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MARKETING MILK IN SIX CITIES OF KANSAS

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MARKETING MILK IN SIX CITIES OF KANSAS.[1]

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THE MILK-MARKETING PROBLEM IN KANSAS.

The growth of small cities and towns in Kansas is making the city milk supply a question of increasing interest. The 1920 census classifies 34.9 per cent of the population of the state as urban. The majority of these people, and all farmers who are producing milk for city consumption, are concerned with the problem of marketing

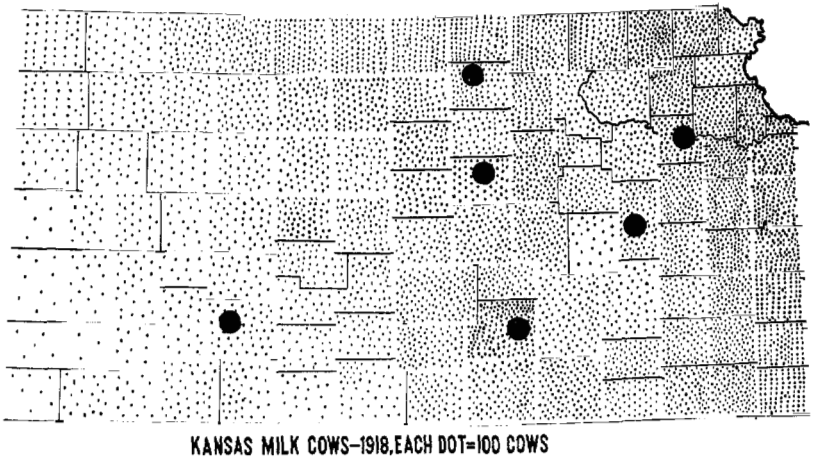

FIG. 1.—Map of Kansas showing the approximate distribution of milk cows and the location of the six cities in which the milk marketing studies reported in this bulletin were made.

milk in cities. While it is true that more than one-third of the population of Kansas is classed as urban, it should be remembered that there are few cities of any considerable size. There are in the state 117 towns having a population of from 1,000 to 5,000, twenty-four having a population of from 5,000 to 25,000, two having a population of from 50,000 to 75,000, and only one city with more than 100,000 inhabitants. Approximately two-thirds of the urban population reside in towns of less than 25,000 inhabitants. These figures make it apparent that the milk-marketing problem of Kansas deals chiefly with the smaller cities and towns.

1. Contribution No. 4 from the Department of Agricultural Economics.

2. The author was a member of the investigational staff of the Kansas Agricultural Experiment Station during the time the marketing investigations herein reported were made.

METHODS AND SCOPE OF INVESTIGATION.

In view of these facts, the Kansas Agricultural Experiment Station in 1919 and 1920 made a study of the marketing of milk in six cities. The cities selected were Wichita, Topeka, Salina, Emporia, Dodge City, and Concordia. The location of these cities is shown in figure 1, and their population, according to the 1920 census, is as follows:

Wichita	72,217
Topeka	50,022
Salina	15,085
Emporia	11,273
Dodge City	5,061
Concordia	4,705

It is believed that these cities represent fairly typical conditions throughout the state. They were selected as being representative cities of varying size and class of population, and are located in sections of the state having different agricultural and industrial conditions.

The city consumer of milk is concerned with the quantity, quality and price of the milk available to him. All of these considerations have been the subject of much discussion and in many instances of controversy in recent years. An adequate supply is desirable, but the quality of the supply is perhaps of greater importance. Many attempts have been made to improve the quality of milk by regulating the sanitary conditions surrounding its production and marketing. The price of dairy products is of interest because of its influence on the cost of living and also because the milk bill has stood alone, unmingled with other items, and this has tended to focus attention upon it.

The producer of milk is interested in its marketing from the standpoint of disposing of his product efficiently and profitably. Dairying has been urged as a means of obtaining a more diversified and profitable type of farming. This has resulted in an increase in the output of dairy products. The producer is interested in the sanitary production of milk, but does not wish to be hampered with regulations which materially increase its cost and which may be of doubtful value in securing desired results from the standpoint of sanitation.

The data included in this study were obtained by questionnaires and by personal visits to as many of the agencies distributing milk in each of these six cities as could be reached. Practically all distributing agencies were included, so that the report is as accurate

as it seemed possible to make it. Samples of milk were taken in each city and sent in iced containers to bacteriological laboratories in Manhattan and Topeka for inspection as to quality. In many cases some difficulty was experienced in obtaining accurate information concerning some phases of the problem because of the lack of definite records. Most of the agencies distributing milk are either farmers or small distributors and operate on a small scale. They do not feel the need of records as do the larger distributors in large cities, and consequently do not keep them. The people concerned were very willing to cooperate in the work and furnished the information as fully and accurately as possible.

In studying the data presented it should be noted that each city should be considered separately. No attempt has been made to average the figures for all cities, since the average would mean little. The figures for each city must be considered as representative of conditions in those cities and towns of which it is typical.

Three terms, the meaning of which should be clearly understood, are used frequently. The agency producing the milk is spoken of as a *producer.* The agency distributing the milk is called a *distributor.* An agency performing both of these functions is designated as a *producer-distributor.*

THE SUPPLY OF MARKET MILK.

The milk supply of these towns was usually produced on near-by farms. There were only a few dairies producing milk within the cities. The farms supplying the milk marketed by the direct method were usually not more than two or three miles from the city; those supplying city dealers were farther out. The distance of the producing farms from the city has an important bearing on the method of sale, the cost of transportation, and other marketing factors. The majority of the producers within two or three miles of the cities chose to deliver their own product direct to the consumers rather than permit it to pass through the hands of distributors. The average distance from the city for farmers selling milk direct to city consumers was 2.79 miles, while farmers selling whole milk to distributors and condenseries averaged 3.15 miles from town, and those selling cream averaged five miles.

The size of the city does not always determine the distance between the farmer who supplies the milk and the consumer. For instance, the producer-distributors were farther from town at Dodge City than at Wichita. Figure 2 shows the location of the farms supplying milk to the city of Topeka.

No part of the milk supply of these six cities was brought from territory far distant from them. Practically all of the supply was delivered to them by wagon. This lessened the problem of getting the milk to the consumer in good condition.

Most of the farms supplying milk direct to the consumer were of small area, averaging considerably less than 100 acres. These

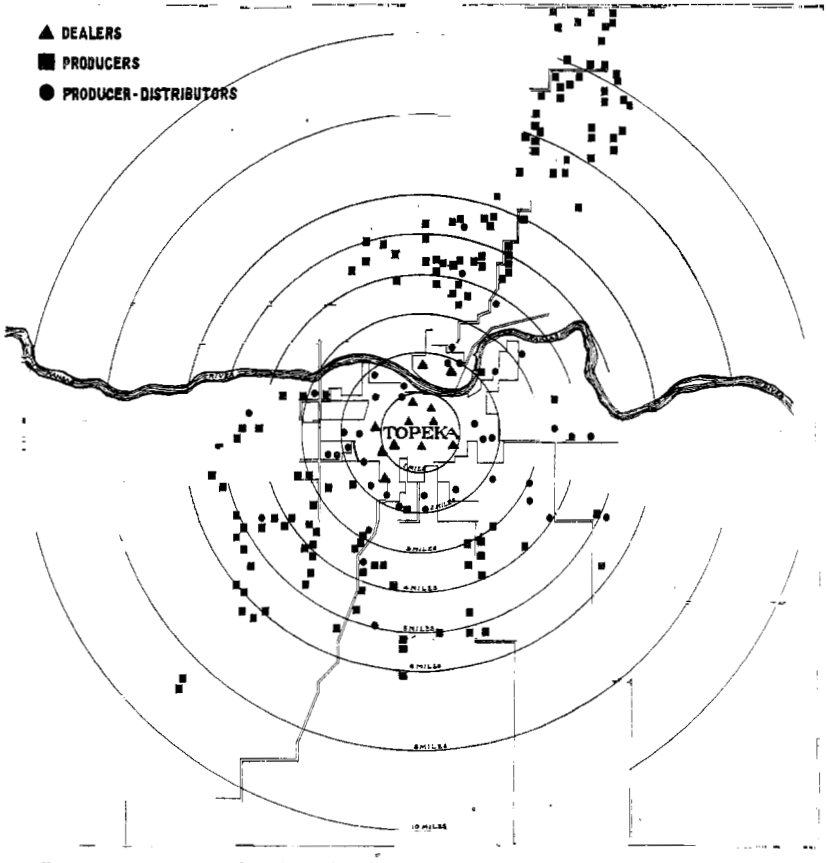

FIG. 2.—Diagram showing the approximate number and location of milk dealers, producers, and producer-distributors located within a radius of one, two, three, four, five, six, eight, and ten miles, respectively, of the center of the city of Topeka.

farms usually produced the feed and bedding needed for the milk cows, but rarely produced any other crops. Approximately 68 per cent of the farms selling whole milk were owned by their operators and 32 per cent were operated by tenants. The tenant has a more difficult problem than the owner in producing a satisfactory product, since all the conditions of production are not under his control.

The average number of cows included in the herds of the producer-distributors was greater than the average number in herds supplying city dealers. The size of herds varied from two to seventy-five cows. The producer with a large herd can afford equipment which cannot be afforded where only a few cows are kept. This often makes it possible for the larger producer to produce milk both under more desirable conditions and at a lower cost of production. Table I gives data concerning the size of herds owned by producer-distributors.

TABLE I.—Number of cows in herds of producer-distributors.

CITY.	Average.	Most frequent.	Largest.	Smallest.
Wichita	27	30	75	5
Topeka	16	10	40	2
Salina	8	8	12	3
Emporia	18	12	60	5
Dodge City	23	40	40	6
Concordia	9	8	16	4

The fact that a large number of cows are being kept on many small farms indicates that the production of whole milk to supply these cities is becoming a specialized type of farming. Table II gives the daily production of milk on the farms of producer-distributors.

TABLE II.—Average daily production of milk on farms of producer-distributors.

CITY.	Flush season.	Low season.	Average of season.	Average per cow.	Average per cow in herds of—		
					Less than ten cows.	Ten to twenty cows.	More than twenty cows.
	Gals.	*Gals.*	*Gals.*	*Gals.*	*Gals.*	*Gals.*	*Gals.*
Wichita	56	28	34	1.63	2.05	2.85	1.94
Topeka	50	28	37	2.30	2.48	2.48	2.25
Salina	19	9	14	1.83	1.83	(*a*)	(*a*)
Emporia	58	31	40	2.20	2.10	2.40	2.27
Dodge City	51	27	36	1.57	1.66	1.36	1.70
Concordia	25	12	18	1.62	2.04	1.50	(*a*)

(*a*) No data available or data unreliable.

It will be noted in Table II that there is considerable variation in the production per cow. This materially affects the cost of producing the milk. Usually the more milk the cow produces the lower the cost per pound.

SURPLUS AND SHORTAGE.

By "surplus" and "shortage" is meant the amount of milk produced or received above or below the normal demand. The season of surplus is frequently termed the "flush" season, and the time of deficiency in production the "short" season. As shown in Table II, the production per herd varies considerably at different times in the year. The producer-distributors must either regulate the production of their herds or purchase milk in times of shortage if a fairly constant supply of milk is to be maintained. The farmers supplying distributors do not usually attempt to maintain a uniform supply throughout the year. This works a hardship on the dealers, whose trade usually demands a fairly constant supply of milk. In some regions distributors have been able to obtain milk from sources other than their regular patrons during seasons of shortage. Fifteen out of twenty distributors in these cities reported that it was either extremely difficult or impossible to obtain milk from other sources to supply the trade in times of shortage. The distributors in Kansas attempt to maintain a sufficient number of patrons to insure an adequate supply in seasons of shortage. This results in a surplus at times, and adds to the total cost of operation by the distributors. The seasons of surplus and shortage were not identical for all distributors, but all of them were confronted with the problem at one time or another during the year. Table III indicates the problem of the producer-distributors in this regard and shows how many of them have overcome it.

TABLE III.—The buying of extra milk by producer-distributors.

CITY.	Number of producer-distributors.	Number buying from other farmers.	Per cent buying part of their supply.	Average number of persons bought from.
Wichita	28	7	25.0	3.0
Topeka	33	13	39.4	3.2
Salina	7	2	28.6	1.0
Emporia	11	2	18.2	3.5
Dodge City	6	4	66.6	2.0
Concordia	5	2	40.0	1.0

THE QUALITY OF MARKET MILK.

IMPORTANCE OF SANITATION.

The desirability and value of milk as a food for human consumption is very largely dependent upon its condition when delivered to the consumer. This makes the problem of sanitation a very important one in the production and marketing of milk. The consumer is interested in obtaining milk of good quality and in good condition. The producer is interested in producing milk of good quality, since the future market for his product is dependent upon its desirability.

CITY MILK ORDINANCES AND INSPECTION.

Only three of the six cities included in these studies had milk ordinances and only two had any provision for enforcing them. The smaller cities and towns cannot afford to employ efficient and competent inspectors, and consequently have difficulty in enforcing any ordinances which may be enacted. This fact, however, should not prevent the consumers of milk in these cities and towns from having the protection afforded by adequate inspection service. It is suggested that a system of state inspection could be inaugurated for those cities and towns which are unable to furnish their own inspection service. Such a plan should give adequate service at a minimum cost.

The milk ordinances in Topeka and Wichita, which were the ones enforced, provide for the following:

1. A license system for all persons or farms supplying the city with milk.
2. The payment of a license fee.
3. Specific sanitary requirements for production and distribution.
4. Compulsory testing for tuberculosis.
5. Standards for dairy products, including fat test, bacteria count, and total solids.
6. Specific conditions for pasteurization of milk.
7. Compulsory inspection and laboratory service and the creation of the office of milk inspector.
8. Punishment for violation of ordinance by fine or imprisonment, or provision for the exclusion from the city of milk which is not produced and distributed in accordance with the ordinance.

The advantages of an inspection service are many, especially in the detection of individual cases of fraud and danger from contamination. Good inspection service also creates a spirit of friendly rivalry among milk distributors within a city and gives the consumer something upon which to base his judgment in selecting a "milkman." Probably the most important feature of milk in-

spection is the testing of cows for tuberculosis. Table IV shows the results of such testing around Topeka. The enormous improvement in two years indicates the possibility of such service.

TABLE IV.-Results of testing dairy cows for tuberculosis in vicinity of Topeka.

	1914.	1916.
Number of cows tested	1,267	2,037
Number of cows condemned	67	17
Per cent condemned	5.29	0.835
Per cent of herds with tubercular cows	23.90	.736
Per cent of herds tested both years (same owner and same premises) with tubercular cows among them	37.83	.000

FUTURE POLICY CONCERNING INSPECTION.

Sanitary regulations have an important bearing upon the cost of production and distribution as well as upon the quantity and quality of the milk supply. The policies of most Kansas towns in dealing with this problem have not been determined, and it is important that the question be studied carefully so that mistakes which have been made in other places may be avoided. It should be remembered that the milk supply of many Kansas towns is produced under very different conditions from those found on farms near large cities. The so-called sanitary equipment is not found on many Kansas dairy farms, and it may prove advisable to eliminate certain regulations prescribing the equipment to be used, and base regulations more upon the quality of the product produced and delivered and the methods of handling it. It should be remembered that the methods used and the care exercised by the persons handling the milk are more important than equipment. Too stringent regulations concerning equipment would probably result in a shortage of milk for a time at least.

Tenant farmers must be especially considered in this regard. They are frequently prevented from complying with the regulations because they do not have the cooperation of the landlord. The tenant cannot be asked to put in permanent sanitary equipment when the landlord will not do his part. On the other hand, the consumer has a right to demand that necessary equipment be obtained and used. If the sanitary standards are to be maintained, either the milk must be produced on farms owned by their operators, or a method of farm leasing must be adopted which will make it to the interest of the landlord to assume his portion of this expense.

QUALITY IN MILK.

The quality of milk varies with many factors, among which are climatic conditions,-the season of the year, geographical location, the type of person handling it, and the equipment used in producing it. A comparison of the quality of the milk supply of Boston with that of Topeka for a period of one year shows that in Boston approximately 88 per cent of the samples taken had a bacterial count of less than 500,000 per cubic centimeter, while in Topeka 95 per cent had a count of less than 500,000 per cubic centimeter. This indicates that, where adequate and efficient inspection service is conducted, the quality of the milk sold in Kansas cities may be of as good or better quality than is obtained in cities apparently more favorably situated. Table V gives comparisons of the quality of the milk supply of five cities of Kansas.

TABLE V.—Comparison of quality of milk supply of five cities of Kansas.

CITY.	Data obtained during period of test.					REMARKS.
	Average per cent of butter-fat.	Average per cent of total solids.	Average number of bacteria per cc.	Lowest bacteria count.	Highest bacteria count.	
Topeka.....	3.67	8.26	198,000	12,000	610,000	
Salina.....	(a)	(a)	160,500	8,000	750,000	Some foreign matter.
Emporia.....	3.68	8.99	148,750	65,000	335,000	Considerable visible dirt.
Dodge City...	4.00	(a)	795,000	10,200	2,200,000	Sediment in several samples.
Concordia....	3.07	10.22	21,000	17,000	25,000	Only a few samples.

No data available for Wichita for the period included.
(a) Data unavailable or unreliable.

A study of the records of the Topeka milk inspection service shows that, although the milk sold by distributors had a lower average bacterial count than that sold by producer-distributors, this was due to Pasteurization, and that no other striking difference was found in the quality of the milk supplied by these two types of distributors. Table VI gives a comparison of the relative quality of milk furnished by the various types of distributors.

TABLE VI.—Relative quality of milk furnished by distributors, producer-distributors, and town cows in Topeka.

SOURCE OF MILK.	Per cent fat.	Per cent total solids.	Bacteria per cc.
Producer-distributor.....	3.93	8.59	147,000
Distributor.....	3.63	8.56	60,500
Town cows.....	4.35	8.72	170,000

Table VII shows the variation in quality of milk furnished by producer-distributors in Topeka. The same price was received by those having the best and those having the poorest quality of milk, quality being based upon the per cent of fat and total solids.

TABLE VII.—Variations in quality of milk sold by producer-distributors of Topeka.

CITY.	Bacteria per cc.	Per cent fat.	Per cent total solids, including fat.
Highest	1,390,000	4.22	14.34
Lowest	21,750	3.24	11.38
Average of 35	325,644	3.71	12.25

GRADES OF MILK.

Probably in the case of no other farm product is there so wide a variation in quality with so little difference in price as in milk. This is illustrated in Table VII, where the same price was paid for all milk, regardless of quality. Under the present Kansas system, where there are no grades for milk, except in Kansas City, Kan., there is little incentive for the dairyman to produce a higher quality of milk than that which will satisfy official requirements. There is no compensation for the additional care and expense involved in producing a product of high quality. The producer-distributor may obtain a special trade for his product, but this is too often the result of personality and selling methods, rather than compensation for quality of product or sanitary methods of production and marketing.

Those grades which have originated in the six cities included in this study are in reality brands or selling names, and are not based upon any official standard. In the six cities studied, only one distributor and three producer-distributors out of twenty-seven sold more than one kind or brand of milk. However, several sold milk which was supposed to be of better quality than that supplied by the ordinary dairyman, and received a higher price for it. Those selling their milk under special names or brands were nearly always well paid for the extra labor, care, and expense involved. The greater part of the increased cost of this milk came from the increased selling expense, and not from the cost of obtaining the higher grade of milk. No "certified" milk[3] was sold in any of the six cities studied,

3. Certified milk is that which has been produced under the supervision of a medical milk commission and in accordance with the requirements of the commission. The milk commission must be appointed by an approved medical society. The medical milk commission employs the services of experts, whose duty it is to make frequent examinations of the milk and methods of production. If the reports of these experts are satisfactory to the commission, it then issues its certification for the milk in question.—*Stocking's Manual of Milk Products.*

It is very apparent that official standards for milk in an adequate grading system cannot be established without the aid of inspection service. Proper grading of milk and the establishment of prices based upon these grades would encourage better methods of production and marketing and insure the dairyman a more nearly fair return. It would do away with the present unfairness, whereby the careless dairyman receives approximately the same price for his milk as the dairyman who produces milk of high quality. It would probably also increase the consumption of milk as it would guarantee the consumer a better quality.

EXTENT OF PASTEURIZATION.

The practice of Pasteurizing milk goes with the control of milk supply by dealers, and has not developed to any great extent in the cities of Kansas. Table VIII gives the per cent of the total milk supply Pasteurized for each city.

TABLE VIII.—Per cent of total milk supply Pasteurized.

CITY.	Average quantity per day.		Per cent pasteurized.
	Used.	Pasteurized.	
	Gals.	*Gals.*	
Wichita	3,764	1,302	34
Topeka	3,421	496	14
Salina	678	540	79
Emporia	612	138	22
Dodge City	283	0	0
Concordia	179	85	48

BOTTLING MILK.

The sanitary conditions of the milk is further aided by bottling before delivery to the consumer. Milk bottles were probably first used in Kansas in Topeka about 1896. Even at present, not all of the milk sold is bottled. The per cent sold in bottles and the per cent sold in bulk, as shown by the data obtained in this study, are as follows:

City.	Per Cent Sold Bottled.	Per Cent Sold in Bulk.
Wichita	90	10
Topeka	86	14
Salina	77	23
Emporia	65	35
Dodge City	63	37
Concordia	78	22

DEMAND AND THE MARKET.

THE CITY AS A MARKET.

There are various markets for milk in Kansas, although only a few specialized dairy-product industries have developed, such as condenseries and cheese factories. These specialined dairy-product industries tend to absorb the surplus supply of milk in times of surplus. This problem was not as acute as it might be, since the surplus for all distributors did not come at the same time. Also, the low per capita consumption of milk makes it possible for consumption to be increased materially. Table IX shows the consumption of whole milk per person in each of the six cities studied.

TABLE IX.—Consumption of whole milk.

CITY.	Population, 1920 census.	Total whole milk consumed daily.	Total whole milk consumed daily per person.
		Pints.	*Pints.*
Wichita	72,217	30,112	0.417
Topeka	50,022	27,368	.547
Salina	15,085	5,424	.360
Emporia	11,273	4,896	.434
Dodge City	5,061	2,264	.447
Concordia	4,705	1,432	.304

It will be seen that the average consumption of whole milk in these cities is 0.451 pint per day for each person as compared with 0.568 pint per day in six Wisconsin cities, as shown in Table X.

TABLE X.—Consumption of whole milk in six Wisconsin cities.[4]

CITY.	Estimated population July 1, 1916.	Total estimated daily consumption of whole milk.	Daily consumption of whole milk per person.
		Pints.	*Pints.*
Milwaukee	436,535	256,319	0.608
Oshkosh	36,065	16,060	.445
Green Bay	29,353	12,649	.431
Eau Claire	18,807	9,354	.497
Beloit	18,072	11,550	.639
Monticello	680	380	.559

4. Hibbard, B. H., and Erdman, H. E., Marketing Wisconsin Milk. Wis. Agr. Expt. Sta. Bul. 285:1-71. Figs. 13. 1917. (Table I.)

These figures indicate that there may be considerable opportunity to increase the consumption of whole milk in Kansas cities, since it is only 79 per cent as great as the consumption in the Wisconsin cities mentioned in Table X. This is of importance from a public-health as well as from an economic standpoint. Investigations have shown that milk is essential to good health. From this point of view it seems improbable that enough milk is being consumed in these Kansas cities.

Supplementary data obtained from consumers and others in these six cities indicate that canned milk is not used in sufficient quantity to materially affect the figures showing the total consumption of milk. It is possible that the lack of adequate inspection service may have something to do with the low consumption in some of these cities. An official inspection service inspires confidence in the product and has a reassuring effect upon the consumer. Educational measures which will increase the consumption of whole milk in Kansas cities are very desirable and should prove beneficial to consumers by giving them more of a healthful, economical and appetizing article of diet. They will benefit the producer by increasing the demand for his product.

ALTERNATE MARKETS.

Alternative markets are important to distributors and producers. In the flush season a market must be found for the surplus milk. Some of the larger distributors have several means for disposing of this surplus. For instance, one Topeka dealer makes butter and ice cream in addition to retailing whole milk. Milk is diverted from one to the other of these branches of the business as the supply of milk and the demand for it makes alternative uses necessary. Where this is possible the problem of surplus milk is less acute. Only about one-half of the smaller dealers have the means for utilizing milk through such side lines, and must dispose of it the best they can.

At the same time that the distributor is giving attention to the utilization of his surplus milk, he must also be meeting competition for the milk of producers which comes from sources such as creameries, ice-cream factories, and condenseries. Cheese factories do not enter in as a competing factor in the cities studied. Condenseries have taken the place of the cheese factory where conditions of production were suitable for cheese manufacturing. The centralized creamery is the biggest competing factor for milk in the territory supplying the six cities studied. Creamery prices are usually lower

than the prices paid for whole milk, but less frequent deliveries, skim milk for hogs, and smaller expense involved in selling cream, oftentimes induce farmers to choose that market rather than to sell whole milk.

The larger condenseries, such as the one at Mulvane, near Wichita, usually are located in a good milk-producing region outside of the city market field. The northern boundary of the territory supplying the condensery at Mulvane just meets or slightly intermingles with the southern boundary of the territory supplying Wichita with market milk. The amount of milk supplied to condenseries fluctuates considerably, being nearly twice as much in the spring as later in the summer. This tends to absorb the excess of milk in times of surplus production.

The ice-cream factory is increasing in importance as a market for Kansas milk. The demand for ice cream varies with the season and the weather, and the needs of ice-cream manufacturers for milk vary accordingly. Consequently, they are not furnished a regular or constant market. Ice-cream plants operate at approximately full capacity during the spring months, when there is usually a surplus of milk. Many ice-cream factories overcome the shortage of summer supply by the use of reconstituted milk made of skim-milk powder, water, and sweet butter.

As to which of these alternative markets will be chosen by the milk producer living within competing territory depends, among other things, upon the following: The location of his farm, relative prices in the various markets for milk, convenience in handling and delivery, and the other farming enterprises followed in connection with dairying.

Those farmers who choose to produce milk for city consumption have the alternative of selling it to one of the distributors in the city or retailing it themselves. The dairyman with a small farm may have little profitable work to employ his time when he is not occupied with his cows. The delivery of milk to city consumers occupies time which would otherwise be idle, and any compensation received for the time employed in retailing adds to his net profit. Where the producer is located at some distance from the city, he must have more than the usual inducements to enter the retail business. The same is true where he has other farming operations which are demanding his time at certain seasons.

All of these factors affecting alternative methods of disposal of dairy products have an important influence upon the milk supply of any city. They must be considered, not only in their effect upon the

supply, but also upon the price of milk to the consumer. Where alternative markets are not available to absorb the excess milk in seasons of surplus, it is probable either that there must be a shortage of milk or that the price received must be high enough to compensate for the greater production required to furnish a constant supply.

THE MARKETING PROCESSES.

The marketing processes through which milk passes on its way from the producer to the consumer are relatively simple, because so much of the milk is marketed directly by producer to consumer. This does not free it of problems, although it makes their consideration more simple.

METHODS OF MARKETING.

There are two methods of marketing milk—the direct method and the indirect. In direct marketing the milk is delivered to the consumer by the agency producing it. In indirect marketing the milk is delivered to the consumer by a distributor, who has obtained it from the producer. The distributor usually buys the milk from the producer in quantity and then bottles and resells it, either direct to the consumer or to another distributing agency. In some instances these two types of marketing are blended so that there is no definite line of demarcation.

In the smaller cities studied, the greater portion of the milk was supplied by producer-distributors through the direct marketing method. In the larger cities more of the milk was handled by distributors, and it reached the consumer through the indirect marketing method. Table XI shows the per cent of the total milk supply of the six cities included in this study furnished by each of these methods.

TABLE XI.—Methods of marketing milk.

CITY.	Per cent of total milk supply furnished consumers by—		
	Distributors (indireat marketin5).	Producer-distributors (direct marketing).	Family cows.
Wichita	65.0	29.7	5.3
Topeka	37.4	58.5	4.1
Salina	83.6	11.7	4.7
Emporia	22.6	72.8	4.6
Dodge City	.0	94.7	5.3
Concordia	54.7	34.1	11.2

The Direct Method of Marketing. — Where the direct method of marketing milk is adopted, "middlemen" are eliminated and the actual work of handling the milk is oftentimes simplified. It should not be inferred from this that all milk should be marketed by the direct method. Conditions are not always favorable for direct marketing.

The first process is to cool and strain the milk as it comes from the barn. The cooling may be done by placing the cans of milk in a large tank of running water or by using a patent cooler containing ice and water, over which the milk runs in a thin stream. Experience has proved the importance of cooling in the production of a high quality of milk. The added expense of a good cooler is more than counterbalanced by smaller losses from sour milk and dissatisfied patrons.

After cooling and straining, the milk is bottled and is ready to start on the delivery route. Some distributors make two deliveries a day, especially in the summer, when raw milk may spoil if not delivered immediately. A wagon drawn by one or two horses or a motor-propelled vehicle is used in delivering the milk. The conveyance is a big item of expense in the cost of delivery, and the type used affects the efficiency of distribution.

In some instances the producer employs a driver, who delivers the milk on a commission basis. The driver may or may not furnish the conveyance, but the producer owns the route, determines the price of the milk, and has general supervision over the methods of sale. The driver is responsible for the loss of bottles and for bad debts. This method is increasing in popularity among those producers who are too busy to do the delivering, but who can obtain more for their milk in this way than if they sold it to a dealer or to a creamery.

The Indirect Method of Marketing. — In the indirect method of marketing, the producer cools the milk, strains it into cans, and then hauls it to the distributor; or if he is far enough from the city to necessitate transportation by rail, he takes it to the railway station, The dealer will frequently establish collection routes, sending conveyances to the farms of the producers to bring the milk to the dealer's plant. This method is usually more efficient than where each producer delivers his small lot of milk to the plant, since the conveyance on one route will bring in the milk of a number of producers and at the same time return their empty cans. Shipping or receiving stations operated at country points, where the milk is received and from there shipped to the city in large amounts, are not

operated to any extent in Kansas. Table XII shows the method of collecting the milk supply of each of the six cities studied.

TABLE XII.—Methods used in collecting milk.

CITY.	Number of gallons collected daily from—			
	Shipping stations.	Collection routes.	Trains.	Producers (direct).
Wichita		2,205	450	250
Topeka	260	703		764
Salina		(a) 2,064		(a) 2,304
Emporia		85		75
Dodge City				
Concordia				

(a) Not all used for city consumption.

When the milk is received at the plant of the city dealer, it is weighed, dumped into the receiving vat, and the cans washed and steamed, after which they are ready to return to the producer. In some cases the milk is clarified, and then Pasteurized. Neither of these practices is followed by all dealers. The vat method of Pasteurization was the method most frequently used. The milk is then cooled, bottled, and placed in a cold room or refrigerator until taken for delivery.

TYPES OF DISTRIBUTORS.

In the cities studied there are, in addition to the regular milk dealers or distributors, what are known as "milk depots," which, after processing and bottling the milk, retail it over the counter. These "milk depots" do not include grocery stores, which sell milk in a similar manner, but buy it already bottled. In Topeka 22.8 per cent of the milk was handled through these "milk depots." Most of these depots are poorly equipped, and very few Pasteurize the milk handled.

The milk dealers in Kansas are mostly private establishments and are not organized companies or corporations. The per cent of the total firms which are organized companies or corporations, for six cities, are as follows: Wichita, 10 per cent; Topeka, 8 per cent; Salina, 50 per cent; Emporia, none; Dodge City, none; Concordia, 100 per cent.

DIRECT VERSUS INDIRECT MARKETING OF MILK.

In former years the producer-distributor handled the greater part of the milk sold throughout the country, but gradually its

sale has been taken over by big dealers in the larger cities. The larger dealers are in a superior position with respect to distance from customer, as compared with the small producer who delivers to supply the larger cities, and the large dealer logically handles this milk. More adequate equipment for Pasteurizing, cooling, bottling, and otherwise handling the milk can be afforded by these larger dealers, so that they probably handle the milk more efficiently and in a more sanitary manner. The volume of their business has made it possible for them to be better equipped for handling the accounting, collecting, and other phases of the enterprise. All of these things have favored the large dealers and tended to eliminate the small producer-distributor in the larger cities. The majority of Kansas towns are not so large that this has occurred, and the producer-distributor is still the most important marketing agency.

As a rule the small producer-distributor supplies milk at the lowest cost, but does not usually supply milk of as high quality as the larger, more fully equipped dealer. The sanitary aspects of the milk supply may prove of sufficient importance to warrant changing from the direct to the indirect method of marketing milk.

RETAIL AND WHOLESALE DELIVERY.

A large proportion of the milk distributors sell milk to both the retail and wholesale trade. The wholesale trade consists of grocery stores, restaurants, hotels, lunch rooms, and similar places. The city dealers usually have certain routes which cover the wholesale trade exclusively and others which do only a retail business. Table XIII shows the per cent of milk sold at wholesale and retail in the six cities studied.

TABLE XIII.—Per cent of the milk supply wholesaled and per cent retailed in the cities studied.

CITY.	Per cent of milk supplied by producer-distributors.		Per cent of milk supplied by distributors.		Per cent of total milk supply.	
	Wholesaled.	Retailed.	Wholesaled.	Retailed.	Wholesaled.	Retailed.
Wichita	20	80	86	14	53	47
Topeka	87	13	73	27	80	20
Salina	0	100	44	56	22	79
Emporia	32	68	83	17	58	42
Dodge City	34	66	(a)	(a)	34	66
Concordia	7	93	0	100	3	97

(a) No dealers.

GROCERY-STORE DELIVERY.

The importance of the grocery store in the delivery of milk to the consumer warrants its serious consideration. Questionnaires were sent to grocery stores in each of the six' cities studied. Returns were available from but five cities, since none of the grocery stores in Dodge City handled whole milk. The proportion of the grocery stores selling bottled milk in the other five cities was as follows: Wichita, 50 per cent; Topeka, 91 per cent; Salina, 100 per cent; Emporia, 25 per cent; Concordia, none. It is noticeable that the outlying stores sell more milk according to size than do the down-town stores, indicating that a great deal of this milk is carried away by the consumer and is not delivered in the grocery wagon.

The average amount of milk sold per store reporting was 36 pint and 88 quart bottles of milk, and 30.5 half-pint bottles of cream each day. The amount sold per store ranged from 17.6 to 864 quarts of milk. The replies indicated that a considerable part of the milk sold by grocery stores was Pasteurized, 60 per cent having been obtained from dealers and 40 per cent from producer-distributors.

The average number of total customers per store was 496, and of this total only 79, or 13.7 per cent, bought milk. The total number of customers per store varied from 45 to more than 1,000, and the per cent buying milk varied from almost none to nearly 100 per cent.

The average price paid the distributor for the bottled milk was 12.3 cents per quart and 6.4 cents per pint. The prices at which the grocery stores sold the milk average 14.8 cents per quart and 8.2 cents per pint, leaving a margin of 2.5 cents per quart and 1.8 cents per pint as compensation for handling the milk. According to reports of the grocery stores, 24 per cent handled milk for the profit derived; 38 per cent handled it only as an accommodation to their customers; and the remaining 38 per cent handled it both as a matter of accommodation and profit. About 95 per cent of the store-keepers believed that the sale of milk helped to increase their regular patronage; about 90 per cent delivered milk with groceries if so desired by the customers; 35 per cent reported that most of the milk sold was the regular and only supply obtained by the customer. These facts would indicate that the handling of milk by grocery stores tends to replace house-to-house delivery for many consumers.

About 50 per cent of the stores reported milk left over from day

to day; 39 per cent kept the milk until sold; 43 per cent returned surplus to the dealers. The keeping of Pasteurized milk until sold is objectionable, since it will become unfit for human consumption before there are any visible evidences of its deterioration. The returning of the unsold milk to the dealer is a loss to him which must be made up on the milk sold.

One of the principal advantages of grocery-store delivery is that customers are enabled to obtain milk at any time during the day, thus being relieved of the necessity of keeping ice to prevent the milk from souring. Of the stores replying to the questionnaire, 60 per cent reported that the sale of milk was distributed more or less evenly throughout the day, 33 per cent reported the heaviest sale in the morning, and 7 per cent reported the heaviest sale in the afternoon. The fact that the grocery stores do not remain open on Sunday increases the demand for milk on Saturday. This demand is difficult to supply, and the producer is confronted with a surplus of milk on Sunday.

Many of the grocery-store keepers reported that they would be glad to be rid of the milk-delivery business if they could get rid of it; but since their trade demands it, they feel that they must continue it as a matter of accommodation.

PRICES OF MILK

The price paid to producers fluctuates with the season and conditions affecting production. The price paid by consumers does not tend to fluctuate to nearly so great an extent. In past years the price of milk has tended to remain constant throughout the year, regardless of temporary conditions of supply and demand. Retail milk prices have been very immobile, and it has been only since the beginning of the World War that they have fluctuated to any considerable extent. This fluctuation in the price paid to producers without any corresponding fluctuation in the price paid by consumers produces one of the many problems in the marketing of milk. The distributor's margin is considerably larger at certain seasons of the year than at others.

The basis for payment for the milk delivered to the dealer by the producer presents another problem. There are several systems of payment, including (1) the hundredweight basis—that is, so much for each 100 pounds of milk of certain butter-fat test, sometimes with additions or substractions for each per cent of butter fat above or below this test; (2) the butter-fat basis, or so much per pound for butter fat, with or without allowance for the value of the skim

milk; and (3) the gallon or can basis, which disregards the fat content and weight. The last system is most frequently used in Kansas, and is the most unsatisfactory of all, 4 method based upon weight and butter-fat content is the most fair and does not penalize the dairyman who produces milk having a high butter-fat content by paying him the same price as is paid the producer selling milk having a low butter-fat content.

Small producer-distributors favor the gallon or can method, because they do not possess the equipment or facilities required for payment on any other basis. This does not alter the fact that the other method of payment is the fairer and should be followed whenever possible.

There were some variations in the retail price paid to different distributors during the same season of the year in the six cities studied. These variations were due to a supposedly higher quality of product, and indicate that at least a part of the consumers mould be willing to pay for the better grades of milk which would result from the establishment and enforcement of official standards for grades of milk.

MILK-MARKETING ORGANIZATIONS.

None of the six cities included in this study had any organization of producers or distributors for marketing purposes. There is unquestionably a field for cooperative endeavor in the marketing of milk in Kansas cities; but before any such organization is attempted, the problem should be studied carefully with a view of avoiding as many of the pitfalls as possible. The marketing of milk in a small city or town presents different problems from those encountered in a large city, and any attempt to adapt the cooperative experience of the distributors in a large city to a small city or town may or may not be successful, depending upon how nearly similar the solutions of the problems involved may be.

COST OF MARKETING MILK.

A study of the cost of marketing milk may be approached from two viewpoints, namely, (1) the efficiency of the marketing system, and (2) the cost of marketing to determine if the charges exacted for the various services performed are fair. The difference between the price paid by the consumer and that received by the farmer or producer is called the price "spread" or margin. This spread must absorb all expenses of marketing and anything remaining is profit, to the various persons performing the services involved in marketing.

To determine as accurately as possible the cost of marketing milk in the six cities studied, figures on the cost of marketing were obtained from as many of the distributors of milk as possible. Some difficulty was experienced in this, due to the fact that many of the smaller distributors did not keep complete records of their costs. In such cases it was necessary to estimate the expenses as accurately as possible, basing judgment on such records as were available. For this reason the costs given are not so accurate as could be desired, but they are the best obtainable under the circumstances, and it is believed that they are sufficiently reliable to give a fairly accurate conception of marketing costs. Table XIV gives the highest, lowest and average costs of marketing milk by nine milk distributors in Wichita, Topeka and Salina. All milk is reduced to the quart basis.

The expenses of preparation include the following items: Shrinkage, or loss due to errors in measuring, short weights, waste, etc.; loss in carrying surplus, or the amount lost on milk purchased during the surplus period to retain customers during periods of shortage, it being necessary to sell some of the milk purchased during the period of surplus to creameries, condenseries, etc., at a lower price than was paid for it; power, steam, refrigeration and lights; labor in plant; bottles and caps; interest on investment in plant at 7 per cent; depreciation; and other miscellaneous items.

The expense of delivery includes: Commissions to drivers; labor; upkeep of teams and wagons or autos; depreciation on delivery equipment; interest on investment in delivery equipment; bad accounts and miscellaneous items. All data are for the year 1919.

TABLE XIV.—Cost of marketing milk in 1919 by nine distributors in Wichita, Topeka, and Salina.

	Lowest.	Highest.	Average.	Per cent of consumers' price.
Yearly output in quarts	141,620	1,825,000	558,438	
Average farm price per quart	$0.0538	$0.0737	$0.0645	45.5
Transportation costs to plant per quart	.0043	.0183	.0110	7.8
Expense of preparation per quart	.0125	.0320	.0195	13.8
Expense of delivering per quart	.0129	.0209	.0159	11.4
General expense per quart	.0002	.0076	.0029	2.1
Dealers' profit per quart	(a) .0141	.0237	.0066	4.7
Dealers' selling price per quart	.1033	.1350	.1211	
Store charges for handling per quart			.0197	14.7
Cost to consumer per quart	.1250	.1500	.1401	100.0

(a) Loss.

In Table XIV it will be noted that the cost of preparing the milk for market exceeds the cost of delivery. This has not been the popular impression, since some dealers have contracted for the delivery of their milk at somewhat higher figures than are indicated by these data. Further consideration of these data shows that there is a wide variation in the efficiency of the various dealers as indicated by the wide range of costs. Part of this range may be attributed to differences in services performed, but it is quite probable that most of it is the result of variation in efficiency.

Table XV shows the cost of marketing milk through five milk depots in Topeka.

TABLE XV.—Cost of marketing milk in 1919 through five milk depots in Topeka.

	Lowest.	Highest.	Average.
Yearly output in quarts	29,612	361,400	153,776
Cost of milk delivered at depot per quart	$0.0800	$0.0911	$0.0874
Expense of handling and selling per quart	.0210	.0553	.0344
Profit per quart	.0102	.0308	.0197
Cost to consumer	.1270	.1520	.1415

A large part of the variation shown in Table XV can be attributed to the variation in the amount of milk sold by the various milk depots. A large output was usually handled much more economically than a small output. The cost of marketing direct by producers is shown in Table XVI, the figures being an average for 29 producer-distributors.

It will be seen that the expense of marketing by the direct method is less than by the indirect method, although the difference is not great. It may be noted that the range of individual costs among the producer-distributors is wide, varying from 1.29 to 6.74 cents per quart. These extremes in costs were accounted for in nearly every case by some peculiarity in the individual business. Those having the higher costs usually had the more modern and adequate equipment. In general, extremely low costs are obtained at the expense of quality, and when the costs are above the average they are usually associated with better grades of milk. When milk is marketed through middlemen, methods and equipment are standardized to a much greater extent than when it is marketed direct by the producer. This probably accounts for the greater range in cost between individuals who market direct.

TABLE XVI.-Lowest, highest, and average cost of marketing milk in 1919 by 29 producer-distributors in six cities of Kansas.

	Average expense per producer-distributor.	Lowest.	Highest.
Labor	$1,016		
Bottles and caps	109		
Bad accounts	45		
Shrinkage	82		
Milk tickets	20		
Fuel	50		
Ice	101		
Miscellaneous supplies	34		
Repairs	34		
Horseshoeing	40		
Depreciation	170		
Repairs on delivery auto	73		
Tires, gas and oil	312		
Feed and shelter for horse	346		
Interest on investment	69		
Total	$1,984		
Yearly output in quarts	76,109	25,550	175,200
Expense per quart	$0.0316	$0.0129	$0.0674

The practice of making two deliveries each day greatly increases the cost of retailing by producer-distributors. One delivery should be sufficient, if adequate equipment is available for properly handling the milk.

RELATION OF EFFICIENCY TO MARKETING COSTS.

Many of the factors affecting the efficiency of the marketing of milk are within the control of the distributor. The distribution of the consumers has much to do with the cost of marketing. If one must drive several blocks to deliver a few quarts of milk the extra cost absorbs the profit. Improvements can sometimes be effected by districting the town to make the milk route more compact. In considering the efficiency of marketing, it must not be assumed that the cheapest method is always the most efficient. If low cost, is obtained at the expense of quality of product it assuredly is not the most efficient.

The cost of delivery increases with the distance of the producer's farm from the city, which no doubt accounts for some of the vari-

ation in cost as noted above. Labor is also a large item of expense which varies with the individual. Many dealers depend to a large extent upon hired labor, while producer-distributors frequently use a large proportion of unpaid family labor. Table XVII shows the proportion of hired and family labor used by dealers and producer-distributors.

TABLE XVII.—Labor used by dealers and by producer-distributors in marketing milk.

CITY.	Dealers.			Producer-distributors.		
	Average number of persons employed.	Per cent family labor.	Per cent hired labor.	Average number of persons employed.	Per cent family labor.	Per cent hired labor.
Wichita	9	30	70	3	64	36
Topeka	4	53	47	3	71	29
Salina	9	4	96	2	100	.....
Emporia	4	75	25	3	74	26
Dodge City	.....	.....	.....	3	63	37
Concordia	4	.....	100	3	100	.....

Bad accounts were not an appreciable item in the cost of marketing milk, but it is believed that this expense can be done away with entirely. Table XVIII shows the extent to which credit is used in the six cities studied. By replacing all credit sales with either the cash or the ticket method, bad accounts may be eliminated.

TABLE XVIII.—Methods of selling milk used by dealers and producer-distributors.

CITY.	Per cent of dealers selling—				Per cent of producer-distributors selling—			
	For cash.	On credit.	By use of tickets.	By a combination of methods.	For cash.	On credit.	By use of tickets.	By a combination of methods.
Wichita	70	.....	.....	30	24	.....	36	40
Topeka	30	.....	10	60	66	9	12	13
Salina	25	.....	50	25	.....	29	42	29
Emporia	50	.....	.....	50	16	25	9	50
Dodge City	.....	.....	.....	.....	.....	.....	.....	100
Concordia	100	.....	.....	.....	25	25	25	25

The loss of bottles through failure of the consumer to return them represents a considerable expense in some instances. This can be partially eliminated by charging for bottles and leaving bottles only in exchange for empty ones. The establishment of bottle exchanges among the distributors in the larger cities studied would quite probably prove advantageous.

No uniform method of disposing of surplus milk was followed. Many separate this milk, selling the cream, and then make the skim milk into cottage cheese or sell it to be used for live stock.

The number of customers on a route, and the amount of milk delivered to each, affects the cost of delivery very materially. Table XIX gives the number of customers for each dealer and producer-distributor in the six cities studied and the per cent of customers to whom milk is sold at wholesale and at retail.

TABLE XIX.—Average number of customers per dealer and per producer-distributor and the per cent of milk wholesaled and the per cent retailed by each.

CITY.	Dealers.			Producer-distributors.		
	Average number of customers.	Per cent wholesale.	Per cent retail.	Average number of customers.	Per cent wholesale.	Per cent retail.
Wichita	320	25	75	63	5	95
Topeka	80	20	80	32	21	79
Salina	305	5	95	35	.....	100
Emporia	72	25	75	116	3	97
Dodge City	.....	.....	.....	108	3	97
Concordia	125	5	95	29	14	86

The use of autos and trucks makes it possible to deliver milk on a route in less time than when horse are used. A large part of this saving is in the time spent in making the first delivery and in returning after the last delivery. Sufficient data are not available to indicate whether the motor-propelled or horse-drawn conveyance was the more economical.

The compactness of the route has a material influence on the time required for delivering milk.

The number of bottles delivered by the driver on one retail route each time he left the wagon were as follows:

One bottle	15 times.
Two bottles	19 times.
Three bottles	7 times.
Four bottles	6 times.
Five bottles	3 times.
Six bottles	2 times.
Seven bottles	3 times.
Eight bottles	1 time.
Nine bottles	1 time.
Ten bottles	2 times.
Eleven bottles	1 time.

This driver in 60 trips from his wagon delivered 194 bottles—an average of 3.23 per trip.

Any improvements in the delivery system which would increase the number of bottles delivered by the driver on each trip away from the wagon would shorten the time required for delivery and reduce the cost. More compactness of routes would accomplish this result. Also, this might tend to increase the size of each driver's load, and this in itself would result in lowered costs.

One of the criticisms frequently made of the milk-marketing system is the duplication of service caused by the overlapping of milk routes. Table XX indicates the extent to which duplication probably occurs in the six cities studied.

TABLE XX.—Duplication of milk routes.

CITY.	Average miles per route.		Total miles, all routes.			Miles of street in city.	Miles of excess travel.	Per cent of excess based on miles of street.
	Dealers.	Producer-distributors.	Dealers.	Producer-distributors.	Total.			
Wichita	17.0	6.4	361	187	548	350	198	56.0
Topeka	11.5	3.0	172	100	272	250	22	8.9
Salina	15.0	3.3	104	11	115	85	30	35.3
Emporia	2.7	5.0	8	50	58	50	8	16.0
Dodge City	.....	4.7	.....	33	33	20	13	*65.0
Concordia	7.0	4.6	14	23	37	30	7	23.3

Table XX indicates that there is considerable duplication of routes and service, and it is probable that the duplication is greater than these figures indicate. This duplication cannot well be avoided without restricting competition. It should be remembered, however, that competition is desirable only so long as it does not result in inefficiency.

CONCLUSIONS.

This study indicates that one of the first steps to be taken in improving the marketing of milk in the cities and towns of Kansas would be the establishment and enforcement of an adequate inspection service. It is probable that an inspection service furnished through agencies supplied by the state would prove more satisfactory than if each small city attempted to establish and maintain its own inspection service. The cost of an efficient system of inspection would probably be prohibitive for most small cities, but if this service could be obtained in cooperation with other similar cities, through some central agency, its cost could be kept at a reasonable figure.

In connection with the establishment of an adequate inspection service there should also be established official standard grades for milk. The establishment of such grades would make it possible to sell milk on the basis of quality. They would also make it possible for the conscientious and efficient dairyman to receive a fair return for his product and would not oblige him to accept the same price paid the careless and inefficient producer.

Such a program of inspection and grading, if combined with an educational program giving proper publicity to the value and quality of the milk offered, should result in an increased consumption of milk. The per capita consumption is low and could unquestionably be increased by any measures tending to create confidence in the quality of the supply of milk offered customers. This would benefit producers and distributors by increasing the volume of their business, and the additional volume of business should make it possible to deliver milk more cheaply. Quality of product should be the principal consideration, and then the method of distribution should be made as economical as possible without impairing the quality.

The present methods of delivery could probably be rendered more efficient by producers' or distributors' organizations, which would tend to eliminate some of the existing duplication of service and delivery routes by combining their efforts. This would make it possible for each driver and conveyance to care for more nearly a full-capacity load. The elimination of one of the two deliveries made each day by some distributors would increase the efficiency of the system by lowering its expense.

The wide variation in costs of marketing milk indicates that there is ample opportunity to improve the methods followed by some of the distributors. Some of these costs should probably be increased

by adding equipment and service which would result in a better quality of product.

The consumer is not given the attention he deserves in the marketing of a product, and, on the other hand, he is too frequently concerned about trivial details. If improvement in the marketing of milk is to be obtained the cooperation of both producers and consumers must be secured.

The adoption of the ticket or cash method of payment by consumer would help materially in reducing costs by eliminating bad accounts. It would also eliminate the cost of collecting charge accounts.

It is impossible to say what particular methods of delivering milk should be adopted for specific Kansas towns, but if the problems of securing their supply of milk are thoroughly understood and intelligently considered, it should not be difficult for those having its improvement in their power to select the method which to them seems to suit most fully their particular needs.

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