CATTARAUGUS COUNTY COST OF MILK PRODUCTION SURVEY

1939-40

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AE 387
January, 1942

AE 387

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Cost of Milk Production Survey
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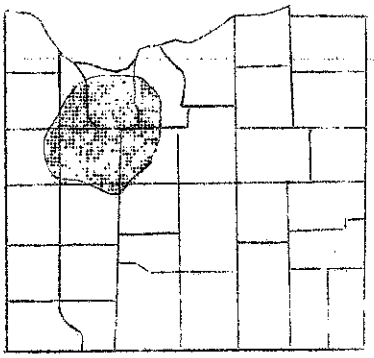
PRELIMINARY REPORT
CATTARAUGUS COUNTY
COST OF MILK PRODUCTION SURVEY
1939-40

A farm management survey of 102 farms was made in the area around the village of Cattaraugus in Cattaraugus County for the year ended April 30, 1940. Information was obtained concerning the whole farm business and detailed cost data were obtained on the dairy enterprise. The survey was made by the New York State College of Agriculture in cooperation with the Cattaraugus County Farm Bureau. The information was obtained by personal visits to the farms.



Area surveyed

CATTARAUGUS COUNTY

The area included in this survey is part of the extensive summer-dairy section of southwestern New York. More than two-thirds of the income on the farms in the survey was from the dairy enterprise. Of the 102 farms, 46 were selling milk to grade B plants and 56 to other markets including an evaporated milk plant, and a baking company.

The land in Cattaraugus County has been classified as to the intensity of use to which it is adapted. The soils, topography, elevation, crops grown, and size and condition of the farm buildings are important factors in this economic classification of the land. The areas of land classes I and II are, in general, better suited to forestry and recreational uses than to farming. The areas of land classes III, IV and V probably will remain permanently in agriculture. The higher the number of the land class the higher the proportion of good soils and the greater the intensity of land use. Of the 102 farms in the survey, 6 were located in land class II, 67 in land class III, 25 in land class IV, and 4 in land class V.

Pastures in this area in 1939 were substantially below normal during the early part of the summer, and due to the severe drought declined continually during the season, until the latter part of August when there was some improvement in conditions. For the state, pasture conditions in 1939 were 13 per cent below the average of the preceeding 10 years, and were lower than for any other year during the decade except for 1934.

One purpose of this study was to describe the relative importance of the various costs in producing milk in an area near the edge of the New York City milkshed. Another objective was to help farmers study the application in their community of some of the factors that have consistently been found over a period of years to be related to the cost of producing milk, and hence to farm incomes.

THE ECONOMIC SITUATION, 1939-40

Following the reinstatement of the federal-state marketing order in the New York milk market in June 1939, the price of milk rose from the low level reached while the order was suspended to a point well above other prices (figure 1). Although the price of milk declined from this point during the rest of the year covered by the survey, it was still above other prices at the end of the year. The peak in the price of milk in November 1939 was higher than at any time since 1931. The net pool price of 3.7 per cent grade B milk at the 201-210 mile zone averaged $1.91 for the year, or 19 per cent above the base period in 1910-14. In this study, in an area on the western edge of the New York City milk shed, the average price received for 3.7 milk sold was $1.66. Average prices paid to New York farmers for all farm products were only six per cent above the level in 1910-14

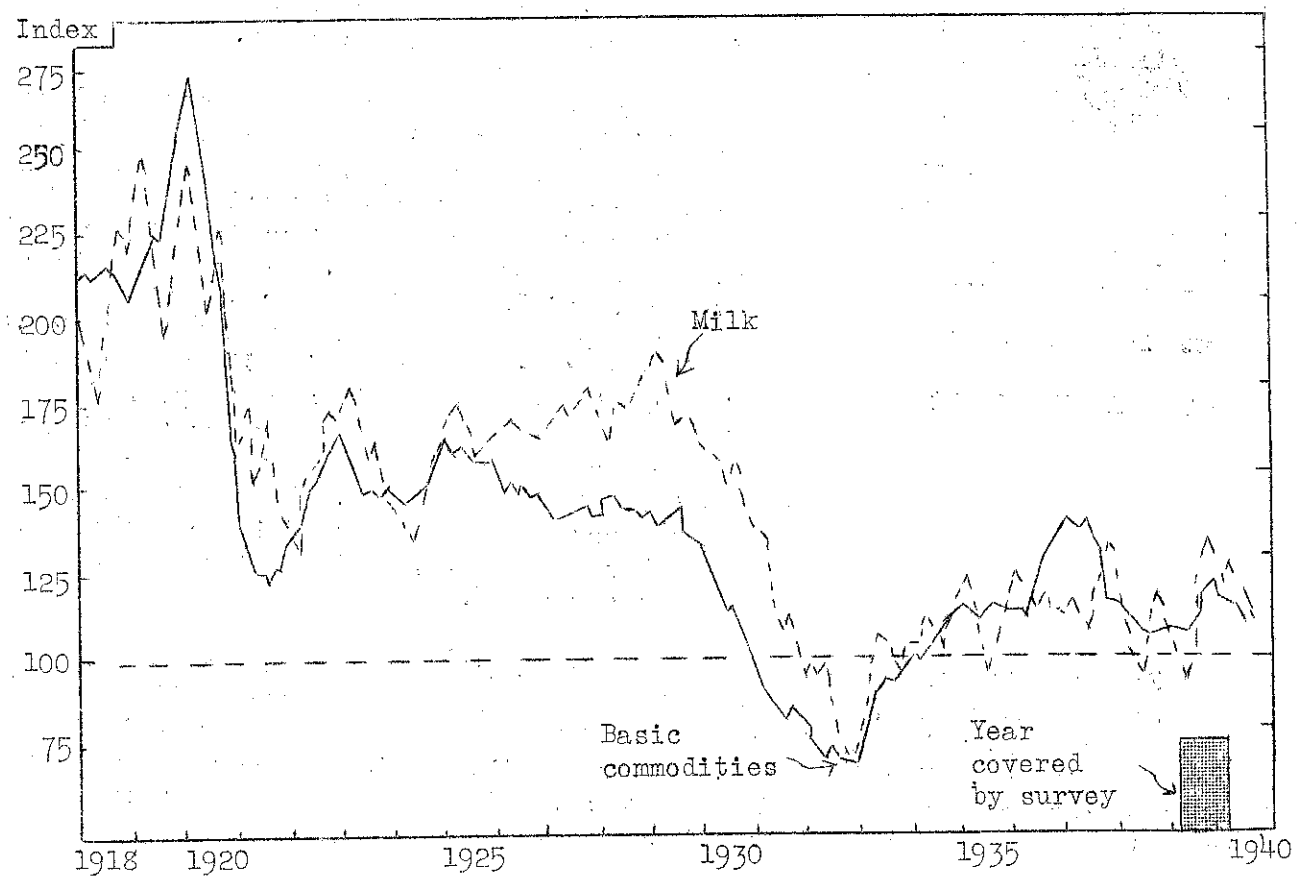


FIGURE 1. FARM PRICE OF MILK IN NEW YORK AND WHOLESALE PRICES OF BASIC COMMODITIES IN THE UNITED STATES (1910-14 = 100).

During the summer months the price of a dairy ration in New York was about 10 per cent below its 1910-14 level, but following the declaration of war in September 1939, grain prices rose rapidly and stayed about 5 per cent above the 1910-14 level for the rest of the year. On an average, dairy feed prices were 2 per cent above the 1910-14 average for the period covered by the survey. The average price per ton for dairy feeds purchased by farmers in this study was $32. Hay prices averaged $9 a ton and succulents $4 a ton.

Wages paid by New York farmers were about 26 per cent above their average in the base period, and averaged $40 a month for the farmers in the survey.

YEARLY COSTS AND RETURNS

Costs and returns per cow

During the year covered by this study, it cost $120 to keep a dairy cow. Besides the milk produced, each cow on the average produced a calf valued at $4, and seven tons of manure worth $7. When the value of these other returns was deducted from the cost of keeping a cow, the net cost of producing milk was $109 a cow.

Total cost of feed per cow was $61. On the average, each cow was fed 1,650 pounds of concentrates, which, including home-grown grains, were valued at $25 (table 1). The value of the 2.4 tons of dry forage was $22 and the 2.1 tons of succulents were valued at $9. Dry forage included, besides hay, small amounts of corn fodder and other feeds. Corn silage made up most of the succulent feeds. The 169 days on pasture, between May 11 and October 27, cost 3 cents a day or $5 a cow for the season.

TABLE 1. AVERAGE AMOUNTS AND COST OF FEEDS AND LABOR PER COW
102 Farms, Cattaraugus County, 1939-40

Feed	Average amount per cow	Average price	Cost per cow
Concentrates	1,650 pounds	$31 a ton	$25
Dry forage	2.4 tons	9 a ton	22
Succulents	2.1 tons	4 a ton	9
Pasture	169 days	.03 a day	5
Man labor	162 hours*	.22 an hour	36

*Does not include man labor hauling milk.

The 162 hours of direct man labor used per cow, exclusive of time spent hauling milk, at 22 cents an hour cost $36 a cow. Besides direct labor on cows, 4 hours of man labor worth $1 were used hauling milk. Other costs, including bedding, milk hauling, use of buildings and equipment, bull service and other items amounted to $22 a cow.

On an average, the value of milk produced per cow was $96, including $94 for milk sold and $6 for milk used at home. ~~The value of milk produced and net cost per cow were just equal. The cows thus returned 22 cents an hour for labor, or the same as the rate at which labor had been charged to the cows.~~

Costs and returns per 100 pounds of milk produced

The average net cost of producing 100 pounds of milk for the year was $1.87, after credits to 19 cents, mostly for calves and manure, had been deducted (table 2). All milk was standardized to a 3.7 per cent butterfat basis to facilitate comparisons of costs between farms and seasons of the year.

TABLE 2. YEARLY COSTS AND RETURNS IN PRODUCING 100 POUNDS OF MILK*
102 Farms, Cattaraugus County, 1939-40

Items	Amount	Cost and value of 100 pounds of milk produced	Per cent of total
COSTS			
Feed			
Concentrates	28 pounds	$ .43	21
Dry forage	81 pounds	.38	19
Succulents	74 pounds	.15	7
Pasture	2.9 days	.09	4
Total feed		$1.05	51
Labor on cows	2.8 hours	.61	30
Depreciation on cows		.03	1
Interest on cows		.08	4
Milk hauling /		.11	5
Use of buildings		.06	3
Use of equipment		.02	1
Bull service		.03	1
Bedding		.02	1
Miscellaneous		.05	3
Total costs		$2.06	100
CREDITS			
Manure		$ .11	58
Calves		.07	37
Miscellaneous		.01	5
Total credits		$ .19	100
NET COST PER 100 POUNDS OF MILK PRODUCED		$1.87	--
VALUE PER 100 POUNDS OF MILK PRODUCED		$1.65	--

*All milk was standardized to 3.7 per cent butterfat, and the value is for milk of the same test.
/Includes 0.1 hour of man labor hauling milk.

Feed costs amounted to $1.05 and made up about one-half of the total cost of producing milk. The 28 pounds of concentrates and the 81 pounds of dry forage fed per hundredweight of milk produced, each alone made up about one-fifth of the total cost. The 74 pounds of succulents were valued at 15 cents and the 2.9 days of pasture accounted for 9 cents per 100 pounds of milk.

The 2.8 hours of direct labor on cows cost 61 cents, or almost one-third of the total cost. Feed and labor together accounted for four-fifths of the total cost of producing milk.

Although a net loss of $10 was taken per head, on the average, for cows replaced, the cost of depreciation was only 3 cents per 100 pounds of milk, or 1 per cent of the total cost. Interest at 6 per cent on the value of the cows accounted for 8 cents. Other costs, including milk hauling, use of buildings and equipment, bull service and other items amounted to 29 cents.

Of the total credits of 19 cents, manure accounted for 11 cents and calves for 7 cents.

SEASONAL COSTS AND RETURNS

During the summer while the cows were obtaining most of their feed from pasture, the net cost per 100 pounds of milk produced was $1.18, as compared to $2.57 for the winter season, and $1.87 for the year (table 3). Production per cow per day averaged 17 pounds for the pasture season, and 15 pounds for the barn-feeding season.

TABLE 3. SEASONAL COSTS AND RETURNS IN PRODUCING MILK*
102 Farms, Cattaraugus County, 1939-40

Items	Cost and value of 100 pounds of milk produced			
	Summer		Winter	
	Amount	Cost	Amount	Cost
COSTS				
Feed				
Concentrates	13 pounds	$.19	44 pounds	$.68
Dry forage	1 pound	≠	164 pounds	.76
Succulents	24 pounds	.05	124 pounds	.25
Pasture	6 days	.18	---	---
Total feed		$.42		$1.69
Labor on cows/	2.2 hours	.48	3.4 hours	.75
Other costs		.35		.44
Total costs		$1.25		$2.88
CREDITS		.07		.31
NET COST PER 100 POUNDS OF MILK PRODUCED		$1.18		$2.57
VALUE PER 100 POUNDS OF MILK PRODUCED		$1.50		$1.81

*All milk was standardized to 3.7 per cent butterfat basis.
/Does not include man labor hauling milk.
≠Less than $.005.

Feed costs during the summer amounted to 42 cents per 100 pounds of milk or about one-third of the total cost. During the winter, feed costs amounted to $1.69, or about three-fifths of the total cost. In the pasture season only 13 pounds of grain were fed per 100 pounds of milk, as compared to 44 pounds in the barn-feeding season. The amounts of dry forage and succulents varied even more widely between the seasons. Only 1 pound of dry forage and 24 pounds of succulents were fed per hundredweight of milk in the summer as compared to 164 pounds of dry forage and 124 pounds of succulents in the winter. Costs for these items of feed varied between seasons by about the same amount as the quantities fed. The six days of pasture required to produce 100 pounds of milk in the summer cost only 18 cents.

Only 2.2 hours of man labor were used to produce 100 pounds of milk in the summer as compared to 3.4 hours for the winter season. The charge for labor of 48 cents a hundredweight in the summer accounted for somewhat more than one-third of the total cost in this season. During the winter, the cost of labor was 75 cents a hundred pounds of milk, but was less than one-fourth of the total cost.

Other costs were 35 cents during the summer and 44 cents per 100 pounds of milk produced during the winter. Credits during the summer, mostly for calves were 7 cents. The 31 cents of credits for the winter season included 22 cents for manure produced.

Variation in the cost of producing milk

The average net cost was $1.87 a hundredweight, but there was a wide variation in costs on individual farms as shown in figure 2. Each vertical line in the graph represents one of the 102 farms, and the length of the line indicates the cost of producing 100 pounds of milk on that farm for the year 1939-40.

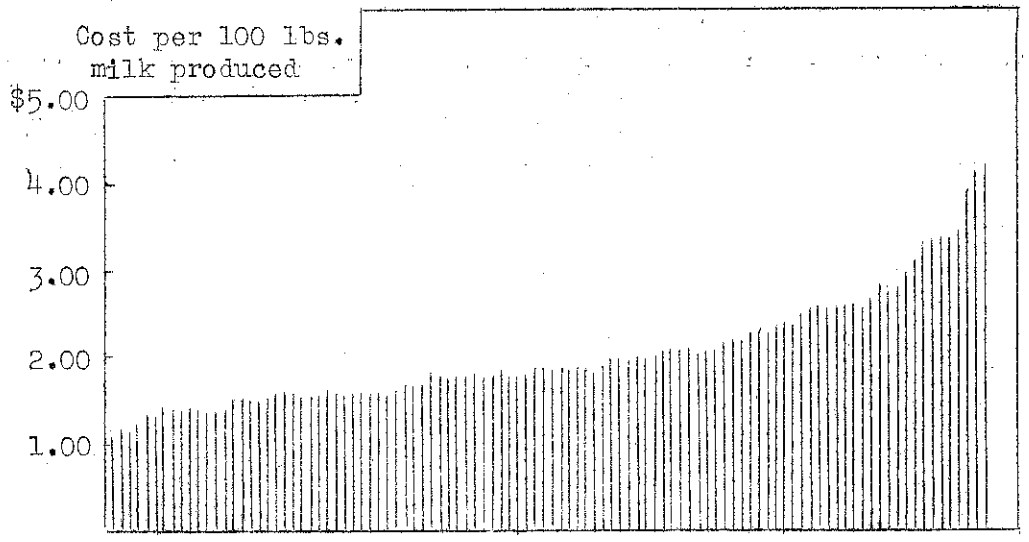


FIGURE 2. VARIATION IN THE YEARLY COST OF PRODUCING 100 POUNDS OF MILK

Each line represents a farm, and the length of the line indicates the cost of producing milk on that farm in 1939-40.

On about one-sixth of the farms, milk was produced at an average cost for the year of less than $1.50 a hundredweight, as compared to $3.00 or more on one-tenth of the farms.

* * * *

So far, this report has presented a cross-section picture of costs and returns in producing milk in this area in 1939-40. The rest of this report will attempt to show the main reasons why some farms produced milk at lower cost, and why some farms had higher incomes than others.

In the discussion that follows, two measures of returns were used. Returns per hour of labor on cows is a measure of what the cows paid for the time spent on them during the year. The average was 22 cents an hour. Labor income is a measure of the return that the whole farm made to the operator for his year's work, after paying all farm expenses and allowing 5 per cent interest on the money invested. The average labor income was $298.

There was a wide variation in both measures of returns between farms. On about one-fifth of the farms, the cows paid all other expenses and made a return of 30 cents an hour or more for time spent on them, while on another one-seventh of the farms no return was made to labor. Nine farms had labor incomes of $1,000 or more. At the same time, more than one-fourth of the farms lost money, in the sense that their incomes were not large enough to cover the charge of 5 per cent for the money invested and at the same time pay all farm expenses.

FACTORS AFFECTING COSTS AND RETURNS IN PRODUCING MILK

Relation of cost per 100 pounds of milk to returns

Since most of the income on these farms was from the dairy enterprise, there was a close relationship between the cost of producing milk and returns. For the 19 farms with costs below $1.50 a hundredweight, returns per hour of labor on cows averaged $.34 and labor incomes $715 as compared to a loss of 5 cents an hour or $279 a farm for the group with highest costs per hundredweight (table 4). Because of this close relationship between the cost of producing milk and incomes, the factors that are related to and affect milk production costs are important to dairy farmers.

TABLE 4. RELATION OF COST OF PRODUCING 100 POUNDS OF MILK TO RETURNS
102 Farms, Cattaraugus County, 1939-40

Cost per 100 pounds milk produced	Number of farms	Average cost per 100 pounds of milk produced	Returns per hour of labor on cows	Labor income
Less than $1.50	19	$1.36	$ .34	$ 715
$1.50 to $1.90	35	1.72	.21	561
$1.90 to $2.30	22	2.06	.10	213
$2.30 or more	26	2.95	-.05	-279

Pounds of Milk Produced per Cow

Relation of production per cow to various factors

The herds with lowest rates of production included, on the average, fewer cows than the herds with the larger amounts of milk produced per cow (table 5). Only a few more hours of labor were required to care for high-producing cows than for low-producing cows, partly because more of the farms with high rates of production used milking machines and other kinds of labor-saving equipment. In this section of the report, man hours per cow includes time spent hauling milk.

TABLE 5. RELATION OF MILK PRODUCTION PER COW TO VARIOUS FACTORS
102 Farms, Cattaraugus County, 1939-40

Pounds of milk produced per cow	Number of farms	Pounds milk produced per cow	Number of cows per farm	Per cent of milk sold October to March	Man hours per cow*	Pounds grain fed per cow
Less than 4,750	27	4,087	18	30	170	1,352
4,750 to 5,750	25	5,204	17	34	172	1,432
5,750 to 6,750	26	6,190	20	38	181	1,862
6,750 or more	24	7,442	22	42	184	2,075

*In this and succeeding tables in this report, man hours per cow includes time spent hauling milk.

For the highest producing herds, more of the milk was produced during the winter season than for the other herds. Cows in the 24 herds with the most milk produced per cow were fed about 700 pounds more grain, but produced almost 3,400 pounds more milk than the cows in the lowest producing herds.

The average amount of milk produced per cow on all farms was 5,687 pounds.

Relation of production per cow to costs and returns

The amount of milk produced per cow was the most important of all factors affecting costs and returns. The average cost per hundredweight was $2.49 in the group of herds with the lowest production, as compared with $1.70 for the farms with the highest producing herds (table 6). In other words, it cost farmers with an average production of less than 4,750 pounds per cow almost 80 cents more to produce 100 pounds of milk than farmers with cows producing 6,750 or more pounds of milk.

On farms with less than 4,750 pounds of milk produced per cow, there was no return to the operator for his year's work, and returns per hour of labor on cows averaged only 5 cents. Labor incomes averaged $723 for the group of farms with the highest producing herds, and the herds in this group returned 24 cents

TABLE 6. RELATION OF MILK PRODUCTION PER COW TO COSTS AND RETURNS
102 Farms, Cattaraugus County, 1939-40

Pounds of milk produced per cow	Number of farms	Cost per hundredweight of milk	Returns per hour of labor on cows	Labor income
Less than 4,750	27	$2.49	$ .05	$-125
4,750 to 5,750	25	2.13	.10	166
5,750 to 6,750	26	1.80	.19	473
6,750 or more	24	1.70	.24	723

an hour for time spent on them. In other words, the cows returned 19 cents more an hour for labor, and the farm operator received $850 more for his year's work on farms with herds producing 6,750 pounds or more of milk than on farms with herds producing less than 4,750 pounds per cow.

Relation of size of cow to production per cow and other factors

The size of cows was studied in relation to the amount of milk produced per cow. Weights of all cows in the barns at milking time were estimated by use of a tape measure that had on it the cow weight scale developed for this purpose by the United States Department of Agriculture.

There was a striking relationship between the size of cow and production per cow. As the size increased, production increased proportionately more (table 7). For herds with cows weighing on the average less than 800 pounds, only 5,176 pounds of milk were produced per cow, as contrasted to 7,258 pounds per cow for herds with an average weight of 1,000 pounds or more. The average size of all cows measured was 902 pounds, with a production of 5,687 pounds of milk per cow. Herds with the larger cows averaged slightly older than those with the smaller cows.

TABLE 7. RELATION OF SIZE OF COW TO PRODUCTION PER COW AND OTHER FACTORS*
100 Farms, Cattaraugus County, 1939-40

Size of cow (pounds)	Number of farms	Average size of cow (pounds)	Pounds milk produced per cow	Per cent milk sold October to March	Cost per hundredweight milk produced	Returns per hour of labor on cows
Less than 800	24	760	5,176	32	$2.09	$ .13
800 to 900	30	840	5,315	36	2.16	.11
900 to 1,000	30	936	5,691	37	1.95	.17
1,000 or more	16	1,051	7,258	41	1.83	.21

*All milk was standardized to 3.7 per cent butterfat.

Not only was more milk produced by large-sized cows, but it was produced more efficiently than by smaller cows. This was indicated by the cost of producing milk. On farms with the smallest cows, the cost of producing 100 pounds of milk averaged $2.09 as compared to $1.83 per hundredweight on farms with the largest cows. Returns per hour of labor on cows was highest on farms with the largest cows.

Relation of season of milk production to various factors

The area included in this survey is located in southwestern New York, on the edge of the New York City milk shed. For the 102 farms in the survey, 36 per cent of the milk was sold during the six winter months from October to March. The drought during the pasture season of 1939 may have reduced the milk flow enough during this season to have affected to some extent the proportion of winter milk on these farms for the year covered by the survey. A wide variation occurred, however, in the season of production on different farms.

The amount of milk produced per cow increased as the proportion of milk sold during the winter season increased (table 8). Herds that produced two-fifths or more of their milk during the period from October to March had an average production of about 6,500 pounds a cow, while herds producing less than 30 per cent of their milk during these months averaged about 4,700 pounds a cow. The cows tended to be heavier in the herds with the larger proportions of winter milk.

TABLE 8. RELATION OF SEASON OF MILK PRODUCTION TO VARIOUS FACTORS*
102 Farms, Cattaraugus County, 1939-40

Per cent milk sold October to March	Number of farms	Per cent milk sold October to March	Pounds milk produced per cow	Average size of cow (pounds)	Man hours per cow	Pounds of grain per cow
Less than 30	22	24	4,743	846	176	1,532
30 to 35	22	32	5,458	866	175	1,591
35 to 40	25	37	5,637	887	175	1,588
40 or more	33	45	6,506	916	179	1,882

*All milk was standardized to 3.7 per cent butterfat.

For the 33 farms with two-fifths or more of their milk produced during the period from October to March, only slightly more labor and grain were used per cow than for the farms that produced less winter milk.

Relation of season of milk production to costs and returns

As the proportion of winter milk increased, the number of cows kept per farm also increased, showing that the most winter milk was produced in the large herds. Largely as a result of the higher rate of milk production, and the efficiencies in operation that accompany a large-sized herd, the cost of milk production declined as more of the milk was produced during the winter season (table 9). Returns per hour of labor and labor income tended to increase as the proportion of the milk sold during the winter months increased.

TABLE 9. RELATION OF SEASON OF MILK PRODUCTION TO COSTS AND RETURNS*
102 Farms, Cattaraugus County, 1939-40

Per cent milk sold October to March	Number of farms	Number of cows per farm	Cost per hundred-weight of milk produced	Returns per hour of labor on cows	Labor income
Less than 30	22	14	$2.36	$ .02	$-84
30 to 35	22	19	2.04	.16	276
35 to 40	25	20	1.93	.17	284
40 or more	33	22	1.91	.20	578

*All milk was standardized to 3.7 per cent butterfat.

Yields of Roughage Crops

Relation of yield of silage to various factors

Herds on farms that produced corn for silage were larger and had higher rates of milk production, with the same amount of grain fed per cow, than herds on farms without silage (table 10). Farms without silage for a winter succulent feed produced less milk during the winter season than farms with silage. Cows on farms without silage were somewhat lighter in weight than cows on farms producing silage.

TABLE 10. RELATION OF YIELD OF SILAGE TO VARIOUS FACTORS
102 Farms, Cattaraugus County, 1939-40

Yield of silage per acre	Number of farms	Number of cows	Pounds milk per cow	Per cent milk sold Oct.-Mar.	Pounds grain per cow	Size of cows (pounds)
No silage grown	47	16	5,389	33	1,668	859
Less than 11 tons	25	22	5,649	38	1,664	882
11 tons or more	30	22	6,185	39	1,683	924

Relation of yield of silage to costs and returns

The cost of production milk was highest, and returns were lowest on the farms with low yields of silage (table 11). Although costs were about the same on the farms on which no silage was grown as on those with high silage yields, returns were considerably higher for the group with good yields of silage. This was partly the result of the large number of cows kept and of the higher rates of production obtained. Apparently it did not pay to produce silage unless reasonably good yields could be secured.

TABLE 11. RELATION OF YIELD OF SILAGE TO COSTS AND RETURNS
102 Farms, Cattaraugus County, 1939-40

Yield of silage per acre	Number of farms	Average tons silage per acre	Cost per cwt. milk produced	Returns per hour of labor on cows	Labor income
No silage grown	47	—	$1.99	$ .16	$259
Less than 11 tons	25	8	2.27	.08	26
11 tons or more	30	13	1.93	.18	558

Although some of the soils in this area may not be well adapted to the production of corn silage, an important advantage of corn silage as a home-grown roughage feed was shown by the survey in this area. Due to the severe drought in 1939, hay yields on many farms were abnormally low. Silage yields were relatively good. Because of the hay shortage, hay prices were high. Farmers without silage were forced to buy more hay at these high prices, to carry their stock through the winter than farmers who produced silage for part of their roughage. This probably partly also explains why labor incomes were higher for farms with good yields of silage than for those without silage.

Relation of yield of hay to various factors

Since dairy farmers in this area usually produce all of the hay fed on their farms, the yield and quality of hay produced are of considerable importance. Cows on farms with high hay yields were fed more grain, and produced more milk than cows on farms with low hay yields (table 12). A few more cows were kept per farm on the farms with the high yields.

TABLE 12. RELATION OF YIELD OF HAY TO VARIOUS FACTORS
102 Farms, Cattaraugus County, 1939-40

Yield of hay per acre	Number of farms	Number of cows per farm	Pounds milk per cow	Pounds grain per cow	Size of cows (pounds)
Less than 1.2 tons	23	19	5,061	1,530	838
1.2 to 2.2 tons	58	18	5,648	1,609	885
2.2 tons or more	21	22	6,480	2,000	931

Farms with the highest hay yields also had the heaviest cows.

Relation of yield of hay to costs and returns

The cost of producing 100 pounds of milk was not consistently related to the yield of hay, but was lowest for the group with the highest yields (table 13). Returns per hour of labor on cows and labor incomes were largest on the farms with the highest yields of hay.

TABLE 13. RELATION OF YIELD OF HAY TO COSTS AND RETURNS
102 Farms, Cattaraugus County, 1939-40

Yield of hay per acre	Number of farms	Average tons hay per acre	Cost per hundred-weight milk produced	Returns per hour of labor on cows	Labor income
Less than 1.2 tons	23	1.0	$2.01	$ .17	$124
1.2 to 2.2 tons	58	1.6	2.11	.12	227
2.2 tons or more	21	2.8	1.88	.19	685

Number of Cows per Farm

Relation of number of cows per farm to labor efficiency and costs and returns

In a dairy region, the number of cows per farm is a useful measure of size of business. The most favorable returns are obtained on a large as compared to a small dairy farm when the price of milk is high, relative to costs, because then even a small profit per cow or per 100 pounds of milk is multiplied many more times than for a small farm.

As previously noted, the year covered by the survey was moderately favorable insofar as the relationship of costs and milk prices was concerned. As a result, costs per hundredweight were considerably lower and labor incomes much higher on farms with large herds than on farms with small herds (table 14).

TABLE 14. RELATION OF NUMBER OF COWS PER FARM TO LABOR EFFICIENCY AND COSTS AND RETURNS
102 Farms, Cattaraugus County, 1939-40

Number of cows per farm	Number of farms	Number of cows	Man hours per cow	Pounds milk produced per cow	Cost per hundred-weight of milk	Returns per hour of labor on cows	Labor income
Fewer than 14	28	10	227	5,389	$2.41	$.05	$-22
14 to 20	33	16	164	5,682	1.98	.15	278
20 to 26	21	23	158	5,650	1.85	.20	373
26 or more	20	33	148	6,149	1.82	.20	700

In this area, large herds made possible much more efficient use of labor than small herds. On the average, only 148 hours were used per cow in the herds of 26 or more cows, as compared to 227 hours per cow in herds of fewer than 14 cows. About 7 more cows were cared for per man on the farms with the largest herds than on the farms with the smallest herds. Production per cow was lowest in the smallest herds and highest for the herds with the most cows.

Cost per 100 pounds of milk produced averaged $2.41 for the herds with fewer than 14 cows, and $1.82 per hundredweight for the herds with 26 or more cows. Returns per hour of labor increased as more cows were kept per farm. Labor incomes also increased regularly for all groups as the number of cows in the herd increased.

Relation of number of cows per farm to capital efficiency

Another advantage of large herds was the result of more efficient use of the money invested. On the average, on the farms with fewer than 14 cows, $460 was invested per cow (table 15). This was about $60 to $80 more than the investment per cow on the farms with 20 or more cows. Since the cow enterprise furnished most of the income on these farms, the proportion of the total farm capital invested in this major income-producing enterprise was a useful measure of capital efficiency. For the herds with the fewest cows, only 13 per cent of the money was invested in cows, as compared to 19 per cent for the large herds.

TABLE 15. RELATION OF NUMBER OF COWS PER FARM TO CAPITAL EFFICIENCY
102 Farms, Cattaraugus County, 1939-40

Number of cows per farm	Number of farms	Number of cows	Value per cow	Total capital per cow	Per cent of total farm capital invested in cows
Fewer than 14	28	10	$62	$460	13
14 to 20	33	16	74	442	17
20 to 26	21	23	71	381	19
26 or more	20	33	77	401	19

The smaller investment per income-producing unit on the large farms results in more dollars of income for each dollar invested in the farm business.

Other advantages of a large-sized dairy farm business include:

1. A lower cost per hundredweight for hauling larger loads of milk.
2. Some saving in cost of building use per cow since the housing cost per cow tends to decrease as the number of cows increases.

3. Lower cost of bull service per cow, because it costs as much to feed and house a bull for a small herd as for a large herd.

4. The possibility of taking advantage of quantity discounts on purchases of feeds may be greater for owners of large herds than for owners of small herds.

Although the advantage of large herds may be small in some of these items, in some cases the aggregate effect may be a real economy to the farm business.

Use of Labor

Relation of man hours per cow to various factors

Efficient use of labor is one of the most important problems in farm organization. The number of hours required to care for a cow a year is one measure of labor efficiency.

There was an inverse relationship between the number of hours of man labor per cow and the number of cows per farm (table 16). The group of farms that were most efficient in use of labor kept 23 cows, as compared to 13 cows for the least efficient group. Season of milk production was about the same for the different groups, and so did not seem to explain why more labor was spent per cow on some farms than on others. Milk production per cow was highest for the group of farms with the most labor per cow.

TABLE 16. RELATION OF MAN HOURS PER COW TO COSTS AND RETURNS
102 Farms, Cattaraugus County, 1939-40

Man hours per cow	Number of farms	Number of cows	Pounds milk produced per cow	Per cent milk sold Oct.-Mar.	Cost per hundred-weight milk	Returns per hour of labor on cows	Labor income
Less than 130	23	23	5,586	38	$1.79	$ .21	$544
130 to 175	34	20	5,685	36	1.79	.19	435
175 to 220	22	20	5,587	34	2.26	.10	136
220 or more	23	13	5,886	36	2.45	.05	5

As more time was spent per cow, the cost of producing milk increased, and returns per hour of labor on cows and labor incomes decreased rapidly.

Relation of cows per man to various factors

Labor efficiency, as measured by the number of cows kept per man also varied widely between individual farms. As the number of cows cared for per

man increased, the number of cows per farm increased, showing that more work was accomplished per man on the large farms (table 17). Although there appeared to be no consistent relationship between labor efficiency and the amount of milk produced per cow, production per cow was lowest for the group with the most cows kept per man.

TABLE 17. RELATION OF NUMBER OF COWS PER MAN TO VARIOUS FACTORS
102 Farms, Cattaraugus County, 1939-40

Number of cows per man	Number of farms	Average cows per man	Number of cows per farm	Pounds milk produced per cow	Per cent work units on cows	Man hours per cow
Fewer than 8	24	6	12	5,777	62	238
8 to 11	30	9	18	5,823	64	185
11 to 14	26	12	23	5,861	69	161
14 or more	22	16	25	5,196	71	117

As indicated by the number of cows per farm and the per cent of work units on cows, more of the work on the farms with the most efficient use of labor was on cows and relatively less on other enterprises than for the farms with fewer cows per man. Man hours per cow decreased rapidly as the number of cows kept per man increased.

Relation of cows per man to costs and returns

The average cost of producing 100 pounds of milk on farms with fewer than 8 cows per man was $2.41 (table 18). The cost per hundredweight decreased as labor efficiency increased, except that for the group with the most cows per man this relationship was reversed and costs increased slightly. Returns per hour of labor on cows and labor incomes increased as more cows were kept per man, except for the group with the most cows per man, for which, as with cost of milk production, there was little change from the third group.

TABLE 18. RELATION OF NUMBER OF COWS PER MAN TO COSTS AND RETURNS
102 Farms, Cattaraugus County, 1939-40

Number of cows per man	Number of farms	Cost per hundredweight of milk	Return per hour of labor on cows	Labor income
Fewer than 8	24	$2.41	$ .05	$-103
8 to 11	30	2.00	.17	316
11 to 14	26	1.87	.17	538
14 or more	22	1.89	.17	527

Combined Effect of Important Factors

The four most important factors that were found to be related to costs and returns in producing milk in this area were the amount of milk produced per cow, number of cows in the herd, yields of roughage crops, and the number of cows kept per man. It has been shown that it paid to be above average in each of these factors. It paid even better to be above average in more than one factor.

For the 12 farms that were below average in all 4 factors, the cost of producing 100 pounds of milk averaged $2.74 (table 19). On these farms there was no return to labor on the dairy enterprise, and the operator received no return from the whole farm for his year's work. Costs on the 20 farms that were average or above in one factor were $2.31. There was a return of 7 cents an hour for labor on cows, but these farms on the average also made no return to the farm operator. For the 10 farms that were average or better in all four factors, costs of production averaged $1.62, returns per hour of labor 26 cents, and labor incomes $1,103.

TABLE 19. COMBINED EFFECT OF IMPORTANT FACTORS*
102 Farms, Cattaraugus County, 1939-40

Number of factors	Number of farms	Cost per hundred-weight milk produced	Returns per hour of labor on cows	Average labor income
Below average in all 4 factors	12	$2.74	$-.01	$ -141
Average or above in 1 factor	20	2.31	.07	- 51
Average or above in 2 factors	32	1.95	.16	233
Average or above in 3 factors	20	1.88	.19	291
Average or above in all 4 factors	18	1.62	.26	1,103

*The four factors are: Number of cows per farm, number of cows per man, rate of milk production, and use of labor.

Eighteen farms, or about one of each 6 in the survey, were average or better in all four factors. The averages for these farms were not spectacular, but were well above the averages for all farms (table 20). The size of business of the 18 farms, as measured by number of cows per farm, was about 50 per cent above average. The amount of work accomplished per man, measured by cows per man, was about one-fifth greater than the average for all farms. The amount of milk produced per cow averaged 6,944 pounds on the 18 farms, as compared to 5,687 pounds for all farms.

Yields of roughage crops on the above-average farms were considerably better than for all farms. The amount of milk produced and the quantity of grain fed per cow on the 10 farms were each about one-fifth greater than average. The cows averaged about 65 pounds larger than for all farms.

TABLE 20. COMPARISON OF GOOD FARMS WITH THE AVERAGE
102 Farms, Cattaraugus County, 1939-40

Factor	Average 18 farms average or above in 4 factors	Average 102 farms
Size of Business		
Number of cows per farm	29	19
Use of Labor		
Number of cows per man	12	10
Man hours per cow*	151	166
Rates of Production		
Pounds milk produced per cow	6,944	5,687
Yield of hay per acre	2.3	1.7
Yield of silage per acre	12	11
Other Factors		
Per cent milk sold Oct.-Mar.	40	36
Pounds grain fed per cow	1,989	1,650
Size of cow (pounds)	964	902
Costs and Returns		
Cost per cwt. of milk produced	$1.62	$1.87
Returns per hour of labor	$ .26	$ .22
Labor income	$1,103	$298

*Includes man labor hauling milk.

The cost of producing 100 pounds of milk was $1.62 or well below the all-farm average. Returns per hour of labor on cows was about 20 per cent greater, and the labor incomes four times as large as the average for all farms.

AVERAGES OF IMPORTANT FACTORS
102 Farms, Cattaraugus County, 1939-40

Items	Your farm	Average all farms
Size of Business		
Cows per farm	_____	19
Use of Labor		
Cows per man	_____	10
Man hours per cow	_____	166
Rates of Production		
Pounds milk produced per cow*	_____	5,687
Tons of hay per acre	_____	1.7
Tons of silage per acre	_____	11
Other Factors		
Per cent milk sold October to March	_____	36
Pounds of grain fed per cow	_____	1,650
Size of cow (pounds)	_____	902
Costs and Returns		
Cost per cwt. milk produced*	_____	$1.62
Returns per hour of labor on cows	_____	$ .22
Labor income	_____	$298

*All milk standardized to 3.7 per cent butterfat basis.

VARIATION IN IMPORTANT FACTORS
102 Farms, Cattaraugus County, 1939-40

SIZE OF BUSINESS	USE OF LABOR		RATES OF PRODUCTION		OTHER FACTORS			COSTS AND RETURNS		
Number of cows	Cows per man	Man hours per cow	Pounds milk per cow	Tons hay per acre	% milk sold Oct.-March	Pounds grain fed per cow	Size of cows (lbs.)	Cost per cwt. milk produced	Returns per hour of labor on cows	Labor income
38	18	89	8,154	3.2	50	4,000	1,075	$1.28	$0.44	$1,556
28	15	117	7,005	2.4	45	2,580	1,001	1.46	0.31	854
24	13	133	6,609	2.0	41	2,136	952	1.60	0.23	603
21	12	143	6,251	1.9	39	1,840	920	1.70	0.20	490
18	11	159	5,851	1.7	37	1,680	891	1.82	0.16	350
16	10	172	5,487	1.5	35	1,490	863	1.93	0.12	178
15	8	192	4,992	1.4	33	1,336	827	2.06	0.09	55
13	8	213	4,689	1.2	30	1,170	796	2.32	0.04	-92
11	7	241	4,300	1.0	27	970	772	2.70	-0.01	-301
8	6	308	3,506	0.9	20	710	736	3.54	-0.17	-717

There are ten numbers in each column. The number at the top is the average of the highest or most efficient one-tenth of the farms for that factor. The columns are independent of each other. The line across the middle separates the upper one-half from the lower one-half of the farms for each factor.