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THE UNIVERSITY OF MINNESOTA

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Report

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The undersigned, acting as a Committee of the Graduate School, have read the accompanying thesis submitted by **Ralph E. Curtis** for the degree of **Master of Arts**. They approve it as a thesis meeting the requirements of the Graduate School of the University of Minnesota, and recommend that it be accepted in partial fulfillment of the requirements for the degree of **Master of Arts**.

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METHODS USED IN DETERMINING NECESSARY PRICE  
FOR MARKET MILK IN THE UNITED STATES,  
WITH SPECIAL REFERENCE TO THE TWIN CITY MARKET

A THESIS

Presented to the Faculty of the Graduate  
School of the University of Minnesota in  
Partial Fulfillment of the Requirements

For the Degree of

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By

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Chapter I  
INTRODUCTION

The purpose of this thesis is to present the different methods that are being used for determining a "fair" or "necessary" price for city market milk, and then discuss their suitability to the Twin City milk market. Many different systems for determining market milk prices are in use at present in the various cities of the United States. Scarcely two cities are following exactly the same plan. The reasons for this are, first, that the whole problem is still in the experimental stage, practically nothing being standardized as yet, and, second, that conditions vary enough in different cities so that it is doubtful if ever there can be complete uniformity of method. The analysis which follows will try to indicate wherein the differences in method are due to the first cause, and wherein they are due to the second.

While the problem of a price basis for market milk is in itself worth a great deal of study, it is still more significant when it is looked upon as part of the whole price problem. Very practical considerations have forced us to study milk prices; but the results of these studies may throw light into some of the dark places in the general price problem.

The circumstances that have made the price question so important in the case of milk are generally understood. The ordinary type of "free competition" can take place only when a considerable number of buyers are competing with each other on one side of the market, and a considerable number of sellers on the other side of the market. The sellers in the case of milk are very numerous; the



buyers a relatively small number of distributors. More than this, these few distributors early began to organize, or at least to enter into open or tacit agreements as to what would constitute reasonable prices to pay the producers. The producers organized to meet this condition. The result is that we no longer have competition, but instead a system of bargaining between representatives of the distributors. This form of bargaining we have learned to call "collective", following the practice of labor unions.

When competition is free, a market price can almost always be reached at some price. Among the large number of individuals in the market, some are sure to be found who will buy or sell at some price within the reach of somebody else. The deals that are made establish the market price. With collective bargaining, the process is entirely different. The buyers and sellers each make one offer at a time, and if the offers do not meet, and neither will change his offer, no deal can be made. When this situation develops, the two parties each begin to look about for arguments or bases upon which to support their positions. The two bases will likely be different. The real issue finally becomes, Which is the proper basis for determining a fair price? or in the use of labor, a fair wage? Presently the whole industry is engaged in a serious controversy over price or wage bases. This is about where the market milk business is today. Collective bargaining practically requires that the representatives of the bargaining groups shall agree upon some bases of arriving at a price.

Two terms are commonly used for describing the price sought in such cases. The popular term is "fair price." The more accurate term is "necessary" price". Necessary price is the price necessary

to call forth the supply that the buyers will take at that price. It really is the price which, over a period of time, equilibrates supply and demand. If the price were lower, more milk would be wanted, but less supplied. If the price were higher, more would be supplied, but less taken. It may seem foolish to a conventional economist to call such a price "necessary price." Why not call it market price? The answer is that it really is not market price, in the ordinary sense of the word. Milk may sell on the actual market for days at a time, or even months, at more or less than "necessary price." The producer takes what he can get for the time being, and this is "market price"; but it may be far from enough to keep him producing indefinitely, or it may be so much that eventually he will produce too much. Necessary price for a given day of course can mean little else than the market price on that day.

The term necessary price, however, usually has a further connotation. It is a forecasted price, a price estimated in advance as just sufficient to equilibrate supply and demand. The term is therefore used only in connection with period contracts.

The term "fair price" carries with it the idea of justice to the producer and justice to the consumer. There is no principle of justice involved in necessary price. The only principle involved is that producers cannot be expected to keep on producing milk when they can do better producing something else. And likewise consumers cannot be expected to keep on buying milk when they can buy other things to better advantage. There is even no principle of justice involved when a producer has to suffer losses from

scrapping equipment used in producing what consumers no longer want. Only in case he suffers loss because other parties illegally conspire against him, is any injustice done. Or in case he gets the worst of it in a bargain, say with the distributors, in which he is relatively weak in bargaining power.

The development of the theme in this thesis will be as follows: First, the factors influencing necessary price will be described. Second, the numerous bases for determining milk prices now used in various cities will be explained. Next, the special circumstances existing in the Twin City market will be presented. Finally, the various methods of determining milk prices will be applied to Twin City conditions and their fitness determined.

## Chapter II

### FACTORS TO BE CONSIDERED IN DETERMINING NECESSARY PRICE FOR MARKET MILK

This chapter lists and explains the conditions or circumstances that must be considered in determining necessary price for market milk. Some of these circumstances are general in their nature and must be taken into account in all milk-producing areas. Others are important only in a few places. These circumstances may be grouped under three heads. First, those connected with "normal price," second, those connected with "market price", and third, those having especially to do with the mechanism of price determination. The terms "normal price" and "market price" are used in this discussion in the sense that has generally been accepted by economists during the last decade. The "normal price" considerations presented are those which are relatively stable. If no other influences intervened than these, we would soon have a stable price for milk, that is, one that would remain at the same level except for the "normal" seasonal range. The "market price" considerations are those which are unstable and undependable, such as seasons, crop-yields, economic crises, changing price levels, foreign competition. The third group of circumstances are those immediately connected with the process of price making, such as the organization of producers, distributors and consumers, public control, etc.

#### Considerations Relating to Normal Price

These considerations might also be grouped under three

heads, relating respectively to production, distribution and consumption. Those relating to production will be discussed first.

1. Natural resources of the producing area. Obviously the price which is paid for market milk must depend to a large extent upon the fertility of the soil, the climate, and the adaptability of the land to the production of milk. For this reason, whole milk always sells at a higher price in the Atlantic and Southern States than it does in the North Central States.

The natural resources of territory just outside that which is immediately tributary to large cities is often of more significance than the resources of the tributary area; for if the outside area has more abundant natural resources, it will come into competition whenever market milk prices climb a few cents above normal, and if the outside territory is poor, then market milk prices may rise to high levels before competition from outside calls a halt. The natural dairy regions of southern Wisconsin have thus always proved a check on market milk prices in Chicago; similarly the province of Ontario in Canada has checked New York City milk prices.<sup>1</sup>

2. Location and distance from the city. The larger the territory from which the milk supply must come, the higher the price will tend to be. The extra transportation cost is sometimes obscured by the fact that railroad lines give uniform rates over the whole producing area. In such cases, however, the rate charged is based on the average cost of haul, and the longer the average haul, the higher the average cost.

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<sup>1</sup>. See Appendix A.

3. Competition of dairying with other farm enterprises.

Milk prices will have to be high enough so that it will pay the farmers as well to use their time, energy, and capital for producing milk as for producing wheat, pork, sugar beets, or whatever other products or combination of products is in competition with milk. The higher the prices for competing products, the higher will have to be the price of milk. If a food shortage should develop in the world, it is likely that the prices of wheat and potatoes would rise, and as a result milk prices would have to rise in regions where wheat and potatoes are produced for market. Similarly, the better adapted a region is for enterprises other than dairying, the higher the price of milk will need to be to compete with them. This is why market milk prices are higher in the Corn Belt than in dairy regions of southern Wisconsin and Minnesota.

The question is not ordinarily, however, the simple one of the competition of dairying with single other farm enterprises. Dairying itself is ordinarily a group of enterprises. The real competition is between several possible combinations of farm enterprises, each with a different amount of dairying in them. At a given set of prices for milk, wheat, pork and other products, one of these combinations of enterprises pays better than the others. If this combination does not supply as much milk as the consumers will take at this price, then the price of milk must rise enough to make a different combination of enterprises, one with more cows in it, the most profitable.

The particular set of enterprises forming the given combination which is most profitable is the one which sets the values

upon the land, the labor, the management, and the capital goods which are used in this combination. The land gets its value from the net income resulting from this combination of enterprises; likewise the labor and management of the farmer; likewise the milk cows that are used in the combination. The labor and management, of course, and usually the cows too, have the advantage that they can move or be moved. They may therefore not have their value set, in the long run, by this particular combination, but by the most profitable combination anywhere within reach for which they are available.

If one will add up the values, so determined, of the particular amounts of land, labor, capital, etc., that enter into the production of a hundredweight of milk, this sum of values will constitute what is called the "cost of production" of milk. The value of the land so used, or the "rent charge", represents what that amount of land is worth used in its most profitable combination. If the number of cows were increased beyond this, the land or some other factor would receive a smaller net return. It will be apparent from the foregoing that the value of land or any other factor in its most profitable combination is a cost that must be met if this factor is to be available for producing milk. What a so-called "cost of production" tells us is that if this much milk is produced we must receive so much per hundred for it or we shall have sold our land, labor, capital and management for less than their value. If the price of milk does not equal the sum of values of the contributing factors so determined, the farmer must conclude that he has too much milk in his combination.

The enterprises with which the dairy enterprises compete in the various combinations are therefore of great significance in determining what must be paid for milk. A very fertile region may therefore produce milk at high cost because, except at high prices, the land may be very profitably used with little or no milk in the combination; and on the other hand, a poor region may produce milk cheaply because a large number of cows makes the most profitable combination even at a low price for milk. Thus in several sandy soil counties in Minnesota, e.g., Anoka, Benton, Todd and Wadena, the percentages of income from dairying, according to the 1910 census, were relatively very high.<sup>2</sup>

Competition with other enterprises is likely to be most important in regions where most of the milk that is produced is for the whole milk market, as in the South, and in many places in the East.

4. The quality of the farming. The more skillful the farmers, the better organized the farm businesses, the larger the incomes farmers are likely to earn. Some of the results from this skill and organization, however, are sure eventually, because of competition between producers, to appear in relatively lower prices for farm products. Thus market milk prices may be lower in areas with good dairy farmers than in areas with poor dairy farmers.

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(2) Benton 21.2%; Anoka 22.5%; Wadena 30.5%; Todd 23.8%. Only 10 counties were higher, and these are largely in the cut-over region.



5. The standard of living of the producers. The standard of living of farmers has a greater influence on necessary prices of their products than for any other class of producers, for the reason that the family life of farmers is closely associated with the farm business. Families with a low standard of living deny themselves more and work harder than is normal for a given return and hence help put a large supply of products on the market at a price lower than normal. There are whole communities, usually of people of foreign stock, where exactly this thing is happening. It is especially easy to do this with dairying because of the large part which family help pays in dairy work. The labor of boys and girls in doing chores and milking night and morning before and after school can have no great price because it has few alternative uses; nevertheless the family that builds up a dairy business on the basis of the cheap labor of a large family can be described only as having<sup>a</sup> relatively low standard of living in one important particular. The price established in any area must take cognizance of the level of consumption of ~~consumption~~ and of work which prevails in that area. If it assumes a higher level than exists, an over-supply of milk will follow.

6. Seasonality in milk production. Different combinations of farm enterprises have different distributions of the load of labor throughout the summer. Dairying therefore fits into some combinations better than others. Climate may compel the farmers in a certain region to work with a combination of enterprises that makes winter dairying impracticable because of conflict of labor needs. Again, certain regions are best suited to crops that can be economically used only for summer feed. This is especially true of

the strictly grazing regions, where the land is too rough or too arid for cultivation. The Corn Belt represents a combination not conducive to winter dairying; the wheat regions represent another. Thus, all in all, a large part of the United States is sure to have a larger milk supply in summer than in winter. To provide a sufficient supply for winter months therefore means seriously modifying the natural combinations of enterprises. If farmers are to produce milk the year round, they must receive enough extra price for their product to recompense them for their losses from other enterprises. In other words, the combination of enterprises providing for year-round milk must be made as profitable as the most profitable other combination.

Further than this, the milk supply cannot be analyzed as simply summer and winter--it is possible to have enough milk in December and not in October or November. The combination must be such that enough milk will be produced continuously throughout the year. The prices must recompense for all the alternative combinations sacrificed in order to get milk any time it is wanted.

7. The extra care which milk must be given in order to make it comply with sanitary requirements when it reaches the city.

8. Competition with other uses of milk-- with butter, cheese condensed milk, etc. For most areas, no other factor is so important as this. If butter or cheese are made in quantity in any area, then so-called "cost of production" can be forgotten, for the price that will bring forth a supply of milk for butter or cheese will also bring forth a supply of market milk,--that is, if a differential is added to pay the farmer for skim milk or whey, as the case may be, and to pay for all extra cost, such as hauling, bottling, etc.

This condition prevails almost everywhere in the North Central States. This competition with other dairy products introduces complications in arranging seasonal prices for market milk. Butter and cheese also have their seasonal prices, but based upon an entirely different set of conditions. Butter, like market milk, is produced to better advantage on pasture in the summer, but it can be stored without great deterioration in quality. Summer and winter prices are based on the one hand on what storage butter is worth in the winter compared with fresh winter butter, minus or plus the cost of storage; and on the other hand, on the comparative advantages and disadvantages of summer and winter dairying. For cheese the analysis is very nearly the same. Now obviously a set of milk prices that may balance summer and winter dairying for butter or cheese, may come very wide of doing the same for market milk. In general, production must be more uniform throughout the year for market milk than for butter or cheese. Market milk prices must therefore be higher than creamery prices in the winter time. In the summer, on the other hand, the creameries can lead in the bidding. Market milk is in the predicament that it must bid high in the winter to get milk produced at all, and high in the summer to compete with butter and cheese. There has even been noticed a tendency for creameries to bid up in the winter also, because they must have a certain amount of cream in order to run at all. Fixed costs can be charged to the flush seasons.

9. The differential--that is, the amount that must be added to the creamery, cheese factory or condensery price of milk to pay the producers for the skim milk, or whey sold with the whole milk, and for the various additional costs of furnishing market milk.

This differential is not a matter of costs alone. Experience has shown that certain differentials are necessary in one area and other differentials in other areas. Seasonal variations also enter into the problem--differentials must be adjusted between months so as to make market milk prices compete with creamery prices month by month.

10. The costs of city distribution. The term cost is used here in the same sense that it was used in talking about the producers. The distributors must get enough for their services to enable them to pay market prices for labor and capital, and at the same time earn incomes for themselves comparable to the incomes of men of like ability engaged in other enterprises. The costs of distributing vary greatly, depending upon such considerations as the following:

- a. Size of the city--distance traveled in making deliveries
- b. Volume of business of the various distributors.
- c. Nature of competition between distributors.
- d. Per capita consumption of milk.
- e. Form in which milk is sold--proportion sold in bulk, in bottles, at stores, delivered to homes, etc.
- f. Efficiency of distributing systems.

Just how the costs of distributing <sup>affect</sup> ~~effect~~ the prices producers receive for milk may not be altogether clear. Many producers no doubt believe that the whole expense virtually comes out of their pockets. As a matter of fact, any increase in distributing costs is likely to be shared between producer and consumer, the share borne by each depending upon the relative elasticity of supply and demand.

11. Elasticity of demand. This has reference not only to the amount of milk demanded by the consumers, but to the amounts that are demanded at various prices. It is assumed that more milk will be taken at 10 cents per quart than at 15 cents. There will be two ways in which this will happen. Some who will take a pint at 5 cents will take none at all at 8 cents. More generally all that will happen is that many will take less at 15 cents than at 10 cents. Milk is generally considered to have a rather inelastic demand, that is, the amount demanded changes relatively little as the price rises and falls. Some evidence will be presented on this point later.

The amount demanded at various prices will depend upon such factors as the following:

a. The character of the population--

- (1) As to age--the more children, especially infants, the more milk used and the less elastic the demand.
- (2) As to nativity--foreign elements in our population consume less milk than the native-born. Especially is this true of the Southern Europeans.

b. Size of incomes. The larger the incomes the less elastic the demand for milk. People of even moderate means buy all the milk they want at any price within reason.

c. The standard of living of the population, which may be higher or lower than the income.

d. Availability of substitutes. It would seem that milk could have few substitutes, yet the facts seem to be that in many cities when a certain point is reached, coffee and cocoa are very extensively substituted,

especially for adults, but to a considerable extent for children also.

e. The quality of the product. It is likely that the higher the quality of any product and the more uniform its quality, the less likely it will be dispensed with as the price rises.

f. Extent of price movements. When prices fluctuate constantly, and the people get used to these changes, they are not disturbed greatly over a rise in price or a fall, and do not readjust their purchases. When one price prevails for a long time, it acquires some of the force of custom, which makes people resent any change from it. The customary price is the "just" price.

12. Seasonality of demand. The economy of the household, and of the consumer, seems to dictate a seasonal variation in the demand for milk, just as does the farm economy a seasonality in production. Part of this is of course due to summer vacations; some of it to winter travel; some of it to the increased consumption of icecream in summer.

13. The problem of seasonal surplus and deficit. It will be apparent from the foregoing that seasonal production and demand may not always match. If the supply is enough to care for the demand in the periods when production is light, then there will be a large surplus other months. Then some provision must be made for using this surplus. In some places, the distributors agree to take the producer's milk all year. They make the surplus into condensed milk, cheese or butter. In other places, producers' associations are handling the surplus. In many areas the supply is increased

considerably during short months by taking in new territory, especially by buying up the whole supply of outlying creameries or cheese factories. In any case, a price policy must be arranged that is adequate to the situation.

14. The importance of milk to the public health. The public health has an important relation both to the quantity of milk consumed and the quality of it. The producers of course can not be expected to accept a lower price just to make it possible for the babies of the poor to have milk; nor can the distributors be asked to handle milk at a loss. However, the public interest in the matter may serve to force producers and distributors to adjust their differences satisfactorily. Furthermore, there is reason to believe that distributors do not always oppose the producers' demands as rigorously as the public interest demands. They sometimes reach a state of mind after a while where they feel that the easiest way out is to "pass the buck" to the consumer. It was a situation of this sort which compelled the Food Administration to engage actively in price-making during the war.

Control of quality is a function which in the last analysis must be left to public officials. However, it is possible for producers' associations and distributors to cooperate with the producers and improve quality greatly.

#### Considerations Relating to Market Price

The conditions described in the foregoing, altho constantly producing their effects, seldom by themselves consummate an actual price for market milk. Almost always a number of temporary circumstances are present and modifying the results. The actual prices

resulting are called "market prices." In a freely competitive market, like a futures market for wheat, market prices are constantly changing. Each bit of news of change in the conditions of production or demand produces its effect on the price. Milk prices are by no means as sensitive to changes as this. Butter prices fluctuate a great deal in the large central markets, but these fluctuations ordinarily affect the producer's price only as monthly averages. Milk prices tend to be established for considerable periods at a time, usually at least a month. This was true before collective bargaining developed. The monthly prices, however, are as truly market prices as if they were made a day at a time. The price any given month may be very different from "normal" prices. Some of the conditions which may affect production are weather changes affecting the supply of feed and especially pasture, changes in the price of purchased feeds, changes in wages of hired labor, changes in the price of competing farm products. Similarly wage changes and periods of unemployment may change demand. Wage changes and strikes may affect distributors' costs. Lastly, general changes in the price levels, such as we have been experiencing pronouncedly ever since 1917, may keep the whole set of circumstances affecting price in a state of confusion and disproportion.

Prices of course do not respond immediately to any of the foregoing changes in conditions, nor do they change strictly in proportion to them. Changes in the conditions surrounding production must be equilibrated with demand before we can know what price will result. On the one hand, we must know how demand responds to changes in price initiated by changes in supply--what we have already discussed as elasticity of demand. On the other hand, we



must know how supply responds to changes in price initiated by changes in demand--what may be called "elasticity of supply."

1. Elasticity of supply. Most of the analyses fundamental to this has already been presented under the discussion of "normal price." The way in which supply will change with price depends upon the extent to which the combinations of enterprises can be modified profitably as a result of the changes in price. The new supply may come from many sources, from the same farmers and the same cows as a result of heavier feeding, from the same farmers but new cows purchased to take advantage of the better prices, or from new farmers who may be living in the market milk zone but selling to creameries, cheese factories or condenseries, or who may be living on the edge of the market milk zone. Changing from selling to a butter factory to selling whole milk may derange the whole farm business, because the skimmilk is needed for young stock. The supply may be temporarily increased to some extent simply by not selling as soon as otherwise would be the case, the farrow cows that are by-products of dairy farming.

2. The response-time of supply. Obviously supply will not respond fully at a day's notice to change in price. A few new farmers may come into the business at a day's notice, and milk flow can be increased perceptibly within a few days by heavier feeding. But most of the changes require some time to work themselves out. There might be drawn for any market-milk area, then, a curve showing the response to a given increase in price at the end of the first week, second week, etc., and there is a similar curve which may be drawn for decreases in price. A price which may be needed to increase the supply to a certain point within a week may be

three times what is needed to build up the same supply in two months; and similarly a cut in price may not show its full effect for a year or two afterwards.

This is another way of saying that the market milk business involves heavy fixed costs. Once a farmer has gone into the business, he cannot afford to quit whenever prices start downward. To be sure, he can usually sell to a creamery; but this frequently involves shipment long distances, and disposing of the skimmilk at a loss. He would not be dairying on his present scale in many cases if his only outlet was the distant creamery.

3. The response-time of demand. The immediate effect of a price change on the amount consumed is likely to be quite different from the effect after a few months.

4. The need for a period contract. Because it takes time to increase or decrease the milk supply, producers hesitate to plan in advance for any particular volume of output unless they can have some assurance in advance as to price. The distributors also need to have their supply assured in advance. Hence the demand for a period contract, covering at least a month, but preferably six months or a year. The usual arrangement is a basis agreement for determining monthly prices accepted in advance for a year. This is not as definite a price prospect as many producers would like, but it is all that they have a right to ask of the distributors.

5. Competition between distributors. In some places the distributors are not working together in perfect harmony in establishing prices. Sometimes the small independent distributors are aligned against the large distributors. In other cases, a milk

producers' association may be supplying part of the distributors, while the rest are buying direct from the farmers. Where this competition prevails, each party to it must consider his competitor's price policy in laying out his own.

#### Conditions Relating to the Price Mechanism

Even the several conditions enumerated under normal and market price may not fully account for the actual prices paid for milk in a given market. Following are some other factors:

1. Bargaining. The price agreed upon for milk is reached by a process of bargaining. In any process of bargaining, the more skillful or more powerful party is likely to get the better of the deal.

2. Organization of producers. To the extent that the producers are organized and coherent, their bargaining power is greater and their representatives more skillful because better paid. It is possible that in some cases the organization may be so effective that it may secure for the producers for a considerable period a slight monopoly advantage, and temporarily a considerable monopoly advantage. Only by controlling production, of course, can this be done. A program of keeping production down to a certain figure and keeping outside milk from coming in, would, while it lasted, assure monopoly advantage. Curtailing production alone will assure to the producers near a city the full advantages of their location, which advantage competition may take away from them in a period of over-production. If any milk has to be shipped out of a market-milk area to outside creameries or condenseries, then the level of prices in the area may under competitive conditions gravitate toward

the price received at the outside creameries minus transportation costs.

3. Organizations of distributors are very effective in strengthening their bargaining power. The policies of such organizations easily lead to monopoly. As with the producers, temporary monopoly advantage of considerable magnitude may be effected, and slight monopoly advantage may be effected over a much longer period. The producers can at least be robbed of most of their advantage of location. Thus the producers near Milwaukee for several years found it to be a disadvantage to be near Milwaukee. Their location meant that Milwaukee was the only market they had for their milk unless they shipped away from the city. When they protested at the prices set for them, the distributors reached out into Sheboygan County and bought the supply of several creameries.

4. Public authority represents the only organization of the consumers.

5. Public opinion, unorganized, may be a stronger force than public authority. It has played an important role in several controversies in recent years.

6. Custom, closely allied to public opinion, is an important force in periods of stable prices. It has very little force at the present time.

7. Nowhere in the foregoing discussion is much said about the general level of prices as determining the price of milk. This influence, however, can be taken for granted without discussion.

#### The Twin City Market Area

The application of the foregoing analysis of price determinants to the Twin City area will be reserved for a later chapter.

It may throw some light on chapters immediately following, however, if the principal elements in the Twin City situation are briefly presented.

Competition with other uses of milk, especially butter and cheese, is especially significant in this territory. Large quantities of milk are shipped out of the market milk area to the 15 centralizers located in the Twin Cities. The Twin City Milk Producers' Association owns thirteen cheese factories in the area. There are many other cheese factories in the southern section of the market milk area. Probably 140 local creameries and cheese factories can be considered as competing with market milk.

Competition with other farm enterprises does not need to be especially considered in the Twin City area, for an abundance of milk can be obtained simply by taking it from other uses.

The problem of seasonal production and demand is especially difficult in this area. The short months of the year are September, October and November.

Competition between the Twin City Milk Producers' Association and certain distributors not dealing with the Association is also an important element in the situation. The Association makes period contracts with the distributors. In the bargaining, the two parties seem to be about equally matched. No monopoly element has thus far been introduced.

Chapter III

PRESENT METHODS OF PRICE DETERMINATION  
IN THE UNITED STATES

The present status of the methods used in determining a price will be shown by the following account of the methods now in use in a number of the largest whole milk markets of the United States.

Boston

In the Boston market, dealers agree to pay a price to the producers based on 3.5 per cent milk delivered in Boston, minus a flat deduction of 3.72 cents per hundredweight for can service and a graduated deduction for dealers' station expenses, freight and war tax on freight ranging from 22.9 cents to 64.6 cents per hundredweight for the nearest and farthest zones respectively.<sup>1</sup>

For January (1920) the dealers agreed to pay the above price for 108 per cent of their sales of whole milk. Where milk is bought by weight and test, the dealer will pay 4 cents for each tenth of a per cent above 3.5 per cent and deduct 4 cents per hundredweight for each tenth of a per cent below 3.5 per cent

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1. U.S.D.A. Bureau of Markets, Fluid Milk Market Report, Feb. 1920, p. 6.

butterfat contents. Where farmers furnish cans between the farm and railroad or milk station, the dealers pay a premium of 2.3 cents per hundredweight. For the balance of milk purchased, the dealers agreed to pay the average Chamber of Commerce price for extra creamery butter for the month for the butterfat in each hundredweight of such milk plus  $32\frac{1}{2}$  cents for each hundredweight of such milk. This price applies to such milk delivered at the railroad station, milk station or usual point of delivery in the country.<sup>2</sup>

The dealers agreed to take all milk made by members of the New England Milk Producers' Association from whom they were then receiving, subject to rejection by the Board of Health or by the dealers of all milk in unmerchantable condition, or in case of failure to provide equipment for cooling and failure properly to cool milk, or failure to maintain dairies in sanitary condition. They further agree to pay the members of the New England Milk Producers' Association as much as they pay any other producers for milk of the same quality at the same station.

The dealers were required to report to the New England Milk Producers' Association, or to some person acceptable to it, under oath the amount of milk purchased, and the test thereof and the amount of milk sold as fluid milk, such report to be subject to verification by the Association.

The method of determining prices of surplus milk was

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(2) U.S.D.A. Bureau of Markets Fluid Milk Market Report, Feb. 1920, p. 6.

changed for March of the same year. Dealers agreed to pay "the average Chamber of Commerce price for creamery extra butter minus 5 cents for cost of manufacturing plus 20 per cent for the butterfat in each hundredweight of such milk plus  $32\frac{1}{4}$  cents per hundredweight for skim milk in each hundredweight of whole milk." 3

It is apparent that a price agreement by some form of collective bargaining exists between the producers and dealers in the Boston territory. The 3.5 standard prevails here as in most markets, and the deduction of 3.72 cents per hundredweight for can service is a matter of agreement, probably arrived at either by compilations of statistical data, or by agreed estimates of such costs. As for dealers' station expenses, freight and war tax, the freight and war tax is known, and the dealers' station expenses are arrived at no doubt by some form of statistical compilation and calculation involving amount of milk handled at each station. From the information given regarding this agreement, there is apparently an allowable surplus of 8 per cent in January based on the production of certain other months taken as a standard.

The fact that an addition or deduction of 4 cents per one-tenth of one per cent butterfat variation from the 3.5 standard shows us that this method does not put a premium on high-testing milk, for the farmer receives only 40 cents for each pound of butterfat in excess of standard, no matter what the

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(3) U.S.D.A. Bureau of Markets Fluid Milk Market Report, March 1920, p. 6.



prevailing market price of butterfat may be.

The 2.3 cents per hundredweight premium paid where farmers furnish cans between the farm and railroad or milk station is also no doubt the result of estimates.

The price for the surplus is based on the practice of converting it into butter, its next best use. The grade of creamery extra is agreed upon partly because it is the grade of butter into which the greater part of the cream would have been converted, and partly because it is the most dependable price quotation. The  $32\frac{1}{2}$  cents pays for the skim milk contained in each 100 pounds of milk delivered as surplus milk. The price is no doubt estimated on the basis of its next best use, which would probably be for hog feeding or for raising calves.

Apparently the above basis for paying for surplus proved unsatisfactory, for it was greatly modified in March. The new basis allows 20 per cent overrun, but deducts 5 cents per pound of butter for making. This method is much more in keeping with ordinary creamery practice.

The provision that the dealers are not to pay outsiders any more than they do members of the Association, helps to protect the producers. It helps in holding the Association together, preventing the possible breaking up of the Association by dealers attempting either wholly or in part to boycott Association members. It further prevents the dealer from contracting to take a small supply from the Association. Thus the dealer may not be allowed to pay extra high prices during shortage months to outsiders with the hope of making additional gains during succeeding

months of the year at the expense of holding down the price to Association members.

It thus eliminates some competition on the buying side between distributors, assures the farmer by an agreement that he is selling his milk to the best advantage, and keeps the price on a level which will allow whole milk production to compete successfully with other farm enterprises and with other uses of milk. Agreeing to take all the milk that a farmer will produce allows him to establish that combination of farm enterprises which is best suited to his needs.

The 3.5 per cent standard controls the quality of the product, and public authority in the form of the Board of Health states that all milk coming to the city is subject to inspection, the agreement giving the dealer the right to reject that which is determined to be in unmerchantable condition.

It is evident as previously indicated that collective bargaining is the basic idea upon which the agreement in this market has been established. In milk price making, collective bargaining is just as truly a step toward the light as it was when first introduced into the wage determination for labor. Previous to the introduction of collective bargaining, milk price to the farmer was very largely a take-it-or-leave-it proposition. The demand on the part of the buyer was there, it is true; but this demand was veiled and by this unequal advantage the buyer sought to extend his margin of profit. The farmer really had more at stake than the distributor buyer, since his product continued to be produced whether there was the usual sale for it or

not, and the equipment and product could not be so easily turned to other uses, nor maintained at relatively so small an expense as could the plant and equipment of the buyer. With the introduction of collective bargaining, the total supply was set forth at once, and it was met by the demand. In this case, the demand had to be unveiled, for there was only one source from which the buyer could get his commodity. The meeting of supply and demand through representative bodies then gave supply a more nearly equal chance to bargain with demand, and the result expressed more truly the significance of each.

New York City

The methods used in New York are described in the following report:

"In general to obtain the price of milk, we take the highest market quotation of butter, add to this the value of skimmilk; then we take the highest market quotation of cheese, and add to it the value of whey; then we obtain the average of these two results and add to this certain differentials to allow for costs of production. During certain months of the year when there is a surplus, an arbitrary differential is subtracted in order to prevent a too large production of summer milk; but this deduction is accounted for by adding it with the cost of production differential to the prices of milk during the period when there is a shortage.<sup>4</sup>

"In order to illustrate the method, we will explain

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(4) Hoards Dairyman 1919. "New York Milk Price Basis", p. 860.

how it works to obtain the April price. There are given here two tables of figures, Schedule 'A' and Schedule 'B'. The quotations of butter for the period preceding the 20th of March average  $58\frac{1}{2}$  cents a pound. By reference to Schedule 'A' we notice that butter at  $58\frac{1}{2}$ ¢ per pound would make 4-per cent milk worth \$2.71 a hundred; and if butter was worth  $58\frac{1}{2}$ ¢, skimmilk would be worth 87¢ a hundred. This would bring the total value of butter and skimmilk in a hundred pounds of 4 per cent milk to \$3.58 a hundred.

SCHEDULE B

Schedule of Differentials Used in the  
New York Market

Month		Add or subtract for costs peculiar to New York territory and to equalize production.
January.....	add	\$ .16
February.....	add	.16
March.....	add	.16
April.....	subtract	.15
May.....	subtract	.15
June.....	subtract	.15
July.....	add	.16
August.....	add	.36
September.....	add	.36
October.....	add	.26
November.....	add	.26
December.....	add	.26

TABLE I. NEW YORK SCHEDULE FOR BUYING WHOLE MILK BASED ON THE MARKET VALUES OF BUTTER AND CHEESE.

Butter Yield, 4 Per Cent Milk, Allowing 16 Per Cent Over-run (pounds)	Butter, Cents per Pound Fresh. Extras 92 Score	Value	Value, Skim Milk per cwt. of Whole Milk	Total Value, Butter and Skim Milk	Cheese Yield, 4 Per Cent Milk (pounds)	Cheese, Cents, per Pound Fresh, Average Run	Value	Value, Whey per cwt. of Whole Milk	Total Value, Cheese and Whey
4.64	71	\$3.29	\$1.12	\$4.41	10.60	37	\$3.92	\$0.25	\$4.17
"	69	3.20	1.08	4.28	"	36	3.82	.25	4.07
"	67	3.11	1.04	4.15	"	35	3.71	.24	3.95
"	65	3.02	1.00	4.02	"	34	3.61	.23	3.84
"	63	2.92	.96	3.88	"	33	3.50	.23	3.73
"	61	2.83	.92	3.75	"	32	3.40	.22	3.62
"	59	2.73	.88	3.61	"	31	3.29	.21	3.50
"	58 <sup>1</sup> / <sub>2</sub>	2.71	.87	3.58	"	30	3.18	.21	3.39
"	56	2.60	.82	3.42	"	29 <sup>1</sup> / <sub>2</sub>	3.12	.20	3.32
"	54	2.51	.78	3.29	"	28 <sup>1</sup> / <sub>2</sub>	3.02	.20	3.22
"	52	2.41	.74	3.15	"	27 <sup>1</sup> / <sub>2</sub>	2.91	.19	3.10
"	50	2.32	.70	3.02	"	26 <sup>1</sup> / <sub>2</sub>	2.81	.18	2.99
"	48	2.23	.66	2.89	"	25 <sup>1</sup> / <sub>2</sub>	2.70	.18	2.88
"	46	2.13	.62	2.75	"	24 <sup>1</sup> / <sub>2</sub>	2.60	.17	2.77
"	44	2.04	.58	2.62	"	23 <sup>1</sup> / <sub>2</sub>	2.49	.16	2.65
"	42	1.95	.54	2.49	"	22 <sup>1</sup> / <sub>2</sub>	2.39	.16	2.55
"	40	1.86	.50	2.36	"	21 <sup>1</sup> / <sub>2</sub>	2.28	.15	2.43
"	38	1.76	.46	2.22	"	20 <sup>1</sup> / <sub>2</sub>	2.17	.14	2.31
"	36	1.67	.42	2.09	"	19 <sup>1</sup> / <sub>2</sub>	2.07	.14	2.11
"	34	1.57	.38	1.95	"	18 <sup>1</sup> / <sub>2</sub>	1.96	.13	2.09
"	32	1.48	.34	1.82	"	17 <sup>1</sup> / <sub>2</sub>	1.86	.12	1.98
"	30	1.39	.30	1.69	"	16 <sup>1</sup> / <sub>2</sub>	1.75	.12	1.87
"	28	1.30	.26	1.56	"	15 <sup>1</sup> / <sub>2</sub>	1.64	.11	1.75
"	26	1.20	.22	1.42	"	14 <sup>1</sup> / <sub>2</sub>	1.54	.10	1.64

"For the period preceding March 20th the market quotations of cheese average 31 cents.<sup>5</sup> By reference to schedule 'A' it will be noted that if cheese is worth 31¢ its value in 100 pounds of 4-per cent milk is \$3.29, and the value of whey in 100 pounds of 4-per cent milk is 21¢, making a total value of 100 pounds of 4-per cent milk, on a cheese basis, of \$3.50 per hundred pounds.

"Add the total value of the butter and skimmilk in a hundred pounds of 4-per cent milk to the total value of cheese and whey in a hundred pounds of 4-per cent milk, and divide the sum by two to get the average, and the result is \$3.54, which is the value of 100 pounds of 4-per cent milk found on the market value of butter and skimmilk, and cheese and whey.

"But the average butterfat content is 3.6 per cent, not 4 per cent. Therefore it is necessary to change our price to this standard. To do this, divide \$3.54, the price of 4 per cent milk, by 4 and multiply by 3.6 per cent, which gives the result \$3.186. By reference to Schedule 'B' and to the month of April, it will be noted that an arbitrary differential of 15¢ is to be subtracted to equalize production. Taking this 15¢ from our price of \$3.186 we obtain as a result \$3.036. This is for average milk containing 3.6 per cent of butterfat. To reduce the figure to a 3 per cent basis, we must subtract a butterfat differential of 4¢ a point for six points or 24¢ from \$3.036. This gives the price for April milk \$2.796 or \$2.80."

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(5) Ibid, p. 861.

This is the combination butter and cheese basis. As is stated, the differentials allowed are arbitrary since there are no means more accurate than experience for determining the payment necessary to bring out precisely a given amount of milk during a given month of the year.

Even assuming that the cost of producing clean milk could be used as a basis, who can tell what is the extra cost of producing an unusually clean milk? Furthermore, these extra costs may not be the same for any two dairymen. The differentials added during the winter are not the same as those subtracted during the spring months of flush production. The reasons for this are as follows:

1. The quantity produced in the flush months is greater than the quantity produced during the winter months. If the same differential were to be subtracted in the flush months as is added during the winter months, there would be an inequality, since the subtraction would have been made on a greater quantity than on the quantity to which a like differential were added.

2. There is more of a financial inducement needed to bring out winter milk than is essential in the amount of cut made on milk of the flush months. The reason for this is that there is greater money cost attached to feeding for winter milk. The labor cost is not always greater, because of larger supply available and less farm work available. This helps to offset the disagreeableness.

The averaging of butter and cheese quotations is to

assist in removing the violent inequalities due to rapid fluctuations in price of one or the other of the two commodities. Furthermore, there are both butter and cheese factories in the territory, and these furnish the two chief alternatives since the region is essentially adapted to the keeping of such livestock as dairy cattle, and not to the raising exclusively of corn, wheat, or cotton.

#### Zoning System

The zoning system of establishing prices to the producers is used about the city of New York, and its consideration must be combined with the foregoing price basis. Essentially the zoning plan as used in relation to the producers is this. A price for milk produced in a given month is established with the consideration that milk at that price would come from the two hundred mile zone outside of New York City. The prices allowed to producers in zones nearer than the two hundred mile zone are graduated so that the difference in price for each zone as we approach the city is equal to the calculated decrease in the express rate. In zones farther from the city than the two hundred mile zone, a graduated increase equal to the difference in express rate is added until the four hundred mile zone is reached. After the four hundred mile zone has been passed, no additions to the milk price due to differences in shipping expense is added.

In both the Boston and the New York territory the producers are organized so that in each case cooperation becomes a strong element in the making of satisfactory prices, since it is



by cooperative action that the producers are able to attain the bargaining power they need. Collective bargaining is just as valuable to the farmer in such circumstances as it is to the laborer. It reduces economic friction and allows supply and demand forces to meet on a more nearly equal basis. Both of the meeting parties are thoroly familiar with the problems of the milk business.

As regards the reckoned value of skimmilk and whey, some who make milk prices declare that whey should be given a value equal to one-half that of skimmilk. According to Schedule 'A' and 'B' here, there is no such relation to be found: In the New York market the makers of the preceding schedules "valued the skimmilk and whey in 100 pounds of whole milk at prices heretofore paid for 100 pounds of such by-products when butter<sup>6</sup> and cheese sold at the figures shown in Table A, notwithstanding not more than 85 pounds of skimmilk or 90 pounds of whey can be secured from 100 pounds of milk." <sup>7</sup>

#### Philadelphia

In the Philadelphia area, the price agreement is arranged with the Interstate Milk Producers' Association, an organization whose members control considerable portions of the natural milk supply of Philadelphia, Harrisburg, Lancaster, York,

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(6) The Price of Milk, C.L.King, p. 63.

(7) Ibid, p. 62

Altoona, Allentown, Bethlehem, Easton, and Reading in Pennsylvania; Wilmington and Dover in Delaware; and Atlantic City and Trenton in New Jersey.<sup>8</sup> The Association has issued the following statement relative to an agreement effective between producers and dealers in its territory with the approval of Dr. Clyde L. King, milk arbitrator for Pennsylvania:

"Each producer shall be credited with the amount of milk delivered by him during October, November and December, 1919. His average production of these three months shall be known as his basic quantity. These amounts shall be posted at receiving stations and duplicate copies sent to the Interstate Milk Producers' Association. During the following nine months he will receive a basic price (which will be determined by conference) for the following percentages of this amount of milk:

January	100%	April	100%	July	110%
February	100%	May	110%	August	105%
March	100%	June	110%	September	100%

"Additional milk produced during these months, if any, to be paid thus:

"A committee of three is to check up each month the average price of New York 92 score solid packed butter as published by the United States Bureau of Markets for that month and to inform immediately all concerned what this may be. Payment for all additional milk above referred to is to be made at the rate of 120 per cent of the butter price as thus established for each point of butterfat in the milk.

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(8) U.S.D.A. Bureau of Markets Fluid Market Report, April, 1920. p.6.

For example: Farmer "A" produced  
2100 lbs. milk in October  
2000 lbs. milk in November  
1900 lbs. milk in December  
3  $\overline{6000}$   
2000 lbs. milk= Basic quantity.

"If he produced 2500 pounds of milk in May, 2200 pounds (110 per cent of 2000 pounds) would be paid for at the maximum price, and 300 pounds at the price for additional milk.

"The butter average was 65 cents for January; therefore 120 per cent of 65 cents or 78 cents for each pound of fat, or \$3.12 per 100 pounds for 4 per cent milk at receiving station door will be the price for this additional 300 pounds of milk.

"Prices on direct-shipped milk to be calculated by paying for the surplus at a price proportionately lower than the maximum price as is the difference in the two prices at the receiving stations in the 50-60 mile zone.

"When tenants move, the average production of the farm for previous tenure to be used as a basis for computation. New shippers in business to be paid for 50 per cent milk at maximum price and 50 per cent at the computed price." 9

Here we have an example of the establishment of a basic quantity. This method of establishing a price cannot be regarded as altogether satisfactory since the basic price may prove to be either too high or too low due to unexpected changes in conditions of production and consumption during the nine months following.

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(9) Idem.

Furthermore, it becomes possible for the dealer to operate on a restricted basis during the three months basic period and then expand immediately afterward either by putting on an advertising campaign or by carrying on a drive for new customers.

For those who are best fitted by natural conditions and availability of family labor to carry on summer dairying, there may be some hardship due to the fact that it becomes difficult for them to establish a satisfactory basic quantity.

As regards the percentage of basic quantity to be used during each month of the year, there is no doubt that past experience has shown which percentage may best be applied to a given month. It may appear that the dealers' purpose in paying a basic price for an additional 5 per cent or 10 per cent of the basic quantity during the months of the year when a surplus is to be expected is to help the farmer to dispose of his surplus milk. This may or may not be true, since we are told by Dr. Clyde L. King that "larger quantities of milk are used in the summer and less in the late autumn and more as the days begin to lengthen, reaching greatest consumption about Easter and declining slightly thereafter until the return of warm weather."<sup>10</sup> Thus these extra percentages during certain months are probably due to extra demand. The extra consumption might, it is true, be due in part to advertising campaigns at this season, the purpose being to help dispose of the farmers' surplus; but no evidence to this effect is available. Or it may be that these extra percentages are details of the collective bargain, it being necessary that the farmers be paid this

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(10) King, C.L. - The Price of Milk, p. 42.

extra price for additional quantities at these months so as to induce them to sell to the city market and to continue to produce clean milk.

The prices for surplus are calculated in a logical manner, butter being without doubt the next best opportunity for the use of such milk. The 120 per cent includes 20 per cent for overrun.

The plan of listing each farm for its basic quantity is to a certain extent logical. A dealer knows in advance how much milk to expect from a given territory. It will occasionally happen that some tenants who are poor managers will move to good farms and thus reap a benefit by selling more milk at a basic price than before moving; but this will produce no serious results.

In some markets, by the time the month of June has arrived, the majority of farmers are expected to be sending approximately twice the amount of milk to market as in midwinter. This fact undoubtedly gave rise to the ruling in the Philadelphia market that all new shippers who do not begin their shipments during the time when basic price is established, must accept a surplus price for 50 per cent of each shipment. This plan undoubtedly seeks to control the operations of such seasonal shippers as dealers in dairy cattle, those having access to much cheap hill pasture land, or those butcher dairymen who might seek to go into and out of milk production, taking advantage of both basic milk prices and the spring market demand for butcher cows. Or it may be that approximately fifty per cent of the total quantity coming to Philadelphia meets the demand for basic milk for direct consumption. In regard to this last statement, the following should throw a little light

on the whole situation. "The basic price in the Philadelphia territory was \$3.61 from January 1 to June 1, 1920. The surplus price was \$3.12, \$3.18, \$3.19, \$3.43, \$3.00 and \$2.76 for January, February, March, April, May and June respectively, an average of \$3.11. With a surplus of one-third, the producer actually received for this period an average of \$3.46. The winter producer receives a higher average price, however, than does the producer in seasons of lower cost."<sup>11</sup> Since for the first six months of the year the surplus is equal to one-third, it is logical that the surplus quantity can at least be no greater during the last six months of the year. Thus the 50 per cent surplus arrangement for new shippers tends to discourage periodic shipping during the low cost months, particularly May and June, and places a premium on those who produce winter milk since they tend generally to lend stability to the business.

#### Columbus Market

In the Columbus market, country prices are based upon the current month's wholesale butter prices in Chicago, plus a premium of six cents per pound, and with a definite allowance of 70 cents per hundredweight for the non-fat content of whole milk.<sup>12</sup> A letter dated January 26, 1920, from the Central Ohio Milk Producers' Association, contains the following relative to the price basis for Columbus. "The surplus over and above the market milk requirements

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(11) King, C.L. - The Price of Milk, p. 158.

(12) U.S.D.A. Bureau of Markets Fluid Milk Market Report, Aug. 1919, p. 5.

exists from three to four months in the year and covers March, April, May and June. The prices last year were figured on a basis of 20 per cent surplus in March and April, and 50 per cent surplus in May and June. The surplus was figured at Chicago butter price, plus six cents a pound, plus 80 cents for skim, if I remember correctly. This was averaged with a price of \$3.80 for 4 per cent milk for the milk used for market milk, which was 80 per cent for March and April, and 50 per cent for May and June."

It is very evident that butter is here considered to be the best opportunity. The price quoted for skimmilk is likewise the price which it would bring in its next best use, although we are not told here just what is the basis upon which the skimmilk price is determined, whether it is based on possible returns from hog feeding or calf feeding, or whether it is considered in the light of its possibilities when made up into a milk powder. The six cents premium is probably allowed as a differential for clean milk costs or for some similar reason.

The 20 per cent surplus for March and April, and 50 per cent surplus for May and June are without doubt based on experience of past years. The prevalence of a 4 per cent standard in this market may be due to any one or more of several things. It may be due to the fact that Guernseys and Jerseys predominate in that particular territory, thus tending to produce milk of high quality. It is also possible that an ordinance may exist in this market which requires that not less than a 4 per cent milk be offered to the consuming public. As far as convenience in calculating a price is concerned, it is as easy to calculate a price on the butter

basis as on the cheese basis.

Cincinnati Market

In the Cincinnati market, the producers have contended for "cost of production plus" for a yearly period. There has been some friction on this point, however, and with each party contending for certain rights, the issue has reduced itself practically to a bargaining basis of price determination. The dealers have been taking all the milk produced including surplus. The surplus is based on the average production of November, December, January, and February, and any amount furnished above the average of these four winter months is considered surplus.<sup>13</sup>

It is apparent that here, as in the case of the California raisin growers, cost of production has been found not to be satisfactory because it did not always equate supply and demand. Even in computing cost of production, there are different ways of figuring, and this introduces the element of bargaining. Cost of production, as already explained in Chapter II, does serve as a guide which usually will bring us within range of the price necessary to equate supply with demand over a considerable period of time. Consumers' goods, however, derive their value ultimately from the estimate of their utility to the consumer and not from the expenses of production. Consequently, once a good has been produced, it has to be sold at what the consumer will pay for it, no matter how much the expense of production exceeds this amount.

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(13) Letter from the Queen City Milk Producers' Assn. of Cincinnati, Jan. 22, 1920.



Whenever consumption is curtailed, the good will not return the expenses of production of the then existing marginal producer, and another margin must be established. In the long run, however, we must assume a "long-run marginal producer," and this individual must receive just enough to induce him to remain in the business during an extended period of time.

The idea of the arbitrary establishment of basic quantity of milk has already been discussed and needs no further comment. In regard to the "plus" of <sup>the</sup> cost of production plan, this means very little more or less than a point in bargaining, for who can tell just how much constitutes the reasonable profit which is the basis for the "plus."

#### San Diego

The prices paid by the fluid milk dealers of San Diego are based on milk testing 4 per cent butterfat.<sup>14</sup> The basis of variation in prices according to different tests of butterfat is explained by Mr. Douglas Young, Manager of the Milk Producers' Association of San Diego County, as follows:

"In the case of milk testing less than 4 per cent butterfat, the quantity of excess skimmilk is determined by calculating the quantity of skim necessary to be extracted to raise such milk to 4 per cent test. In other words, we determine the weight of skimmilk (or non-fat content of whole milk) above the amount necessary for 4 per cent milk by multiplying the deficient fat test by 25, the result being the weight of the 4 per cent milk (standardized).

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(14) U.S.D.A. Bureau of Markets Fluid Milk Market Report, Feb. 1920, p. 5.

Example: If milk tests 3.5 per cent, the weight of standardized 4 per cent milk to be derived therefrom would be figured as follows:  $3.5 \times 25 \text{ pounds} = 87.5 \text{ pounds}$  4 per cent milk.

"The weight of excess skim to be allowed for in each hundredweight of 3.5 per cent milk would be figured as follows:  $100 \text{ pounds} - 87.5 \text{ pounds} = 12.5 \text{ pounds}$ , excess skim."

The following table taken bodily from the U.S.D.A. Bureau of Markets Fluid Milk Market Report of February, 1920, illustrates the method of determining the prices for 100 pounds of milk of various tests:

TABLE II. Application of Method of Determining San Diego Milk Price

Butterfat Test (Per cent)	Pounds of fat paid for at \$1.25 per pound	Pounds of "excess fat" at \$.80 per pound <sup>x</sup>	Pounds of "excess skim" at \$.60 per hundred-weight*	Total value of price per hundredweight of whole milk
3.5	3.5	-	12.5	\$4.45
3.6	3.6	-	10.0	4.63
3.8	3.8	-	5.0	4.85
4.0	4.0	-	-	5.00
4.2	4.0	.2	-	5.16
4.4	4.0	.4	-	5.32
4.5	4.0	.5	-	5.40

\* "The price to be paid per pound of butterfat not in excess of 4 per cent and the allowance per hundredweight of "excess skim" are agreed upon in advance of delivery of milk by the Association.

x "Excess fat (above 4 per cent) is paid for at 14 cents above the current month's San Francisco butter market quotations, which during the month of January averaged approximately 80 cents.

"The above method of determining prices applies to such milk dealers as may care to contract under it. The Milk Producers' Association of San Diego County handles the surplus of its members!"

The merits of the butter basis used in the San Diego market have previously been discussed, as also the 4 per cent milk standard. The plan here for standardization, however, is new. We are not told just what the \$1.25 covers, but probably it includes express charges, the cost of extra clean milk, etc. It is further stated in the footnote to the table that the price to be paid for butterfat not in excess of the standard is agreed upon in advance of delivery. This means that it is determined by collective bargaining.

There seems to be no provision for seasonal production, except in so far as it may be included in the \$1.25 per pound paid for standard butterfat. The price allowed for excess skim milk is probably equivalent to what it would bring in its next best use, and the same is probably true of the excess fat. The 14 cents per pound paid in addition to the San Francisco butter market quotation is the equivalent for the overrun which should be allowed, the 14 cents being not quite 20 per cent of the 80 cents quoted as the current San Francisco price.

#### Chicago

In the Chicago market, the collective bargaining idea prevails, an estimated cost of production<sup>being</sup> used as a basis for arriving at a price. Contracts are made for a month at a time. We have here an example of the proper use of cost of production in

price making. Here it is evidently used as a guide, and not as a hard and fast ultimate determinant. Estimated production costs and collective bargaining cover an extremely wide and general field of operation, and provide not only for competition with other enterprises, but also allow room for covering the problem of surplus and deficit, and seasonality of production. Under such a plan, such things as seasonal price variations are established on the basis of experience with the natural working out of economic forces, and so must be approximately right.

Where business is passing through a period of rising prices, it may, from the farmer's point of view, be advisable to contract for only one month at a time so as to prevent the entrance of any lag into the milk price curve, owing to the rapid rise in the general price level. During the last period of rising prices, the farmers felt that they were getting too little for their milk; and then when prices began to descend, they began to feel that they were being only fairly well paid for their product.

From the point of view of the dealer, during a period of descending prices, a short time contract would seem to be particularly beneficial since it assists in enabling him to keep consumers' price down to the level at all times where the consumer can afford to keep up his former level of milk consumption. During a period of rising prices, on the other hand, he would gain what the producer loses.

Taking into consideration the benefits and injuries liable to come to each during periods of rapid change, the fairest and most satisfactory process, the process which would during the

periods of rapid change, bring the most satisfactory balancing of losses and gains to each, would probably be that in which the short time contract is used.

In normal times when there is no marked disturbance of the price level, the long period contract is probably the most satisfactory, since it assures the dealer of his supply and assures the farmer a continued outlet for his product.

#### Indianapolis

Practically all of the milk supply of Indianapolis delivered at country receiving stations is purchased on the basis of the current month's Chicago butter market quotations, a premium of 15 cents per pound being given.<sup>15</sup>

#### Kansas City

In this market the milk delivered at the country stations is paid for on a straight butterfat basis at a definitely stipulated price per pound butterfat. However, in the cases of a few country stations, prices paid for butterfat are to be based on the Chicago butter prices for the current month, a premium of 15 cents per pound butterfat being allowed, the same as at Indianapolis.<sup>16</sup>

Why in these two widely separated parts of the country the same price basis is used may seem strange. It may be true, however, that a combination of conditions may exist in the production territory about two different milk markets which may make

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(15) U.S.D.A. Bureau of Markets Fluid Milk Market Report, Jan. 1920, p. 5.

(16) Ibid, Aug. 1919, p. 5.

logical the use of the same basis in both places. We know, for example, that both are in a territory which produces much corn and livestock.

#### San Antonio

In the San Antonio market, surplus milk is paid for on a straight butterfat basis, and a premium of 4 cents over the prevailing butterfat prices is allowed for sour cream. Surplus milk here is defined as milk in excess of the basic quantities delivered on December 31.<sup>17</sup> The 4 cents premium is no doubt a reward for producing a high quality product that will be sure to reach the market in good condition.

#### Milwaukee

At Milwaukee in June 1919, milk purchased for city distribution was based on the Plymouth cheese market.<sup>18</sup>

Surplus milk in this market is considered as that amount which the dealers cannot sell for direct consumption. The price paid for surplus milk is based on its next best use in manufactured products.<sup>19</sup>

#### St. Louis

In the St. Louis market,<sup>20</sup> the price is calculated each

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(17) U.S.D.A. Bureau of Markets Fluid Milk Market Report, March 1920  
p. 6.

(18) Ibid, June 1919, p. 4.

(19) Ibid, Aug. 1919, p. 5.

(20) Hoard's Dairyman - "Who Won the St. Louis Milk Strike" -  
Dec. 1920, p. 873.

month by multiplying the per cent of butterfat by the average daily value of 92 score butter on the Chicago market for the previous month, plus one-half the average daily price of a bushel of cash corn on the St. Louis market as an allowance for the skimmilk, plus thirty cents per hundred pounds for hauling and handling. An additional thirty cents per hundred pounds will be paid in November, December, January, and February, an additional twenty cents in August, while a deduction of thirty cents per hundred pounds is made in May and June. An illustration of the operation of this agreement is the calculation which established the November price at \$3.10. The average Chicago price for 92 score butter in October was \$.57, and for corn in St. Louis, \$1.01. Therefore:

Butterfat	.57 x 3.5 =	\$1.995
Skimmilk		.505
Hauling and handling		.30
Addition for November		<u>.30</u>
November 1920 price.....		\$3.10

This price is paid within the zone in which the express rate on a ten-gallon can of milk does not exceed twenty-nine cents, the producer paying transportation charges in excess. All milk is to be taken, the deductions in price taking care of the surplus.<sup>21</sup>

This is the butter and corn basis, and is used only in the St. Louis market thus far. The corn factor is not based on the idea of an alternative farm enterprise entering into competition with milk production, but is merely a method of figuring out

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(21) Idem.

equivalent feeding values of skimmilk and corn. This part of the agreement is adapted from the old Gurler rule which was proposed a number of years ago, and which, as stated in Henry and Morrison's "Feeds and Feeding", reads as follows: "The value of 100 pounds of skimmilk when fed along with corn to fattening hogs is half the market price of corn per bushel." <sup>22</sup> It is true, however, that this arrangement does cause the price of milk to some extent to follow the corn market, but not enough to affect to any extent elasticity of supply, availability of the factors of production for producing milk, or the existing competition with other farm enterprises.

The hauling and handling charge, and the payment of express rates over 29 cents per can are matters of agreement.

#### Seattle

In the Seattle market, the price of milk is based upon a combination of prices based on cost of production, and prices based on competing products. The average of four figures is taken as the price of milk, one based on each of the following products, condensed milk, cheese and butter, and one based on a cost of production figure adapted from the Pearson formula. The result is considered as the producer's price. <sup>23</sup>

In connection with the butter price, the commission has decided to take the average price being paid for butterfat in four

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(22) Feeds and Feeding, Henry and Morrison, p. 599. By Henry-Morrison Company, Madison, Wisconsin.- Fifteenth Edition.

(23) Hoard's Dairyman - "The Seattle Milk Strike" - Dec. 3, 1920. p. 883.



cooperative creameries in this district, and add to this price a flat allowance of fifty cents for the skimmed milk contained in one hundred pounds of raw milk. This gives the producer all the possible advantages of this market inasmuch as the cooperative creameries are supposed to eliminate some of the middleman's profit.

In arriving at the price per hundredweight of milk thru the cheese market, the commission has taken the f.o.b. price at the cooperative cheese factory of Tillamook, Oregon, which has been successfully conducted for the past several years. Four cents per pound has been deducted from this price to cover the cost of manufacturing. In this item the commission has also made an allowance of twenty-five cents for the whey contained in one hundred pounds of raw milk. This is taken from authoritative sources which regard whey as having half the feeding value of skimmilk.<sup>24</sup>

Taking all of these items and finding the results for milk containing 3.6 pounds butterfat per hundredweight, we have the following:

Condensery price		\$1.89
Butterfat at 61¢ per lb.	\$2.20	
Skimmilk	.50	2.70
Cheese	2.50	
Whey	.25	2175
Cost of production		<u>4.26</u>
Average of four items.....		\$ 2.90

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(24) Idem.

Lest the price thus obtained, however, should be too far out of line with the average of the three possible markets referred to above, namely, condensery, butter, and cheese, the commission has further decided that the price thus arrived at shall never be less than fifteen per cent above the average of the three items before mentioned, or more than twenty-five per cent above the average of the three items. This added price allowed to producers for the Seattle market is awarded by the commission as a premium for producing a high quality of milk and to insure a continuous flow of such milk into Seattle markets. For every point above or below the 3.6 per cent standard, a price is applied equivalent to the current price of butterfat on the Seattle market. This always gives the opportunity for the free play of the supply and demand forces and so in the long run gives an equal advantage to both producer and dealer.

"One of the troublesome problems for both producer and distributor is the disposal of the surplus supply of milk which is afforded at certain times of the year. On this point the commission has decided that the shipper shall be entitled to send to his distributor, through April, May, June and July, the ordinary months of surplus, an amount equal to the average of his shipment for the preceding eight months. During the four months of April, May, June, and July, any excess above this average may be shipped to the distributor, and the distributor shall allow the producer for the butterfat in his milk at the rate of ten cents per pound more than the running price of butter print on Western Avenue."<sup>25</sup>

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(25) Idem.

Thus the Seattle agreement is virtually a combination butter, cheese, and condensed milk basis. It is clear that the cost of production may operate only within limits, and under the conditions given here, may serve only within those limits as a seasonal market regulator. The reason for the 15 per cent and 25 per cent limits above the price which would have been arrived at by averaging the three basic commodities is clearly stated, and these limits must, as in the case of the "plus" idea in cost of production plus a reasonable profit, be arbitrarily fixed.

The method used here for determining the market value of milk testing above or below standard, gives the farmer at all times full value for his product whether the quality be high or low. If he chooses he may produce a high testing milk, and no premium is generally placed on a run of high-testing or low-testing milk, as seems to be the case in some of the other markets. In those cases where the price per point butterfat variation is arbitrarily fixed, it usually puts a premium on low testing milk, since the price per point variation is in practically all cases below the current market price for butter of the proper standard of quality.

The deduction for cheese manufacturing costs is without doubt the result of statistical compilation relative to manufacturing costs. The flat allowances for whey and skimmilk are arbitrary and cannot at all times be equal to feeding value reckoned in corn or other grains, nor can these arbitrary allowances at all times be reckoned as equivalent to the best opportunity manufactured products.

The basis of paying for surplus milk is logical in that it follows the butter market. The arbitrary ten cents per pound over a given quality of butter will in most cases give a reasonable allowance for overrun, but the farmer when comparing this method with that of selling butterfat to the creamery, gets a relatively low price for his skimmilk, since the creamery usually pays about 4 to 5 cents above actual butter quotations. Then on 3.5 per cent milk, the farmer would get  $17\frac{1}{2}$  to 21 cents for the skimmilk in each hundred pounds of surplus.

The length of the basic period will depend some on the production scheme in use in a given territory; and in order to adequately meet the demand at all times of the year, a term of basic months in one market may not apply well to another market. It is possible, however, for contention to arise over this point, and due consideration should be given the production scheme in use with its accompanying seasonality of supply before determining just how many and which months shall determine basic quantity.

The fact that in the Seattle territory there is abundant rainfall with considerable warmth during a large part of the year, thus making a long pasture season with an abundance of green feed may have some influence on the length of the basic period, since a tendency toward uniformity in seasonal conditions should help to make for a more uniform supply throughout the year.

Evansville.

At Evansville, Indiana, the following formula is used for determining the prices to apply to milk delivered in any half

monthly period:

"The average of butterfat prices paid by creameries for the preceding 15 days multiplied by the average butterfat test of milk, plus the price of 30 pounds of shorts (on a ton basis) to cover value of skimmilk for feeding purposes, plus a premium of 40 cents per hundredweight of whole milk, plus or minus the seasonal allowances to encourage more uniform production.<sup>26</sup>

The seasonal additions or subtractions are as follows:

January	add	15	cents	per	hundredweight
February	add	15	"	"	"
March	add	15	"	"	"
April	subtract	20	"	"	"
May	"	20	"	"	"
June	"	20	"	"	"
July	"	20	"	"	"
August	add	10	"	"	"
September	"	10	"	"	"
October	"	15	"	"	"
November	"	15	"	"	"
December	"	15	"	"	"

Applying the figures as they were for the first fifteen days in December, we have:

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(26) U.S.D.A. Bureau of Markets Fluid Milk Market Report, Feb. 1920, p. 6.

4 pounds butterfat at \$.745 = \$2.986

(For the first 10 days the price paid for fat in cream was 76 cents per pound. For the next five days the price was 72 cents per pound, making an average price of \$.745 per pound.)

Skim milk in 100 pounds (30 pounds shorts at \$2.65 per hundredweight) .795

Premium for production of clean market milk .400

Addition for December .150

\$ 4.330

If any producer delivers milk in quantities 20 per cent in excess of the amount called for by his contract, no allowances are made for the value of skim milk or for extra production costs; but such surplus is paid for by the dealer on a straight butterfat basis. If a producer falls more than 20 per cent short of the amount called for by his contract with the dealer, he is paid on the same basis that applies to the normal supply but a reduction of 5 cents per pound of Butterfat is made in such a case." 27

In a later report we get the following modifications that have come into use at Evansville:

"Until further notice, prices will be determined at the beginning of the month instead of in the middle and at the end of each month. If by the use of the formula given in the February report, the price of 4 per cent milk is 32 cents per hundredweight less than the estimated average production

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(27) Idem.

cost, then the prices to be paid will be an average of the amounts referred to. The cost of production is calculated on the basis of the following items of cost: 20 pounds corn plus 20 pounds of <sup>a</sup>4-2-1 mixture of corn, bran and cottonseed meal plus 48 pounds hay plus 150 pounds silage plus 20 pounds corn stover plus 20 pounds straw plus 3 hours labor plus 10 per cent for management." 28

The first part of the account before the change was effected was virtually a butterfat basis, plus a seasonal differential which sought to regulate seasonal supply. The arrival at the price for skimmilk is here another method of using feed equivalents, shorts being used here in the same manner in which corn was used at St. Louis. The figure added for clean milk costs is the result of agreement, and must be to a great extent arbitrary. The seasonal differentials used during various months, we assume to be the result of past experience in that particular territory. It is apparent that within limits, the producer agrees to furnish a given quantity of milk to the dealer, the milk supplied above the upper limit being reckoned as surplus.

When supply falls below the lower limit, a slight penalty is assessed because of the failure to deliver the minimum quantity specified in the contract. This seems to be a reasonable method of procedure since both the producer and the dealer have occasion to bear some of the seasonal difficulties. Due to the monthly sequence of supply and price, it is possible that when price ~~and~~

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(28) U.S.D.A. Bureau of Markets Fluid Milk Market Report, March 1920, p. 5.

and supply are combined in a given way during a series of months, their advances may not exactly offset their declines. Hence in some years a surplus of value and in some years a deficit of value may remain at the close of a given period.

The exact use to be made of production cost as a modification to the original method in case the price goes 32 cents less than estimated average production cost is not made clear; but this plan probably seeks to establish an average between the estimated production cost and the butterfat basis price. It is likely that cost of production and the price of butterfat will not both be too low nor too high at the same time. Hence cost of production and the price of butterfat may each act as a check upon the other, and so prevent any violent fluctuations in the price of milk. The figure, 32 cents, as a difference has probably been established as the result of estimates. Cost of production in this case, as in any other, may serve only as an indicator and may not always be considered as the final word in making a price.

#### Other Price Bases

There are still other price bases which may be considered. Some of these are not now in use; others have merely been proposed. The first method that we shall consider here is the "Fat plus six tenths" method which has been used by some Wisconsin cheese factories as a means of paying their patrons for milk received. This method presents itself as a possible method of calculating a price for market milk because it is so directly related to the cheese basis.



The "fat plus six tenths" method of figuring milk prices is discussed in Wisconsin bulletin 276, but is of very little significance since it does not embody any of the basic factors which enter into the making of a price, but is just a convenient method of calculating a redistribution of payment on butterfat content in a milk pool so that the resulting figures will correspond to cheese yield for milks of various tests. This can best be illustrated by quoting from the above mentioned bulletin.<sup>29</sup>

TABLE II. Payments Figured by the Straight Fat Method

Patron's name or number	Weight of milk delivered :- pounds:	Fat in Milk Per cent by test	Total weight :- pounds	Price per pound of fat	Payment to patron
1	100	3.0	3.0	39.75	\$1.1925
2	100	3.5	3.5	39.75	1.39125
3	100	4.0	4.0	39.75	1.59
4	100	4.5	4.5	39.75	1.78875
5	100	5.0	5.0	39.75	1.9875
Total	500		20.0		\$ 7.95000

$$\frac{\$7.95}{20} = 39.75\phi, \text{ the "price per pound of fat."}$$

(29) Wisconsin Bulletin 276, "Correct Payment for Cheese Factory Milk" - J.L.Sammis, p. 7.

TABLE IV. Payments for Milk Based on the Average Yield of Cheese 30

Patron's number	Weight of milk delivered (pounds)	Fat test of milk	Yield of cheese containing 37 per cent moisture	Price per pound of cheese	Value of cheese at 15 cents per pound
1	100	3.0	8.30	\$.15	\$1.245
2	100	3.5	9.45	.15	1.14175
3	100	4.0	10.60	.15	1.59
4	100	4.5	11.74	.15	1.761
5	100	5.0	12.90	.15	1.935

TABLE V. "Yield Value" of Milk Compared with Fat Test Payments and Pooling System Payments

Patron's number	Fat Test (Per cent)	Payments figured by pooling system	Yield value of milk	Payments figured by the fat test
1	3.0	\$1.59	\$1.245	\$1.192
2	3.5	1.59	1.417	1.391
3	4.0	1.59	1.590	1.590
4	4.5	1.59	1.761	1.788
5	5.0	1.59	1.935	1.987

(30) Wisconsin Bulletin 276, Correct Payment for Cheese Factory Milk - J.L.Sammis, p. 12.

In the case of the pooling system, the total amount of money received for milk is divided by the total amount of milk delivered to the cheese factory. This, according to the above table, gives \$1.59 per hundredweight regardless of test.

"It was seen in Table V that by the fat test method, the payments are slightly too high for patron 5, and slightly low for patron 1. Adding .6 per cent to each patron's fat test corrects this error, and brings all patrons' payments into practically exact agreement with the 'yield' values of the milk. (Table VIII).<sup>31</sup>

TABLE VIII. Fat Plus Six Tenths Payments Compared With Yield Values

Patrons' number	Fat Test	Fat plus .6 per cent	Price of fat per pound	Payment to patron	"Yield Value" of Milk	Payments figured by fat test
1	3.0	3.6	34.565	\$1.2443	\$1.245	\$1.192
2	3.5	4.1	34.565	1.4171	1.417	1.391
3	4.0	4.6	34.565	1.5900	1.590	1.590
4	4.5	5.1	34.565	1.7628	1.761	1.788
5	5.0	5.6	34.565	1.9356	1.935	1.987
Total		23.0		\$ 7.9498	\$ 7.948	\$ 7.948

$\frac{7.95}{23}$  equals 34.565 cents, the "price per pound."

"As long as the patron's fat tests do not differ by more than .5 per cent from the factory average test, either the fat

(31) Ibid, p. 18.

test method or the fat plus six tenths method give practically the same payment, within less than 2 cents on the dollar. When some patron's test differs regularly by more than .5 per cent from the factory average<sup>32</sup> test, the new fat plus six tenths method is the one here recommended as the simplest means of avoiding both the small errors in payment to such patrons by the fat test, and the very large errors in payment by the pooling system."

Since the foregoing is only a convenient method of calculating a milk price which corresponds to cheese yield, it can have significance only when the cheese basis is used in making a price for market milk.

Price based on the net market returns to the dealer.

Where the producer and the distributor are not the same individual, such a plan would be uneconomic since it would make one entrepreneur bear the risks of another. The distributor could always stay in the business and shift his risks onto the shoulders of the farmer.

Where the producer and distributor are the same whether individually or as an association, then such a plan is what we should expect, for then the same individual is engaged in two businesses at the same time. A distinction should be made, however, in the returns from production and the returns from distribution so that it may never be necessary for production to bear milk distribution losses without full knowledge of it.

Prices contingent upon the prevailing price of milk in

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(32) Ibid, p. 19.

some large centers of consumption or at various condenseries, cheese factories or milk stations supplying some large market. This is just another kind of competing demand. If whole milk is used in a small town in a whole milk producing district, enough must be paid for it to keep it from going through the regular channels of trade to some one of the larger markets.

The commission plan. Although similar to collective bargaining, the commission plan differs essentially in that the representatives of the producers and representatives of the milk buyers are supposed to be parties not engaged in any form of the milk business, and hence it is supposed that they may be able to arrive at a right price without any showing of unfairness. This method, however, when carried into practice may prove unsatisfactory for the following reasons:

1. Men appointed on milk commissions are often those who are biased because they seek the favor of the people for political reasons.

2. They are often men who are not familiar with farming and with the costs necessarily involved in milk production.

3. They may be men who allow their personal interests as consumers to enter into their activities as commissioners.

The commission plan as it was worked out at the Chicago Milk Inquiry in 1917 seemed to illustrate the above points.

We are confronted, however, by the fact that at Detroit, Michigan, the commission plan produced satisfactory results for a

considerable period.<sup>33</sup> The important point, then, to be considered is why it worked out satisfactorily at Detroit and not in the Chicago territory. First of all, the original five men appointed by Governor Sleeper of Michigan to investigate conditions relative to the production and marketing of milk were all men who had either some agricultural or marketing connections and hence were no doubt quite familiar with the milk business. Of the remaining three people who sat on the Commission, the first was a Detroit business man designated by the Detroit Board of Commerce, the second a representative of the Detroit Federation of Labor, and the third a woman representing the Detroit Federation of Women's Clubs. Here there was a somewhat more equal representation of producers' and consumers' interests than in the case of the Chicago Milk Inquiry.

Furthermore, at Detroit the members of the Commission seemed to realize the importance of the situation and that both producers and consumers<sup>were</sup> passing through a period of uncertainty. There was perfect harmony of purpose. The fact that all were working in harmony and that both consumers' and producers' interests were pretty equally represented is without doubt the most outstanding reason for a satisfactory result. There was a realization that the price of milk was too low and that there was danger of too small a quantity of milk coming to the Detroit market during succeeding months. With that knowledge confronting them, it is logical

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(33) The Detroit Commission Plan of City Milk Administration. Special Bul. 99, Michigan Agricultural College Experiment Station - W.O. Hedrick and R.C. Anderson.

Since the issue of this bulletin the representatives of Detroit producers have been investigating price bases in various other markets with a view to finding a lasting remedy for their situation.

that they should recognize that the price of milk to the producer could be moved successfully in only one direction, and that upward. The important part of the procedure, however, was how far upward should the price be moved, for they wished an adequate supply of milk to come to the market, and wanted a fairly immediate response. The cheese basis was suggested and then rejected because the Detroit area was not a cheese producing area. The butter basis was suggested and rejected because it was contended that butterfat production is a different sort of dairy farming than producing city milk because those general farms selling butterfat were not inspected by city Boards of Health, and that they could arrange their production time to suit seasonal fluctuations in butter prices. Furthermore, it was contended that butterfat accounts for only about one half the food value of the milk. The above explains why they chose cost of production as a basis for making a price. They needed immediate results and cost of production produced them. As a result of their operation, the price of milk was raised from \$2.60 per hundredweight to \$3.35 per hundredweight, an increase of 75 cents on each hundredweight of milk, or an increase of approximately 29 per cent. The farmers were satisfied with the increase, and the dealers were still allowed their margin of profit. The consumer was informed virtually that since the price level had risen, he would have to pay more for his milk if he wished to get an adequate supply; and milk sold direct to the consumer was advanced from 12 cents to 14 cents per quart.

To sum up the Detroit situation, the factors that caused the Commission plan to work out successfully here were, first, that

the original five men on the Commission had either some agricultural or marketing connections and therefore understood the nature of the milk business. Second, after the Commission had been increased to eight members, both consumers' and producers' interests were very equally represented. Third, milk was looked upon as a public utility and each member of the Commission truly strove to get an impartial view of the whole situation. Fourth, cost of production as used on this occasion brought out a price that satisfied both producers and consumers for the time being, and harmony was maintained.

The Ratio or Index Method. The Ratio or Index method has been proposed as a means of working out milk prices, and the ratio element was actually used to some extent at the time of the Chicago Milk Inquiry in 1917. The Ratio or Index method is not practical, however, because it cannot be made an ultimate means of accurately and properly determining milk prices.

Mr. H. A. Wallace's book on "Agricultural Prices"<sup>34</sup> describes the method as follows:

"The fundamental idea of the ratio method is that the price of every product is determined in the long run by the price of some other product or products. The price of hogs is determined in the long run by the price of corn. The price of corn is determined in the long run by the price of land, labor, farm machinery and horse feed." He further says in a footnote to the above, "It may be argued that the price of

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(34) H.A.Wallace, Agricultural Prices, p. 57.



hogs determine the price of corn, and the price of corn determines the price of land. This to a large extent may be true and yet not interfere with the usefulness of the ratio method for purposes of price judging."

He illustrates his methods as follows:

"In order to allow the general public to judge of the merits of wage increases, strikes and price advances, it would be well if the ratio method might be applied to manufacturing and mining industries; for instance, in the case of coal, it might be shown (these figures are purely illustrative and possibly are wide of the facts) that 40 per cent of the cost of producing coal is labor, 20 per cent machinery charge, and 40 per cent risk, interest on investment and similar factors, which vary in just about the same ratio as the other two factors already mentioned. Distributing this 40 per cent miscellaneous charge, we get 67 per cent of the cost of producing coal represented by labor and 33 per cent by machinery charge. Now, assume that in 1920 the labor charge has advanced over the ten-year base by 90 per cent, and the machinery charge by 110 per cent. Multiply 67 by 190 and 33 by 210 and adding, we find that on this basis coal in 1920 should be about 94 per cent above the ten-year base. If the ten-year base is \$3.50 per ton, the proper price for coal in 1920 should evidently be somewhere around \$6.80 per ton." 35

The ratio method may serve as a practical guide, or as an indicator, but cannot be accurate as an instrument in price

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(35) Ibid, p. 59.

making, for the following reasons.

1. A change in the character of the population. Suppose that a change in the industries of the Twin Cities should bring in a great deal of the negro and foreign element of population, and as a result as many of the more refined classes of white people should move to other cities. Negroes and foreigners do not as a general rule use as much milk as the white people, and especially the better classes of whites. The ratio index method used at that particular time might have dictated a 'retail consumers' price of 13 cents per quart both before and after the change. Perhaps before the change, the total supply was demanded at 13 cents per quart; but afterwards perhaps only 75 per cent of that supply--the numbers of population remaining the same--would be demanded. This would necessarily throw our ratio-index method out of line, and in order to arrive at a right price, we should be forced to resort to the old idea of the making of a price point through the free operation of the supply and demand forces. In the above instance the present price would have to be replaced by a lower price owing to the change in the demand schedule.

2. A new demand may enter the field. Suppose that a given quantity of milk is demanded and supplied, the ratio method dictating 13 cents per quart, which happens to be a fair and necessary price. But suppose now that a distinctly new demand springs up in the form of a distributing of milk among school children at recess periods. If we may suppose a 10 per cent increase in demand for milk, such a demand not affecting in any way the factors entering into the index formula, then the ratio index method would

necessarily have to be cast aside, and supply and demand equilibrated at a new price point which in this case would be a price point higher than the previous one.

3. The use of substitutes may throw the price dictated by the ratio method out of line. As mentioned in a previous part of this discussion, it was shown among the poorer classes in New York City that when the price of milk became too high, such substitutes as coffee and cocoa are used. We might use cocoa here as a good illustration for several reasons. (a) Cocoa is not produced in the United States and therefore does not compete for American labor, the uses of American land, and very little or not at all for American capital. Consequently, it could not modify any of the factors by which a price for milk would be likely to be made through the use of the ratio index method. (b) It is quite palatable, very digestible, and somewhat nutritious and is therefore widely used. We may suppose that the ratio index method produced satisfactory results up to the point where milk became 13 cents per quart. At this point, cocoa which we shall assume could be put on the United States market at 10 cents per pound, would begin to compete as a substitute with milk at 13 cents per quart. Below 10 cents per pound no cocoa, we shall suppose, could be put on the market at all. Then let us suppose that the ratio method were satisfactory up to the price of 13 cents per quart; but when this price arrived, cocoa would begin to compete noticeably, and supply and demand would then not be equated at 13 cents, but necessarily at a lower price, which would throw the ratio index method out of line as in the previous cases. Whether cocoa were

an increasing or decreasing cost good should make no difference since its presence as a substitute would compel the supply and demand forces to become active in order to bring about a price which would clear the milk market.

If we consider this problem from the supply side, we are likely to find difficulties nearly as great as those already discussed. If in a period of rising prices labor advances much more rapidly than any other factor, then a price may be brought about which will be higher than that price which will clear the market. The same may be true of feed or any other essential factor which functions in a large way to influence milk production. On the other hand, during a period of declining prices, because of the entrance in a large way of these same factors, the price of milk may be lower than that price necessary to bring out an adequate supply.

The free operation of market supply and demand. This introduces the idea of short-time fluctuations. We cannot depend upon what we usually think of as short-time fluctuations in determining a milk price for milk production is not given to rapid changes. One cannot go into or out of the milk business in a few days or weeks or even in a few months without losing considerable money. Furthermore, what would be the length of a short-time fluctuation in the milk business? The producers' price seldom changes oftener than once each month. The consumers' price seldom changes oftener than once in six months. These periods do not seem very short as compared with our usual concept of short-time fluctuations. Beneath these short-time fluctuations which are most

noticeable there are long-time fluctuations or price trends. For the producer, this trend tends more to follow the seasons. The consumers' price trend tends to show up in the passing of years.

Our interest in the producers' price lies chiefly in the long-time fluctuations or in the trend; for it is upon the trend of prices that the producer must depend in order to stay in the dairy business.

The expression "free operation of supply and demand", usually applies to prices in the grain or livestock markets, depending largely on short-time fluctuations of the market. In the livestock market, price on a particular day is made in accordance with the condition of the existing short-time fluctuation of the market, and when the animal is sold, he is gone entirely and forever. There are seasonal high points, it is true, but even if the cattle grower takes advantage of those, he cannot always be assured of "breaking even" or better each year. Although short-time fluctuations occur in the producers' milk price from month to month, the trend is to him even more significant since only a part of his year's volume of milk may be marketed each month.

The various means of arriving at a market milk price which have been discussed here, may generally be placed in two classes:

1. Those methods which trace prices back to their ultimate source, which is value through the utility of the product to the consumer.

2. Those methods which trace price back to the value of the land, feed, labor, or something else used in milk production.

The methods of the first class offer fully as many difficulties as those of the second, but the price is usually more satisfactory when worked out. Cost of production and the ratio methods belong to the second class and are valuable only in that they indicate whereby one may come somewhere near right price in the beginning, and thus eliminate to some extent the amount of balancing involved in the process of arriving accurately at a right price.

There are two essentials, however, which I believe must function in the process of making a whole milk price in any market. They are: (1). Collective bargaining which tends to give the forces of supply and demand their full opportunity to operate. (2) The ultimate functioning of one of the means of price making which is truly economic, e.g., competing with butter, butter and cheese, or competing with corn in the Corn belt, wheat in the Wheat country, or cotton in the Cotton belt. All these are based ultimately on utility.

The Twin City Milk Producers' Association is employing both of the above principles in the present method of making a price for milk. At present the combination butter and cheese basis is used.

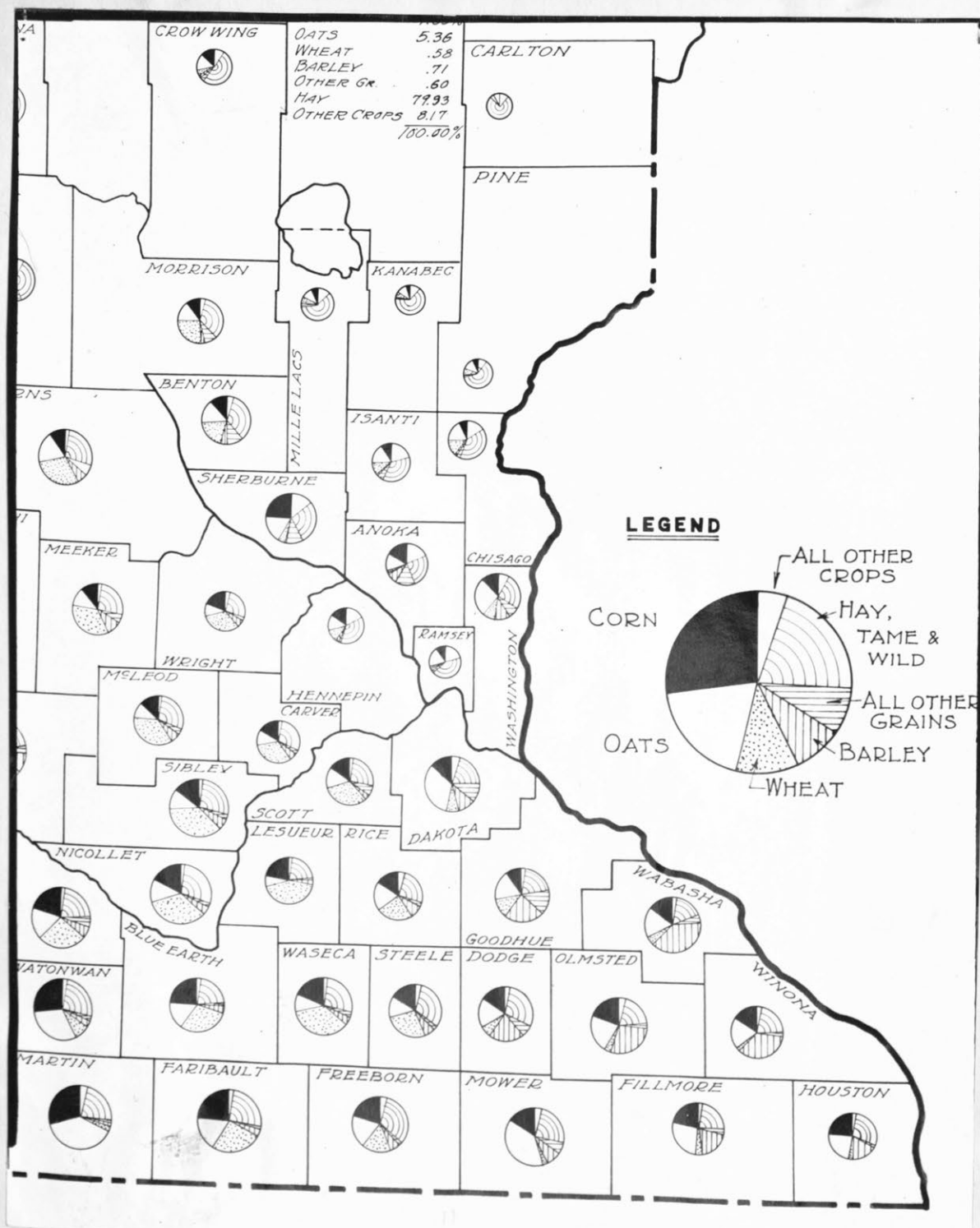


Figure II. PERCENTAGE OF CROP ACRES IN VARIOUS CROPS BY COUNTIES, MINNESOTA, 1910 CENSUS

## CHAPTER IV

### CONDITIONS IN THE TWIN CITY MARKET AREA

Before considering the price system best suited to the Twin City area, we must take account of the special conditions prevailing here. We will consider this under three heads, namely, production, distribution and consumption.

#### Production Condition

The area about the Twin Cities in which milk is produced, should, as a matter of convenience in discussion, and also as a matter of market significance, be divided into two parts:

1. That territory included by the counties from which milk now actually comes to the Twin Cities for direct consumption, either through the Association, or through independent distributors, and which constitutes actual supply territory.

2. All territory shown in the map in Figure 1 outside the counties included in No.1, where milk is also produced, although usually not in such great quantities, which is capable of becoming supply territory as the Twin Cities grow, or in case the supply fails in the natural supply territory. This we shall designate as potential supply territory.

Let us first consider the actual supply territory. It is not possible to divide the area about the Twin Cities into precise zones, but a rough division can be made on the basis of



zones, and which offer the keenest competition to milk production.

In the first zone about the Twin Cities, which extends out for a distance of approximately five miles, market gardening and truck farming prevail. A few dairy cattle are usually kept, but these are not the principal source of income. Dairying is really a supplementary enterprise. Dairy cattle seem to serve in this case to supplement the income from other sources, since there are usually some wastes that cows can consume to pretty good advantage, such as sweet corn stalks, in some cases a small amount of cabbages not sound enough for market, and grass from idle spots about the farm. Furthermore, cows serve to give winter employment to the farmer. In territory of this kind, it is quite the usual thing to find a predominance of grade Jerseys and Guernseys, with some grade Shorthorns and a few Holsteins. Quality rather than quantity seems to be the prevailing desire in this part of the territory due principally to the fact that home use is the first consideration, only excess milk being sold to the Twin Cities.

In the Twin City territory, the modal truck farmer who ships milk to the city through the Milk Producers' Association produces very little more than 50 pounds per day. (37)

There are also in this zone about seventy men known as butcher dairymen. It is customary for them to purchase fresh cows at the South St. Paul stock yards, <sup>and</sup> feed them well during lactation, so that when they are near to drying they are in good condition to return to the market. Of this number of farmers, there are about

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(37) Estimate given by H.R. Leonard of the Twin City Milk Producers' Association.

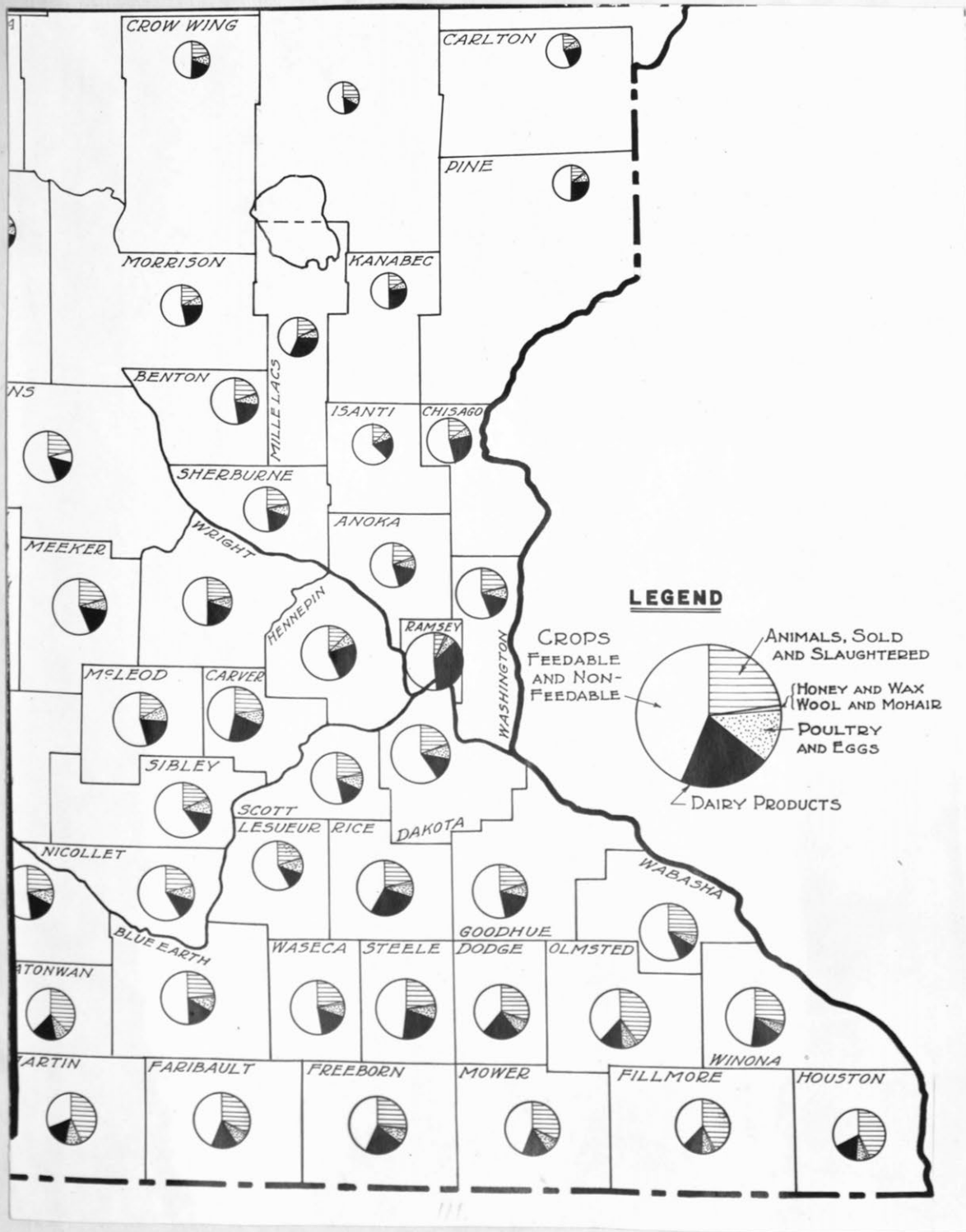


Figure III. PERCENTAGE OF GROSS FARM INCOME FROM VARIOUS SOURCES. BY COUNTIES, MINNESOTA, 1910 CENSUS.

eight or ten who sell their milk through the Milk Producers' Association. The majority of the others run their own distributing wagons into the city. Since the cows used by these men are purchased at the stock yards, they get more grade Shorthorns than any other. The truck farmers and butcher dairymen each produce nearly 50 per cent of the milk supplied by this territory.

In the territory described above, only about 10 per cent of the farmers receive their main income from milk. The remaining 90 per cent receive their main income from truck.

The second zone includes the area from five miles to twenty miles out of the city. In this territory, the farms are larger, and tend to approach the diversified type. The map in Figure III shows that in general twenty per cent of the receipts come from dairy products, and the greater part of the remainder from hay and grain. Dairying is here one of a group of complementary enterprises. In this area, generally speaking, the cattle are more uniform in type. They range from grade Shorthorns to grade and some purebred Holsteins, but tend strongly toward Holstein blood, for this is the territory in which the greater part of the Twin City milk supply is produced.

Out beyond the second zone, relatively few farmers have specialized in dairying, the greater number of farms being classed as diversified, the grade Shorthorn again predominating. In the third zone the dairy enterprise becomes more of a supplement than a complement to the other parts of the farm business, since the cattle to a large extent depend upon surplus roughage. Furthermore, the dairy operations can be successfully carried along at

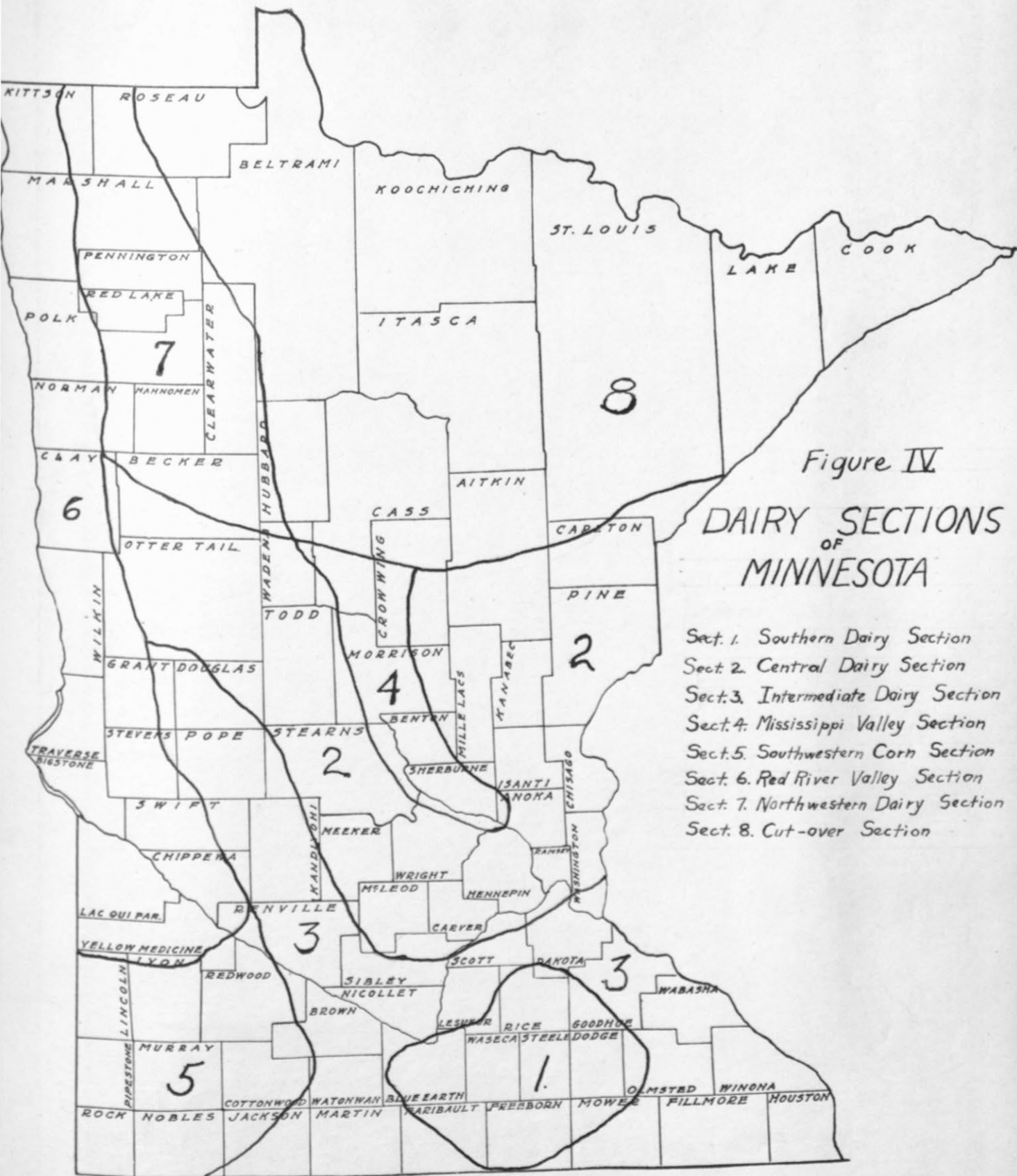


Figure IV  
DAIRY SECTIONS  
OF  
MINNESOTA

- Sect. 1. Southern Dairy Section
- Sect. 2. Central Dairy Section
- Sect. 3. Intermediate Dairy Section
- Sect. 4. Mississippi Valley Section
- Sect. 5. Southwestern Corn Section
- Sect. 6. Red River Valley Section
- Sect. 7. Northwestern Dairy Section
- Sect. 8. Cut-over Section

the same time with the other farm operations without any serious interference with the labor required for those other operations.

It is apparent that a discussion of the area by zones serves only to give a rather general idea of the relation of the business of milk production for city use to other forms of the farm enterprise. In reality there is much overlapping of these zones, principally because the dairy business tends to follow railroad lines where the farmers can ship daily.

Probably a little more accurate method of presenting distribution of the various combinations of farm enterprises will be to follow the sections in the map in Figure IV. Sections 1, 2, 3, and 4 at present contribute the entire city milk supply, and a great deal in addition.

Section 1. Southern Dairy Section. In this section less than half of the receipts are from the sale of crops, and much the larger proportion of the livestock receipts are from dairy products and sales of cattle. This makes it an intensive dairy section. Hogs are raised in combination with dairying, but they do not constitute the larger enterprise. The corn acreage is about 20 per cent of the total. The cash crop is spring wheat, except in Dodge County where it runs strongly toward barley. It is evident here that the complementary idea in enterprises runs strongly, everything being built around milk production as the central and most important enterprise on the farm.

In this area there are four stations from which the Twin City Milk Producers' Association get their supply, forty-four

stations where creameries are supplied, and seven stations where cheese factories are located. This section embraces all of the entire area of the three counties of Waseca, Steele, and Dodge, and parts of Mower, Olmstead, Goodhue, Dakota, Rice, Le Sueur, and Blue Earth counties. No independent distributor buyers receive milk from this section.

Section 2. Central Dairy Section. Receipts from sales of crops range from 50 to 65 per cent of the total receipts. This is also true around the Twin Cities. In the southwestern counties in this section, spring wheat is sold in large quantities. The livestock receipts are very largely from dairy products and sales of cattle.

Twelve stations in this area send milk shipments through the Twin City Milk Producers' Association. Independent distributor buyers receive shipments from thirteen stations, there are creameries located at one hundred nine stations and milk is sent to cheese factors at only four stations in this area. The part of section 2 in the supply territory includes the entire area of Pine, Chisago, Ramsey, Kanabec, Isanti, and Carver Counties and also parts of Carlton, Mille Lacs, Crow Wing, Morrison, Benton, Sherburne, Anoka, Washington, Dakota, Scott, Sibley, McLeod, Meeker, Wright, Renville and Stearns Counties.

Section 3. Intermediate Dairy Section. In the southeastern counties barley is an important cash crop. Corn is not very important because of the rough rolling topography and heavy clay soil. The receipts from dairy products and sales of cattle are very important. Relatively speaking, this is a beef cattle

district. In general this is a section where intermediate conditions prevail. Here oats, spring wheat and barley are the main cash crops and the larger proportion of the cattle are of the dual purpose type.

In this section we again find some stations making city shipments. In this territory, milk from four stations is marketed through the Twin City Milk Producers' Association and three stations supply independent distributor buyers. Seventy-seven stations show creamery locations and there are cheese factories at eight stations. In the area there are the entire counties of Fillmore, Winona and Wabasha. In addition there are parts of Olmstead, Goodhue, Dakota, Scott, Le Sueur, Sibley and Renville Counties.

Section 4. Mississippi Valley Section. This narrow strip of territory consists of sandy land in the Mississippi River Valley and is largely given over to potatoes, rye, and the small grains. Dairy receipts are a very important source of income, however.

Section 4 indicates three stations which supply milk to the Twin City Milk Producers' Association, there are sixteen stations which show creamery locations, and only one station showing the location of a cheese factory. No independent distributor buyers operate in this territory. This section includes parts of Crow Wing, Morrison, Benton, Sherburne, Anoka, Hennepin, Wright and Stearns Counties.

A still more detailed idea of the actual supply territory may be presented in description by counties. In Washington County<sup>(38)</sup>

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(38) The information as to counties was mostly supplied by Mr. H. R. Leonard, Manager of the Twin City Milk Producers' Association.

dairying is usually combined with hay and grain production. The typical farm in this county has from ten to fifteen cows. The quarter section farm seems to be the prevailing size but there are a good many eighty-acre farms. (39)

In Ramsey County, most of the milk is produced in small quantities since the main source of income here is truck. A great many of the farms here are forty-acre farms with from four to six cows.

In Dakota County, the milk-producing area follows the railroad. It is necessary, especially in districts farther out from the city, that direct and adequate train service be available for milk shipment in order to get the product to the distributor in good condition. In this county, as in Washington County, the farms are of good size, and the majority of farms are diversified. The modal farmer here keeps about twelve cows.

In Rice County, there are two distinctly dairy communities. On the farms about Northfield, approximately 60 per cent of the income of the farm business is derived from the sale of dairy products, this being one of the most important regions from which milk comes to supply the city trade. About the city of Faribault, practically all milk produced is sold to the Faribault Condensary. There are many one hundred and sixty-acre farms in Rice County. Rice County is one of the foremost centers in Minnesota for the production of purebred Holstein cattle.

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(39) Thirteenth Census of the United States. 1910. Abstract with Supplement for Minnesota, p. 655.

Size of farm	20-49 acres.	-	304 farms.
	50-99 acres.	-	544 farms.
	100-174 acres.	-	600 farms.
	175-259 acres.	-	205 farms.



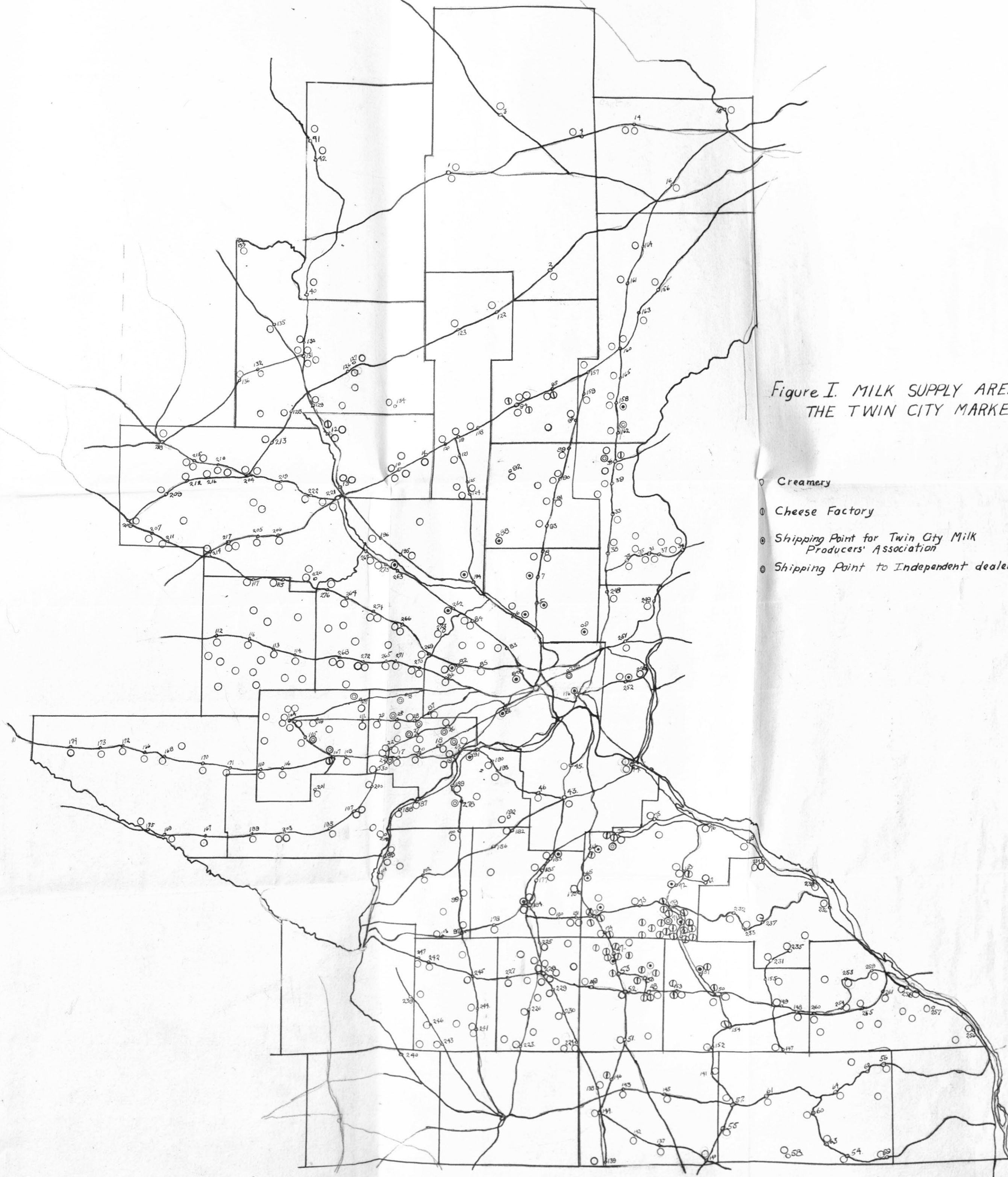


Figure I. MILK SUPPLY AREA FOR THE TWIN CITY MARKET, 1920

- Creamery
- ⊖ Cheese Factory
- ⊕ Shipping Point for Twin City Milk Producers' Association
- ⊙ Shipping Point to Independent dealers

In Goodhue County, the milk-producing territory is again found to follow the railroad line. The principal points which send milk to the city from this county are Dennison, Stanton, and Cannon Falls. These farms are about the same as those in Washington County, there being many quarter section farms, and the modal farmer keeping about twelve cows and getting the remainder of his income from grain and some hay.

Hennepin County has a large number of medium-sized farms, the majority of farms supporting about eight cows under the present system. The modal farm here is probably about eighty acres in size.

In Anoka, Sherburne, Chisago, Scott, Wright, and Carver Counties, the farms are of approximately the same size as those in Hennepin County, but in the majority of cases about six cows per farm are kept. The map in Figure II shows that parts of Anoka, Sherburne, Wright and Hennepin Counties lie within the potato-producing area, which partly serves to account for the combination of dairying with potato growing in this section. To some extent dairying and potatoes serve to supplement each other, especially where winter dairying is done, and to some extent they become complementary by virtue of excess roughages consumed and manure produced which may be used on the land which eventually goes into the main crop, potatoes.

Comparison of Figures I and IV shows that the potential milk supply territory is also all in Sections 1, 2, 3, and 4. Thus there will never be any difficulty in getting sufficient milk to supply the Twin Cities with whole milk. Practically the

only question lies in educating outlying producers into taking sufficient care to produce a suitably clean milk for the market.

In this outlying or potential supply territory, dual purpose cattle are more generally found than in the territory now actually supplying the market with whole milk. This is due partly to the fact that they continue to produce fairly well with less care than a distinctly dairy type of cow, and partly to the desire of the farmer to have a cow which at drying time may be in such condition that she will bring a good price in the market.

Analysis of Farming Systems: The usual systems of farming in the area in question involve some sort of combination of small grain, corn, and hay, and dairying. It is worth while to see how the enterprises fit together. In regard to labor, the dairy cattle to some extent compete with crops during the growing season, especially in spring time before the pasture season begins. During the time that cows are on pasture, however, this competition for labor is not so serious. In a case of this kind, however, dairy cows must, especially in the areas of level country, compete very markedly for land, since in those localities the pasture land is of such a nature that it could easily be plowed up and put into either corn, or some profitable small grain. As for capital, cattle require warm shelter, and there is an investment in the cattle themselves; but generally speaking this can not be said to interfere with growing the crops mentioned. At certain times of the year, particularly when cows are freshening there may be some competition for management; but generally speaking, managerial ability on the farm is not a limiting factor.

Where winter milk production is the rule, there is probably less competition between the factors of production than where summer milk is produced. The same analysis in general applies to combinations with market gardening and truck farming. Labor no doubt is the one factor in practically every case that serves to limit the combination of other crops with dairying. But so far as winter is concerned, milk production can, so far as labor and management are involved, be considered largely as a supplementary enterprise. As regards the utilization of second quality grain and hay, unsound cabbages and sweet corn stalks from which the green ears have been snapped, the dairy enterprise becomes supplementary to the other enterprises of the farm.

The way in which the combinations of dairying with crops works out depends upon the extent to which a farm specializes in dairying. The dairy enterprise, as has been previously brought out, may be conducted almost as a sole enterprise or it may be conducted in combination with many other enterprises. Usually the more specialized the farming carried on with respect to dairying, the truer to dairy type and breeding are the cattle demanded by the producer; for as he approaches specialization in milk production, he wants cows that will satisfy most fully his singleness of purpose. When farms are highly specialized, as where milk is produced for city consumption, more and better equipment is required, also better management and more attention to production technique. This is because city milk has special sanitation requirements and because profitable production requires unusual attention to the feed and care of the herd.

Hence, the more specialized the dairy production, the more intelligent the type of men in the business. Such men find it worth while to put efficiency even into the details of their work. By far the greater part of the farm income is obtained from the dairy herd, and here is where they must make their success.

Where dairying is less specialized, usually less care is given to the herd and a less efficient type of men are found handling dairy cattle. There will also be less equipment, because a small dairy enterprise cannot afford labor-saving equipment. More rugged cattle are kept and these do very well with fewer comforts.

One is surprised to find after all how small a proportion of the milk produced in the actual supply territory is sold as market milk, as compared to what goes to cheese factories and creameries. Price competition is not the only kind of competition that must be met. Following are some other factors which must be included in comparing butter, cheese and market milk as alternative outlets for milk:

1. Does the creamery, cheese factory, condensary, ice cream plant, powdered milk plant or centralizer offer any special inducement, such as return of skimmilk or whey at a reasonable figure for feeding purposes?
2. Quality requirements.
3. Personal preferences of the farmer as to care in production.
4. Extra hauling charge incurred by having to deliver city milk every day.
5. The inconvenience of always meeting the early morning train.
6. Inconvenience of dealing with parties so far from home.

7. The chance of unusual can loss in shipment.
8. Advantageous disposal of surplus and sale of shortage during those periods.

Effect of Nationality of Producers: Many of the producers in the Twin City area or their ancestors have come from milk-producing countries in Europe, and most of the nationalities predominating are known for their habits of diligence and thrift, which characteristics go well with the business of milk production. In the following table are given the three leading nationalities of foreign born and the three leading native white of foreign parentage in the most representative counties of the supply territory.<sup>(40)</sup> The predominating nationalities here are German, Swede, Norwegian and some Irish, with a few Danes, Finns, Austrians and Russians. As a usual thing, the Germans, Swedes, and Norwegians make some of the best dairymen, because they are diligent, thrifty, and can stand a considerable amount of physical work.

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(40) Thirteenth Census of the United States. 1910. Abstract with Supplement for Minnesota.

Table VII

## Leading White Nationalities Represented in the Supply Territory.

County	Nationality														
	Foreign White						Native White of Foreign Parents								
	Sweden	Norway	Germany	Denmark	Austria	Finland	Russia	Canada	Holland	Sweden	Norway	Germany	Ireland	Denmark	Austria
Anoka	1142	333	385							1160	299	595			
Carver	688		2259						121	830		4313	183		
Chisago	3760	89	321							4329		515	67		
Dakota	771		2349		539					709		3838	1155		
Hennepin	28127	16971	10377							2367	14790	19942			
Isanti	3941	83	287							4419	75	501			
McLeod			2271	389	920							4104		436	1240
Ramsey	11748		14845				4381			11813		24930	8950		
Rice		932	1448		574						1272	2589			1129
Scott		196	1355		502							2717	667		733
Sherburne	624	346	330						Not	667	410	537			
Washington	2203		1823						French:						
									681						
Wright	2287		1895			477				2568		3104	552		
										2684		3472	387		

Figures taken from Thirteenth Census of the United States. 1910 Abstract with Supplement for Minnesota, Table I pp. 606-623.

Elasticity of Supply: Elasticity of supply in any product must be considered (a) from the point of view of changes in supply out of stock, and (b) from the point of view of changes in supply out of new production. In the case of milk, stock must be considered to include milk which is being produced from day to day under the conditions then prevailing, in either the actual or potential milk-producing territory. A change in price will ordinarily affect the supply forthcoming either out of stock or out of new production, depending upon the apparent permanence of the change in the price relative to changes in prices of other things including labor. The change in price of course follows a change in demand. This change in price is necessary to equate this new demand with supply. If there is reason to believe that the relative change in demand is temporary, only supply out of stock will be affected, that is, milk will be brought in from other uses or from new territory. If there is reason to believe that either a permanently new demand has been established or that some demand of long standing has been permanently cut off, then supply out of what is termed new production will be affected. If the price falls, of course there will be a decrease in the actual amount of producing stock retained on the farms. Even a temporary increase in price, however, may be handled out of new production to some extent, as indicated by following:

1. By feeding fresh cows a little more carefully and a little more liberally than before.
2. By retaining worn-out cows in milk a little longer before sending them to the packer.



If the price declines temporarily, one may

1. Raise more calves on the cheaper milk.
2. Sell off the worn-out cows a little earlier.

There are certain temporary conditions that effect supply and demand. Thus weather conditions from day to day or week to week may enter in to change supply without any price change. They inconvenience distributors' and producers' associations at times but others are not important.

Seasonality of supply is of more significance. There is a definite seasonal relation between supply and demand in all markets, and prices must be averaged so as to take care of this variation in seasonal production, so as to hold production as nearly in line as possible with actual city demand. The prices are so set as to induce the farmer to make an effort to control production so as to take as great advantage as possible of the high points in the year's milk price schedule. If the price rises owing to the permanent establishment of some new demand, a new supply will presently be coming out of new production. It may come in any of the following ways:

1. Worn-out cows will be held longer in the milking barn before being scrapped.
2. Milk cows may be fed more heavily.
3. A change in the relation between the factors of production in the farm enterprise may be made necessary. Perhaps labor-saving equipment may be installed.
4. Assuming that milk has become by far the most profitable of farm enterprises, it will tend to replace to some extent some other farm enterprises formerly engaged in; particularly in the case of farms on the extensive margin.

5. The barriers of custom and personal preference will on the diversified farms be broken down in some cases and those farmers will begin to get into the dairy enterprise to stay.
6. Wellgrown heifers will be bred to freshen a little earlier, and there will be a tendency to work more rapidly toward purebred or high-producing grade dairy stock in the territory affected.
7. The factor of production time will become a more significant factor here than in the case of temporary change, and will constitute the length of time required to raise a heifer and get her to the point where she will begin to produce milk.

If there is a permanent decline in the price of milk,

1. Some of the marginal farmers will seek another better opportunity.
2. Many worn-out cows will be scrapped which otherwise would not have been disposed of.
3. In such a case as this, probably there would be little or no extra calf raising since the period of decline is too long to warrant it, but on the other hand only the highest producing cows will be maintained.
4. Here again, there will probably be some shift in the relationship between the factors of production employed, and some dairy farms may become diversified.

With a decline in price, we should expect the dairyman on the intensive margin to suffer the greatest loss, since he has staked all on the one enterprise, has no other source of income, and is not turning any surplus roughages into milk as is the farmer on the extensive margin.

With a rise in price, however, the man on the intensive margin would make the greatest relative gains in business since he is concentrating on the one enterprise.

### Demand Conditions

Elasticity of supply expresses one series of influences in the production and marketing of a quantity of milk. Elasticity of demand expresses another series of influences which function with elasticity of supply in such a way as to always clear the market.

Up to the present time no milk consumption surveys have been taken in the Twin Cities to determine amounts of milk consumed at various seasons of the year, by various classes of people, during periods of rising or falling prices, or under conditions which would tend to show the relation of milk consumed at a given price to the level of wages or in relation to the prices of milk substitutes. Some data are available, however, which bear on these questions. Also a few surveys have been made in somewhat similar cities.

Minneapolis. Conditions of milk consumption in Minneapolis may be expressed in a fairly comprehensive manner, even though no survey has been made. In the following table is shown the amounts of the various types of sales of milk and cream by the various milk distributors. The totals also give one a good idea of the prevailing size of business of the individual milk distributors located here. The figures here given were taken between August 4 and August 18 inclusive, 1920.

Table VIII

Daily Milk Consumption in Minneapolis as Indicated by the Daily Volume of Distributors' Sales. (5)

Distributor	Wholesale		Retail		Totals	
	Bulk gallons	Bottled gallons	Bulk gallons	Bottled gallons	Milk gallons	Cream gallons
A	350	600	---	250	1200	350
B	1000	3000	---	3000	7000	1000
C	60	800	---	400	1300	60
D (4)	200	700	---	1300	2200	200
(1) E (4)	40	8000	---	1200	2000	150
F (4)	40	600	---	1500	2260	120
G	--	60	---	240	300	35
H (2)	45	200	---	400	700	90
(3) I (4)	120	360	---	1320	1800	220
J	--	22	---	278	300	15
K	25	425	---	350	800	50
L	50	--	---	950	1000	100
M	500	4500	---	200	5000	300
N	100	200	---	100	400	25
O	--	--	---	450	450	20
P	--	175	---	175	350	10
Q	40	900	---	900	1800+	100
R	500-600	250	---	2400	3200	400
S	5	6	---	289	300	40
T	25	225	---	550	800	35
Total	3150	21023	---	16252	33160	3320

- (1) Wholesale Bulk Cream 50 gallons
- (2) Butter Sales 100 pounds
- (3) Butter Sales 300 pounds, 150 gallons Buttermilk, and 2 cases Certified Milk
- (4) D, E, F, and I are branches of the same management
- (5) Figures obtained from the Minneapolis Health Department.

The totals show the following to be consumed in Minneapolis daily:

(a) 3150 gallons wholesale bulk goods for hotel trade, and a part of the restaurant trade. In some restaurants, milk is served in individual bottles.

(b) 21023 gallons wholesale bottled goods for the grocery store trade and the remaining part of the restaurant trade. There are no retail bulk sales since the city does not permit the sale of "dipped" milk to retail customers.

(c) 16252 gallons of retail bottle goods, the amounts delivered direct to the house from the wagon in units of one pint, one quart, or any multiple of these units.

(d) The cream figure, 3320 gallons, is not divided so as to distinguish between the amounts going to the wholesale and the amounts going to the retail trade.

Many of these companies also sell buttermilk, butter, ice cream, and I believe at times, cottage cheese. Very little record of this is given here, but in a few cases the sales of these products are sufficient to make quite a substantial addition to the income of the business. In addition to the amounts of milk given here, one half a delivery wagon load of retail milk is delivered in Minneapolis by a St. Paul distributing company. This would probably be not over 25 or 30 additional gallons daily.

St. Paul. In the city of St. Paul, the milk business has apparently not reached the stage of concentration of the distributing business into a comparatively few large concerns.

The city is still served by many comparatively small dealers, about one hundred of them in all.

Approximately 25,000 gallons of milk are consumed daily in St. Paul, one third of this amount of milk being sold as raw milk. Further than this, no data can be obtained relative to the amounts of milk consumed there, since no surveys have been conducted. (42)

As regards the character of the population of the Twin Cities according to nationality, the figures in Table IX, although over ten years old, should be representative. These figures are given as percentages of the total population and combine foreign-born with native-born of foreign parentage.

Table IX

Leading Nationalities in the Twin Cities (43)

Nationality	Percentage	
	Minneapolis	St. Paul
Sweden	26.1	16.4
Norway	16.9	6.2
Germany	14.8	30.5
Canada - Other	6.8	5.0
Ireland	6.7	11.3
Austria	5.2	5.5
Russia	4.4	4.7
England	3.7	3.7
Canada - French	2.5	2.3

(42) St. Paul Health Department.

(43) Thirteenth Census of the United States, 1910 Abstract with Supplement for Minnesota, p. 604.

In the Twin Cities as in most cities, the greater part of the population is employed in industrial and mercantile establishments and represents what is generally known as the "working classes". Standard grade milk constitutes for the most part the quality demanded, the certified milk business here being of extremely small proportions.

Rochester, N.Y. Conditions in Rochester, New York, probably approach conditions in Minneapolis and St. Paul more nearly than those existing in any other city in the country which has thus far been surveyed with any degree of completeness. In population, however, the resemblance is not very striking. In Rochester, of the 1,330 families visited, the nationalities are distributed as follows: (44)

"American - - - - -	691	Austro-Hungarian -	10
Italian - - - - -	243	French - - - - -	8
German - - - - -	100	Greek - - - - -	1
Jewish - - - - -	56	Swiss - - - - -	2
Canadian - - - - -	43	Belgian - - - - -	1
Russian - - - - -	45	Danish - - - - -	3
Irish - - - - -	33	Colored - - - - -	2
English - - - - -	26	Roumanian - - - - -	3
Polish - - - - -	25	Swedish - - - - -	1
Holland - - - - -	17	Assyrian - - - - -	1
Scotch - - - - -	10	Not Reported - - -	9"

Thus a larger proportion of the population is from Southern Europe than in the Twin Cities. Also there are more Jews and Russians.

The conclusions to be drawn from the Rochester work are various and interesting. It is quite apparent, first of all, that there is no relation between size of income and the total number

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(44) Rept. of Rochester Milk Survey by the Committee on Public Safety of the Common Council. Charles E. North, Director. p. 35. Published December, 1919.

of persons in a family. There are, however, a greater number of children under one year of age, and up to six years of age, in the families having small incomes than those in the families having larger incomes. Up to six years of age, children probably drink more milk than later in life. Between the ages of seven and sixteen, there does not seem to be any definite gradation between size of income and number of children per family except that the greatest number does appear in the case of the families having the lowest incomes. This is no doubt a recurrence of the low standards of living that often accompany people having the lowest levels of income. All the way through, however, the figures show a less number of children per family in the case of those receiving the higher incomes.

The relative position of milk in the food budget of families of various incomes is shown in the following table. (45)

Table X  
Relation of Income to Food Expense and Milk Expense

Income Per Week	Average	Number of families	Amount spent weekly for food	Per cent of total income for food	Amount spent weekly for milk	Per cent of total income for milk	Per cent of food expense for milk
Under 20 . . . . .	\$16.17:	174	\$10.38:	64.2%:	\$.90	5.6%:	8.7%
20 to 24 . . . . .	21.58:	237	12.81:	59.4%:	1.12	5.2%:	8.7%
25 to 29 . . . . .	26.48:	236	14.43:	54.5%:	1.36	5.1%:	9.4%
30 to 39 . . . . .	32.77:	218	15.62:	47.7%:	1.46	4.5%:	9.3%
40 to 49 . . . . .	47.18:	144	15.59:	33.0%:	1.47	3.1%:	9.4%
50 and over . . . . .	56.08:	86	19.97:	35.6%:	1.87	3.3%:	9.4%
Income not given: -----		235	16.79:	-----	1.57	-----	9.4%

(45) Report of Rochester Milk Survey by the Committee on Public Safety Report of Rochester of the Common Council, Charles E. North, M.D. Director. p. 36.



There is evidently a definite relation between the per cent of total income spent for milk and the size of income, the per cent being greatest for the families of small incomes. This may be explained in two ways:

1. There are more children, especially young children in those families having small incomes.

2. Families having a small income spend a greater per cent of their income for foods.

This is a verification of Engel's laws of consumption. The absolute amount of money spent for milk, however, increases definitely with size of income, although, of course, at a decreasing rate as income gets larger. The families having small incomes, even though spending a greater percentage of income for milk, do not use milk quite as liberally per capita as do the more well-to-do families.

The proportion of the food budget spent for milk, however, does not vary greatly with incomes. Families having the lowest income, under \$20 per week, spend 8.7 per cent of the food budget for milk. Families receiving the highest income, \$50 and over per week, spend 9.4 per cent of the food budget for milk. One reason for this showing is that milk has a great variety of uses and may be used in expensively made foods as well as for drinking purposes. \* This indicates that milk is not merely a necessity - it is a comfort or luxury also. Milk seems to be added to the budget at about the same rate as the more expensive foods which we usually class as luxuries; this makes the percentage of total food cost spent for milk remain quite nearly the same even with an increased expenditure for milk.

Further evidence of the same general sort is the following: (46)

Table XI  
Relation of Income to Amount of Milk Used

Per Week. Income	: Quarts of milk used: per day	: Quarts of milk: per child per day for drinking	: Quarts: per capita	: Per cent of families using no milk	: Percentage of required amount of milk used*
Under 20	: 1.03	: .19	: .19	: 17.8%	: 31%
20 to 24	: 1.22	: .20	: .22	: 8.4%	: 28%
25 to 29	: 1.51	: .24	: .27	: 4.2%	: 48%
30 to 39	: 1.54	: .26	: .27	: 5.0%	: 50%
40 to 49	: 1.48	: .24	: .28	: 2.9%	: 54%
50 and over:	: 1.87	: .39	: .34	: 2.4%	: 69%
Income not given	: 1.60	: .32	: .35	: 4.2%	: 71%

\* The amount of milk required was calculated from the standard of the Association for Improving the Condition of the Poor, New York City. The standard is as follows:

- Children under 6 years - - - One quart
- Children 6 to 16 years - - - One-half quart
- Adults - - - - - One-third quart."

The child of the workman having the income under \$20 per week drinks .19 of a quart of milk daily while the child of the man who earns \$50 per week and over drinks .39 of a quart of milk daily. Thus the child of the lowest paid class of workman gets 31 per cent of the milk which health standards recommend, and the child of the man in the highest paid class receives 69 per cent of the health standard recommendations.

No data are given here relative to the increase or decrease in the amount consumed with a price change either up or down. It is quite apparent, however, that milk may be classed as

(46) Ibid. p. 37.

a necessity and must have a relatively inelastic demand. We further know that up to this time no thoroughly satisfactory substitutes for whole milk have been found. If the price of milk goes up, the greatest hardship is worked on the poorer classes. Here, therefore, is the place to expect the greatest decline in consumption and the low-income classes in nearly every city constitute the majority of the population. Consumption must therefore fall off somewhat as the price rises. A further interesting fact is that by far the greater number of families who use no milk at all, are among the poorer classes.(47)

Philadelphia. The city of Philadelphia corresponds in general rather closely to Twin City conditions in that Philadelphia contains a large proportion of industrial population. During 1917 and 1918, data were compiled to determine the conditions of milk consumption in Philadelphia. The following gives some conception of the results of this investigation: (48)

"The consumption of milk in a family depends upon whether wages are rising or falling as well as upon the trend in the price of milk. Miss Ethel Rupert, of the Society for Organizing Charities in Philadelphia, took responsibility for a report - - - as to whether the poor people in the city of Philadelphia were decreasing milk consumption because milk had increased in price. Her study was made in April and May of 1918. Data were secured from a total of 1,130 workingmen's families in the city of

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(47) Ibid.

(48) Clyde L. King. "The Price of Milk". p. 43.

Philadelphia. Comparisons in wages and milk consumption were made with a similar period in 1917. During this year, milk had advanced from 12 to 13 cents per quart. The results were as follows: (49)

Table XII  
Relation of Milk Consumed to Wages in Wage Earners' Families in Philadelphia

Number of families	Percentage of total	Income increased or decreased	Average wage 1918	Average wage 1917	Avg. increase or decrease in wage	Avg. amount of milk used	No. of families increasing use of milk	Percentage of total	No. of families decreasing use of milk	Percentage of total	Families making no change in milk used	Percentage of total	Families taking no milk
114	10	Unknown	---	---	---	2.5	34	30	31	27	46	40	3
128	11	Decreased	15.02	21.45	6.43	2.3	26	20	44	34	45	35	13
234	21	Stationary	19.00	19.00	--	2.6	65	27	70	29	82	35	19
654	58	Increased	22.31	15.86	6.46	2.6	201	30	194	29	228	35	31

"This was a year in which wages generally were increasing. When wages advanced, there was a slight tendency to increase the use of milk; and a slight tendency to decrease the use of milk when wages did not keep pace with living costs. When wages remained stationary, milk consumption remained stationary. The significant point, however, is the number that made no change, (50) whether wages increased or decreased. Milk is a family necessity."

The consumption of milk is also directly influenced by the prices of substitute foods on the market. In Philadelphia the consumption of whole milk was kept constant, despite a fifty per cent increase in price. But a fifty per cent increase in the

(49) Idem.

(50) Ibid. p. 44

price of butter brought a substantial decline in consumption. In other words, there were no foods then competing successfully with whole milk at the price level of thirteen cents, while with the same proportional increase in the price of butter, other fats came promptly into competition with butter." (51)

"Consumption, moreover, is affected by suggestion. In one city of Pennsylvania, an 'Eat More Milk' campaign, carried on in newspapers alone, increased the total consumption of milk in that city ten per cent in two weeks. By a concert of many methods, the per capita consumption of milk in Philadelphia in the early spring of 1918, when milk was 13 cents a quart, was brought up to where it had been when milk was 8 cents a quart." (52)

"Differences in national and racial food habits disclose possibilities for special education. As a rule, negroes do not consume milk in the quantities Anglo Saxon peoples do. Professor McCollum (of John Hopkins University) has accounted by this fact for the high rate of tuberculosis among the colored people in certain crowded sections of our cities." (53)

In regard to seasonal tendencies toward milk consumption we find the following: "The consumption of dairy products by individuals of any race or section will vary with the season. Larger quantities of milk are used in the summer, and less in the late autumn, and more as the days begin to lengthen; reaching greatest consumption about Easter, and declining slightly thereafter until the return of warm weather." (54)

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- (51) Idem.  
(52) Ibid. pp. 42 and 43.  
(53) Ibid. p. 41.  
(54) Ibid. p. 17.

New York. The following account, taken from the Report of the Mayor's Committee on Milk, gives us some conception of consumption conditions in New York City: (55)

"High prices in New York City during the past year have resulted in changing the diet of young children in the poorer parts of the city from milk to other things, or from milk of high grade to milk of lower grade, with consequent injury to their health. (55) A milk census taken in October, 1916, shows the city was using 1,900,000 quarts of milk a day. A similar census taken on October 5, 24, and 25, 1917, showed respectively, 1, 411,658 quarts, 1,576,723 quarts, and 1,531,968 quarts, indicating shrinkages of 26.7 per cent, 17 per cent, and 19.4 per cent. Statistics from large companies show decreases for October, ranging from 50 per cent to 11 per cent, in various districts of the city. These shrinkages in the amount of milk consumed are undoubtedly due largely to the advances in price which have recently occurred. (56)

A survey was made by Bailey B. Burritt, Director of the New York Association for Improving the Condition of the Poor, of 2,200 families in various parts of Manhattan and Brooklyn. This survey required 250 investigators, composed of persons in the employ of the Association for Improving the Condition of the Poor and health nurses of the City Department of Health. The survey is summarized as follows:

"Aim - To get some light as to how families living on a very narrow margin are meeting the increased cost of milk.

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(55) Report of the Mayor's Committee on Milk, City of New York, Dec. 1917. p. 21.

(56) Ibid. p. 23

"Method of Investigation - Schedules were placed in the hands of investigators, who made a house to house canvass of a particular selected section. Only such families as had at least two children under six years of age were considered, and all families under the care of the Baby Health Stations or receiving milk from a relief organization were eliminated. (57)

"Locations - Each investigator was sent to a selected section and told to canvass each house. Since there were 250 investigators, it is felt that the whole city is quite well represented. In Manhattan, representative sections are Cherry, Mott, Henry, Allen, Warren and Christopher Streets, and 99th to 105th Streets from the East River to Third Avenue, 53rd to 66th Streets from the Hudson to 10th Avenue. Corresponding sections in Brooklyn are Hicks and Bond Streets, Greenpoint, Metropolitan and Thatford Avenues. In the Bronx, Washington Avenue and Lorillard Place; Rockaway Avenue in Jamaica and Spruce Street in Richmond Hill.

"The Survey was made during the week of October 9, 1917. Of the 2500 schedules sent out, 2200 were used in the tabulation of results."

Table XIII

Amount of Milk Purchased, with Changes since 1916. (58)

Number of families, 2200 (each containing 2 children under 6 years)

Members of 2200 families	- - - - -	12,439
Adults	- - - - -	4,467
Children from 6-16	- - - - -	2,534
Children under 6 years	- - - - -	<u>5,438</u>
		12,439

(57) Idem.  
(58) Ibid. p. 24.

Table XIII, continued (59)

Milk purchased in 1916	--	4,797	quarts daily	
Milk purchased in 1917	--	<u>3,193</u>	quarts daily	(141 cans condensed milk)
Difference	- - - - -	<u>1,604</u>	quarts daily	

Estimated milk needed by 12,439 people:

Children under 6 years (1 quart each)	- - - -	5,438	quarts
Children from 6 to 16 (1/2 quart each)	- - - -	1,267	quarts
Adults (1/3 quart each)	- - - - -	<u>1,489</u>	quarts
		<u>8,194</u>	quarts

Details with regard to change in milk supply from October, 1916 to October, 1917.

Number of families getting more milk	- - - -	121
Number of families getting same amount	- - - -	599
Number of families getting less	- - - - -	<u>1,480</u>
		<u>2,200</u>
Number of families getting more condensed milk	-	420

Families cutting milk supply:

25 per cent or less	- - - - -	219
25 - 50 per cent	- - - - -	969
50 - 75 per cent	- - - - -	169
75 - 99 per cent	- - - - -	3
100 per cent	- - - - -	<u>120</u> 1,480

(Of these 120 families dropping milk entirely, 73 substituted condensed milk).

Families buying from

1/2 to 1 quart less	- - - - -	863
1 to 2 quarts less	- - - - -	449
2 to 3 quarts less	- - - - -	131
3 to 4 quarts less	- - - - -	31
4 to 5 quarts less	- - - - -	<u>6</u> 1,480

Of the 1480 families getting less milk, 1,213 are substituting tea and coffee.

Families changing from Grade A to B	- - - - -	266
Families changing from Grade B to C	- - - - -	67
Families changing from bottled to loose	- - - - -	474
Families with babies less than 1 year old	- - - - -	982

Of these 982 families:

Those buying less milk than in 1916	- - - - -	562
Those buying same amount of milk	- - - - -	316
Those buying more milk	- - - - -	79
Those dropping their milk entirely	- - - - -	<u>25</u> 982



Table XIII, continued

"Mothers' Statements - In 829 families where milk has been decreased, the mother states that the children are either losing weight or are not gaining. In these 829 families there are 2,090 children under six years of age.

"Tea and Coffee - 2,148 children under six years of age are drinking tea and coffee."

Nationalities Represented (60)

Italians - - - - -	725
Americans (colored 73) - - - - -	497
Jewish - - - - -	416
Germans and Austrians - - - - -	220
English, Irish and Scotch - - - - -	185
Slav - - - - -	93
Oriental - - - - -	40
Danish Swedish and Norwegian - - - - -	12
French - - - - -	6
Spanish - - - - -	4
Hollander - - - - -	1
Greek - - - - -	1

"The value of good milk is indicated by the fact that among the 60,000 babies in New York City annually patronizing infant milk depots, the death rate for infants under one year is only 42 per thousand, while the general death rate for infants under one year in the entire city is 93 per thousand." (61)

Even though New York City is much larger than the Twin Cities, and even though the poorer districts of the Twin Cities do not cover any very great area, the economics of many conditions pertaining to both places must be the same. The New York investigation throws much light on the behavior of the marginal consumers when changes in the factors which affect the demand for milk make themselves felt.

(60) Ibid. p. 25.

(61) Ibid. p. 26.

Chicago. In the city of Chicago, some definite figures were taken relative to the amount demanded at various consumers prices. "With the increase in price to consumers from 10 cents to 13 cents per quart, there had been a marked reduction in consumption. At 8 cents a quart the daily consumption ran close to 1,000,000 quarts, at 10 cents around 800,000, and at 13 cents it had fallen in October to about 584,000 quarts."

It is possible, however, that even at the price of 13 cents, consumption might have increased slightly after the first psychological effects of the price increase had worn away. Milk is by most classes considered more of a necessity than otherwise and the experience of distributing concerns indicates that after the first marked decrease in consumption due to a price rise, consumption tends to increase slightly until it has reached the point where a stable equilibrium between supply and demand at that price is established.

"Evidence was presented through 'field nurses' who had made inquiry as to the effect of the October increase in prices. There was found to be a reduction in consumption among the poor families who were substituting coffee for milk with their children." (62)

In the foregoing pages, definite instances have been given of how various conditions affect the amount of milk consumed. We have found precise evidence of the effect of the use of substitutes, of racial and seasonal differences, of standards of living, and size of income. All of these factors, with others not specifically discussed, at this point, may enter in to influence

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(62) Journal of Political Economy. "The Chicago Milk Inquiry" by C.S. Duncan. April, 1917. p. 333.

the amount consumed at a given price. The functioning of these factors, however, each with a different weight at different times, brings about the different demands appearing at succeeding periods of time.

In spite of this influence, however, the demand for milk is much more constant than the supply of it. When distributors contract for a given quantity to be delivered during a given period of time, they are therefore not wholly in the dark. They are able to anticipate demand with a fair degree of accuracy.

#### Milk Distribution

The market machinery involved in the distribution of milk is much simpler than for many other products. The channels through which milk and cream pass on their way from the farm to the consumer are as follows:

1. Milk sold through the Association is delivered by the farmer to the country station of the Association. From here it is hauled by rail or by auto truck to the distributors in the city with whom the Association has contracted. Approximately 50 per cent of the milk coming to the Twin Cities is handled through the Association. (63)

2. Individual producers ship or haul by truck direct to city distributors. Four of the largest distributors receive all their milk from this source.

3. Some farmers bottle their milk in the country and bring it directly to the city in their own distributing wagons. In this case the milk is sold direct from producer to consumer,

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(63) Estimate given by Twin City Milk Producers' Association. 1918.

and there is no intervening party who handles the product. There are a great many more of these small distributors operating in St. Paul than in Minneapolis. Of all the milk produced in the actual supply territory, approximately 10.9 per cent comes to the Twin Cities for whole milk consumption.<sup>(64)</sup>

4. Milk is delivered daily at the cheese factory and made up into cheese which is sold through the regular channels. Probably about 13.5 per cent of the milk produced in the actual supply territory is made into cheese.

5. If milk is separated on the farm, the skim milk is marketed through calves or hogs, and the cream which is usually delivered to a creamery is made up into butter and distributed through the regular channels of butter. There are in both the actual and potential supply territories many more creameries than cheese factories.

In those sections of the country where milk is not the main product of the farm business, the creamery is more logically an institution than the cheese factory, for cream can be allowed to accumulate for two or three days on the farm, and if cared for properly, can still be made into good butter, but the cheese factory milk must be delivered every day. Skim milk is also preferred to whey for feeding. In the actual supply territory, approximately 75.6 per cent of the milk produced<sup>(65)</sup> finds its way into the local creameries.

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(64) Based on 1918 estimate that 50 per cent of whole milk consumed in the Twin Cities comes through the Twin City Milk Producers' Association. May 1921, 70 per cent estimated to come through the Association.

(65) Calculated estimate based on Dairy and Food Commission figures and calculated estimate of the amount coming to the Twin Cities for whole milk consumption.

6. The farmer also has the alternative of shipping his cream to a centralizer where it is made up into butter. This practice is followed, however, principally by farmers who are dissatisfied with the local creamery, or else produce a low-grade of cream. It is impossible under present conditions to determine the per cent of milk going into centralizer cream.

The milk or sweet cream from the country must be pasteurized and standardized before it is put up in the sterile cans or bottles for delivery. The dealer who carries on a business of any size must have a completely equipped bottling plant and creamery. He also must arrange to store his milk in refrigeration from one afternoon until the following morning. Milk drawn from the cows on the evening of one day and the morning of the following day is shipped to the distributor, pasteurized, standardized, cooled and bottled before the end of the day and is then stored in refrigeration over night for delivery the next morning. Milk that is returned unused is skimmed and the cream is made up into butter.

City Distribution. The average retail delivery for a Minneapolis milk wagon driver is 250 quart points per day. The following is a statement given out by a Twin City Milk distributing company relative to delivery costs.

Table XIV

Analysis of Business of One Twin City Distributing Company

Amount of Milk Purchased per Day.	
4550 gallons, at 30¢ per gallon -----	\$1365.00
Total Sales.	
500 gallons bulk milk, at 40¢ per gallon-----	200.00
2800 gallons wholesale bottle milk, at 45¢ per gal.	1260.00
1000 gallons retail milk, at 52¢ per gallon-----	<u>520.00</u>
	\$1980.00
200 gallons milk returned, used for butter-fat---	60.00
50 gallons waste and shrinkage.	
<u>4550 gallons.</u>	
Cost of Distribution per Month.	
Four barn men-----	455.00
One special driver-----	135.00
One blacksmith-----	156.00
Blacksmith supplies-----	200.00
Forty-four routes-----	5940.00
Four route men-----	600.00
Feed-----	2048.22
Harness repairs-----	259.03
Wagon repairs-----	404.96
Veterinary service-----	25.00
Shavings-----	25.00
Liability insurance-----	125.00
Ice-----	100.00
Rent of barn-----	100.00
Depreciation on horses and wagons-----	300.00
Coupon books-----	<u>125.00</u>
	\$10998.21
Plant Maintenance per Month.	
Wages-----	4026.00
Fuel-----	243.86
Power-----	325.14
Maintenance of plant-----	300.00
Building maintenance-----	85.00
Water-----	130.00
Insurance-----	75.00
Bottle breakage-----	150.00
Caps-----	150.00
Depreciation-----	300.00
Auto repairs-----	300.00
Insurance and taxes-----	<u>150.00</u>
	\$6185.00
Administration expense-----	2500.00 2500.00
Gross selling profit per quart-----	.04
Cost of distribution per quart-----	.0215
Cost of plant maintenance-----	.0125
Administration-----	<u>.0050</u>
	.0390
	<u>.0010</u>

The statement given here shows the volume of business done by one of the larger milk distributing companies in Minneapolis, and shows the nature and extent of the different expenses incurred in carrying on the business.

The gross margin of profit, taken on wholesale bulk milk is 10 cents per gallon. On wholesale bottled milk, a margin of 15 cents per gallon is taken. Bottle losses and bottling expense are no doubt the main reasons for the difference between the margin or "spread" on wholesale bulk and wholesale bottled milk. The gross margin of 22 cents per gallon on retail milk involves a delivery expense that is considerably higher than that of wholesale milk. The greater part of the 200 gallons of milk returned comes from the grocery stores which have the privilege of returning unsold milk to the distributing company. There is considerable loss of butterfat on this milk owing to the amount of cream which sticks to the bottle upon emptying out its contents.

The expense charged to "farty-four routes" is the salaries of the forty-four drivers employed to handle those routes. The "four route men" are really route foremen who look after the work of the drivers, break in new drivers from time to time, and also take care of driving the various routs at the times when it comes the turn of the driver of a given route to have a day off duty. The special driver mentioned is one whose duty it is to take care of special orders to be delivered on short notice. Since the drivers do not take care of the horses they drive, the four barn men listed must be employed.

In both the distribution costs and costs of plant operation, wages is the largest single item. By comparison,

distribution costs on the above volume of milk are approximately 60 per cent greater than actual costs of plant operation.

Administration expense here also becomes a very considerable item, being approximately 13 per cent of the entire monthly expense. The gross selling profit or spread as indicated at 4 cents per quart, or 16 cents per gallon, is only a fair amount of spread, as compared with other cities of the United States, the range for the entire country being from  $2\frac{1}{2}$  to  $5\frac{1}{2}$  cents per quart.

Several of the problems that confront the distributor are the following:

1. At times in the year, particularly in the winter when very heavy snows occur, it is nearly impossible to get milk to the city for a day or two. In such instances the customers must undergo considerable hardship, and the dealer is forced to lose money because of idle men, teams, and plant equipment, and no product to handle.

2. Another problem is that of seasonal shortage. The Milk Producers' Association has considered it its duty to see to supplying shortage milk, but even its best efforts are sometimes not sufficient to supply the right amount of milk, and some milk is purchased outside. This problem becomes particularly acute in the case of those firms not buying milk through the Association, since they must assume all of the responsibility of providing their own shortage milk.

3. Another problem the dealer faces is that of securing help. It is difficult always to get careful and competent drivers for their wagons. Then the milk drivers' union gives them a good



deal of trouble. The dealers feel that the union practically dictates the terms of the contract under which the drivers work. The union has been able to enforce the so-called "closed shop".

4. Another problem is bottle losses. Some bottles are broken, but more are lost. More bottles are broken in winter than in summer. Lost bottles are often recovered through the small grocery stores. It seems to be the practice in the Twin Cities to give 3 cents for all bottles turned in and then sell them to the milk dealers for 5 cents, making a profit of 2 cents. The small boys pick up large numbers of bottles and trade them in at the corner grocery.

Methods and Terms of Sale. Milk, when sold by the producer for city distribution, is usually sold under contract. The contract may extend over a period of one month, three months, six months, or one year, depending upon the desires of the parties concerned. Usually it is agreed in the Twin City territory that the milk shall be delivered at the distributor's door, and that the producer shall receive a certain amount per hundred weight for his milk, which is equal to a milk price figured on the prevailing basis plus transportation and clean milk costs. Prices for some cities are quoted on the basis of an 8-gallon or a 10-gallon can. Under the present agreement in the Twin Cities, those distributors who buy milk from the Milk Producers' Association are not allowed to pay any less for milk which may for any reason be purchased outside the Association, than they would have paid if they had purchased their product through the Association. The contract between the Milk Producers' Association and the various distributors establishes, in addition to a price-basis agreement,

a guarantee of delivery and acceptance of a certain amount of milk per day from the producer to the distributor. Such a guarantee helps to stabilize the business.

Practically the only agreement between the distributor and the restaurant or hotel keeper, or proprietor of the grocery store which the distributor serves, is a verbal agreement concerning the price. These classes of retailers buy each day what they need to fill the orders of their trade. The price is arrived at partly by competition among distributors, and some consideration is also taken of comparative delivery and handling expense. There is no regulation regarding the price for which the groceryman or hotelkeeper shall sell the article, nor the margin of profit he may take. This all depends upon his ability as a buyer, and the class of trade that he serves. If he is a shrewd buyer, he may take some advantage of the existing competition among distributors and thus add a small margin of extra profit on the buying side. If he serves a very exclusive class of people, he may add a little to the retail price of the commodity, and take a little extra profit on the selling end.

Milk in the hands of the middleman, although drawing a very small profit per unit, is usually handled in such quantities that the volume of business serves in nearly all cases to make up for the small amount of profit per unit.

As regards the policy, practice and program of the large distributing concerns in the Twin Cities, very little information is obtainable due to the very keen competition. There are still a few large companies who purchase their milk outside of the Association. These companies must of course make their purchases

competitively since they purchase in some cases from individuals in territory in which the Association also takes milk from the farmers.

The Twin Cities have neither by public authority nor by private agreement been divided into zones for milk delivery. It is true that in some sections of the city, one company may do a great deal more business than another. This, however, may be the result of competitive practices in business getting or it may be due to the remoteness and sparsely settled condition of the territory. Under the present system, each company places routes in the city wherever it can get enough customers to take care of a distributing wagon. This block of territory is usually large enough in the beginning so that when more customers have been added up to a certain point the territory is cut in two parts and a wagon serves each half of the territory. So a distributing company aims to deliver to more houses in the same block and in this way dispose of a load of milk by travelling a shorter distance. This practice also enables a company to give its patrons better service. A company thus puts out additional wagons as rapidly as the trade calls for it; and so its ability to secure sufficient customers in a given territory helps to determine the rate of business expansion. There is one case in Minneapolis where the same company owns four plants located in different parts of the city, thus giving it some advantage in regard to access to its distributing territory.

In general, the distributor will contend for a low price for the following reasons:

1. It is logical to believe that at a lower price, more

milk will be consumed, thus increasing his total profit.

2. Less money is required per unit of product for carrying on the business.

3. It enables delivery men usually to work with fuller loads, thus tending also to decrease the expense of handling.

It is possible, however, that with lower prices the total margin of profit will be decreased owing to the probable decrease in the margin per unit of product handled.

The position in the business cycle of these lowered prices will also have its effect. If the time when lowering of prices through an effort to liquidate surplus stocks is taking place, then it is likely that there will be some unemployment. If the point has been reached just preceding a rise, when production is beginning and prices are still low, it is likely that more milk will be consumed than in the previous instance; so the relation between the price of milk and other economic conditions must also be taken into consideration.

Transportation and Storage. Transportation of milk is one of the producers' big problems. Not only is transportation cost an important factor, but weather conditions also become extremely important. It is not hard to understand why there may at times be difficulty in keeping milk in proper condition until it reaches the consumer. There are two methods by which milk is brought from country points to the city:

1. Milk may be hauled by auto truck from country points not over 30 miles out from the city. In some parts of the Twin City territory, milk may be hauled by truck during the entire year. This is particularly true where there are either permanently hard

roads, or else paved roads which are state highways. During the late fall and winter with milk shortage and bad roads, the truck hauling falls off somewhat; but in January and February, there comes a slight increase until as the spring progresses and grass comes, and roads become easily passable, truck hauling plays a very important part in the transportation of milk from country points into the city. At the present time, there are about forty trucks that haul milk directly into the Twin Cities. In the spring of the year at the time when the roads are good, it is estimated that 80 per cent of the milk in the thirty-mile or trucking zone about the Twin Cities is hauled in by auto truck. There are, in addition, to the above, from 10 to 20 auto trucks that do milk hauling between country points outside the city, most of them hauling to cheese factories. By using auto trucks for milk hauling, several advantages are gained:

a. Milk comes directly from country to city and does not have to wait on depot platforms in hot and cold seasons of the year.

b. The can loss by truck is much less than when milk is sent by railroad, since all cans are sure to be returned on the empty truck, and since the truck visits but a small number of country points, few cans will be misplaced on the return trip.

c. It costs no more to send milk to the city by auto truck than it does to send it in by rail, since auto truck rates are based on rail shipment rates.

The outlying stations that make cheese in the spring and summer months, usually ship milk to the cities by rail during the fall and winter.

2. Of the railroads that haul milk to the cities, some take milk as baggage and others take milk as an express shipment. While the railroad lines which haul milk by express handle only about 5 per cent of the milk, they cause about 90 per cent of the can losses. <sup>(66)</sup> This is considered to be due to the carelessness of employees of the railroad company who either leave the wrong number of cans or else leave them at the wrong stations. Consequently these cans become lost. No reimbursement for can losses has thus far been made possible, except where it can be proven that the cans were smashed, which indicates definitely that it was the fault of the carrier. Many of the shipping stations are so small that there is no station agent and cans left at that station are considered as having been properly and sufficiently delivered. Even where there are agents, it is reported that they do not require the farmers to sign for cans shipped or received, and when there is a loss then the farmer has no check on the company. It is further reported that if a farmer wishes to sign for his cans of milk, he is required to wait so that after a few times he gets tired of waiting and so neglects to sign for his cans. Thus the agent avoids any trouble which might arise through lost cans. Some shippers on branch lines lose more cans than other regular shippers not on branch lines. We are, therefore, led to believe that the greater the number of times cans are transferred, the greater the number of cans lost in shipment.

Investment in cans becomes a distinct item with rail shippers, as it requires three and sometimes four sets of cans in order to handle the milk supply from a given farm.

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(66) Estimate given by Mr. C.A. Bornkamp of the Twin City Milk Producers' Association according to 1920 conditions.

The following instance is given as typical of a farmer on a branch line. He ships six cans per day from Credit River to the Twin Cities. His milk is transferred at Farmington where it must often wait for a long time on the platform. This farmer's check amounts to about \$360.00 per month and he loses on the average of one 8-gallon can per month. At this time a new 8-gallon can costs \$5.30 which is approximately  $1\frac{1}{2}$  per cent of the monthly milk check of the above producer.

The elements entering into the cost of milk transportation may be listed as follows:

1. Express or baggage rate.
2. War tax.
3. Rate on handling from creamery to station in the country.
4. Rate on handling from station to dealer in the city.

The war tax on baggage lines is 3 per cent and on express lines the war tax is 5 per cent. The following table will show the cost of milk transportation in itemized form for shipment from the important milk stations to the Twin Cities. By noticing the 5 per cent rate and the 3 per cent rate, one can pick out the railroads which handle milk as baggage shipment and those which handle milk as an express shipment.

Table XV

Express and Baggage Rates for Milk Shipped to the Twin Cities

Railroad	Station	Can Rate			Rate per cwt.	War Tax Rate per Cwt. Per Cent	Rate on Depot Rate per Cwt. Actual Payment per cwt.	Rate on Depot Haul	Country	City	Total Charges
		5-gal.	8-gal.	10-gal.							
		\$	\$	\$							
M.A. & A.C.	Anoka	.090	.13	.15	.174	3	.005	.....	.05	.229	
M.N. & S.	Northfield, All Points	.100	.16	.20	.232	3	.007	.....	.05	.290	
C.G.W.	Stanton, & All Points Near	.125	.20	.25	.290	3	.009	.....	.05	.370	
	Dennison & Beyond	.155	.25	.315	.365	3	.011	.....	.05	.426	
	Common Lake	.140	.225	.28	.325	3	.009	.....	.05	.385	
	Common Falls	.125	.20	.25	.290	3	.009	.....	.05	.350	
C.M. & St.P.	Rosemont	.095	.15	.18	.209	3	.006	.....	.05	.265	
	Dundas	.10	.165	.20	.232	3	.007	.....	.05	.290	
	Northfield	.10	.165	.20	.232	3	.007	.....	.05	.290	
	Medford	.125	.20	.25	.290	3	.009	.....	.05	.350	
G.N.	Other Points	.10	.165	.20	.232	3	.007	.....	.05	.290	
	Elk River	.10	.15	.17	.197	5	.010	.05	.05	.300	
	Elk River now hauled by truck	.....	.....	.....	.....	.....	.....	.....	.....	.300	
	Anoka	.10	.15	.17	.197	5	.010	.....	.05	.260	
Truck	Cedar	.10	.15	.17	.197	5	.010	.....	.05	.260	
	Hasty Park Creek	.11	.17	.24	.278	5	.014	.....	.05	.342	
	Enfield	.....	.....	.20	.232	5	.012	.....	.05	.294	
	Centerville	.....	.....	.....	.250	.....	.....	.....	.....	.250	
N.P.	Robbinsdale	.....	.....	.....	.050	.....	.....	.....	.....	.050	
	Wyoming & Points Nearer	.10	.15	.17	.197	5	.010	.....	.05	.257	
Soo	Withrow and Loretto	.10	.15	.17	.197	5	.010	.....	.05	.257	
R.I.	Faribault	.11	.17	.24	.278	5	.014	.....	.05	.342	
Soo Baggage	Somerset, Wis	.....	.22	.265	.....	.....	.....	.....	.....	.350	
	New Richmond, Wis	.....	.....	.265	.....	.....	.....	.....	.....	.350	
	Ceylon, Wis	.....	.....	.265	.....	.....	.....	.....	.....	.350	



The Twin City Milk Producers Association. Previous to the organization of the Twin City Milk Producers' Association, there were several small county milk producers' associations, but each had only a relatively few members, and no one association controlled enough territory or enough of the supply to be very significant. The dealers seemed to have things pretty much their own way. Finally the idea was conceived of uniting these small associations into one large organization. This also led to organizing and joining to the large organization many counties and other blocks of territory previously unorganized about the Twin Cities, but which were very significant in their ability to furnish a supply of milk to the Twin Cities. The methods of other milk producers associations were then investigated, stock was sold, and the Association became incorporated as a cooperative organization capitalized at \$50,000. After a stormy beginning period, such as is experienced by most pioneering organizations, it got its affairs on a firm business basis, and at present has about 3000 members and is capitalized at \$500,000. In addition to providing for the handling and sale of milk to the city distributors, thirteen manufacturing plants have been established at convenient points in the supply territory for manufacturing butter and cheese from surplus milk. This in brief is the manner in which the Twin City Milk Producers' Association grew out of the necessity which existed. (67)

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(67) 1920 Annual Rept. of Twin City Milk Producers' Association. For complete detailed history see pages 12 to 18 inclusive.

The following condensed balance sheet shows the condition of the business of the Milk Producers' Association on August 31, 1920. (70)

Assets

Cash on Hand and in Banks-----	\$113,092.83
Notes and Accounts Receivable-----	195,076.85
Due on Stock Subscriptions-----	111,634.27
Cheese, Butter and Cream Inventories-----	10,740.06
Office Supplies and Prepaid Insurance-----	2,075.60
Factory Equipment-----	46,281.92
Cans, Supplies, etc.-----	14,717.19
Real Estate & Payments on Acct. of Purchases	68,078.10
Treas. Stock and Certificates in Suspense---	2,971.00
	\$564,667.82

Liabilities

Capital Stock issued and outstanding-----	\$63,606.00
Stock Sales not paid in full-----	170,300.00
August Supply & Equip. Bills (paid in Sept.)-	15,493.04
Due Producers for August Milk-----	230,295.77
Mortgage on Purchased Property (Paid in Sept)	2,000.00
Sinking Fund and Interest-----	13,495.85
Reserve for Depreciation-----	13,966.33
Reserve for Taxes-----	523.42
Reserve for Stockholders Refunds-----	26,368.31
Reserve for Dividends on New Stock-----	2,413.92
Miscellaneous Reserves-----	10,525.76
Operations Acct.-to take care of Mdse Unsold	15,631.09
Milk Coupons Outstanding-----	48.33
	\$564,667.82

A very large part of the assets are in relatively liquid form. In a business of this kind, there must be quite a large proportion, relatively speaking, of liquid assets since the farmers must be paid each month for their milk. Notes and Accounts Receivable must include in large part, especially the accounts receivable, the payments due the Producers' Associations by distributors who have received milk. The amount due on Stock Subscriptions is fairly liquid since 5 per cent of the producers' milk check may be deducted each month as payment. Inventories of

(70) Ibid. p. 10.

Butter, Cheese, and Cream show stores of butter and cheese not yet marketed. It is evident that the manufacturing end of the Association's business is advancing to considerable proportions, for an investment of over forty-six thousand dollars in factory equipment will provide for a considerable volume of product available for manufacture. The item for cans and other supplies to go with the above manufacturing business is an item of considerable proportions and appears here to compare quite favorably in proportion with the can investment of farmer shippers.

Treasury Stock and Certificates in Suspense is simply another form of stock assets, since treasury stock is stock which has once been issued but is now owned by the Association, having been repurchased by the Association from farmers who have gone out of the dairy business. The Certificates of Suspense came into existence as follows: When "cow shares" were issued at \$1.00 per share, stock was never issued for some of these, probably because farmers who bought them moved away. To cover these payments one hundred shares of this stock have been set aside. Up to this time only four of those shares have been issued, leaving ninety-six shares still remaining in the part of the item known as Certificates in Suspense.

In the liability items, capital stock issued and outstanding and stock sales not paid in full should be considered together, since the part of the item listed as "not paid in full" is listed in the assets as "due on stock subscriptions" and is in reality practically as good as though all were paid. The item "due on stock subscriptions" is not backed by notes, however, being covered only by the 5 per cent deduction provision which

exists in the contract between the producer and the Association. It may be interesting to note that on February 28, 1921, there were 3,069 members in the Association and \$289,000 worth of stock signed for. In the liabilities also, we find evidence of the fact that a large proportion of the business assets must be in liquid form in order to take care of the Association's enormous payments to producers from month to month. This also helps to explain the first item among the assets. The mortgage listed is a small one and need not be considered here, especially since its time of payment is indicated, and it therefore is not an item large enough to affect the business appreciably. The succeeding five items, which have to do with the various forms of reserves, need not be discussed as they are all forms of providing for some accruing expense which will have to be met at some future date, provision for them now assuring the stability of the business. The reserve for stockholders refunds is an item which provides for refunds or paying off the outstanding original stock which was sold originally at \$1.00 per share. A part of this stock has been repurchased by the Association at \$6.50 per share and this item provides for the repurchase by the Association of a large part of the remainder. Operations account to take care of merchandise unsold becomes virtually a catch-all. It is the equivalent of a Profit and Loss account; cooperative organizations may not accumulate profits, but they have some doubtful accounts and some losses.

The milk coupons belong to the Northfield distributing business, and are coupons for milk purchase issued to customers. Prices to producers are established about the tenth day of each

month. To all those shipping either direct to the distributors, or to the Nicollet Island or Woodbury plants, payment is made by the fifteenth day of the month. To those members supplying milk to the other ten plants, payment is made by the twentieth day of the month. The difference in payment dates is due to the volume of office work required in connection with computing those payments.

The following figures show the volume and trend of the Association's business during the last few years, beginning with the year 1918. (71)

	<u>1918</u>	<u>1919</u>	<u>8 months 1920</u>
Pounds cheese sold	951,648	1,734,298	685,216
Pounds butter sold	168,557	371,128	526,688
Pounds cream handled	912,986	1,619,732	1,742,959
Pounds milk handled	72,598,801	88,217,181	67,000,862
Amount gross sales	\$2,103,183.23	\$3,113,408.76	\$2,253,265.01
Added to sinking fund	\$ 10,629.15	\$ 15,619.30	\$ 11,310.24

It is apparent that the business of the Association is steadily growing. Between January 1st, 1921, and April 7th, 1921, 729 new members were added to the Association.

Price Policies. Following is a history of the development of the methods by which prices have been established for the producer since the organization of the Twin City Milk Producers' Association.

From the organization of the Twin City Milk Producers' Association in the month of April, 1917, until November, 1918, prices were made to the producers entirely by contract. During this time, the prices were established on the basis of the cost of the production of milk. Experience showed that this method was

(71) Idem.

not satisfactory; the cost of production gave a figure so low that the farmers did not find it profitable to produce city milk on this basis.

In November, 1918, a new method of determining a price for milk was established, namely, the cheese basis. Prices were based on the price of Twin Cheese on the Plymouth, Wisconsin, Market, the price being made by taking the average price for the current month, (usually four quotations) multiplying by 10, and adding to this a differential of \$.70 per hundred weight. The differential, which was an estimate, was supposed to cover three things:

1. To cover the cost of transportation from the country points into the city, estimated at 35 cents per hundred weight.

2. The value of the whey estimated to be worth from 15 to 16 cents per hundred weight.

3. The extra care needed to keep milk in a sweet condition until it reached the city. The extra care was supposed to be provided for by the remainder of the differential that had been established. The differential so established remained the same from month to month throughout the year.

After August 1, 1919, the method was changed again. The Twin Cheese price at Plymouth, Wisconsin, was still the basis, but the cheese price used was the average for the preceding month. Also a sliding differential was adopted, as follows:

June -----	\$ .40	December	\$ .55
July -----	.45	January	.50
August-----	.55	February	.45
September-	.55	March----	.45
October---	.60	April----	.45
November--	.60	May-----	.40

The price so determined was the price for milk delivered at the dealers' door, the association agreeing to take care of the surplus during the season of surplus, and to guarantee to supply all that was needed during the short season. Of the differential given above, 35 cents per hundred weight was to cover the expense of transporting the milk from the producer to the distributor. The standard milk sold is a milk testing 3.5 per cent butterfat, and for milk testing higher or lower than 3.5 per cent, there is a variation in payment for the product of 5 cents per point each way; thus if milk tests 3.6 per cent, 5 cents per hundred weight is added to the price of the milk, and if the milk tests 3.4 per cent, then 5 cents per hundred weight is subtracted from the stated milk price. (72)

In 1920, a new plan was used for computing prices to be paid to milk producers in the Twin City area. This contract also is in force for a twelve-month period, and is stated as follows:

"The price to be paid for all milk furnished under this contract during any month, and which said purchaser hereby agrees to pay, shall be based on the prices per pound for Twin Daisy, and Young America Cheese on the Plymouth, Wisconsin, cheese market and on the quoted prices per pound for New York Extra Butter on the New York butter market during the entire preceding month, and shall be computed in the following manner:

"First. Compute the Cheese Basis. Add all of the quoted prices per pound for Twin Daisy and Young America Cheese on the Plymouth, Wisconsin, cheese market during the preceding month, divide the sum by the total number of quotations to give

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(72) Ibid. p. 8.

the average and multiply this average by ten (10). The results shall be known as the Cheese Basis.

"Second. Compute the Butter Basis. Add the highest daily quotations per pound for New York Extra Butter (scoring 92) on the New York butter market during the preceding month, divide the sum by the total number of highest daily quotations to give the average and multiply this average by five and two tenths (5.2) The result shall be known as the Butter Basis.

"Third. Compute the Final Average. Add the Butter Basis to the Cheese Basis and divide the sum by two (2). The result shall be known as the Final Average.

"Fourth. Compute the Standard Monthly Price. Add to the Final Average the following amounts to cover loss of whey, transportation charges, and other incidental expenses of delivering milk:

	<u>1920</u>		<u>1921</u>
August-----	\$ .85	January-----	\$ .70
September-----	.90	February-----	.65
October-----	.95	March-----	.60
November-----	.90	April-----	.55
December-----	.80	May-----	.50
		June-----	.40
		July-----	.60

"While this is the method of determining the price, the distributors pay for milk, members must keep in mind that during the summer months only a part of the milk is sold in the form of whole milk. The rest of it must be manufactured into butter or cheese and the price received for this is not necessarily the same as the price received in the city market.

The price paid patrons is determined by taking the net amount received per one hundred pounds, whether such milk is sold to the distributors or in the form of butter and cheese, and deducting from this amount the cost of operating the Association."



The way in which the new price basis works out may be seen in Tables XVI and XVII where butter, cheese, and the butter and cheese combination are compared using the old schedule of differentials in Table XVI and using the new schedule of differentials in Table XVII.

Table XVI

Schedule of Prices Which Would Have Existed if Old Differentials Were Used

Month	1919			1918			1917		
	Cheese	Butter	Butter & Cheese	Cheese	Butter	Butter & Cheese	Cheese	Butter	Butter & Cheese
Jan.	4.17	4.13	4.09	2.85	2.95	3.05	2.86	2.72	2.58
Feb.	4.09	3.88	3.67	2.84	3.00	3.15	2.78	2.66	2.53
Mar.	3.55	3.35	3.15	3.07	3.09	3.10	2.94	2.82	2.69
Apr.	3.72	3.70	3.67	2.85	2.82	2.79	3.06	2.85	2.63
May	....	....	3.78	2.67	2.66	2.64	2.97	2.81	2.64
June	3.62	3.52	3.42	2.70	2.72	2.74	3.04	2.76	2.48
July	3.62	3.39	3.15	2.82	2.78	2.74	2.80	2.64	2.48
Aug.	3.81	3.51	3.21	3.05	2.97	2.89	2.86	2.72	2.53
Sept.	3.70	3.56	3.41	3.17	3.06	2.94	2.89	2.79	2.68
Oct.	3.70	3.69	3.67	3.44	3.48	3.51	3.13	3.01	2.84
Nov.	3.75	3.92	4.08	3.89	3.78	3.67	3.08	3.01	2.94
Dec.	3.83	4.04	4.24	3.92	3.88	3.83	2.86	2.90	2.94
Avg.	3.78	....	3.63	3.11	....	3.09	2.94	....	2.67
-----									
1916									
Jan.	2.18	2.25	2.32	2.01	2.14	2.27			
Feb.	2.20	2.19	2.17	1.97	2.10	2.22			
Mar.	2.20	2.21	2.22	2.08	2.10	2.11			
Apr.	2.20	2.29	2.37	2.03	2.02	2.01			
May	2.11	2.19	2.27	1.95	1.98	2.01			
June	2.11	2.06	2.01	2.10	2.01	1.91			
July	2.00	2.01	2.01	2.00	1.96	1.91			
Aug.	2.11	2.09	2.06	2.03	1.99	1.95			
Sept.	2.25	2.21	2.16	1.90	1.90	1.90			
Oct.	2.55	2.46	2.37	2.06	2.03	2.00			
Nov.	2.71	2.57	2.42	2.13	2.12	2.11			
Dec.	2.90	2.74	2.58	2.15	2.16	2.16			
Avg.	2.30	....	2.25	2.03	....	2.05			

Table XVII

Schedule of Prices Which Would Have Existed if New Differentials Were Used

Month	1919			1918			1917		
	Cheese	Butter & Cheese	Butter	Cheese	Butter & Cheese	Butter	Cheese	Butter & Cheese	Butter
Jan.	4.37	4.33	4.29	4.05	3.65	3.25	3.06	2.92	2.78
Feb.	4.29	4.08	3.87	4.04	3.70	3.35	2.98	2.86	2.73
Mar.	3.70	3.50	3.30	3.22	3.24	3.25	3.09	2.97	2.84
Apr.	3.82	3.80	3.77	2.95	2.92	2.89	3.16	2.95	2.73
May	....	....	3.88	2.77	2.76	2.74	3.07	2.91	2.74
June	3.62	3.52	3.42	2.70	2.72	2.74	3.04	2.76	2.48
July	3.77	3.54	3.30	2.97	2.93	2.89	2.95	2.79	2.63
Aug.	4.11	3.81	3.51	3.35	3.77	4.19	3.16	3.02	2.88
Sept.	4.05	3.91	3.76	3.52	3.91	4.29	3.24	3.17	3.03
Oct.	4.05	4.04	4.02	3.79	3.83	3.86	3.48	3.31	3.14
Nov.	4.05	4.22	4.38	4.19	4.08	3.97	3.38	3.31	3.24
Dec.	4.08	4.29	4.49	4.17	4.13	4.08	3.11	3.15	3.19
Avg.	3.99	....	3.83	3.48	....	3.46	2.88	....	2.87

Month	1916			1915		
	Cheese	Butter & Cheese	Butter	Cheese	Butter & Cheese	Butter
Jan.	2.38	2.45	2.52	2.21	2.34	2.47
Feb.	2.40	2.39	2.37	2.17	2.30	2.42
Mar.	2.35	2.36	2.37	2.23	2.25	2.26
Apr.	2.30	2.39	2.47	2.13	2.12	2.11
May	2.21	2.29	2.37	2.05	2.08	2.11
June	2.11	2.06	2.01	2.10	2.01	1.91
July	2.15	2.16	2.16	2.15	2.61	3.06
Aug.	2.41	2.39	2.36	2.33	2.29	2.25
Sept.	2.60	2.56	2.51	2.25	2.25	2.25
Oct.	2.90	2.79	2.72	2.41	2.38	2.35
Nov.	3.01	2.87	2.72	2.43	2.42	2.41
Dec.	3.15	2.99	2.83	2.40	2.41	2.41
Avg.	2.50	....	2.45	2.24	....	2.33

The prices given here are calculated from the figures given in Appendix Tables and showing the New York market quotations for butter and cheese during the period covered in the table. To compare the actual schedules of old and new differentials, the following brief table is given:

Table XVIII  
Old and New Differentials Compared

Month	Old Differential	New Differential	Increase
January	.50	.70	.20
February	.45	.65	.20
March	.45	.60	.15
April	.45	.55	.10
May	.40	.50	.10
June	.40	.40	...
July	.45	.60	.15
August	.55	.85	.30
September	.55	.90	.35
October	.60	.95	.35
November	.60	.90	.30
December	.55	.80	.25

It will be seen that the heaviest additions to the old differential have been made during the months of September and October. This should encourage fall freshening of cows and so bring an adequate supply of milk to the market during those months when there has previously been a shortage. Furthermore, the increases in differential during the winter months are greater than those during the summer months. This also should encourage winter production. It is evident that in all cases but one, additions were made to the old differential. In the one remaining case, which was in the month of June, the differential remained the same. The outstanding fact in this relation is that summer differentials are not lowered. In this territory it will be remembered that a great deal of butter and cheese is made. If milk is to come to the city for consumption as whole milk, enough must be applied to the original price to keep that milk from going into other channels. During the summer season, butter and cheese

factories operate to full capacity, getting products made up for storage. These plants demand the farmers' milk and will take it all if they can get it. Therefore, the city must add a differential in summer sufficient to meet the competition of butter and cheese factories. Furthermore, the Milk Producers' Association in this territory is equipped to make up surplus milk into butter and cheese. The price for whole milk in the Twin Cities cannot therefore go below butter or cheese during those months or the farmers will begin to wonder why their product was not sold to butter or cheese which was at that time the best opportunity.

To the prices upon which Figure V is based may be directly applied the figures 10 and 5.2 given in figuring out the cheese and butter bases respectively. The figure 10 has reference to actual cheese yield of 100 pounds of 3.5 per cent milk under a given set of conditions. The figure 5.2 in the butter basis includes the 3.5 for standard milk plus 20 per cent overrun which added to the 3.5 brings the figure to 4.2. Then one pound of butter fat is allowed as the value of the skimmilk minus the whey, in 100 pounds of whole milk. This provides for a skimmilk value which varies with the price of butter. The addition of 1.0 to 4.2 brings the figure up to 5.2. The price of butter multiplied by 5.2 should bring the same result as the equivalent price of <sup>how</sup>cheese multiplied by 10. The following calculations show these work out:

For the years 1910 to 1920, butter averaged \$.369 per pound.

For the years 1910 to 1920, cheese averaged \$.194 per pound.

$$.369 \times 5.2 = \$1.919$  per one hundred pounds.

$.194 \times 10 = 1.941$  per one hundred pounds.

The difference = \$.022 per one hundred pounds.

Figure V (Continued)

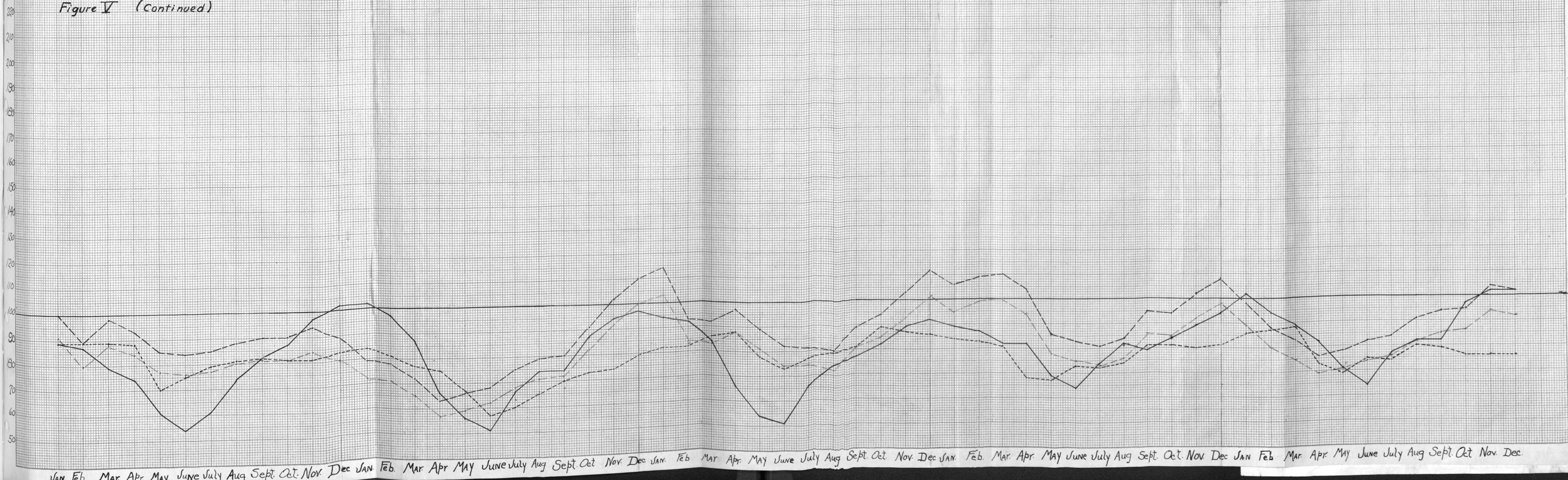
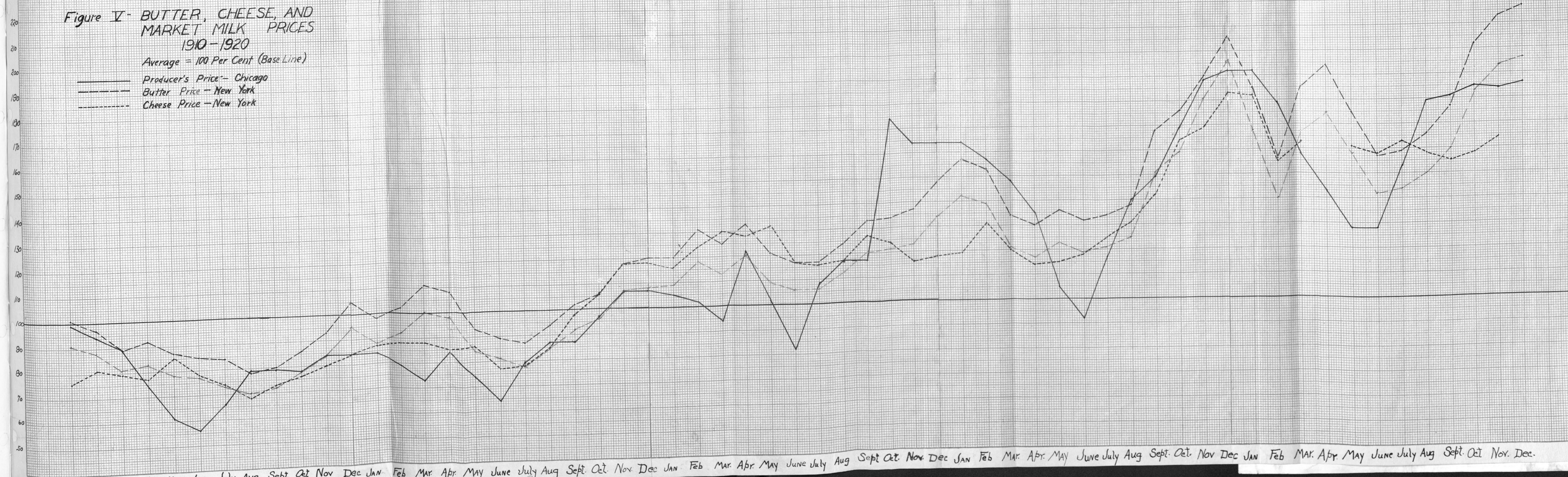


Figure V - BUTTER, CHEESE, AND MARKET MILK PRICES 1910-1920

Average = 100 Per Cent (Base Line)

- Producer's Price - Chicago
- - - Butter Price - New York
- - - Cheese Price - New York



If 5.26 had been used as a butter factor, however, the two bases would have given identical results. This means that 5.26 would have been a better factor for the ten-year period.

The two factors used at the present time, however, are approximately equivalent factors. The principal advantage in having exact equivalents is that it enables one to choose between the butter and cheese bases. For a combined basis, a small error would make no difference.

Figure V shows the relative levels of the prices of New York Creamery Extra butter, the New York prices of the class of cheese known as "New York State Flats, Fresh Extras", and the Chicago price of whole milk. Prices of milk in the Twin City market over a long period of years are not available because milk price records in the Twin City market have been kept only since the organization of the Twin City Milk Producers' Association. Minnesota butter goes largely to the New York market. Cheese in the middle west must be in line with cheese on the New York market to prevent dealing between markets. So it is logical that New York prices for butter and cheese should be used. Chicago is the nearest city to the Twin Cities where available records of prices for milk have been kept over a long period of years. In the Chicago production area, the soil and farming systems are not very different from those in a large part of the area about the Twin Cities; consequently when discussing Figure V we are not far from the actual conditions of the Twin City market.

This figure was constructed in the following manner. An average price was established for butter and for cheese for each month during the ten-year-period 1910-1919. The monthly price for

whole milk was also established for each month during the same ten-year period. A base for each of the above commodities was established by taking an average of the total number of months during which price quotations were obtained. For milk, this base figure became \$1.96+, for butter \$.37-, and for cheese the price became \$.19+.

The range of milk price from season to season is greater than that of butter and cheese in all years except 1913 when this range is slightly exceeded by butter. This is without doubt brought about by the seasonal relations between milk production and whole milk market demands. The reason that price for whole milk could be so much below butter and cheese during the summer months of some years was due, first, to the fact that period contracts were made in many places, and second, to the fact that in some localities, shipment to the city had become practically the only reasonable outlet.

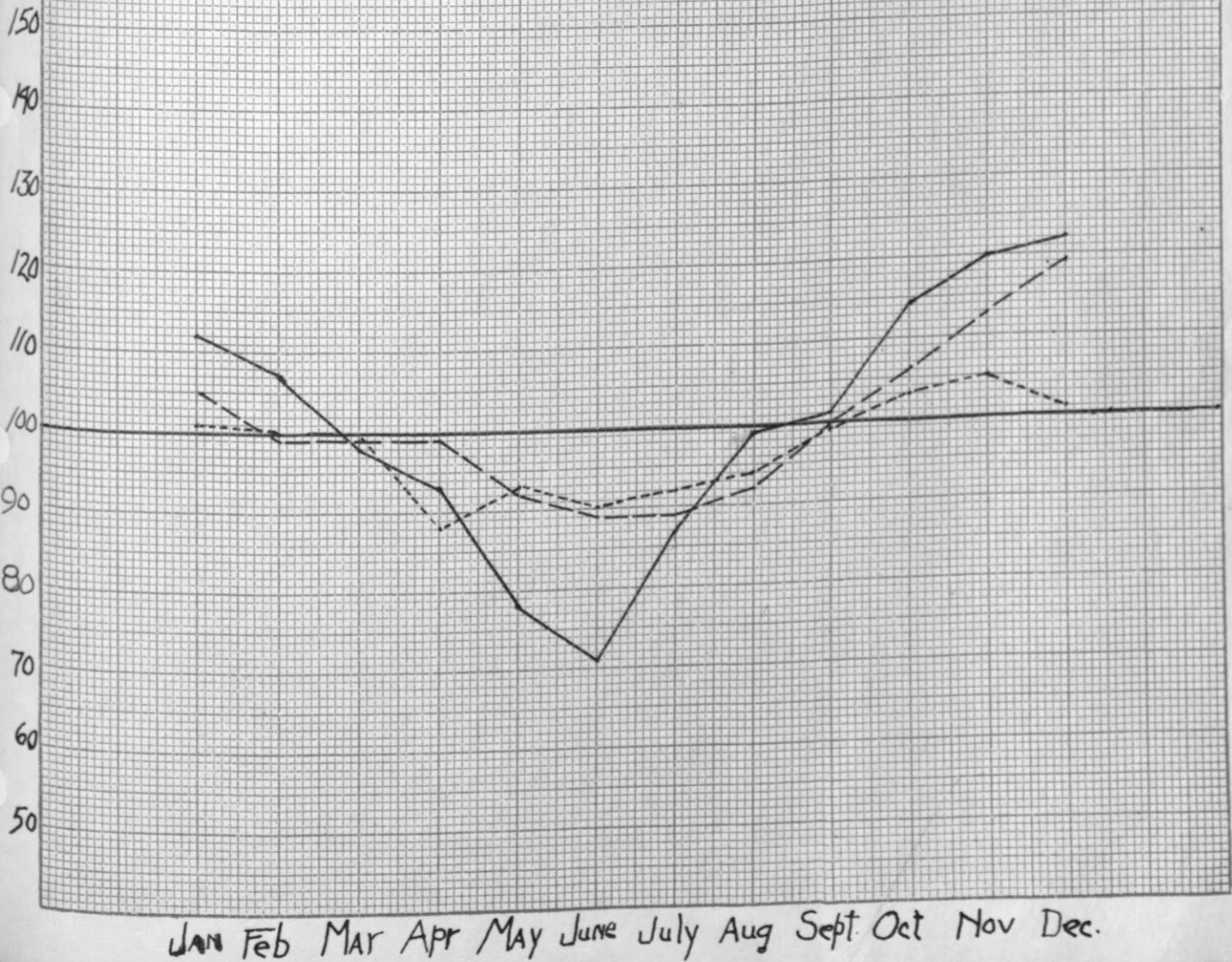
In 1911, 1914 and 1918, the price level of whole milk during the year shows itself to be distinctly in advance of butter and cheese price levels. During 1912 and 1916 the milk price curve is somewhat lower than the price levels of butter and cheese, and there is also some tendency for the milk price curve to be lower in 1910. During the remaining years 1911, 1913, 1914, 1915, 1917, 1918 and 1919 is a great deal of alternation. During 1910, the prices for butter and cheese stay pretty near together, while in 1911, cheese and butter seem to alternate in approximately six month periods, cheese having the higher price level during the first period and butter maintaining a higher level during the second period. In 1912, 1914, 1915 and 1918 the price levels of



Fig VI TEN-YEAR MONTHLY AVERAGES OF  
BUTTER, CHEESE AND MARKET  
MILK, CHICAGO MARKET  
1910-1920

Average = 100 Percent (baseline)

Market Milk —————  
Butter - - - - -  
Cheese - - - - -



butter and cheese remain very nearly together. During 1913, butter distinctly takes the lead and during 1916, 1917 and 1919 there is considerable alternation.

There is a seasonal tendency throughout the entire ten-year period for all three of the above curves to fluctuate in the same direction at the same time. This is in the natural order of things because the whole milk market must compete for whole milk purchases and must also pay a seasonal differential in order to bring out an adequate supply of winter milk. During the fall and winter months, fresh butter is a little higher priced, creameries wish to keep running and consequently they too can afford to pay a little more than summer prices for butterfat. Cheese factories can also afford to pay a little more in the winter than in the summer. During eight out of the ten years, butter has a greater seasonal price range than cheese.

In Figure VI, which shows the ten-year monthly averages of butter, cheese and whole milk, the points represented in this figure were calculated by taking a simple average of the ten January quotations, the ten February quotations, etc., for each commodity. Here we have a view of the entire period. The seasonal range of whole milk is very definitely greater here than either butter or cheese. It is further evident that since the cheese price level is higher during the summer months May to August inclusive, we should expect the cheese factories to take advantage of summer milk flow to make their products for storage. The seasonal range of butter here is somewhat greater than that of cheese.

Figure VII. SALES OF ONE MINNEAPOLIS MILK DEALER, 1919

Average price = 100 PerCent (base line)

- Retail Price
- Pints and quarts combined
- - - Retail Quarts
- - - Retail Pints

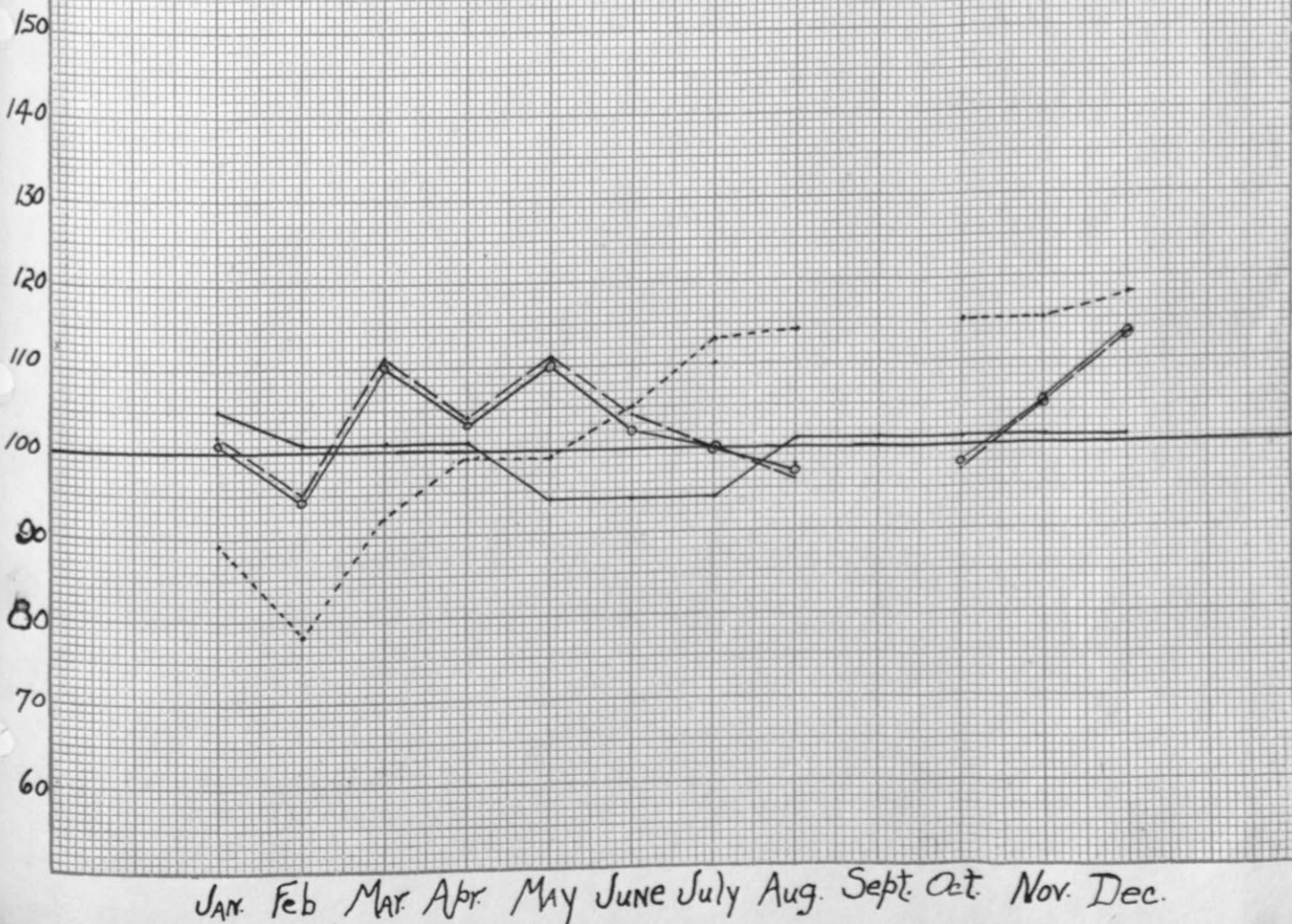


Figure VIII. SUPPLY AND DISPOSAL OF MILK OF THE TWIN CITY MILK PRODUCERS' ASSOCIATION; ALSO PRICE TO PRODUCERS

Base line = 100% = 1,000,187 pounds (Average quantity sold to dealers)

- x Producers' price
- o Shortage Milk Purchased and Delivered to Distributors
- Delivered to Distributors
- Delivered to Butter and Cheese Factories of the Association

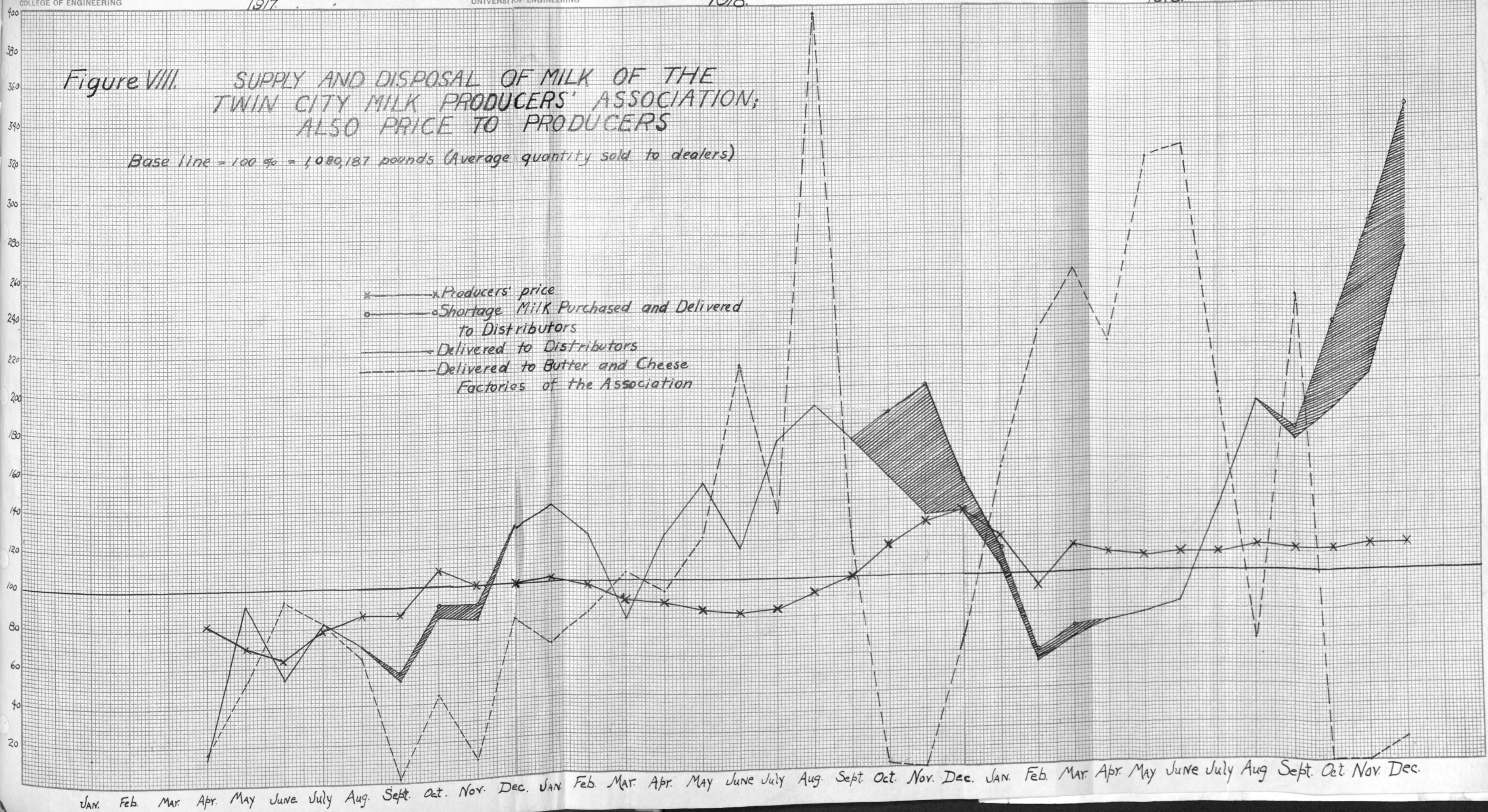


Figure VII gives some idea of the seasonal trend in volume of business of a milk distributor business. The graph covers only one year and only one dealer, but it is the only specific data available on the subject. It is apparent in this case that there is no correlation between amount supplied and price. Seasonal conditions no doubt caused some of the fluctuations; but business expansion and contraction no doubt caused more of it. It is interesting to note that after the price of milk was raised in August, consumption remained practically the same for some time and later in the month of November began a definite increase. Business expansion of course may account for this. Usually it is a period of shortage in the Twin Cities. Note also that even after the price drop in May, the pint sales began to ascend while the quart sales descended; which would seem to indicate that consumers were buying in smaller units to insure keeping quality until used. Combined sales of retail quarts and pints, however, show a decline. This decline is the opposite of what is usually expected at this season of the year. More milk is usually consumed during the summer than during the other seasons of the year, except in the early spring at about Easter time when warm weather begins to come on.

Figure VIII shows the amount of milk delivered to distributors, the amount delivered to butter and cheese, amount of shortage milk purchased, and the producer's price. The figure was constructed in the following manner. First an average of the quantities of milk delivered to distributors by months during the entire period was taken. This gave 1,080,187 pounds, which represents one hundred per cent. In April, 1917, 14 per cent of this

base amount was delivered to distributors in the Twin Cities by the Twin City Milk Producers' Association. The amount of surplus milk handled each month by the creameries and cheese factories belonging to the Association, was also reduced to a percentage of the base amount, 1,080,187 pounds. So in the series of months involved in this graph, we are able to compare the amount of milk delivered to distributors with the amount of milk delivered to the butter and cheese plants of the Association. The shortage milk delivered to distributors during certain months is added as a percentage of this same base to the curve showing the volume of regular Association milk delivered to distributors. This allows a comparison between the amount of shortage purchased, and the amount of whole milk marketed to distributors that was actually produced by Association members. It will be seen that during many of the months when shortage milk was purchased, there was also surplus milk existing. This may be explained in two ways: First, it was impossible to determine just how much Association milk would be forthcoming each day and so the Association, to insure a safe margin, usually had a surplus. The agreement made the Association responsible for providing a sufficient supply of milk at all times and for taking care of all surplus. Second, advance agreements were necessary with the cheese factories from which milk during these months was purchased; and these agreements had to be kept at all times in good faith in order to insure possible future needs.

In several instances the amount of surplus milk delivered to butter and cheese factories varies quite noticeably and appears to be influenced largely by the change in the amount delivered to

distributors. In June of 1918, this is very clearly established. With a decrease in the amount of milk delivered to distributors, a marked increase in surplus appears. During October and November of the same year, an increase in the amount of milk delivered to distributors reduces the surplus to almost nothing. There is also another marked instance of this during October and November of 1919. In the spring and early summer months of 1919, the opposite appears to have been the case. Other minor instances of these same relations between the two above mentioned curves became noticeable upon a careful examination of the figure. These curves bear out the contention of the Association that the distributors flock to them in shortage periods and then buy cheaply elsewhere in flush periods.

The base price was calculated in the same manner as the quantity base, being an average of the total number of months. The base price is \$2.75. The April, 1917, price, for example, was 82 per cent of the base price. Furthermore, it shows that when in May, 1917, the milk supply delivered to distributors increased from 14 to 92 per cent and surplus milk increased from 16 to 52 per cent, the price decreased from 82 to 70 per cent. It is evident that in this kind of a market there is not at all times a definite correlation between changes in price and changes in supply. During the months of March to July, 1918, inclusive, prices changed very little but the supply increased rapidly. Similar conditions prevailed during the summer of 1919. This is without doubt due to the fact that with the coming of spring and early summer, more milk will be produced whether the farmer will or no; and owing to the increased manufacture of non-perishable

products at that season of the year, the price must remain at a certain level in order to bring sufficient milk to the Twin City market. During the winter seasons of 1917 and 1918, there appear slight price increases, but we cannot discover here any strikingly definite correlation between supply and price, probably due mainly to the seasonal element in production and to seasonal competition of manufactured milk products.

Table XIX shows the manner in which shortage milk was purchased by the Twin City Milk Producers' Association during the shortage months of 1918 and 1919. During the shortage of these two years, milk was purchased wherever it could be found within reasonable shipping distance of the Twin Cities. It was purchased on various bases; in some cases the Association was forced to purchase on almost any agreement that it could use within reason because the contracts between the Association and the dealers specified that the Association should furnish sufficient milk during the shortage months and should take care of all surplus during the flush season.

The milk came from factories which were already running at low capacity and could not so well afford to let the milk as in the flush season.

There was far greater uniformity in the method of purchase during 1918 than during 1919. During the shortage months of 1918, practically all milk purchased outside the Association was purchased on the cheese basis. This basis prevailed probably because that was the method of purchase then accepted for regular purchase by the Association from its members. There was some variation, however, in the differential used to cover the whey in



one hundred pounds of milk, the variation being from 30 to 45 cents. During the shortage months of 1918, but two creameries sold on the butter basis and in both cases, the resulting price was less than the prevailing price to Association members. This was probably another reason why the cheese basis was used, for as calculated, it appeared to be the best opportunity, although, as actual price levels in Figure V show, the average level of butter prices for November and December of 1918 was above the average level of cheese prices. We have no knowledge, of course, in these cases as to the relation between the prices of skim milk and whey. In the two butter purchases a 25 per cent overrun was calculated. All cheese purchases, except one, were on the basis of ten and one-half pounds of cheese. The other one used the figure of eleven and one-fourth.

During the shortage months of 1919, a greater variety of methods was used in purchasing milk than during the preceding year. Here the use of a cheese basis or a butter basis of purchase is pretty evenly divided. In 1919, the purchase of shortage milk began in September and continued through the months of October, November and December. Figure V shows that during these months the level of butter prices was actually in advance of the level of cheese prices. A recognition of this fact may have led to more purchased on the butter basis, although there are some cheese purchases which show as high as purchases on the butter basis. This is undoubtedly due mainly to the manner of calculation of whey and skim milk values. When milk was purchased on the cheese basis in 1919, the figures 10,  $10\frac{1}{2}$  and 11 were used for cheese yield. The estimated value of whey also varied from 20 to 60 cents.

There is some balancing effect here, however, because the figure of 20 cents is used with the figure 11 given for cheese yield, and the 60 cents allowed for whey is used in combination with the cheese yield of 10. The differential of 40 cents with a  $10\frac{1}{2}$  pound yield of cheese is the cheese basis combination used most frequently.

One purchase was made on the basis of distributors' September price. This would be definitely related to the actual Association price to distributors during that month, and is probably equivalent to the producers' price given in the table, the express expense being paid by the Association in addition to the actual purchase price.

Table XIX

## Methods Used in Purchasing Shortage Milk. 1918.

Period covered by price:	City	Distance: from Twin Cities:	Basis	Date	Avg. price used for cheese:	Price variation or per point:	Cost of 3.5 per cent milk:	Assoc. price of 3.5 per cent milk:
<b>October</b>								
29-31	Lena	100	10½ x Twin Cheese + \$.40	10-28	.31½	...	3.68	3.20
29-31	West Concord	72	10½ x Twin Cheese + \$.30	10-28	.31½	...	3.58	3.20
29-31	Kenyon	53	10½ x Twin Cheese + \$.40	10-28	.31½	...	3.68	3.20
16-31	Pine City	63	Avg. N.Y. Extra + 25% overrun + \$.60 for skim	.....	.578	.07	3.13	3.20
27-28	White Willow	90	10½ x Twin Cheese + \$.40	10-21	.310	...	3.66	3.20
<b>November</b>								
1-4	Gylon, Wis.	56	10½ x Twin Cheese + \$.45	10-28	.32½	...	3.83	3.20
5-11	"		Ditto	11-4	.32½	...	3.89	3.50
1-4	West Concord	72	10½ x Twin Cheese + \$.30	10-28	.31½	...	3.58	3.50
26-30	"		Ditto	11-25	.34½	...	3.95	3.50
1-4	White Willow	90	10½ x Twin Cheese + \$.35	10-28	.31½	...	3.63	3.50
5-11	"		Ditto	11-4	.32½	...	3.76	3.50
1-4	Kenyon	53	10½ x Twin Cheese + \$.40	10-28	.31½	...	3.63	3.50
5-11	"		Ditto	11-4	.32½	...	3.81	3.50
26-30	"		Ditto	11-25	.34½	...	4.05	3.50
5-11	Douglas	114	10½ x Twin Cheese + \$.30	11-4	.32½	...	3.71	3.50
12-18	"		10½ x Twin Cheese + \$.35	11-11	.33	...	4.06	3.50
19-25	"		Ditto	11-18	.34	...	4.18	3.50
26-30	"		Ditto	11-25	.34½	...	4.26	3.50
12-18	Mantorville	74	10½ x Twin Cheese + \$.40	11-11	.33	...	3.87	3.50
19-25	"		Ditto	11-18	.34	...	3.97	3.50
26-30	"		Ditto	11-25	.34½	...	4.05	3.50
1-4	Lena	100	10½ x Twin Cheese + \$.40	10-28	.31½	...	3.68	3.50
5-11	"		Ditto	11-4	.32½	...	3.81	3.50
12-18	"		Ditto	11-11	.33	...	3.87	3.50
19-25	"		Ditto	11-18	.34	...	3.97	3.50
26-30	"		Ditto	11-25	.34½	...	4.05	3.50

(continued)

Table XIX- continued (page 2)

Period covered by price:	City	Distance: from Twin Cities:	Basis	Date	Avg. price used for price was made:	Price variation: cheese or butterfat:	Cost of: 3.5 per cent milk:	Assoc. price of: 3.5 per cent milk:
....	: Pine City...	: 63	: N.Y. Extra + 25% overrun + \$.60 for skim:	....	: .6107	: .076+	: 3.27	: 3.50
....	: Loretto.....	: 21	: Cheese basis.....	....	: .05	: .05	: 4.10	: 3.50
....	: "	:	: Ditto.....	....	: .05	: .05	: 4.15	: 3.50
December:	:	:	:	:	:	:	:	:
1 & 2	: Lena.....	: 100	: 10½ x Twin Cheese + \$.40.....	11-25	: .34½	: .05	: 4.05	: 3.70
3-9	: "	:	: Ditto.....	12-2	: .35	: .05	: 4.08	: 3.70
1 & 2	: West Concord:	: 72	: 10½ x Twin Cheese + \$.30.....	11-25	: .34½	: .05	: 3.95	: 3.70
3-9	: " "	:	: Ditto.....	12-2	: .35	: .05	: 3.98	: 3.70
1 & 2	: Kenyon.....	: 53	: 10½ x Twin Cheese + \$.40.....	11-25	: .34½	: .05	: 4.05	: 3.70
3-9	: "	:	: Ditto.....	12-2	: .35	: .05	: 4.08	: 3.70
17-23	: "	:	: Ditto.....	12-16	: .34½	: .05	: 4.02	: 3.70
1 & 2	: White Willow:	: 90	: 10½ x Twin Cheese + \$.35.....	11-25	: .34½	: .05	: 4.00	: 3.70
3-9	: " "	:	: Ditto.....	12-2	: .35	: .05	: 4.03	: 3.70
1 & 2	: Cylon, Wis.:	: 56	: 10½ x Daisies + \$.45.....	11-25	: .36½	: .05	: 4.26	: 3.70
3-9	: " "	:	: Ditto.....	12-2	: .36½	: .05	: 4.26	: 3.70
1 & 2	: Mantorville :	: 74	: 10½ x Twin Cheese + \$.40.....	11-25	: .34½	: .05	: 4.05	: 3.70
3-9	: "	:	: Ditto.....	12-2	: .35	: .05	: 4.08	: 3.70

(continued)

Table XIX- continued (page 3)

1919		1919.						
Period covered by price:	City	Distance: from Twin Cities	Basis	Price: per pound used:	Price: variation: per point: butterfat:	Express: Rate	Cost of: 3.5 per cent milk:	Association: price of 3.5 per cent milk
September:	Milaca.....	74	: Based on distributors price for Sept.:	:	:	:	:	:
:	:	:	: less .36 exp. + .15% cost of handling :	..	.05	.36 <sup>+</sup>	3.19	3.10
Sept.:	Rock Creek..	58	: N.Y. Extra + 20% overrun .60 for skim:	..	.07	.35	3.56	3.10
:	:	:	: up to B.F. quotation of 65¢. From :	:	:	:	:	:
:	:	:	: 65-70¢ for B.F., 70¢ for skim. Over :	:	:	:	:	:
:	:	:	: 70¢ for B.F., 75¢ for skim..... :	:	:	:	:	:
Sept.:	Norwood.....	40	: N.Y. Special & 20% overrun + 50¢ for :	..	.07	.35	3.50	3.10
:	:	:	: skim Up to B.F. quotations of 60¢ :	:	:	:	:	:
:	:	:	: From 60-70¢ or over for B.F., 70¢ for :	:	:	:	:	:
:	:	:	: skimmilk..... :	:	:	:	:	:
October:	:	:	:	:	:	:	:	:
1st half:	Norwood.....	40	: Ditto..... :	..	.07	.35	3.82	3.10
2nd half:	"	:	: Ditto..... :	..	.07	.35	4.01	3.10
1st half:	Milaca.....	74	: Same as in September..... :	..	...	.36 <sup>+</sup>	3.17	3.10
2nd half:	"	:	: Ditto..... :	..	...	.36 <sup>+</sup>	3.17	3.10
1st week:	Rock Creek..	58	: Same as in Sept..... :	..	.07	.35	3.67	3.10
2nd week:	" "	:	: Ditto..... :	..	.07	.35	3.78	3.10
3rd week:	" "	:	: Ditto..... :	..	.07	.35	4.01	3.10
4th week:	" "	:	: Ditto..... :	..	.07	.35	4.05	3.10
5th Paym.:	" "	:	:	:	:	:	:	:
29,30,31:	:	:	: Ditto..... :	..	.07	.35	4.04	3.10
October:	Mayer.....	45	: N.Y. Extra + 20% overrun + 60¢ for skim :	..	.07	.29	3.97	3.10
:	:	:	: up to B.F. quotation of 65¢ for N.Y. :	:	:	:	:	:
:	:	:	: Extra. Over 65¢ for B.F., skim brings :	:	:	:	:	:
:	:	:	: 70¢..... :	:	:	:	:	:
October:	Motordale...	49	: N.Y. Extra & 20% plus 60¢ for skimmilk: :	..	.07	.29	3.83	3.10
:	:	:	: regardless of butterfat price..... :	:	:	:	:	:

\* Express rate has been subtracted from price paid the producing company.

(continued)

Table XIX - continued (page 4)

1919									
Period covered by price:	City	Distance: from Twin Cities	Basis	Price: per pound used	Price: variation: per point: butterfat	Express: rate	Cost of: 3.5 per cent milk	Association: price of 3.5 per cent milk	
October	Gylon, Wis.	56	10½ x Twin Cheese + \$.40	.05	.37	.37	3.92	3.20	
1st week	Somerset, Wis.	34	10½ x Twin Cheese + \$.40	.26½	.37	.37	3.55	3.10	
2nd week	" "	+	Ditto	.29	.37	.37	3.82	3.10	
4th week	" "		Ditto	.30	.37	.37	3.92	3.10	
1st week	New Richm. "	47	10½ x Twin Cheese + \$.40	.05	.37	.37	3.18 <sup>+</sup>	3.10	
2nd week	" " "		Ditto	.05	.37	.37	3.30 <sup>+</sup>	3.10	
3rd week	" " "		Ditto	.05	.37	.37	3.45 <sup>+</sup>	3.10	
4th week	" " "		Ditto	.05	.37	.37	3.55 <sup>+</sup>	3.10	
October	Watertown	30	N.Y. Extra + 20% overrun + 70¢ for skim	.07	.29	.29	3.92	3.10	
			where butterfat quotation is 60-70¢						
	Lyndale	20	N.Y. Extra + 20% overrun + 60¢ for skim	.07	.37	.37	3.83	3.10	
			up to quotation of 65¢ for N.Y. Extra						
			Over 65¢ for B.F., skimmilk brings 70¢						
November									
1st half	Milaca	74	Same as in September	.36 <sup>+</sup>	.36 <sup>+</sup>	.36 <sup>+</sup>	3.22	3.15	
2nd half	"		Ditto	.36 <sup>+</sup>	.36 <sup>+</sup>	.36 <sup>+</sup>	3.22	3.15	
1st half	Norwood	40	Same as in September	.35	.35	.35	3.68	3.15	
2nd half	"		Ditto	.35	.35	.35	3.95	3.15	
1st half	Biscay	58	10 x Twin Cheese + \$.60	.05	.35	.35	3.60	3.15	
2nd half	"		Ditto	.05	.35	.35	3.53	3.15	
1-9	New Richm. Wis.	47	10½ x Twin Cheese + \$.40	.05	.35	.35	3.55	3.15	
10-16	" " "		Ditto	.05	.35	.35	3.47	3.15	
17-23	" " "		Ditto	.05	.35	.35	3.52	3.15	
24-30	" " "		Ditto	.05	.35	.35	3.60	3.15	

<sup>+</sup>Express rate has been subtracted from price paid the producing company.

<sup>+</sup>Express rate should be added to this price to give price to the distributor.

(continued)

Table XIX- continued (Page 5)

1919									
Period covered by price:	City	Distance: from Twin Cities	Basis	Price: per pound used	Price: variation per point: butterfat	Express: rate	Cost of: 3.5 per cent milk	Association: price of 3.5 per pertmilk	
November:									
1-9	Gylon, Wis.	56	10½ x Twin Cheese + \$.40	...	.05	...	3.55	3.15	
10-16	" "		Ditto	...	.05	...	3.47	3.15	
17-23	" "		Ditto	...	.05	...	3.52	3.15	
23-30	" "		Ditto	...	.05	...	3.60	3.15	
	Nonsen	50	11 x Twin Cheese quotation straight	...	.05	...	3.29	3.15	
December:	White Willow	90	11 x Twin Cheese + \$.20	...	...	...	3.45	3.15	
1-15	Lyndale	20	Same as in October	...	Calculated var.	...	3.91	3.15	
	"				.07 act.var.	.09			
16-31	"		Ditto	...			3.84	3.15	

## CHAPTER V

### A PRICE SYSTEM FOR THE TWIN CITIES

This chapter will discuss the normal price considerations, market price considerations, and the actual price mechanism as these considerations are applied to conditions in the Twin City whole milk market. In connection with these, the actual and proposed price bases discussed in Chapter III will also be introduced, with a view to establishing a proper method of making a milk price in the Twin City market.

#### Normal Price Considerations and Related Price Bases

The price bases that must be discussed in relation to normal price are those relating to cost of production and the seasonal differentials based on cost of production.

Cost of Production: Cost of production must be taken account of in any territory wherever there is a possibility that prices for the products of the dairy industry in that territory, taken as a whole, may possibly at some time, or at certain seasons of the year, go so low that not enough milk will be produced and sold as whole milk to supply the demand of the cities in that area: Previous discussion of the Twin City Area has made it clear that plenty of milk is produced in the area to feed the population. Cost of production can on the whole, be ignored. This is because the area is one which is always likely to find dairying one of its best opportunities.



These same natural conditions, however, the rough land, the wooded areas and the light soils, make pasture dairying more profitable than winter dairying. This is one factor which helps to bring about a shortage of whole milk for city consumption in the fall and winter. The cold winters also make dairying in winter very disagreeable. Therefore, for the shortage months of the year, cost of production must be taken into account. Enough must be paid for market milk in October to make the producers freshen cows in the fall no matter what other enterprises are crowded out or curtailed. The income of milk producers during the shortage months is therefore an important part of the mean for the year. The factors that influence cost of production during these months must therefore be considered. Some of these factors are the costs of winter feeding, of adequately warm shelter and of winter hauling. Furthermore, the producer who supplies milk in the fall and winter must necessarily have less to sell in the spring and summer. Prices for milk during these months are high relative to cost, because butter and cheese can be stored. Rents, land value, wages and farm incomes reflect this relatively high price for butter and cheese. If winter milk is to be produced, it must be sold at a price which will return the producers as large a return on their own efforts and upon the factors of production as they would receive from summer dairying. The level of prices for dairy products as a whole must of course yield a return from a dairy combination which equals the returns from any alternative combination.

Seasonal costs must therefore be considered, but who can find what the seasonal cost of production is? It varies among farmers just as does yearly cost of production. Feeds fed in the winter have been grown during the preceding summer, some with expensive hired labor, and some with inexpensive family labor. Even if it were possible to compute a seasonal cost of production, it might give us a necessary price, or it might give us too high or too low a price. What actually happens then is that even though a cost may be reckoned, it becomes a competitive bid in the market, and those to whom it pays costs or more will respond; others will stick to the old methods.

Competition with Other Uses of Milk: It will be apparent that in the Twin City area, except for the shortage months, the real basis for computing necessary prices must be the alternative - use values of milk in the form of butter, cheese, etc. Market milk in the Twin City area will always have to meet both butter and cheese factory competition, sometimes one and sometimes the other, depending upon which is relatively higher at the time. Figure VI showed that butter prices average highest in the winter, and cheese prices in the summer. The butter curve would probably give the safest basis if butter or cheese alone were used as a basis. This is because from May to September the butter curve, although under the cheese curve, is closely parallel to it, which will make it easy to average adjustments.

An average of butter and cheese prices will of course produce a curve which splits the difference between the butter

and cheese curves. This means that it will be somewhat too low to meet butter competition in winter, and too low to meet cheese competition in summer. If such a basis is used, a seasonal differential must be arranged which provides for these difficulties. This differential will also have to take care of other factors in the situation, such as the high winter costs already mentioned.

Demand Aspects: Demand is of course the prior consideration in necessary price. What the people of the Twin Cities will take at various prices determines what will be produced at these various prices. Demand changes over a series of years, from season to season during the year, and then in various irregular ways depending upon special conditions that develop, such as weather changes, unemployment, etc. In this part of the chapter we are interested only in the long-time changes and the normal seasonal changes. If conditions remain normal long enough, supply and demand will come to an equilibrium and necessary price and cost of production will be the same, and this will be true as to normal seasonal ranges the same as to general levels of price and production. The Twin Cities are no exception to the general rule in this respect. The amount and quality demanded because of the nature of the population figures in the process of equilibrating supply and demand, and hence in necessary price. The extra demand of certain months calls forth extra production at these periods to meet it, and at whatever cost that is necessary to be paid to bring forth this supply.

As to seasonal demand, the butter and cheese bases are not so satisfactory as cost of production. The mere fact that butter or cheese customarily rises or falls at certain seasons of the year has no direct relation to the amount of whole milk demanded at those seasons. Cost of production may therefore be equated with demand at certain seasons at levels above butter and cheese equivalents.

Differentials: It is apparent that the above price bases have not fulfilled all of the requirements of a milk price as applicable to Twin City conditions. The seasonal supply and demand have not been adequately provided for. Neither has extra care nor location and distance from city been included in our discussion. There is a way in which the lacking element in these price bases may be provided for, and that is by means of differentials. The differential may be analyzed in two parts, first, the elements of extra cost that must be added at all seasons of the year; and second, those elements peculiar to seasons. As to the first, a differential must be added to butter price to pay for the skimmilk and buttermilk contained in the milk. A similar addition must be added for whey in the case a cheese basis is used. In the Twin City area at present, the value of the whey is included in the general average differential. What the skimmilk is worth more than whey is represented by the value of a pound of butter. This is a purely arbitrary basis. It has the merit of flexibility, of rising and falling with butter prices. A better basis is a feed equivalent. Feed does not

always rise and fall with butter, and skimmilk and whey get their value as feed on the farm. A corn equivalent, or perhaps a barley equivalent would be better than a butter equivalent for the Twin City area. It would be well if a feed equivalent could be determined for whey also. Such feed equivalents may be worked out experimentally, but such figures are of little value for these purposes. Estimate and then try it out, is the method that must be used.

The other elements in the general differential are transportation, extra care of clean milk, etc. Obviously no way can be found of calculating all of these. "Cut and try" is the method that must be used.

A flat differential cannot be applied, however, to all months of the year. We have already seen that there are some extra costs that must be met in the shortage months. The excess differential added in these months must be subtracted from the surplus months. But the summer prices cannot go very low without driving the producers to the butter and cheese factories. The present seasonal range of differentials represents the results of a few seasons of experience along this line. Eventually all concerned will be wiser on this subject than they are at present. The present range, however, cannot be very far wrong.

Importance to public health enters into milk price bases not only as an extra cost of producing clean milk on the farm, but also as a cost of distribution. These elements must affect consumers price and consequently affect the demand side of the equation.

The ratio method has not been fully discussed relative to the Twin City area, but since it operates in a manner similar to cost of production, it may be considered in the same light as cost of production. The set of conditions in the Twin City area are not such as would make it any more useful here than cost of production.

The butter, cheese, condensed milk and cost of production combination used at Seattle would be applicable in so far as the elements of this basis have already been discussed relative to butter, cheese, and cost of production. There is one difference in the manner in which cost of production is used here, however, and that is in relation to the establishment of arbitrary limits within which it may operate. This, however, is a market price consideration. Condensed milk is merely another opportunity for milk disposal, and condensed milk may be made and stored; consequently it holds a position quite similar to that of butter and cheese, and so needs no further consideration because it produces no new effects.

Surplus and Deficits: The Twin City Milk Producers' Association method of handling surplus and deficits is coming increasingly into use. Where the distributors handle the surplus in their own cheese factories, condenseries, etc., it becomes necessary to adopt the device of a basic quantity. This device, as has been pointed out, works too well at times. However, a producers' association cannot take over the surplus and deficit responsibility unless it can make year contracts with the dis-

tributor. Thus far, it has not been able to accomplish this to its satisfaction. The distributors have been glad to make contracts for the shortage period; but not so anxious to stick to them at surplus periods. When an association tries handling its own surplus, it meets the problem of equalizing prices between members delivering to its shipping stations and to its factories as periods when the seasonal differential puts market milk prices out of line with butter and cheese prices. This matter has not been entirely settled as yet. In general, a general monthly pool is being preferred at present. All members get the same price no matter how their milk is used, due allowance being made for skimmilk, whey, etc.

#### Market Price Considerations

Market price conditions relative to the Twin City Milk market are discussed here with a view to establishing the relations between the market price phenomena of the milk business and the various price bases which recognize the market price of milk in any way. First of all, it must be borne in mind that the market price fluctuations in the milk business do not occur nearly so quickly as in the marketing of livestock or grain. The extent to which market price considerations enter into the price of milk may be seen in Figure V. Whenever whole milk prices are high or low relative to butter or cheese, considering the season of the year, then market price forces are at work.

Certain of the price bases which have been in use recognize to some extent these short-time fluctuations. In the case

of the butter, cheese, and butter and cheese bases, there is recognition of the market price conditions to the extent that market prices of all dairy products can be expected to move together. This might be illustrated by an experience like the present. The early spring is bringing a large flow of market milk to the cities. So is it increasing the stocks of butter and cheese. All can be expected to decline together. Butter and cheese, however, may get out of line with each other; hence if either alone is used as a basis, or if the two are averaged, our market milk price based on them may be a misfit. Ordinarily increases in production at such times will run ahead of increases in consumption.

When an association pools all milk sold, the butter, cheese, and butter and cheese bases may be in use and even though no violent changes may occur in the market prices of these commodities, the price per hundredweight of milk may be lower due to a relatively greater amount of milk being turned into surplus for manufactured products. With such a system, the small fluctuations from day to day will affect the relative amounts going into regular channels and into surplus, and thus determine to some extent the fluctuation in the price per hundredweight at the end of the pool. This variation in quantity going to each may change from day to day in the Twin City market, and may come about as originating from either the demand or the supply side. Such a system is thus actually very responsive to market price conditions.

A marked upward short-time fluctuation in the price of milk or downward fluctuations in the prices of other commodities



may bring more milk to the market in a relatively short time. During the winter of 1920-21 the prices of grains lowered very rapidly. Farmers in the Twin City area could afford to feed more heavily, and they could also afford to milk more cows. Thus during these particular winter months no shortage was experienced. As to just how soon the response in supply came relative to the new adjustment of the factors involved, it is not entirely possible to determine. This is an example of a typical market price situation. The usual winter month differentials were not needed in this case.

A rise or a fall in the price of milk, if great enough, may be reflected in consumer's price, although consumers milk price is usually influenced more by producers normal price changes. Twin City distributors say, however, that with a rise in the price of milk, there is within two or three days a noticeable falling off in the amount demanded, and then in the course of a week or ten days, the amount consumed has returned practically to normal. With a fall in consumers price, however, the consumers increase their purchases only gradually.

With the South St. Paul livestock market so near, a farmer may easily hold his cows any length of time he wishes so to take advantage of milk price fluctuations. With a marked fluctuation upward in the price of milk, new shippers will send milk to the association. During the winter of 1920-21, milk became the best opportunity and soon outside shippers began to join the Twin City Milk Producers' Association. As mentioned in a previous chapter, 729 new members came into the association

between January 1st and April 7th, 1921. Consequently supply in this case responded within a relatively short time.

In discussing the need for a period contract, it is recognized that essentially milk production lends itself best to a long-time contract. Such contracts, however, do not provide in any way for the short-time fluctuations above described, except in so far as a variable basis is agreed upon, such as the butter or cheese basis. These bases provide not only for the long-time element of the contract, but also to some extent for the short-time fluctuations, since actual prices are computed monthly. The fluctuations in the prices of butter and cheese govern the fluctuations in milk price.

The short-time fluctuations in the Twin City market may be affected somewhat by the fact that not all distributors buy milk from the association, particularly at some seasons of the year, and so during those seasons, relatively more milk must be converted into manufactured products at a slightly lower price.

As previously stated, the cost of production as a price basis does not take account of the short-time fluctuations in the market. The ratio method takes better account of the short-time fluctuations in cost of production, that is, if all the commodities which are used in making up the ratio have daily, weekly, or monthly price fluctuations. But there would be no assurance that cost variations would be such as would cause supply and demand to meet most advantageously at all times.

The corn element in the butter and corn basis takes account of the short-time fluctuations in feed prices as these

affect short-time fluctuations in cost. Basic quantity takes account of the short-time or market fluctuations in so far as it provides for converting surplus milk into manufactured products.

The butter, cheese, condensed milk and cost of production combination basis used at Seattle also recognizes short-time fluctuations in the milk market. The condensed milk element is the only element not discussed, but it holds the same relation to market fluctuations as butter and cheese.

#### Conditions Relating to the Price Mechanism

In any market there are various elements which influence actual agreeing upon a price for milk. This section of the chapter will discuss the actual process of making prices. Bargaining is probably one of the strongest elements which enters into the making of a price agreement, and the way in which it functions will depend upon the extent to which the two contending parties are organized, and whether or not they have equal bargaining power. In the Twin City area, the Milk Producers' organization at present has a membership of slightly over three thousand members. These include a considerable portion of the Minnesota producing area in the immediate vicinity of the Twin Cities. Although the Association does not control the entire territory, it controls a considerable part of the whole milk producing area. The dealers, on the other hand, have organized a Milk Dealers' Association which directs the general policies of the Milk Dealers, the majority of whom operate in Minneapolis territory. At certain seasons of the year, most of these dealers buy their milk, through the association.

This is the only way they can get it at such times. During the remainder of the year, some of them attempt to purchase milk outside the association both in Minnesota and adjoining Wisconsin territory. The seasonality of production then tends to keep the Producers' Association and the Dealers' Association together. Neither has complete control in this area, and when they meet in contending for a milk price, they are very evenly matched. Consequently the effect is quite similar to the bargaining operations between associations of employers and trade unions.

Public authority influences price in the Twin Cities only as it operates through health and sanitation requirements which are enforced by city regulations. In some cities, the zoning of milk delivery as a means of saving delivery expense to the consumers becomes one means by which public authority may affect consumers price; but this has not been attempted here. Public opinion may at times operate to lower prices, or in enforcing certain ideas relative to the maintenance of the health of the community involved. Usually public opinion soon expresses itself in city ordinances. This, however, is not possible in all cases and so it must at times operate independently, usually in some such form as "buyers' strikes", which although usually fairly temporary, frequently have a material effect at least for the time being.

Custom is still a slight factor in influencing milk prices. It operates principally through the consumer. It is customary for the consumer to have the milk brought to his door. He is still somewhat accustomed to having changes in consumers milk price not oftener than twice each year.

The above forces enter into influencing the establishment of a price point. Of all these factors, the element of bargaining is probably the most influential. Bargaining determines just what price basis shall be used, and the amounts of differential that must be paid each month during a series of months. Bargaining in its truest sense operates either between individuals or between groups of individuals formed into organizations which are fairly well matched.

To return definitely to conditions surrounding the Twin City market, it has already been determined that the producing area about the Twin Cities is essentially a dairy territory. Therefore milk will continue to be produced for some purpose whether the market price for whole milk in the Cities is satisfactory or not. So in order to bring an adequate supply of milk to the Twin Cities the competition of butter and of cheese in the territory must be met. The cost of production and ratio methods may be adequate for making satisfactory long-run prices for milk, but there is no assurance that they will give prices that will meet butter and cheese competition month in and month out. If the butter basis is used, butter competition will be sure to be met at all times, but during the periods when the level of cheese prices remains above the level of butter prices, there will again be difficulty. The same is practically true of the butter and corn basis. The cheese basis in like manner meets the competition of cheese at all times, but during those periods when the level of butter prices lies above the level of cheese prices, the cheese basis is thrown out of line. Since

this territory is by the law of comparative cost a dairy territory, and since the price levels of butter and of cheese do not correspond at all times, it is difficult to find a basis which will exactly suit the conditions.

The cheese basis was previously used by the Twin City Milk Producers' Association and found to be unsatisfactory. It is still evident, however, that competition with cheese must be adequately met. The butter and cheese combined basis is now in use here in the Twin Cities for making the producers' price. Owing to the fact that the average of the butter and cheese prices always causes the curve representing the combination to lie between the butter price curve and the price curve for cheese, some of the disadvantage is removed, but some still remains.

A plan which might be used would be to use the level of butter price, or the level of cheese price, whichever is the higher. This would give the farmer full ability to sell his milk at all times to the best advantage, whether that best advantage happened to be butter or cheese. At the present time, whenever the combined butter and cheese basis plus the differential goes too low, the farmers become anxious to turn their milk to the commodity which is the best opportunity. Is this plan better?

The combined butter and cheese basis, although not making the high points in the curve which is at the time the best opportunity, reaches a higher level than the commodity which at that particular time is the poorest opportunity. Furthermore, the normal movements of a price curve based upon the

butter and cheese combination are much less violent than it would be for butter alone or for cheese alone or for the two taken alternately. Consequently, to a gradually fluctuating curve of this kind, a series of differentials may be more intelligently added than to a curve which fluctuates more actively. After some experience, for experience is necessary in choosing any differential with a reasonable degree of success, the amount of differential which must be added to this slowly fluctuating curve can be more accurately determined than for a more violently fluctuating price curve.

The other plan, which suggests taking the butter price level or cheese price level whichever is the higher, gives the farmer the full advantage of the law of opportunity cost. This is thoroughly in harmony with economic doctrines. Since the curve which gives the better opportunity at all times may fluctuate more often and to a greater degree either up or down, a smaller differential needs to be added than in the case of the slowly fluctuating curve of the combined butter and cheese. The smallness of this differential tends to reduce the amount of error; but owing to the fact that the differential contains a seasonal element, it is more difficult to apply.

The most essential part of establishing a price lies in getting the basic method as nearly satisfactory as possible. Each of these two methods has its advantages, and at the present time they represent the most acceptable possibilities in the establishment of a satisfactory milk price in the Twin City Market.

APPENDIX

Table XX

Shipping Points and Amounts of Milk Produced in Actual and Potential Supply Territory Tributary to the Twin Cities.

Number	Station Name	County	Pounds of Milk Supplied
1	Aitkin	Aitkin	6,810,856
2	McGrath	Ditto	182,161
3	Palisade	Ditto	1,199,387
4	Tamarack	Ditto	392,857
5	Andover	Anoka	42,742
6	Anoka	Ditto	5,351,334
7	Cedar	Ditto	1,569,830
8	Bethel	Ditto	1,832,124
9	Centerville	Ditto	292,949
10	Foley	Benton	6,767,517
11	Oak Park	Ditto	1,198,665
12	Rice	Ditto	2,026,316
13	Sauk Rapids	Ditto	2,381,524
14	Cromwell	Carlton	892,857
15	Cloquet	Ditto	2,023,820
16	Barnum	Ditto	2,500,000
17	Bangard	Carver	3,644,249
18	Augusta	Ditto	2,841,009
19	Carver	Ditto	2,532,329
20	Cologne	Ditto	7,530,950
21	Watertown	Ditto	157,073
22	Young America	Ditto	10,864,845
23	Mayer	Ditto	3,892,830
24	Norwood	Ditto	4,296,595
25	Chaska	Ditto	4,110,019
26	Victoria	Ditto	4,767,653
27	Waconia	Ditto	5,818,267
28	Maple	Ditto	1,555,212
29	Motordale	Ditto	4,525,799
30	Hamburg	Ditto	1,984,440
31	Center City	Chisago	6,675,372
32	Chisago City	Ditto	2,862,041
33	North Branch	Ditto	6,500,394
34	Taylor's Falls	Ditto	1,549,380
35	Lindstrom	Ditto	2,765,690
36	Rush City	Ditto	15,993,865
37	Shafer	Ditto	2,856,869

(continued)



Table XX (Continued)

Number	Station Name	County	Pounds of Milk Supplied
38	Stacy	Chisago	364,876
39	Harris	Ditto	2,142,033
40	Fort Ripley	Crow Wing	436,912
41	Jenkins	Ditto	259,259
42	Pequot	Ditto	716,936
43	Farmington	Dakota	2,211,573
44	Hastings	Ditto	1,970,496
45	Rosemont	Ditto	1,060,123
46	Lakeville	Ditto	1,498,206
47	West Concord	Dodge	13,401,215
48	Kasson	Ditto	4,344,929
49	Claremont	Ditto	2,509,490
50	Mantorville	Ditto	4,795,634
51	Hayfield	Ditto	7,373,847
52	Dodge Center	Ditto	1,194,182
53	Cheney	Ditto	514,936
54	Canton	Fillmore	1,596,920
55	Ostrander	Ditto	1,477,542
56	Rushford	Ditto	5,552,245
57	Spring Valley	Ditto	5,636,363
58	Granger	Ditto	6,428,869
59	Mabel	Ditto	5,357,619
60	Preston	Ditto	2,790,763
61	Wykoff	Ditto	4,190,013
62	Peterson	Ditto	965,217
63	Harmony	Ditto	3,265,129
64	Lanesboro	Ditto	96,000
65	Dennison	Goodhue	4,597,374
66	Stanton	Ditto	4,628,694
67	Bellchester	Ditto	1,491,936
68	Goodhue	Ditto	2,942,635
69	Frontenac	Ditto	771,976
70	Kenyon	Ditto	6,534,595
71	Lena	Ditto	226,424
72	White Willow	Ditto	145,824
73	Wanamingo	Ditto	10,644,822
74	Skyberg	Ditto	2,563,723
75	Welch	Ditto	2,509,338
76	Red Wing	Ditto	3,261,728
77	Pine Island	Ditto	15,793,457
78	Cannon Falls	Ditto	6,840,322
79	Zumbrota	Ditto	4,403,566
80	Robbinsdale	Hennepin	3,457,386
81	Hopkins	Ditto	615,390
82	Loretto	Ditto	5,327,140
83	Osseo	Ditto	1,125,381
84	Rogers	Ditto	3,826,664
85	Hamel	Ditto	1,453,345

(continued)

Table XX (continued)

Number	Station Name	County	Pounds of Milk Supplied
86	Maple Plain	Hennepin	5,616,886
87	St. Bonifacius	Ditto	1,918,329
88	Crown	Isanti	5,880
89	Braham	Ditto	1,776,982
90	Grandy	Ditto	2,112,671
91	Cambridge	Ditto	2,952,544
92	Dalbo	Ditto	833,333
93	Isanti	Ditto	3,293,366
94	Ogilvie	Kanabec	4,668,909
95	Mora	Ditto	2,548,693
96	Grasston	Ditto	1,099,539
97	Waterville	Le Sueur	2,748,603
98	Le Sueur	Ditto	6,408,740
99	Kilkenny	Ditto	1,429,217
100	New Prague	Ditto	4,548,339
101	Ottawa	Ditto	2,246,796
102	Le Sueur Center	Ditto	2,476,596
103	Elysian	Ditto	2,131,718
104	Hutchinson	McLeod	32,078,880
105	Biscay	Ditto	6,079,674
106	Brownston	Ditto	2,058,009
107	Glencoe	Ditto	14,335,095
108	Plato	Ditto	6,322,943
109	Silver Lake	Ditto	7,821,562
110	Stewart	Ditto	1,396,439
111	Lester Prairie	Ditto	15,582,527
112	Grove City	Meeker	7,540,723
113	Darwin	Ditto	3,924,131
114	Dassel	Ditto	7,031,744
115	Watkins	Ditto	3,103,656
116	Litchfield	Ditto	10,300,599
117	Eden Valley	Ditto	2,264,304
118	Bock	Mille Lacs	2,080,000
119	Milaca	Ditto	10,676,880
120	Forreston	Ditto	2,096,609
121	Pease	Ditto	3,471,204
122	Isle	Ditto	733,040
123	Onamia	Ditto	729,166
124	Princeton	Ditto	4,534,149
125	Long Siding	Ditto	1,847,425
126	Genola	Morrison	1,542,783
127	Pierz	Ditto	5,029,257
128	Bowlus	Ditto	5,229,166
129	Royalton	Ditto	2,332,871
130	Belle Plaine	Ditto	1,481,375
131	Little Falls	Ditto	3,324,143
132	Flensburg	Ditto	1,155,436
133	Motley	Ditto	1,055,821

(continued)

Table XX (Continued)

Number	Station Name	County	Pounds of Milk Supplied
134	Ramey	Morrison	574,932
135	Randall	Ditto	1,763,869
136	Swanville	Ditto	2,193,917
137	Adams	Mower	5,036,045
138	Lansing	Ditto	1,825,527
139	Lyle	Ditto	2,046,200
140	Le Roy	Ditto	2,692,222
141	Racine	Ditto	4,200,000
142	Rose Creek	Ditto	1,532,176
143	Brownsdale	Ditto	4,593,796
144	Austin	Ditto	707,595
145	Dexter	Ditto	1,279,437
146	Mayville	Ditto	1,361,775
147	Chatfield	Olmstead	3,615,642
148	Dover	Ditto	4,584,348
149	Eyota	Ditto	2,692,091
150	Rochester	Ditto	3,506,586
151	Douglas	Ditto	2,080,537
152	Stewartsville	Ditto	4,354,568
153	Byron	Ditto	6,703,636
154	Simpson	Ditto	1,064,939
155	Viola	Ditto	1,024,898
156	Askov	Pine	1,671,815
157	Brook Park	Ditto	724,953
158	Pine City	Ditto	6,044,139
159	Henriette	Ditto	372,010
160	Hinckley	Ditto	1,501,185
161	Finlayson	Ditto	1,413,793
162	Rock Creek	Ditto	885,902
163	Sandstone	Ditto	621,211
164	Willow River	Ditto	478,757
165	Beroun	Ditto	1,463,771
166	Olivia	Renville	573,877
167	Fairfax	Ditto	3,064,046
168	Bird Island	Ditto	1,993,367
169	Franklin	Ditto	582,566
170	Hector	Ditto	1,992,201
171	Buffalo Lake	Ditto	1,031,660
172	Danube	Ditto	1,421,214
173	Renville	Ditto	1,693,853
174	Sacred Heart	Ditto	636,040
175	Morton	Ditto	610,948
176	St. Paul	Ramsey	4,300
177	Bridgewater	Rice	2,447,762
178	Morristown	Ditto	2,980,839
179	Nirstrand	Ditto	3,413,499
180	Ruskin	Ditto	3,170,196
181	Epsom	Ditto	5,326,858

(Continued)

Table XX (Continued)

Number	Station Name	County	Pounds of Milk Supplied
182	Webster	Rice	5,648,065
183	Northfield	Ditto	3,909,866
184	Faribault	Ditto	5,910,931
185	Dundas	Ditto	2,412,720
186	Lonsdale	Ditto	2,401,900
187	Belle Plain	Scott	1,957,857
188	Blakely	Ditto	2,431,252
189	Jordan	Ditto	6,246,990
190	Marystown	Ditto	758,935
191	Shakopee	Ditto	64,992
192	New Market	Ditto	1,639,540
193	Prior Lake	Ditto	2,246,164
194	Elk River	Sherburne	3,988,979
195	Becker	Ditto	706,192
196	Clear Lake	Ditto	2,858,786
197	Arlington	Sibley	1,348,070
198	Gaylord	Ditto	2,168,633
199	Gibbon	Ditto	2,730,378
200	Green Isle	Ditto	1,276,454
201	New Auburn	Ditto	1,710,365
202	Henderson	Ditto	2,591,024
203	Winthrop	Ditto	3,493,070
204	Albany	Stearns	5,178,288
205	Richmond	Ditto	1,550,792
206	Cold Spring	Ditto	605,823
207	Belgrade	Ditto	3,494,986
208	Brocton	Ditto	2,427,902
209	Elrosa	Ditto	1,449,600
210	Freeport	Ditto	7,201,582
211	Georgeville	Ditto	1,138,374
212	Greenwald	Ditto	1,265,369
213	Holding Ford	Ditto	1,557,885
214	Paynesville	Ditto	1,358,514
215	Melrose	Ditto	6,799,881
216	New Munich	Ditto	2,849,476
217	Roscoe	Ditto	2,642,970
218	Sauk Center	Ditto	2,455,328
219	Avon	Ditto	1,030,592
220	Kimball	Ditto	1,542,805
221	St. Cloud	Ditto	1,181,206
222	St. Joseph	Ditto	237,860
223	Ellendale	Steele	4,581,668
224	Blooming Prairie	Ditto	10,474,484
225	Medford	Ditto	4,557,038
226	Hope	Ditto	6,031,681
227	Meridan	Ditto	2,929,693
228	Owatonna	Ditto	17,019,549

(Continued)

Table XX (Continued)

Number	Station Name	County	Pounds of Milk Supplied
229	Pratt	Steele	3,015,212
230	Bixby	Ditto	2,278,688
231	Elgin	Wabasha	3,139,700
232	Zumbro Falls	Ditto	1,287,133
233	Hammond	Ditto	1,207,554
234	Lake City	Ditto	3,518,869
235	Plainview	Ditto	4,142,455
236	Kellogg	Ditto	867,434
237	Millville	Ditto	1,207,554
238	Wabasha	Ditto	872,933
239	Pemberton (Blue Earth County)	Creamery in Waseca County	1,158,486
240	Minnesota Lake (Faribault County)	Creamery in Waseca County	548,263
241	New Richland	Waseca	4,927,177
242	Janesville	Ditto	1,998,441
243	Matawan	Ditto	1,007,264
244	Otisca	Ditto	2,162,861
245	Waseca	Ditto	1,154,250
246	Waldorf	Ditto	1,097,035
247	Smith Mill	Ditto	1,172,193
248	Forest Lake	Washington	1,870,330
249	Copas	Ditto	4,236,897
250	Stillwater	Ditto	912,721
251	Withrow	Ditto	1,557,389
252	Lake Elmo	Ditto	1,742,125
253	Altura	Winona	2,365,691
254	Utica	Ditto	2,270,837
255	Lewiston	Ditto	4,872,497
256	Dakota	Ditto	3,017,858
257	Pickwick	Ditto	602,238
258	Winona	Ditto	6,898,523
259	Rollingstone	Ditto	1,802,830
260	St. Charles	Ditto	3,589,621
261	Stockton	Ditto	1,232,112
262	Albertville	Wright	2,904,890
263	Enfield	Ditto	70,818
264	Annandale	Ditto	4,671,059
265	Waverly	Ditto	4,292,521
266	Buffalo	Ditto	5,144,890
267	Clearwater	Ditto	1,133,433
268	Cokato	Ditto	7,855,810
269	Rockford	Ditto	4,000,311
270	Delano	Ditto	12,911,761
271	Montrose	Ditto	3,876,064
272	Howard Lake	Ditto	2,927,770

(Continued)

Table XX (Continued) (73,74,75)

Number	Station Name	County	Pounds of Milk Supplied
273	Hanover .....	Wright .....	2,507,960
274	Maple Lake .....	Ditto .....	3,469,370
275	Hasty .....	Ditto .....	996,227
276	South Haven .....	Ditto .....	1,360,000
277	Winsted .....	McLeod .....	31,946
278	Helena .....	Scott .....	52,233
279	Lake Josephine .....	Ramsey .....	239,041
Wisconsin Stations Not Entered on Map			
Association Purchase	Cylon .....	.....	122,517
Independent Buyers' Purchase	(Star Prairie .. )Nye .....	..... .....	13,371 183,929
	(Osceola .....	.....	90,712

- (73) Minnesota State Dairy and Food Department.
- (74) Twin City Milk Producers' Association.
- (75) Independent Minneapolis Dealer.

See Fig. 1.

Table XXI  
Chicago - Elgin Monthly Milk Prices. (76)

Month	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
Jan.	1.75	2.00	1.85	1.75	2.00	1.95	1.64	2.05	3.22	3.76
Feb.	1.70	1.90	1.80	1.70	1.85	1.85	1.54	2.00	3.07	3.50
Mar.	1.55	1.70	1.65	1.60	1.75	1.75	1.43	1.85	2.90	3.10
Apr.	1.45	1.30	1.30	1.61	1.60	1.45	1.65	2.40	2.65	2.80
May	1.20	1.10	1.05	1.36	1.40	1.20	1.45	2.00	2.05	2.50
June	1.05	1.00	1.00	1.25	1.25	1.10	1.25	1.60	1.80	2.50
July	1.20	1.30	1.30	1.46	1.50	1.30	1.55	2.12	2.30	3.00
Aug.	1.45	1.45	1.45	1.61	1.60	1.55	1.70	2.30	2.75	3.50
Sept.	1.60	1.45	1.50	1.55	1.60	1.55	1.70	2.30	2.92	3.55
Oct.	1.70	1.70	1.60	1.65	1.90	1.53	1.90	3.42	3.32	3.63
Nov.	1.90	1.85	1.75	1.75	2.00	1.65	2.10	3.22	3.68	3.60
Dec.	2.00	1.90	1.80	1.85	2.00	1.65	2.10	3.22	3.77	3.65

(76) Agricultural Prices, A. Wallace. p. 162.

See Fig. V.

Table XXII

Average Monthly Price in the New York Market of Butter. (77)  
(Creamery Extras)

Month:	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
Jan.	33.44	26.39	38.10	35.18	32.66	33.50	32.64	40.09	52.24	61.86
Feb.	29.64	26.11	31.14	36.39	29.34	32.31	33.86	43.57	51.13	51.84
Mar.	32.63	23.91	30.64	36.77	27.74	29.76	36.96	41.63	44.52	61.67
Apr.	31.13	21.11	32.35	34.59	25.40	30.77	36.03	44.21	43.34	64.52
May	28.43	21.87	29.71	28.61	26.16	28.88	31.08	40.23	45.33	58.19
June	27.92	22.83	27.31	27.81	27.22	28.23	29.82	39.11	43.95	52.33
July	28.31	24.99	27.13	27.02	27.90	27.02	28.93	39.06	44.81	53.00
Aug.	29.38	26.31	26.63	27.98	30.43	25.92	31.20	41.37	46.04	55.26
Sept.	29.89	26.55	29.76	31.57	31.43	26.63	33.88	44.30	55.94	58.87
Oct.	29.96	30.44	31.29	31.46	31.68	28.61	35.44	44.62	58.70	67.46
Nov.	31.17	33.91	34.46	33.85	34.79	31.10	39.41	45.51	63.28	71.15
Dec.	29.66	36.79	37.27	36.12	33.98	35.09	39.87	49.45	68.68	72.48

(77) 1911-1920 January issues of the New York Produce Review and American Creamery, New York City.

See Fig. V.



Table XXIII

Average Monthly Price of Cheese in the New York Market. (78)  
(N.Y. State Flats, Fresh Extras)

Month:	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
Jan.	17.75	16.76	16.36	16.73	17.15	15.15	17.45	23.25	23.88	26.43
Feb.	17.75	16.23	16.43	16.56	17.47	16.27	17.51	24.89	26.23	30.96
Mar.	17.75	15.30	17.27	16.15	17.50	15.80	17.50	26.06	23.99	32.69
Apr.	17.65	14.98	17.62	13.67	14.60	15.45	17.09	25.65	22.74	.....
May	14.05	13.43	15.58	13.42	13.88	16.97	17.11	26.35	22.95	32.24
June	14.99	11.45	14.55	14.57	14.95	15.54	15.45	23.45	23.66	31.68
July	15.71	12.04	15.32	14.30	14.72	14.81	15.62	23.14	24.98	32.60
Aug.	16.16	12.90	15.89	14.82	16.03	13.51	16.98	23.43	26.22	31.53
Sept.	16.32	13.97	16.23	16.13	15.89	14.62	19.52	25.34	28.36	30.96
Oct.	16.13	14.59	17.70	16.23	15.18	15.28	21.13	24.82	32.89	31.54
Nov.	16.25	14.76	17.31	15.99	15.17	16.01	23.51	23.11	33.71	32.75
Dec.	16.50	15.88	17.28	16.13	15.15	16.78	23.63	23.50	36.67	.....

(78) Idem

See Fig. V.

Table XXIV

Ten Year Average Monthly Prices of Milk,  
Butter and Cheese. 1910-1919.

Month	: Dollars per <sup>1</sup> : : hundred weight: : of whole milk:	Cents per Pound	
		Butter <sup>2</sup>	Cheese <sup>3</sup>
Jan.	2.20	38.77	19.61
Feb.	2.10	36.56	19.41
Mar.	1.92	36.56	19.41
Apr.	1.82	36.56	17.08
May	1.53	33.97	18.05
June	1.39	32.86	17.47
July	1.71	32.86	17.86
Aug.	1.94	33.97	18.24
Sept.	1.98	36.93	19.22
Oct.	2.24	39.14	19.99
Nov.	2.35	41.73	20.38
Dec.	2.39	43.94	19.61

1. Chicago-Elgin Milk Price.
  2. Creamery Extra Butter - New York Market.
  3. Cheese, New York State Flats, Fresh Extras -  
New York Market.
- See Fig. VI.

Table XXV

Sales of One Minneapolis Milk Dealer.<sup>(79)</sup>

Month	: Retail : : Quarts :	: Retail : : Pints :	: Quarts and pints : : combined in terms: : of quarts :	Consumers
				: retail price : per quart : cents
Jan.	221,372	24,817	233,780.5	13½ (13-14)
Feb.	206,737	21,632	217,545.0	13
Mar.	242,307	25,611	255,112.5	13
Apr.	226,905	27,365	240,587.5	13
May	242,062	27,390	255,757.0	12
June	225,569	29,079	240,108.5	12
July	216,443	31,493	232,189.5	12
Aug.	208,558	31,805	224,460.5	13
Sept.	124,002	18,656	133,330.0	13
Oct.	211,615	31,964	227,597.0	13
Nov.	227,613	31,987	243,606.5	13
Dec.	246,536	32,885	262,978.5	13

(79) Independent Minneapolis Dealer.

See Fig. VII.

Table XXVI

Milk Purchased Outside the Association During Shortage Months. (Pounds) (80)

Month	1917	1918	1919
Jan.	.....	.....	103,733
Feb.	.....	.....	65,274
Mar.	.....	.....	48,362
Apr.	.....	.....	.....
May	.....	.....	.....
June	.....	.....	.....
July	.....	.....	.....
Aug.	.....	.....	.....
Sept.	19,975	.....	74,006
Oct.	64,012	389,076	496,658
Nov.	82,927	728,035	855,477
Dec.	3,360	181,318	814,942

(80) Twin City Milk Producers' Association.

See Fig. VIII.

Table XXVII

Surplus Milk Produced by Association Members and Converted into Butter and Cheese. (Pounds) (81)

Month	1917	1918	1919
Jan.	.....	743,531	1,694,508
Feb.	.....	902,563	2,471,863
Mar.	.....	1,126,077	2,810,558
Apr.	165,462	1,011,720	2,392,352
May	558,101	1,313,655	3,446,858
June	1,008,350	2,283,400	3,511,756
July	878,186	1,444,420	2,095,653
Aug.	695,690	427,792	699,938
Sept.	23,654	127,626	266,521
Oct.	475,820	20,062	1,275
Nov.	111,100	6,071	1,690
Dec.	884,501	731,411	133,694

(81) Idem.

See Fig. VIII.

Table XXVIII

Wholesale Milk Prices Paid to Association Members. (82)

Month	1917	1918	1919
Jan.	\$ .....	\$ 2.80	\$ 3.30
Feb.	.....	2.70	2.57
Mar.	.....	2.50	3.12
Apr.	2.30 (-2% Comm. & Sinking fund) (-4% fund)	2.35+.07 addit. = 2.42	3.00
May	2.00 - 2% ditto	2.20+.11 addit. = 2.31	2.95
June	1.80 - 2% ditto	2.15+.10 addit. = 2.25	3.00
July	2.20 - 2% ditto	2.3 2.30	3.05
Aug.	2.40 - 2% ditto	2.55	3.15
Sept.	2.40 - 3% ditto	2.75	3.10
Oct.	3.25) - 3% ditto 2.90)	3.20	3.10
Nov.	2.90) - 3% ditto 2.78)	3.50	3.15
Dec.	2.75 Basis of price charged	3.70	3.15

(82) Idem.  
See Fig. VIII.

Table XXIX

Supply, to Dealers, of Milk Produced by Association Members. (Pounds) (83)

Month	1917	1918	1919
Jan.	.....	1,509,696	1,130,616
Feb.	.....	1,349,400	589,706
Mar.	.....	861,829	723,286
Apr.	144,189	1,348,105	794,817
May	990,974	1,612,139	843,781
June	589,680	1,251,383	909,807
July	894,138	1,865,254	1,450,149
Aug.	764,991	2,052,545	2,044,124
Sept.	566,244	1,848,597	1,841,296
Oct.	897,814	1,637,781	2,018,984
Nov.	886,296	1,425,405	2,205,708
Dec.	1,402,410	1,446,672	2,922,975

(83) Idem.  
See Fig. VIII.

Table XXX

Seasonal and Territorial Milk Price Range In  
Principal Cities of the United States. \*(84)

Month	Boston	New York	Philadelphia	Richmond	Cleveland	Columbus	Indianapolis	Chicago	Milwaukee
January	4.65	4.335	3.94	5.12	4.30	4.20	3.15	4.15	3.82-3.85
February	4.65	4.125	3.94	5.12-5.18	4.24	4.20	3.15	3.78	3.60-3.85
March	4.53	4.005	3.94-4.19	5.12-5.18	4.19	No Price	2.98-3.15	3.45	3.35
April	4.53	2.75	3.99	5.12-5.18	3.66	3.75	2.98	3.20	3.16
May	4.19	2.75	3.99	5.12-5.18	3.55	3.25	2.80-2.98	3.20	3.16
June	4.19	3.03	3.94	5.06-5.18	3.55	3.25	2.80-2.98	3.30	3.16
July	4.42	3.15	3.94	5.00-5.12	3.77	3.25	2.80-2.98	3.70	3.60
August	4.65	3.55	4.40	5.06-5.18	4.13	3.45	2.80-3.52	4.20	3.75
September	4.88	3.85	4.40	5.12-5.18	4.19	3.45	2.80-3.05	4.07-4.20	3.75
October	4.88	3.85	4.40	5.06-5.18	4.19	3.45	2.98-3.23	4.13-4.20	3.75
November	4.88	3.85	4.40	5.06-5.18	3.90	3.45	2.98	3.52-3.63	2.75
December	4.88	3.38	3.48	5.12	3.72	3.50	2.80-2.98	3.08-3.18	2.75

\* Monthly Producers Price Quotations Per Hundredweight for Wholesale Milk Delivered to the Dealers' City.

Table XXX (Continued) \* (84)

Month	Minneapolis	Des Moines	St. Louis	New Orleans	San Antonio	San Francisco	Seattle	San Diego
January	3.57	3.75	4.29	5.12	3.70	4.03	3.74	4.45
February	3.47	3.75	4.07	5.13	3.64	4.04	3.20-3.52	4.45
March	3.11-3.49	3.75	3.71	5.12	3.66	4.04	3.02	4.45
April	3.20-3.35	3.62	3.59-3.72	5.12	3.66	4.04	2.60-3.15	4.45
May	3.10-3.20	3.50	3.60	4.16-4.42	-	4.04	3.20	4.45
June	3.05-3.11	3.50	3.36	4.16-4.42	-	4.04	3.20	4.45
July	2.80	3.50	3.72-3.82	4.17-4.42	-	4.07	3.58	4.45
August	3.51	3.50	3.84-4.42	4.42	-	4.51	3.58	4.45
September	3.57	3.50	-	5.13-5.35	3.75	4.51	3.58	4.45
October	3.80	3.75	-	5.35	3.75	4.51	-	4.71
November	3.68	3.75	3.60	5.12-5.35	3.75	4.51	-	4.71
December	3.66	3.75	3.65	4.20-5.35	-	4.04-4.51	2.90	4.71

(84) U.S.D.A. Bureau of Markets Fluid Milk Market Reports 1920.

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C.E. North, M.D., Director. Dec. 1919.
- Twin City Milk Producers' Association Annual Report. 1920.
- U.S. Dept. Agric., Bureau of Markets Fluid Milk Market Reports  
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Miscellaneous

- Cloverleaf Milk Co., Minneapolis, Minn.
- Metropolitan Milk Co., Minneapolis, Minn.
- Minneapolis Board of Health, Minneapolis, Minn.
- Minnesota State Dairy and Food Department, St. Paul, Minn.
- Queen City Milk Producers' Association, Cincinnati, Ohio
- St. Paul Board of Health, St. Paul, Minn.
- Central Ohio Milk Producers' Association, Urbana, Ohio  
(Columbus Market)