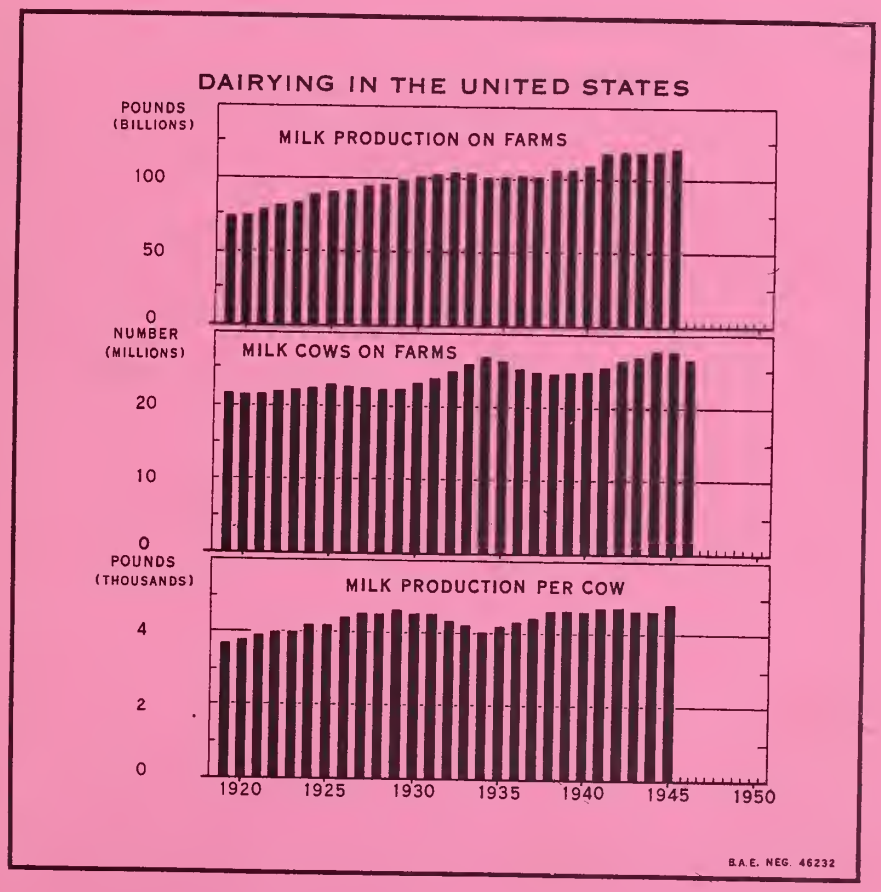
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF AGRICULTURAL ECONOMICS

DAIRYING IN WAR AND PEACE



by Olav F. Anderson

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The background data used for the analysis are mainly from statistics contained in the crop and livestock reports and other production releases of the Bureau of Agricultural Economics.

In order to maintain the comparability of the statistical information with that in earlier publications of the War and Peace series, the data in this publication have not been adjusted for recent revisions in some of the Department statistical series based on the 1945 Census of Agriculture. The revised data pertaining to milk production, number of milk cows, and production per cow differ nationally from those contained in this publication by less than one percent in any year. Regional differences also are small and in most cases are less than three-tenths of one percent.

DAIRYING IN WAR AND PEACE*

By Olav F. Anderson, formerly Agricultural Economist

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SUMMARY

Production of milk on farms in the United States has increased steadily since World War I. The record output of 122 billion pounds in 1945 was 66 percent greater than production in 1919. The increase was due about equally to increases in numbers of milk cows and in production per cow. The continued rise in milk production was interrupted seriously only once in this 27-year period and this was by the drought of the 1930's. The slight drop in wartime production in 1943 and 1944 compared with 1942 resulted from the rapid expansion in output of hogs and eggs and from less favorable pasture conditions.

Production of milk has increased in all regions. The percentage increase from 1919 to 1945 has been most pronounced in the Pacific Southwest and least in the Northeast. The proportion of the country's total milk supply which is produced in the three major dairy regions combined - the Northeast, the Lake States, and the Corn Belt - has remained almost constant at about 62 percent for nearly 20 years.

The lower rate of increase in milk production in the Northeast has been largely offset during the last two decades by the rate at which output in the Lake States and the Corn Belt has been increased.

The record production of milk in 1945 exceeded the 1935-39 average by nearly 19 billion pounds, or 18 percent. This increase is the more remarkable because it was achieved during a period of rapid expansion of all agricultural output with intensive competition for the relatively limited supply of factors of production.

During the war, several conditions were favorable to a high level of milk production. Early announcement of support prices helped minimize the risk involved in expanding production. An exceptionally high demand for dairy products developed because of record increases in the incomes of domestic consumers, large requirements of the armed services, and exports for Lend-Lease and world rehabilitation needs. The growing domestic consumption of dairy products was accentuated by the establishment of ceiling prices on dairy products. Milk prices plus dairy-production payments during World War II exceeded parity to a significantly greater extent than in any year during or since World War I.

The average milk-feed price ratio, including dairy-production payments, was appreciably higher during the war than during either the 1935-39 or the 1922-41 periods. The wartime butterfat-feed price ratio, including payments, was above the average for 1935-39 though approximately the same as that for 1922-41. The more profitable returns from the sale of milk induced many farmers to shift from the sale of farm-separated cream to that of whole milk. Sales of whole milk were 57 percent of total production in 1945 as compared with 39 percent in 1935-39. At the same time the proportion sold as cream decreased from a prewar average of 31 percent to 21 percent.

On the basis of the butterfat-beef and butterfat-hog price ratios during the period 1940-44 as compared with the 20-year (1922-41) average ratios, the production of butterfat during the war years was less profitable than was the production of beef or hogs. The average prices received for milk and butterfat during the same 5-year period were relatively more favorable than the average price received for eggs, according to the milk-egg and butterfat-egg price ratios. This relative price advantage of dairying over production of eggs probably was offset somewhat by the increased efficiency in egg production which has come about in the last 10 years, and by the rise in labor costs.

Agricultural output, like industrial output, was affected by a sharp rise in production costs during the war. Of special significance to dairying, and other high-labor enterprises, was the increase in farm-wage rates of more than 175 percent from prewar to 1945. Inability to obtain sufficient labor in some localities meant that output of milk and butterfat could not profitably be increased, whereas increased production of beef, hogs, or poultry, with lower labor requirements, was more easily brought about. Feed costs over the same period rose more than 75 percent from prewar, which was less than the percentage rise in

the prices received for milk and butterfat. There were times, however, when dairymen in some areas were unable to buy sufficient feed for their requirements.

Civilian per capita consumption of milk and milk products on a whole-milk equivalent basis for 1940-44 remained substantially unchanged from the 1935-39 and 1924-43 averages. Consumption of dairy products was regulated by rationing and other means as the overall supplies of milk were inadequate to meet the total demand. Although consumption of nonfat milk solids increased, consumption of butter declined to a level in 1945 that was the lowest in more than 75 years. The consumption of butterfat in all forms however, showed little change during the war years.

Production of milk on farms probably will continue its upward trend. The rate at which it will increase will be affected principally by the relative profitableness of dairying as compared with other livestock enterprises, and the progress achieved in dairy technology. Under a prosperous economy and with a growing population, profitable domestic markets for 140 billion pounds of milk or more probably could be developed by 1955. To develop such markets further economies in the production and distribution of milk would be highly important. Also, it would be helpful to expand consumer-educational programs as well as to extend the scope of programs making readily available to school children nutritious lunches with emphasis on dairy products.

Production increases to supply an expanding market for milk may be expected as the result of several factors. (1) Feed supplies for dairying may be increased as a consequence of further declines in the number of work animals, by improvement in the varieties of feed crops produced, and by an increased use of lime and fertilizers on crop and pasture land. (2) An improvement in the efficiency of the average dairy cow appears likely, not only because of continued culling of inferior animals and more effective disease control, but also because of a rapidly expanding artificial-breeding program. Most of the improvements from the widespread use of improved sires, made possible by artificial breeding, are still to be achieved, and over a longer period it is possible that productive capacity will be increased by cross breeding. (3) Further mechanization provides a basis for increased operating efficiency of the dairy enterprise.

Shifts in the urban population, accompanying the probable future growth of industry in the South and West, may bring about changes in the regional pattern of milk production for fluid use. With relatively few alternative livestock enterprises that compete effectively with dairying, an expansion of milk production in the major manufactured-dairy-product areas appears probable as methods of dairy processing and transportation are further improved.

MILK PRODUCTION FROM 1919 TO 1945

A pronounced and steady upward trend has characterized production of milk in the United States since World War I. (See cover chart.) The only significant interruption in this upward movement was brought about by the drought and depression of the 1930's.

Production of milk during World War II rose sharply until 1942 and then leveled off to a slightly lower plane until 1945 brought an all-time high. The leveling off in midwar resulted from a combination of factors. Chief among them were the rapid expansion in competing livestock enterprises - hogs, beef, poultry, and eggs; slightly less favorable pasture conditions; a tighter labor supply, and difficulties in feed distribution in some areas.

For the whole period from 1919 to 1945, production of milk increased about two-thirds. This increase was due about equally to increases in cow numbers and in production per cow. The number of cows increased about 28 percent and production per cow 29 percent. Although some of the fluctuations during the period in numbers and production per cow are inversely related, both series show persistent upward trends.

Production of milk has risen in all regions since 1919 (fig. 1). 1/ Increases ranged from 27 percent in the Northeast to a high of 128 percent in the Pacific Southwest. Increases in the Lake States and the Corn Belt, the two regions with the largest output, were somewhat above the national rate of 66 percent (table 1 and fig. 2).

The upward trends in milk production in the several regions have followed a broadly similar pattern. The greatest divergence has occurred in the Great Plains. Here the drought conditions of the 1930's were more severe and wartime developments have favored production of wheat and beef cattle.

1/ In this study the various regions are comprised of the following States (fig. 1):
Northeast - Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, The District of Columbia.
Lake States - Michigan, Wisconsin, Minnesota.
Corn Belt - Ohio, Indiana, Illinois, Iowa, Missouri.
Appalachian - Virginia, West Virginia, North Carolina, Kentucky, Tennessee.
Southeast - South Carolina, Georgia, Florida, Alabama, Mississippi.
South Central - Arkansas, Louisiana, Oklahoma, Texas.
Great Plains - North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado.
Pacific Northwest - Idaho, Washington, Oregon.
Pacific Southwest - Arizona, Utah, Nevada, California, New Mexico.

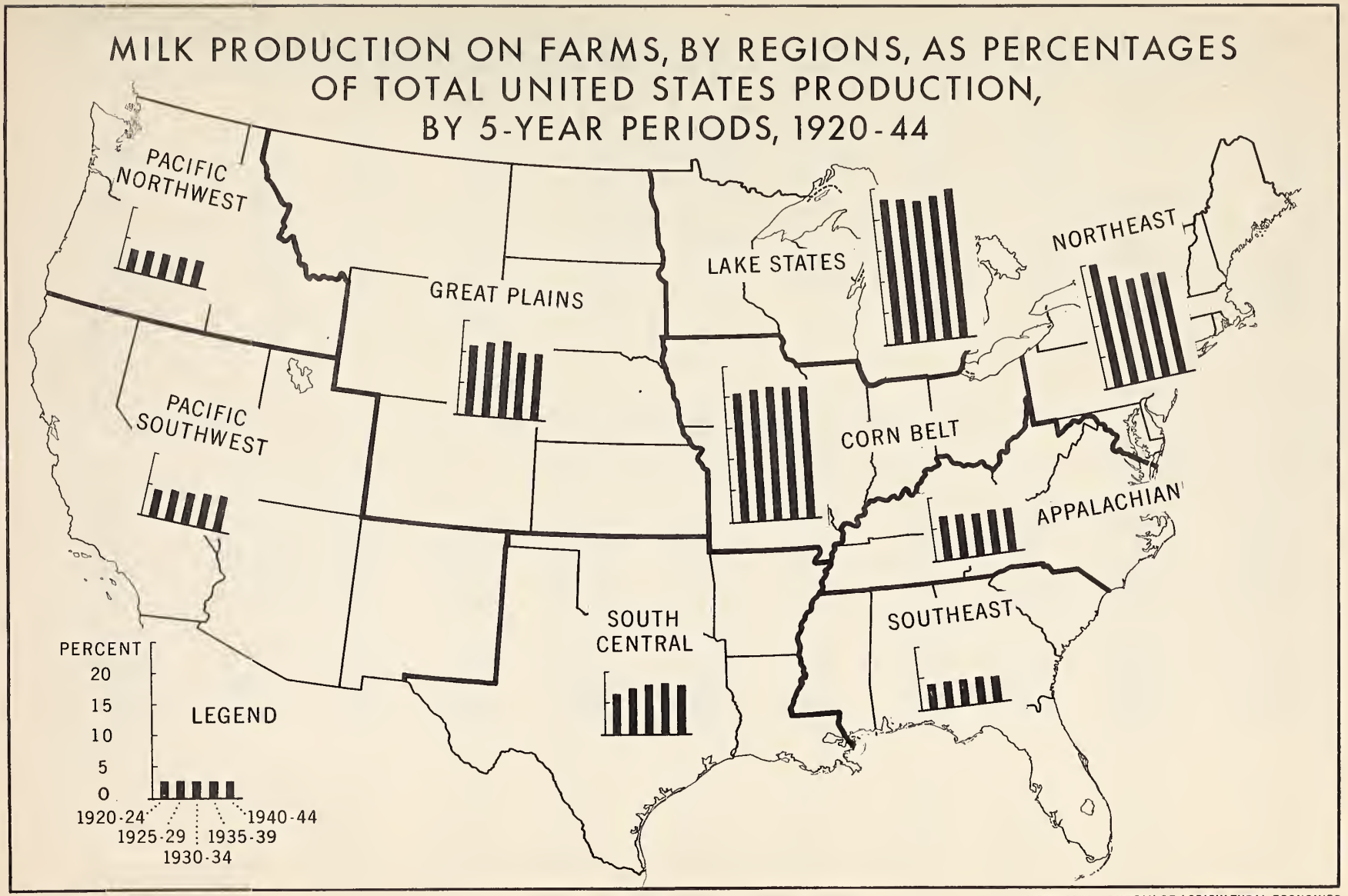

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Fig. 1

Table 1.- Milk: Production on farms, United States and regions, averages 1920-44, annual 1919 and 1940-45 1/

Period or year	United States	Northeast	Lake States	Corn Belt	Appalachian	Southeast	South Central	Great Plains	Pacific Northwest	Pacific Southwest
	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds
1919	78,800	15,600	16,480	15,109	5,176	3,086	4,718	8,006	2,540	3,085
Average:										
1920-24	81,624	16,210	18,980	16,735	5,636	3,232	5,308	9,062	2,864	3,598
1925-29	94,805	16,601	21,831	19,684	6,493	3,844	6,965	11,200	3,565	4,623
1930-34	102,676	17,047	22,978	21,799	6,805	4,368	7,975	12,500	4,050	5,172
1935-39	103,624	17,409	23,871	21,804	7,169	4,458	8,354	10,780	4,337	5,442
1940-44	116,189	18,907	27,766	24,407	7,932	4,634	9,074	12,109	4,915	6,447
1940	109,510	18,427	26,019	23,027	7,257	4,248	8,535	11,306	4,623	6,068
1941	115,498	19,031	27,575	24,277	7,710	4,468	9,151	12,133	4,837	6,358
1942	119,240	19,411	28,530	25,061	8,124	4,687	9,282	12,645	5,009	6,491
1943	118,140	18,690	28,477	24,684	8,178	4,809	9,178	12,593	4,988	6,543
1944	118,555	18,976	28,229	24,985	8,393	4,957	9,243	11,866	5,110	6,796
1945 2/	122,219	19,826	29,808	26,140	8,662	5,045	9,304	11,409	4,982	7,043
	Index numbers (1935-39 = 100)									
1919	71	90	69	69	72	69	57	74	59	57
Average:										
1920-24	79	93	80	77	79	73	64	84	66	66
1925-29	92	95	92	90	91	86	83	104	82	85
1930-34	99	98	96	100	95	98	96	116	93	95
1935-39	100	100	100	100	100	100	100	100	100	100
1940-44	112	109	116	112	111	104	109	112	113	118
1940	106	106	109	106	101	95	102	105	107	112
1941	112	109	116	111	108	100	109	112	112	116
1942	115	112	120	115	113	105	111	117	116	119
1943	114	107	119	113	114	108	110	117	115	120
1944	114	109	118	115	117	111	111	110	118	125
1945	118	114	125	120	121	113	111	106	115	129

1/ Data for 1919-23 derived from Trends in Size and Production of the Aggregate Farm Enterprise, 1909-36, Works Progress Administration, National Research Project (1938); all other data from B.A.E. series on Farm Production, Disposition and Income from Milk (processed).
2/ Preliminary.

MILK: PRODUCTION ON FARMS, UNITED STATES AND REGIONS, 1919-45

INDEX NUMBERS (1935-39=100)

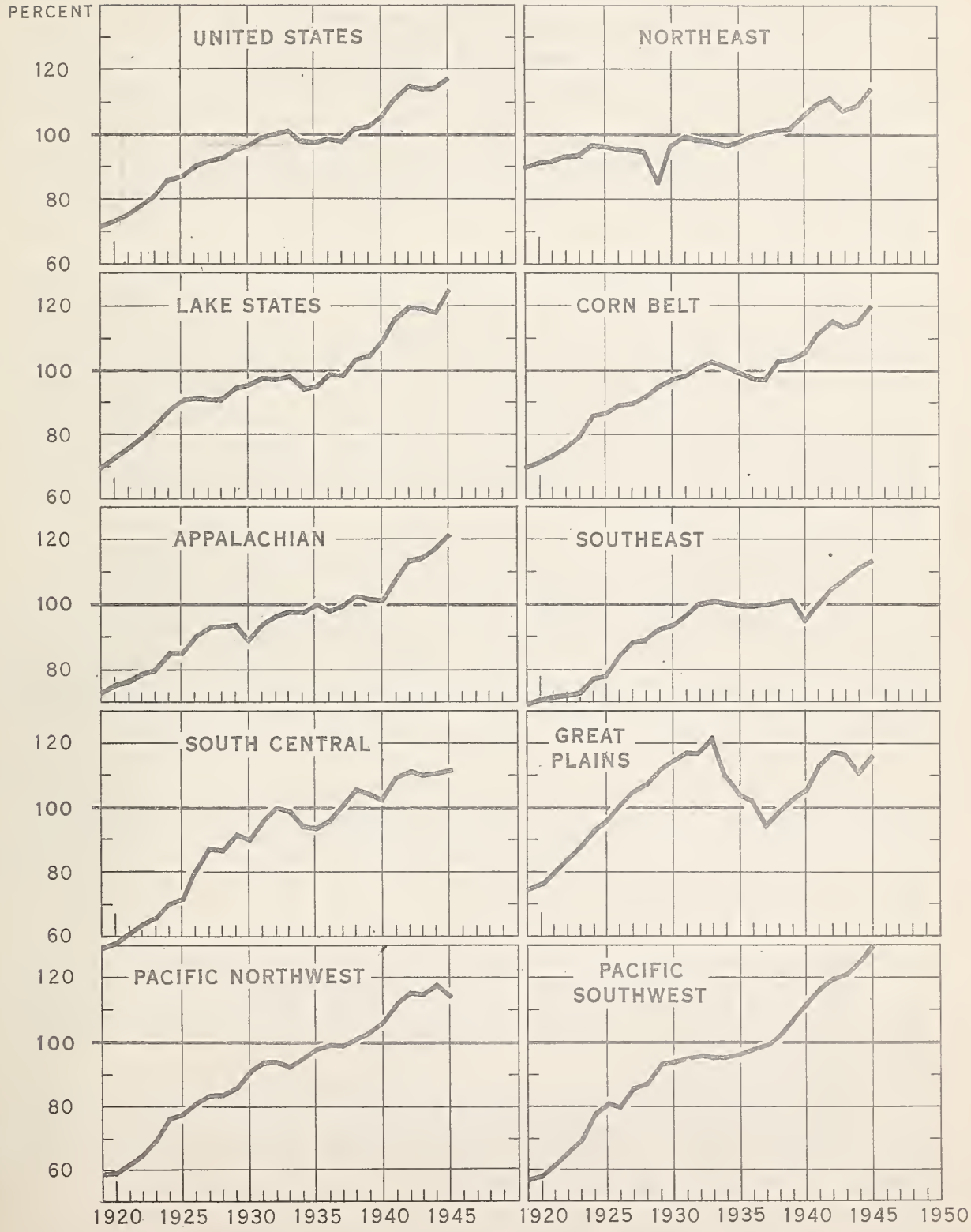

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Fig. 2

The trend patterns for milk-cow numbers and for milk production per cow are somewhat less uniform but bear a striking resemblance from region to region. Cow numbers have changed very little in the Northeast over the period and in the Great Plains the drought and special war effects are noticeable. Milk production per cow increased less in the southern regions in recent years than in most other parts of the country. This is no doubt related to the rapid expansion in cow numbers (fig. 3).

Although each of the several regions has shared in the expanding market for dairy products, a small shift in the relative shares supplied by each has come about since 1919 (table 2, fig. 1). A slightly greater proportion of the Nation's milk was produced in the three major dairy regions 27 years ago. In 1919 milk production in the Northeast, the Lake States, and the Corn Belt comprised 64 percent of the Nation's supply and in 1945, 62 percent. The latter proportion has been substantially the same for the last two decades.

The relative proportions of milk produced in two of the three major dairy regions have changed, however, since 1919. In the Lake States region, where production has gone up at the highest rate, the proportion of total production in the United States rose from 22 percent in 1919 to 24 percent in 1945. The rate of increase in the Corn Belt, which has been close to that of the country at large, has resulted in the share of 21 percent of total production remaining fairly constant throughout the entire 27-year period. In the Northeast a significantly lower rate of increase has brought about a decrease in the share of the Nation's total milk produced from 21 percent in 1919 to 16 percent in 1945.

MILK PRODUCTION IN THE WAR YEARS, UNITED STATES AND REGIONS

As we have seen, the upward trend of milk production in the war years was a continuation of the long-time trend. Dairy farmers in the United States, in response to the needs of the time, increased production of milk to a record level of 122 billion pounds in 1945, or 18 percent above the 1935-39 average. That they were able to respond in this fashion is the more remarkable when the pressure from expansion of other farm products is considered.

The expansion in milk production was brought about both by increases in cow numbers and in production per cow. Measuring from the average of 1935-39 to 1945, the increase in each was about 9 percent. The peak in milk-cow numbers was reached in 1944 and in production per cow in 1945 (tables 14 and 15, appendix). Present indications are that the 1946 production per cow will exceed the 1945 record.

The favorable price situation for dairying caused farmers to increase cow numbers by saving more heifers and by retaining older cows longer than usual. In 1945 the less productive cows were culled at a heavier rate in some areas and fewer heifers were saved, with the result that milk-cow numbers declined slightly by 1946.

Milk production per cow reached a record average of 4,789 pounds in 1945, slightly above the previous highs of 1941 and 1942. High rates of feeding, favorable pasture conditions and the slight reduction in cow numbers contributed to this high average production.

MILK: AVERAGE NUMBER OF COWS AND PRODUCTION PER COW ON FARMS, UNITED STATES AND REGIONS, 1919-45

INDEX NUMBERS (1935-39=100)

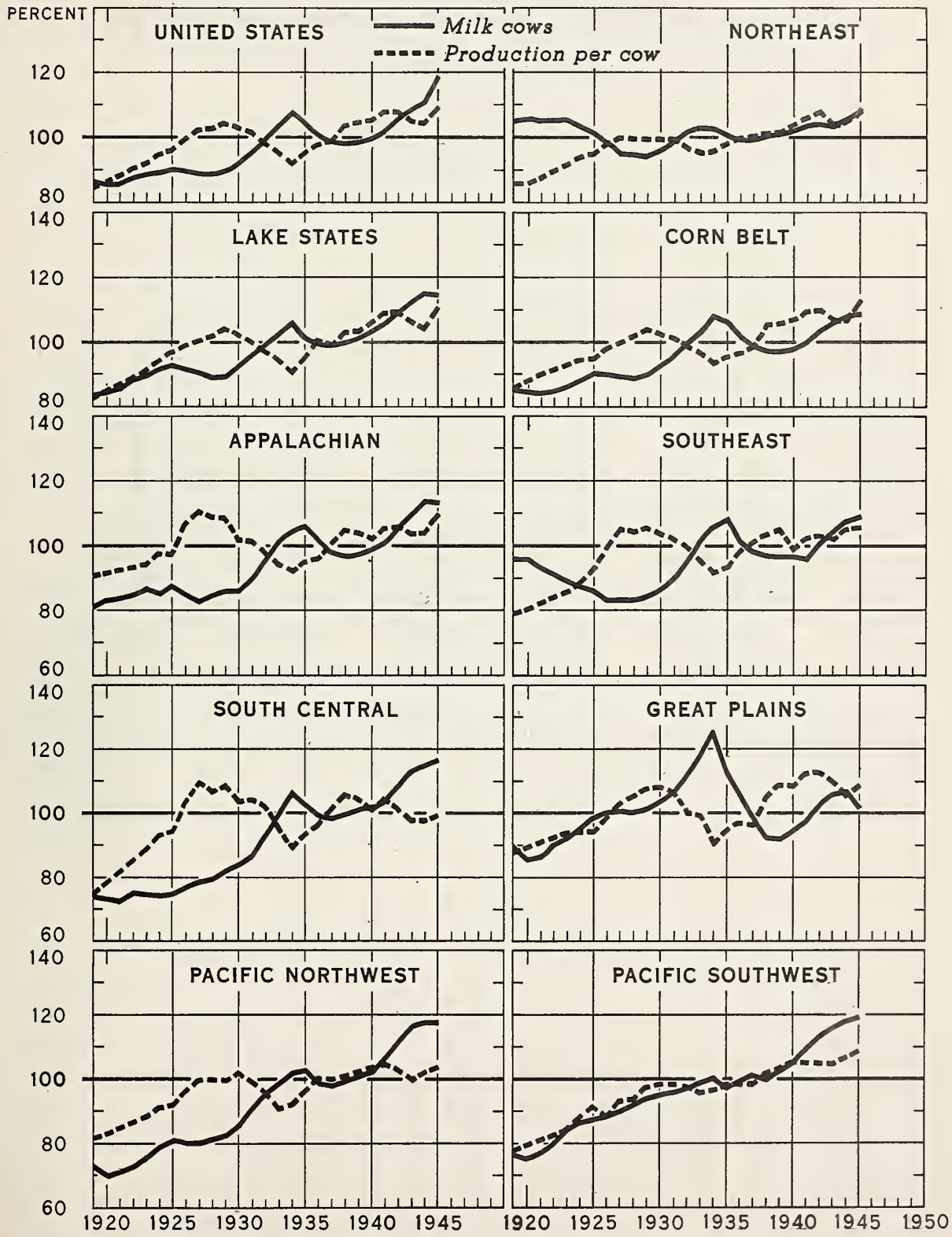

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Fig. 3

Table 2.- Milk: Production on farms in major dairy regions as percentage of total farm production, United States, averages 1920-44, annual 1919 and 1940-45 1/

Period or year	United States		Region			
			Percentage of U. S. total production			
	Production	Percentage of total	Northeast	Lake States	Corn Belt	Other
	Million pounds	Percent	Percent	Percent	Percent	Percent
1919	73,800	100.0	21.1	22.3	20.5	36.1
Average:						
1920-24	81,624	100.0	19.9	23.2	20.5	36.4
1925-29	94,805	100.0	17.5	23.0	20.8	38.7
1930-34	102.676	100.0	16.6	22.4	21.2	39.8
1935-39	103,624	100.0	16.8	23.0	21.0	39.2
1940-44	116,189	100.0	16.3	23.9	21.0	38.8
1940	109,510	100.0	16.8	23.8	21.0	38.4
1941	115,498	100.0	16.5	23.9	21.0	38.6
1942	119,240	100.0	16.3	23.9	21.0	38.8
1943	118,140	100.0	15.8	24.1	20.9	39.2
1944	118,555	100.0	16.0	23.8	21.1	39.1
1945 2/	122,219	100.0	16.2	24.4	21.4	38.0

1/ Computed from data in table 1.

2/ Preliminary.

Several factors aided in achieving the high wartime milk production. Perhaps most important was the large supply of feed grains on hand at the outset of the war and the continued high production of feed. Back of the feed-grain situation were the cumulative joint effects of better-than-average weather and agricultural technology. Higher yielding varieties of grains and grasses, greater use of fertilizers, increased mechanization, and similar factors underlay the whole agricultural scene. Hay and pasture conditions were well above normal.

Prices for dairy products and prices plus payments were relatively favorable. Fears of overexpansion appear to have been modified by the terms of the Steagall Amendment which provided for farm-price supports of certain commodities, including whole milk and butterfat, at 90 percent of parity for at least 2 years after the official end of the war.

However, some unfavorable factors served to check further increases in production. Prices of butterfat did not rise as much as prices of whole milk, and farmers in butterfat areas frequently found that it paid better to expand their beef fattening, hog, and poultry enterprises at the expense of dairying. The shortage of farm labor was an additional factor in such decisions. This became more pronounced as the war continued.

Difficulties in obtaining many items of farm machinery and equipment aggravated the situation at times. However, an actual expansion in the use of tractors and power equipment and particularly of milking machines offset the situation to a considerable extent.

Major Regions

Milk production during the war years in the three regions of major dairy importance combined -- the Northeast, the Lake States, and the Corn Belt -- rose more rapidly than in the remaining regions as a whole. Production rose to 20 percent above the 1935-39 prewar average in 1945 in these three regions, and 15 percent in the remaining six combined. An all-time peak was reached in 1945 in all regions except the Great Plains and Pacific Northwest (table 1, fig. 2).

Lake States

Production of milk in the Lake States increased by 1945 to a level 25 percent higher than in 1935-39. More milk is produced in this region than in any of the other regions. This marked increase came about partly because no alternative livestock enterprise is highly competitive with dairying throughout much of the region. Favorable wartime prices for milk encouraged producers to expand production rapidly. Favorable prices for nonfat solids induced many farmers in the farm-separated cream areas of Minnesota and southwestern Wisconsin (northern fringes of the Corn Belt proper), to market whole milk instead of selling only the butterfat

as cream and retaining the skim milk for animal feed on the farm. More than half of the wartime expansion in the productive capacity of milk-drying plants was added in the Lake States region. Before the war 45 percent of all milk or its equivalent entering commercial channels was sold as butterfat in the form of cream. The proportion in 1944, at 24 percent, was only about half of prewar. Conversely, the proportion marketed as whole milk expanded from 52 to 74 percent.

In Wisconsin, the leading State in milk production and where half of this region's milk is produced, the output of milk in 1945 was 34 percent above the prewar average.

Corn Belt

The wartime production of milk on farms in the Corn Belt increased to an all-time peak in 1945. This was 20 percent greater than 1935-39. Dairying in this region, as a source of cash farm income, is outranked by hogs, and cattle and calves. As farmers in the butterfat areas of the Corn Belt are frequently able profitably to shift feed from the production of milk to that of beef and hogs, the greatest increases in milk production were effected in the nonbutterfat areas. Nevertheless, the installation of facilities for handling whole milk in some of the farm-separated cream areas induced many producers of cream to shift to the more profitable whole-milk outlets. The farm-labor shortage, accompanied by high wage rates, resulted in decreased numbers of cows milked in certain areas. This was particularly true in Iowa, the State where most of the milk in this region is produced, as many of the milk cows there are dual-purpose. Production of milk in Iowa in 1945 was only about 11 percent greater than prewar, whereas in Missouri it was 34 percent above.

Northeast

Production of milk in 1945 in the Northeast, where approximately three-quarters of the total is used as fluid milk or cream, was 14 percent higher than the 1935-39 average. This gain in production was considerably less than the increases in the Lake States and Corn Belt, and below the national gain of 18 percent.

Dairying is by far the chief livestock enterprise in the Northeast, with poultry and eggs in second place. The foundation of dairying in this region, as in the Lake States, is a combination of soil, terrain, and climate that produces an abundance of low-cost hay and pasture. Dairymen try to produce large supplies of roughage and are dependent, therefore, on buying large quantities of feed grains from the Corn Belt. They must then compete with dairymen from the Lake States, who also are deficient in feed-grains.

In New York, which has about two-fifths of the total production of milk in the Northeast, production in 1945 was 14 percent greater than in 1935-39. Production in Pennsylvania was about 16 percent greater.

Other Regions

More milk is produced in the Great Plains States than in any one of the other five regions in this group. Slightly more than three-fourths of the milk which enters commercial channels is sold as farm-separated cream to be made into butter. The skim milk is used chiefly for animal and poultry feed. Dairymen in this region, with few and scattered facilities for handling whole milk at their disposal, had little incentive to expand production of milk, so long as cattle grazing, and production of hogs, poultry, and eggs provided favorable returns. Production of milk during the war rose to 17 percent above prewar in 1942, then declined to a level 6 percent over the 1935-39 average in 1945.

A steady year-to-year wartime expansion in the production of milk in the Appalachian region reached a level in 1945 which exceeded prewar by 21 percent. Most of the milk produced in this region up to the time of the war was consumed on farms.

The proportion sold, in one form or other, now exceeds 50 percent of total production, primarily because of the greater output. The high wartime demand for whole-milk products accentuated the decline in the proportion of milk used for butter, a decline which began in 1933 when nearly three-quarters of all milk sold from farms was used for this purpose. Increased emphasis during the war years has been placed on the production of evaporated milk, cheddar cheese, and ice cream in the Appalachian region.

The peak production of milk in the South Central region was attained in 1945 at a level 11 percent above prewar. The principal incentive for expanding production of milk in this region was to meet the expanded fluid-milk and cream market which resulted from the growth of population in war-industry centers and in military camps. Cattle and calves normally are the source of greatest cash income from livestock in this region, with dairying second. Income from poultry and eggs exceeded that from dairying during 1940-44, however. Dairying in the South Central region is only slightly more commercialized than it is in the Appalachian region. In 1939, 60 percent of the farms reporting cows milked had less than 3 cows. About two-thirds of the milk produced is sold or used in dairy products sold from farms. The increase in milk production during the war years in the South Central region was primarily the result of the increase in cow numbers.

In the Pacific Southwest, the average production per cow is higher than in any other region. Here production of milk in 1945 was 29 percent

greater than prewar. This was the highest percentage increase of all regions. A heavy influx of people during the war who obtained employment in the numerous war industries in that region, heightened the demand for fluid milk and cream. Of the milk used in the manufacture of dairy products, the output of evaporated and condensed milk absorbed a greater proportion, whereas the share used in the manufacture of butter dropped sharply. Production in California comprises about four-fifths of the total production in this region. The increase in production in California, 32 percent more milk in 1945 than prewar, was exceeded in this region only by the gain of 38 percent in Utah.

Production of milk in the Pacific Northwest in 1945, although smaller than in 1944, was 15 percent above prewar. The increased population resulting from the demand for additional labor in the shipbuilding and other war industries in coastal and inland cities created a greatly increased demand for fluid milk and cream during the war years. Fluid milk sheds were extended, penetrating deeply into the cheese and evaporated milk areas. The diversion of milk from manufactured to fluid use brought increased returns to producers and was a principal reason for the increased production.

Production of milk in the Southeast in 1945 reached the highest level on record, 13 percent above prewar. Commercial production of milk in this region is relatively low as more than half of the total production is consumed on farms. Of the farms reporting cows and heifers kept for milk in 1939, 85 percent reported less than 3, and only 1 percent had more than 9 cows. For a number of years farmers in this region have sold as farm-churned butter a higher proportion of their milk than have producers in any other region. In the war years they marketed a sharply increased proportion of their production as whole milk. In the prewar period nearly 46 percent of all milk sold or used in dairy products sold from farms in the Southeast was marketed as whole milk. The proportion in 1944 was 64 percent. The wartime demand for more fluid milk and cream in military camps, which were numerous throughout the region, was a principal reason for this change.

PRICES RECEIVED BY FARMERS FOR MILK AND BUTTERFAT

Prices received by farmers for milk and butterfat, production payments included, rose to the highest levels on record in World War II. Average prices plus payments received in 1943 were not quite so high as the previous peak prices received in the first 2 years following the close of World War I. But those received in 1944 and 1945 were significantly higher (table 17, appendix). In relation to parity, prices during World War II also were higher than at any previous time. Annual average prices, including payments, were at least 20 percent above parity in the years 1943-45. At no time during World War I or in the years following did prices exceed parity by so much as 10 percent (table 17, appendix).

The average price received by farmers for wholesale milk rose sharply after 1940 and reached the highest level on record in 1944 and 1945. The average price of $3.78 per hundredweight, payments included, in each of these years was more than twice that of the prewar average price (table 3).

The average price received for milk in 1935-39 was 88 percent of parity. From a level of 92 percent of parity in 1940, prices received increased steadily until in 1944, with production payments included, prices averaged 39 percent above parity. The years 1944 and 1945 were the only two complete years in which production payments were offered to producers of milk and butterfat.

Prices received by farmers for butterfat also climbed rapidly after 1940. They reached the highest level in 1945 when the average price to farmers, production payments included, was 63.5 cents. This price was more than twice as high as the prewar average of 29.1 cents per pound. Although the price of butterfat did not rise quite so rapidly as did the price of milk in the earlier war years, the increases were substantial (table 3).

In the period 1935-39, the average price received for butterfat was 86 percent of parity. Steady increases in the war years brought the price in 1945 to 39 percent above parity.

DAIRY PRODUCTION PAYMENTS AND SUBSIDIES

The Dairy Production Payments program 2/ was inaugurated in October 1943. Its purpose was to provide to producers, in addition to the prices received for milk and butterfat, payments that would increase unit returns sufficiently to assure a high level of production in the face of rising feed costs.

Ceiling prices previously imposed on various dairy products prevented prices to farmers for milk and butterfat from rising sufficiently to compete with the returns forthcoming from other livestock production. A processor's subsidy program providing for the payment by the Government of 3-3/4 cents per pound on wholesale cheddar cheese, was placed in effect December 1, 1942. It was terminated February 1, 1946, when increases in retail and wholesale ceiling prices in the amount of the subsidy were permitted. The processors' subsidy on butter of 5 cents a pound at the wholesale level became effective early in June 1943. It was continued until November 1, 1945, when a rise in the ceiling price, to replace the subsidy, was permitted. A purchase-and-resale program for fluid milk (class I) in 13 of the metropolitan sales areas where Federal milk-marketing agreements are in effect, was begun in April 1943. Increases in prices to producers in certain markets had been authorized

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2/ Originally known as Dairy Feed Payments Program.

Table 3.- Parity prices and actual prices received by farmers for milk sold at wholesale, and butterfat sold as cream, United States, averages 1909-18 and 1935-44, annual 1914-23 and 1940-45 1/

Index numbers (1935-39 = 100)

Period or year	Milk prices			Butterfat prices		
	Parity	Actual		Parity	Actual	
		Without payments	With payments 2/		Without payments	With payments 2/
Average:						
1909-14	78	88	---	78	90	---
1914-18	102	115	---	102	115	---
1935-39	100	100	---	100	100	---
1940-44	115	144	151	115	141	146
1914	80	90	---	80	89	---
1915	83	89	---	83	90	---
1916	98	97	---	98	103	---
1917	116	134	---	115	132	---
1918	135	166	---	135	160	---
1919	155	183	---	155	186	---
1920	158	178	---	158	192	---
1921	129	129	---	129	132	---
1922	128	118	---	128	126	---
1923	130	138	---	130	148	---
1940	98	102	---	98	98	---
1941	103	122	---	103	119	---
1942	117	145	---	117	139	---
1943	126	172	180	126	173	177
1944	132	180	209	132	174	200
1945	136	178	209	135	173	218

1/ Computed from data in table 17, Appendix.
2/ The data in this column are based on the 1935-39 average price without dairy-production payments representing 100 percent, as no production payments were made before 1943.

under provisions of marketing agreements which were effective before the President's "hold-the-line" order was given. Retail prices, however, had not been adjusted when the President's directive was issued. Consequently, the objectives of both programs-- one to raise prices to producers and the other to permit fluid milk distributors to meet the higher wholesale costs of milk without raising retail prices-- were accomplished by the purchase-and-resale device. This program was ended as of June 30, 1946.

The Dairy Production Payments program was designed originally to compensate for rapidly rising feed costs, and to give further stimulus to an expansion in milk production without changing the market price structure. Later, the payments were intended also to offset the rapid rise in farm wage rates and other costs.

Dairy-production payments were made available to producers on milk and butterfat sold after October 1, 1943. Under this program, which continued up to June 30, 1946, the payment rates varied by States and areas from 25 to 90 cents per hundredweight of wholesale milk and from 4 to 17 cents per pound of butterfat sold through 1945. In general, the highest rates were paid producers in the winter barn-feeding months, the lowest rates in the spring-summer months when pastures are at their best.

Production payments comprised 76 percent of the total money expended by the Government during 1943-45 on the production-consumption-subsidy program involving dairy products. The butter subsidy comprised 14 percent, cheese 8 percent, and the fluid milk purchase-and-resale program, 2 percent of all the expenditures (table 4). Total payments to farmers, under the dairy-production and subsidy programs, made up about 4.5 percent of the farmers' cash income from dairy products, including payments, in 1943; 15.3 percent in 1944; and an estimated 14.0 percent in 1945. The weighted average proportion throughout the 3 year period was 12.2 percent.

DAIRY-FEED AND DAIRY-LIVESTOCK PRICE RATIOS

High prices for dairy products are not in themselves sufficient to assure a high level of milk production. Of greater importance are favorable relationships between prices of dairy products and feed and labor costs, and prices of competing crop and livestock products.

Milk-Feed Price Ratio

The ratios between prices received for milk and feed costs were favorable to an expansion in milk production in each of the years in the period 1940-45. In 1940, when a pound of milk at wholesale was equal in value to 1.29 pounds of concentrate ration, the value of milk in relation to feed was 5 percent greater than the average 20-year (1922-41) relationship. The ratio ranged from 6 percent above prewar in 1940 to 16 percent in 1945 (table 6).

Table 4.- Dairy-production payments and subsidies, United States, 1943-45 1/

Type	1943	1944	1945 2/
	Million dollars	Million dollars	Million dollars
Dairy-production payments	49.7	385.5	500.0
Cheese subsidy	3/ 29.5	30.3	4/ 34.6
Butter subsidy	41.7	79.9	55.6
Purchase and resales in 13 fluid milk areas	5/ 6.0	12.0	12.0
Total	126.9	507.7	602.2

1/ BAE - The Dairy Situation, Feb.-March 1946 (processed).
2/ Partly estimated.
3/ Total of 13 months, December 1942 - December 1943.
4/ Includes January 1946.
5/ Begun April 1943.

Butterfat-Feed Price Ratio

Prices received for cream sold as butterfat, in relation to feed costs, were not generally so favorable to a large expansion in the production of milk for farm-separated cream as were prices received by those marketing whole milk. Consequently, many producers in the intensive butterfat areas elected to use their feed supplies in expanding milk production and marketing it as whole milk where processing facilities were available, or expanding their production of beef or hogs or poultry and eggs. The 20-year average value of 1 pound of butterfat was 24.6 pounds of concentrate ration. The value of butterfat exceeded this average in only 3 of the 6 years 1940-45. The average 1940-44 ratio of 24.8 pounds was only 1 percent greater than the 1922-41 ratio, but was above the 1935-39 average by eight percent (table 6).

Butterfat-Beef Price Ratio

Prices of butterfat in relation to beef, according to the price ratios, were such as to favor the production of beef in the prewar period and in each of the war years except 1944 and 1945 (table 6). In the period 1935-39, the average value of a pound of butterfat was 4.5 pounds of live weight beef, 13 percent below the 20-year average. The return to the 20-year relationship in 1944 and 1945 - although beef prices averaged the highest of the war years in 1945 (table 5) - was due in no small degree to the dairy-production payments.

Table 5.- Average prices paid by wholesale slaughterers per 100 pounds live weight of cattle and hogs, and average price per dozen eggs received by farmers, United States, averages 1922-44, annual 1940-45 1/

Index numbers (1935-39 = 100)

Period or year	Cattle		Hogs		Eggs	
	Price	Index number	Price	Index number	Price 2/	Index number
	Dollars		Dollars		Cents	
Average:						
1922-41	7.24	104	8.24	95	22.6	109
1935-39	6.99	100	8.71	100	20.8	100
1940-44	10.27	147	11.24	129	28.2	136
1940	7.95	114	5.67	65	18.0	87
1941	9.14	131	9.42	108	23.5	113
1942	10.98	157	13.57	156	29.9	144
1943	12.22	175	14.11	162	37.1	178
1944	11.08	159	13.43	154	32.4	156
1945	12.41	178	14.55	167	37.5	180

1/ BAE.- The Livestock and Wool Situation, January-February 1946 (processed); Farm Production, Disposition Chickens and Eggs, June 1939 (processed); and Poultry-Ration Costs and Poultry-Feed Price Ratios, 1924-45 - March 1946 (processed).

2/ Weighted average.

Butterfat-Hog Price Ratio

As compared with the 1922-41 ratio, the production of butterfat was definitely more favorable than hogs in only one of the war years, and that was in 1940. In that year a pound of butterfat was equivalent, on the average, to 5.3 pounds of live weight hog, or 18 percent more than the 1922-41 average value. From 1941 through 1944, according to the ratios, production of hogs was more profitable than production of butterfat. Production payments on butterfat in 1944 and 1945 helped to return the ratio to its long-time relationship of 4.5 pounds in 1945 despite the fact that prices of hogs reached their peak in 1945 (table 5).

Butterfat-Egg Price Ratio

In relation to the long-time average prices of butterfat were more favorable than were those for eggs throughout most of the war period. This was true in all years except 1942 and 1943. In those 2 years 1 pound of butterfat was equal in value, on the average, to 1.3 dozen eggs, or about 7 percent below the prewar and 1922-41 average ratios. Although prices of eggs reached their highest wartime level in 1945 (table 5), the greatest relative advantage of butterfat over eggs was in 1944 and 1945, the only two complete years in which production payments were made on butterfat.

Milk-Egg Price Ratio

The milk-egg price ratio was more favorable to the production of milk than eggs in each of the war years except 1942 and 1943. In the prewar period 1935-39, on an average a hundredweight of milk was equal in value to 8.6 dozen eggs. During the war years the ratio ranged from a low of 8.4 dozen in 1943 to a high of 11.4 dozen in 1944, when prices of eggs fell sharply from the preceding year (table 5) and production payments were paid on milk for the first complete year. The 1940-44 average ratio of 9.5 dozen exceeded prewar by 10 percent, although this decided advantage in favor of milk is weighted unduly by the favorable ratio for the year 1944 (table 6).

COSTS OF LABOR AND FEED

The costs of farm labor and feed concentrates are the two items of principal importance that affect the cost of producing milk. The wartime rise in wages paid farm labor, relative to prewar, was greater than the corresponding rise in prices, payments included, received by farmers for milk and butterfat. Prices of milk and butterfat rose to a substantially higher level, however, than did the price of feeds (tables 3 and 7).

Table 6.- Price ratios: Prices received by farmers for milk and butterfat in relation to feed costs and prices received for competing livestock and livestock products, United States, averages 1922-44, annual 1940-45

Index numbers (1935-39 = 100)

Period or year	Milk-feed 1/		Butterfat-feed 1/		Butterfat-beef 3/		Butterfat-hog 3/		Butterfat-egg 5/		Milk-egg 5/	
	Ratio 2/	Index number	Ratio 2/	Index number	Ratio 4/	Index number	Ratio 4/	Index number	Ratio 6/	Index number	Ratio 6/	Index number
	Pounds		Pounds		Pounds		Pounds		Dozens		Dozens	
Average:												
1922-41	1.23	101	24.6	107	5.2	116	4.5	129	1.4	100	8.7	101
1935-39	1.22	100	23.0	100	4.5	100	3.5	100	1.4	100	8.6	100
1940-44 7/	1.35	111	24.8	108	4.2	93	4.1	117	1.5	107	9.5	110
1940	1.29	106	24.0	104	3.8	84	5.3	151	1.5	107	9.9	115
1941	1.39	114	26.4	115	4.0	89	3.8	109	1.5	107	9.2	107
1942	1.32	108	24.4	106	3.8	84	3.1	89	1.3	93	8.5	99
1943 7/	1.35	111	24.8	108	4.2	93	3.7	106	1.3	93	8.4	98
1944 7/	1.39	114	24.5	107	5.4	120	4.4	126	1.8	129	11.4	133
1945 7/8/	1.41	116	27.5	120	5.2	116	4.5	129	1.6	114	9.8	114

1/ B.A.E. - J. L. Wilson, Rations Fed to Milk Cows, January 1945, (processed).
2/ Pounds of concentrate ration equal in value to one pound of milk, or butterfat, at the price received by farmers.
3/ B.A.E. - Dairy Situation, October 1944 and August 1945, (processed).
4/ Pounds of live weight beef, or hog, equal in value to 1 pound of butterfat at the price received by farmers.
5/ B.A.E. - Computed from monthly series of milk, butterfat, and egg prices as given in the issues of Agricultural Prices, (processed).
6/ Dozens of eggs equal in value to 1 pound of butterfat, or 100 pounds of milk at wholesale.
7/ Includes allowance for offered rates of dairy-production payments after October 1, 1943.
8/ Preliminary.

The rise in prices of milk and butterfat from 1935-39 to 1940-44 was slightly greater than the increase in prices paid by farmers for commodities used in production, labor, interest, and taxes combined. This situation, together with the expansion of output, resulted in substantially higher net income to dairy farmers during the war years. Operating statements of typical family-operated dairy farms in New York and Wisconsin, for example, show that average annual earnings of farm operators during the period 1940-44 were approximately double those of the prewar period.

Farm Wages

Wages for farm workers in the United States, which reflect a growing decline in the number of farm laborers, increased far more rapidly throughout the war years than did prices of milk and butterfat. In 1945 farm wage rates were almost 180 percent higher than the prewar average, whereas the prices of milk and butterfat, including production payments, were 109 and 118 percent, respectively, above the prewar average. This created a difficult problem for those dairymen in need of hiring help. Not only was the rate of increase in farm wages exceptionally great but the quality of laborers obtainable was below normal standards. Higher wages in war industries attracted men from the farm-labor force in the earlier war years. Later, many young men from the farms were called into the armed services. Dairymen, who formerly had relied solely on family labor, helped swell the ranks of those bidding for farm workers in a farm-labor market that was being depleted. More labor-saving machinery, together with an intensive effort to increase labor efficiency, counteracted somewhat the labor shortage which was felt most severely in 1944.

The average monthly farm-wage rate without board in 1945 was $95.40 for the country at large. This rate was nearly 180 percent higher than the prewar average. Wages in 1945 in 10 States leading in milk production ranged from 129 percent above prewar levels in Pennsylvania to 221 percent in Texas. Farm wages in Iowa rose to a level which, in 1945, was more than 200 percent above prewar.

Feed Costs

The wartime percentage rise in the value of concentrate rations fed milk cows in the commercial-milk and butterfat areas of the United States was less than the rise of prices for milk and butterfat, including production payments.

The value of concentrate rations in the wholesale milk areas averaged $2.02 in 1940-44, a rise of 34 percent over prewar. Wholesale prices of milk for the same 5-year period, payments included, averaged 51 percent higher than prewar (table 7).

Table 7.- Concentrate rations: Estimated value per 100 pounds fed to milk cows for producing whole milk sold to plants and dealers, and for producing milk skimmed on farms for sale as cream, United States, averages 1922-44, annual 1940-45 1/

Index numbers (1935-39 = 100)

Period or year	For producing whole milk sold at wholesale		For producing milk skimmed on farms for sale as cream	
	Value per 100 pounds	Index number	Value per 100 pounds	Index number
	Dollars		Dollars	
Average:				
1922-41	1.66	110	1.37	105
1935-39	1.51	100	1.30	100
1940-44	2.02	134	1.73	133
1940	1.43	95	1.19	92
1941	1.58	105	1.30	100
1942	1.96	130	1.66	128
1943	2.39	158	2.09	161
1944	2.74	181	2.39	184
1945	2.68	177	2.31	178

1/ Bureau of Agricultural Economics - From Wilson, J. L., Rations Fed to Milk Cows, - January 1945 (processed), and Concentrate Rations Fed Milk Cows in 1945 - March 1946 (processed).

In the butterfat areas the value of concentrates fed milk cows in 1940-44 was 33 percent above prewar, whereas the average prices including production payments, received for butterfat were 46 percent greater than in 1935-39.

The steady rise in the price of concentrates was due principally to the tremendous wartime expansion in production of beef cattle, hogs, poultry, and eggs, as well as dairying. The large supplies of feed grains on hand at the beginning of the war helped to prevent a more rapid rise in feed prices. The establishment of ceiling prices on certain feed grains, beginning with corn in the first quarter of 1943, and specific high-protein and byproduct feeds, helped materially to stabilize concentrate prices although it restricted the movement of grain supplies from surplus to deficit areas. Large wartime increases in the production of linseed, soybeans, and peanuts, although short of fulfilling total demands, were also a factor in preventing a greater rise in concentrate prices after 1942.

IMPROVED PRACTICES AND OTHER FACTORS AFFECTING MILK OUTPUT DURING THE WAR

In the preceding sections, the wartime price changes for dairy products, changes in the costs of certain productive factors, and price changes for products competitive with dairying were considered. As indicated there, prices of milk and butterfat, particularly after the inauguration of dairy-production payments, reached a higher level as compared with 1935-39 than did prices of most other competing agricultural products. Increases in prices of feed were lower, whereas farm-wage rates increased by a larger percentage than did prices of milk and butterfat. Intercommodity price relationships were favorable for an expansion of milk output during most of the war. Although such developments did not necessarily result in higher, or even as high, net returns to farmers from dairying as from other selected enterprises during the war years, the economic situation was such as to result in several changes which provided an enlarged physical basis for future dairy expansion.

Reduced Numbers of Horses and Mules

The steady downward trend in numbers of horses and mules since World War I has been more than sufficient from the standpoint of feed supplies released to permit the expansion that has come about in numbers of milk cows in the last 27 years. There were 26.5 million horses and mules on farms January 1, 1919. By 1946, there were 11.5 million head, a reduction of 57 percent. The shift from horse-and-mule to tractor power, which began in 1918, has released an estimated 55 to 60 million acres of crop and pasture land for the increased production of milk, meat, and other products. There have been no long-time significant changes in the total numbers of roughage-consuming and grain-consuming animal units, but the composition of the total numbers has changed materially over the years (table 8).

Table 8.- Roughage-and grain-consuming animal units: Estimated number by specified classes on farms January 1, United States, averages 1920-44, annual 1940-46 1/

Period or year	Roughage-consuming animal units 2/			
	Cows and heifers 2 years and over kept for milk	Horses and mules	Other cattle and sheep	Total
	Thousands	Thousands	Thousands	Thousands
Average:				
1920-24	21,846	24,554	39,419	85,819
1925-29	22,381	21,188	33,122	76,691
1930-34	24,923	17,948	37,846	80,717
1935-39	24,999	15,750	37,522	78,271
1940-44	26,313	13,709	43,213	83,235
1940	24,926	14,481	38,741	78,148
1941	25,478	14,136	41,001	80,615
1942	26,398	13,720	43,381	83,499
1943	27,106	13,379	45,699	86,184
1944	27,656	12,833	47,243	87,732
1945	27,674	12,246	46,410	86,330
1946 4/	26,785	11,455	45,063	83,303
	Grain-consuming animal units 3/ 5/			
Average:				
1920-24	21,846	27,992	90,941	140,779
1925-29	22,381	24,154	90,523	137,058
1930-34	24,923	20,461	94,192	139,576
1935-39	24,999	17,955	79,829	122,783
1940-44	26,313	15,629	107,211	149,153
1940	24,926	16,508	97,057	138,491
1941	25,478	16,115	91,856	133,449
1942	26,398	15,641	101,038	143,077
1943	27,106	15,252	117,241	159,599
1944	27,656	14,630	128,863	171,149
1945	27,674	13,960	104,554	146,188
1946 4/	26,785	13,059	106,691	146,535

1/ BAE - Livestock, Meats and Wool Market Statistics and Related Data, June 1943, (processed), and The Livestock and Wool Situation, Jan.-Feb., 1946 (processed). 2/ Weighted by the relative consumption of roughage by each class or species of animal. One milk cow is considered as 1.0 animal unit; horses and mules, 1.0; other cattle 0.75; and sheep 0.12. 3/ Weighted by the relative consumption of grain by each class or species of animal. One milk cow is considered as 1.0 animal units; other cattle, 0.51; horses and mules, 1.14; sheep, 0.04; hogs, 0.87; and chickens, 0.045 animal units. 4/ Preliminary. 5/ The consumption by hogs and chickens is included with that of other cattle and sheep in the estimates of grain-consuming animal units.

Hay Supplies and Quality

More hay, and hay with a higher nutritive value, was produced during the war years 1940-44 than during any other 5-year period since 1919. The production of 105 million tons of hay in 1945 was even higher than the wartime average of 96 million tons (table 9, and table 18, appendix). The significance of this high wartime level of hay production as related to the output of milk is magnified by the importance of the higher nutritive content of the hay. There has been a marked increase in the quantity of legume hay produced since 1930. Only one-fourth of all hay produced in 1920-24 consisted of legumes reported separately, but the proportion increased steadily until by the war years it had almost doubled. There are indications that the proportion of timothy in hay classified as "clover and timothy" has declined during the last quarter century and that at the same time, the proportions of red, alsike, and Ladino clover have become greater. In both prewar and war periods, the Nation-wide production of clover and timothy hay was exceeded by that of alfalfa.

The striking importance of the shift to production of more legumes with their higher protein content and greater yielding capacity is reflected, in part, by the greater supply and higher nutritive quality of hay per unit of livestock. Despite an increase of 6 percent in the number of roughage-consuming units of livestock over prewar, the 1940-44 average quantity of hay per roughage-consuming unit of livestock was 2,320 pounds, or 7 percent higher (table 9). In 1945 the supply was more than 12 percent above prewar. Of the quantity available only for milk cows, other cattle and sheep, the 1940-44 average was 2,060 pounds per livestock unit or 16 percent over the 1935-39 average, and the quantity in 1945 was 26 percent greater than prewar. The average annual supply of digestible protein available per livestock unit of milk cows, other cattle and sheep was 126 pounds for the period 1935-39, 146 pounds for the period 1940-44, and 152 pounds in 1945.

Higher Rate of Feeding Hay

Roughage in the form of hay is the principal source of nutrients for milk cows. The large supplies of high-quality hays available during the war period were reflected in the higher rates at which roughage-consuming animals were fed. The average disappearance of hay per hay-consuming animal unit rose to 13 percent above prewar in 1945 (table 10).

Feed Grains

The wartime production of feed grains, which are highly important to the production of milk,was the greatest of any 5-year period on record. In fact, all previous production records of feed grains - corn, oats, barley, and grain sorghums - were broken during the war years 1942-45. Production in 1940-44 exceeded the prewar level by 26 percent. In 1945 production was 33 percent higher than prewar.

Table 9.- Quantity and protein content of all hay available per unit of roughage-consuming livestock, United States, averages 1920-44, annual 1945 1/

Period or year	All hay produced	Hay per unit of livestock		Digestible protein in all hay	Digestible protein per unit of livestock	
		Milk cows, other cattle, and sheep 2/	All roughage-consuming livestock		Milk cows, other cattle, and sheep 3/	All roughage-consuming livestock
	1,000 tons	Pounds	Pounds	1,000 tons	Pounds	Pounds
Average:						
1920-24	90,503	1,520	2,100	5,118	84	119
1925-29	85,077	1,700	2,220	5,255	104	137
1930-34	73,801	1,320	1,820	4,944	88	122
1935-39	84,247	1,780	2,160	5,925	126	151
1940-44	96,430	2,060	2,320	6,853	146	165
1945 4/	104,951	2,240	2,430	7,118	152	165

1/ From Changes in Hay Production in War and Peace, Johnson, Neil W. BAE March 1945 (processed).

2/ After deducting 1.8 tons of average hay per head for horses and mules.

3/ After deducting estimated digestible protein in hay fed to horses and mules.

4/ Preliminary.

The high wartime level of feed-grain production, 9 percent above the previous 5-year high achieved in 1920-24, was supplemented at the outset of the war with considerable quantities of feed grains from the ever-normal granary. This was significant reason for the rapid expansion in milk production at a time when the increased production of hogs, beef cattle, and poultry and eggs brought about intensive competition for available feed-grain supplies.

The more extensive adoption of hybrid corn, and the development and use of new strains of higher yielding oats, contributed substantially to the ability of farmers to produce more feed grains in 1940-44 than in prewar. This wartime increase was due largely to increased yields as acreage was expanded only 4 percent over 1935-39. Production in 1945, even greater than average in 1940-44, also was achieved on acreage that exceeded prewar by only 4 percent.

High Rate of Concentrate Feeding

The greater production of feed grains in the war period not only enabled, but, in the later war years with the more favorable price relationships, actually encouraged dairymen to increase the rate of feeding concentrates to milk cows (table 10). This rate in 1945 was 44 percent above the 1935-39 average.

Pastures

The average condition of dairy pastures during the war years was considerably better than the prewar and long-time average (table 10). In 1942 and 1945 especially, pastures were unusually good. It is not mere coincidence that the all-time records of milk production were achieved in 1942 and 1945 when pasture conditions were the best and second best, respectively, of any year since 1919.

Considerable improvement has been made in the quality of dairy pastures in some areas. In the Northeast and Lake States, greater emphasis has been given to the use of selected grass and legume mixtures, in both permanent and rotation pastures, and also to the application of lime and fertilizers.

Improved Practices

The greater application of improved practices by dairy farmers has contributed materially to the high level of wartime agricultural production. It has been estimated that of the increase in yields per acre from 1935-39 to 1944, about 40 percent was due to better weather. The remaining 60 percent resulted about equally from (a) the more widespread use of improved varieties of plants, notably hybrid corn; and (b) the greater use of commercial fertilizers. 3/

3/ Barton, G. T. and Cooper, M. R. Farm Production in War and Peace, Bur. Agr. Econ. Dec. 1945 (Processed).

Table 10.- Disappearance of hay per hay-consuming animal unit, grain and concentrates fed per milk cow, and dairy pastures condition, United States, averages 1922-44, annual 1940-45

Index numbers (1935-39 = 100)

Period or year	Disappearance of hay per hay-consuming animal unit on farms January 1 1/ 2/		Grain and concentrates fed daily per milk cow 3/		Dairy pastures condition 6/	
	Quantity	Index number	Quantity	Index number	Normal = 100.0 7/	Index number
	Tons		Pounds		Percent	
Average:						
1922-41	1.06	99	4/ 4.07	101	74.6	102
1935-39	1.07	100	4.03	100	73.4	100
1940-44	1.16	108	5.14	128	80.2	109
1940	1.15	108	4.59	114	77.2	105
1941	1.15	108	4.92	122	76.8	105
1942	1.20	112	5.18	129	87.8	120
1943	1.17	109	5.50	136	81.4	111
1944	1.11	104	5/ 5.51	137	78.0	106
1945	8/ 1.21	113	8/ 5.82	144	87.3	119

1/ BAE - From Feed Situation, July 1945, and April-May-June 1946 (processed).
2/ Actually disappearance per hay--, forage--, and pasture-consuming animal unit. One milk cow is considered as 1.0 animal unit; horses and mules, 1.0; other cattle, 0.75; and sheep, 0.12.
3/ BAE - From J. L. Wilson, Rations Fed to Milk Cows - January 1945, (processed), and Concentrate Rations Fed to Milk Cows in 1945, March 1946, (processed).
4/ Ten-year average, 1931-40.
5/ Revised.
6/ BAE - Dairy separate, a supplement to Crop Production, November 1945, (processed).
7/ Pasture growth under nearly ideal weather is considered "normal," or 100 percent.
8/ Preliminary.

Hybrid corn is the most dramatic illustration of how the adoption and use of higher yielding seeds can raise the level of agricultural productivity and efficiency. Hybrid corn is more resistant to lodging, plant diseases, and insects, and yields about one-fifth more than open-pollinated varieties. New varieties of oats also have been developed, but their use has not as yet become so extensive. Nevertheless, losses in oat production have been materially reduced because of the resistance of new varieties to stem rust and crown rust. Considerable progress has been made with respect to pasture improvement through the development of higher yielding mixtures of grasses, and legumes better adapted to given areas. Likewise, progress has been made in the widespread introduction into new areas of plants not formerly considered suitable. Ladino clover is an outstanding example. This legume already has given great promise of improving materially pasture yields in the Lake States, the Northeast, and the Corn Belt.

Commercial Fertilizers

The use of commercial fertilizers increased markedly during the war years. The total consumption in 1944 of 2.5 million tons of nitrogen, phosphoric acid, and potash represented an increase of 80 percent over 1935-39. In the regions of major importance in the production of milk, the percentage increases in the consumption of commercial plant nutrients from 1935-39 to 1944 were as follows: Northeast, 59; Lake States, 226; and Corn Belt, 129 percent. It is estimated that in 1943 about 23 percent of the total commercial nutrients were applied to hay and pasture lands; 43 percent to land on which principal cash crops are grown, and 34 percent to the production of other crops. The proportion of cropland which received commercial fertilizers greatly exceeds the proportion of permanent pasture so treated. Of the acreage devoted to crops in 1943, nearly 20 percent was given commercial fertilizer. On a comparable basis, the proportion in the Northeast was 43, in the Lake States 31, and in the Corn Belt 20 percent. The proportion of acreage of permanent pasture in the country excluding that so classified in most of the Great Plains, Pacific Northwest, and Pacific Southwest--that was fertilized in 1943 was about 6 percent. The percentage fertilized in the Northeast was 7.5, in the Lake States 0.2, and in the Corn Belt 1.7. Progress made in applying commercial fertilizer to cropland in the principal dairy regions has far surpassed the extent of its use on permanent pastures. 4/

Timeliness of Operations

Timeliness of operations is important to the successful production of quality roughage and grain crops on dairy farms. Tardiness in sowing small grains, drilling or cultivating corn, even if late only to the extent of 2 or 3 days, frequently results in a significantly lower yield. Newly mown hay, if exposed too long to the weather, may lose much

4/ Ibach, D. B., Fertilizer, Desirable Patterns of Use. Bur. Agr. Econ., Agr. Situation, March 1946.

of its nutritive value. Such losses are real. They are reflected either in the need for buying more feed for the milking herd or in reduced production of milk. Mechanized power, more than any other single factor, and longer working days enabled dairymen to maintain during the war timely operating schedules and to produce bigger crops and more milk with less manpower than at any previous time. Despite the fact that farm tractors and other machinery were not readily available during the war, the number of tractors on farms increased 12 percent from January 1, 1942, to January 1, 1945. Total national increases during this same period in the number of specified tractor-drawn machines considered important in many of the major dairy areas were as follows: moldboard plows, 10 percent; row-crop planters, 25 percent; row-crop cultivators, 32 percent; combines, 23 percent; mowers, 26 percent; windrow pick-up balers, 67 percent; and cornpickers, 29 percent. The number of milking machines on farms throughout the country was increased by half during the same 3-year period (table 11). Approximately 80 percent of the new milking machine installations were reported in the Northeast, the Lake States, and the Corn Belt, although the percentage rise from 1942 to 1945 tended to be larger in regions other than these three. 5/ It is probable that by 1945 between 50 and 60 percent of the farms with dairy herds of ten cows or more were equipped with milking machines. Installations increased relatively more in most of the regions other than the Northeast, the Lake States, and the Corn Belt.

Scientific or "fast" milking gained considerable impetus during the war years when the labor shortage was acute. The great increase in the number of milking machines probably accentuated its adoption. Where dairymen used it effectively, "fast" milking reduced by 25 to 50 percent the time required for milking the herd. Adoption of the recommended procedures of fast-milking methods assists in the control of mastitis and may result in increases in production of milk from 2 to 5 percent in individual herds.

Considerable interest was shown in the later war years in the use of hay driers installed in the mow space of barns. Their adoption was based more on their effectiveness in preventing the loss of valuable feed nutrients than on their use as labor-saving devices. Further improvements in the design of hay driers undoubtedly will encourage their use, particularly in the areas where the curing of hay is always difficult because of highly humid weather conditions at hay-harvesting time.

WARTIME DEMAND FOR DAIRY PRODUCTS

High effective demand for milk and dairy products prevailed throughout the recent war years. A level of milk production of 140 to 145 billion pounds probably would have been necessary to satisfy in full the total

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5/ Brodell, A. P. and Cooper, M. R., Number and Duty of Principal Farm Machines, Bur. Agr. Econ., Nov. 1944 (Processed).

Table 11.- Milking machines: Number on farms January 1, United States and regions, 1942-45 1/ 2/

State group	Number 2/			
	1942	1943	1944	1945
	Number	Number	Number	Number
United States total	254,700	309,065	344,995	379,325
Northeast	83,200	101,450	112,700	119,325
Lake States	84,000	102,500	113,600	123,400
Corn Belt	44,500	54,250	60,700	69,200
Appalachian	3,200	3,790	4,405	5,390
Southeast	1,100	1,295	1,545	2,185
South Central	3,400	4,130	4,955	6,325
Great Plains	9,700	11,690	13,125	15,350
Pacific Northwest	11,000	13,400	15,700	17,900
Pacific Southwest	14,600	16,560	18,265	20,250
	Index numbers (1942 = 100)			
United States total	100	121	136	149
Northeast	100	122	136	143
Lake States	100	122	135	147
Corn Belt	100	122	136	156
Appalachian	100	118	138	168
Southeast	100	118	140	199
South Central	100	122	146	186
Great Plains	100	120	135	158
Pacific Northwest	100	122	143	163
Pacific Southwest	100	113	125	139

1/ Bureau of Agricultural Economics - Compiled from State data comprising national summary as given in Number and Duty of Principal Farm Machines - Brodell, A. P. and Cooper, M. R., November 1944.(Processed).
2/ A milking machine refers to all milking units served by one vacuum pump.

effective demand, including exports, for milk and its products in 1944 and 1945 at the level of retail dairy-product prices then prevailing. The extremely high consumption resulted principally from three factors:

(1) Additional expenditures for dairy products by former low-income families whose purchasing power was materially strengthened under conditions of virtually full employment and higher wages.

(2) Control over the rise in retail prices by ceilings established after May 1942 on various commodities including dairy products.

(3) Government procurement of dairy products for the armed services at home and abroad, for relief purposes in liberated areas, and for allied requirements under Lend-Lease.

Consumer Purchasing Power

National income in 1944 and 1945 was more than twice that of the prewar period. Factory payrolls reached their highest level in 1944, 260 percent of the 1935-39 average. That the factory payroll per employed worker in that same year was only 109 percent greater than prewar suggests the great increase in the number of people employed by factories geared to the production of the wartime economy. There was substantially full employment during the war.

A high level of productive employment is necessary for the maintenance of a profitable market for dairy and other agricultural products. Families with moderate incomes consume, on the average, considerably more milk and milk products per capita than do those with low incomes; and high-income families consume appreciably more than do those in families of moderate income (table 12, appendix). Per capita consumption of fluid milk in 1941 in families whose annual income was $5,000 or more was three times that of persons in families with an income of $500 or less; the consumption of butter, three times as much; cheese, twice as great; cream, 40 times; and ice cream, 14 times as much. The data suggest that lower-income groups, although inclined toward a higher consumption rate of canned milk, prefer to shift to greater consumption of fresh milk and other higher cost products when their incomes permit.

Retail Prices

Price ceilings imposed on several foods, including dairy products, in October 1942, curtailed increases in retail prices during the war years. Retail prices of dairy products rose less in relation to prewar levels than did the average of all foods (table 19, appendix). Price control, coupled with rationing in many instances, resulted in percentage increases of prices of certain staple foods that were smaller than the

percentage increase in consumer incomes. Consequently, the demand for unrationed foods with no ceiling prices increased more than would otherwise have been the case.

Several factors contributed toward making price ceilings effective on dairy products. Subsidies were paid by the Government, as discussed earlier. They consisted of those for cheese, butter, and the purchase-and-resale program which involved fluid milk and cream in certain large metropolitan sales areas as well as payments to farmers. An order, effective February 1, 1943, enabled handlers and distributors of fluid milk and cream to offset partially the rise in marketing costs. Every-other-day retail delivery, elimination of small-quantity wholesale deliveries and callbacks, and other measures were invoked to conserve manpower, trucks, tires, and gasoline.

Timeliness in buying, under the Government procurement program, was important to the maintenance of price control. Purchases for the armed forces, rehabilitation, and Lend-Lease programs were greatest in the seasons of flush milk production, and least when production was at low ebb. Consequently, from current production, the month-to-month supplies of dairy products available for civilian use were maintained at rather constant levels. Government procurement of specified dairy products involved the issuance in late 1942 of the first of a series of "set-aside" orders to processors. The processors to whom the orders applied, those whose production was at or above a certain monthly or annual minimum, were required to set aside each month a certain specified proportion of their month's production for sale to designated agencies of the Government. If not sold directly to such designated agencies, the quantities set aside could be sold to authorized receivers or assemblers who, in turn, would set aside equivalent quantities to be sold to such agencies. The proportions were modified from time to time, not only in accordance with the seasonal swings in milk production but with respect to changes in civilian, military, and Lend-Lease requirements. The first of the set-aside orders, issued November 5, 1942, pertained to spray-process dried skim milk. The order applying to butter went into force February 1, 1943. The cheddar-cheese set-aside order became effective February 15. On June 1, the order requiring the set-aside of both roller-and-spray-process dried skim milk replaced the order of 7 months earlier, and on March 1, 1944, an order became effective limiting the sales by processors of dried milk other than dried skim milk to domestic commercial buyers.

Exports

The United States changed during the war from a net importer to a net exporter of dairy products. Total exports from this country in 1935-39, which consisted chiefly of canned milk, were equivalent to about one-tenth of 1 percent of the milk produced for human consumption. In 1944, due to Lend-Lease, military, and rehabilitation requirements, exports of butter, cheese, and canned and dried milk were equivalent to

5.5 percent of milk production. This was equivalent to an increase in exports from about 140 million pounds of whole milk to 6,500 million pounds.

Exports of butter were significant in only the last three war years. In 1943, when the peak net export of butter was 97 million pounds, nearly 5 percent of the total production was sent abroad. In 1935-39, annual imports of butter exceeded exports by about 8 million pounds, and less than one-tenth of 1 percent of production was exported (tables 20 and 21, appendix). Russia, under Lend-Lease, was the recipient of most of the butter exported.

Net exports of cheese reached their peak in 1944 at 292 million pounds, with about 30 percent of production exported. In the prewar period, annual imports of cheese exceeded exports by 54 million pounds. Total exports comprised only three-tenths of 1 percent of production, excluding cottage, pot, and bakers' cheese, in 1935-39. Great Britain was the principal market outlet for cheese during the war, although the armed forces also received substantial quantities.

Exports of canned milk increased sharply during the war. Net exports of evaporated milk increased from an average of 26 million pounds in 1935-39 to over one-half billion pounds in each of the last three years of the war. This was an increase from more than 1 percent of production to about one-sixth of total output. Condensed milk exports, on a net basis, increased from less than 4 million pounds prewar to 122 million pounds in 1945. The rise in exports of condensed milk, which was due largely to Russian purchases, increased the proportion of production exported from about 2 percent before the war to 35 percent in 1945.

Dried-whole and dried-skim milk exports also were increased greatly in the war years. Whereas net exports of dried whole milk in 1935-39 averaged 1.0 million pounds, in 1945 the net export was 67 million pounds when nearly 31 percent of production was sent to other countries. Net exports of dried skim milk, the production of which had expanded sharply during the war owing to favorable prices and the establishment of additional drying facilities in the intensive farm-separated cream areas of the Midwest, increased from 10 million pounds in 1940 to 254 million pounds in 1944. Total exports in that year were about 44 percent of production.

In the last three decades, net exports of butter and cheese from this country have been of consequence only during the periods of World War I and World War II. Exports of canned milk, however, have exceeded imports each year since World War I, during which time the United States became a large exporter of evaporated and condensed milk as it did in World War II. Exports of dried whole and dried skim milk were not of great importance before the recent war.

CIVILIAN CONSUMPTION OF MILK AND MILK PRODUCTS

Average per capita civilian consumption of milk and dairy products on a whole-milk equivalent basis for the period 1940-44 was almost exactly the same as 1935-39, and only 1 percent less than the average for the 20-year period 1924-43 (table 22, appendix).

Although the average per capita civilian consumption of 803 pounds during the war period was the same as in 1935-39, it ranged from a high of 839 pounds in 1942 to a 20-year low of 761 pounds in 1943. A decrease in production from the previous year, in addition to the increased exports for military and Lend-Lease needs, resulted in smaller quantities being available for civilian use in 1943.

Of significance was the change in the form in which butterfat was consumed during the war period. A greater share of the per capita consumption of butterfat was in fluid milk and cream thereby increasing the consumption of nonfat solids. A sharp rise in the consumption of fluid milk and cream was made possible by the marked shifts by producers from the sale of farm-separated cream to that of whole milk (table 13, appendix). In the prewar period, the per capita consumption of fluid milk and cream averaged 340 pounds of whole milk equivalent annually (table 23, appendix). Successive increases throughout the war years brought the rate to 438 pounds in 1945, a gain of 29 percent. At the same time the consumption of butter declined steadily from a prewar average of 16.7 pounds per capita to 10.9 pounds in 1945, the lowest rate in more than 75 years. This drop of 35 percent in domestic consumption of butter was inevitable in view of the greater wartime use of whole milk and whole-milk products, and with approximately 5 percent of the total butter production shipped abroad under Lend-Lease in 1943 and 1944. Consumption of cheese per capita averaged slightly higher in 1940-44 than prewar when the average was 5.5 pounds per person. Except in 1944, the annual consumption rate of evaporated and condensed milk was above the prewar average of 16.7 pounds per year, and for the whole period 1940-44 the rate was 8 percent higher than the 1935-39 rate. Consumption of ice cream rose sharply. From a prewar level of nearly 24 pounds milk equivalent, the consumption rate rose to the all-time high of 38.5 pounds in 1942, dropped sharply in 1943, due to restrictions imposed on its manufacture, but rose again to 29.5 pounds in 1945 when greater supplies of nonfat solids were made available.

To "stretch" the available supplies of butterfat, retail sales of cream with a butterfat content in excess of 19 percent were prohibited as of November 25, 1942. An ice-cream order issued a week later limited the quantity of total butterfat and nonfat solids used in frozen-milk desserts and mixes for civilian consumption.

A more nearly equitable distribution of dairy products among civilians, in the face of short supplies, was assured by rationing, which was inaugurated in 1943. Butter and cheese, except certain specified types, were rationed beginning March 29. On June 2, the rationing program was extended to include condensed and evaporated milk. All of the soft perishable cheeses, except cottage, pot, and bakers' containing 5 percent or less butterfat, were included as of June 6. Fluid milk and cream were not rationed but their consumption was restricted by another device to ensure a certain minimum of milk supplies for the manufacture of products necessary for export. An order was issued, effective September 10, 1943, which provided for the establishment of milk-sales areas, base periods, quotas, and quota periods for the sale of fluid milk, fluid cream, and fluid milk byproducts. The supplementary local orders, which applied to specific market areas, through which the general order was administered, became effective at various dates throughout the 7 months subsequent to October 4, 1943. The order was in effect in 140 fluid-milk sales areas throughout the country. Consumer rationing of butter, cheese, and canned milk was ended within a few months following the cessation of hostilities in the Pacific.

PROBABLE FUTURE TRENDS IN MILK PRODUCTION

Production of milk on farms in the United States will continue upward. The rate at which it will increase will be influenced by: (1) future levels of employment and national income; (2) population growth; (3) the effectiveness of consumer-education programs in increasing the demand for milk and dairy products; (4) the profitableness of dairying relative to other livestock enterprises; (5) the extent to which the efficiency of milk production is increased; and (6) the pattern of utilization of nonfat solid supplies.

If all of the foregoing factors were favorable, and assuming normal weather, a reasonable supply of farm labor and machinery, and sufficient seeds, lime, and fertilizers, the annual production of milk on farms might reach 140 to 150 billion pounds by 1955.

Even with relatively unfavorable economic conditions, production of milk on farms likely will increase. Production in all regions probably will continue to expand, but the rate at which expansion will take place will vary among regions.

The Northeast probably will continue to increase its production at a slower rate than the Lake States and Corn Belt. In many areas of the Northeast the small and irregular fields do not lend themselves well to widespread mechanization. The incentive to produce much milk over and above the quantities needed for the nearby fluid-milk markets is not great. Feed costs are high, and it is difficult for a greater production to compete with the lower-cost milk-producing areas of the Lake States and Corn Belt. In fact, a greater production of milk powders, ice-cream mixes, and other dairy products in the dairy-product manufacturing regions

probably will compete more effectively in the Northeastern markets in the future than have manufactured products in the past.

It seems likely that production in the Lake States may for a time increase at a more rapid rate than production in the other two major dairy regions. If a greater share of the milk produced in these States can enter the more distant and more profitable fluid-milk and cream markets, the likelihood will be even greater. The widespread adoption of higher yielding oats and of hybrid corn, which has moved northward the upper limits of the Corn Belt, has enabled farmers in the Lake States to produce greater quantities of feed grains than were produced 5 or 10 years ago.

In the Corn Belt, too, dairymen may produce an increasing share of the country's milk supply in coming years. In the war period, farmers in this region maintained their share of the total milk supply despite their increased production of beef, hogs, and poultry, at the same time that pasture acreage was decreased because of an expansion in certain crops, notably soybeans. Less emphasis should be given to intertilled crops in future years, with more land devoted to hay and pastures. This, together with the traditional surplus production of feed grains, probably will result in increased numbers of dairy and beef cattle in the Corn Belt.

It appears unlikely that production of milk in the Great Plains will expand as rapidly as in most of the other regions. Much will depend upon the need for wheat and the degree to which wheat land will be converted to grass.

A continued rapid expansion of milk production probably will come about in the next decade in the Pacific Northwest and in the Pacific Southwest. If a large proportion of the population that migrated to the West Coast during the war chooses to remain there permanently, the long-time demand for milk and cream would be considerably augmented. The potentiality for greatly increasing the production of high-quality alfalfa hay and pasture in certain newly irrigated areas of these States is a favorable factor on the production side. Production of milk almost entirely from alfalfa hay and pasture permits the sale of milk at lower prices that still yield a margin of profit to producers.

Future increases in the production of milk in the Southeast and South Central regions will depend considerably on alternative uses of land previously in cotton production, and the extent to which the war-time expansion in acreage of peanuts is maintained in some areas. The best use of some lands would involve conversion to a grass-and-livestock economy, in which dairying very probably would play an important part. If the South becomes industrialized to the extent of providing nonfarm economic opportunities for many of the people who will not be needed on farms with the gradual mechanization of cotton production, dairying may expand in many areas to supply growing needs for fluid milk. At present,

dairying in the South is handicapped by a lack of good pastures and home-grown feed grains, but potentialities exist in many areas for the production of ample quantities of hay, pasture, and winter grains for feed. Annual grasses and legumes may be the foundation for the development and maintenance of more commercial dairying in the South. Any expansion of commercial dairying for the manufactured dairy-products market will meet with keen competition from the low-cost areas of the Corn Belt and the Lake States. Improvements in milk-processing techniques, refrigeration, and rail, truck, and air transportation will intensify this competition, although probably not to the extent that it will preclude a significant expansion in dairying. Even apart from the usual advantages to be derived from expanding the commercial production of milk, the South, more than any other section of the country, would benefit greatly from increased milk production for home consumption on farms.

In the Appalachian region, certain areas are well adapted to an appreciable expansion in production of milk. Capacity to increase the production of forage crops and grains, an ample supply of labor, and a type of farming with which dairying can be readily integrated, point toward the increased relative importance of milk production in that area.

Readjustments in Transition Years

Dairy farmers, like producers of other agricultural products, face adjustments in the next several years. Domestic demand is not expected to be large enough to absorb declines in the exports of dehydrated and canned milks that might come once the relief-feeding period is ended and military demands are further curtailed. This will necessitate adjustments at the processing level, particularly in the Lake States and the Corn Belt. Shifts in population from military-installation and war-industry centers, as their activities have diminished, have affected and will continue to affect the operations of dairy farmers in the particular areas where these changes occur.

Maintaining domestic demand, and whatever portion of war-expanded exports that can be sold competitively in world markets, are important considerations for dairymen. A sudden return to conditions approximating prewar might mean substantial price declines. Price protection is offered to a degree by the legislation providing for the support of milk and butterfat prices at not less than 90 percent of parity until January 1, 1949. However, a price for dairy products of 90 percent of parity would mean a price reduction of about one-third from the average prices, including production payments, for 1945, assuming no change in the parity index.

Need for Increased Efficiency in Producing Milk

Dairymen can help to assure themselves of continued profitable operation through intensive efforts to reduce production costs per unit of product. This can best be achieved by:

(1) Producing more and better roughage, pasture, and feed grains.

(2) Improving feeding practices.

(3) Increasing output per worker.

(4) Improving breeding practices.

(5) Using more effective sanitation and disease-control measures.

Roughage, Pasture, and Feed Grains

An abundance of home-produced, high-quality roughage is a basic essential to low costs in the production of milk. The displacement of grasses with legumes usually will insure not only a greater quantity of hay, but hay with a higher nutritive value. Moreover, legume hays help to improve soils. Production of more alfalfa, clover, lespedeza, soybean, and Kudzu hays will tend to minimize the need for buying large quantities of high-protein concentrates. High-quality succulent roughages, whether corn silage, sorghum- or green-hay silages, add variety and palatability to total rations of dairy cows. Hybrid corn has improved considerably the nutritive quality of corn silage throughout many of the major dairy States, and this should be an added inducement for the production of more of this roughage. The ensiling of newly cut legume hays in areas where, because of frequent rains and high humidity, it is difficult to cure hay properly may be the means of conserving large quantities of feed nutrients that would otherwise be lost because of undue exposure of hay to weather. The proper use of barnyard manure, lime, phosphates, and potash is important to a high level of roughage production.

Perhaps no single crop offers so much opportunity for raising milk production on farms as does pasture. Pastures often suffer from neglect. Well-defined pasture programs, involving carefully planned systems of integrating rotation with permanent pastures to insure ample grazing throughout 5 or 6 months of each year, are possible on a large number of dairy farms. Periodic reseeding, liming, and fertilizing of permanent pastures may double or even triple their production. The careful selection of adapted varieties of legumes and grasses, and various mixtures, in addition to liming and fertilization, are essential to the maintenance of high yields from both permanent and supplemental pastures.

Production of corn, oats, and barley is an important part of the successful operation of a dairy farm in many areas. It may reduce the need to buy high-protein concentrates, especially when the dry roughage fed to milk cows consists of generous quantities of high-quality legume hays.

A high level of feed-grain production entails the use of good quality seeds and the proper application of barnyard manures, lime, and commercial fertilizers.

Scientific Feeding

The greatest opportunity to increase production per cow within a short-time period on most farms lies in the proper feeding of milk cows. Proper feeding means the use of balanced rations, and feeding a cow in accordance with her production. A common and costly fault in the management of most dairy herds is underfeeding the potentially high-producing cows and over-feeding the low producers. The practice of scientific feeding is predicated on knowledge of what individual cows are doing, how much milk and how much butterfat they are producing each day, each month, and each year. This involves frequent testing and maintenance of records, such as the services which are provided by the Dairy Herd Improvement Associations throughout the country. Only through the best use of available roughage and grain supplies, in addition to the wise purchase of feed supplements, can a dairy farmer obtain the maximum profit from his dairy herd.

Increasing Output per Worker

Many dairy farmers could conduct their activities more profitably by adjusting their dairy operations to produce a greater quantity of milk per man-hour of labor devoted to the dairy enterprise. This may entail steps to mechanize the farm more fully,to re-arrange the dairy barn to make it more convenient, and thus to dispense with the services of a hired hand. It may involve enlarging the dairy herd to utilize more fully the labor available and at the same time to provide profitable outlets for surplus roughages and feeds. It might be desirable to cull the herd of the least profitable cows and to maintain a smaller herd so that each cow can be allowed a greater quantity of home-grown roughage in preference to dividing the usual home-produced supply among a larger number of cows. The adoption of tractor power, and a full line of the needed tractor machinery, may displace from two to eight horses, thereby releasing barn space and reducing total feed requirements so that additional cows may be added. More cropland can be prepared, more crops sown, cultivated, and harvested per man-hour, when a farm is fully mechanized. Greater timeliness of operations permitted by greater mechanization results in greater crop production and better quality of crops harvested. Machine milking, combined with the recently popularized "fast" milking methods can also bring about greater output of milk per unit of labor.

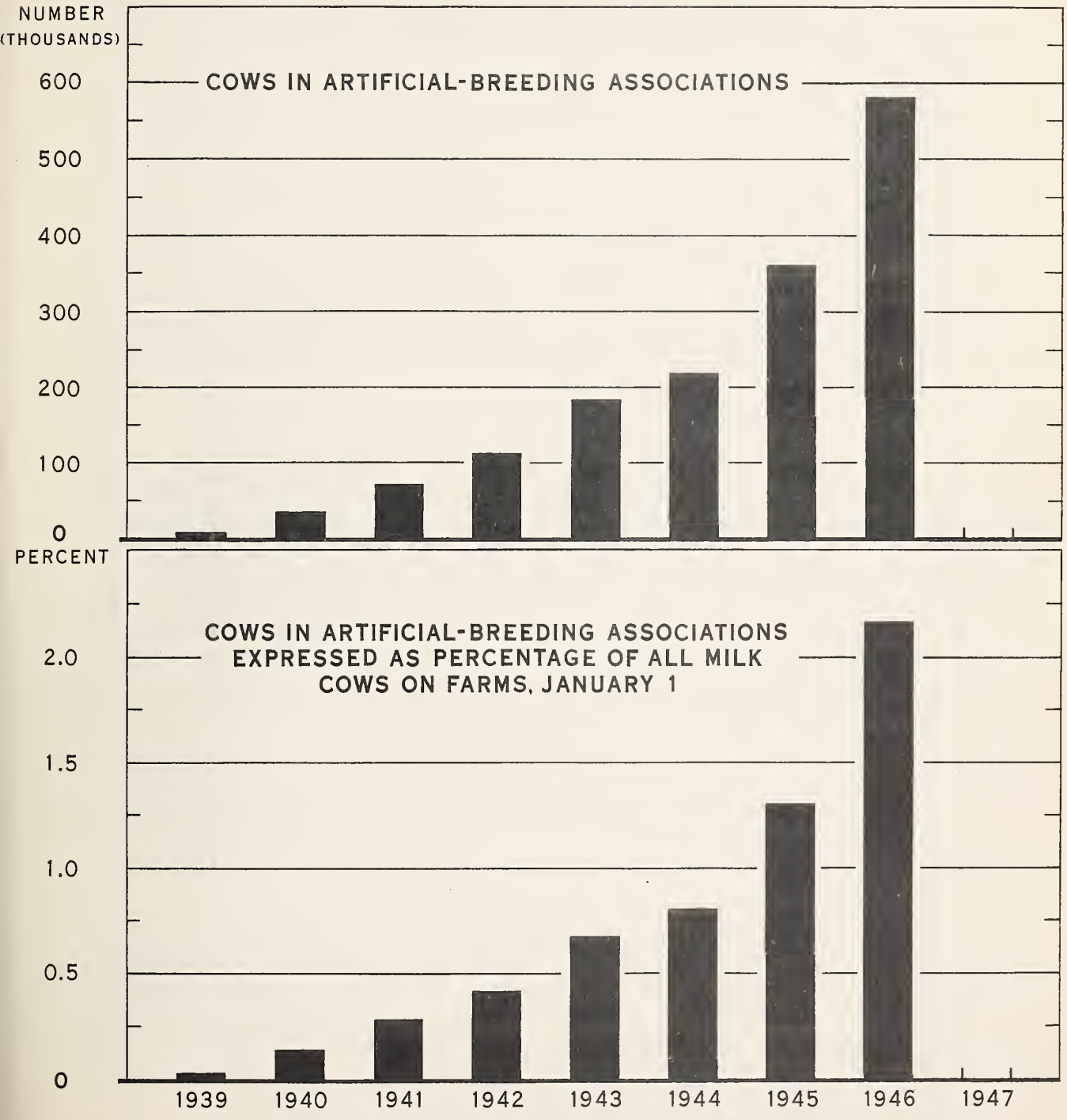
Scientific Breeding

Further improvement in the inherent productive capacity of milk cows is essential to increasing efficiency in the production of milk. An effort on the part of each farmer to determine the production of all of his cows individually, then to cull the unprofitable or low producers, replacing them with better cows, would go far toward decreasing costs of producing milk. The various dairy-cattle breed organizations and the Agricultural Extension Service, through the Dairy Herd Improvement Associations, have been highly effective in helping farmers achieve a profitable operation of the dairy enterprise. They have brought to them and helped them adopt the broad principles upon which scientific breeding is based, namely; careful selection and careful mating of dairy cattle. Today, many dairy farmers have an opportunity to mate their milk cows, at a nominal cost, to sires with proven ability to transmit to their offspring improved production capacity. The artificial-breeding program, which has grown steadily since 1938 when it was begun in the United States (tables 24, 25, 26 appendix; fig. 4), may benefit the herds of those producers who avail themselves of the services offered. The promise which such a program holds forth cannot be lightly dismissed. The effectiveness of a proved sire is no longer restricted to the breeding of some 40 to 60 cows annually on 1 to 3 farms in a single rural community. Today, owing to the techniques of artificial breeding, a sire may be mated to from 600 to 1,500 cows in a year. The effects of improved breeding are extended geographically. And the time required to improve markedly the productive capacity of the average cow is materially reduced. One authority has stated that if artificial-breeding service were made available to every milk-producing area in the country and a large portion of the dairy cattle in each area were included in the program, it is highly probable that the average production of all cows could be raised by as much as 500 pounds of milk per year within two or three generations, or 5 to 10 years. 6/

Cross-breeding of dairy animals may be a practical means of stepping up milk production in herds for which production records have been kept for a period of time. Recent experiments 7/ have indicated substantial possibilities in this direction. The daughters of first-generation crosses tested thus far have achieved a level of production approximately 20 percent above that which would be expected on the basis of the records of sire and dam. There are possibilities of increasing the productive capacity even further by the introduction of a third breed in a second-generation cross, although a broader experimental basis is required before possibilities can be adequately appraised. The practical application of these findings to commercial dairying probably would develop slowly, although this process would be expedited by the growth of artificial breeding associations.

6/ Bureau of Dairy Industry - From memorandum by Dr. J. F. Kendrick, Head, Division of Dairy Herd Improvement Investigations, to the writer.
7/ A Cross Breeding Experiment with Dairy Cattle, Fohrman, M. H. Bur. Dairy Indus. May 1946 (Processed).

DAIRY CATTLE: NUMBER OF COWS ENROLLED IN COOPERATIVE ARTIFICIAL-BREEDING ASSOCIATIONS IN THE UNITED STATES, AND PERCENTAGE OF NUMBER OF COWS AND HEIFERS 2 YEARS OLD AND OVER KEPT FOR MILK ON FARMS, JANUARY 1, 1939-46



U.S. DEPARTMENT OF AGRICULTURE

Figure 4

NEG. 46236 BUREAU OF AGRICULTURAL ECONOMICS

Sanitation and Disease Control

The production of high-quality milk under conditions of cleanliness is a major requisite to obtaining and maintaining the most profitable market outlets for dairy products. But even aside from the production of a quality product to protect the interest of the consumer, the producer's laxity in exercising sanitation precautions in managing his herd may greatly affect the profitableness of his dairy enterprise. The prevalence of infectious mastitis in the herds of thousands of producers probably costs dairymen millions of dollars annually. Bang's disease, also, is cutting severely into the returns of milk producers. Dairymen whose herds are free from these contagions cannot afford to relax their precautions. Federal-State programs to decrease the incidence of Bang's disease were effective until retrenchments in the program were necessary. New means of treating certain types of mastitis infection may prove highly effective in some instances. But basically, the effectiveness of any attempt to curb and control the spread of mastitis and infectious abortion in herds - as was also true in the fruitful fights against cattle-tick fever and tuberculosis - depends to a large degree upon the precautions exercised by individual dairymen.

MILK AND THE NATIONAL WELFARE

Whole milk is a nearly perfect food. It contains complete proteins, readily digestible fat, carbohydrates, and several essential minerals and vitamins. A high rate of consumption of milk and whole-milk products is conducive to excellent body growth, development of bone structure, and teeth in children and youths. The protective qualities of milk and dairy products build resistance to diseases for people of all age groups who daily consume the recommended minimum quantity of whole milk or its equivalent. A high per capita consumption of good-quality milk and whole-milk products by a large proportion of a people is a big step toward achievement of a high health standard.

School-lunch programs in the United States, with their emphasis on milk products, have provided highly nutritive lunches for thousands of children who are least able to afford them. A far-reaching expansion of this program would contribute to the physical growth, health, and happiness of millions of children through the elimination or reduction of malnutrition.

The emphasis on milk and dairy products in some of the in-plant feeding programs, provided by some manufacturers for their employees during the war, proved a good investment. It is probable that in-plant feeding will become increasingly popular in the years ahead and that a growing interest in the greater use of dairy products will be in evidence.

Food-stamp or food allotment plans which within the last decade enabled families with incomes below certain levels to obtain specified foodstuffs at reduced costs, have proved workable. Inclusion of dairy products under any such future plans, would result in increased consumption by many people who otherwise, because of financial circumstance, might be denied their use.

Low distribution costs, if they reduce retail prices, are conducive to a high level of milk consumption. Every-other-day delivery, the elimination of call-backs, a minimum duplication of truck routes, and consumer discounts on quantity purchases, are stimulants to lower costs of distribution and to higher rates of consumption. A differential between the price of milk sold in stores and that delivered to the home enables consumers to "stretch" the purchasing power of their dollars expended for dairy products.

An effective program of consumer education, sponsored by public and private agencies, has accomplished much in developing an increased public awareness of the nutritive qualities and palatableness of dairy products. Considerably more can be done. The effectiveness of greater stress on the use of nonfat solids in the future will prove beneficial to consumers as well as producers who are faced with the prospect of a shrinking export demand for certain whole-milk products and nonfat solids.

Hope for immediate development of permanent export markets is small. This country has not normally had a large foreign market for dairy products. Only in time of war, over the last 45 years, have our exports appreciably exceeded imports. It would seem, however, that if the barriers that presently restrict international trade can be lowered, low production costs may enable dairy farmers profitably to exchange some milk products for goods that foreign consumers would like to market in the United States.

A high level of domestic employment holds the greater promise for a continued profitable market for dairy products. Expenditures for dairy products are directly related to consumer incomes. If high production of industrial and agricultural products continues in the United States in the years ahead, by 1955 this country might require the production of 140 billion pounds or more of milk on farms for domestic consumption alone.

Future expansion of dairying, on a sound economic basis, should prove highly desirable from a national point of view. Economies in production resulting from increases of efficiency in producing roughages, feed grains and pastures - owing to improved plant breeding, greater mechanization, liming, and fertilization - may be reflected in lower costs of dairy products to consumers, without decreasing returns to producers.

Conservation of natural resources is one objective of progressive nations. Soil-conservation programs normally seek to reduce the proportion of land devoted to intertilled crops and to increase the proportion of acreage in sod crops. The cornerstone of continued successful dairying is the production of soil-building leguminous hays and pastures. Application to the fields of the animal manures produced, supplemented by adequate quantities of lime and commercial fertilizers, maintains and adds to the fertility of the soil.

High labor requirements are characteristic of dairying. Hence, an expansion of dairying in areas where one-crop farming is dominant would mean new farm-employment opportunities. This would result also in greater community stability and solidarity.

Table 12.- Per capita consumption of dairy products in farm and nonfarm families, by income level, United States, 1941 1/ 2/

Dairy product	Under $500	$500-$999	$1,000-$1,499	$1,500-$1,999	$2,000-$2,999	$3,000-$4,999	$5,000 and over
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
			FARM FAMILIES				
Fluid milk	432.7	503.2	536.6	576.0	594.7	585.2	608.7
Butter	11.7	14.3	15.3	16.3	15.9	18.1	15.6
Cheese	1.8	2.7	4.7	6.4	6.4	6.5	6.8
Cream	8.7	9.8	15.8	15.2	17.3	18.1	24.9
Ice cream	1.1	2.4	3.9	4.6	6.0	7.6	8.2
Evaporated and other	5.1	6.5	9.7	11.5	14.0	8.5	31.7
			NONFARM FAMILIES				
Fluid milk	116.0	205.8	264.8	265.9	285.0	305.5	354.9
Butter	7.2	12.1	13.8	15.4	16.6	17.7	20.6
Cheese	5.3	6.1	7.1	8.6	9.7	10.4	11.4
Cream	0.8	1.9	5.1	8.2	12.1	18.8	31.9
Ice Cream	2.4	7.2	11.4	15.3	19.1	22.8	10.8
Evaporated and other	14.7	23.7	21.1	19.8	17.2	13.1	10.8

1/ BAE, W. W. Cochrane, High Level Food Consumption in the United States, U.S.D.A., Misc. Pub. 581, 1945.
2/ Excludes military personnel and institutional groups.

Table 13.- Milk produced on farms: Quantities marketed as whole milk at wholesale, and as cream, United States, average 1935-39 and 1945 1/

Item	Unit	1935-39 average	1945 2/
Production on farms	Mil. lb.	103,624	122,219
Marketed as:			
(a) Whole milk (wholesale)	"	40,270	69,355
Percentage of production	Percent	39	57
Percentage of 1935-39 average	"	100	172
(b) Cream	Mil. lb.	32,165	25,537
Percentage of production	Percent	31	21
Percentage of 1935-39 average	"	100	79

1/ BAE - Computed from data contained in series Farm Production, Disposition, and Income from Milk.
2/ Preliminary.

Table 14.- Milk cows: Average number during year on farms, United States and regions, averages 1920-44, annual 1919 and 1940-45 1/

Period or year	United States	Northeast	Lake States	Corn Belt	Appalachian	Southeast	South Central	Great Plains	Pacific Northwest	Pacific Southwest
	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands	Thousands
1919	19,890	3,400	3,795	4,167	1,632	1,305	2,047	2,555	547	644
Average:										
1920-24	20,536	3,575	4,047	4,300	1,710	1,280	2,011	2,535	578	701
1925-29	21,369	3,149	4,145	4,639	1,758	1,260	2,155	2,859	640	806
1930-34	25,958	3,278	4,535	5,221	1,996	1,482	2,625	3,205	759	859
1935-39	25,548	3,249	4,547	5,125	2,038	1,481	2,698	2,775	761	879
1940-44	24,958	3,368	4,968	5,336	2,167	1,511	2,951	2,845	840	991
1940	23,684	3,314	4,705	5,080	2,022	1,426	2,736	2,684	785	934
1941	24,561	3,359	4,830	5,235	2,085	1,455	2,835	2,781	812	977
1942	25,167	3,367	4,992	5,382	2,184	1,513	2,975	2,898	854	1,002
1943	25,665	3,368	5,132	5,458	2,247	1,566	3,044	2,962	875	1,011
1944	25,915	3,455	5,181	5,527	2,298	1,597	3,067	2,901	878	1,031
1945 2/	25,519	3,442	5,147	5,444	2,247	1,590	3,042	2,714	844	1,049
	Index numbers (1935-39 = 100)									
1919	84	105	84	81	80	88	76	85	72	73
Average:										
1920-24	87	104	89	84	84	86	75	91	76	80
1925-29	91	97	91	91	85	85	80	102	84	92
1930-34	102	101	100	102	98	100	97	116	97	98
1935-39	100	100	100	100	100	100	100	100	100	100
1940-44	106	104	109	104	106	102	109	103	110	113
1940	101	102	104	99	99	96	101	97	103	106
1941	104	103	106	102	102	98	105	100	107	111
1942	107	104	110	105	107	102	110	104	112	114
1943	109	104	113	106	110	106	113	107	115	115
1944	110	106	114	108	113	108	114	105	115	117
1945	108	106	113	106	110	107	113	98	111	119

1/ Data for 1919-23 derived from Trends in Size and Production of the Aggregate Farm Enterprise, 1909-36, Works Progress Administration, National Research Project (1938); all other data from B.A.E. series on Farm Production, Disposition and Income from Milk (processed).
2/ Preliminary.

Table 15.- Milk: Production per cow on farms, United States and regions, averages 1920-44, annual 1919 and 1940-45 1/

Period or year	United States	Northeast	Lake States	Corn Belt	Appa-lachian	Southeast	South Central	Great Plains	Pacific Northwest	Pacific Southwest
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1919	5,710	4,588	4,545	5,626	5,172	2,568	2,305	5,400	4,644	4,790
Average:										
1920-24	5,975	4,805	4,690	5,892	5,296	2,526	2,659	5,574	4,954	5,156
1925-29	4,457	5,272	5,269	4,243	5,755	5,052	5,232	5,946	5,568	5,755
1930-34	4,289	5,201	5,067	4,175	5,410	2,947	5,058	5,902	5,455	6,020
1935-39	4,400	5,359	5,250	4,256	5,518	5,011	5,095	5,888	5,701	6,192
1940-44	4,655	5,615	5,589	4,574	5,661	5,067	5,096	4,256	5,847	6,506
1940	4,624	5,560	5,550	4,555	5,589	2,979	5,120	4,212	5,904	6,497
1941	4,741	5,666	5,709	4,659	5,701	5,075	5,225	4,365	5,957	6,487
1942	4,758	5,765	5,715	4,656	5,720	5,098	5,120	4,363	5,865	6,478
1943	4,604	5,549	5,549	4,525	5,640	5,071	5,015	4,252	5,701	6,472
1944	4,575	5,634	5,449	4,521	5,652	5,165	5,014	4,090	5,820	6,592
1945 2/	4,789	5,760	5,791	4,802	5,855	5,175	5,059	4,204	5,905	6,714
	Index numbers (1935-39 = 100)									
1919	84	86	85	85	90	79	74	87	82	77
Average:										
1920-24	90	90	89	91	94	84	85	92	87	85
1925-29	101	98	100	100	106	101	104	102	98	95
1930-34	98	97	96	98	97	98	98	100	96	97
1935-39	100	100	100	100	100	100	100	100	100	100
1940-44	106	105	106	108	104	102	100	110	105	105
1940	105	104	105	106	102	99	101	108	104	105
1941	108	106	109	109	105	102	104	112	104	105
1942	108	108	109	109	106	103	101	112	103	105
1943	105	104	106	106	104	102	97	109	100	104
1944	104	105	104	106	104	105	97	105	102	106
1945	109	108	110	113	110	105	99	108	104	108

1/ Data have been computed from tables 1 and 16, or obtained from sources indicated in them.
2/ Preliminary.

Table 16.- Milk cows and annual production per cow on farms by major dairy regions as percentage of the United States, averages 1920-44, annual 1940-45 1/

Period or year	United States	Percentage of United States in: Northeast	Lake States	Corn Belt	Other
	Thousands	Percent	Percent	Percent	Percent
		NUMBER OF MILK COWS			
Average:					
1920-24	20,536	16.4	19.7	21.0	42.9
1925-29	21,369	14.7	19.4	21.7	44.2
1930-34	23,938	15.7	18.9	21.8	45.6
1935-39	25,548	13.8	19.3	21.8	45.1
1940-44	24,958	13.5	19.9	21.4	45.2
1940	23,684	14.0	19.9	21.4	44.7
1941	24,361	13.8	19.8	21.5	44.9
1942	25,167	13.4	19.8	21.4	45.4
1943	25,663	13.1	20.0	21.3	45.6
1944	25,913	13.2	20.0	21.3	45.5
1945 2/	25,519	13.5	20.2	21.3	45.0
	Pounds	Percent	Percent	Percent	Percent
		PRODUCTION PER COW			
Average:					
1920-24	5,975	121	118	98	85
1925-29	4,457	119	119	96	88
1930-34	4,289	121	118	97	87
1935-39	4,400	122	119	97	87
1940-44	4,655	121	120	98	86
1940	4,624	120	120	98	86
1941	4,741	120	120	98	86
1942	4,738	122	121	98	85
1943	4,604	121	121	98	86
1944	4,575	123	119	99	86
1945 2/	4,789	120	121	100	84

1/ Computed from tables 14 and 15, Appendix.
2/ Preliminary.

Table 17.- Parity prices and actual prices received by farmers for milk sold at wholesale, and butterfat sold as cream, United States, averages for selected periods, annual 1914-25 and 1940-45, with actual prices as percentage of parity 1/

Period or year	Milk prices					Butterfat prices				
	Parity	Actual				Parity	Actual			
	Price per 100 pounds	Price per 100 pounds 2/		Percentage of parity		Price per pound	Price per pound 2/		Percentage of parity	
		Without payments 3/	With payments 3/	Without payments 3/	With payments 3/		Without payments 3/	With payments 3/	Without payments 3/	With payments 3/
	Dollars	Dollars	Dollars	Percent	Percent	Cents	Cents	Cents	Percent	Percent
Average:										
1909-14 4/	1.60	1.60	-	100	-	26.3	26.3	-	100	-
1914-18	2.10	2.09	-	100	-	34.4	33.5	-	97	-
1935-39	2.05	1.81	-	88	-	33.7	29.1	-	86	-
1940-44	2.36	2.61	2.74	111	116	38.8	40.9	42.6	105	110
1914	1.65	1.65	-	100	-	26.8	25.9	-	97	-
1915	1.71	1.61	-	94	-	28.1	26.3	-	94	-
1916	2.00	1.76	-	88	-	32.9	30.0	-	91	-
1917	2.37	2.42	-	102	-	38.9	38.5	-	99	-
1918	2.77	3.01	-	109	-	45.5	46.7	-	103	-
1919	3.17	3.32	-	105	-	52.1	54.2	-	104	-
1920	3.23	3.23	-	100	-	33.1	33.9	-	103	-
1921	2.64	2.33	-	88	-	43.4	38.4	-	88	-
1922	2.62	2.14	-	82	-	43.1	36.6	-	85	-
1923	2.67	2.50	-	94	-	43.9	43.2	-	98	-
1940	2.00	1.84	-	92	-	32.9	28.5	-	87	-
1941	2.11	2.21	-	105	-	34.7	34.3	-	99	-
1942	2.40	2.62	-	109	-	39.4	40.3	-	103	-
1943	2.59	3.12	3.25	120	125	42.6	50.3	51.4	118	121
1944 5/	2.71	3.25	3.78	120	139	44.6	50.6	58.2	113	130
1945 5/	2.78	3.22	3.79	116	136	45.6	50.4	63.3	111	139

1/ Bureau of Agricultural Economics - From monthly series Agricultural Prices (processed).
2/ Simple average of monthly prices received by farmers throughout the year.
3/ Dairy-production payments paid on milk and butterfat as cream sold after October 1, 1943.
4/ August 1909 through July 1914, the parity base period.
5/ Subject to revision.

Table 18.- Average production of all hay and relative importance of different kinds, United States, averages 1920-44, annual 1945 1/

Period or year	All hay	Percentage of all hay				
		Tame hay				Wild hay
		Legumes reported separately 2/	Clover and timothy	All other tame hay 3/		
	1,000 tons	Percent	Percent	Percent		Percent
Average:						
1920-24	90,503	25	46	13		16
1925-29	85,077	33	42	11		14
1930-34	73,801	40	33	15		12
1935-39	84,247	46	28	14		12
1940-44	96,430	4/ 48	4/ 28	13		11
1945 5/	104,951	4/ 45	4/ 31	12		12

1/ BAE - From Johnson, N.W., Changes in Hay Production in War and Peace, March 1945 (processed).

2/ Alfalfa, lespedeza, sweetclover, soybean, peanut-vine, and cowpea hay. Exclusive of the clovers reported in "clover and timothy" hay.

3/ Grains cut green for hay and production reported as miscellaneous tame hay.

4/ The legume percentage would be increasingly greater in recent years and the "clover and timothy" percentage considerably smaller if statistics on clover hays (grown alone) were available and included.

5/ BAE - Computed from Annual Summary, Crop Production, December 1945 (processed); preliminary.

Table 19.- Index numbers: Retail costs of selected food items including dairy products, in 51 large cities combined, by groups, United States, averages 1923-44, annual 1940-45 1/

(1935-39 = 100)

Period or year	All foods	Dairy products	Meats	Eggs	Fruits and vegetables 2/
Average:					
1923-42	112	111	104	115	135
1935-39	100	100	100	100	100
1940-44	120	121	119	131	133
1940	97	101	96	94	96
1941	106	112	108	112	103
1942	124	125	126	136	131
1943	138	135	134	162	169
1944	136	134	130	153	168
1945	139	134	131	164	177

1/ Bureau of Agricultural Economics - Computed from Bureau of Labor Statistics Retail Price Bulletins.
2/ Includes fresh, canned, and dried.

Table 20.- Net imports and net exports of selected dairy products, United States, averages 1935-44, annual 1940-45 1/

Period or year	Net imports and net exports					
	Butter	Cheese	Evaporated milk	Condensed milk	Dried whole milk	Dried skim milk
	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds	Million pounds
Average:						
1935-39	+ 8.0	+ 54.0	- 26.0	- 3.0	- 1.0	+ 1.0
1940-44	- 36.0	- 151.0	- 444.0	- 43.0	- 24.0	- 135.0
1940	- 2.0	+ 31.0	- 119.0	- 27.0	- 7.0	- 10.0
1941	+ 1.0	- 78.0	- 590.0	- 82.0	- 15.0	- 37.0
1942	+ 5.0	- 282.0	- 375.0	- 14.0	- 13.0	- 135.0
1943	- 97.0	- 133.0	- 579.0	- 43.0	- 40.0	- 241.0
1944	- 86.0	- 292.0	- 555.0	- 49.0	- 47.0	- 254.0
1945 2/	- 29.0	- 183.0	- 539.0	-122.0	- 67.0	- 187.0

1/ BAE - From Dairy Situation, September 1946 (processed). Data preceded by plus (+) sign are imports; those preceded by minus (-) sign, exports.
2/ Subject to revision.

Table 21.- Exports of selected dairy products from the continental United States expressed as percentages of production of respective products, averages 1935-44, annual 1940-45 1/

Period or year	Percentage of dairy products exported						
	Butter 2/	Cheese 3/	Evaporated milk	Condensed milk	Dried whole milk	Dried skim milk	Total exports 4/
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Average:							
1935-39 5/	.05	0.3	1.4	1.9	15.8	1.2	0.1
1940-44	2.0	17.8	14.1	14.9	26.4	28.8	3.3
1940	0.1	0.3	4.8	10.2	24.1	3.1	0.4
1941	0.1	10.3	18.2	26.6	32.6	10.1	2.3
1942	0.7	27.5	10.7	5.3	21.0	23.9	3.7
1943	5.0	15.9	18.9	15.0	29.0	47.3	4.5
1944	4.8	29.7	16.2	15.2	26.4	43.5	5.5
1945 6/	1.9	17.1	14.4	35.2	30.6	29.0	3.7

1/ BAE - From Dairy Situation, September 1946 (processed).
2/ All butter, farm and factory.
3/ All factory cheese excluding cottage, pot, and bakers' cheese.
4/ In terms of whole milk equivalent expressed as percentage of total milk produced for human consumption.
5/ From unpublished data.
6/ Subject to revision.

Table 22.- Milk: Total per capita production, and civilian per capita consumption on a whole-milk equivalent basis, United States, averages 1924-44, annual 1924-45 1/

Index numbers (1935-39 = 100)

Period or year	Production 2/				Consumption 3/	
	Farm	Nonfarm	Total	Index number	Total	Index number
	Pounds	Pounds	Pounds		Pounds	
Average:						
1924-43	817.4	25.3	842.7	102	809.3	101
1935-39	803.4	22.0	825.4	100	801.4	100
1940-44	861.4	20.8	882.2	107	803.4	100
1924	782	39	821	99	796	99
1925	783	37	820	99	802	100
1926	795	35	830	101	818	102
1927	800	32	832	101	813	101
1928	795	29	824	100	805	100
1929	813	26	839	102	812	101
1930	814	23	837	101	815	102
1931	831	23	854	103	835	104
1932	832	23	855	104	830	104
1933	834	23	857	104	812	101
1934	804	22	826	100	813	101
1935	795	22	817	99	799	100
1936	800	22	822	100	792	99
1937	791	22	813	98	797	99
1938	815	22	837	101	795	99
1939	816	22	838	102	824	103
1940	830	21	851	103	821	102
1941	867	21	888	108	807	101
1942	885	21	906	110	839	105
1943	866	21	887	107	761	95
1944	859	20	879	106	789	99
1945 4/	875	20	895	108	799	100

1/ Bureau of Agricultural Economics.
2/ Based on Bureau of Census estimates of population on July 1 which includes armed-force personnel overseas.
3/ Based on civilian population estimates.
4/ Preliminary.

Table 23.- Civilian per capita consumption of selected dairy products, United States, averages 1935-44, annual 1940-45 1/

Period or year	Civilian per capita consumption							
	Butter 2/	Cheese 3/	Condensed and evaporated milk	Ice cream 5/	Dried whole milk	Dried skim milk 4/	Fluid milk and cream 5/	Total milk 5/
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Average:								
1935-39	16.7	5.5	16.7	23.8	.13	1.9	340	801
1940-44	14.4	5.6	18.1	31.4	.24	2.1	379	803
1940	16.9	6.0	19.2	28.1	.15	2.2	343	821
1941	15.9	6.0	18.2	33.3	.17	2.4	351	807
1942	15.6	6.3	18.3	38.5	.19	2.3	372	839
1943	11.7	5.0	18.6	28.3	.38	2.0	403	761
1944	12.0	4.9	16.1	29.0	.32	1.6	424	789
1945 6/	10.9	5.9	18.2	29.5	.25	2.2	438	799

1/ BAE - From National Food Situation (processed).
2/ All butter, farm and factory.
3/ All cheese except full skim, cottage, pot, and bakers' cheese.
4/ Not included in "total milk" consumed.
5/ Expressed in terms of whole-milk equivalent.
6/ Subject to revision.

Table 24.- Dairy cattle: Number of cows and bulls enrolled in cooperative artificial-breeding associations in United States, by regions and 10 ranking States on basis of cows enrolled January 1, 1946 1/

Cows and bulls by region				Cows in ranking States, and bulls			
Region	Cows 2/		Bulls	Rank and State	Cows 2/		Bulls
	Number	Percent	Number		Number	Percent	Number
Northeast	190,059	32.8	320	1. Wisconsin	118,315	20.4	102
Lake States	174,703	30.1	206	2. Pennsylvania	78,599	13.6	87
Corn Belt	157,497	27.2	219	3. Ohio	70,465	12.2	63
Appalachian	12,474	.7	35	4. New York	56,476	9.7	76
Southeast	4,328	3.9	9	5. Iowa	43,423	7.5	80
South Central	2,795	.7	14	6. Michigan	35,275	6.1	28
Great Plains	22,353	2.2	46	7. Illinois	28,430	4.9	27
Pacific Northwest	10,995	.5	30	8. Nebraska	22,353	3.9	46
Pacific Southwest	4,273	1.9	21	9. Minnesota	21,213	3.6	76
				10. New Jersey	19,218	3.3	46
				Other	85,810	14.8	269
United States	579,477	100.0	900	United States	579,477	100.0	900

1/ Bureau of Dairy Industry - D.H.I.A. Letter for March 1946, Vol. 22, No. 3 (processed).
2/ Cows and heifers of breeding age.

Table 25.- Dairy cattle: Cows and heifers enrolled in artificial breeding associations expressed as percentage of cows and heifers 2 years and over kept for milk on farms January 1, 1946, by regions and 10 ranking States

Region	Percentage of all cows kept for milk 1/	Rank and State	Percentage of all cows kept for milk 1/
	Percent		Percent
Northeast	5.3	1. Wisconsin	4.6
Lake States	3.2	2. Pennsylvania	8.3
Corn Belt	2.8	3. Ohio	6.1
Appalachian	.5	4. New York	3.9
Southeast	.2	5. Iowa	3.0
South Central	.1	6. Michigan	3.3
Great Plains	.8	7. Illinois	2.5
Pacific Northwest	1.2	8. Nebraska	3.8
Pacific Southwest	.4	9. Minnesota	1.2
		10. New Jersey	12.6
		Other	.6
United States	2.2	United States	2.2

1/ Based on data obtained from Bureau of Dairy Industry (table 24, Appendix) and from BAE's Livestock on Farms January 1, Feb. 15, 1946 (processed).

Table 26.- Comparisons of milk and butterfat production between dams and daughters of proved sires in artificial breeding associations, United States, as of January 1, 1945 1/

(Grouped according to the butterfat-production range of the dams to which the sires were mated)

Butterfat production range of dams	Sires	Sires that		Average production				Difference	
		Maintained or increased production	Decreased production	Dams		Daughters		Milk	Fat
				Milk	Fat	Milk	Fat		
Pounds	Number	Number	Number	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
225-249	1	1	0	5,043	240	8,362	407	3,319	+ 167
250-274	0	---	---	---	---	---	---	---	---
275-299	4	4	0	7,284	282	9,988	411	2,704	+ 129
300-324	6	5	1	7,543	316	9,592	405	2,049	+ 89
325-349	20	18	2	8,765	340	9,807	389	1,042	+ 49
350-374	28	28	0	9,010	362	10,113	412	1,103	+ 50
375-399	29	21	8	9,436	386	10,121	419	685	+ 33
400-424	33	25	8	9,945	412	10,582	446	637	+ 34
425-449	14	10	4	10,680	438	11,042	453	362	+ 15
450-474	4	3	1	13,008	457	13,128	476	120	+ 19
475-499	6	6	0	12,429	484	13,105	510	676	+ 26
500-524	1	1	0	14,193	503	13,102	514	- 1,091	+ 11
525-549	1	0	1	16,238	549	15,060	516	- 1,178	- 33
Total	147	122	25	---	---	---	---	---	---
Average	---	---	---	9,629	387	10,488	428	859	+ 41

1/ Bureau of Dairy Industry, Division of Dairy Herd Improvement Investigations.