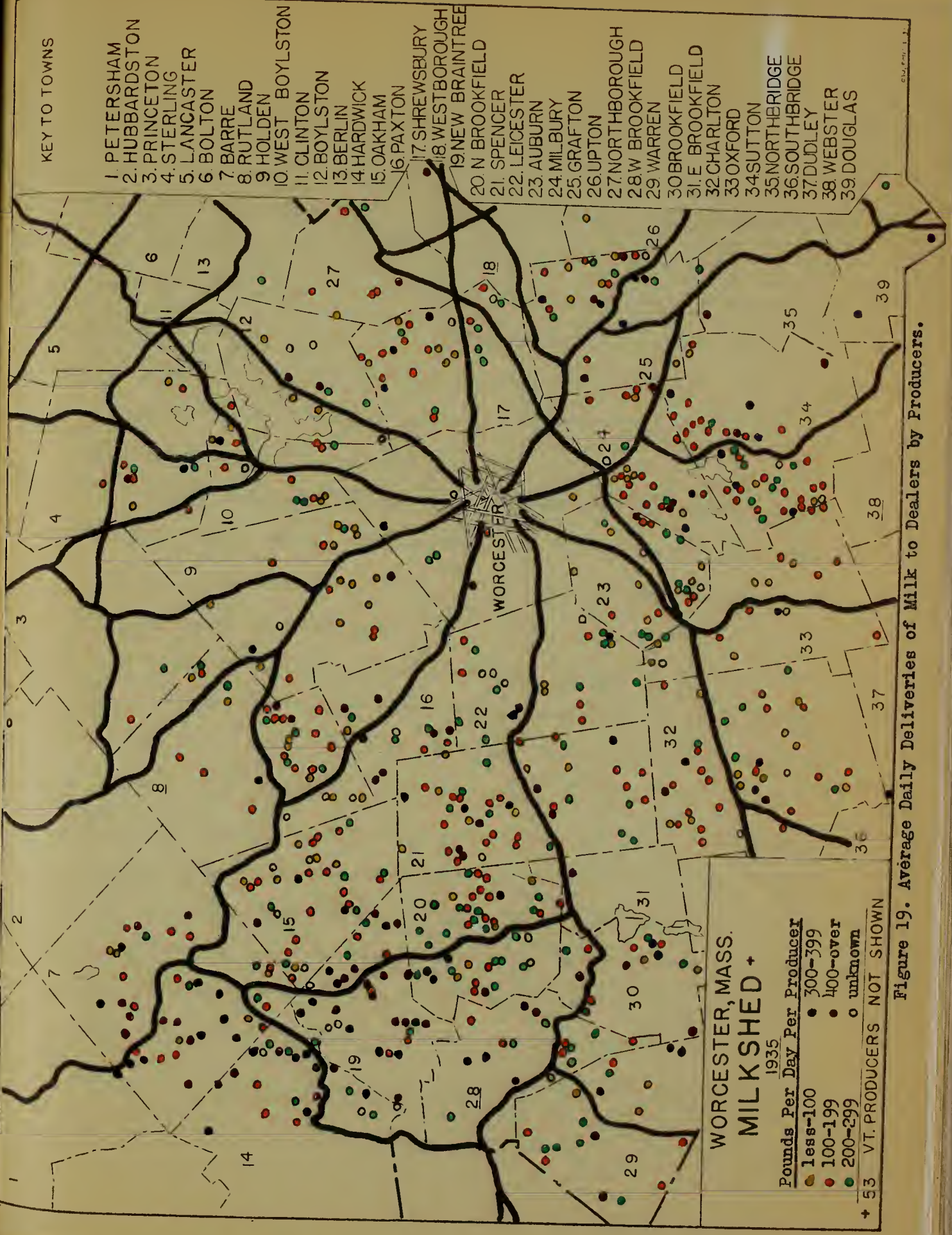


Figure 19. Average Daily Deliveries of Milk to Dealers by Producers.



of the map.

### Part-Year Producers in the Milk Shed

Records of the Massachusetts Milk Control Board listed 753 producers supplying milk for the Worcester market in 1935. Of this number, complete records for 732 or 97.3% of the total were available. Of these, 599 were part of the milk shed for the entire year. The remaining 133 varied from one-half to eleven months in the market, averaging 5.4 months. The temporary (or part-year) producers kept dropping out and being added rather regularly so that the average number of producers at any one time was 650.1 compared to 732 separate producers.

This number (650.1) plus about 20 producers, whose information was unavailable, is a very accurate count of producers in Massachusetts supplying milk for Worcester in 1935.<sup>1</sup> As shown in Table 1, these producers supply 92.0% of the total milk supply.

Part-year producers varied from a high point of 69 in January and March to a low of 53 in the last three months of the year. Such producers constituted a yearly average of 9.4% of all producers, the range being from a high of 11.5% in January to a low of 8.0% in September (see Table 18).

During 1935, approximately one producer in 10 dropped out of the market within the 12 month period, but new producers entering the market seem to balance those that drop out (see Table 19 and Figure 20). With total number of producers in January taken as 100%, new producers entered the market and others dropped out at 1.1% and 1.3% per month, respectively. Both the upward and downward trend were very regular and exhibited no

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1. Each producer dealer and distributor is counted as one producer in this tabulation.

Table 18. Percentage Part-Year Producers are of All Producers by Months in the Massachusetts Area of the Worcester Milk Shed - 1935

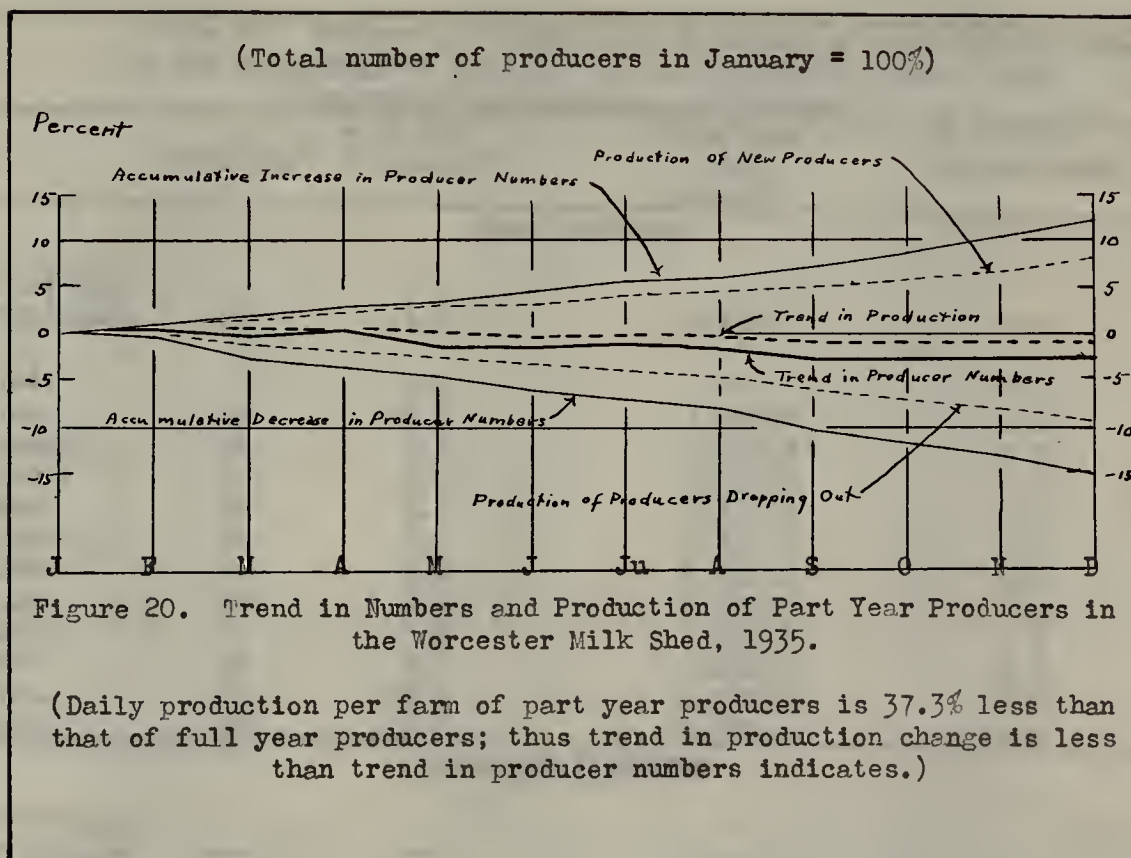
Month	Full Year Producers	Part Year Producers	All Producers	% Part Year Producers
Jan.	599	69	668	11.5
Feb.	599	76	675	11.3
March	599	69	668	11.5
April	599	67	666	10.0
May	599	62	661	9.4
June	599	59	658	9.0
July	599	62	661	9.4
Aug.	599	58	657	8.8
Sept.	599	52	651	8.0
Oct.	599	53	652	8.0
Nov.	599	53	652	8.0
Dec.	599	53	652	8.0
Average	599	61.6	650.1	9.4

noticeable seasonal fluctuations. As the downward trend was slightly in excess of the upward one, the total number of producers in December was only 97.6% of the number in January.

Of the total of 133 part-year producers, 17 withdrew from the market and reentered one or more times within the year. This accounts for a total of new entries and withdrawals (82 entries and 98 withdrawals) which exceeded the total number of part-year producers (133).

Table 19. Numbers and Production by Months of Producers Added to and Dropped From the Massachusetts Area of the Worcester Milk Shed - 1935

Month	New Producers	Producers Withdrawn	Part-Year Producers	Daily Deliveries Part-Year Producers (lbs.)	Av. Daily Deliveries, New Producers (lbs.)	Av. Daily Deliveries, Producers Withdrawn (lbs.)
Jan.	0	0	69	10,444.5	151.4	151.4
Feb.	10	3	76	12,079.4	179.1	52.0
March	5	12	69	11,290.5	193.2	146.3
April	5	7	67	11,065.4	151.8	140.6
May	3	8	62	10,483.9	200.9	148.0
June	6	9	59	10,456.3	197.6	134.8
July	9	6	62	10,242.8	98.6	183.5
Aug.	2	6	58	9,865.5	114.9	101.2
Sept.	9	15	52	8,711.9	131.4	155.8
Oct.	9	8	53	9,091.2	173.9	147.2
Nov.	11	11	53	8,837.3	125.5	148.6
Dec.	13	13	53	8,912.5	152.7	146.9
Av.	6.8	8.2	61.1	12,343.3	155.9	138.0



Part-year producers are 37.3% smaller than full-year producers. Average daily deliveries of part-year producers were 151.4 pounds of milk daily compared to 241.6 for full-year producers and 230.8 for all producers. Because of this condition the increases and decreases in producer numbers are not correct measures of corresponding increases and decreases in milk production. New producers entering the market during 1935 equaled 12.3% of the total number of producers in January, but the production of these new producers amounted to only 8.0% of total production in January. Likewise, producers dropping out during the year equaled 14.9% of total producers in January but only 9.1% of January production (see Table 20 and Figure 20).

Of the 133 part-year producers, the milk shed zone location of 71 was known and 62 unknown. According to the geographical distribution of these



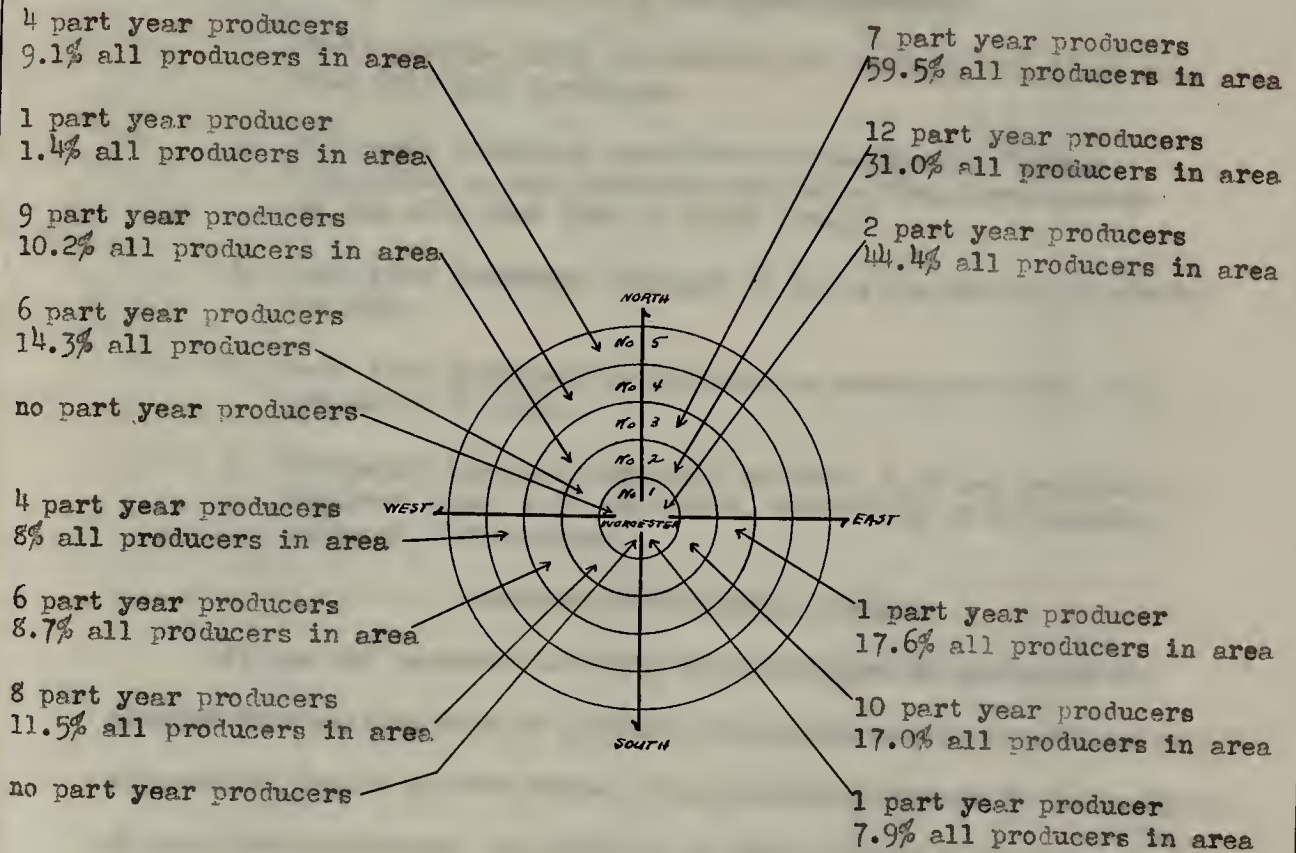
Table 20. Numbers and Production by Months of Part-Year Producers in the Massachusetts Area of the Worcester Milk Shed - 1935  
(expressed as percentage of January)

	Producers*	% of All Producers**	Production (lbs.) (Daily)*	% of All Production**
<u>New Producers</u>				
Part-Year Producers	69	11.5	10,444.5	---
Jan.	0	0.0	---	---
Feb.	10	1.5	---	0.0
March	15	2.3	1,791.0	1.2
April	20	3.0	2,757.2	1.8
May	23	3.4	3,516.4	2.3
June	29	4.3	4,119.0	2.7
July	38	5.7	5,304.6	3.0
Aug.	40	6.0	6,192.1	4.0
Sept.	49	7.3	6,421.8	4.2
Oct.	58	8.7	7,604.6	4.9
Nov.	69	10.3	9,161.2	5.9
Dec.	82	12.3	10,542.4	6.8
			12,527.1	8.0
<u>Producers Withdrawn</u>				
Part-Year Producers	---	---	---	---
Jan.	0	0.0	---	---
Feb.	3	0.5	---	0.0
March	15	2.2	156.1	0.1
April	22	3.3	1,911.2	1.2
May	30	4.5	2,895.5	1.9
June	39	5.8	4,079.6	2.6
July	45	6.7	5,292.8	3.4
Aug.	51	7.5	6,393.8	4.1
Sept.	66	9.9	7,000.9	4.5
Oct.	74	11.1	9,337.3	6.1
Nov.	85	12.7	10,514.6	6.8
Dec.	98	14.7	12,149.7	7.9
*Accumulative Total			14,059.2	9.1

\*\*January = 100.0%

71 producers (53.4% of the total) part-year producers are more numerous in the northeastern part of the milk shed than elsewhere (see Figure 21). In this area, part-year producers comprise 31.0 to 59.5% of all producers compared to 8.0 to 14.3% part-time producers in the western half of the milk shed. Part-year producers are fewest in the northwest quarter of

Figure 21. Diagram showing geographical distribution of part year producers in the Worcester Milk Shed in 1935.\*



	Northeastern Quarter	Southeastern Quarter	Northwestern Quarter	Southwestern Quarter
Number of Producers	21	12	20	18
% all producers in Area	38.3	15.7	8.2	8.6

\*This distribution includes only 53.4% of all part year producers.

Zone 4. (1.4% of all producers in the area.) This distribution is at most a very rough classification of geographic location of part-year producers because it includes only 53.4% of all such producers.

To sum up the activities of part-year producers:

1. Their average daily deliveries per producer are 37.3% less than full year producers.
2. Part year producers constitute a considerably larger proportion of all producers in the northeastern quarter of the milk shed than in other areas.
3. Part year producers averaged to be in the market 5.4 months in 1935.
4. Part time producers constituted an average of 9.4% of all producers in 1935.
5. Producers increase regularly at about 1.1% per month and decrease about 1.3% per month, exhibiting no noticeable seasonal fluctuations.

#### Producer Shifts Among Dealers

It was not possible to trace the activities of producers who changed from selling milk to a dealer in another market to selling to a Worcester dealer or vice versa. Such producers appear in the analysis of part year producers. In addition to such producers already analyzed, a few full year producers changed the outlet for their milk from one dealer to another within the market as did some of the part year producers during their period of activity in the market. (See Table 21)

All producer shifts among dealers varied from none in January to 6 in September. Through the year there averaged about two producers per month who changed from one dealer to another. For the entire year 1935, 2.6% of full year producers and 7.5% of part year producers changed dealers.



Table 21. Seasonal Distribution of Massachusetts Milk Producers Supplying Worcester Who Changed from One Worcester Dealer to Another in 1935

	Full year Producers	Part year Producers	Total
Jan.	-	-	-
Feb.	1	-	1
March	2	-	2
April	-	2	2
May	-	1	1
June	1	1	2
July	2	-	2
Aug.	2	-	2
Sept.	2	4	6
Oct.	2	-	2
Nov.	4	1	5
Dec.	1	1	2
Total	17	10	27

Total number of full year producers - 599: Total number of Part Year producers - 133.

2.6% of full year producers changed dealers in 1935 compared to 7.5% of part time producers who changed dealers.

#### Variations in Seasonal Production

Seasonal variation of total purchases of milk by dealers has already been analyzed in a previous section. This analysis is a preliminary survey of seasonal variation among producers.

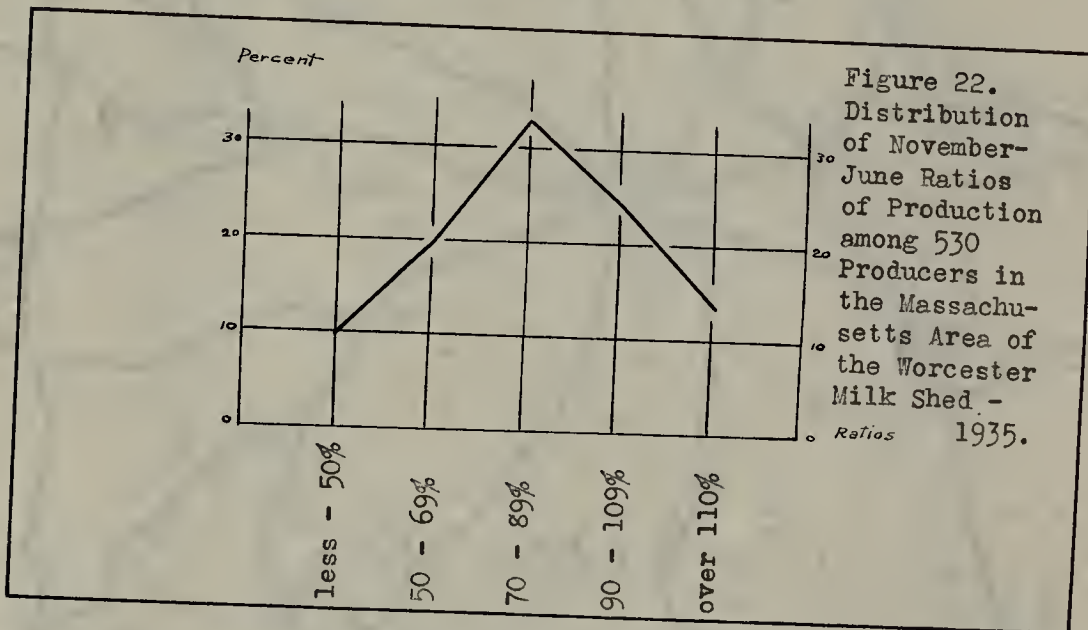
Using a November-June ratio<sup>1</sup> as a measure of seasonal variation in production, the average ratio for the entire Massachusetts Area of the milk shed is approximately 80%. When the range of ratios is divided into 5 groups, a comparatively flat distribution curve that is slightly skewed toward higher ratios is produced (see Table 22 and Figure 22). Out of 530 producers tabulated, 176 or 32.6% fall in the modal group (70-89.9%

1. For the purpose of this analysis the November-June ratio is November milk production divided by June milk production. A low percentage indicates high June surplus. Percentages much over 100 indicate the opposite situation.

Table 22. November-June Ratios of Producers  
in the Massachusetts Area of the Worcester Milk Shed, 1935

	less- 50%	50- 69%	70- 89%	90- 110%	110%- over	Total	Unknown
Number Producers	52	105	173	128	72	530	221
% Total	9.8	19.8	32.6	24.2	13.6	100.0	---

ratios). Of the total number, the November-June ratios of 23.4% are either above 110% or below 50%.



Geographical distribution of producers according to this 5-way classification is accomplished on the base map in Figure 23. There seems to be no concentration of one or more classes in any locality in the milk shed. Producers of all degree of seasonal variation are found in proximity.

This very general analysis of seasonal variation in production is presented merely as a background for further study. It helps to point out the need for additional analysis along at least two lines: (1) an evaluation of and comparison with other measures of seasonality of



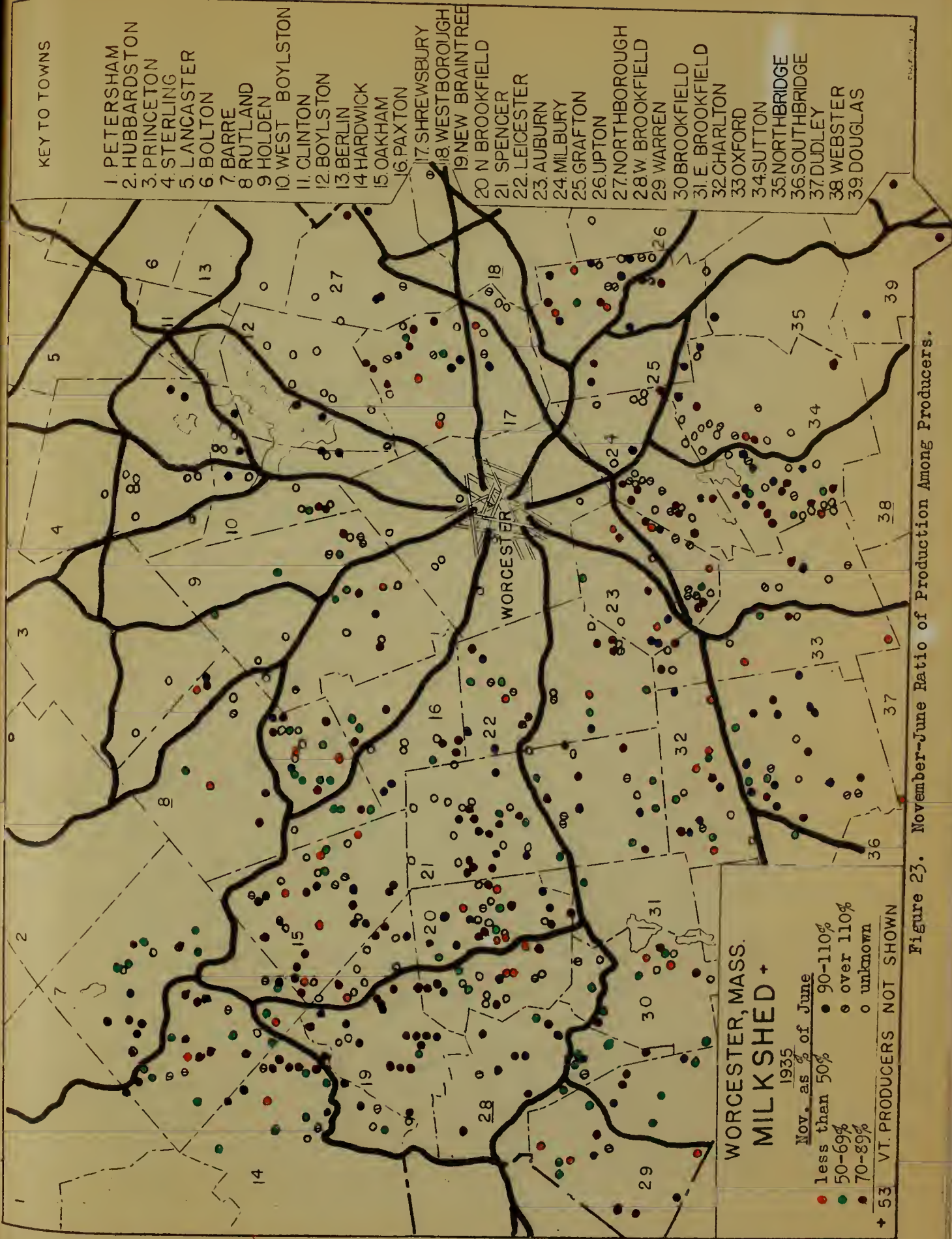


Figure 23. November-June Ratio of Production Among Producers.



the November-June ratio used in this study; (2) comparison of seasonality of production under different price plans.

Other studies of seasonal milk production tend to indicate that the November-June ratio, through a rather rough measure at best, is as satisfactory as a more involved and complicated index.<sup>1</sup> A measure adapted to one milk shed may not suit others. Complete analysis of seasonal production in this study has been limited to a November-June ratio analysis because of lack of more complete data for a large proportion of producers.

Among the producers operating under the Flat plan, there appears to be no conformity to the usual seasonal peak expected in June. This seems to indicate that daily deliveries of such producers often do not represent total production. If such condition is true, at least some Flat plan dealers operate not to purchase all production of their producers. Detailed comparison of seasonal deliveries of Flat plan

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1. H. C. Fowler in Seasonal Variation in Milk Production Under the Rating Plan, Vt. Agr. Exp. Sta., Bul. 353, May, 1933, measured seasonal variation both by coefficient of variability and November-June ratios. Referring to five districts studied in Vermont (page 18 and 20) he states, "The variation in monthly averages of milk production ..... as measured by the coefficient of variability ..... does serve to show the relative variation in milk production between any two years or between any two producers or groups of producers....."

"Another measure of seasonal variation in milk deliveries, the ratio of November production to June production, exhibits a similar picture of the changes which took place in between 1927 and 1931 in the several districts."

H. A. Ross in The Supply Side of the New York Milk Market, Cornell Univ. Agr. Exp. Sta., Sept. 1931, page 22, states, "By expressing the November production in percentage of the June production, a single factor is obtained which is an accurate index of the seasonal curve of production. That is, the average production of even a relatively small number of farms will show a seasonal curve typical of their farm management practice as it related to seasonal breeding, and feeding methods."

producers with that of Rating and Use plan producers should shed light on this point.

### Rates Charged for Hauling Milk

Analysis of transportation of milk from farm to city plant is a preliminary survey that is basic to more detailed study of transportation problems. Transporting milk is largely in charge of dealers who set the rates that are deducted from gross payments to producers.

In the Massachusetts area of the milk shed, charges for hauling milk from farms to dealers plants varied from 11.6 to 46.5 cents per 100 pounds of milk,<sup>1</sup> in 1935. The extremes represent rates charged by dealers buying on a per quart basis. Common rates charged by most dealers are 20, 25, 30 and 35 cents per hundred pounds of milk.

#### Average Milk Shed and Zone Rates

In 1935, the average hauling rate for all milk produced in Massachusetts for Worcester was 28.2 cents.<sup>2</sup> Rates by zones varied from an average of 23.8 cents in the local 5 mile zone to 31.2 cents in Zone 5 (20-25 miles). Average rates did not increase directly in proportion to distance from market. The average rate increased 2.8 cents from Zone 1 to Zone 2, compared to a 1.9¢ increase in Zone 2 over Zone 3, 0.9¢ increase in Zone 4 over Zone 3, and 1.8¢ increase in Zone 5 over Zone 4 (see Table 23).

#### Distribution of Rates Within Zones

The differences in average rates from one zone to another aggregate

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1. This is a range of from 1/4 to 1 cent per quart.

2. All hauling charges referred to are per hundred pounds of milk.



Table 23. Average Zone Rates for Hauling Milk in the Massachusetts Area of the Worcester Milk Shed - 1935

Zone	No. of Producers	Average Daily Deliveries Per Producer (lbs.)	Average Rate (cents per cwt.)	Cents increase preceding zone
1 (0-5 miles)	25	181.3	23.8	---
2 (5-10 miles)	211	219.3	26.6	2.8
3 (10-15 miles)	172	220.0	28.5	1.9
4 (15-20 miles)	127	285.2	29.4	0.9
5 (20-25 miles)	45	299.6	31.2	1.8
Total	580	Weighted Average	28.2	---

only 7.4 cents in a distance of 25 miles. The range of rates that collectively produce the averages in each zone is of much more significance (see Table 25 and Figure 24). Except for Zone 1, where no rates exceeded 30 cents, the entire market-wide range of rates was found in all zones. In Zone 1, 30.6% of all producers had their milk hauled for less than 15¢. In succeeding zones the percentage of producers in this class progressively decreased to 2.2% in Zone 5.

The highest rate group (35 cents and over) first appears in Zone 2 but does not include a large proportion of producers until Zone 5 is reached. In that Zone, 42.2% of all producers pay a 35¢ rate compared to 15.7% at that rate in Zone 4. The most common rate is 30¢. In Zone 1, 16.7% of producers pay a 30¢ rate. The proportion increases to 29.0% in Zone 2, 47.9% in Zone 3, and 57.6% in Zone 4, but decreases to 40.1% in Zone 5.

#### Changes in Rates in 1935

Comparatively few changes in hauling rates were effected in 1935, rates of only 10 producers being reduced and of 26 increased. (see Table 24). A common reason for rate changes is disparity of the existing rate with those of nearby farmers. The most frequent change was an increase



Table 24. Changes in Milk Hauling Rates in the  
Massachusetts Area of the Worcester Milk Shed - 1935

Rate Reduced		Rate Increased	
Change (cents per 100 lb.)	No. of Producers	Change (cents per 100 lb.)	No. of Producers
35.0 to 23.2	6	23.0 to 30.0	5
35.0 to 25.0	2	25.0 to 30.0	21
35.0 to 30.0	<u>2</u>		<u>—</u>
Total	10		26

from 25¢ to 30¢. (21 producers were affected.) Total number of producers  
(36) having rates changed amounted to 5.5% of all producers.

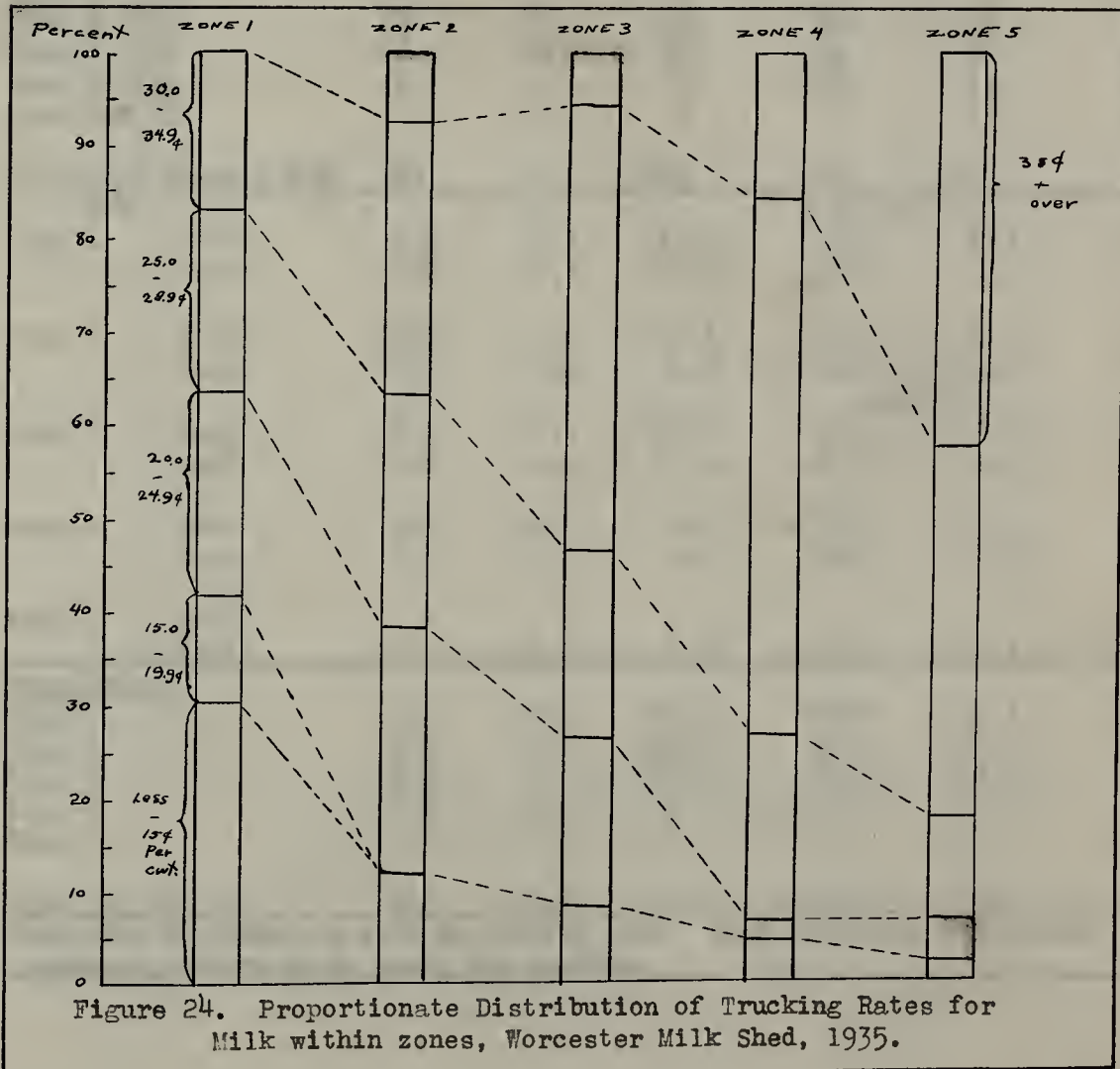


Table 25. Rates Charged for Hauling Milk in the Massachusetts Area  
of the Worcester Milk Shed - 1935

Cents per 100 lbs.		less 15¢	15-19.9¢	20-24.9¢	25-29.9¢	30-34.4¢	35¢ over
Area		Number of Producers					
Zone 1 (0-5 mi.)	East 18	2	1	6	3	6	0
	West 18	9	3	2	4	0	0
Zone 2 (5-10 mi.)	East 111	14	0	24	35	32	6
	West 120	13	0	38	23	35	11
Zone 3 (10-15 mi.)	East 20	6	0	3	3	7	1
	West 168	10	0	30	36	83	9
Zone 4 (15-20 mi.)	East 3	-	-	-	1	2	-
	West 127	6	0	3	25	73	20
Zone 5 (20-25 mi.)	East 0	-	-	-	-	-	-
	West 45	1	0	2	5	18	19
<u>Zone Totals</u>							
Zone 1 - 36		11	4	8	7	6	0
Zone 2 - 231		27	0	62	58	67	17
Zone 3 - 188		16	0	33	39	90	10
Zone 4 - 130		6	0	3	26	75	20
Zone 5 - 45		1	0	2	5	18	19
<u>Total all Zones - 630</u>		61*	4	108	135	256	66
Area		% of Total					
Zone 1	East	11.1	5.6	33.4	16.8	33.1	0.0
	West	50.0	16.7	11.1	22.2	0.0	0.0
Zone 2	East	12.6	0.0	21.6	31.5	28.9	5.4
	West	10.8	0.0	31.6	19.2	29.2	9.2
Zone 3	East	30.0	0.0	15.0	15.0	35.0	5.0
	West	6.0	0.0	17.9	21.4	49.3	5.4
Zone 4	East	0.0	0.0	0.0	33.3	66.7	0.0
	West	4.7	0.0	2.4	19.8	57.6	15.7
Zone 5	East	-	-	-	-	-	-
	West	2.2	0.0	4.4	11.1	40.1	42.2
<u>Zone Totals</u>							
Zone 1		30.6	11.1	22.2	19.4	16.7	0.0
Zone 2		11.7	0.0	26.8	25.1	29.0	7.4
Zone 3		8.5	0.0	17.6	20.7	47.9	5.3
Zone 4		4.6	0.0	2.3	20.0	57.7	15.4
Zone 5		2.2	0.0	4.4	11.1	40.1	42.2
<u>Total all Zones</u>		9.7	0.6	17.1	21.4	40.7	10.5

\*Includes 46 producers with no hauling rate. Such producers are either producer dealers or do their own hauling.

Figure 25 shows hauling charges among producers plotted on the base map. This elaborates the general rate differences in localities shown in Figure 24. In some areas one rate predominates while in other areas a standard rate seems entirely lacking. The factual picture in itself does not reveal reasons for the differences that exist but does present a basis for analysis of local transportation problems.

#### Factors Affecting Local Rates

At least two important factors affect hauling charges in a local area: dealer handling the milk and location of the farm with reference to a hard surface or main route road. The efficiency of a dealer's trucking operations and his buying price plan are important factors influencing hauling rates. Most rates of 46.5¢ (1¢ per quart) are charged by Flat plan dealers. Their gross price to producers is often higher than that of dealers of either surplus plan. The higher hauling rate tends to make net or farm prices among producers more nearly equal.

#### Comparative Rates for Massachusetts and Vermont Milk

Hauling charges for 48 Vermont milk producers shipping to Worcester were available. This milk is first trucked from the farm to a country plant, shipped by rail from the country plant to Worcester, and then hauled by truck from a railroad siding to the dealers plant. In the country, rates for farm to country plant hauling varied from 10¢ to 25¢ (see Table 26).

Table 26. Farm to Country Plant Hauling Rates for 48 Vermont Producers in the Worcester Milk Shed - 1935

Rate	Hauled own	10¢	15¢	20¢	25¢	Total
No. Producers	6	15	18	6	3	48
% of Total	12.5	31.2	37.5	12.5	6.3	100.0



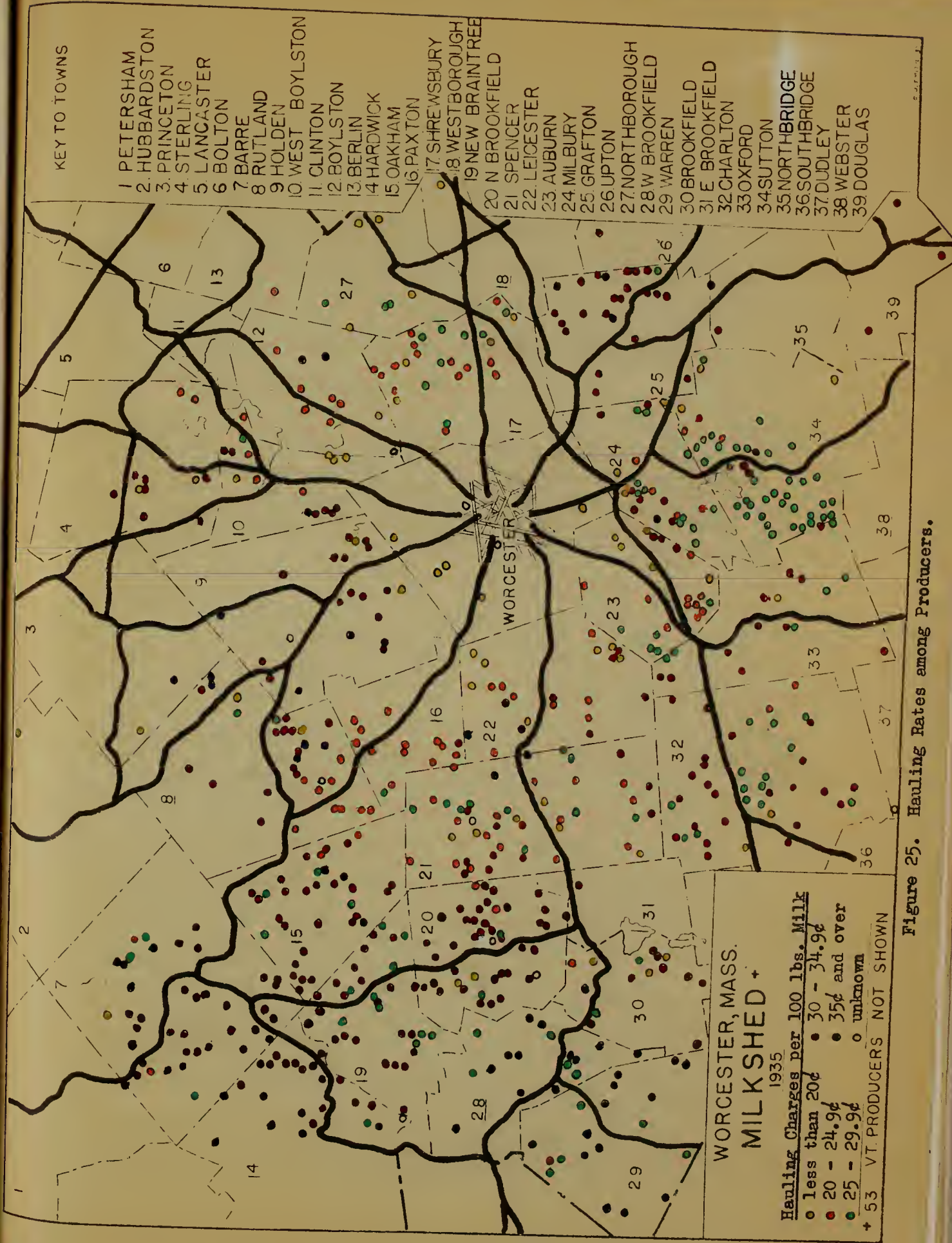


Figure 25. Hauling Rates among Producers.

The freight rate on Vermont milk shipped to Worcester in 1935 was 41.3¢ per hundred pounds. It cost 5¢ per hundred pounds to haul the milk from the railroad depot to the dealer's plant. Country plant charges are estimated at 29¢ per hundred pounds of milk handled.<sup>1</sup>

These rates compared to local hauling rates in the Massachusetts area show that the cost of transporting Vermont milk to Worcester is from 38.8 to 88.7 cents per 100 pounds more than corresponding cost of Massachusetts milk (see Table 27).

Table 27. Comparative Costs of Transporting Vermont and Massachusetts Milk from Farm to Dealers' Plants in Worcester - 1935  
(cents per 100 pounds)

	Massachusetts		Vermont	
	High	Low	High	Low
Hauling rate	46.5	11.6	25.0	10.0
Freight	-	-	41.3	41.3
City haul	-	-	5.0	5.0
Country Plant Cost*	-	-	29.0	29.0
Total	46.5	11.6	100.3	85.3
Less Massachusetts range			-11.6	-46.5
Extra Cost for Vermont milk			88.7	38.8

\*Estimate based on cost for "Class A" plants in Milk Receiving Station Operation in Vermont by O. M. Camburn, Vt. Agr. Exp. Sta., Bulletin 303, Nov. 1929.

This differential does not indicate economy in purchasing Massachusetts milk rather than Vermont milk but is a measure of the comparatively lower cost of production that Vermont producers must have in order to compete in the Worcester market.

#### Summary of Hauling Rates

Basic information relative to hauling rates in 1935 is summarized

1. Camburn, O. M., Milk Receiving Station Operation in Vermont, Vermont Agr. Exp. Sta., Bul. 303, November, 1929.



as follows:

1. Rates in the Massachusetts Area ranged from 11.6 to 46.5¢ per 100 pounds, averaging 28.2.
2. In most parts of the area, wide differences in local rates existed, although the average of rates by 5-mile zones increased only 7.4¢ from Zone 1 (0-5 miles) to Zone 5 (20-25 miles).
3. Buying price plan of dealer affected rates; some Flat Plan dealers charged relatively higher rates than Use and Rating plan dealers.
4. During the year 5.5% of producers had their rate changed, more rates being raised than lowered.
5. Cost of getting milk from Vermont to dealers plants in Worcester ranged from 38.8 to 88.7¢ more than such cost for Massachusetts milk, depending on location of respective producers and type of dealer handling the milk.

#### Price Structure

Net farm prices for milk testing 3.7% butter fat have been used to compare returns for milk among producers in different parts of the milk shed and among different price buying plans. Such a price represents a good basis of comparison from a production cost or comparative return basis. It does not show the absolute net return that a price unadjusted for butter fat would show, but such an absolute price used comparatively obscures the increased cost of producing milk of higher butter fat content.

In 1935, the average differential allowed in Worcester for milk above or below 3.7% butter fat content was 4.1¢ for each one-tenth percent. According to G. F. Dow in a study of producer-distribution costs in three areas in Maine, "the cost of producing milk increased about one-fourth cent per quart for each additional increase of 0.3 in the percentages of the



butter fat test."<sup>1</sup> This amount equals 3.8¢ per one-tenth percent butter fat compared to the average differential of 4.1¢ actually allowed in Worcester in 1935.

The method used in the Maine study of computing increased cost of higher testing milk may be open to criticism, and the estimate given does not account for seasonal variation of such cost. Also, producer-distributor costs in Maine are only roughly comparable to wholesale producer costs in Worcester County, Massachusetts. In spite of these discrepancies, the comparison emphasizes the fact that existent butter fat differentials in the Worcester area are somewhat commensurate with the actual production cost differentials. On this basis, net prices for milk testing 3.7% butter fat have been selected as an equitable basis of comparison.

In many studies of milk prices, the analysis has been confined to prices received for milk delivered at dealers plants. Such studies fall short of revealing actual returns to producers. Recognizing this situation, J. M. Tinley and M. H. Blank in analyzing the East Bay milk market conclude, "If an agency undertakes in the future to collect information on the supply and demand factors for market milk, it would be desirable to use farm prices instead of prices delivered to plants."<sup>2</sup> In this study, schedules of gross prices accompany the net price analysis to make the information complete.

- 
1. Dow, G. F., An Economic Study of Milk Production Costs in Herds of Producer-Distributors in Maine, Maine Agr. Exp. Sta., Bul. 385, Aug. 1936, Page 48.
  2. Tinley, J. M., and Blank, M. H., An Analysis of the East Bay Milk Market, Calif. Agr. Exp. Sta., Bul. 534, June 1932, Page 52.

# Prices Paid in the Market - 1935

The Class I price averaged \$3.281 and the Class II price \$1.522 per 100 pounds in 1935. The gross composite price of 13 Use Plan dealers averaged \$2.991 (see Table 28).

Table 28. Butter Fat Differentials and Gross Prices Paid at Dealers Plants by Worcester Milk Dealers in 1935  
(dollars per 100 pounds)

Month	Class I Price (\$ per cwt.)	Class II Price (\$ per cwt.)	Butter fat Differential	Gross Composite Price 13 Dealers (\$ per cwt.)
Jan.	3.0225	1.68	.0453	2.9043
Feb.	3.0225	1.88	.0507	2.8979
Mar. 1-9	3.0225	1.79	.0489	2.9613
10-31	3.371			
Apr.	3.371	1.85	.0442	3.0871
May	3.371	1.32	.0358	2.8964
June	3.371	1.07	.0289	2.7489
July	3.371	1.22	.0328	2.9679
Aug.	3.371	1.27	.0343	2.9857
Sept.	3.371	1.24	.0334	3.0419
Oct. 1-20	3.371	1.38	.0369	3.1618
21-31	3.25			
Nov.	3.25	1.78	.0426	3.0894
Dec.	3.25	1.79	.0485	3.1040
Average	3.281	1.522	.0410	2.9905

## Distribution of Producers by Price Plans

There were approximately 130 Flat Plan producers, 320 Rating Plan producers, and 240 Use Plan producers in the Worcester milk shed in 1935. In addition, about 40 producers had their plan changed. (see Figure 26) The map shows that most Flat Plan producers are located northeast of and relatively nearby the market. Use Plan producers predominate southwest of the city. West of the city there are about equal numbers of Use and Rating plan producers in the second and third zones. Beyond Zone 3, or 15 miles and more from market, Rating Plan producers predominate.

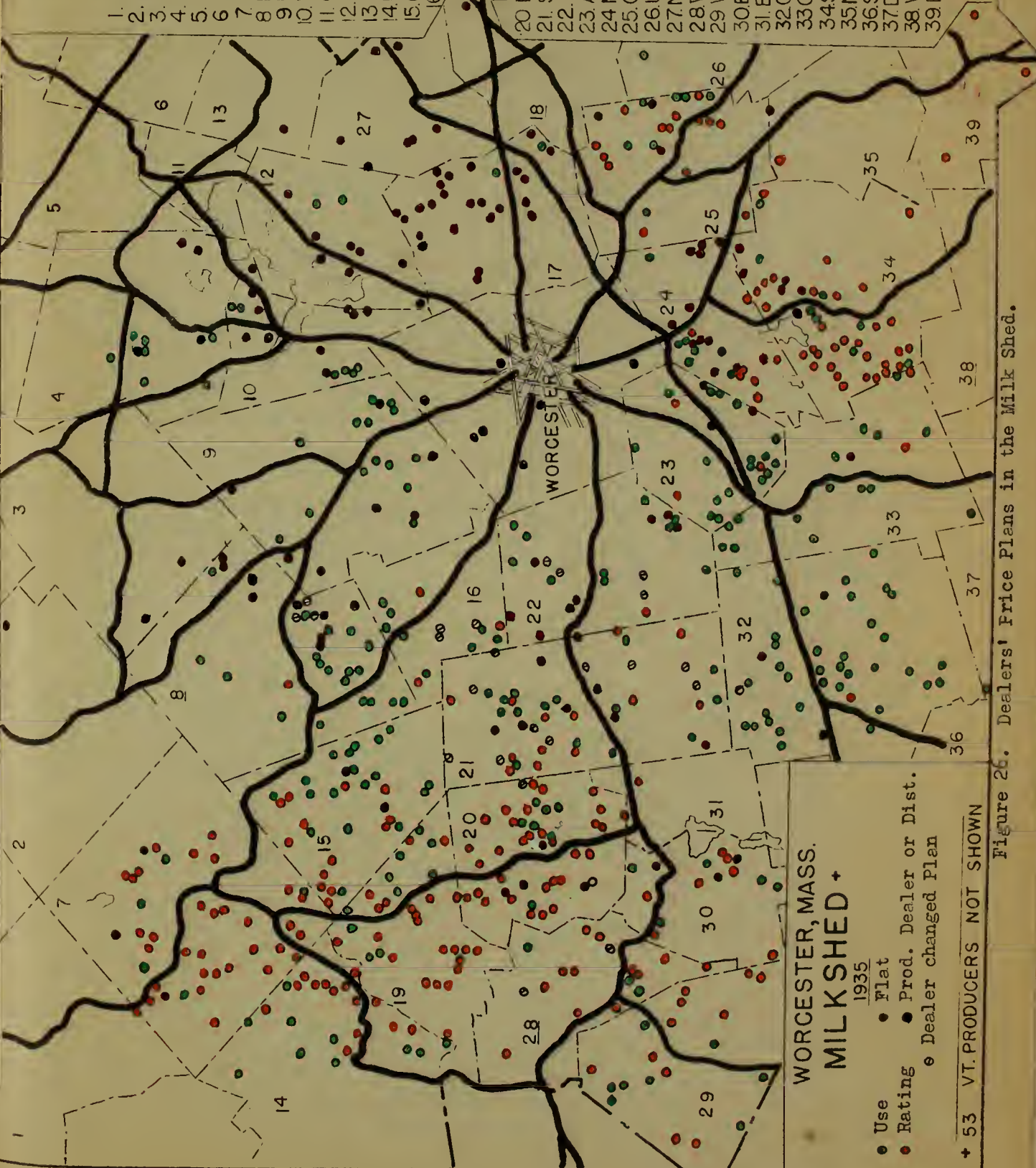
## Comparative Prices Received among Zones

Net farm prices for 329 producers (54.2% of all full year producers)



KEY TO TOWNS

1. PETERSHAM
2. HUBBARDSTON
3. PRINCETON
4. STERLING
5. LANCASTER
6. BOLTON
7. BARRE
8. RUTLAND
9. HOLDEN
10. WEST BOYLSTON
11. CLINTON
12. BOYLSTON
13. BERLIN
14. HARDWICK
15. OAKHAM
16. PAXTON
17. SHREWSBURY
18. WESTBOROUGH
19. NEW BRAintree
20. N. BROOKFIELD
21. SPENCER
22. LEICESTER
23. AUBURN
24. MILBURY
25. GRAFTON
26. UPTON
27. NORTHBOROUGH
28. W. BROOKFIELD
29. WARREN
30. BROOKFIELD
31. E. BROOKFIELD
32. CHARLTON
33. OXFORD
34. SUTTON
35. NORTHERIDGE
36. SOUTHBRIDGE
37. DUDLEY
38. WEBSTER
39. DOUGLAS



WORCESTER, MASS.  
MILKSHED +  
1935

- Use
- Rating
- Flat
- Prod. Dealer or Dist.
- Dealer changed Plan

+ 53 VT. PRODUCERS NOT SHOWN

Figure 26. Dealers' Price Plans in the Milk Shed.

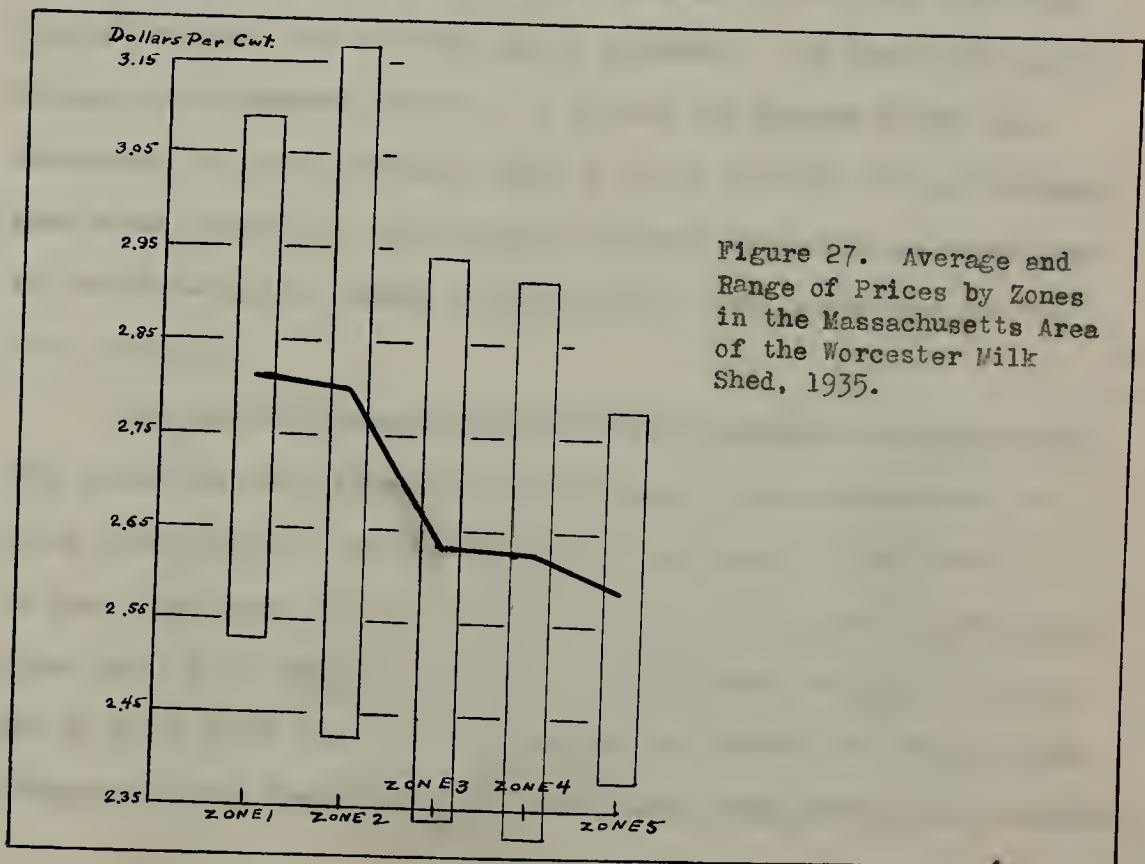


were available. The group is composed of 28 Flat Plan, 134 Rating Plan, and 167 Use Plan producers. The average group price decreased from 2.815 in Zone 1 to 2.581 in Zone 5 in 1935. This is a decrease of 23.4¢ per 100 pounds in 25 miles but does not occur regularly. Over half the total decrease (16.3¢) occurs from Zone 2 to Zone 3 (see Table 29).

Table 29. Average Net Prices for Milk Received by Use, Rating, and Flat Plan Producers in the Massachusetts Area of the Worcester Milk Shed by 5-Mile Zones - 1935

Price Plan	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
	(dollars per 100 pounds of 3.7% milk)					
Flat	-	2.993	-	-	-	2.993
Rating	2.813	2.757	2.679	2.632	2.610	2.667
Use	2.816	2.725	2.621	2.591	2.559	2.657
Weighted Average	2.815	2.801	2.638	2.623	2.581	2.687
Rating above Use	-	-	-	-	-	-
Use	-.003	.032	.058	.041	.059	.010

The price range within individual zones varied from 75¢ in Zone 2 to 40¢ in Zone 5. (see Figure 27).

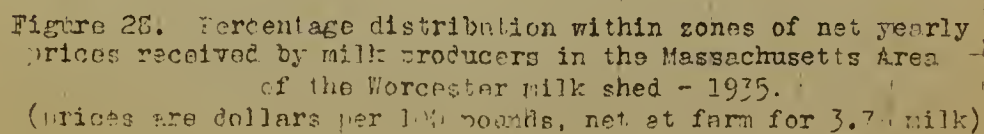
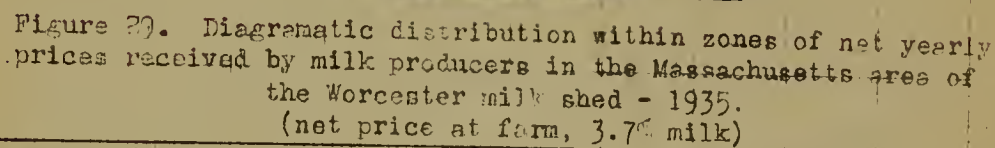


As shown in Figure 28, Zone 2 was the only zone in the market where the entire market-wide range of prices existed. Figure 29 reveals a rather uniform percentage distribution of prices, the modal group successively falling in a lower price class from zone to zone.

#### Comparative Prices Received Among Price Plans

Flat plan producers received an average price in 1935 of \$2.993 per hundred weight of milk compared to \$2.667 for Rating plan producers and \$2.657 for Use plan producers. Market-wide comparisons, however, are misleading as they do not consider zone distribution of producers among price plans. Such a comparison (see Table 29) reveals that Flat plan producers receive approximately 25¢ per hundred weight more than either Use or Rating plan producers and that Rating plan producers receive 3 to 6¢ more than Use plan producers. All Flat plan producers included in this analysis are located in Zone 2; thus such producers can be compared only to other Zone 2 producers. The reason why most Rating plan producers receive 3 to 6¢ more per hundred weight than comparable Use plan producers seems to be in the fact that as distance from market increases, proportions of Rating plan producers continuing in the higher price classes is greater than such proportions for Use plan producers.

Percentage frequency distributions of producers by zones reveal that among Use plan producers the modal group falls successively in a lower price class as the zone increases (see Figure 30 and Table 30). In Zone 2 the modal group is in the \$2.70 to \$2.79 class, in Zone 3 the modal group falls back to the \$2.60 to \$2.69 class, in Zone 4 it is in the \$2.50 to \$2.59 class and in Zone 5 it has reached the lowest classification, (less than \$2.50). In comparison, among Rating plan producers,





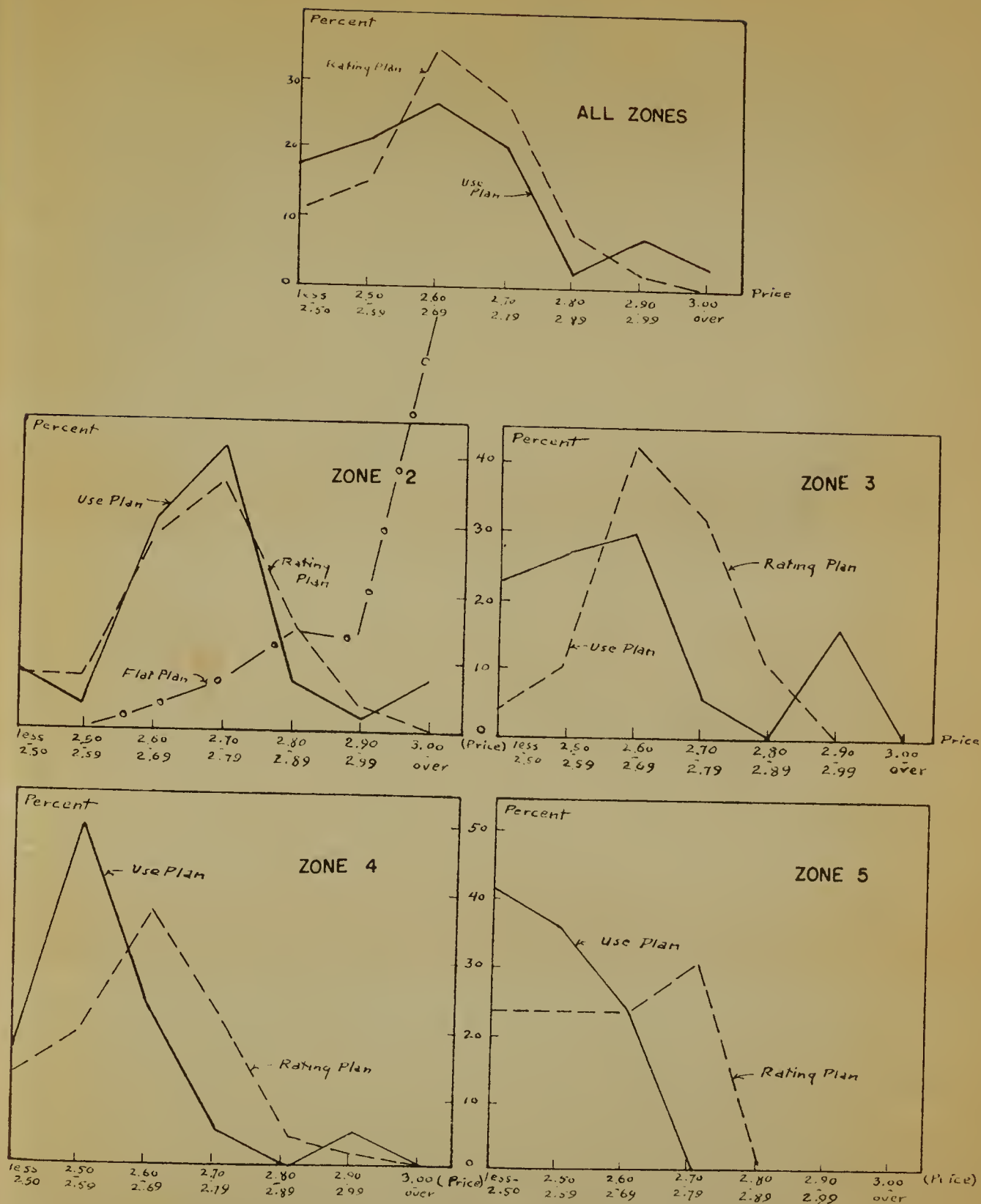


FIGURE 30. PERCENTAGE DISTRIBUTION WITHIN ZONES OF NET PRICES RECEIVED BY PRODUCERS BY PRICE PLANS, WORCESTER MARKET, 1935 (DOLLARS PER 100 POUND 3.7% MILK)

Table 30. Distribution of Producers by Number and Percentage of Net Prices Received by All Producers by Zones in the Worcester Market - 1935  
(price classes are dollars per 100 pounds, 3.7% milk)

Zone	1	2	3	4	5	Total
Price Class	Producers					
2.50-less	-	7	16	2	10	35
2.50-2.59	-	4	21	22	9	56
2.60-2.69	1	25	32	28	7	93
2.70-2.79	7	34	13	16	4	74
2.80-2.89	1	12	3	3	-	19
2.90-2.99	1	6	11	2	-	20
3.00-over	1	21	-	-	-	22
Zone totals	11	109	96	73	30	319
% of Total Market	3.4	34.2	30.1	22.9	9.4	100.0
Price Class	Percentage					
2.50-less	0.0	6.4	16.7	2.7	33.4	11.0
2.50-2.59	0.0	3.7	21.9	30.1	30.0	17.6
2.60-2.69	9.0	22.9	33.3	38.5	23.3	29.1
2.70-2.79	64.0	31.2	13.5	21.9	13.3	23.2
2.80-2.89	9.0	11.0	3.1	4.1	0.0	6.0
2.90-3.00	9.0	5.5	11.5	2.7	0.0	6.3
3.00-over	9.0	19.3	0.0	0.0	0.0	6.8
Zone totals	100.0	100.0	100.0	100.0	100.0	100.0

the modal percentage in Zones 2 and 3 is respectively the same as for Use plan producers, but in Zone 4 it remains as in Zone 3 (\$2.60 - \$2.69 class), and in Zone 5 advances to the next higher (\$2.70 - \$2.79) class.

Due to the inherent nature of the Rating plan, net prices among its producers should exhibit a wider range than corresponding Use plan prices. Both reflect surplus, but Rating plan producers' surplus is not entirely determined by percentage of the dealers Class I sales. This is borne out in Zones 4 and 5 in Figure 30 where the distribution of producers along the entire area price range is much more even for Rating than for Use plan producers. This analysis shows that farther than 15 miles from the market, price decrease due to increased distance is comparatively slight.

Figure 31 shows net prices among producers plotted on the base map with symbols indicating price plans.

#### Relationship between Net Price and Hauling Rates and Dealers' Surplus

From Zone 1 to Zone 5, the average hauling rate increases 7.4¢ per 100 pounds while the average net price received decreased 23.4¢. Only 31.6¢ of price decrease as distance from market increases is caused by increased hauling charges. Further analysis shows that surplus of dealers buying from producers living farthest from market is greater than surplus of dealers buying nearby milk. Among Use Plan producers, this situation accounts for 10.0¢ (38.9%) of the 25.7¢ price decrease from Zone 1 to Zone 5. The condition is less marked among Rating Plan producers, 4.4¢ (21.7%) of the 20.3¢ decrease from Zone 1 to Zone 5 being thus caused (see Table 31).

Table 31. Successive Zone to Zone Changes in Net Producer Prices, Hauling Rates, and Percentage of Class I Milk in the Massachusetts Area of the Worcester Milk Shed, 1935.  
(prices are dollars per 100 pounds 3.7% milk)

Zone	Successive Zone		Successive Zone		Percent		Successive Zone	
	Net Price Decrease	Rating	Increase in	Hauling Rates	Class I Milk	by Zones	Decrease	Due to Surplus
		Use			Rating	Use	Rating	Use
1	-	-	-	-	90.4	87.5	-	-
2	.056	.091	.028		88.4	85.5	.035	.030
3	.078	.104	.019		86.9	82.4	.026	.055
4	.047	.031	.009		87.5	82.0	-.010	.007
5	.012	.032	.018		87.9	81.5	-.007	.008
Total	.203	.257	.074				.044	.100

Only 50 to 60% of price decrease due to distance from market is thus far explained. Variation in butter fat content and decrease due to greater surplus have been accounted for, and price schedules for the period in question were administratively determined. Probably the additional decrease is due to the wide price ranges within zones that produce both the price and hauling rate average, and the small size of the price sample.



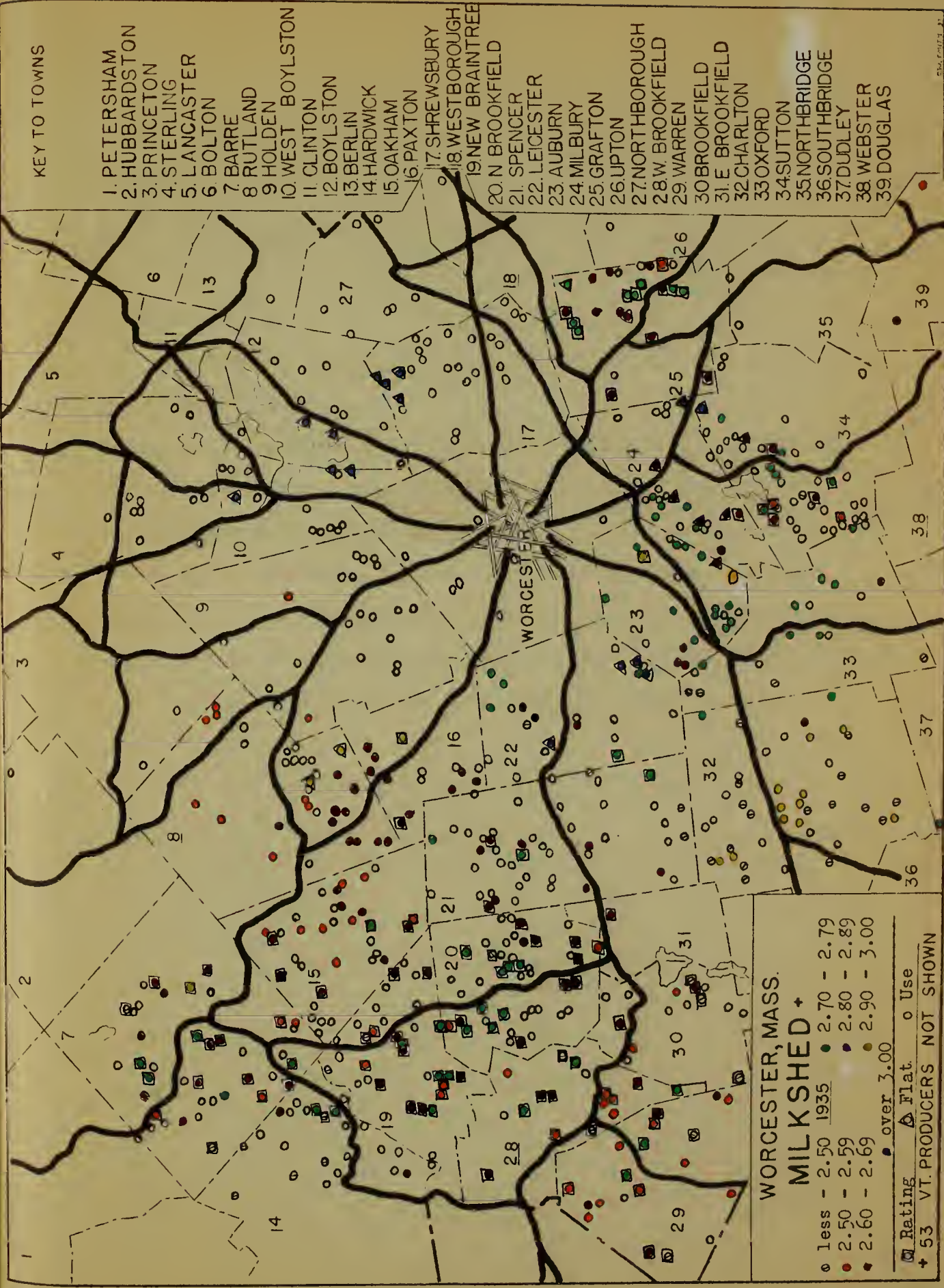


Figure 31. Net Prices Received at the Farm for 3.7% Milk. (Dollars per 100 pounds)

### Summary of Price Structure

1. Worcester dealers paid a gross composite price for milk of about \$2.99 per 100 pounds of 3.7% milk in 1935. Net price to producers was about \$2.69. Producers received 90% of the gross price.
2. Prices to Flat plan producers were about 25¢ higher than prices to other producers.
3. Prices to Rating plan producers were 3 to 6¢ higher than prices to Use plan producers.
4. Net prices averaged to decrease 23.4¢ from Zone 1 to Zone 5 (from 5 miles to 25 miles), the decrease being about 5¢ greater for Use than for Rating plan producers.
5. A considerable range of prices existed in each zone, being highest in Zone 2 (75¢) and lowest in Zone 5 (40¢). Zone 2 was the only area where the entire market-wide range of prices existed.
6. Distance from market is somewhat less important beyond 15 miles.
7. Only 31% of the decrease in net prices due to distance is accounted for by increased hauling rates.



Summary

In 1935, 92% of Worcester's milk was produced in Massachusetts compared to 80% in 1932. Nearly all cream purchased as such was of out-of-state origin, 30 to 60% coming from the Middle West.

Worcester is geographically a rather simple market, being surrounded by small secondary markets on the north, east and south, and its milk shed slightly overlaps the Springfield milk shed on the west side. Vermont milk competitively is a potential source of supply but constituted only a small percentage in 1935. Worcester is the only sizeable market in which most milk produced in the milk shed can economically compete.

In 1935, 77 milk distributors, 23 of which were producer-dealers, operated in Worcester. Average daily sales for 54 regular dealers were 2755 pounds compared to 504 pounds for producer-dealers. The largest dealer handled over 13,000 pounds of milk daily; the 10 largest dealers handled 52% of the entire market. Sales of intermediate dealers constituted only 2.5% of all sales.

Classified according to price buying plans, 22 Flat plan dealers handled 13.1% of the market, 23 Use plan dealers handled 35.0%, 11 Rating plan dealers handled 44.7% and 23 producer dealers handled the remaining 7.2% of the entire market.

Total purchases of milk by dealers varied 22% from June to November, while fluid sales exhibited no very marked fluctuations. Use plan dealers carried slightly higher surplus (16.7%) than Rating plan dealers (11.6%) though the analysis did not include enough dealers to be really conclusive. Comparison of dealers within the group revealed considerable lack of uniformity as to high and low surplus months. Many times the division of surplus among dealers in a particular month was extremely unequitable.



A comparison of 1935 with 1936 showed that seasonal surplus for most dealers followed the same general trend in both years.

All Massachusetts milk for Worcester is trucked to market. Most smaller dealers perform this service themselves, but larger dealers contract with some of their producers to do the hauling.

The New England Milk Producers Association with its membership comprising 55.9% of all Worcester milk producers in Massachusetts in 1935 is the principal cooperative association in the market. It is a bargaining agency with a sales committee that meets with dealers to determine prices. This activity has been minimized since the Commonwealth has had governmental control.

The Massachusetts Milk Control Board through its administrative unit, Area 8, (The Worcester Area) has established producer prices since September 1934, and "recognizes" schedules of retail prices. From its advent until June 2, 1937, the Board had conducted hearings on 29 separate cases of violation of its provisions.

In Zone 2 (10 to 15 miles) are located 35% of all producers in the Massachusetts area of the milk shed. These producers produce 32% of total milk. Ninety percent of the milk comes from the first four zones or from within a 20 mile radius from the center of the city. By quarters 42% of producers producing 49% of total milk are located northwest of the city compared to 9% of producers and 7% of production from northeast of the city. In 1935, 80% of total milk from Massachusetts was produced west of the city compared to 70% being thus produced in 1932.

Producers averaged to deliver 233 pounds of milk daily in 1935. The range was such that 25% of the producers produced 50% of all the milk. By zones, average daily production per farm steadily increases

from an average of 181 pounds in Zone 1 to 299 pounds in Zone 5. By quarters average daily production per farm varied from 183 pounds northeast of the city to 278 pounds northwest of the city.

Approximately 10% of producers are part year producers; that is, they will not be in the market 12 months hence. The dynamic nature of the milk shed is indicated by the fact that in 1935 producers dropped out at the rate of 1.3% per month, and new producers were added at the rate of 1.1% per month. Daily deliveries per farm were about 37% less for part year producers than for full year producers. Proportionately they were more numerous northeast of the city than elsewhere, constituting 40 - 50% of all producers there compared to about 8% northwest of the city.

In the northeast quarter of the milk shed live only 9% of all producers. They are predominately of the Flat plan type and their daily production per farm is about 35% less than for farms west of the city. Proportionately, the area has 3 to 5 times as many part year producers as other areas.

In 1935, 2.6% of all producers changed from one dealer to another.

Using November-June ratios as a measure of seasonality of production, November production averages about 80% of June production. This compares favorably with the 22% seasonal variation in total purchases of milk by dealers.

Hauling rates in the Massachusetts area of the milk shed varied from 11.6 to 46.5¢ per 100 pounds of milk, averaging 28.2¢. Wide variations in most every locality exist, the entire market wide range of rates being in evidence in all zones except Zone 1. Such variations minimize the importance of the average increases from zone to zone which total only 7.4¢ from the inside to the outside of the milk shed.

Cost of getting Vermont milk from farm to dealers plant varied from 38.8 to 88.7¢ more per 100 pounds of milk than comparable costs for local milk.

During 1935, 5.5% of all producers had their hauling rate changed, more rates being raised than lowered.

Net prices received at the farm for 3.7% milk averaged about \$2.69 per 100 pounds compared to average gross composite prices of \$2.99. Producers received 90% of the gross price.

Prices to Flat plan producers were about 25¢ higher than prices to other producers. Rating plan producers received prices 3 to 6¢ higher than did Use plan producers.

Net prices decreased 23.4¢ from the 5 mile to the 25 mile zone, the decrease being about 5¢ greater for the Use than for the Rating plan producers. This is to be compared to an increase in hauling rates in the same distance of 7.4¢. Increased hauling rates constitute only 31% of total net price decrease from zone to zone. For Use plan producers, increased amounts of surplus milk from the more distant producers accounts for 38% more of the price decrease. The remainder is apparently due to the wide range of both net prices and hauling rates in each area.

The range of net prices paid for milk varied from 75¢ (Zone 2) to 40¢ (Zone 3). The entire market-wide range of prices existed in only Zone 2 and that of hauling rates in all but Zone 1.



### Summary Discussion

From time to time both public and private agencies have set themselves to the task of gathering, recording, and analyzing market information with the result that the marketing of many products is now aided by statistical barometers. Such research is continually appraising and testing existing market guides in efforts to improve them or develop better ones.

The business of developing helpful indicators in milk markets is still in its infancy. Lack of comprehensive understanding of limitations attached to milk distribution greatly hampers satisfactory solution of current problems. The perishability of fluid milk and its many alternative uses, make the development of useful barometers for its markets a delicate and difficult task, though such peculiarities emphasize the great necessity for correct market indicators if order is to ensue.

Though milk is a universally marketed product, circumstances attending its distribution vary widely, necessitating extensive knowledge of local conditions for proper buyer and seller negotiations. As in the case of most products, the trade is aided in the conduct of its business when it knows the extent of and variations existent in the supply area, channels of distribution, marketing area, volume of product purchased, and consumer preference.

This study analyzes market information for only one 12 month period, 1935; thus it cannot hope to shed light on many conditions entailing observation for a longer period. In its limited scope, it has attempted detailed analysis, hoping that the foundation has been laid for the following market indicators:

#### Size of the Market

The Bureau of Agricultural Economics, Division of Markets, reports

receipts of fluid milk for only New York, Boston, Chicago, and Philadelphia. The size of other milk markets can be determined only by separate investigation. This study is not the first attempt to measure the volume of fluid milk sold in Worcester, as Doctor A. H. Lindsey in "Secondary Milk Markets in Massachusetts" measured sizes of various markets using dealers' estimates of daily sales on file with city milk inspectors.<sup>1</sup> The measure used in this thesis is more dependable as it totals actual purchases as reported by all dealers for one month and on the basis of information for a very large proportion of the entire market reveals seasonal variation in total supply and Class I sales. Thus this analysis is probably the first comprehensive measure of market surplus.

#### Significance of Per Capita Cream Consumption

As previously indicated, accurate daily per capita consumption of milk and cream is impossible to determine because the exact number of persons served by dealers in the Worcester Market is unknown. Using population figures for the city (190,471) per capita purchases of fluid milk from dealers was .81 pounds and total dealer purchases of out-of-state cream equaled .60 pounds milk equivalent daily per capita in 1935. Probably these rates reduced 10 to 20% represent approximate rates of consumption. It seems important to note that cream purchases from without the regular fluid milk shed represent the production of nearly 80% as much milk as milk for fluid consumption. This reveals the competitive position of Worcester County in the dairy industry when it is realized that Worcester dealers handle only about 15% of surplus milk.

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1. Lindsey, A. H., Sources of Milk Supply in Twenty-Nine Secondary Markets in Massachusetts, Mass. Agr. Exp. Sta., mimeographed report, Amherst, March 1934.

Nearby land competes for the fluid milk trade as long as surplus remains low while much more distant areas are able to compete for the cream trade.

#### Dealers

Though the size and respective importance of particular dealers has in a general way always been known to people engaged in milk distribution in Worcester, this study furnishes a factual basis for such general knowledge and corrects any misconceptions that may have existed through lack of information. In many milk markets more than 50% of fluid sales are handled by a very small proportion of dealers. Though perhaps not controlling enough of the market to actually be monopolistic, the dominating position of small groups of dealers has been an important factor to deal with in those markets. Observation of division of sales among dealers in a large number of markets will probably reveal a close correlation between such division and regulatory methods being used to maintain orderly marketing.

In Worcester the ten largest dealers constituting 12.7% of all dealers must be included to account for 50% of market sales (Table 3, page 23). Whether or not such division provides for enough "give and take" to prevent domination from any point probably cannot be statistically determined. It is a matter of record, however, that the Worcester market, a rather simple market geographically as shown in this study, has experienced fewer marketing problems in recent years than the Springfield market where the geographical sales area and division of sales among dealers is entirely different. Such knowledge in itself solves no problem but does emphasize the need of knowing the conditions peculiar to particular markets.



### Surplus Milk

Satisfactory regulation of surplus milk has probably been the most difficult problem in many milk markets. Investigations of the Federal Trade Commission indicate that some dealers have been able to conceal many phases of their surplus operations from public scrutiny. Until full details of such operations can be learned, solution of the surplus problem is impossible. Against this light the surplus picture for Worcester is especially valuable. Data on file in the office of the Milk Control Board indicate Class I and surplus milk sales' information from which composite producer prices are computed. On this basis, surplus in 1935 averaged only 10 to 20% compared to 40-60% surpluses in such markets as Boston and New York. Milk marketing is possible on a low surplus margin.

The presence of two cream dealers in the city which in effect are clearing houses for most of the surplus of regular dealers may explain the ability of Worcester to operate with but little surplus. These dealers are also the agencies handling most of the cream of out-of-state origin. Such specialization of products handled probably helps prevent market complications.

This study attempts a new technique in analysis of surplus milk. Average surplus carried in the market fails to indicate extremes and variations that may exist. For that reason a sample of ten dealers of similar type was selected for individual analysis (see Figure 13, page 41). This analysis made by two week periods for 1936 shows that though average surplus is never very high, some dealers' surplus approaches 40 to 50% in peak months while that of others remains low, though average surplus is never very high. From month to month, considerable shift of the existent

surplus from one dealer to another takes place. In times of market difficulty, high surplus at particular points is usually a contributing factor. Individual dealer analysis reveals these points of stress.

Where market-wide pools operate, this uneven distribution of surplus is obviously eliminated. In markets not subscribing to a pool, this type of surplus analysis reveals the need or lack of need of some form of sales equalization.

### Conclusion

Though this study did not set out to go all the way in establishing adequate indicators to guide producers and distributors in marketing milk in Worcester, it has attempted to set forth many of the economic variations on which dependable barometers might be based. Economic analysis of many milk markets in this country have been prompted by the existence of current difficulties. Such studies have been primarily interested in finding answers to the problems in question; thus contributions to the fundamentals of milk marketing have been incidental. As an example, the analysis of the East Bay market<sup>1</sup> resulted in a recommended schedule of information that should currently be kept up to date to form the basis for intelligent marketing in that area.

This study attempts an over-all appraisal of the Worcester market during a period of normal operation. Further analysis from the base thus established should enable the milk trade to more intelligently solve difficulties as they occur.

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1. Tinley, J. M., and Blank, Martin H., An Analysis of the East Bay Milk Market, Agr. Exp. Sta., Univ. of Calif., Bul. 534, Berkeley, June, 1932.

As a personal footnote, the author wishes to emphasize that this study has been made possible in its present form only through access to rather complete files of information possessed by the Massachusetts Milk Control Board. Though this filing is only a by-product of the Board's major functions, such activity is infinitely valuable in itself as an aid to understand market fundamentals. From the recent pioneering efforts of state governments in the field of milk regulation may emerge a realization of a need for more complete statistics than are currently assembled.



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