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# Some Economic Aspects of the Fluid Milk Industry of Nebraska

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**SOME ECONOMIC ASPECTS  
OF THE FLUID MILK INDUSTRY  
OF NEBRASKA**

**by**

**Kenneth E. Anderson**

**A THESIS**

**Presented to the Faculty of  
The Graduate College in the University of Nebraska  
In Partial Fulfillment of Requirements  
For the Degree of Master of Arts  
Department of Agricultural Economics**

**Under the Supervision of Dr. C. Clyde Mitchell, Jr.**

**Lincoln, Nebraska**

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Kenneth E. Anderson

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## INTRODUCTION

The 1950 census classifies 45.6 percent of the population of Nebraska as urban. Most of these people and all of the farmers that produce milk for city consumption are concerned with the problem of marketing fluid milk.

One reason the consumers are interested in milk is because of its food value. Milk is one of the few practically complete foods since it contains most of the vitamins, minerals and other nutritional necessities for a well rounded diet.

Producers are interested in the relatively high price they receive for fluid milk in comparison to the prices they receive for milk that is used for other purposes. Also, since an increasing number of acres of land once used for cultivated crops is being converted to grass, the farmer is confronted with the problem of utilizing the pasture in producing more milk for fluid consumption. Many farmers have family labor available and utilize this labor by maintaining a milking herd, thus supplementing their income.

The majority of the population centers in Nebraska are relatively small as compared with those of other Midwestern states. Table I shows Nebraska's population groups as they were in 1940. The fact that only two cities, Lincoln and Omaha, exceed 25,000 in population indicates that Nebraska's major milk-marketing problems concern small cities and towns.

In these smaller population centers the problem of obtaining high-quality milk has been great. Until recently, most of the milk



TABLE I

NUMBER OF CITIES, TOWNS, AND VILLAGES  
BY POPULATION GROUPS, NEBRASKA, 1940.

<u>Size Groups</u>	<u>Number</u>
Less than 50	244
50 - 249	267
250 - 499	104
500 - 999	104
1,000 - 1,499	37
1,500 - 1,999	19
2,000 - 2,499	12
2,500 - 2,999	8
3,000 - 10,000	18
Over 10,000	9
Total populated places	822

(From Rand McNally Atlas of the United States, Canada, and Mexico (Chicago, Rand McNally Company, 1945), pp. 8, 9.)

marketed in these places was not graded or pasteurized, the quality of the milk being dependent on the degree of cleanliness the producer wished to maintain. Since most of the milk was supplied by producer-distributors, the quality of the milk depended on the producer. In many cases the milk reached the consumer in a desirable condition; however, some towns were supplied with an unsatisfactory product which did not meet acceptable quality standards. Recently most towns have been supplied with pasteurized milk. Usually one or two dairymen would set up plants that included pasteurizing equipment, and would buy milk from the former producer-distributors. Generally speaking, this change has resulted in the consumer's getting a higher quality product.<sup>1</sup>

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<sup>1</sup>

For definition of "quality" see Appendix H, p. 86.

The interest of producers in fluid-milk sales has caused an increase in the wholesale delivery of milk. The amount of milk sold as butterfat has decreased during the past decade, and wholesale deliveries of milk have increased, as shown in Table II below. For the period 1936 through 1948 the amount of cream sold as butterfat has declined 14 percent, while wholesale-milk deliveries have increased 43 percent. This indicates that less milk is being processed for butter production and more for fluid milk, ice cream and other dairy products.

TABLE II

## TOTAL VOLUME OF WHOLESALE MILK AND BUTTERFAT SALES IN NEBRASKA

Year	Wholesale Delivery to Plants, Dealers, etc.	Cream Sold as Butterfat
	(Million lbs.)	(in 000 lbs.)
1936	253	56,580
1937	225	49,960
1938	267	53,680
1939	313	58,860
1940	235	61,360
1941	247	66,830
1942	295	73,380
1943	335	76,530
1944	330	65,920
1945	321	58,620
1946	365	55,630
1947	370	53,250
1948	360	48,510

(From Agricultural Statistics, U. S. Department of Agriculture, 1936-1949).

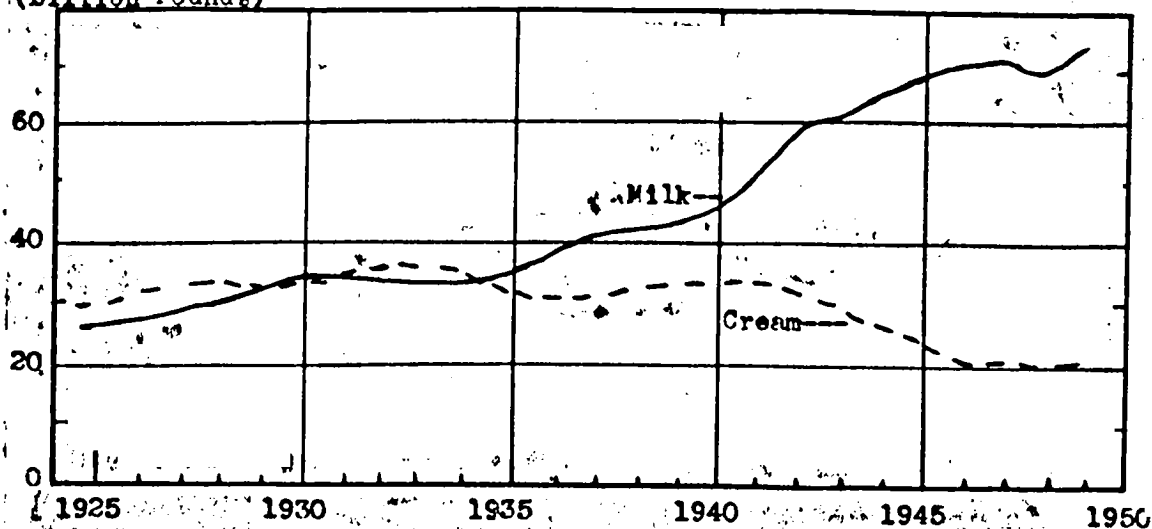
The fact that farmers are selling less milk as cream and more as fluid milk in Nebraska is not an unusual situation as compared with such

sales over the United States as a whole. Cream deliveries have declined since 1933, while wholesale-milk deliveries have been increasing throughout the entire period. This is illustrated by the following figure:

FIGURE 1

WHOLESALE DELIVERIES OF MILK AND CREAM  
BY FARMERS IN THE UNITED STATES  
(MILK EQUIVALENT)

(Billion Pounds)



(From The Dairy Situation (Washington, D. C., Bureau of Agricultural Economics, United States Department of Agriculture, May, 1950))

The methods of collecting milk and cream differ. Most of the milk in Nebraska is collected by truckers who obtain it at the primary source, the farm. On the other hand, much of the cream in Nebraska is taken to a cream station or creamery by the producer. The cream station serves as a collection point where the cream is tested before being sent to a centralizer creamery.

The cost of collecting milk could probably be reduced considerably if the various plants would arrange their routes so that no dupli-

cation occurred. When competing firms have trucks covering the same territory, the stops are undoubtedly less frequent than if one firm's trucks picked up milk for all the producers in the area. A higher cost of collection per hundredweight of milk results when the stops are far apart.

The number of milk cows fluctuated considerably during the past few decades. The all-time peak in number of cows kept for milk was in 1934, and from 1934 to the present time there has been a gradual decline, with only minor fluctuations. Prices received for other farm enterprises were increasingly high in the 15-year period preceding 1950. This condition may be a contributing factor in the decrease in milk-cow numbers.

#### Purpose of the Study

A description of the milk industry of the state will be attempted in this study. The volume of fluid milk purchased and sold by milk distributors, the amount sold in paper and in glass containers, and the amount sold wholesale and retail are the quantity relationships to be considered. Seasonal comparisons will be made dealing with volumes purchased and sold in June and October.

## CHAPTER I

### STATISTICAL METHOD

The list of plants available at the time this study was started included too many processors of fluid milk to make possible a complete census within the limits of time and budget. An alternative was to take a random sample that would include representative sizes of plants from all major parts of the state.

As previously indicated, the problem of marketing milk in the smaller towns and cities is particularly important in Nebraska. Therefore, Lincoln and Omaha were not included in the study. (Some dairy farmers living in the Lincoln and Omaha area may sell milk to surrounding towns, and thus be included).

The fluid-milk processing plants selected for the study are located in all parts of the state. These plants were chosen with regard to the type of farming area, and the estimated size of the plant which handled fluid milk.

In order to find out the total number of plants in the state, use was made of data from two sources. Records of the Nebraska Department of Dairy Foods, Weights, and Measures yielded the names and locations of 107 plants. The publication Who's Who in the Butter, Cheese and Milk Industries<sup>1</sup> gave the names and locations of 71 plants in addition to those which were on the state list. After adjusting<sup>2</sup> for those plants

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<sup>1</sup> Who's Who in the Butter, Cheese and Milk Industries, American Butter and Cheese Review (Volume II, No. 4, New York, Urner-Barry Company, March, 1949), pp. 179, 180.

<sup>2</sup> See Appendix A, p. 71.

on these lists which were no longer in business, a corrected state list of 84 plants and a corrected Who's Who list of only ten plants remained in this list. Thus, a total of 94 plants was found to be active in the state in 1950.

The plants were divided into three groups on the basis of average daily volume of milk handled. Size I plants handled up to 499 quarts; Size II plants, 500—1999 quarts; Size III plants, 2000—10,000 quarts.<sup>3</sup> In the corrected list of 94 plants, there were found 67 Size I plants, 21 Size II plants, and six Size III plants.

The state was divided into 13 sections which closely correspond rather to the type-of-farming areas and crop-reporting districts. (See Figure 2) A two-way stratified method of sampling was employed according to the designated areas, and on the basis of estimates of the size of the plants. Size I plants were selected at random within each area; the group sample of the Size II plants was drawn at random from the entire state; and the entire population was taken for the Size III plants.

Different methods of sampling were used for the three sizes of plants because there were Size I plants in all areas, while there were Size II and Size III plants in only some of the areas. Since there were only six Size III plants, a complete census of them was possible.

The original sample drawn totaled 51 plants. Alternates were chosen and used when some of the plants were found to be out of business.<sup>4</sup> The final sample also includes 51 plants.

For the computational procedure see Appendix B.

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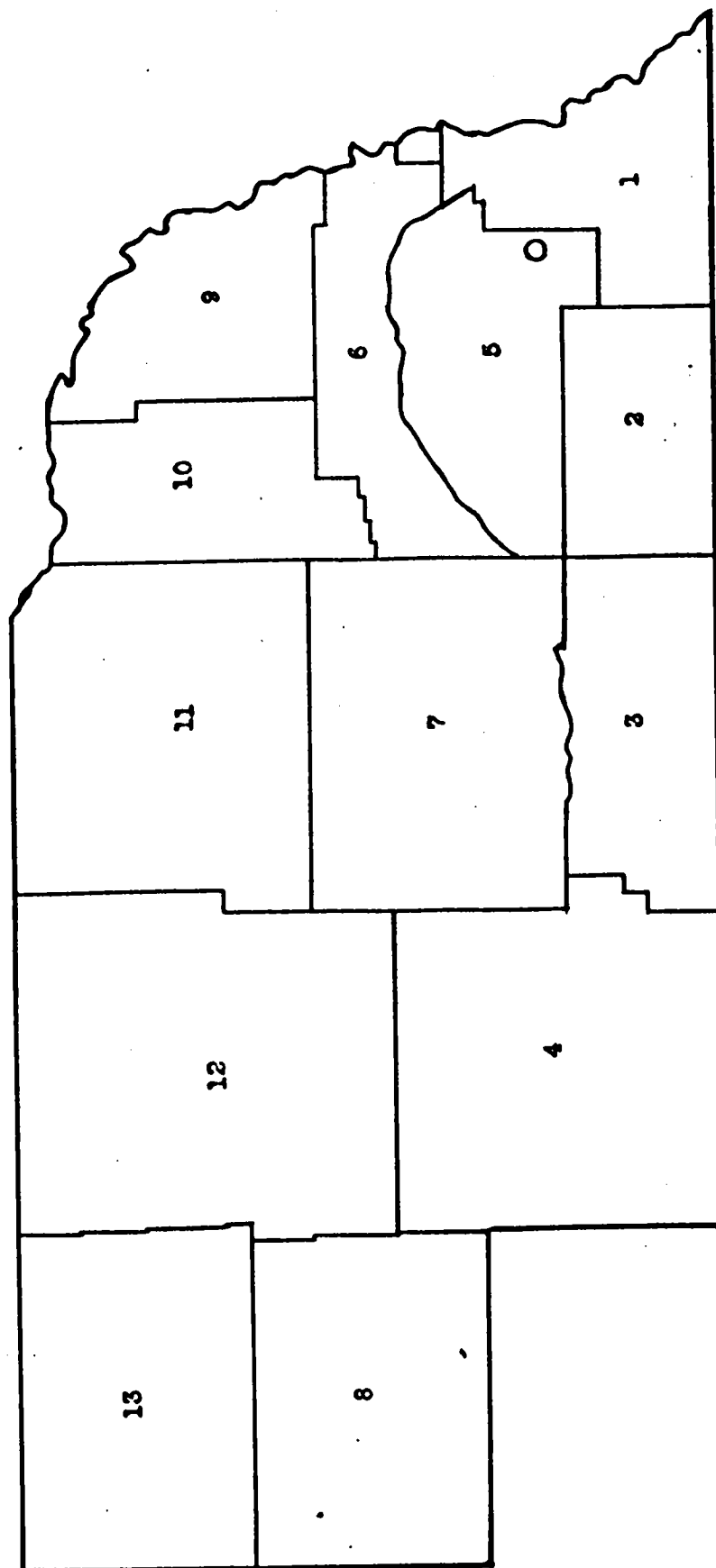
Estimates were made by a dairy specialist who is familiar with the fluid milk plants in the state.

4

Area XII was the only area in which no samples were obtained. All the original samples picked and all alternates on the population list were out of business; hence that area was not considered.

**FIGURE 2**

**DIVISION OF NEBRASKA INTO SECTIONS USED  
IN SELECTION OF THE SAMPLE**



## CHAPTER II

## SUPPLY

The first milk cows were brought into Nebraska about 1820.

These cattle, along with the others which were essentially beef stock, were purchased in St. Louis to provide a meat supply for the use of the 600 men, women, and children at Fort Atkinson, located at the present site of Fort Calhoun. No definite record of the number of cattle in the first herd can be found. However, the November 2, 1823, report of the Sixth Infantry stationed at the fort, listed among other things the following cattle:

2	English bulls
2	Common bulls
121	Cows
112	Calves
96	Yearlings
43	Young Cattle
<u>6</u>	Steers
282	Total <sup>1</sup>

Since Fort Atkinson was abandoned in 1827, one can assume that there were no milk cows in Nebraska during the succeeding years, for according to available documents, there were no settlers in Eastern Nebraska until 1842. Some cows were brought through Nebraska by the caravan travelers to the western region during the 1840's. The milk from these cows was used to supplement the diet of the travelers.

When the Territory of Nebraska was opened for settlement in 1854,

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<sup>1</sup>Hayden Deforest Hughes, The Beginnings of Formal Education in Nebraska (M.A. Thesis, Lincoln, Nebraska, Department of School Administration, University of Nebraska, June, 1934), p. 69.



some of the domesticated cattle from the east were introduced. These cattle were used as beasts of burden, milk producers, and a source of meat. One of these uses has since been eliminated—cattle as a source of power. They were supplanted, of course, by horses for many years, and then gradually tractors took the place of horses.<sup>2</sup>

Many changes have occurred in the cattle population in Nebraska since the early days. As the human population increased, milk-cow numbers also increased. From 1910 through 1924, the number of milk cows in Nebraska remained fairly constant, but there was a decided increase during the following decade. In 1934, an all-time peak of 819,500 head was reached. This could probably be attributed in part to the depression. Because of the drouth, many Nebraska farmers had little or no income during these years except the amount they received from the sale of milk and cream. This condition prompted them to keep more cows for milking purposes.

From 1935 through 1941, a rather steady decline (with minor fluctuations) in the number of milk cows occurred, amounting to 23.5 percent, and from 1942 through 1945 there was a steady increase amounting to 15.5 percent. Beginning in 1946, a sharp decline set in which continued through 1950. (See Figure 3) Factors contributing to the decrease in the number of cows kept for milk production are: (1) a shortage of labor, (2) alternative enterprises, and (3) the dislike for milking cows. In 1949, 480,500 head were kept for milking purposes. This is the lowest number that has been kept for the last forty years.

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<sup>2</sup>Walter Kollmorgen, The Milk Industry of Nebraska (Bulletin 15, Lincoln, Nebraska, Conservation Department of the Conservation and Survey Division, University of Nebraska, December, 1937), p. 5

The number of beef cattle retained by Nebraska farmers in 1934 was one of the peaks in the course of fluctuations shown in Table I. Even though the numbers of beef cattle and milk cows were both high in 1934, no close correlation exists between the two over a period of years.

TABLE III

NUMBER OF BEEF CATTLE KEPT BY NEBRASKA FARMERS, 1924-1950.

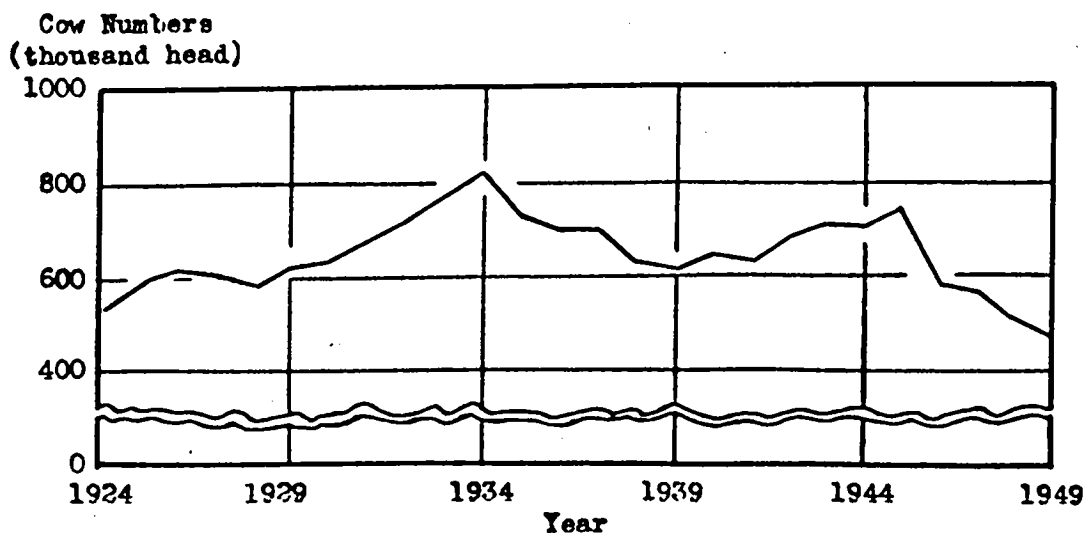
Year	Number of Beef Cattle	Year	Number of Beef Cattle
	(Thousands)		(Thousands)
1924	2525	1937	2072
1925	2430	1938	1871
1926	2371	1939	1900
1927	1873	1940	2007
1928	1810	1941	2109
1929	1975	1942	2301
1930	2095	1943	2573
1931	2286	1944	2894
1932	2336	1945	3176
1933	2535	1946	3139
1934	2798	1947	3069
1935	2181	1948	2973
1936	2473	1949	3082
		1950	3118

(From Office of the Bureau of Agricultural Statistics, United States Department of Agriculture, Lincoln, Nebraska).

Since the late 1940's the number of beef cattle has been higher than in any preceding period. The price of beef cattle has been high and farmers' incomes have likewise been high. The combination of these two factors seemingly contributes to the willingness of farmers to invest their capital in one of the most risky enterprises as well as one which offers the possibility of highest returns--the beef-cattle business.

FIGURE 3

## CHANGE IN MILK-COW NUMBERS IN NEBRASKA

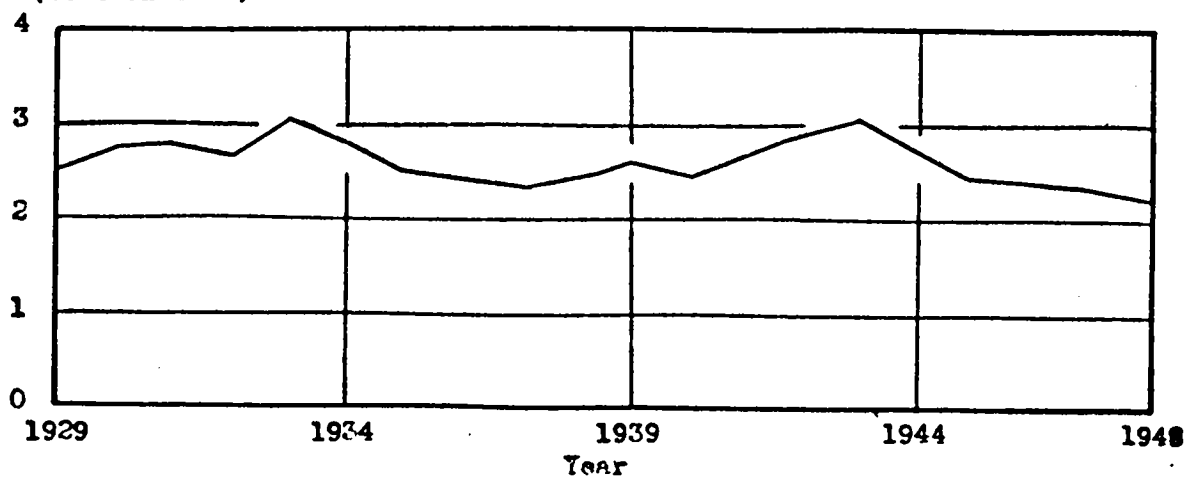


(From Agricultural Statistics (Washington, D. C., United States Department of Agriculture, 1925-1950))

FIGURE 4

## TOTAL MILK PRODUCTION IN NEBRASKA

Annual Production Milk  
(billion lbs.)



(From Agricultural Statistics (Washington, D. C., United States Department of Agriculture, 1930-1949))

This temporary decrease in the number of milk cows may or may not be an indication that less dairying will be done in Nebraska in the future. The decrease is probably in part a result of the existing high cost of labor. Another contributing factor is that during the past five years there has been an abundance of moisture, a condition conducive to the growing of cash crops such as corn and wheat which have been yielding a high gross income to the Nebraska farmer. The high-yield and high-price combination has undoubtedly been a major determining influence on the decline. The probable future pattern of numbers of cows kept for milk will be discussed in a later chapter.

The trend in milk production is very similar to that of the number of milk cows. Milk production in Nebraska increased through the year 1933, when it reached an all-time peak. (See Figure 4) It steadily declined up to 1938, increased until 1943, and has been declining to the present.

The average production in Nebraska has increased from 167 pounds of butterfat per cow in 1939 to 179 pounds in 1949. These figures are for cows kept for milk throughout the entire state. The average production per cow between 1939 and 1949 was 175 pounds, whereas the average production per cow registered in the Dairy Herd Improvement Association was 344 pounds during the same period. Undoubtedly, the use of higher grade bulls, artificial insemination, more succulent pastures, and many similar improvements in dairy management are responsible for the increased production, particularly within the D.H.I.A. herds.

Even though total milk production has been declining the past few years, wholesale delivery of milk to plants and dealers has been increasing. Wholesale delivery of milk has increased from 313,000,000

pounds in 1939 to 360,000,000 pounds in 1948, while cream sales decreased from 58,860,000 pounds of butterfat in 1939 to 48,510,000 pounds in 1948. Possibly many farmers who formerly sold cream are now selling whole milk. (See Figure 5)

The relationship of Nebraska to other states is indicated by the fact that Nebraska ranked 18th in the United States in both 1948 and 1949 in numbers of cows and heifers, two years old and over, kept for milk production. In 1929, the state ranked 13th. Because of Nebraska's larger area, however, its rank is not a true indication of the density of the cow population.<sup>3</sup>

Nebraska ranked fifth in the number of cows retained for milking purposes in 1929 and again in 1949. This indicates that the state is holding its place within the West North Central Division.

In total milk production, Nebraska ranked 14th in the United States in 1929 and again in 1948. In the West North Central Division, Nebraska ranked fifth in milk production in 1929 and again in 1948. Nebraska is maintaining its place in total milk production in the United States and in the West North Central Region. In production per cow, Nebraska ranked 28th in the United States and third in the West North Central Region in 1948.<sup>4</sup>

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<sup>3</sup>

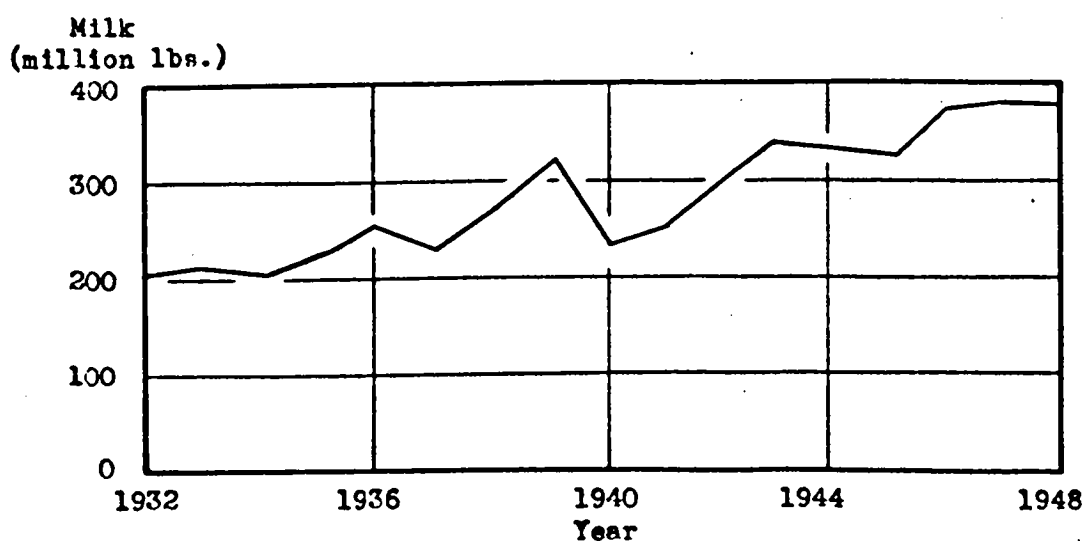
Acresage is not the all-important part of the problem. The number of cows per pasture acre--the stocking ratio--is a major factor. Some pastures in Eastern Nebraska will support one to one and one-half milk cows per acre, while in some of the drier regions the stocking rate materially declines. Technological advances in the agricultural field have contributed to higher grass yields per acre. These technological advances are: (1) the application of fertilizer, (2) introducing of new grasses that are more succulent and higher yielding, and (3) pasture rotation.

<sup>4</sup>

Agricultural Statistics (Washington D. C., U. S. Government Printing Office, 1949), p. 420.

FIGURE 5

WHOLESALE DELIVERY OF MILK  
FROM PRODUCERS TO PLANTS AND DEALERS  
IN NEBRASKA



(From Agricultural Statistics (Washington, D. C., United States Department of Agriculture, 1932-1948))

Nebraska ranked second in the United States in the percentage of milk cows of dual-purpose breeding in 1929.<sup>5</sup> This exemplifies the fact that Nebraska is not strictly a dairying state but instead is predominantly a beef-producing one. The primary consideration as viewed by the typical Nebraska farmer is to buy an animal that will be a good beef producer. The milk-production aspect is a secondary consideration in the minds of most Nebraska farmers. This is probably the main reason for the low production per cow in Nebraska. Even though the production per cow has increased during the last ten years, such additional factors as small herds, a lack of good bulls, a lack of outlets for milk with premium only for butterfat, and a lack of incentive by the producer to provide good rations and desirable milking stables have contributed to the relatively low production per cow in Nebraska.

The Bureau of Agricultural Economics gives a rather interesting classification of cows kept for milk by crop-reporting districts. Marked variations are noted. These variations are the result of several factors. One is the type of farming. Where wheat is the main crop, generally the number of cows milked is quite small. Also where irrigated farming exists, numbers of milk cows are small. On 160-acre irrigated farms where some family labor is available and most of the acreage is devoted to corn, dairying fits in quite well because the seasonality of labor requirements allows 15 to 20 dairy cattle to be milked. On the larger irrigated farms, 320 to 480 acres, dairying does not fit in very well with good farm organization. Labor requirements during the growing season are very demanding, and therefore beef cattle and hogs best fit

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5

Statistical Supplement No. 8 to Milk Production Trends (Washington, D. C., United States Department of Agriculture, 1933).

into the farm business. When beans, sugar beets, and potatoes occupy the entire acreage of the irrigated farm, the labor requirements are very high during the growing season. Unless a fluid-milk market exists through which whole milk can be marketed at a high price per hundred-weight enabling the farmer to hire labor to care for the cows, dairying is not likely to exist. Therefore, dairying will fit into some irrigated-farm organizations, but a combination of this with a good market is essential. The irrigated areas of Nebraska are close to the sandhills, the origin of many feeder cattle; so many of the irrigation farmers buy feeders off the range and feed them out in their feed lots. Along with the feeders, hogs fit into the plan quite well. The farrowing periods for the sows can be arranged for the times when labor requirements for the crops are nil. Likewise, the beef cattle can be fed during the winter, while cows should be milked at least ten months out of the year.

In a general farming area, dairying fits into the overall farm business plan better than in any of the specialized types of farming areas in Nebraska. The feeds needed to maintain a dairy herd are raised on the farms and milking fits into the labor requirements better than it does on many of the irrigated farms in the state.

Another very important factor is the market for the milk produced. The state's population is mostly concentrated in eastern Nebraska which provides a sizeable market for fluid milk.

Two factors, then, contribute to the fact that the numbers of milk cows are greatest in the eastern one-third of the state: (1) many farmers have decided that milk cows should comprise a part of their farm business since they feel that this farm organization fits into the type of farming area in the eastern part of the state, and (2) the availability



of a market for fluid milk. The factor of an available fluid-milk market is very important because, of the prices paid for the various forms of milk, the price paid for fluid milk is the highest.

Most of the milk-cow herds in Nebraska are small. Dairying is merely a side-line enterprise on most farms; thus little emphasis has been placed upon improvement of the milk herd in the past. However, with Grade A milk programs being accepted in more and more cities, fluid milk producers are being forced to install cooling equipment and sanitary milking parlors to meet the specifications of the program. This in turn encourages the producer to milk more cows since his initial investment varies little when he adds a few more cows to his herd.

As a result of the progressively greater acceptance of the Grade A program, milk quality has been improving. Naturally, some producers would produce Grade A milk even if there were no requirement, but they are in the minority. Therefore a quality-improvement drive becomes necessary, if the markets are going to be supplied with Grade A milk.

The price paid for Grade A milk is greater than that paid for lower grades. In some markets, Grade A is the only grade of milk bought for fluid consumption. This has been the case in the Omaha milkshed since April of 1951.

Pasteurization has greatly increased milk quality for the consumer. Most of the milk now sold to consumers in Nebraska is pasteurized.

A large herd (over six cows) is generally considered to be the most efficient herd. Several reasons can be given for this. A farmer who has a large herd must usually be a competent manager, because he has to make the enterprise pay or his farm business will rapidly dis-

integrate. The large farmer can produce feed at less cost than a smaller farmer, because equipment and labor are generally used more efficiently than on smaller farms.<sup>6</sup> Therefore, the cost per ton or per bushel of feed is less. There are certain indivisibilities of factors which require that a large volume must be maintained if the factors are to be utilized efficiently. Men must always be hired in units no smaller than one. In addition to labor, other indivisibilities of the dairying business are stables, milking machines, manure-disposal equipment, milk coolers, and the like. A certain amount of equipment is needed and the equipment should be used to care for the number of cows for which the equipment is designed. As an example, where six milking stables are available, they can be used to milk 18 or more cows, in three shifts.

When milking cows is one of the major enterprises on the farm, as it is where most large herds are maintained, the farmer will probably give them better care than if milking were a minor enterprise. Also, they are a major source of income and therefore the farmer will probably take a great deal of interest in them and see that they are properly fed and milked. "In the past two decades, milk production on United States farms has increased by 20 billion pounds, or one-fifth, while the number of milking herds has declined."<sup>7</sup>

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Since labor comprises a great deal of the cost of producing milk, it is an important consideration. Wilcox of the University of Wisconsin and Rarchenstein of the United States Department of Agriculture have found that such jobs as cleaning and assembling the milker or driving cows to and from the barn in summer take about the same length of time regardless of herd size. Therefore, for these overhead labor costs, the large herd will have a lesser cost per cow than the small herd.

7

The Agricultural Situation (Volume 34, Number 10, Washington, D. C., Bureau of Agricultural Economics, United States Department of Agriculture, October, 1950), p. 2.

Milk cows continue to be kept on one-third of the farms in this country primarily for the purpose of supplying the family with milk.

Among commercial producers, the changes in volume per herd between small and large operators contrast sharply. A score of years ago, farmers having three to nine milk cows contributed more to total milk production than any other group. Since 1929, the number of these herds has decreased about one-fourth and the amount of milk they produce has dropped 12 billion pounds.

Larger commercial herds have shown an opposite trend. Between 1929 and 1949, herds of ten to 19 cows increased in number, and their output of milk rose eight billion pounds, or more than one-fourth. The greatest contribution to the increase in production, however, has come from the large herds. Output from herds of 20 milk cows or more has doubled in the past 20 years. These herds now furnish more milk than any other of the principal groups.<sup>8</sup>

In Nebraska, milk production has declined. In 1939 milk production was 2,728,000,000 pounds, and in 1949, 2,256,000,000 pounds. No information is available as to the decreased size of herd associated with this decline. However, in the ten-year period prior to 1939, a slight decrease in the number of herds containing one to two, three to ten, ten to 19, and 20 to 29 cows occurred. The 30 to 49 and 50 to 79 cow herds decreased by practically 50 percent. Herds numbering 75 to 99 and 100 cows and over increased slightly.

Milk production increased in Nebraska during the war years, from

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John L. Wilson, "Fewer Herds, More Milk," The Agricultural Situation (Volume 34, Number 10, Washington, D. C., Bureau of Agricultural Economics, United States Department of Agriculture, October, 1950), p. 2.

1941 to 1944, and has been declining since that time. The peak was reached in 1943.

The bulk of the herds in Nebraska are three-to-nine cow herds. Most farmers choose to produce enough milk for their own use and enough to sell in small quantities to the cream station as cream. This situation is warranted in many cases in which family labor often consisting of a young son going to grade or high school, is available. The son has a limited amount of time in the mornings and evenings, and if he did not have the cows to milk, perhaps his time would be wasted. The above is a justification for the small herd. A larger herd could not be maintained if it depended upon the son's care.

Milking cows seems a confining enterprise to the operator, since the cows have to be milked twice every day. This fact contributes to the decrease in the number of cows milked when an adequate income can be obtained in other ways on the farm. Many farmers will probably continue to milk one to three cows for the purpose of supplying milk for family needs. Probably the main condition that will encourage farmers to increase their herd size is a better price for their milk. The producers supplying fluid milk to population centers, receive a reasonably good price for their milk, but this way of marketing milk is limited by the number of population centers in the state.

Processors obtain their supply of milk from various sources. The estimated amounts purchased by processors in 1949 through the different channels are as follows: (1) amount purchased from producers, 62,000,000 quarts, (2) amount purchased from other distributors, 6,000,000 quarts, (3) amount purchased out of state, 500,000 quarts, and (4) amount

produced by the plant owner, 1,500,000 quarts.<sup>9</sup> The producers serve as the main supply line, which is a condition that would be expected. Other distributors furnish a sizeable amount of milk to the distributor. In cases where a company owns several plants, milk is shipped from plant to plant when there is an occasional need for a greater supply than the plant normally maintains. With bottled milk, too, a distributor may purchase either paper or glass containers from another distributor. Most of the producer-distributors, that is, the distributors that produce at least a part of their milk, maintain larger herds than the producers supplying distributors. Many of the producer-distributors are either out of business or going out of business in the near future, because of the stiff competition furnished by the larger distributors. Many of the small producer-distributors interviewed had recently gone out of business and were selling whole milk to a distributing agency in the same area which they had formerly supplied as a producer-distributor. Some of the large distributors offered to arrange for the collection of the milk from the small producer-distributor as an inducement to get the producer-distributor to sell to them.

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It must be borne in mind that Lincoln and Omaha are excluded in this study.

### CHAPTER III

#### SEASONAL VARIATIONS IN SUPPLY AND DEMAND

Most farmers who produce for other than fluid-milk markets produce the most milk during periods when the most pasture is available, and a minimum of dry feed is needed. This period in Nebraska, the growing season, is from April through September, and the season when the pasture supply is greatest is generally in June. During April and the first two weeks in May, most of the grasses are beginning their growth and they do not attain an optimum height for pasturing until about the middle of May. Many farmers breed their cows to freshen in the spring, so that the animals will be ready to utilize the peak pasturage season. True, many farmers sow warm-season annual grasses such as sudan grass so that they will have a fairly good supply of pastures through the entire growing season, but the peak production of milk is generally in June. The entire growing season is a period when milk is usually available in quantity from producers. Within this span there are times when the supply of fluid milk exceeds the amount needed for consumption and the distributors and processors must use the excess in ice cream, butter, and similar products.

During the rest of the year the producers do not produce enough milk to satisfy the needs of the distributor to whom they sell. October through March is a time when the milk cows must be fed a great deal of dry feed if milk production per cow is to be kept at a profitable level. Large quantities of roughage in the form of alfalfa hay or silage, with the addition of concentrates and high protein feeds, must be supplied

when the natural vegetation is dormant. This entails more expense and inconvenience to the farmer and many times he does not care to assume this new burden. The farmer who is selling whole milk of the required grade wishes to be able to sell all his milk to the processor. The processor, in turn, wants a steady supply of milk so that he does not have to worry about signing up other producers at the season of the year when many of his producers have less milk available than normal.

A study in Indiana revealed that the receipts of milk were low from November through March and reached a peak in June.<sup>1</sup> Studies in other states indicate that the high point of production is June and the low point from October to December.

Seasonal variations in dairy costs and returns exist as well as seasonal variations in supply, according to a Michigan study.<sup>2</sup> The costs in September were about one-third less than those in March. Including the dairy products sold, dairy products used, credit for the calves born, and the manure produced, the total income per cow was highest in April and lowest in October. The net return per cow was highest in June and lowest in October. It was found that the total cost of producing a pound of butterfat by the herds studied varied from 27 cents in June to an average of 45 cents in March. During the various months, the average income from the sales of dairy products ranged from 38 to 44 cents per pound of butterfat. Therefore, there was a six-cent variation in price

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<sup>1</sup> Clifford M. Hardin, The Supply and Utilization of Milk in Indiana (Bulletin 462, Lafayette, Indiana, Agricultural Experiment Station, August, 1941), p. 37.

<sup>2</sup> The Quarterly Bulletin (Volume 19, No. 2, East Lansing, Michigan, Agricultural Experiment Station, November, 1936), p. 81.

compared to an 18-cent variation in the cost of producing a pound of butterfat. The conclusion of the study was that dairymen selling their dairy products on a butterfat basis might find that it was to their advantage to produce more of the year's production during the summer months.

While the dairy costs and returns in Nebraska are probably not exactly like those in Michigan, they indicate seasonal variations that are in a general way common to both states.

### Variation in Demand

The problem of seasonal supply cannot be discussed adequately without mentioning the complementary aspect of seasonal sales. In most states the peak in sales of fluid milk is usually reached in October. A study in Wisconsin was made on the seasonal variations in production and consumption. Although production was found to vary the most, consumption also was found to change from season to season.

Consumption is uniformly low during the summer vacation months, begins to climb during the latter half of September, moves decidedly upward in October and reaches a high point during the latter part of October. It decreases slightly during the winter, but again climbs during the spring reaching a relatively high point during the months of April and May after which it again falls to a low point during the vacation months, June, July and August. <sup>3</sup>

Therefore, in many states the relationship between supply and demand for fluid milk is an inverse one. The peaks in supply are during the months when consumption is the lowest and vice versa.

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<sup>3</sup>W.P. Mortenson, An Economic Study of the Milwaukee Milk Market (Research Bulletin 113, Madison, Wisconsin, Agricultural Experiment Station, University of Wisconsin, January, 1932), p. 29.



In some of the smaller cities and towns in Nebraska, consumption remains about the same the year around. Some variations appear, however, as some of the processors in the smaller cities and towns sell more during October than in June. A large city such as Omaha follows the general trend portrayed in the Wisconsin study: peak sales in June and low sales during October.<sup>4</sup>

In Nebraska, the seasonality of supply is a problem with many of the processors. For the state as a whole the average daily supply in June, 1950, was 150 percent of the average daily supply in October, 1949.<sup>5</sup> The average daily purchases from farm producers was 42 percent greater in June than in October, and the average amount that the plant owner produced daily was 13 percent greater in June than in October. The average daily purchases from other distributors in October was 19 percent of the June purchases. Distributors usually buy from other distributors only when their supply from producers is not adequate. It is normal, then, for greater amounts to be purchased in October. A similar relationship exists for the average daily amount purchased out of the state. In October, the average daily purchases out of state were five percent greater than in June. One important point should be emphasized at this time. The amount of milk purchased both for October and June is not used solely for bottling; some plants use the milk for ice cream, some separate a part of it and churn it into butter, and some have various other uses for their milk as the total sales and purchases are not equal.

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Based on a survey made by the author in the summer of 1950.

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Ibid.

The Size I plants were found to be the only ones whose managers produced milk. The other plants bought all their milk. The milk that is produced by the plant owner usually constitutes the bulk of his sales since a small producer-distributor generally does not buy from more than two small producers.

### Plans to Stabilize the Supply

In an attempt to stabilize the supply of milk, processors in various parts of the United States have employed such practices as the base-surplus-pricing system. The purpose of the plan is to distribute proceeds from the sale of milk in such a way as to increase the relative returns to producers whose milk shipments are comparatively constant throughout the year.

The usual procedure under a plan of this type includes:

- (1) Assigning to each producer in advance a base quantity of milk determined by his past shipments in relation to those of other producers and in relation to market sales.
- (2) Determining for each pay period the performances of producers under their assigned bases; that is, the quantity of base milk and the quantity of excess milk delivered.
- (3) Dividing the proceeds from the sale of milk and calculating separate prices for base milk and for excess milk.
- (4) Paying each producer the one price for his base deliveries and the other for excess deliveries.<sup>5</sup>

A relatively new development in the field of milk pricing that originated in Louisville, Kentucky, is the Louisville Fall Premium Plan, commonly known as the "Take off and Pay back Plan". The plan was intro-

duced into the market by the Falls Cities Milk Producers Association as a result of a search for a workable answer to maladjustments between the supply and demand for graded milk. The purpose of the plan was to provide an incentive to encourage fall milk production without overstimulating production in the spring months when the market already had more than enough for fluid use.

Essentially, the plan provides a guaranteed fall premium, through building up a reserve pay-back fund in the hands of the Market Administrator. This is done by applying a given take-off rate to the volume of milk received by each handler in the months of April, May, and June. During the fall months of September, October, and November, the pay-back fund, which has been held in escrow by the Market Administrator is paid back pro-rata to producers in each of the pay-back months. Cooperation among the various agencies involved was reported to be good.<sup>7</sup>

No discussion of a plan is complete without a comparison of it with other plans. The pay-back plan could never fail to provide an incentive to fall shipments superior to straight blending of prices because spring shipments build up a producer-payment fund, which when returned would always result in a positive figure to be added to the computed blend price.

When the pay-back plan is compared to the seasonal differential plan, the pay-back plan differs in several respects. First, the amount of the seasonal differential is not fixed arbitrarily but rather is determined by the production performance of all shippers. Second, the amount of the incentive is not uniform to all producers but is individually determined by the seasonal sales of each spring and fall, as compared with the standard set by all producers in the

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Conversation in July, 1950, with John B. Roberts, Agricultural Economist, University of Kentucky.

market. As a result, a producer who intends to secure his share of the incentive payments cannot decide he is doing well enough and let down on his production without danger of falling progressively behind. That is to say, under the pay-back plan a producer who goes to extreme spring production worsens his position both absolutely and relatively, while the differential price is fixed and a producer may worsen his position absolutely without changing it relatively.<sup>8</sup>

The base-surplus plan and the Louisville Plan are similar in many respects, but they differ in various ways. One difference is that the Louisville Fall Premium Plan is strictly a one-price plan for not only the producer, but the handler as well. Secondly, the market is not divided into basic and surplus uses for the purpose of giving each producer a share of Class I and II sales on a two-price basis. In the third place, the take-off and pay-back plan is definitely elastic in that the assumption is made that some shippers will always be spring producers, some may become fall shippers, and many will lie between in the seasonal distribution of their shipments.

The key to the Louisville Plan is explained best by the following statements:

When the take-off and pay-back plan is viewed solely from the standpoint of the market mechanics, the key to its operation is the relationship between total receipts of milk in the pay-back and in the take-off period. From the standpoint of the milk shipper, the plan measures the individual producer's milk production against that of all producers combined, or the market total. Insofar as the pay-back check is concerned, the individual shipper whose ratio of fall milk deliveries is identical to that of the market will draw from the pay-back fund an amount of money equal to that set aside for a volume of milk equaling his shipments in the take-off period. Those whose ratio of fall to spring shipments falls below that of all producers, will fail to recover the full amount of the set-aside represented by the volume equal to their spring shipments. And the producer whose ratio of fall shipments to spring shipments exceeds the average of all producers will draw from the fund more than the

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<sup>8</sup> John B. Roberts, The Louisville Fall Premium Plan for Seasonal Milk Pricing (Bulletin 510, Lexington, Kentucky, Kentucky Agricultural Experiment Station, University of Kentucky, November, 1947), pp. 56, 57.

amount of the set-aside represented by the volume equal to his spring shipment.<sup>9</sup>

The present author found in interviews with many of the handlers in Nebraska, that they met the problem during October, and some of the other months when the supply from their regular producers was short, by buying milk from other distributors. Still others enlisted new producers. Buying from other distributors is fairly satisfactory; however, the transportation cost involved is bound to cause the cost of the milk to the handler to be more than if he were getting the milk direct from his own producers, assuming the same price paid to old and new producers per hundredweight of milk at the farm level. Many of the companies that have several plants scattered throughout the state take care of their seasonal short-supply period by shipping milk from plant to plant as the need arises.

Some handlers in the eastern part of the state buy milk from Minnesota handlers. The Minnesota handler can pay the transportation cost and still make money shipping his fluid milk to a Nebraska dealer. Where this situation exists, it indicates that the Minnesota handler already has a supply of milk adequate to meet the fluid-milk needs of the area in which he operates. If the milk were not shipped out-of-state, it would have to be used for other purposes such as butter, cheese, and condensed milk, which do not return as high a price per quart equivalent of milk as does the fluid milk. This indicates that our milk supply is not governed by the boundaries of the state, but that an interstate flow of milk on wheels exists, and presumably operates on a profitable basis.

In some instances, where the distributor had an adequate supply

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<sup>9</sup>

Ibid. p. 50.

during the season that is considered the short-supply season, a large surplus of milk existed through most of the summer months. The handler utilized this milk by making cheese, butter, or other products that returned less than bottled and retailed fluid milk. This, of course, would be all right if the producer who actually adjusted his production to supply the handler with a steady supply of milk the year-around, were compensated for his efforts. If the handler could utilize all the surplus milk during the summer, he could probably also do so during the winter. This situation indicates that the plant is probably not being operated at maximum efficiency.

Perhaps if a plan to encourage fall production of milk were used in most of the areas of the state, by handlers who have a relatively fixed demand for bottled milk, there would be greater efficiency and the producers would be compensated on a more just basis, assuming that the handlers would pass on the fruits of their more efficient business to the producers.

Some of the distributors visited said that the price per hundred-weight they paid the producer was determined by the competition within the community. Others claimed that their policy in the matter was determined by the price paid by some plant or group of plants in the nearest large city.

The reason for the above explanation is to point out that if a seasonal plan for paying farmers for their milk were adopted by plants in the larger cities, then the smaller towns and villages would probably adopt a similar policy. The result would most likely be a "chain reaction" from the plants in the larger cities to those in the small villages.

The federal milk order that is in effect in Omaha serves as a means of helping the producers and the handlers settle their pricing

problems. The market administrator determines the prices that are to be paid the producers in the market area by handlers by computing a uniform price per hundredweight for 3.8 percent milk. The handler pays one price for the milk which he sells for consumption in whole fluid form and a price that is lower for the surplus fluid milk which he sells in the form of other products.

By pricing surplus milk separately, the classified price plan prevents reasonable surpluses from depressing the price of local farm milk to the point where the market's supply of milk may become endangered.<sup>10</sup>

The seasonal problem is one that certainly warrants a great deal of consideration and study in the future. A better arrangement between producer and distributor should result if pricing policies are directed toward compensating the producer who adjusts his milk supply in order to have a relatively constant supply for sale to the handler during each month. Conversely, the producer who plans for all his production to occur during the summer months should not receive so high a price for his milk going into fluid use as the producer who sells in the fall and the rest of the short season when his feed costs are higher.

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Questions and Answers on Fluid Milk Marketing Orders (Washington D. C., United States Department of Agriculture, Production and Marketing Administration, May, 1950), p. 6.

## CHAPTER IV

### THE POTENTIAL SUPPLY OF MILK IN EASTERN NEBRASKA

#### The Soil-Conservation Influence

For several years, the people of Nebraska have become more and more conservation conscious. Many farmers have decided to "save the soil" by constructing physical structures such as terraces on their land and by planting crops that are adapted to their particular types of soil. The degree of erosion, soil type, and slope or topography are taken into consideration by the Soil Conservation Service in classifying the land as to its proper use.

These farmers have probably taken their course of action as a result of the great amount of public education that has taken place during the past 15 years. The Soil Conservation Service has done a great deal of educational work, as have the State Extension Service and the newspapers. The federal government has subsidized the building of terraces, dams, and other construction jobs involved in conservation work, along with sponsoring planting of grasses and legumes during some years.

All these factors have encouraged the farmers to enlist their efforts in the Soil Conservation Service programs. The general trend in the long-run plan of the Soil Conservation Service is to get land that is subject to severe erosion out of the row crops and into close-growing crops, such as grass. This has begun to materialize in much of Nebraska and more acres are being sown in grass.



Many bulletins and books have been written on the possibilities of extremely high returns from grass. Undoubtedly, much of this is fiction, but some supposedly reliable sources have claimed higher returns per acre from grass than from corn and other high-returning crops. There are two principal alternatives open at the present time for the use of grass in Nebraska. Farmers can milk cows or raise and fatten beef cattle.

### Expanded Milk Production in Irrigated Areas

Several irrigation projects are being expanded in Nebraska. In some states where irrigation has been introduced, dairying has had a place on a part of the irrigated farms. The farmers who had land included in the Columbia River Basin Project in Washington maintained dairy herds after irrigation was introduced. However, dairying does not fit into the overall farm plan very well because of the high demand for labor during the growing season when irrigating must be done. But if family labor is available, the farmer can utilize this labor by maintaining a herd of milk cows. High-quality roughage, a limited amount of grain, and an available supply of inexpensive labor are sometimes considered as favorable for dairying and raising poultry. Low-quality roughage, an abundance of grain, and a short supply of labor are generally considered necessary conditions for fattening beef cattle and the raising of hogs.

A very important factor must be injected into this generalization; this factor is the market. If a market for a high grade of wholesale milk, rather than merely a butterfat market, is available a farmer will have an added incentive to milk cows. The farmer will probably be interested in expanding his milk-cow herd and will be willing to hire additional

labor if he can receive the premium price paid for high-grade wholesale milk. The psychological factor of personal choice is of great importance; if an individual prefers milking cows to raising beef cattle, he will probably milk cows even if raising beef cattle is more profitable for him, or vice versa.

Since the irrigation farmers in the central and western part of the state are close to the sandhills and can buy feeder cattle at a relatively low price, the major cattle enterprise in this area will most likely be beef. No generalization that feeder cattle move from the sandhills to the irrigated farms can be made; however, the relationship is highly possible. Many of the irrigation farmers in these sections are apparently successful in raising as well as fattening beef cattle. Most of the farmers who do raise their own feeders have a pasture acreage available in addition to their irrigated land.

### Area of Expansion

The small two-to-three-milk-cow herds will probably continue to exist over most of the state because the family needs milk and cream, and if family labor is available to do the milking, the farmers will be likely to keep a few milk cows. Any expansion that might take place would probably not be at the expense of the very small two-to-three-cow herds. If an expansion occurs, it will probably be an expansion of the six-to-15 cow-herds because the men having such herds are evidently interested in dairying and most likely to expand their enterprise if anyone does. A farmer who milks about ten cows usually relies on the returns from the milk as a major source of income. If a market for

wholesale milk is accessible, this farmer will probably be interested in expanding one of his major enterprises.

There is no way to forecast what percentage of the grassland will be utilized by the raising of beef cows or by pasturing milk cows. However, some hypotheses can be set up to indicate what the increase in milk production would be if a certain percentage of the potential grassland were devoted to the grazing of milk cows. Table IV gives the acres of Classes V, VI, and VII land that are at the present time in cultivation.

TABLE IV

TOTAL ACRES IN CLASS V, VI, AND VII  
IN CULTIVATION IN EASTERN NEBRASKA BY COUNTIES

County	Acres	County	Acres
Burt	71,388	Nance	24,562
Cedar	57,046	Merrick	41,896
Cuming	61,604	Pierce	21,792
Dakota	35,136	Platte	57,226
Dodge	60,682	Stanton	35,134
Douglas	35,686	Gage	77,278
Dixon	40,994	Lancaster	98,608
Thurston	39,132	Jefferson	43,546
Washington	56,218	Johnson	35,430
Wayne	47,130	Pawnee	46,245
Sarpy	24,938	Thayer	25,878
Cass	69,392	Wuckolls	23,934
Nebraska	54,648	Clay	25,734
Otoe	77,028	Fillmore	17,354
Richardson	50,872	Saline	21,536
Saunders	70,266	Seward	22,056
Antelope	39,838	York	25,878
Boone	44,784	Hamilton	32,730
Colfax	33,932	Hall	34,395
Knox	67,284	Polk	25,335
Madison	30,590	Bulter	28,366
Total 1,833,499			

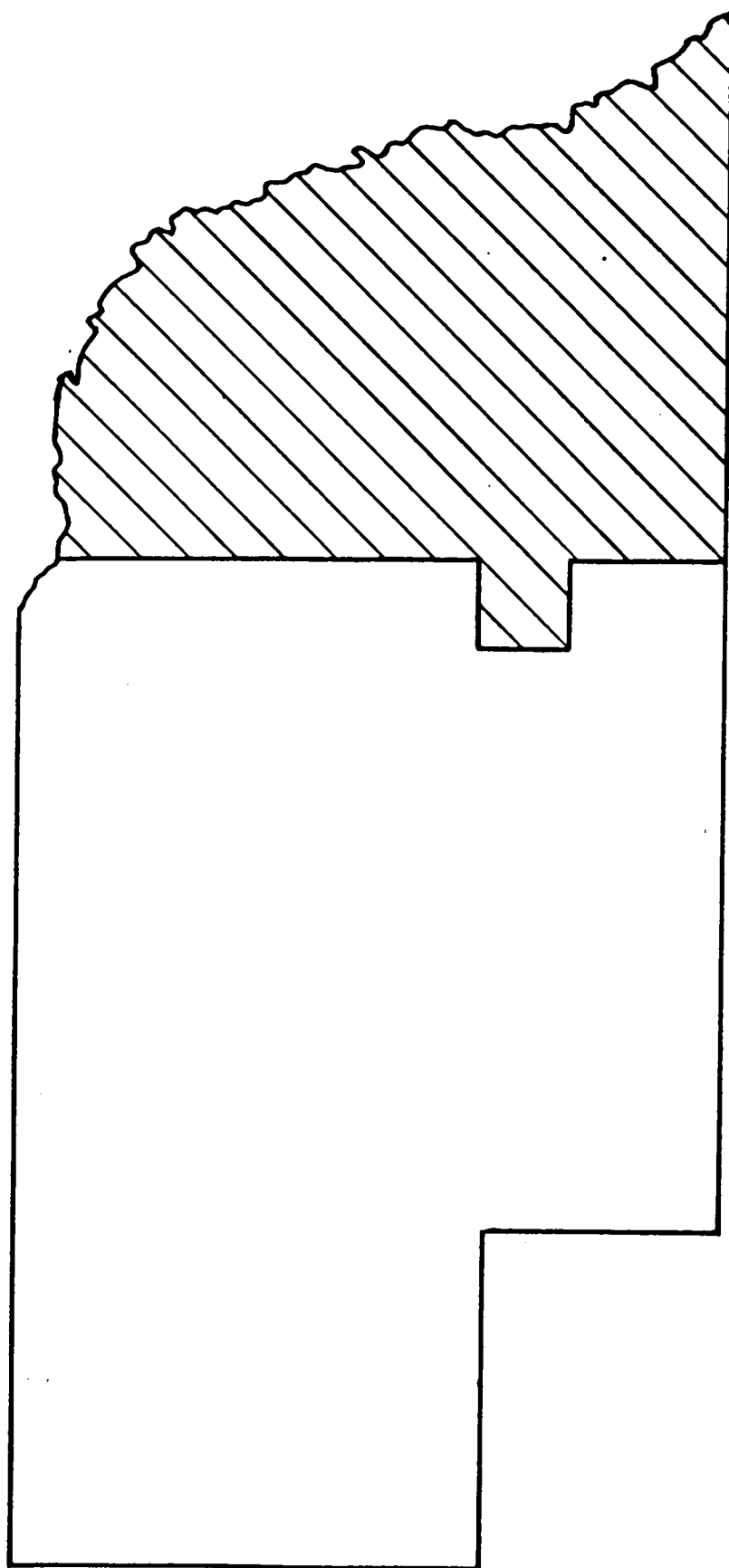
(Compiled by Conservation and Survey Division, of the United States Soil Conservation Service, Lincoln, Nebraska, 1980).

Only the eastern part of the state is being considered as a potential area for an increased milk supply because the bulk of the population is centered in this section. (See Figure 6) Certain portions of the rest of the state may be smaller potential dairy areas, such as those around some of the medium-sized population centers. The farming in the eastern part of the state is, generally speaking, of a diversified nature. This type of farming readily permits the milking of cows. Locally-grown feed is usually available, and the peak labor requirements can be arranged so that the labor needed for milking cows can be distributed throughout months when other labor requirements are not at a peak.

Most of the large population centers are located in the eastern part of the state. This factor is of prime importance because the fluid milk that is bottled is sold mainly in cities and towns.

The Classes V, VI, and VII lands that were listed in Table IV are acres of land, now under cultivation, which should be used in a different manner, according to Soil Conservation Service standards. The Soil Conservation Service has divided land into eight classes. Classes I and II can be intensively cropped, while Classes III and IV require restricted cropping practices. Class V land is poorly drained or alkali soil—flat flood plains which are subject to frequent flooding; this land is suitable only for permanent grassland. Class VI land includes fine-textured soils that are susceptible to severe erosion, and steeply sloping or gravelly and stony land; it should be kept in perennial grass. Class VII land is steep and usually has a sparse growth of vegetation. Good hayland management and restricted grazing practices must be applied. Class VIII land is wasteland and has value in some areas for recreational purposes or as a refuge for wild birds and animals.

FIGURE 6  
AREA DESIGNATED AS POTENTIAL DAIRY AREA



The acres listed in the table are the acres recommended by the Soil Conservation Service for grass only. The total number of acres in the counties listed is the foundation on which the potential supply of milk is based.

Three different hypotheses have been cited; these hypotheses are presented in Table V.

TABLE V

POSSIBLE INCREASE IN THE NUMBER OF MILK COWS  
AND THE RESULTING INCREASES IN PRODUCTION

Fraction of Increased Acreage to be Devoted to an Increase in Milk Cow Numbers	Acres	Number of Cows Acreage Will Support	Pounds of Butterfat Resulting from in- crease	Gallons of Milk Resulting from in- crease
1/2	916,750	366,700	69,673,000	212,319,300
1/3	611,166	244,466	46,448,540	141,545,814
1/4	458,375	183,350	34,836,500	106,149,650

(The total number of acres on which the fractional increases are based is 1,833,499.)

The number of acres was calculated by multiplying the fraction appearing in the first column by the total number of increased acres of grass, 1,833,499. The number of cows the acreage would support was found by dividing the number of acres in column two by 2.5. The figure 2.5 was used since the stocking rate was estimated as 1.5 acres of pasture per cow and one acre of hayland per cow. The allowance for hay land was made because the hay requirements for a cow during the season when no green pasture is available would nearly equal the amount of hay harvested

from an acre of land on a long-run basis. The number of pounds of butterfat was obtained by multiplying the number of cows in column three by 190, the number of pounds of butterfat per cow. The figure was used on the basis of the following information.

A series of figures representing the pounds of milk per cow and pounds of butterfat per cow for Nebraska was obtained from the annual publication of the U. S. Agricultural Statistics.

TABLE VI

POUNDS OF MILK AND BUTTERFAT  
PER COW IN NEBRASKA, 1939-1949

Year	Production per Milk Cow	
	Milk	Butterfat
	Pounds	Pounds
1939	4,400	167
1940	4,830	203
1941	4,460	169
1942	4,540	173
1943	4,540	173
1944	4,320	180
1945	4,350	165
1946	4,660	177
1947	4,750	180
1948	4,720	179
1949	4,700	179

(Agricultural Statistics (Washington D. C., U. S. Government Printing Office, U. S. Department of Agriculture, 1939-1949))

Since no regularity prevailed in the foregoing list, the 1949 figure for pounds of butterfat per cow was used with an adjustment upward of 11 pounds. The adjustment was made because the figure for the

state includes cows kept for milk all over the state and this includes many cows that are very low producers and are kept mainly for beef purposes. The higher potential is based upon the assumption that milk cows used for the additional acreage will be cows that are somewhat higher producers than the average for the state.

The figure as to gallons of milk resulting from the increase is based on the estimated 190 pounds of butterfat per cow. The percent of butterfat used by the Bureau of Agricultural Economics in the statistical calculations for the annual publications for the state of Nebraska, 3.8 percent, was divided into 190. The resulting figure, 5,000, was divided by 8,642, the number of pounds in a gallon of milk, yielding the answer of 579 gallons per cow; 579 was multiplied by the number of cows in column two to get the total gallons of milk resulting from the increase.

The number of gallons of milk resulting from the increased number of cows is significant. The increase in the number of gallons of milk would result in the following increases in milk production, expressed as a percentage of the total milk production in Nebraska in 1948: (1) 81 percent if one-half of the increased acreage were devoted to an increase in milk-cow numbers, (2) 54 percent if one-third of the acreage, and (3) 41 percent if one-fourth of the acreage.

#### Need for Expanded Market

If the amount of milk produced were to increase in the great proportions indicated above, the market for milk in Nebraska would have to be expanded appreciably. Some milk is shipped into the state from Minnesota for fluid-milk consumption. Perhaps the producers in Nebraska could provide milk to compete with the price charged by the Minnesota



sources if they would strive toward larger herds and a lower cost per pound of butterfat. The population centers of the eastern part of the state serve as one large potential market. The demand for fluid milk for consumption may increase in these centers. Prices received by farmers for milk are greatest when it is used for fluid consumption; for this reason the possibility of an expansion in the market for fluid milk in eastern Nebraska was considered first.

Demand for butterfat has been decreasing the past few years. Probably the principal reason for that decrease is the heightened demand for oleomargarine. This situation indicates that other uses must be found for milk. The amount of cheese processed might be increased, as well as some of the by-products used for livestock feed. The main increase could be in the form of powdered and condensed milk. More uses for powdered milk are being found continually. The newly introduced cake mixes contain powdered milk, and these mixes have attained great favor with housewives. Many of the people in foreign countries need milk in their diets, but no milk is available, because the limited supply of land must be used for the growing of cereal grains which produce the greatest amount of consumable food per acre. Whole milk cannot feasibly be shipped great distances; however, powdered or condensed milk can. Perhaps much of the powdered milk that might be produced in Nebraska could be sent to some of these foreign lands, if national programs were so devised as to make this practicable.

Another possibility is the setting up of more condensaries, since there are only eight condensaries in the state at the present time, but these do not can the milk; the milk is condensed and used mainly for the manufacture of ice cream. Perhaps some subsidiaries of one or more of

the large evaporated-milk companies could be established in the eastern part of the state.

The Missouri Valley Project may bring industry into Nebraska, with the supply of power that will most likely be available. If this should be the case, an expansion in the fluid-milk market would be inevitable, in response to an influx of industrial labor from other areas within or without the state.

## CHAPTER V

## COLLECTION OF MILK

The collection of milk is an important step in the process of getting the milk from the producer to the consumer. Milk can decrease in quality very easily during the time of movement if it is not properly handled.

Three methods of collecting milk are employed in Nebraska, namely, (1) by the plant, (2) by independent truckers, and (3) by farmer delivery directly to the plant. The method widely used by distributors in the state is to contract independent truckers.<sup>1</sup> (See Table VII) Those distributors who do this usually subtract the hauling charge per hundred-weight from the producer's check. Other distributors prefer to let the producers make their own arrangements for delivering the milk to them. Where a cooperative association exists, it takes care of the necessary trucking contracts and bookwork.

A study made in the New England states on milk assembly concluded that by re-routing trucks and by operating the trucks with as near capacity loads as practicable, the total number of miles traveled by commercial

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The manager of one of the plants visited on the survey said that he maintained his own collection service because he thought he was able to satisfy and keep his producers in this way. His reasoning was that by paying the farmer-producer a slightly lower price than the other distributors, but not deducting the cost of hauling from their check, he made the producer happier than had he paid a higher price for the milk and then deducted the hauling charges. The fact that the producer received a check with no deductions from it had a desirable psychological effect. The foregoing case was interesting and peculiar to this one plant; none of the rest of the plants visited had used this approach.

TABLE VII

## METHODS OF COLLECTION AND CORRESPONDING AMOUNTS RECEIVED IN 1949

	Number of Self-Operated Routes	Amount Received in 1949	Number of Independent Routes	Amount Received in 1949	Number of Routes Direct from Farmer	Amount Received in 1949
TG	50	13,181,756	78	37,223,721	158	8,960,956

routes could be reduced 25 to 50 percent. The same percentage saving could be made in the number of trucks used on the above-mentioned routes. In this same study, the following conclusions were also reached.

The total miles traveled and the number of vehicles used by self handlers could be reduced 70 to 90 percent. When commercial routes and self haulers are considered together, over 50 percent of the total mileage now being traveled in many areas could be saved.

These savings could be realized only in part by a program of rerouting trucks without changing producer-handler relationships. If all gross-hauling were eliminated, if only the most suitable trucks were employed, and if the majority of the self-haulers were placed on commercial routes, maximum savings could be realized. The latter program would involve many readjustments between producers, truckers and processors.<sup>2</sup>

No doubt, the collection of milk in Nebraska could be handled more efficiently. But it would entail a switch of producers from one distributor to another, and this would probably not materialize without difficulty and without coercion. In a broad sense, the conclusions

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<sup>2</sup>

Allan MacLeod, Possible Economies in the Assembly and Distribution of Milk in New England (Storrs, Connecticut, Agricultural Experiment Station, May, 1944), p. 5.

reached in the Connecticut study could probably be applied to Nebraska.

The trucks which are used for the collection of milk in Nebraska have boxes that are either closed, closed and insulated, or open. Trucks with open boxes are usually used by distributors who buy from near by producers. If the milk must be hauled any great distance, a closed box is essential for keeping the milk cool until it reaches the processing plant.

Many problems arise in milk collection which require close cooperation between milk dealers and farmers. One of these is the problem of milk exposure. In many cases, the farmer leaves his milk at his mailbox for collection. Because of the danger of souring in hot weather and of freezing in cold weather, the farmer should expose his milk to the weather as little as possible. In order to eliminate partially this problem, some processors have made two suggestions, namely: (1) to keep the milk in the cooler as long as possible, and (2) to wrap blankets around the cans in freezing weather. Since frozen milk cannot be tested accurately and is of an inferior grade, the processor throws it away and the loss is paid by the producer.

A distributor who operated his own collection trucks claimed that they were much more dependable than independent haulers. The independent haulers, according to this distributor, would often refuse to go over bad roads and would not do many things that are imperative in keeping good relations between producer and distributor.

Up to this point, the discussion has dealt with the collection of the raw milk in cans. When the supply from local producers is inadequate to meet consumer demand, some distributors purchase bottled milk from other distributors. These purchases are usually made between plants that

are owned by the same company. This bottled milk is usually secured by the wholesale delivery trucks of the distributor. This is actually a distribution process. In many cases, the wholesale truck route goes through a town in which the bottled milk is purchased, and no extra trip is required. The milk is merely loaded onto the trucks and taken to the distributor's plant. In other cases, the retail truckers pick up the wholesale lot of milk early in the morning before they start their retail route for the day.

Many of the small producer-distributors visited had been approached by the larger companies with the suggestion that they sell their milk to the latter. The larger company often made the offer attractive by promising the producer-distributor collection service, that is, arranging to make the collection for him. Some of the producer-distributors were considering this, because of the squeeze that had been placed on them by the paper-bottle competition, and, for a few, the competition that pasteurized milk was giving them.

## CHAPTER VI

### MILK DISTRIBUTION AND SALES

Milk delivery is of equal importance with milk collection.

Delivery is the last step in getting the milk to the consumer. Delivery from the plant is made either to a wholesale outlet such as a retail store or a restaurant, or to the doorstep of the consumer.

In Nebraska, most of the milk delivery is made by the distributor in his own trucks. Small amounts are delivered in bread trucks or some other means of transportation. Small distributors sell practically all their milk in the town in which they are located, but the larger distributors sell a great deal of their produce to retail stores in other towns, and in a few cases, maintain retail house-to-house delivery routes in nearby towns. Some of the processors have counters in the front of their plants over which sizeable retail sales are made.

Since a study was not made specifically on the costs of distribution, no definite statements can be made about the efficiency of the milk-distribution system of the state as a whole. Other states have made studies of this, however, and have arrived at some interesting conclusions.

#### Studies in Other States

A study of milk delivery in rural areas in Connecticut revealed that the distribution of fluid milk in rural areas could be much more efficient. The study of 13 areas in that state indicated that by complete

adoption of alternate day delivery, and by the allocation of exclusive territories with deliveries made daily or on alternate days, sizeable savings could be made.

In the summer of 1942, because of the widespread though not universal use of alternate-day delivery, about 36 percent of the daily delivery mileage was being saved. This compares with a maximum estimated potential savings of 45 percent if all producers were placed on an alternate-day basis.

Adoption of a system of exclusive territories would yield potential savings of 38 percent with daily delivery or of 64 percent with alternate-day delivery. Savings would be higher than these levels in the larger towns but would be very small in the areas of low delivery density.<sup>1</sup>

It was concluded that exclusive territories would yield mileage savings approaching the maximum that could be made under any system that still maintained home delivery.

In another Connecticut study on milk delivery, some conclusions for all the studies made of that particular series were reached.<sup>2</sup> One conclusion was that the route miles per quart of milk decreased with increases in total delivery density, but that the decrease was much more pronounced for the reorganized routes than for the systems of delivery used at that time. The greatest efficiencies of distribution cannot be attained by only the individual distributors trying to improve their own methods, but by the individual distributors working together to try to

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Allan MacLeod and C. J. Miller, Efficiency of Milk Marketing in Connecticut, "Milk Delivery in Rural Connecticut" (Bulletin 249, Storrs, Connecticut, Department of Agricultural Economics, University of Connecticut, July, 1943), p. 29.

2

R. G. Bressler, Jr., D. A. Clarke, Jr., S. K. Seaver, Efficiency of Milk Marketing in Connecticut, "Conservation Possibilities in Retail Delivery in Major Markets" (Bulletin 253, Storrs, Connecticut, Department of Agricultural Economics, University of Connecticut, August, 1944), p. 40.



re-route their present systems of delivery to avoid duplication of routes. This procedure gives rise to many problems and would be difficult to carry out successfully, but, if the distributors were willing, a great saving would result by employing it.

Studies of specific markets could be made in Nebraska to discover the inefficiency of the distributions of fluid milk in the state. There are probably some cross-hauling and daily delivery in Nebraska. Alternate-day delivery and the elimination of cross-hauling would undoubtedly increase the efficiency of milk delivery in the state. The Connecticut studies doubtless reveal many conditions which also prevail in Nebraska.

Another study on the costs of distributing milk was made in Montana. Most consumers were satisfied with alternate-day delivery, according to the survey.

One of the most significant findings of this study was that most market areas did not have a stable and adequate supply of milk during the year. Nearly all distributors who handled any appreciable quantity of milk purchased their supply from dairy farmers rather than producing some or all of their requirements.

Nearly 25 percent of the families interviewed purchased their milk supply at the store, even though home delivery cost no more. If the price of milk had been two cents less at the store, than delivered to the home, only 49 percent of the families interviewed would have been interested in the saving.<sup>3</sup>

Most distributors in Nebraska who handle any appreciable quantity of milk, also purchase their supply from dairy farmers. However, most market areas in Nebraska have an adequate supply during the year. Distributors in Nebraska in 1949, sold about 60 percent of the milk they processed in the town where their dairy plants were located. They sold

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Gerald E. Korsan, Costs of Distribution of Milk in Montana Markets (Bulletin 462, Bozeman, Montana, Montana State College Agricultural Experiment Station, July, 1949), p. 39.

the other 40 percent in other towns, mainly as wholesale milk. The estimated amount of whole milk sold in the home-towns of the distributors in 1949 was 25,195,973 quarts, and the estimated amount sold outside of the home-town in 1949 was 17,416,292 quarts.<sup>4</sup>

The condition of the typical fluid milk sold to consumers has changed for the better in the past two decades. When Nebraska was even more sparsely settled than it is now, the villages and towns were supplied by one or more producer-distributors who sold raw milk to the people of the town. As time passed, regulations to encourage better milk quality effected the pasteurizing of some of the milk. The pasteurizing equipment is relatively expensive; so in order to pay for this equipment, a rather large volume has to be maintained by the processor. In many cases, one of the small distributors would buy the businesses of other small distributors and use them as supply lines for his larger plant. This process has been increasing to the present time. Now, most of the milk sold in the state is pasteurized. Some of the smaller plants are not pasteurizing, but more and more milk is being pasteurized as time goes on.

In late years homogenized milk has become popular with consumers. Some still prefer the cream-on-top milk, which allows skimming of coffee cream, but evidently most consumers have accepted homogenized milk as the form in which they prefer milk to be sold. The homogenizer is another machine that adds to the cost of processing the milk. Again, this is another step towards centralizing the milk plants; a rather large volume of milk must be sold to maintain a pasteuriser, a homogenizer, and some

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Excluding Lincoln and Omaha.

of the other newer machines that are now on the essential list of a modern plant owner. The necessary equipment is an indivisible cost, and even though small machines are used an appreciable volume must be maintained.

The fact that much of the milk in the state is sold wholesale can readily be seen from Table VIII. Retail sales in 1949 were only about 50 percent of the amount sold wholesale. The distributor not only has retail routes, but also sells to restaurants and stores in his own town as well as in other towns.

TABLE VIII

MILK SALES IN NEBRASKA IN 1949

Total Milk Sales	Amount Pasteurized in 1949	Amount Homogenized in 1949	Amount Wholesale in 1949	Amount Retail in 1949
Quarts	Quarts	Quarts	Quarts	Quarts
70 42,401,365	41,658,201	29,897,641	27,829,987	14,173,979

(Excluding Lincoln and Omaha)

Approximately 70 percent of the total amount of milk sold in 1949 was homogenized. Apparently most people prefer homogenized over cream-on-top milk.

Grade A milk comprised the greatest share of the sales in 1949. Approximately 36 percent as much Grade C as Grade A was sold in 1949 and only about 15 percent as much Standard Grade as Grade A was sold. (See Table IX)

TABLE IX

QUANTITIES OF GRADE A, GRADE C, AND STANDARD GRADE MILK  
SOLD IN NEBRASKA IN 1949

	Total Amount of Grade A in 1949	Total Amount of Grade C in 1949	Total Amount of Standard Grade <sup>5</sup> in 1949
	Quarts	Quarts	Quarts
TO	34,766,049	12,397,237	5,328,882

(Excluding Lincoln and Omaha.)

The number of years during which the plants have used pasteurization was included on the schedule used in the survey. The overall mean number of years of pasteurization for Size I plants was 12, for Size II plants 16, and Size III plants 20 years. This indicates that the larger plants have been pasteurizing longer than the smaller plants.

The price spread between wholesale and retail milk varies from one to three cents per quart.<sup>6</sup> From the limited information available, the spread is least in the small towns and greatest in the larger population centers.

<sup>5</sup>

Standard-grade milk is milk which need not be graded, since no ordinance prevails in the community in which the milk is sold. Some of this milk is pasteurized and would qualify as Grade A milk, but since no Grade A ordinance exists the milk is designated as standard grade.

<sup>6</sup>

One of the distributors visited said he was quite sure he could put milk on the market with as wide or wider margin than a large company that was shipping milk into the town in which he was located. The basis for his reasoning was that the transportation cost was so great to get the milk from the large distributor's plant to the town. Situations similar to this should be studied in detail in future projects.

Distributors who have decided to bottle their milk in paper have been able to establish more wholesale outlets for sales of milk at the expense of existing distributors in the smaller centers of population. The transportation for the milk that the distributor must be concerned with is a one-way proposition; he does not have to worry about having the bottles returned. Apparently, most consumers have accepted paper-bottled milk as having more advantages than disadvantages over glass. An increase in the amount of milk bottled in paper seems inevitable in Nebraska.

TABLE X

SALES OF MILK IN PAPER AND GLASS  
AND THE NUMBER OF BOTTLES REPLACED IN 1949

	Amount in Paper Cartons in 1949	Amount in Glass in 1949	Number of Bottles Replaced in 1949
TOTAL	19,349,752	21,523,584	602,712

## CHAPTER VII

### STATE LAWS AND OTHER REGULATORY MEASURES

There are many laws concerning the quality of the milk sold to consumers within Nebraska. Some of these laws prohibit sales of adulterated, unsanitary, or substandard products. Other laws forbid people suffering from or coming in contact with any acute contagious disease to handle milk; prohibit sale of milk from diseased animals, and prohibit unlawful trade practices. If any individual is found guilty of violating any of the state laws a complaint is filed with the county attorney in the county in which the violation occurred. The county attorney then takes the case to the county court. The judge then makes his decision on the basis of how serious the violation is. The state law is set up to put limits on the range of the penalty. At what point between these limits the violator will be punished is left to the discretion of the county judge. The state legislature is considering a Grade A law which would standardize the definition of "Grade A" so that it would mean the same thing all over Nebraska.

#### Laws in Maine

A description of the evolution of regulatory measures in Maine has been made by George F. Dow.<sup>1</sup> Some of the highlights of the description will be noted. The purpose of the numerous laws that have been

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<sup>1</sup>

George F. Dow, An Economic Study of Milk Distribution in Maine Markets (Bulletin 395, Orono, Maine, Maine Agricultural Experiment Station, March, 1939), pp. 546-553.

established in different markets to regulate the milk supply is to protect consumers in two ways, namely: (1) to protect consumers against fraud and (2) to safeguard public health through adequate restrictions in the production and handling of milk. The State of Maine has established minimum regulations which apply to all milk distributors in the state. For the state as a whole, it was estimated that for each dollar the state expended for milk inspection the local town and city expended only 45 cents. Samples of milk and cream were obtained by state or local inspectors at least annually for each milk distributor.

State regulations for the production and sale of Grade A milk in Maine were established in 1938. Among other requirements to meet Grade A standards, milk had to contain at least 3.75 percent butterfat and not over 25,000 bacteria per cubic centimeter at the time of delivery. Milk had to be bottled on the farm where it was produced. Either raw or pasteurized Grade A milk could be sold. Each distributor handling milk in Maine was requested to register with and be licensed by the State Department of Agriculture.

The higher quality of the milk in Portland than in the rest of the state was the result of more detailed local supervision and regulation, and the pasteurization of a greater portion of the milk in the Portland market. Since the consumers had an intimate knowledge of the milk situation in the smaller towns and villages, there was less urge for detailed regulations to protect the consumer than in the larger cities. The proportion of milk that was pasteurized decreased as the size of the city decreased. When regulations require a great deal of equipment, a high volume of sales per distributor is an essential.

### Laws in Nebraska

There are two full-time state inspectors in Nebraska to inspect milk plants. Twelve territory inspectors devote about 25 percent of their time to the inspection of dairy plants. The two full-time inspectors also inspect all other dairy plants. No definite statement can be made at this time as to the effectiveness of state jurisdiction, but generally speaking, the quality of the milk in the state has improved progressively to the present time.

Of course, as with other similar laws in this state and other states, 100 percent compliance does not result. There are a limited number of inspectors and they can not be in all plants at all times. Nevertheless, the state laws seem to have encouraged an improvement of the quality of milk delivered to consumers during the past 20 years. Not only do laws and regulations influence the quality of the milk offered for sale, they also stimulate the consumer to demand better milk. Thirty years ago, when pasteurisation was in its infancy, it was accepted slowly, but after people became educated as to the value of the process, its popularity grew rapidly. The demands of the consumers for this higher-quality product forced many milk distributors to pasteurize their milk.

Several District Health Units are found in various parts of Nebraska; their locations are as follows:

Scotts Bluff County Health Unit.....	Gering
Grand Island-Hall County Health Unit....	Grand Island
City-County Health Department.....	Lincoln
City-County Health Department.....	Omaha
City Health Department.....	Hastings
City Health Department.....	Kearney, (includes Lexington)
City Health Department.....	McCook, (includes Holdrege)
City Health Department.....	Alliance



Letters of inquiry were sent to the units listed above to discover what type of ordinance prevails in the city or cities under their jurisdiction.

The City of Gering milk code was adopted some 15 years ago. The ordinance stresses the importance of sanitation in the production and distribution of raw milk. There are no specific regulations for milk pasteurizing plants or farm dairies. Very little is mentioned in the code concerning pasteurized milk. It is the duty of the city physician to visit frequently each retailer and make recommendations to the city council for the approval of an annual milk license. The milk code does specify that no milk may be sold from untested cows; also, the milk shall have a 3.2 percent butterfat and state standards for milk solids. From 1937 to 1947 the Scotts Bluff County Health Department assisted the various cities and villages in the county with milk inspections. Since the adoption of the United States Public Health Service Standard Milk Code in January, 1947, the entire milk program has been enforced by the Department of Health in Scotts Bluff County. A grading ordinance omitting Grade "B" is now in effect. The contemplated change in the code is to omit grade "C" bottled milk except for manufacturing purposes.

Grand Island has a milk ordinance adopted in 1942. It was amended in September, 1945, to exclude raw milk. At present only Grade A pasteurized milk is sold in Grand Island. Two trained sanitary inspectors inspect dairies and distributors.

Lincoln has the USPHS ordinance.

In Omaha an ordinance governing the production, handling and distribution of milk and cream entitled "The Milk Control Act" is now in effect. The ordinance is enforced by the health officers with interpretations contained in the 1936 edition of the United States Public Health

Service Milk Code. This ordinance is a modification of the United States Public Health Service Milk Ordinance and Code. A new all-Grade A ordinance is now in the process of being completed and has been in effect since April 1, 1951. Five sanitarians are in the field, to see that the producers are in compliance. Besides these sanitarians, six or seven other field men from the dairies and the milk association give Grade A information and check high-count producers, which helps a great deal in keeping the ordinance enforced.

The city of Kearney adopted the 1939 edition of the USPHS Milk Ordinance and Code in 1943. Prior to that time no controls existed. With regard to inspection methods followed to enforce the law, the recommendations of the adopted code are followed with the exception of insignificant changes which do not affect the ultimate goal. All fluid milk must be from farms approved as Grade A. No changes are anticipated in the ordinance except for revisions made in the USPHS code. This ordinance also applies to Lexington.

The USPHS Milk Ordinance and Code passed December 9, 1946, is now in effect at McCook. There was an ordinance before this one, but it was inadequate.

At Holdrege, the USPHS Milk Ordinance and Code passed February 5, 1946, in addition to a clause added in May 16, 1950, to exclude raw milk and milk products, is in effect. Both McCook and Holdrege have the Grade A requirement and now have an adequate supply of milk that meets the demands of the ordinance.

The local milk ordinance at Alliance was adopted in 1938. Before that time, no control to insure the quality of the local milk prevailed. At the present time, under the provisions of the ordinance, a local health

officer makes at least quarterly inspections of all dairies and pasteurizing plants and picks up samples of milk monthly, bottled locally by dairies and pasteurizing plants, and takes them to the testing laboratories of the United States Public Health Service at Gering, Nebraska, for testing. No Grade "A" requirement is in effect. A crescendo of consciousness of better milking practices in the area through inspections and advice prevails, but no enactment of "Grade A" requirements is contemplated for the near future.

Letters of inquiry were also sent to cities of various populations in the state to discover what type of ordinance they have. Eleven letters were sent to the mayors of these cities and four replied. No ordinance is in effect in three of the cities.<sup>2</sup> The York ordinance is based upon the unabridged form of the United States Public Health Service Milk Ordinance and Code with exceptions as printed in the published clipping, available at the Federal Security Agency, U. S. Public Health Service, Washington, D. C. Grade "A" milk is a requisite stated in the ordinance.

State laws and local ordinances seem to have resulted in a higher quality of milk than was offered for sale before they were in effect. However, once a higher quality product enters the market, consumers demand a maintenance of this quality. Consequently, processing companies demand a high-quality product of the producers. The author observed, while on the survey conducted in connection with this milk project, that many small

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Nebraska City does not have a fluid-milk ordinance at the present time. Such an ordinance is anticipated in the near future, but as yet there are a number of problems which are going to have to be ironed out before a workable ordinance can be drawn up.

Superior has no fluid milk ordinance in effect at the present time.

Norfolk has no fluid milk ordinance at the present time, but expects to have one in effect in the near future.

producer-distributors around cities were anticipating going out of business. Consumers in these towns prefer pasteurized milk, and these small producer-distributors felt that they could not afford to buy the pasteurizing equipment and compete with the larger established firms. Many of the producer-distributors around small towns that formerly supplied the consumers in the town with milk are anticipating going out of business and many have gone out of business because pasteurized milk is being shipped into the towns and distributed through the stores. Practically all consumers seem to prefer the pasteurized milk to the raw milk sold by the small home-town producer-distributor even if a differentiation of one or two cents per quart prevails. This condition seems to indicate that if consumers have what is popularly supposed to be higher-quality milk available they are going to insist upon buying it in preference to a lower-quality product at a slightly lower price.

## CHAPTER VIII

### OPERATION OF THE FEDERAL MILK MARKET IN THE OMAHA-COUNCIL BLUFFS MARKETING AREA

In many large cities the price paid to farmers for milk they sell to be processed and consumed in the area is fairly well regulated. A flexible price system is usually the accepted procedure in these regulated areas. Thirty-seven marketing areas in the country are now under Federal regulation. The value of the milk regulated is approximately three-fourths of a billion dollars per year.

Federal regulation of the milk industry grew out of the needs of milk producers for a stabilizing force in the marketing and pricing of their milk. Before 1933, the most important Federal legislation affecting milk marketing were the Clayton Act of 1914 and the Capper-Volstead Act of 1922. Both of these acts encouraged, as a matter of public policy, the development of cooperative associations of producers of agricultural commodities. Milk producers, and particularly those selling their milk in city markets, responded to this encouragement and a considerable number of cooperative associations of milk producers grew up in production areas supplying city markets.<sup>1</sup>

Pricing and marketing milk was very difficult for these organizations. Cooperatives developed the "classified price system" which went into effect in many large markets in the country by 1920.

"The Agricultural Adjustment Act (i.e., Title I of the Farm Relief Act of 1933) contained the first authorization to the Secretary of Agriculture to fix prices for milk."<sup>2</sup>

The Agricultural Marketing Agreement Act of 1937 provides the

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Federal Milk Marketing Orders. (Washington, D. C., Prepared by the Dairy Branch, Production and Marketing Administration, United States Department of Agriculture, July 27, 1950), p. 1.

2

Ibid. p. 3.

legislative basis for the milk regulatory program. A market order may be issued only if two-thirds, and in some cases three-fourths, of the producers supplying the market assent.

Federal orders and marketing agreements now operating throughout the country have helped remove destructive competition, have aided in eliminating producer-dealer conflicts, and, with their flexible price mechanisms, have provided for adjustment of prices, both up and down, in line with changes in consumers incomes. In view of these accomplishments, it is recommended that the larger markets in the country, not operating under a federal or state order, in the near future give serious consideration to coming under such an order that establishes producer prices and keeps these prices in line with competitive farm products and consumer prices.<sup>3</sup>

One Federal Milk Market, the Omaha-Council Bluffs Marketing Area, is in operation in Nebraska. The market administrator is located in Omaha.

(See Appendix C for the duties of the market administrator.)

Nothing has been said about the size of the Omaha-Council Bluffs Marketing Area. The scope of the area in which the Federal order is in effect is as follows:

the territory within the corporate limits of the cities of Omaha, Nebraska and Council Bluffs, Iowa; the territory within Kane, Lake, Garner and Lewis townships in Pottawattamie County, Iowa, and the territory within East Omaha, Florence, Union, Benson, McHugh, Moorehead, McArdle, Loveland, Ralston, Ashland, and May precincts in Douglas County, Nebraska, and the territory within Gilmore, Highland and Bellevue townships in Sarpy County, Nebraska.<sup>4</sup>

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Ronald W. Bartlett, The Milk Industry (New York, The Ronald Press Company, 1946), pp. 110, 111.

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Regulating the Handling of Milk in the Omaha-Council Bluffs Marketing Area (Federal Milk Order No. 35, Omaha, Nebraska, Compiled and published by the Market Administrator under Order 35, July 1, 1949). p. 3.

The milk in these areas is classified into three different categories and the amounts used in the various classes determine to some extent the uniform price to producers. The entire system apparently operates in the fashion of a pooling arrangement, (See Appendix D) The uniform price is computed periodically by the administrator. (See Appendix E)

Federal milk orders are apparently effective. Assurance to farmers of dependable markets and prices for their milk and assurance to consumers of adequate supplies of pure milk are merits of federal orders that are worthy of praise. Some sort of mediator is desirable in a large market to coordinate the activities of producers and handlers.

## CHAPTER IX

## PAPER-BOTTLED MILK

Only recently has paper-bottled milk been offered for sale in Nebraska. Five years ago, most of the milk in Nebraska was bottled in glass, but now the amounts bottled in paper and in glass are about the same. Some processor-distributors contend that they can bottle milk at a lesser cost per bottle by using paper bottles than by using glass bottles. Others have the opposite opinion. In the case of paper-bottling, the processor rents a machine from the Pur-Pak or the American Can Company at a base rent and then pays a per bottle fee that varies with the volume. The cost per bottle decreases as the volume increases.

Most of the distributors contacted for this study who were using paper bottles said that since they had started using paper their sales had increased. Others said that by using paper, they had been able to maintain their volume of sales. The distributors agreed that if they had not installed the paper bottles, they would have lost some of their business.

Some of the smaller distributors that did not want to employ a paper bottler bought cone-shaped paper bottles and installed an attachment on their glass-bottle filler to fill the cones. The distributors who employed this device claimed that they had been able to maintain their sales in that manner. The distributors who did not have a paper-bottling machine, and did not use cone-shaped paper bottles, contended that the introduction of the paper bottle had caused a decrease in their sales.

Distributors who use a paper bottler and claim that they can use it with greater economy than by using glass bottles are probably thinking



of the glass breakage and extra labor required when glass bottles are used. Two men can operate a paper-bottling machine, while glass filling machines require three to five men, and then the bottles have to be washed.

To decide if the use of paper bottlers results in greater economy of operation than using glass bottles would require a specific study of the matter. However, other states have studied the situation in detail, and some of the results of their studies will be cited.

Although the popular acceptance of the paper container is quite new, the fiber container is far from being a new method of packaging milk. Some trials were made in the early twentieth century; but the first notable progress was attained in the early 1920's by several experimental operations. Two of the largest stumbling blocks were the problems of leakers and of consumer acceptance. The use of a higher-quality paper was a great step in reducing the number of leakers.

The first machine to fabricate, fill and seal the Pure-Pak container was built in 1926 and installed in the Dairy Department of the Ohio State University at Columbus, Ohio. This machine had an operating cycle of about ten containers per minute.<sup>1</sup> After tests were made on the machine, a group of men in Toledo, Ohio, formed a company known as the American Paper Bottle Company. A new machine which was intended for commercial use was designed by a Toledo man, Van Wormer.

In the early part of 1935, Ex-Cell-O took over the manufacturing of the machine and completely redesigned it to eliminate the difficulties of operation that were still characteristic of the machine at that time. In 1938, the commercial installation of the machines was launched on a

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<sup>1</sup>

John W. Sharp, The Intermarket Movement of Paper Container Milk in Ohio (Unpublished thesis, Department of Rural Economics, Ohio State University, 1949), p. 3.

relatively large scale. "Between the years 1938 and the beginning of the war, in 1941, Ex-Cell-O manufactured and installed approximately 160 machines throughout the country."<sup>2</sup> During the same period, the materials used in the container were improved as a result of experimental developments.

The production of the machines was stopped during the war years. The military department approved of the container, which was used for the distribution of milk to the armed forces.

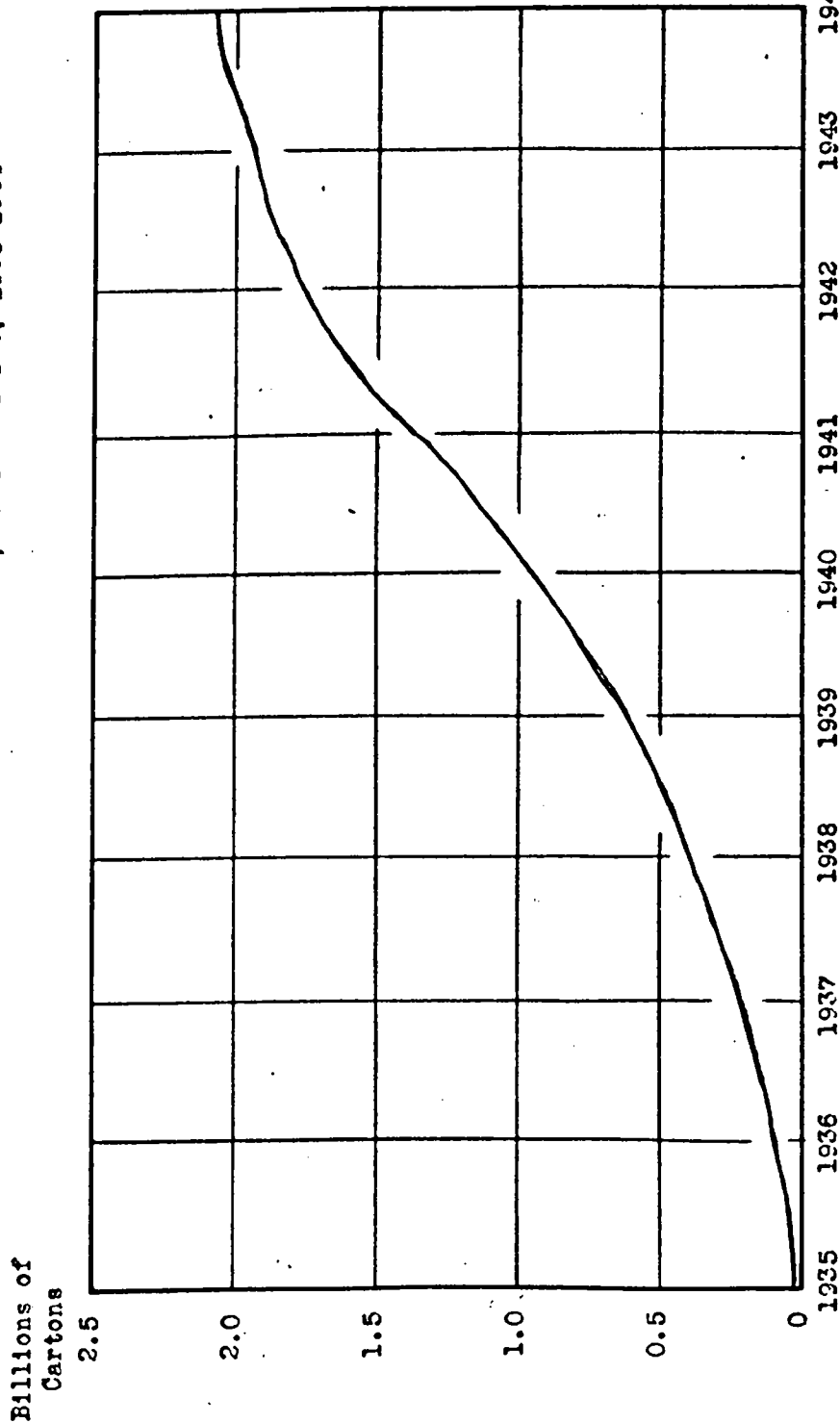
The great advancements made in the use of paper containers during the early period and up to 1944 can readily be seen in Figure 7. Since from 1941 until after the war no more machines were made, the increase depicted after 1944 was a result of the increased output of the machines in operation in 1941. Approximately 700 additional machines have been installed in dairy plants throughout the United States since the war. The paper container is now used in every large-and medium-sized market in the country. Three sizes of Pure-Pak machines are manufactured: (1) the midget, (2) the medium sized, and (3) the giant. The main difference in the three machines is the rate of production. The midget has a capacity of approximately 18 bottles per minute; the medium-sized, 33 per minute, and the giant, 45 to 47 per minute.

The Pure-Pak, as well as the other paper-bottling machines, have increased in use since World War II. The discussion in the following several paragraphs is based upon Sharp's study.

Originally the paper container was designed for use through stores as a single-service package to eliminate the multiple-trip glass bottle.

FIGURE 7

NUMBER OF PAPER CONTAINERS USED FOR MILK, UNITED STATES, 1935-1944



(From Frank Melissner, *Economic Aspects of Fiber Containers* (Unpublished thesis, Ames, Iowa, Department of Agricultural Economics, Iowa State College, 1950), p. 7.)

But the paper container is being used for doorstep delivery more extensively every year.

According to the Ohio study, no indication of any direct connection between the type of market and the growth of the use of the paper container is evident. Rapid expansion of delivery service was found in cities in Ohio with Grade A ordinances, those with federal marketing orders, and those cities not affected by either.

One of the prime factors in the intermarket movement of paper-container milk is the standard Grade A ordinance. In the areas of Ohio where a Grade A ordinance exists and an adequate supply of milk of that quality is available, the delivery service of paper-container milk has expanded to a high degree. As long as uniformities of ordinances prevail, the flow of milk is not blocked, but, when ordinances differ, shipments of milk can be stopped.

In some of the areas in Ohio where neither a Grade A ordinance nor a federal marketing order is in effect, Grade B milk was bottled in Grade A territory and delivered to areas that did not come under the Grade A ordinance. The milk was purchased from the producer at slightly higher prices than the condenseries paid and sold at a price comparable with that of Grade A milk.

As more paper-bottled milk is sold in outlying market areas in Nebraska, competition will probably arise for the supply of milk in the areas adjacent to these processors.

Until recently the paper-bottling machines used in Ohio could only be rented. Processors are able to purchase them outright now. (See Appendix F for leasing conditions) The high production costs experienced by Ohio processors resulted from the dual use of paper and glass.

Two labor forces for bottling had to be maintained in most cases, one for paper and one for glass. Where the processors converted to paper exclusively, their production costs are comparable to those for glass alone.

TABLE XI

SUMMARY OF UNIT COSTS FOR GRADE B MILK DELIVERED TO STORES IN  
QUART BOTTLES OR PAPER CONTAINERS ON WHOLESALE ROUTES, NORTHERN  
NEW JERSEY METROPOLITAN AREA, YEAR ENDING JUNE 30, 1942.

Item	Milk in Glass Bottles (Average)	Milk in Paper Containers
Processing costs	\$.0094	\$.0067
Caps and Hoods	.0016	—
Bottles or Containers	.0010	.0120
Selling and Delivery	.0307	.0185

(From Leland Spencer, Costs of Distributing Milk in New Jersey  
(May, 1943), Table 29.)

Costs of processing are higher for glass bottles because more labor is required. Washing bottles is eliminated when milk is bottled in paper. Three to five men are required to operate a glass-bottling machine, while two men can operate a paper-bottling machine. Paper containers are more expensive than glass ones since the paper carton is used for one trip and glass bottles are used many times. The cost of selling and delivery is much less for paper cartons than for glass bottles, and the paper carton being very compact, is a space-saver. Therefore, delivery costs can be reduced appreciably.

In the Cambridge, Ohio, area, a producers cooperative that for-

merly sold milk by the hundredweight decided to sell bottled milk. The cooperative installed a paper-container machine and contracted a sales agency to handle the outlet of its milk. The milk is sold only to dairies in the area desiring the paper-bottled milk. A brand name of the distributor's own choice is used which allows the small distributors to meet any existing competition from other sources wanting to distribute paper-container milk in their area.

A variety of paper milk containers have been used in the market.<sup>3</sup> There are two main groups of containers: (1) factory-made containers and (2) dairy plant-assembled containers. Factory-made containers (Sealright, Zinpak and Cance) are completely fabricated and paraffined at the carton factory, packed in sealed cartons, and shipped to milk plants.

"Paper containers fabricated 'on the spot' require approximately 1/25 less storage room as they are either received as partially prefabricated flat blanks (Sealking and Zinpak) or knocked down (Pure-Pak)."<sup>4</sup> The Sealright container can be filled on glass-bottle fillers with special capping attachments. Although Cance cartons are also completed in the factory, a special machine is required to fill them. Although Pure-Pak and Reed's Can-O-Matic cartons are partially prefabricated at the factory, a special machine is needed to complete the cartoning process. Sealking, a plastic-coated carton, is the latest development in the field of fiber milk containers. Zinpak fillers and containers are as yet not commercially available.

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3

Frank Meissner, Economic Aspects of Fiber Containers (Unpublished thesis, Ames, Iowa, Department of Agricultural Economics, Iowa State College, 1950), p. 8.

4

Ibid., p. 9.

Although there are many advantages in using paper containers, certain disadvantages have been discovered. Processors and consumers alike were badly troubled with leakers in the development of the paper carton. (See Appendix G for detailed reasons for preferences over glass and difficulty with paper cartons)

Paper bottling of milk is now at the point in Nebraska where it was in Ohio when most of the distributors maintained both paper and glass bottling in their plants. Minimum operating costs cannot be attained until the distributor switches entirely to paper. As long as he maintains both glass and paper, additional labor is required; more records have to be kept; and more machinery must be maintained.

## CONCLUSIONS

Sales of wholesale milk by farmers have been increasing for the past 15 years, while cream sales to creameries have been decreasing. This situation is not peculiar to Nebraska; the same trend is also true for the United States.

Production of milk in Nebraska is greatest in the eastern part of the state. Likewise consumption is concentrated in Eastern Nebraska. This situation is easily understood since the bulk of the population is concentrated in the eastern part of the state, and since farm conditions are most favorable for the support of dairy cows, in this section.

Most of the bottled milk in Nebraska is pasteurized at the present time and much of it is Grade A. Large distributors located in the secondary markets are shipping bottled, pasteurized milk to surrounding towns and cities. Many small distributors that have sold raw milk in these small population centers are now out of business because they decided not to pasteurize their milk. Practically all consumers prefer pasteurized to raw milk and if pasteurized milk is available at the same price, they will refuse to buy raw milk.

The bulk of milk produced for fluid purposes in the state is produced from relatively small dairy herds. However, the great increase in milk produced in recent years has been brought about in relatively large herds.

The number of milk cows in Nebraska reached an all-time peak in 1934, and has been declining (with minor fluctuations) since that time. The herds of the producer-distributors in the state are practically all larger than those of producers supplying processing plants that engage



in distributing only.

The future effects of soil conservation on the dairy industry in Nebraska will probably be noticed most in the eastern part of the state. Under certain assumptions as to an increase in grass acreage in this area (see p. 34), it is estimated that the area could support increased dairy herds which would increase the total milk production by roughly 100,000,000 to 200,000,000 gallons per year.

There are noticeable seasonal changes in the supply of milk produced for fluid purposes in the state. This fact causes problems of distribution for the milk handlers, and may force the price of retail milk higher than it otherwise would be. The problem, which is at present being met by importing out-of-state milk to meet seasonal shortages, might also be met by setting up a seasonal milk pricing plan which would encourage producers to level out their year-round production.

In the larger cities, there is some variation according to seasons in the quantity of milk retailed to consumers. Consumption in the smaller towns remains fairly constant throughout the year. Consumption in all markets, however, does not vary nearly as much as does production.

Most of the milk in Nebraska is collected by independent truckers; some is delivered to the plant by farmers; and some is collected from individual farms by trucks sent out from the plant. Milk delivery from the plant is usually made with the distributor's own trucks.

The use of the paper bottle appears to be having a noticeable effect on the method of distribution. Paper bottling of milk is a recent innovation which seems to be having much success in competition with glass bottling. It appears that this process may have grave implications in its effect on small processors of milk and on the area of distribution

which a dealer can encompass. The exact implications cannot be defined at this time. However, since paper-cartoned milk occupies less space than milk bottled in round glass bottles per-unit volume of milk, transportation costs are cut appreciably. Processors must use paper exclusively to attain the economies of scale possible in the bottling of milk in paper.

A number of cities in Nebraska have municipal laws governing the distribution of milk within their jurisdiction, especially insofar as quality is concerned. Federal regulations on pricing of milk have also been brought into the picture in the Omaha-Council Bluffs market.

## APPENDIX A

Since many of the plants visited were out of business, adjustments had to be made of the total population number. This adjustment was necessary before many of the calculations within the sample were made, and of course before any inferences about the state, as a whole, excluding Lincoln and Omaha from the sample, were attempted.

Of the sample, including those plants from which schedules were obtained and those out of business, 45 were taken from the state list and 41 from the other source. Of the 45 taken from the state list, 31 were Size I plants, nine were Size II, and five were Size III plants. Nine of the 45 plants were out of business; eight of these were Size I and one was a Size II plant.

### Correction Factors

A correction was made on the basis of those out of business on the state list. For the Size I plants the fraction  $\frac{8}{31}$  was multiplied by 77. The  $\frac{8}{31}$  was used because eight Size I plants were out of business and 31 were sampled from the state list of 77. Therefore, by multiplying the fraction of those out of business over the total number sampled from the state list by the total population of Size I plants taken from the state list, the number of plants, 20 to be dropped from the population of Size I plants on the state list, was obtained. For the Size II plants the fraction  $\frac{1}{9}$  was multiplied by 24, since one Size II plant was out of business. Nine Size II plants were sampled, and there were 24 Size II plants in the population taken from the state list. The number of plants

to be dropped was three. None of the Size III plants were dropped because all of them were visited and all were in business. Five of the six were secured; one was uncooperative. After making the adjustments mentioned above, the adjusted state list includes 57 Size I plants, 21 Size II and six Size III plants.

A larger percentage of plants visited that were taken from Who's Who in the Butter, Cheese, and Milk Industries were out of business. From this source 38 Size I plants were visited and 32 were found to be out of business. The same procedure was used to correct the population figures as was used for the state list. The fraction  $\frac{33}{38}$  was multiplied by 55, the population number resulting in dropping 55. All the Size II plants were dropped since three were visited and all three were out of business. Therefore, the adjusted population value for the Size I plants on this source was ten, and 0 for the Size II plants.

The grand total for the Size I population is 67, for the Size II, 21, and for the Size III plants, six.

## APPENDIX B

Outline of Computational Procedure

## A Size I plants

- 1 Calculation of mean
  - a Within each area
  - b Overall mean
- 2 Calculation of totals
- 3 Setting of limits about the total at the five-percent level
  - a Calculation of variance of observation within each area
  - b Calculation of the variance of the sample mean
  - c Calculation of the variance of the total
  - d Calculating the limits

Computational Procedure

The plants were entered on a summary sheet listed according to area and size. The mean for the Size I plants within each area was calculated. The formula used was  $\bar{X}_i = \frac{\sum_{j=1}^{n_i} X_{ij}}{n_i}$ . The overall mean for Size I

plants was then calculated. The formula used was  $\bar{X}_I = \frac{1}{N} \left( \sum_{i=1}^k n_i \bar{X}_i \right)$ . The

symbol  $n$  refers to the number in the entire sample of Size I plants for which observations were listed;  $n_i$  refers to the number of observations within each area; and  $\bar{X}_i$  designates the mean for each area of the Size I observations. The only exception to the definition of  $n_i$  is when a mean number was desired instead of a total figure;  $n_i$  was used then. It can be defined as the number of observations within each area for which a figure was listed. The total for the Size I plants was then secured by using the formula  $T_I = N \bar{X}_I$ .  $T_I$  indicates the total for the population;  $N$  the total number in the Size I population and  $\bar{X}_I$  the overall mean for

the Size I plants.

The next major step was to set limits about this total at the five percent level, but before this could be done several factors included in the major step had to be solved. The first was  $s_{1I}^2$ , the variance of Size I plants within each area. The formula used was

$$s_{1I}^2 = \frac{\sum_{j=1}^{n_1} x_j^2 - \frac{(\sum_{j=1}^{n_1} x_j)^2}{n_1}}{n_1 - 1}$$

number of observations, and  $n_1 - 1$  the number of degrees of freedom.

The next step was to find the variance of the sample mean. The formula employed was  $V(\bar{X}_I) = \frac{N-n}{nN^2} (N_{1I} s_1^2 + N_{12} s_2^2 + \dots + N_{13} s_{13}^2)$ .

$N$  refers to the total in the population,  $n$  the total sample number,  $N_{1I}$  the total population of each respective area. The  $N_{1I}$  was obtained by using the same ratio of correction factors as those that were used to correct the entire population numbers. The ratio remained the same for all areas, but the number for the unadjusted population changed, of course. The ratio used was the fraction  $\frac{8}{51}$  multiplied by the total unadjusted state-list population for each area for the state list and  $\frac{16}{19}$  multiplied by the total Who's Who population for each area for the other source. The two adjusted values were added and the result was a total population for each area of Size I plants.

The variance of the total was the next calculation.  $V(T) = N_I^2 V(\bar{X}_I)$  was the formula used, where  $N_I$  refers to the total population number of Size I plants, and  $V(\bar{X}_I)$  the variance of the sample mean which was explained above. The final step of calculating the limits was then accom-

plished. The formula used was  $L_{T_I} = T_I \pm \sqrt{V_{(T)}} (t.05)$ , where  $T_I$  refers to the total for the Size I population,  $V_{(T)}$ , the variance of the total, and  $t.05$ , the five percent limit, using 66 degrees of freedom.

The next group of calculations was for the Size II plants. These differed a great deal from the Size I calculations because of the difference in the selection of the sample. The mean,  $\bar{X}_{II}$  was calculated for each group of Size II plants for each area. Then, the mean for overall was secured by the formula  $\bar{X}_{II} = \frac{1}{n} \sum_{i=1}^{N_{II}} X_i$ . Since this formula was explained above, the explanation will not be repeated. The total for each of the types of information (e.g. total milk sales) was then obtained by the formula  $T_{II} = N \bar{X}_{II}$ . The variance was then calculated by the formula

$$s_{II}^2 = \frac{\left( \sum_{i=1}^{N_{II}} X_i^2 \right) - \frac{\left( \sum_{i=1}^{N_{II}} X_i \right)^2}{n}}{n - 1}$$

in the foregoing explanation of the Size I calculations, no further explanation is necessary. The standard deviation ( $S_{II}$ ) was then obtained

by the formula  $S_{II} = \sqrt{s_{II}^2}$ . The subsequent step was to set the limits

about the total. The formula employed was  $L_{T_{II}} = T_{II} \pm t.05 \sqrt{\frac{S_{II}}{n}} N_{II}$ .

Here, the total ( $T_{II}$ ) calculated previously for the Size II plants was used,  $t.05$  with 21 degrees of freedom was used,  $S_{II}$  the value just obtained previous to this step,  $\sqrt{n}$  in which case  $n$  is equal to nine, and the total population number ( $N_{II}$ ) is equal to 21.

The Size III calculations were similar to the Size II, but the

difference was that the entire population, six plants of Size III, was taken. Five of six plants were obtained for the sample so the proper adjustments were made in the calculations for this one plant that was not cooperative. The mean  $\bar{X}_{III} = \frac{\sum_{i=1}^{n_{III}} X_i}{n}$  was first calculated for each

of the groups of Size III plants for each area. The  $T_{III}$ , such as total amount pasteurized for each division interested in was then secured using the formula  $T_{III} = N \bar{X}_{III}$ . The variance,  $S_{III}^2 = \frac{\sum_{i=1}^{n_{III}} X_i^2 - \frac{(X_1)^2}{n}}{n - 1}$  was

then calculated and then  $S_{III} = \sqrt{S_{III}^2}$ . The limits were then set about the  $T_{III}$ 's. The formula used was  $L_{T_{III}} = T_{III} \pm t.05 \frac{S}{\sqrt{n_{III}}} N_{III}$ . The

t value at the five percent level with five degrees of freedom was used. S had been calculated previously,  $\sqrt{n_{III}}$  was computed using five as the value of  $n_{III}$ . and  $N_{III}$ , the total population number, was six.

The three totals and three sets of limits have been calculated thus far. The grand totals and grand limits were then secured respectively by adding the  $T_I$ ,  $T_{II}$ ,  $T_{III}$  values and  $L_I$ ,  $L_{II}$ ,  $L_{III}$ , both upper and lower limits.



## APPENDIX C

## DUTIES OF THE MARKET ADMINISTRATOR

The market administrator is appointed by the Secretary of Agriculture or anyone who is authorized to exercise the powers and to perform the duties of the Secretary. The administrator has certain obligations which he must fulfill; these duties are enumerated in Federal Milk Order No. 35 as follows:

(1) Within 45 days following the date upon which he enters upon his duties, execute and deliver to the Secretary a bond, conditioned upon the faithful performance of his duties, in an amount and with surety thereon satisfactory to the Secretary.

(2) Pay out of the funds provided by Sec. 935.8, the cost of his bond, his own compensation, and all other expenses necessarily incurred in the maintenance and functioning of his office.

(3) Keep such books and records as will clearly reflect the transactions provided for herein, and surrender the same to his successor or to such other person as the Secretary designate.

(4) Unless otherwise directed by the Secretary, publicly disclose to handlers and producers the name of any person, who, within 10 days, after the date upon which he is required to perform such acts, has not.

(i) made reports pursuant to Sec. 935.3 or

(ii) made payments pursuant to Sec. 935.7

(5) Promptly verify the information contained in the reports submitted by handlers; and

(6) Publicly announce by such means as he deems appropriate, the prices determined for each delivery period as follows:

(i) On or before the 3rd day after the end of each delivery period, the minimum class prices computed pursuant to Sec. 935.5 and the butterfat differential computed pursuant to Sec. 935.7 (a) (3).

(ii) On or before the 7th day after the end of each delivery period, the uniform price computed pursuant to Sec. 935.6 (b) (5).<sup>1</sup>

## APPENDIX D

## CLASSIFICATION OF MILK

Class I milk shall be all skim milk and butterfat disposed of for consumption in the form of milk, skim milk, buttermilk, or flavored milk drinks and all skim milk and butterfat not specifically accounted for as Class II milk or Class III milk.

Class II milk shall be all skim milk and butterfat disposed of as cream, either sweet or sour, including any mixture of butterfat and skim milk containing more than 6 percent butterfat, for consumption in fluid form and eggnog.

Class III milk shall be all skim milk and butterfat specifically disposed of as animal feed or used to produce any milk product other than those specified in (1) and (2) of this paragraph, and actual plant shrinkage up to but not in excess of

- (1) 5 percent of the total receipts of skim milk received from other handlers which are not cooperative associations and
- (ii) 2 percent of the total receipts of butterfat except butterfat received from other handlers which are not cooperative associations.<sup>1</sup>

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Regulating the Handling of Milk in the Omaha-Council Bluffs Marketing Area (Federal Milk Order No. 35, Omaha, Nebraska, Compiled and published by the Market Administrator under Order No. 35, July 1, 1949), p. 7.

## APPENDIX I

## COMPUTATION OF MINIMUM CLASS AND UNIFORM PRICE

The minimum class price is the minimum price that handlers must pay the producers for the various classes of milk. The price paid is the highest derived by two methods of computation. One is an average of the basic prices reported to have been paid for milk of 3.5 percent butterfat content received during the preceding delivery period at a number of plants that are selected for which prices are reported to the market administrator or to the Department of Agriculture, divided by 3.5, and multiplied by 3.8 and adjusted to the nearest cent. The other method of computation is the price computed for the preceding delivery period for Class III milk containing 3.8 percent butterfat.

The uniform price is the computed price per hundredweight that the market administrator arrives at for producer milk. The computed price is the uniform price to be paid to the producers in the area.

Official Price Announcement<sup>1</sup>  
For the Delivery Period June 1-30, 1950

Minimum Class Prices - Section 935.5

Hundredweight prices to be used in computation of value of milk by classes:

**Class I**

Skim Milk:  $\$3.95 - (\$85.00 \times 3.8\%) + 0.962 \dots \dots \dots \$ .75$   
Butterfat: Basic Class III Butterfat Price  $\$70.00 + \$15.00 \dots \dots \dots 85.00$   
(May Butter Solids Average Price  $\$3.20 + \$ .75 = \$3.95$ )

**Class II**

Skim Milk:  $\$3.95 - (\$85.00 \times 3.8\%) + 0.962 \dots \dots \dots \$ .75$   
Butterfat: Basic Class III Butterfat Price  $\$70.00 + \$15.00 \dots \dots \dots 85.00$   
(May Butter Solids Average Price  $\$3.20 + \$ .75 = \$3.95$ )

**Class III**

Skim Milk: Dry-Skim Value  $\$ .51 + 0.962 \dots \dots \dots \$ .53$   
Butterfat: Chicago 92-Score Butter  $\$ .59875 \times 1.25 - \$ .05 \times 100 \dots 70.00$   
(June Butter Solids Average Price - Chicago 92-Score Butter  $\$ .59875$   
 $\times 1.25 - \$ .05 \times 3.8 = \$2.66 + \text{Dry-Skim Adjustment } \$ .51 = \$3.17$ )

Butterfat Differential to Producers - Section 935.7 (a) (3)

For each one-tenth of one percent of average butterfat content above or below 3.8 percent:

Formula: Average 92-Score Chicago Butter  $\$ .59875 + 20\% = \$ .07$  per cwt.

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From the office of the Market Administrator, Omaha-Council Bluffs Marketing Area, Omaha, Nebraska, July 3, 1950.

Statement of the Computation of Uniform Price<sup>1</sup>  
For the Pool Period June 1 - 30, 1950

Milk Classification	<u>Pounds</u>	<u>Price Per Cwt.</u>	<u>Value</u>
Class I - Skim Milk	8,314,477	\$ .75	\$ 62,358.60
Butterfat	<u>295,390</u>	85.00	<u>251,081.50</u>
Total Class I	8,609,867		\$313,440.10
Class II - Skim Milk	415,124	\$ .75	\$ 3,113.45
Butterfat	<u>75,865</u>	85.00	<u>64,485.25</u>
Total Class II	490,989		\$ 67,598.70
Class III - Skim Milk	5,754,175	\$ .53	\$ 30,497.14
Butterfat	<u>143,935</u>	70.00	<u>100,754.50</u>
Total Class III	5,898,110		\$131,251.64
Excess Value	<u>                    </u>		<u>77.48</u>
Total	<u>14,998,966</u>		\$ 512,367.92
Add Withdrawal from Producer-Settlement fund			6,569.10
Add Butterfat Adjustment to 3.8%			<u>38,339.50</u>
Gross Value for 3.8% Milk			\$ <u>557,276.52</u>
Gross Hundredweight Price			\$ 3.715433
Deduction for Producer-Settlement Reserve			<u>045433</u>
Producers Uniform Price Per Hundredweight for 3.8% Milk			\$ <u>3.670000</u>

July 6, 1950

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From the office of the Market Administrator, Omaha-Council Bluffs  
Marketing Area, Omaha, Nebraska

## APPENDIX F

## LEASING CONDITIONS FOR PAPER-BOTTLING MACHINES

Lease Conditions for Pure-Pak<sup>1</sup>

When Pure-Pak was first placed on the market in 1935, the dairies could either purchase or lease their machines. During World War II, no Pure-Pak machines were produced. After the war, machines were available only on a lease basis. In August, 1948, a sale price was set.

If a dairy now leasing a machine would prefer to purchase it, there exists a credit allowance set-up to apply against the purchase price, depending upon the number of years the machine has been in service.

The January 1950 list prices on Pure-Pak machines were as follows:

		<u>Filling Speed</u>
Midget Model "E"	\$23,500	20
Junior Model "J"	40,000	35
Senior Model "F"	60,000	65

Under the lease agreement, the dairy pays a base rental on the machine plus a production rental on the cartons filled and sold by the dairy. For the Midget Machine, best adapted to small Iowa dairies, the set-up is as follows:

Base rental \$9,540.00 with \$900.00 down payment upon the execution of the base and 48 consecutive payments monthly of \$180.00 each. Production rental is figured on the basis of \$2.00 per thousand on quarts,

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<sup>1</sup>

Frank Weisner, Economic Aspects of Fiber Containers (Unpublished Thesis, Ames, Iowa, Department of Agricultural Economics, Iowa State College, 1950), pp. 184, 185, 187.

\$1.50 on pints, \$1.00 per thousand on  $\frac{1}{2}$  pints. The minimum monthly production rental is \$125.00, subject to discounts up to 50 percent depending upon the volume handled.

<u>Volume in quarts Bottled monthly</u>	<u>Percent Discount of Production Rental</u>
62,499	0
62,500 - 99,999	5
100,000 - 124,999	10
125,000 - 149,999	15
150,000 - 174,999	20
175,000 - 199,999	25
200,000 - 224,999	30
225,000 - 249,999	35
250,000 - 274,999	40
275,000 - 312,499	45
over 312,500	50

Prices of Pure-Pak Milk Blanks  
East of the Rocky Mountains (Effective December 1, 1948)

Prices per Thousand Cartons

Quantity	<u>Quarts</u>		<u>Pints</u>		<u>Half-Pints</u>	
	<u>One</u> Color	<u>Two</u> Color	<u>One</u> Color	<u>Two</u> Color	<u>One</u> Color	<u>Two</u> Color
500,000	\$9.50	\$9.65	\$7.60	\$7.75	\$6.30	\$6.45
250,000	9.60	9.75	7.70	7.85	6.40	6.55
200,000	9.65	9.80	7.75	7.90	6.45	6.60
150,000	9.70	9.85	7.80	7.95	6.50	6.65
100,000	9.75	10.00	7.85	8.10	6.55	6.80
50,000	9.90	10.30	8.00	8.40	6.70	7.10
40,000	10.00	10.45	8.10	8.55	6.80	7.25
30,000	10.20	10.75	8.30	8.85	7.00	7.55
20,000	10.50	11.30	8.60	9.40	7.40	8.10
10,000	11.50	12.90	9.60	11.00	8.30	9.70

F.O.B. Shipping points (Delair, N. J.-Whittier, Calif. - Beusenville, Illinois). Original art work, photostats, engravings and printing plates to be paid by the dairy.

Lease Conditions for Sealking<sup>2</sup>

The Sealking assembling and filling machine is leased to the dairy at a cost of \$1,100.00 per month for 48 months. Starting with the fifth year, the lease price is \$1,200.00 per year.

The bottles are priced for individual parts--sidewalls, tops, bottoms, and foil. There is a royalty according to quantity purchased.

The total for all parts including royalty is:

<u>Size</u>	<u>\$ per thousand</u>
Quarts	15.68
Pints	10.89
Half-pints	8.35

The Canco containers were (February, 1950) \$19.00 per 1000 quarts in Des Moines; the basic rental \$125.00 a month.

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<sup>2</sup>

Ibid., p. 188.



## APPENDIX C

### DIFFICULTIES WITH PAPER-CARTONED MILK AND REASONS FOR PREFERENCE OF PAPER OVER GLASS

The following information was obtained by condensing some of the data presented in John W. Sharp's thesis, The Intermarket Movement of Paper Container Milk in Ohio

#### Consumer Acceptance

Chain stores saw in the paper container great possibilities of eliminating their greatest headache of milk sales, the inconvenience of added labor involved in bottle returns. Chain stores were leaders in Ohio.

Difficulties with paper in the beginning were as follows:

1. Leakers (Manufacturers redesigned their products, machines, and producers of paper containers.)
2. Consumers were doubtful of cream content because of not being able to see the cream line. (Proper labeling was the factor that contributed most in gaining consumer confidence.)

#### Reasons Consumers gave for its Preference:

1. No deposits or returns
2. Container easy to dispose of
3. No need for bottle washing
4. Easy to carry
5. Convenient
6. Sanitary

Reasons Stores gave for Paper-Carton use:

1. Less handling
2. No deposit or return difficulties
3. A saving of refrigeration space
4. Decrease in breakage

Further Reasons Processors gave for Paper-Carton use:

1. Brings economies in weight and space
2. Involves less handling
3. Saves in distribution costs
4. Saves refrigeration space

APPENDIX H

DEFINITION OF QUALITY

Milk quality as it is used in this thesis, includes two major connotations obtained from the Revised Milk Ordinance Recommended by the United States Public Health Service, April, 1949.

One determinant is a low bacterial plate count per milliliter. A second is a product that has not been contaminated by infectious germs from humans, rodents, or insects.

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