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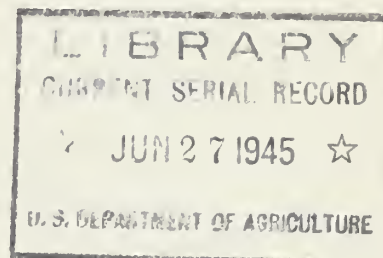
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FARM CREDIT ADMINISTRATION  
UNITED STATES DEPARTMENT OF AGRICULTURE  
WASHINGTON, D. C.

FARMERS' COOPERATIVES  
AND THE  
TREND TOWARD LARGE-SCALE  
DAIRY PLANTS



By  
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# FARMERS' COOPERATIVES AND THE TREND TOWARD LARGE-SCALE DAIRY PLANTS

By  
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The present trend toward large-scale dairy plants is one of the most important economic developments that have occurred in the history of the dairy industry in the United States. Research directed toward analysis of the trend thus far has been limited, however.

This report has been prepared in an attempt to present a relatively comprehensive picture of the development and characteristics of the trend, and to emphasize its relationship to the urgent need for reorganization and consolidation of many existing cooperative dairy associations.

Many of the data presented herein pertain to the dairy industry as a whole and not solely to cooperative associations. The trend is industry-wide and must be considered from that standpoint. If a cooperative dairy association is to view in proper perspective its own particular competitive situation, it cannot ordinarily differentiate between its competitors on the basis of the type of proprietorship under which they individually operate.

## SIGNIFICANCE OF THE TREND TOWARD LARGE-SCALE PLANTS

In general, the dairy plants which offer the greatest opportunities for postwar success are those in which all the milk solids may be used profitably. Such utilization of the milk is not ordinarily possible in small plants and is not necessarily effected in large-scale plants. The latter, however, with relatively minor changes can be adapted to permit such utilization.

No attempt is made herein to establish a definite line of demarcation between those plants which are large-scale and those which are not. "Large-scale" is a purely relative term and the line would not be fixed but might change from year to year. The advantages of large-scale operations, however, may be as important 20 years from now as at present.

The term "large-scale" denotes merely large productive capacity; the term "flexible" denotes an adaptability of productive capacities that cannot be profitably attained in a small plant. Although it is impossible to

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accurately forecast all possible postwar competitive conditions, it may be assumed that, under certain conditions at least, a "large-scale" plant that is reasonably "flexible" will be competitively stronger than a "large-scale" plant that is not "flexible."

The relative merits of flexible and specialized plants of approximately equal size have not been finally determined. Perhaps they should be judged on an individual case basis. The price advantages of the flexible plant must, in any event, be weighed against the greater opportunities for operating economy in the specialized plant.

If the number of flexible plants increases, competition will probably also increase. The ability of such plants to shift their productive capacities from the manufacture of one dairy product to that of another may tend to prevent the prices of any one product from getting seriously out of line with the prices of other dairy products. This might have a beneficial, stabilizing effect on the industry as a whole but would mean that some high-cost, small-scale plants would be eliminated.

From the data subsequently presented as evidence of the existence of the trend toward large-scale plants, it is impossible to differentiate between those plants which are flexible and those which are not. Flexibility of operations must be considered as a refinement of the trend toward large-scale plants, rather than as a separate development.

In addition to the increase in efficiency of utilization of milk solids and the opportunity to achieve greater flexibility of operations, there are certain other factors which favor large-scale plants in comparison with small-scale plants. The latter factors are principally concerned with operating economies related to size, and the processing and marketing advantages that may be secured by an organization operating a large-scale plant. They are discussed in some detail in a subsequent section of this report.

Groups of local associations which pool their marketing and purchasing activities can effect substantial savings for the individual associations. The pooling plan merits recognition as a substantial improvement over prevailing practices and may provide the solution to the problems of associations in some areas. In general, however, it appears to be no more than an evolutionary step toward the greater economies that can be effected through consolidation.

Cooperating farmers should realize that the process of elimination of the least efficient plants is going to be a major problem, probably sooner than later, in most localities in the areas of important dairy production. They should realize also that (1) the change can usually be effected much more cheaply and on a more economically sound basis if it occurs as a result of rationalized action rather than a result of purely competitive processes, and (2) the change will occur whether or not cooperative associations are the ones to take the initiative in meeting modern conditions in the industry. In order to improve or even maintain their present status in the industry, cooperatives must plan now to meet this challenge of the postwar period. If, in comparison with private organizations, cooperatives are not of equal or superior service to farmers and consumers; they cannot, and should not, continue to operate.

## VARIABLE FACTORS AFFECTING A STUDY OF THE TREND

The single factor which probably creates the most difficulty in ascertaining the full measure of the trend toward large-scale dairy plants is that pertaining to changes in the average percentages of capacity at which the plants are operated. This is particularly important when changes in the annual average production per plant are considered. Prior to the present war period, probably a majority of the dairy plants in the United States were operated at levels well below their maximum capacity for production.

Data relative to the percentages of capacity at which large numbers of individual dairy plants have been operated are not available. Plants can be classified as large-scale, therefore, only on the basis of what they actually produced and not what they might have produced had they been operated as near capacity as seasonal fluctuation of receipts would permit. Furthermore, classification of a plant as "large-scale" solely on the basis of large capacity could be misleading. A plant with large capacity but small production would not only lack the advantages of large-scale operations, but would also probably be less efficient than a smaller plant (with approximately equal production) operated nearer capacity.

It is not reasonable to assume that the entire increase during recent years in average production per dairy plant is attributable to changes in the percentages of capacity at which the plants have been operated. For example, in May 1942, average production per plant making whole milk American cheese in the United States was 48,670 pounds. Contrary to normal seasonal fluctuation of production, May was the peak production month that year. Monthly average production per plant in 1932 reached its peak in June at 21,340 pounds. That was only 43.8 percent of the average production in May 1942.

If we assume all plants to have been operated at 100 percent of capacity in May 1942, they would, if no other changes had occurred, have been operated at only 43.8 percent of capacity during the peak month of 1932. This seems hardly credible. A business with as great seasonal variation of production as the cheese industry could hardly be expected to maintain several thousand organizations if production during the peak month were at such an inefficient level.

There are at least a dozen other factors, in addition to changes in the percentages of capacity at which the plants are operated, which cannot be accounted for except by application of complex statistical techniques. In this report, however, an attempt is made to describe only general relationships. Its principal objective is to stimulate vitally necessary action on the cooperative front, rather than to present a scientific analysis of a challenging statistical problem.

The data given on succeeding pages should not be interpreted as reflecting only the trend toward large-scale plants. However, a portion of the increase in average size of each of the various types of dairy plants is attributable to that trend. No attempt is made herein to determine the relative importance of the portion but it is believed large enough to be significant.



## MEASUREMENT OF THE TREND<sup>1</sup>

Measurement of the trend toward large-scale dairy plants contributes to an understanding of its historical development and its present economic significance. However, members of individual cooperative dairy associations should not place much emphasis on a comparison of the size of their plants with the State averages. Each association should be most interested in the sizes of the dairy plants in its own competitive area. It must be remembered, furthermore, that competition will come from dairy plants of all types and not only from those making the kinds of products manufactured in the association's own plant.

The trend toward large-scale plants may be measured in a number of different ways. These may relate to changes in physical make-up of existing plants, relative size of newly constructed plants as compared with previously existing plants, numbers of employees, numbers of patrons, or average volume of business. Data are not available to permit measurement by most of these methods.

The problem is approached in this report through consideration of average volume of business. Comparisons of and changes in annual average production and in receipts are discussed in this section. Comparisons of the total value of annual sales are not satisfactory because of the variable factors which may distort the entire picture. Market price fluctuations, quality and location price differentials, and changes in sales outlets and marketing costs may affect the validity of conclusions derived from such comparisons.

The following data pertain to all dairy establishments which make the given products, and not to specialized plants only. The average size of the specialized plants would probably be considerably greater than that of all plants manufacturing a given product. In addition, it must be remembered that the data reflect changes in a number of variable factors, including the average percentages of total capacity at which the plants were operated.

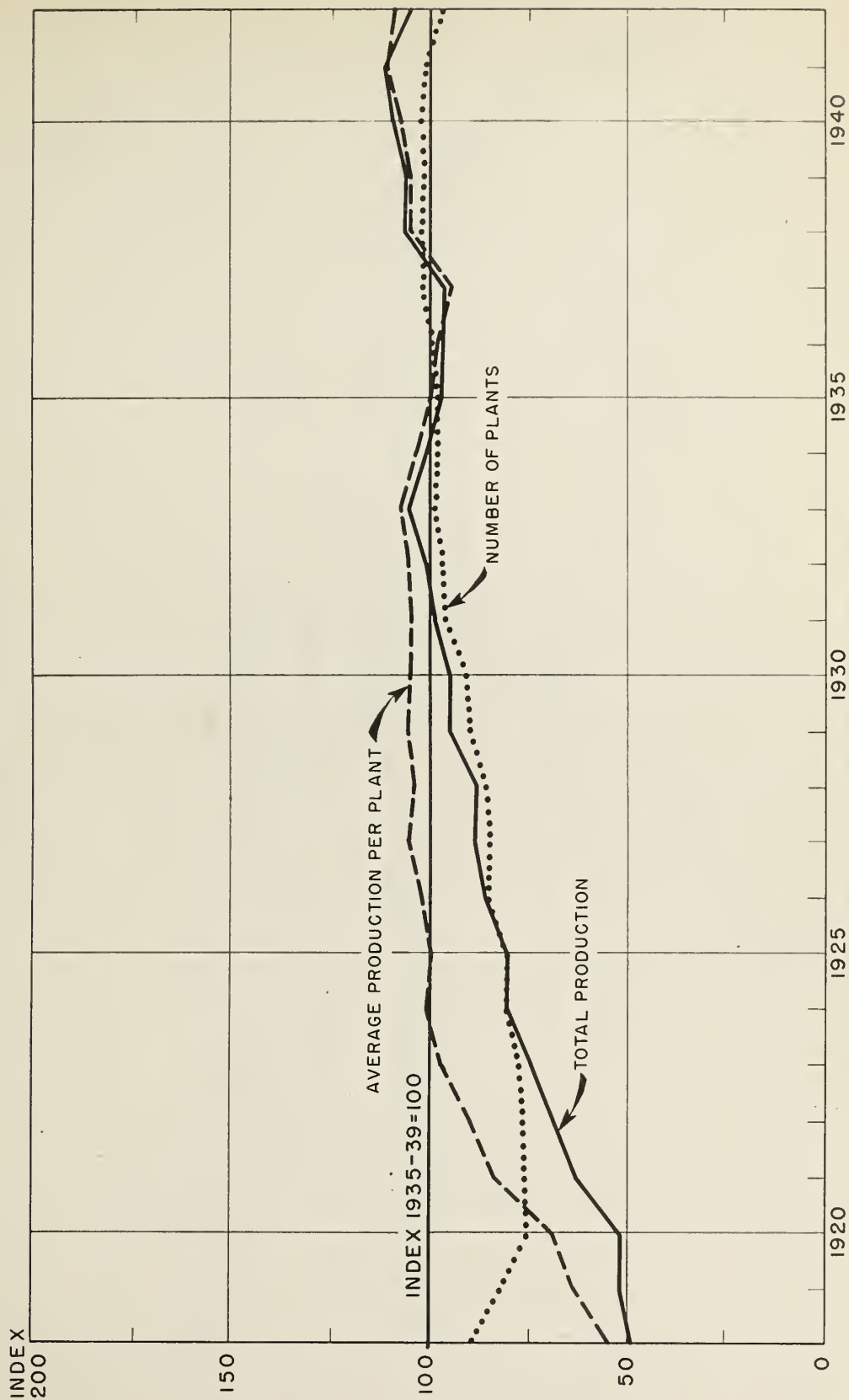
### COMBINED PRODUCTION OF COOPERATIVE AND PRIVATE PLANTS

#### Annual Average Production Per Plant

Annual average production per plant has increased remarkably during the last 25 years in the dairy plants in the United States producing the principal dairy products. Data relative to changes in size of milk distributing plants are not available, but the trends toward large-scale plants in the butter, American-cheese, dried skim milk, and evaporated milk branches of the dairy industry are reflected in figures 1, 2, 3, and 4 and in tables 5, 6, 7, and 8.

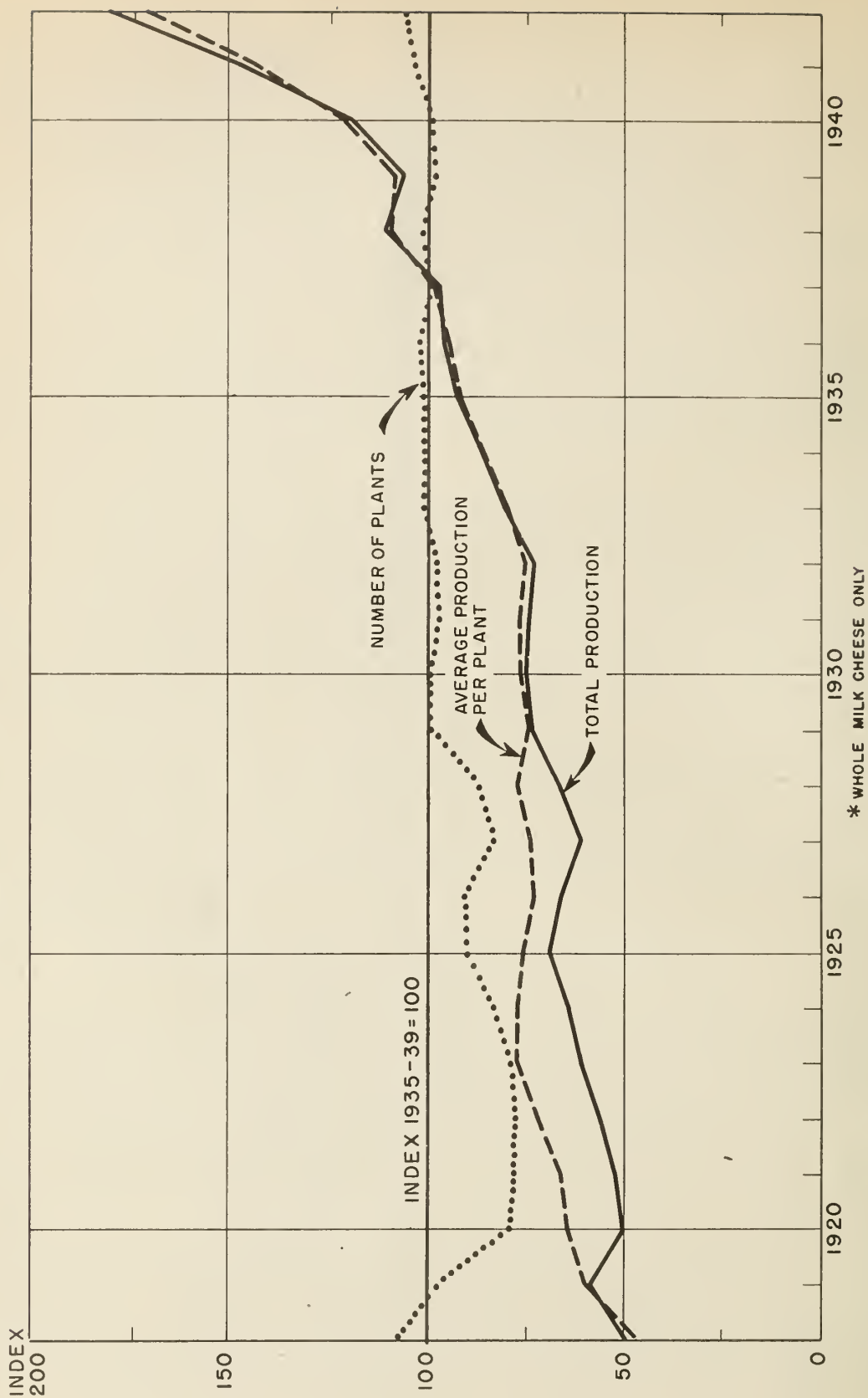
<sup>1</sup>The data presented in this section of the report were, unless specifically noted otherwise, either taken directly from or based on compilations of the Bureau of Agricultural Economics, U. S. Department of Agriculture. Butter: data for the years before 1931 are for creamery butter alone; from 1931 through 1942 the data include the number and production of plants producing whey butter. American cheese: the data pertain to the production of whole milk cheese only, and not to that made from part-skim or full-skim milk. Dried skim milk: data represent production of both human food and animal feed unless specifically noted otherwise; these products are referred to by name herein only in a historical sense and therefore the new term "nonfat dry milk solids" is not used. Evaporated milk: data represent production of unskimmed, unsweetened evaporated milk, case goods only.

FIGURE 1  
U. S. PRODUCTION OF CREAMERY BUTTER, 1918-42



Source: Based on data compiled by the Bureau of Agricultural Economics, U.S. Department of Agriculture  
NOTE: 1931-42 DATA INCLUDE PRODUCTION OF WHEY BUTTER

FIGURE 2  
U.S. PRODUCTION OF AMERICAN CHEESE,\* 1918-42

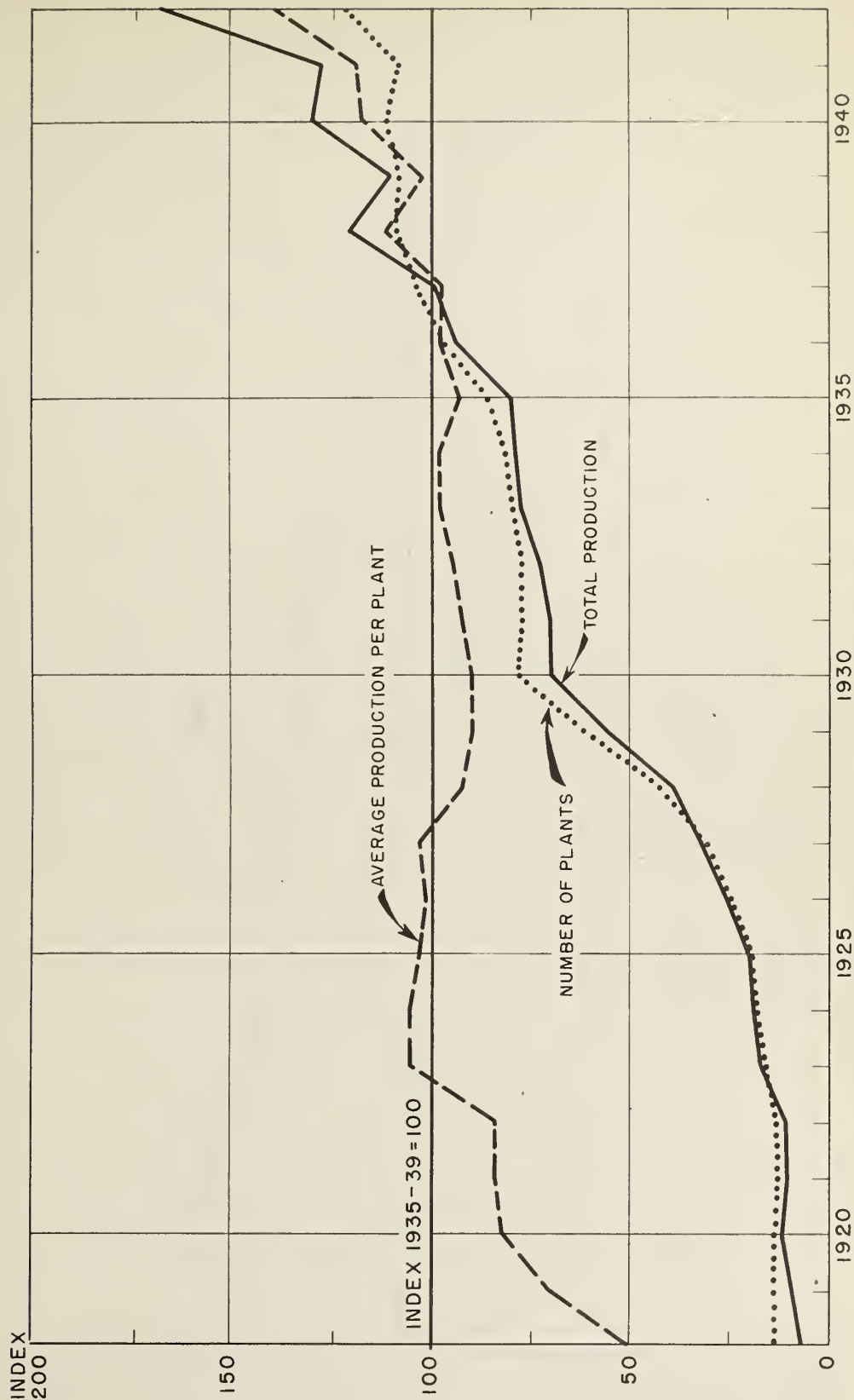


Source: Based on data compiled by the Bureau of Agricultural Economics, U.S. Department of Agriculture

\* WHOLE MILK CHEESE ONLY

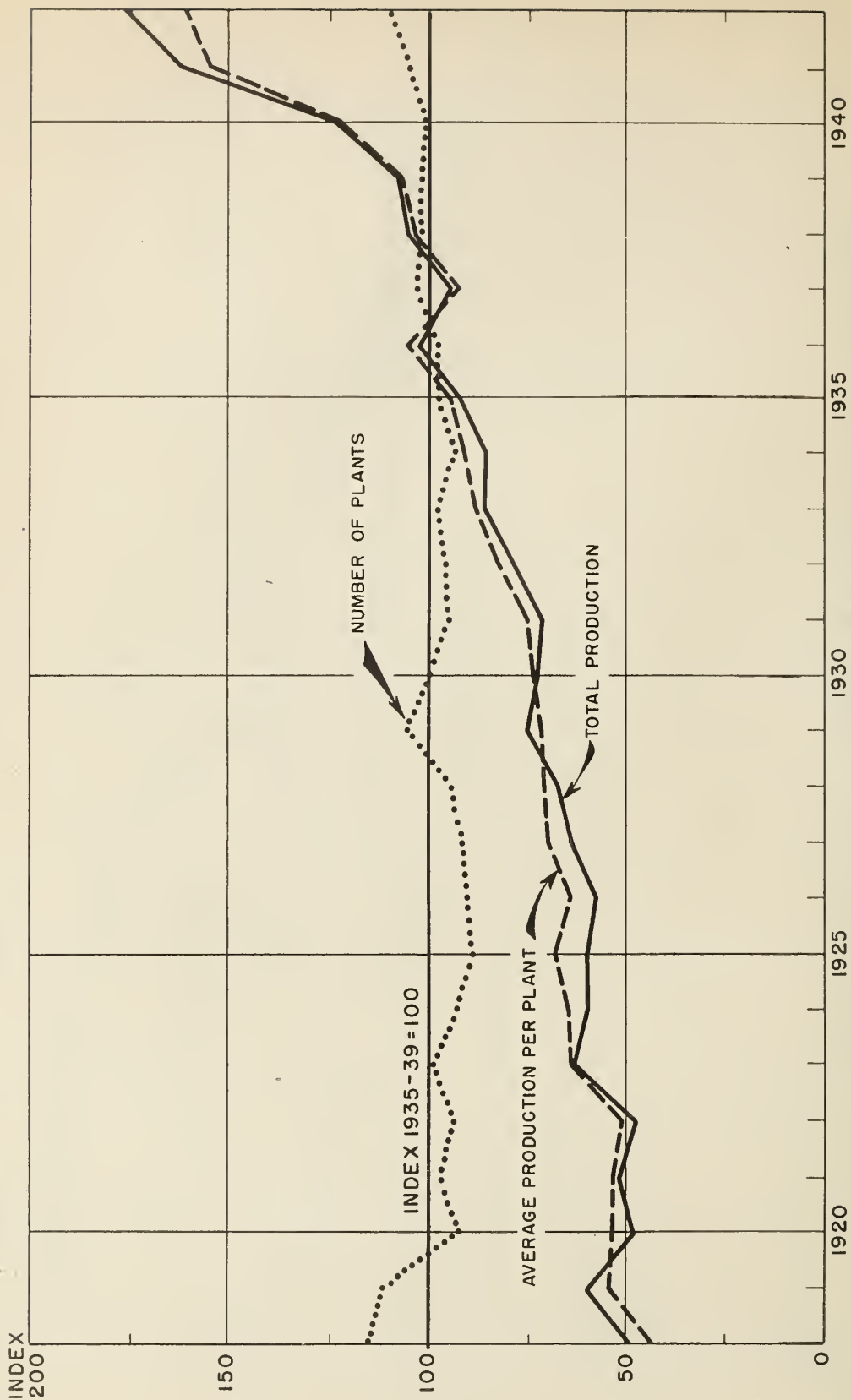
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FIGURE 3  
U. S. PRODUCTION OF DRIED SKIM MILK,\* 1918-42



\* BOTH HUMAN FOOD AND ANIMAL FEED  
Source: Based on data compiled by the Bureau of Agricultural Economics, U.S. Department of Agriculture

FIGURE 4  
U. S. PRODUCTION OF EVAPORATED MILK,\* 1918-42



\* UNSKIMMED, UNSWEETENED, CASE GOODS ONLY

Source: Based on data compiled by the Bureau of Agricultural Economics, U.S. Department of Agriculture

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Significant differences exist between changes in production of the various major dairy products. The first 5 years after World War I brought revolutionary changes in the butter industry. Although the total number of plants decreased, total production increased tremendously and average production per plant increased 78 percent. During the succeeding 20 years, 1923-42, average production per plant increased slowly but, in general, rather steadily.

The American-cheese industry experienced the same kind of change during the 1918-23 period as did the butter industry but to a lesser extent. Since 1932, however, a significant difference has occurred. The number of cheese plants has remained relatively constant, but there has been a 128 percent increase in average production per plant.

Figure 5 illustrates the fact that during the period 1933-42 the annual average production of American-cheese factories increased proportionately much more rapidly than that of creameries. It shows, further, that the plants were smaller, on the average, in each of the principal producing States than in the country as a whole. This is significant because of the large number of cooperative associations concerned and the degree of competition which may prevail in those areas after the war.

The situation in the dried skim milk industry has shown some variation. During the 1918-23 period, there was an even greater increase in average production per plant than in the butter industry but, up to the beginning of World War II, there was no further increase. During that latter period, 1923-39, the number of plants and total production had each increased over 550 percent. The additional wartime increase in average production per plant is partly attributable to a shift in utilization of processing facilities. The production of dried skim milk for human food usually involves a larger operation than that for animal feed. Production of the human food in 1942 was 54.3 percent above 1941 production, whereas the 1942 animal feed production was 44.3 percent below 1941 production.

There were fewer evaporated milk plants in the United States in 1942 than in 1918 but production was over  $3\frac{1}{2}$  times as great. Changes in average production per plant correlated rather closely with total production changes throughout the entire 25-year period. The most marked increase in production occurred since the beginning of World War II.

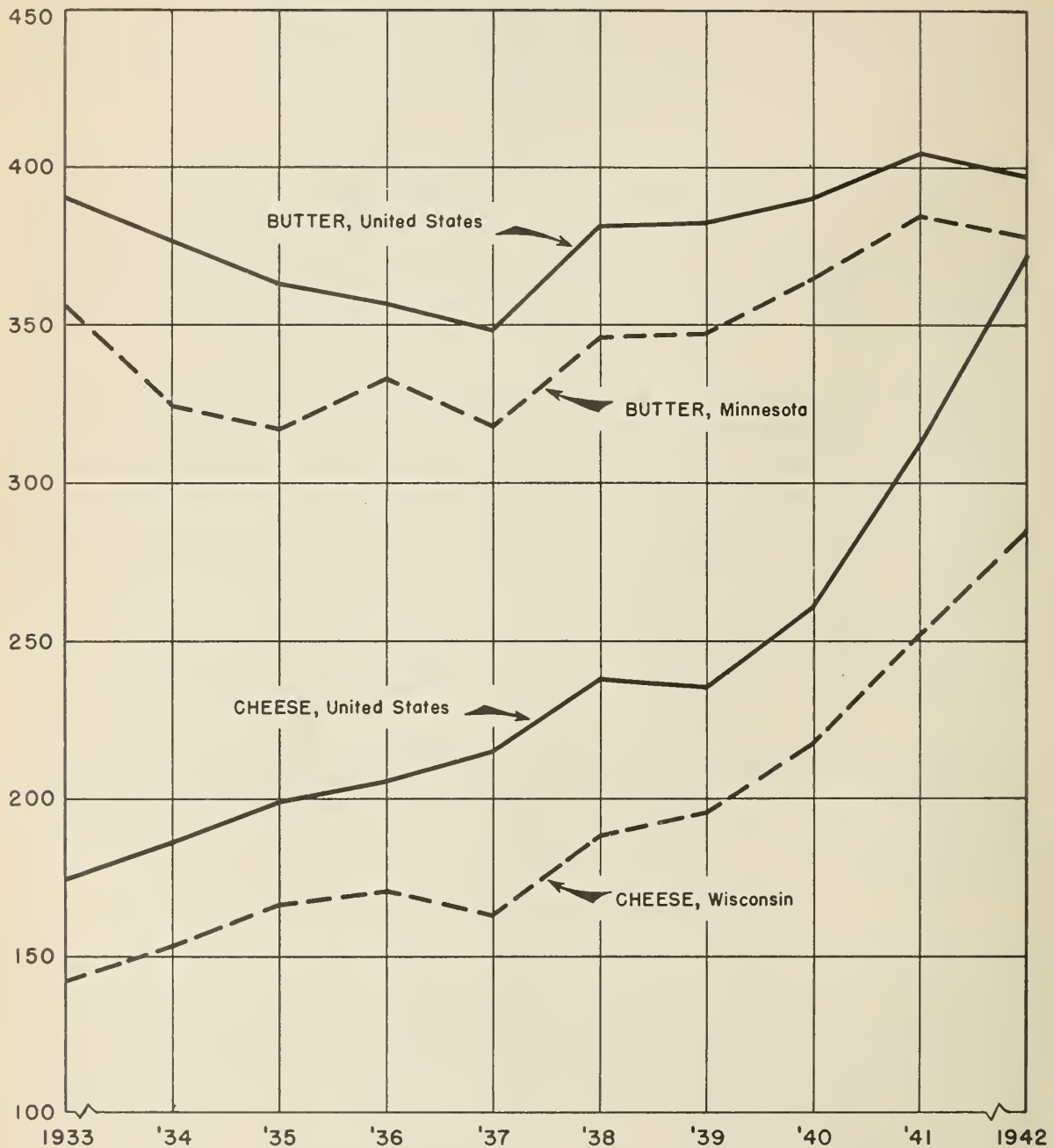
#### Size Distribution of Plants According to Annual Production

Figure 6 graphically illustrates recent increases in numbers of large-scale American-cheese factories in Wisconsin. Average production per plant has risen remarkably and not simply because of a tendency of large factories to become larger but partly because of an industry-wide trend toward increased size. The number of very small factories has shown a significant decrease.

If, for illustrative purposes, only those American-cheese factories which annually produce 500,000 pounds or more of cheese are classified as "large-scale" plants, then only 0.7 percent of the factories in Wisconsin

FIGURE 5  
 AVERAGE PRODUCTION PER PLANT OF CREAMERY  
 BUTTER\* AND AMERICAN CHEESE♦  
 1933-42

POUNDS-THOUSANDS



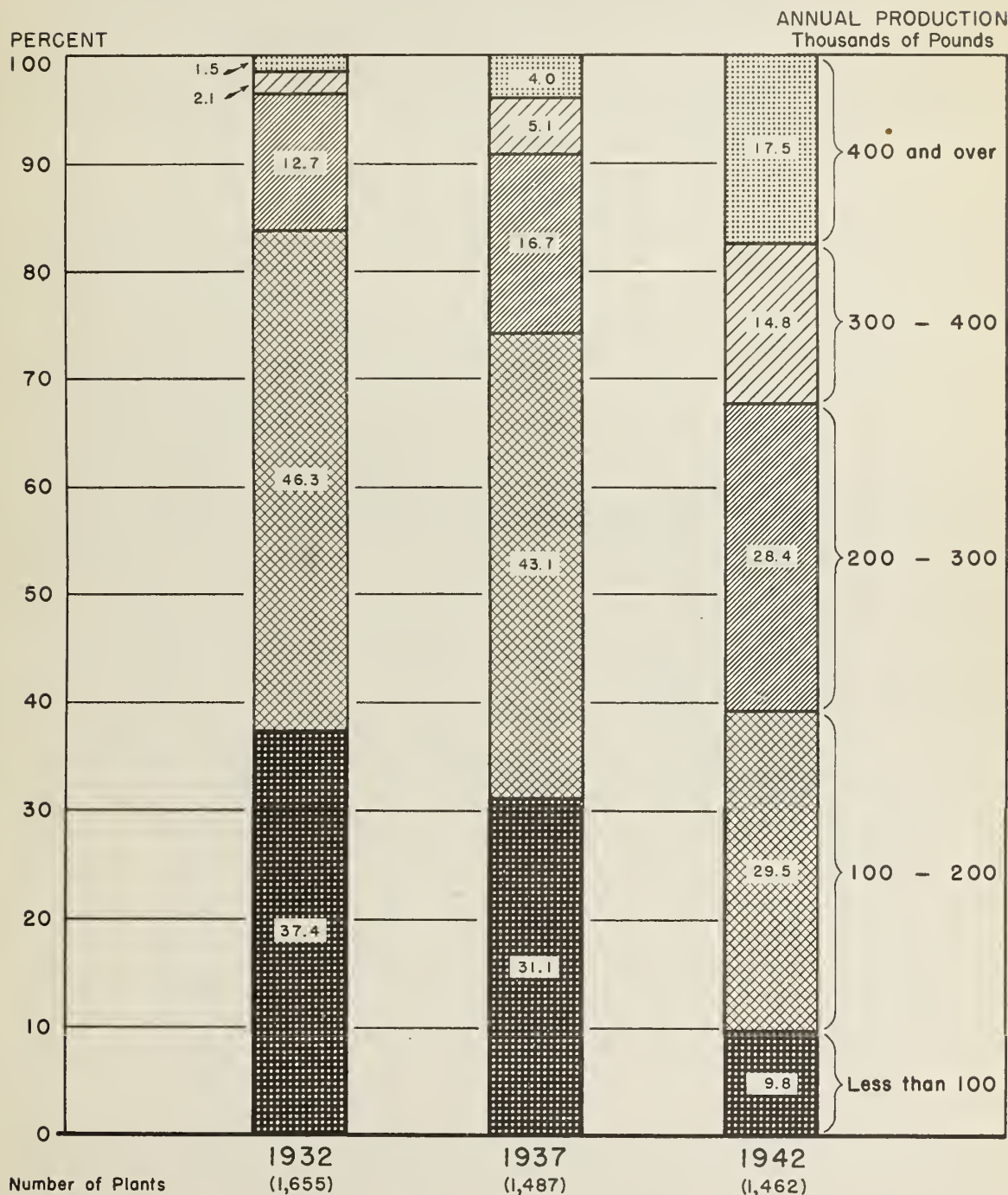
\*INCLUDES WHEY BUTTER

♦INCLUDES WHOLE MILK CHEESE ONLY

Source: Based on data compiled by the Bureau of Agricultural Economics, U.S. Department of Agriculture

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FIGURE 6  
AMERICAN-CHEESE FACTORIES IN WISCONSIN  
PERCENTAGES OF TOTAL NUMBER OF PLANTS  
CLASSIFIED BY ANNUAL PRODUCTION



Source: Based on data compiled by the Bureau of Agricultural Economics, U.S. Department of Agriculture

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in 1932 might have been termed "large-scale" (table 1). By 1937 this proportion had risen to 1.9 percent, and in 1942 it was 10.8 percent. This was a remarkable increase but the great majority of the plants still were small.

The trend toward large-scale cheese plants is more effectively demonstrated by the data in table 1 than by simple average per plant figures. Comparable data for the other product-branches of the dairy industry have not been compiled, but the trend is probably as significant for cooperative creamery associations as for the associations producing American cheese. No segment of the dairy industry is entirely free from effects of the development.

#### Annual Average Receipts of Milk Per Plant

The customary method of determining the relative sizes of dairy plants, classified according to the principal product manufactured, is to compare receipts of whole milk or milk equivalent. This may be done on the basis of annual average receipts per plant, or by size groupings of plants established according to volumes of annual receipts.

Data relative to production of Wisconsin dairy plants in 1935 have been analyzed and the results published.<sup>2</sup> Those data show that 98.1 percent of the total number of American-cheese factories in that State, 43.8 percent of the creameries, and 3.2 percent of the combined total number of condenseries and condensery receiving stations received less than 5 million pounds of milk or milk equivalent in 1935. Only 0.2 percent of the American-cheese factories, 25.8 percent of the creameries, and 77.8 percent of the condenseries and condensery receiving stations received 10 million or more pounds of milk or milk equivalent in that year.

Table 1. - American-cheese factories in Wisconsin: Percentages of total number of plants included in indicated size groups based on annual production, 1932, 1937, 1942<sup>a</sup>

ANNUAL PRODUCTION OF AMERICAN CHEESE	1932 (1,655 plants)	1937 (1,487 plants)	1942 (1,462 plants)
<i>pounds</i>	<i>percent</i>		
Under 100,000.....	37.4	31.1	9.8
100,000 - 199,999.....	46.3	43.1	29.5
200,000 - 299,999.....	12.7	16.7	28.4
300,000 - 399,999.....	2.1	5.1	14.8
400,000 - 499,999.....	0.8	2.1	6.7
500,000 - 599,999.....	0.3	0.7	4.0
600,000 - 699,999.....	0.1	0.3	2.4
700,000 - 799,999.....	0.1	0.1	1.3
800,000 - 899,999.....	0.0	0.2	0.8
900,000 - 999,999.....	0.1	0.3	0.4
1,000,000 and over.....	0.1	0.3	1.9
Total .....	100.0	100.0	100.0

<sup>a</sup> Includes all factories making American cheese, not just specialized plants making that product. Source of data: Compiled from records of the Bureau of Agricultural Economics, U. S. Department of Agriculture.

<sup>2</sup> Froker, R. K.; Colebank, A. W.; and Hoffman, A. C. Large-Scale Organization in the Dairy Industry. U. S. Department of Agriculture, Cir. 527, 68 pp. 1939. See p. 19.

The data illustrate the relatively small size of most creameries and American-cheese factories in Wisconsin. Judged on the basis of receipts of milk equivalent, the average creamery was considerable larger than the average cheese factory.

The following table affords a comparison of average sizes of the principal types of dairy plants for 5 of the last 25 years.

Table 2. - Estimated annual average receipts of milk on a milk equivalent basis, at dairy plants in the United States classified according to type of product manufactured, 6-year intervals, 1918-42

PRINCIPAL PRODUCT MANUFACTURED	AVERAGE RECEIPTS PER PLANT OF MILK OR MILK EQUIVALENT				
	1918	1924	1930	1936	1942
	<i>1,000 pounds</i>				
Creamery butter <sup>a</sup> .....	4,172	7,718	8,020	7,507	8,353
American cheese <sup>b</sup> .....	1,021	1,677	1,649	2,057	3,721
Dried skim milk <sup>c</sup> .....	3,677	7,691	6,578	7,097	10,188
Evaporated milk <sup>d</sup> .....	13,704	19,981	22,772	32,819	50,264

<sup>a</sup>Data for the years 1918, 1924, and 1930 are for creamery butter alone; data for the years 1936 and 1942 include the number and production of plants manufacturing whey butter. Receipts include milk equivalent of farm-separated cream.

<sup>b</sup>Whole milk cheese only.

<sup>c</sup>Both human food and animal feed.

<sup>d</sup>Unskimmed, unsweetened, case goods only.

Source of data: Compiled from records of the Bureau of Agricultural Economics, U. S. Department of Agriculture. Annual average receipts for each type of plant were computed by multiplying the total production figure by the appropriate USDA conversion factor (quantity of milk to which 1 pound of product is equivalent) and then dividing by the appropriate number of plants.

It is apparent from the data presented in table 2 that not all product-branches of the dairy industry are converting to large-scale units at the same rate. It is difficult to measure the differences, however, because the figures for receipts at creameries are not directly comparable with those for receipts at other types of plants. The creamery figures are inflated in proportion to the quantity of farm-separated cream which they represent. The actual receipts of cream and milk were much lower than the milk equivalent figures indicate because most of the milk, from which the cream was separated, never left the farms.

A further defect in this method of comparison is the fact that it does not allow for the different uses of a given quantity of whole milk. A number of dairy products may be produced from the milk and, when milk equivalent figures are used, the total quantity of whole milk utilized by all products is shown as having been utilized in each product. This fault may be corrected by limiting comparisons to a butterfat basis, but then no recognition can be given to the large quantities of dairy products made from skimmed milk.

It is interesting to note that the annual average production of ice cream in 1942 was, on a milk equivalent basis, only 360,000 pounds per plant. This may be compared with 8,353,000 pounds for creameries and 3,721,000 pounds for American-cheese factories. However, if the number and production of counter-freezers were excluded from consideration, the annual average figure for ice cream plants would be much higher.



## COMPARATIVE PRODUCTION OF COOPERATIVE AND PRIVATE PLANTS

It has been considered impracticable to attempt to measure changes over a period of years in the relative sizes of private and cooperative dairy plants. If lists were available to show which plants operating in given States in given years were private, which were cooperative, which had changed from one type of ownership to the other and when they had changed, the task would be relatively simple. In the absence of such lists, however, it has appeared desirable to make a size comparison for only 1 recent year for which the information could be acquired.<sup>3</sup>

Probably more private organizations than cooperative associations operate plants that produce butter and American cheese as byproducts. Data are not available to support this assumption, but the fact that a majority of the milk-distributing plants are operated by private organizations offers some supporting evidence. This relationship is important only in considering the smallest size-groups of plants, however, as plants producing quantities of a product sufficient to be entered in the larger size-groups would not be producing it merely as a byproduct.

Similarly, the fact that the data include the number and production of plants going out of business during the calendar year is important only in consideration of the smallest size-groups. Probably a majority of the plants going out of business are, whether cooperatively or privately owned, smaller than the average in the industry.

### Creameries in Minnesota<sup>4</sup>

Over one-sixth of the creamery butter produced in the United States in 1942 was produced in Minnesota.<sup>5</sup> About 42.5 percent of the cooperative buttermaking associations in the United States are in that State.<sup>6</sup> Almost three-fourths of the total quantity of butter produced in Minnesota in 1942 was manufactured in cooperative plants.<sup>7</sup> The organizations making butter in that State thus afford a good indication of the sizes of creamery plants throughout the United States operated by cooperatives and by private interests.

Cooperative creameries in Minnesota in 1942 were, on the average, almost exactly the same size as creameries operated by private organizations. Production by the cooperatives averaged 378,000 pounds as compared with 380,000 pounds for the private plants.

There were significant differences, however, in the size distributions of cooperative and private plants (table 3). More than 45 percent of the private plants produced less than 175,000 pounds during 1942; slightly over 19 percent of the cooperative plants produced less than that quantity. A considerably larger percentage of private plants than of cooperative plants produced over a million pounds of butter during the year.<sup>8</sup>

Figure 7 graphically illustrates these relationships.

<sup>3</sup>Some comparison can be made of the size of cooperative cheese factories in Wisconsin in 1926 and in 1942. Table 9, page 29, illustrates the changes which occurred. Production figures for the 2 years are not exactly comparable, however, because the data for 1926 pertain to all varieties of cheese whereas the data for 1942 pertain to American cheese only.

<sup>4</sup>The word "creamery" as used herein includes all buttermaking establishments and not just those specializing in butter production.

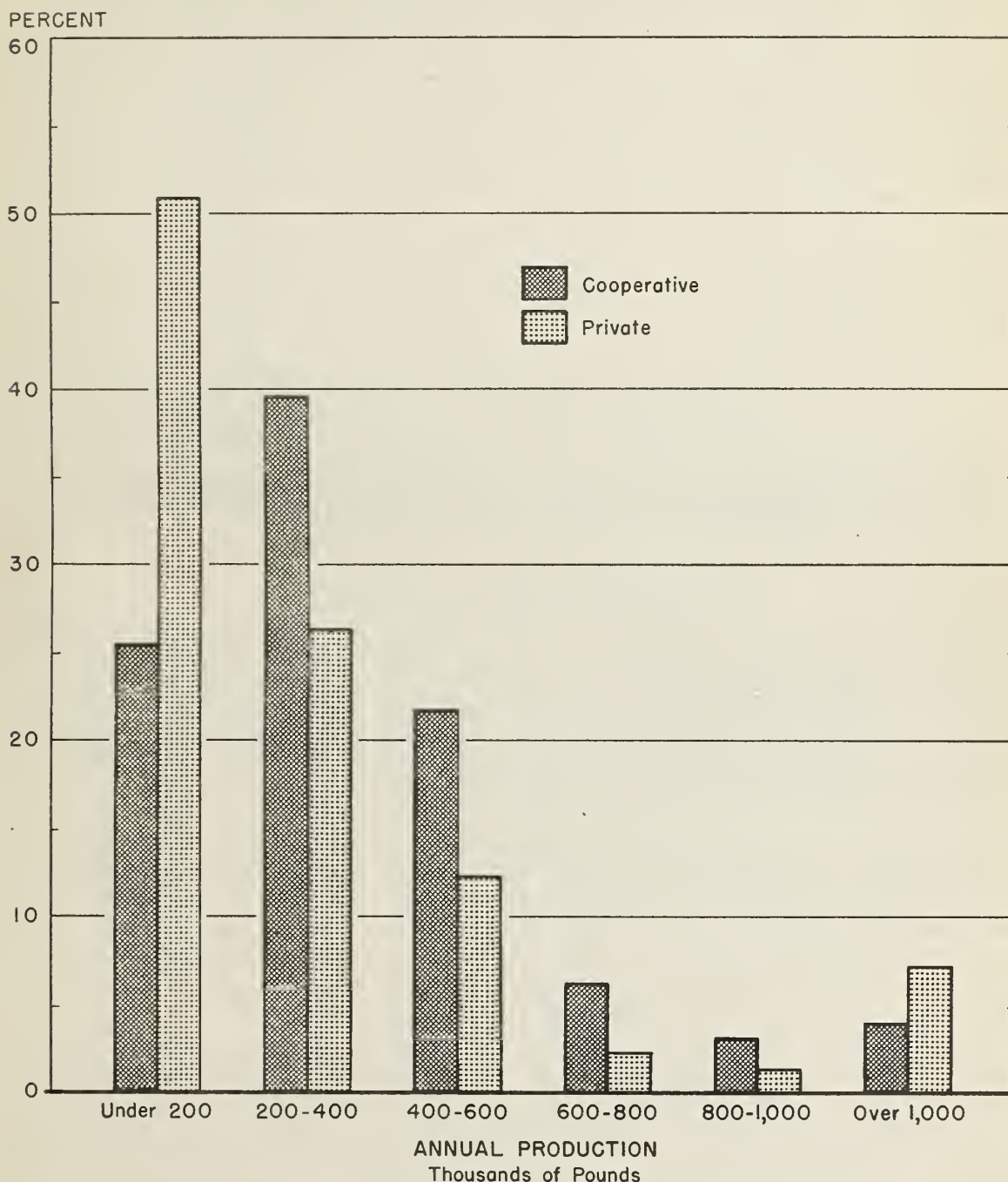
<sup>5</sup>Estimate based on production figures in: U. S. Department of Agriculture, Bureau of Agricultural Economics. Production of Manufactured Dairy Products, 1942. 34 pp. February 1944. See p. 18. (Processed.)

<sup>6</sup>Estimate based on records of the Farm Credit Administration.

<sup>7</sup>Estimate based on a Farm Credit Administration survey: cooperative plants identified as such from FCA records; production figures compiled from records of the Bureau of Agricultural Economics, U. S. Department of Agriculture.

<sup>8</sup>There are so many more cooperatively operated plants in the State, however, that the actual number of cooperative plants producing more than a million pounds of butter was 50 percent greater than the number of private plants producing more than that quantity (table 10 of this report, page 29.)

FIGURE 7  
 COOPERATIVE & PRIVATE CREAMERIES, MINNESOTA  
 PERCENTAGES OF TOTAL NUMBER OF PLANTS  
 CLASSIFIED BY ANNUAL PRODUCTION, 1942



Source: Based on records of the Farm Credit Administration and the Bureau of Agricultural Economics, U.S. Department of Agriculture

Table 3. - Creameries in Minnesota: Percentages of total numbers of cooperative and private plants included in indicated size groups based on annual production, 1942<sup>a</sup>

ANNUAL PRODUCTION OF BUTTER	609 COOPERATIVE PLANTS	222 PRIVATE PLANTS	ALL 831 PLANTS
<i>pounds</i>	<i>percent</i>		
Under 100,000.....	5.9	23.4	10.6
100,000 - 199,999.....	19.5	27.5	21.7
200,000 - 299,999.....	22.3	19.4	21.5
300,000 - 399,999.....	17.3	6.8	14.4
400,000 - 499,999.....	13.0	9.5	12.0
500,000 - 599,999.....	8.7	2.7	7.1
600,000 - 699,999.....	4.1	0.9	3.3
700,000 - 799,999.....	2.1	1.3	1.9
800,000 - 899,999.....	1.8	0.4	1.5
900,000 - 999,999.....	1.3	0.9	1.2
1,000,000 and over.....	4.0	7.2	4.8
Total.....	100.0	100.0	100.0

<sup>a</sup> Includes all plants making creamery butter and whey butter, not just specialized plants making those products.

Source of data: Cooperative plants identified as such from Farm Credit Administration records; production figures were compiled from records of the Bureau of Agricultural Economics, U. S. Department of Agriculture.

### American-Cheese Factories in Wisconsin<sup>9</sup>

Almost one-half of the American cheese made from whole milk in the United States in 1942 was manufactured in Wisconsin.<sup>10</sup> Nearly three-fourths of the cooperative cheese factories in the United States are in that State; about two-thirds of that group manufacture American cheese.<sup>11</sup> Slightly less than one-quarter of the American cheese produced in Wisconsin in 1942 was manufactured in cooperative plants.<sup>12</sup>

The cooperative American-cheese factories in Wisconsin in 1942 were, on the average, slightly larger than the private factories. Production of the former averaged about 294,000 pounds for the year as compared with 283,000 pounds for the latter. Only 6.8 percent of the cooperative factories produced less than 100,000 pounds of American cheese during the year; 10.6 percent of the private factories produced less than that quantity. Table 4 illustrates further differences.

<sup>9</sup> The term "American-cheese factories" is used in this section of the report to include all American-cheese-making establishments and not just those specializing in the manufacture of that particular variety of cheese.

<sup>10</sup> Estimate based on production figures in: U. S. Department of Agriculture, Bureau of Agricultural Economics. Production of Manufactured Dairy Products, 1942. 34 pp. February 1944. See p. 19. (Processed)

<sup>11</sup> Estimate based on records of the Farm Credit Administration.

<sup>12</sup> Estimate based on a Farm Credit Administration survey: cooperative plants identified as such from FCA records; production figures compiled from records of the Bureau of Agricultural Economics, U. S. Department of Agriculture.



Table 4. - American-cheese factories in Wisconsin: Percentages of total numbers of cooperative and private plants included in indicated size groups based on annual production, 1942<sup>a</sup>

ANNUAL PRODUCTION OF AMERICAN CHEESE	322 COOPERATIVE PLANTS	1,140 PRIVATE PLANTS	ALL 1,462 PLANTS
<i>pounds</i>	<i>percent</i>		
Under 100,000.....	6.8	10.6	9.8
100,000 - 199,999.....	32.6	28.6	29.5
200,000 - 299,999.....	28.3	28.4	28.4
300,000 - 399,999.....	14.9	14.8	14.8
400,000 - 499,999.....	7.2	6.6	6.7
500,000 - 599,999.....	4.7	3.9	4.0
600,000 - 699,999.....	1.2	2.7	2.4
700,000 - 799,999.....	0.9	1.4	1.3
800,000 - 899,999.....	0.3	0.9	0.8
900,000 - 999,999.....	0.6	0.3	0.4
1,000,000 and over.....	2.5	1.8	1.9
Total.....	100.0	100.0	100.0

<sup>a</sup>Includes all factories making American cheese (from whole milk) not just specialized plants making that product.

Source of data: Cooperative plants identified as such from Farm Credit Administration records; production figures were compiled from records of the Bureau of Agricultural Economics, U. S. Department of Agriculture.

In actual numbers of large plants, however, the private concerns led the cooperatives.<sup>13</sup> There were only 18 cooperative plants (5.5 percent) that produced over 600,000 pounds of cheese; 81 private plants (7.1 percent) produced more than that quantity.

Figure 8 illustrates the differences in the size distributions of the cooperative and private American-cheese factories. These differences do not follow the same pattern as those between cooperative and private creameries in Minnesota (figure 7). Unlike the case in the creamery industry, there is no apparent tendency in the American-cheese industry for relatively larger numbers of the private plants to fall within both the smallest and the largest size groups. The data do not permit comparisons to be made between the different private plants on the basis of their types of proprietors. Such a comparison would probably show that a majority of the smaller private plants are independently owned and that many of the larger ones are owned by the local and national chains.

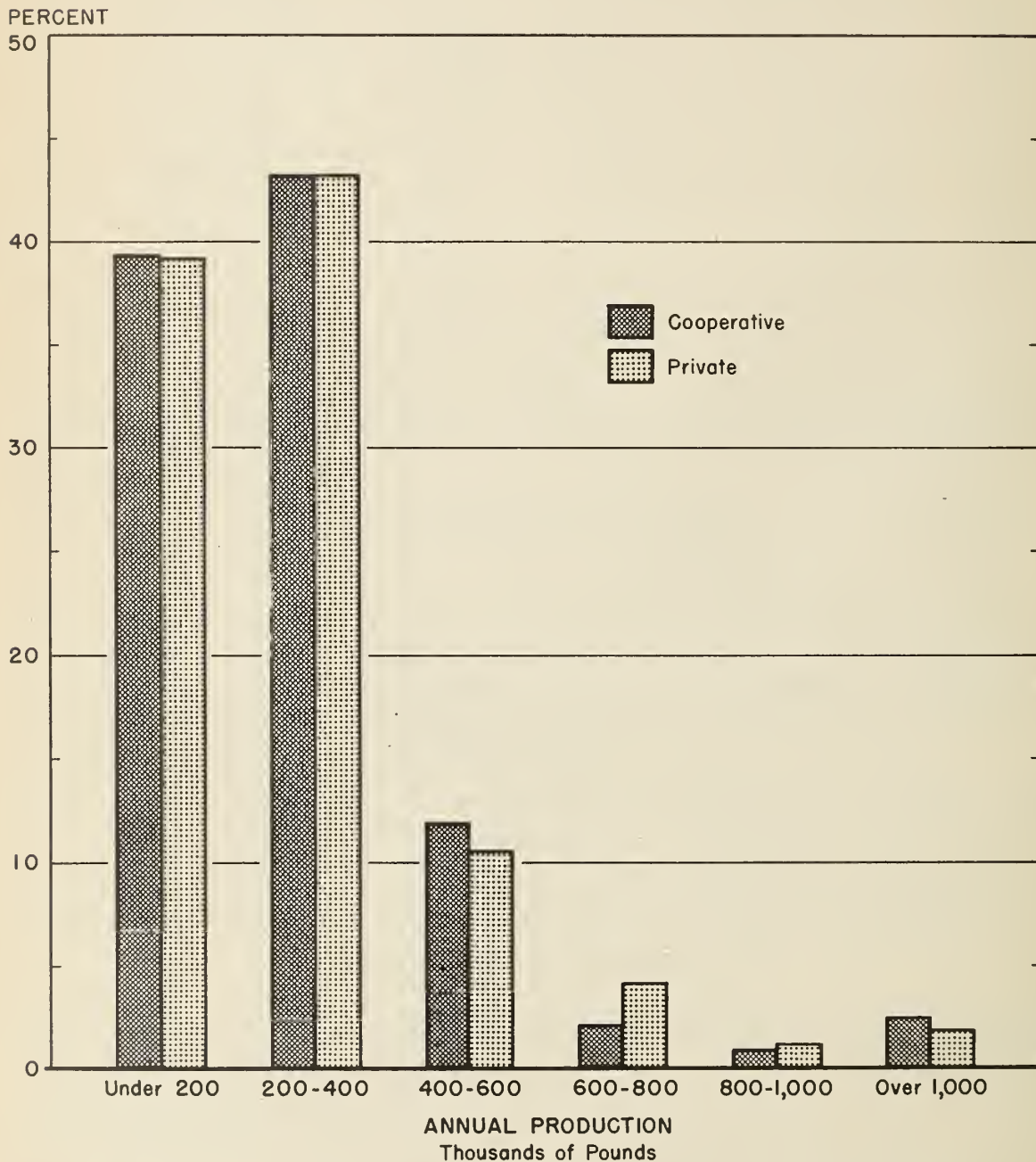
#### Other Plants in Wisconsin

No current data relative to dairy plants, other than creameries in Minnesota and American-cheese factories in Wisconsin, are available. Data for Wisconsin plants in the year 1935 have been published.<sup>14</sup> Those figures show that the average size of all dairy plants operated by cooperatives in 1935 was greater than that of plants operated by independents

<sup>13</sup>Table 11, page 30, of this report.

<sup>14</sup>See reference cited in footnote 2. Some of the data are reproduced in table 12, page 30, of this report.

FIGURE 8  
COOPERATIVE AND PRIVATE AMERICAN-CHEESE  
FACTORIES, WISCONSIN: PERCENTAGES OF  
TOTAL NUMBER OF PLANTS CLASSIFIED  
BY ANNUAL PRODUCTION, 1942



Source: Based on records of the Farm Credit Administration and the  
Bureau of Agricultural Economics, U.S. Department of Agriculture

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and local chains. However, plants operated by private companies doing business on a national scale were, on the average, larger than those operated by cooperatives. This same relationship applied to the flexible plants then in operation.

Only 1.6 percent of the total number of dairy plants in Wisconsin in 1935 were classified as flexible plants, but they handled 7.5 percent of the total volume of milk received from farms. Of the total number of dairy plants, 14.5 percent received nearly 60 percent of the total volume of receipts of milk.

#### General Relationships

The relative sizes of other dairy plants in a plant's competitive area are more important to each dairy cooperative than the State production averages for plants of the type it operates. The State averages are significant because of the assumption that a greater number of below-average-size plants will be eliminated by postwar competition than of above-average-size plants. However, the fact that a given cooperative plant is larger than the State average for that type of plant is no assurance that it will be able to successfully compete with the other dairy plants in its own locality.

In regard to dairy plants of a specialized type, assuming conditions other than type of proprietorship to be the same, the small private plant probably has less chance to survive than the small cooperative plant. The interests of producers are to a much greater extent involved in the financial welfare of the latter. Furthermore, the value to producers of a cooperative plant cannot be measured only in terms of the price the producers receive for their milk or cream. For these reasons, the producers may maintain their plant, for a time at least, even after it has outlived its economic usefulness. This nontechnical factor strengthens the competitive position of each cooperative plant but it may, when a plant cannot survive, eventually cause greater financial loss to the producers than would have been incurred by the owner of a private plant. When the need for such a plant or association no longer exists, it should be eliminated and the cooperative effort of the producers directed into the more effective channels offered by larger plants and associations.

There has been a very marked decline in numbers of plants in the major production areas. Cooperatives now operating plants in those areas must be particularly vigilant in order to best serve the interests of their producer patrons.

One significant fact is not shown by the data presented herein. With their chains of plants and variety of sales outlets, the national and regional private dairy companies may be the most effective competitors of dairy cooperatives after the war. Large-scale cooperative marketing associations can meet this challenge at the distribution level but only large-scale plants will be able to meet it at the production level. In 1935 the average plant operated in Wisconsin by national companies was over three times as large as that operated by cooperatives.<sup>15</sup> Consolidation of plants in the postwar period can be effected by large private companies as well as by cooperative associations. The latter cannot afford to lag behind in the competitive race.

<sup>15</sup>See p. 20 of reference cited in footnote 2

## REASONS FOR DEVELOPMENT OF THE TREND

Competition is, of course, the basic economic force which gave rise to, and has perpetuated, the development of the trend toward large-scale dairy plants. In order to justify and maintain their existence, all dairy plants and all cooperative associations must have something of value to offer to patrons. The inducement for patronage may or may not be economic in nature. Business competition is largely economic, however, and the trend has developed as a result of economic conditions.

Some of the specific technical reasons for the development of the trend are discussed below in order to assist in an evaluation of the significance of the trend, and in the development of comprehensive appraisals of individual competitive situations.

### IMPROVEMENTS IN TRANSPORTATION FACILITIES AND TECHNIQUES

Improvements in transportation facilities and techniques have resulted in cheaper, faster, and more dependable delivery of milk and cream to plants. They have also permitted tremendous improvements in the quality of those raw materials when received at the plants.

Furthermore, these improvements have greatly increased the size of the geographic area from which an individual dairy plant can profitably procure milk and cream. As a result, the procurement areas of many plants have overlapped with those of other dairy plants in their locality. The latter condition has been particularly true in the areas where dairying was established on a major scale before the advent of the relatively recent transportation developments. Competition has, therefore, increased in such areas, and the advantages of a large volume of business are of particular importance to every plant located in one of them.

The principal recent improvements in transportation, in relation to the trend toward large-scale dairy plants, are as follows:

1. Highways. Because of increased average width and a greater number of hard surfaced roads, highways can bear more and heavier traffic than they could a few years ago. More direct routes and a more extensive system reduce the hauling distance from farms to the plants at which the milk is received and from the plants to urban areas of consumption. Development of efficient snow-removal equipment permits year-round delivery of milk to plants.
2. Trucks. Modern trucks, which can be operated in accordance with efficient trucking techniques, have replaced slow and relatively costly horse-drawn wagons and sleighs, both for hauling milk to plants and for transporting the finished dairy products to buyers.
3. Railroads. Speedier deliveries, extension of lines, and refrigeration service have increased the maximum distances for which milk and milk products may be safely transported by rail.

## ADVANTAGES OF LARGE VOLUME OF BUSINESS

An increase in volume of production often results in an increase in net income. This permits a cooperative association to (1) make such changes in plant facilities and marketing methods as are desirable, (2) accumulate adequate capital for all purposes, (3) offer more services to patrons (4) make a reasonable rate of return to producers on money invested in the association, and (5) increase the money payments to producers for the milk they deliver to the association. The returns to producers will tend not only to be larger but also to represent greater proportions of the prices consumers pay for the products.

Specifically, the advantages of a large volume of business are as follows:

1. Operating efficiency. Manufacturing costs per unit of product usually decrease as volume increases.<sup>16</sup> Fixed costs per unit of product manufactured also decrease. This increase in general operating efficiency is perhaps the greatest single advantage of possessing a large volume of business. Most of the dairy cooperatives that have gone out of business during recent years have been, according to reports received by the Farm Credit Administration, associations which operated small plants. Lack of sufficient volume of business was often given as the specific reason for the cessation of plant operations.
2. More complete utilization of milk solids. Recent nutritional discoveries and the war-stimulated demand for dairy products will have lasting effects on the dairy industry. The plants that can use all or most of the milk solids, by producing by-products, will be able to pay more for the milk they receive. This highly important development favors the construction and expansion of large-scale plants after the war. Byproducts such as whey powder cannot be produced efficiently in plants receiving only an average volume of milk.
3. Competent manager. The ability of the manager is usually one of the most important factors determining the success or failure of a cooperative dairy association. An association operating a small-scale plant usually cannot compete effectively for the services of an efficient manager with an association operating a large-scale plant.
4. Specialized personnel. The magnitude of operations of a plant with a large volume of business requires the employment of a greater number of workers than may be profitably utilized in a plant with a small volume of business. In a small-scale plant, each man must perform a number of diverse duties; in a large-scale plant, specialists may be employed to perform certain specific functions.

<sup>16</sup> A large number of published statements, as well as the experience of most plant operators, have conclusively established the fact that there is a relationship between plant operating costs and the volume of receipts of milk or cream. Table 13 of this report offers some supporting evidence. One of the most intensive studies of the relationship was reported in the following publication: Bressler, R. G., Jr., *Economies of Scale in the Operation of Country Milk Plants*, With Special Reference to New England. The New England Research Council on Marketing and Food Supply and others, 92 pp. 1942.



5. Quality of products. As a result of technological advantages, the ability to pay a premium for high quality milk, and the opportunity to make profitable use of the services of fieldmen, an increase in volume of business will usually permit an increase in the average quality of the product or products produced. In the absence of governmental maximum price control, an increase in quality ordinarily results in a higher average selling price for the product. This is even more likely to be true after the present war than it was before.
6. Standardization of products. Standardization of products presents one of the greatest postwar opportunities for progress by cooperative dairy associations. Greater uniformity of quality and physical appearance of each product are usually more easily achieved in a large-scale plant than in a small-scale plant.
7. Brand name. If a product is of dependably uniform quality and can be produced in sufficient year-round volume, use of a brand name usually results in a price premium.
8. Yield of product. Increased efficiency of operations derived from increased volume may result in a greater yield of the final product (of given composition) from each unit quantity of milk. Some losses of raw product in the plant, such as the loss of butterfat which has adhered to the walls of separators and connecting pipes, do not increase in direct proportion to increases in the volume of product handled.
9. Sales outlets. If a plant can produce a large volume of product, in "normal" times there may be available certain outlets for its products that would otherwise be closed. Ordinarily, the greater the degree of selectivity of outlets the greater the return on sales of the product. Furthermore, as compared with an association distributing a small volume of product, one with a large volume will have greater price bargaining power irrespective of the particular sales outlet selected.
10. Reduced costs of distribution. Large shipments of dairy products can be made at lower costs per unit of product than small shipments. The association with a large volume of business may also be able to eliminate several marketing steps for its product and to retain the savings thus effected. In addition, it may adopt more efficient and effective methods of merchandising products. In general, however, regional and national cooperative marketing associations appear to provide the most satisfactory answer to the problem of cooperative distribution of dairy products.
11. Services to patrons. Associations operating large-scale plants can extend a greater number of services to patrons than can the associations with small plants. This is true in regard to sale of the farmers' milk, purchase of supplies which farmers need, and employment of fieldmen.

12. Machines. Certain types of plant and office machines that can be operated more efficiently than others require a large volume of business in order to operate efficiently enough to compensate for the additional costs involved. For certain processes, such as dehydration of milk for use as human food, there are no machines that can be operated efficiently with a small volume of milk. Other plant operations, such as packaging, are also particularly dependent on a large volume of production if costs are to be held to reasonable levels.
13. Research. A large volume of business may present an opportunity for extensive research. The postwar importance of research devoted to the many phases of manufacture and distribution of dairy products must be appreciated by members of farmers' cooperatives if their associations are to progress.

#### ADVANTAGES OF OPERATIONAL FLEXIBILITY

A large-scale plant is not necessarily flexible but a flexible plant usually has to be large-scale to be profitable.<sup>17</sup> The importance of utilization of all the milk solids was discussed in a preceding section of this report; such utilization can be achieved in the multiple-process flexible plant. The ability to shift production is also important. The success or failure of a flexible plant need not hinge on the price of a single product. On the contrary, such a plant can, under some conditions at least, produce the combination of dairy products that will make greatest net returns to milk producers.

A reasonably flexible plant may thus be in a particularly strong position with respect to competition from within and without the dairy industry.<sup>18</sup> Furthermore, as a profitable year-round outlet for the farmers' milk, it may have more dependable sources of supply than an inflexible large-scale plant.

It should be noted that large-scale organizations can achieve flexibility of operations in regard to both production changes and utilization of milk solids through direction of operations in a number of small plants. Each small plant can be operated in somewhat the same relationship to the other small plants as that which exists between product departments of a single flexible plant. This type of control over operations of a group of plants is characteristic of private national dairy corporations. It offers a kind of competition which small cooperatively owned plants may have to meet to a greater extent after the war than before.

#### WHY SOME CO-OPS HAVE NOT KEPT UP WITH THE TREND

Reorganization of corporate structures and consolidation of resources, including plant facilities, offer the only means by which some cooperative dairy associations can get large-scale plants. Some associations

<sup>17</sup> The determination of the minimum volume of milk necessary for profitable operation of a flexible plant, as well as what constitutes a "reasonably flexible" plant, are problems that must be solved on an individual case basis or by limited local areas.

<sup>18</sup> For example, the small creamery which received farm separated cream, and is dependent almost wholly on the price of butter, now has considerable competition outside the dairy industry and may have some within. Outside the industry, fortified oleomargarine is an established competitor and may become considerably stronger than it was before the war; within the industry, the relative returns from other dairy products containing butterfat are always important.



which do not have large-scale plants could themselves bear the cost of construction of such plants and furnish the necessary volume of business. However, a sizable proportion of the total number of the associations in this country would be benefited by reorganization or by consolidation with one or more neighboring associations.

Many of the benefits to be derived from reorganization and consolidation of cooperative dairy associations are not discussed herein. Those which pertain to a large volume of business and are most important have been outlined.

A statistical survey might be conducted to discover the reasons that have kept some associations from following the general trend in the industry toward large-scale plants. However, for purposes of this publication, such a survey does not seem necessary. The following reasons would, in the opinion of the author, probably be found most important.

1. The directors and other members of some associations probably have been oblivious to even the existence of the trend toward large-scale plants. In a few cases, this might indicate a lack of ability to comprehend economic changes, but usually it would reflect only the shackles imposed on human activity and thought by the force of habit. Custom can be a real barrier to progress.
2. Directors and other members of some associations may have been aware of the trend but have had no realization of the economic benefits which might accrue to them from operation of a large-scale plant.
3. The officers, directors, managers, and employees of some associations may have fought a change which would remove some of them from office and terminate the employment of others. Even an honest and conscientious cooperator may have his vision clouded by personal considerations.
4. Some large parent associations may have wished to refrain from promoting consolidation because of the resultant reduction in number of affiliated associations. They may also have feared that the remaining local associations would criticize such action and might even sever relations with them.
5. In some areas, particularly those supplying fluid milk to large urban centers, competition for the farm supply of fluid milk and cream may have been so keen in recent years that in order to be able to maintain a large volume of sales on the market some parent organizations have deliberately operated uneconomical local plants.
6. Individual and community loyalty to established local plants may have been so great in some localities that the economic advantages of consolidation have not been given proper consideration. Local business interests may also have wished to maintain the farmers' plants or organizations.
7. Personal convenience may have caused some producer-members to oppose change. Elimination of one or more local plants usually means that the milk from certain farms will have to be hauled a greater distance than formerly. The hauling costs of the farmers

operating those farms might be increased, but net returns might also increase because the new plant would probably provide a better marketing outlet for their milk. However, the farmers might be more concerned with sure increases in costs than with possible increases in net returns. A great majority of the farmers affected by the consolidation would be benefited by it if it were economically sound.

8. Some producers probably have feared the creation of a monopoly through elimination of all but one or two plants or associations in a locality. Larger dairy plants result in, or are a result of, larger dairy organizations. Such organizations may contain elements of monopoly. However, the trend toward large-scale plants has already developed and it is merely a question of whether cooperative associations or private corporations are to be dominant in each locality.

## CONCLUSIONS

1. A trend toward large-scale plants has developed in the dairy industry.
2. A large volume of business permits economies which give a large-scale plant very definite competitive advantages over a small-scale plant. The large-scale plant is not necessarily more efficient but can be if factors other than size, such as management, are approximately equal.
3. A reasonably flexible large-scale plant appears best fitted, under certain conditions at least, to meet changing competitive conditions in the industry.
4. Local competitive conditions that have in the past permitted some associations to operate relatively inefficient plants may be greatly changed after the war. Due to improved facilities for transportation and communication, conditions 10 miles distant, 100 miles distant, and even 1,000 miles distant will be more important to each association than ever before.
5. Many plants in the major areas of dairy production will probably be eliminated after the war. The change can usually be effected much more cheaply and on a more economically sound basis if it occurs as the result of rationalized action rather than as a result of purely competitive processes.
6. If rationally planned action is not taken, postwar competition may eliminate many plants at the expense of milk producers and their marketing system.
7. A cooperative dairy association handicapped by possession of too small a plant can secure a large-scale plant by increasing the productive capacity of its existing plant, purchasing an established large plant, or by constructing a new large plant. The latter course of action will be desirable in many cases.
8. In order to operate a large-scale plant profitably, however, many an existing association will have to either reorganize or consolidate with one or more neighboring associations.
9. No association should make a hurried or haphazard attempt at either reorganization or consolidation. Action should be taken only if a careful study of the situation has shown such action to be economically desirable. Then it must be decisive and comprehensive.
10. Planning for such action should be initiated as soon as possible because a "wait and see" policy may postpone reorganization or consolidation until it is too late to take effective action. A slogan heard during the early part of the present war - "Too little and too late" - may have special implications for some dairy cooperatives in the postwar period.

## BASIC STATISTICAL DATA

Table 5. - Creamery butter: Number of plants, total production, and average production per plant, United States, by years 1918-42<sup>a</sup>

YEAR	NUMBER OF PLANTS	TOTAL PRODUCTION	AVERAGE PRODUCTION PER PLANT
		1,000 pounds	
1918.....	4,118	818,175	198.7
1919.....	3,742	868,125	232.0
1920.....	3,447	883,577	250.5
1921.....	3,463	1,054,938	304.6
1922.....	3,497	1,153,515	329.9
1923.....	3,539	1,252,214	353.8
1924.....	3,690	1,356,080	367.5
1925.....	3,715	1,361,526	366.5
1926.....	3,909	1,451,766	371.4
1927.....	3,887	1,496,495	385.0
1928.....	3,925	1,487,049	378.9
1929.....	4,141	1,597,027	385.7
1930.....	4,177	1,595,231	381.9
1931.....	4,397	1,667,452	379.2
1932.....	4,424	1,694,132	382.9
1933.....	4,515	1,762,688	390.4
1934.....	4,499	1,694,708	376.7
1935.....	4,488	1,632,380	363.7
1936.....	4,558	1,629,407	357.5
1937.....	4,660	1,623,971	348.5
1938.....	4,671	1,786,172	382.4
1939.....	4,646	1,781,737	383.5
1940.....	4,692	1,836,826	391.5
1941.....	4,619	1,872,183	405.3
1942.....	4,435	1,764,054	397.8

<sup>a</sup>Data for years before 1931 are for creamery butter alone; from 1931 to 1942, inclusive, the data include the number and production of plants manufacturing whey butter.

Source of data: Compiled from reports of the Bureau of Agricultural Economics, United States Department of Agriculture.

Table 6. - American cheese: Number of plants, total production, and average production per plant, United States, by years 1918-42<sup>a</sup>

YEAR	NUMBER OF PLANTS	TOTAL PRODUCTION	AVERAGE PRODUCTION PER PLANT
		1,000 pounds	
1918.....	2,485	253,634	102.1
1919.....	2,266	295,144	130.2
1920.....	1,826	254,684	139.5
1921.....	1,819	261,727	143.9
1922.....	1,808	282,806	156.4
1923.....	1,835	308,108	167.9
1924.....	1,936	324,695	167.7
1925.....	2,100	347,240	165.4
1926.....	2,120	335,915	158.5
1927.....	1,932	307,777	159.3
1928.....	2,010	335,253	166.8
1929.....	2,303	370,314	160.8
1930.....	2,297	378,816	164.9
1931.....	2,260	374,648	165.8
1932.....	2,274	370,743	163.0
1933.....	2,348	408,631	174.0
1934.....	2,339	435,491	186.2
1935.....	2,353	468,999	199.3
1936.....	2,370	487,576	205.7
1937.....	2,312	492,041	212.8
1938.....	2,358	560,542	237.7
1939.....	2,284	537,298	235.2
1940.....	2,300	602,790	262.1
1941.....	2,405	753,122	313.1
1942.....	2,464	916,850	372.1

<sup>a</sup>Data pertain to production of American cheese made from whole milk; that made from part-skim or full-skim milk not included.

Source of data: Compiled from reports of the Bureau of Agricultural Economics, United States Department of Agriculture.



Table 7. - Dried skim milk: Number of plants, total production, and average production per plant, United States, by years 1918-42<sup>a</sup>

YEAR	NUMBER OF PLANTS	TOTAL PRODUCTION	AVERAGE PRODUCTION PER PLANT
		1,000 pounds	
1918.....	57	26,202	459.7
1919.....	55	34,945	635.4
1920.....	56	41,893	748.1
1921.....	50	38,546	770.9
1922.....	53	40,617	766.4
1923.....	65	62,251	957.7
1924.....	72	69,219	961.4
1925.....	78	73,317	940.0
1926.....	99	91,718	926.4
1927.....	125	118,123	945.0
1928.....	175	147,996	845.7
1929.....	253	207,579	820.5
1930.....	317	260,675	822.3
1931.....	312	261,938	839.5
1932.....	313	270,194	863.2
1933.....	323	288,114	892.0
1934.....	330	294,935	893.7
1935.....	349	297,506	852.5
1936.....	394	349,550	887.2
1937.....	421	372,203	884.1
1938.....	442	449,291	1,016.5
1939.....	438	408,380	932.4
1940.....	451	481,805	1,068.3
1941.....	439	476,497	1,085.4
1942.....	492	626,562	1,273.5

<sup>a</sup>production for both human food and animal feed included.

Source of Data: Compiled from reports of the Bureau of Agricultural Economics, United States Department of Agriculture.

Table 8. - Evaporated milk: Number of plants, total production, and average production per plant, United States, by years 1918-42<sup>a</sup>

YEAR	NUMBER OF PLANTS	TOTAL PRODUCTION	AVERAGE PRODUCTION PER PLANT
		1,000 pounds	
1918.....	161	1,002,874	6,229.0
1919.....	156	1,194,496	7,657.0
1920.....	130	979,873	7,537.5
1921.....	136	1,028,172	7,560.1
1922.....	132	949,909	7,196.3
1923.....	139	1,252,520	9,010.9
1924.....	131	1,189,755	9,082.1
1925.....	125	1,202,456	9,619.6
1926.....	127	1,158,476	9,121.9
1927.....	129	1,273,815	9,874.5
1928.....	133	1,337,022	10,052.8
1929.....	148	1,499,644	10,132.7
1930.....	140	1,449,149	10,351.1
1931.....	134	1,428,993	10,664.1
1932.....	135	1,570,612	11,634.2
1933.....	137	1,716,700	12,530.7
1934.....	132	1,711,570	12,966.4
1935.....	137	1,838,890	13,422.6
1936.....	137	2,043,759	14,917.9
1937.....	145	1,902,545	13,121.0
1938.....	143	2,104,198	14,714.7
1939.....	143	2,170,601	15,179.0
1940.....	142	2,464,668	17,356.8
1941.....	147	3,246,547	22,085.4
1942.....	154	3,518,504	22,847.4

<sup>a</sup>Unskimmed, unsweetened, case goods only.

Source of Data: Compiled from reports of the Bureau of Agricultural Economics, United States Department of Agriculture.



Table 9. - Cooperative cheese factories in Wisconsin: Number of plants in samples and percentages in indicated size groups based on annual production, 1926 and 1942<sup>a</sup>

ANNUAL PRODUCTION CHEESE	1926 (329 PLANTS) <sup>b</sup>	1942 (322 PLANTS) <sup>c</sup>
<i>pounds</i>	<i>Percent</i>	
Under 100,000.....	20.1	6.8
100,000 - 199,999.....	50.2	32.6
200,000 - 299,999.....	22.5	28.3
300,000 - 399,999.....	5.1	14.9
400,000 - 499,999.....	0.9	7.2
500,000 - 599,999.....	0.0	4.7
600,000 - 699,999.....	0.3	1.2
700,000 - 799,999.....	0.3	0.9
800,000 - 899,999.....	0.0	0.3
900,000 - 999,999.....	0.0	0.6
1,000,000 and over.....	0.6	2.5
Total.....	100.0	100.0

<sup>a</sup>Includes all factories making cheese, not just specialized plants.

<sup>b</sup>Sample group of cooperative plants making cheese, selected with no distinctions as to variety, made. Based on survey made by the Bureau of Agricultural Economics.

<sup>c</sup>Total number of cooperative plants making American cheese; production in those plants of other varieties of cheese was not included. Cooperative plants identified as such from Farm Credit Administration records; production figures compiled from records of the Bureau of Agricultural Economics, United States Department of Agriculture.

Table 10. - Creameries in Minnesota: Numbers of cooperative and private plants in indicated size groups based on annual production, 1942<sup>a</sup>

ANNUAL PRODUCTION OF BUTTER	COOPERATIVE PLANTS	PRIVATE PLANTS	ALL PLANTS
<i>pounds</i>			
Under 100,000.....	36	52	88
100,000 - 199,999.....	119	61	180
200,000 - 299,999.....	136	43	179
300,000 - 399,999.....	105	15	120
400,000 - 499,999.....	79	21	100
500,000 - 599,999.....	53	6	59
600,000 - 699,999.....	25	2	27
700,000 - 799,999.....	13	3	16
800,000 - 899,999.....	11	1	12
900,000 - 999,999.....	8	2	10
1,000,000 and over.....	24	161	40
Total.....	609	222	831

<sup>a</sup>Includes all plants making creamery butter, not just specialized plants.

Source of data: Cooperative plants identified as such from Farm Credit Administration records; production figures were compiled from records of the Bureau of Agricultural Economics, United States Department of Agriculture.

Table 11. - American-cheese factories in Wisconsin: Numbers of cooperative and private plants in indicated size groups based on annual production, 1942<sup>a</sup>

ANNUAL PRODUCTION OF AMERICAN CHEESE	COOPERATIVE PLANTS	PRIVATE PLANTS	ALL PLANTS
<i>pounds</i>			
Under 100,000.....	22	121	143
100,000.- 199,999.....	105	326	431
200,000 - 299,999.....	91	324	415
300,000 - 399,999.....	48	169	217
400,000 - 499,999.....	23	75	98
500,000 - 599,999.....	15	44	59
600,000 - 699,999.....	4	31	35
700,000 - 799,999.....	3	16	19
800,000 - 899,999.....	1	10	11
900,000 - 999,999.....	2	4	6
1,000,000 and over.....	8	20	28
Total.....	322	1,140	1,462

<sup>a</sup>Includes all factories making American cheese, not just specialized plants.

Source of data: Cooperative plants identified as such from Farm Credit Administration records; production figures were compiled from records of the Bureau of Agricultural Economics, United States Department of Agriculture.

Table 12. - Number of dairy plants of all types by size groups and by type of proprietor, Wisconsin, 1935

SIZE OF PLANT (IN TERMS OF MILK RECEIPTS FROM FARMS)	TOTAL MILK RECEIVED		PLANTS BY TYPE OF PROPRIETOR						
			TOTAL		COOP- ERA- TIVE	INDE- PEND- ENT	NA- TIONAL COM- PANIES	LOCAL DAIRY CHAINS	UN- CLAS- SIFIED
<i>million pounds</i>	<i>1,000 Pounds</i>	<i>Percent</i>	<i>Number</i>						
Under 5.0....	4,070,447	40.2	2,467	85.5	431	1,004	36	162	834
5.0 to 9.9...	1,428,803	14.2	205	7.1	89	85	19	8	4
10.0 to 14.9.	872,858	8.6	72	2.5	41	19	10	2	-
15.0 to 19.9.	817,941	8.1	48	1.7	19	8	21	-	-
20.0 to 29.9.	1,381,563	13.7	57	2.0	22	9	24	2	-
30.0 and over	1,541,557	15.2	35	1.2	10	1	24	-	-
Total...	10,113,169	100.0	2,884	100.0	612	1,126	134	174	838

Source: Reproduced from Froker, R. K.; Colebank, A. W.; and Hoffman, A. C. Large-scale Organization in the Dairy Industry. United States Department of Agriculture Cir. 527, 68 pp. 1939. See p. 25.

Table 13. - Cooperative creameries in five midwestern States: Average manufacturing costs per pound of butter, 172 plants grouped according to annual production of butter, 1942<sup>a</sup>

ANNUAL PRODUCTION OF BUTTER	NUMBER OF PLANTS	RANGE OF COSTS PER POUND OF BUTTER	AVERAGE COST PER POUND OF BUTTER <sup>a</sup>
<i>pounds</i>		<i>cents</i>	
Less than 100,000.....	5	4.14 - 5.38	4.51
100,000 - 199,999.....	28	2.22 - 6.99	3.42
200,000 - 299,999.....	40	1.83 - 4.63	3.06
300,000 - 399,999.....	28	2.12 - 3.76	2.78
400,000 - 499,999.....	22	1.73 - 4.11	2.51
500,000 - 599,999.....	17	1.69 - 3.61	2.59
600,000 - 699,999.....	11	1.80 - 2.98	2.37
700,000 - 799,999.....	4	1.42 - 2.73	1.98
800,000 - 899,999.....	2	2.26 - 2.55	2.41
900,000 - 999,999.....	4	1.76 - 3.61	2.55
1,000,000 and over.....	11	1.59 - 2.77	2.14
All plants.....	172	1.42 - 6.99	2.85

<sup>a</sup>The fluctuations of average costs among the larger size groups are probably due to the smallness of the samples. For example, in the 700,000-799,999 group the low average for the four plants is due primarily to the extremely low cost of 1.42 cents per pound achieved in one plant. Similarly, in the 900,000-999,999 group, the plant with the cost of 3.61 cents per pound raised the average of the group considerably. If production and costs of all plants producing between 500,000 and 1,000,000 pounds are lumped together, an average cost figure of 2.45 cents per pound is derived. This average cost is smaller than that for any group of plants producing less than 500,000 pounds, and is more than that for the group producing over 1,000,000 pounds.

<sup>b</sup>Sum of the items in each range divided by the number of plants.

Source of data: Cooperative Auditing Service, Inc., Minneapolis, Minn., Cooperative Creameries, Summary of comparative Costs of Operation, Periods Ending May 1, 1942 to April 30, 1943. 36 pp. 1943. (Processed.)

