CHENANGO COUNTY COST OF MILK PRODUCTION SURVEY

1939-40

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Mr. K. D. Scott, County Agricultural Agent, helped to plan the survey. C. G. Borglum, E. A. Eklund, Richard Hildreth, R. G. Latimer, and R. J. Peacock of the Department of Agricultural Economics assisted in taking the records.

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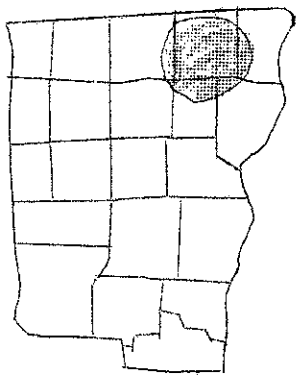
PRELIMINARY REPORT
CHENANGO COUNTY
COST OF MILK PRODUCTION SURVEY
1939-40

A farm management survey of 104 farms was made in the area between Earlville and North Norwich in Chenango 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 Chenango County Farm Bureau. The information was obtained by personal visits to the farms.



Area surveyed

Chenango County

On farms in this area, cash crops and poultry are commonly combined with the dairy enterprise. About two-thirds of the income on the farms in the survey was from the dairy enterprise, and one-fourth from crops, eggs and poultry. All farms in the survey had grade B milk markets.

The land in Chenango 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 104 farms in the survey, 20 were located in land classes I or II, 34 in land class III, 12 in land class IV, and 38 in land class V. When elevation alone was considered, 57 of the farms were located on the side slopes and hills, and 47 in the valley.

Pastures in central and southeastern New York 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 where cash crops and poultry were commonly combined with the dairy enterprise. 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 a t 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 near the middle of the milkshed, the average price received for 3.7 milk sold was $1.88. Average prices paid to New York farmers for all farm products were only six per cent above the level in 1910-14.

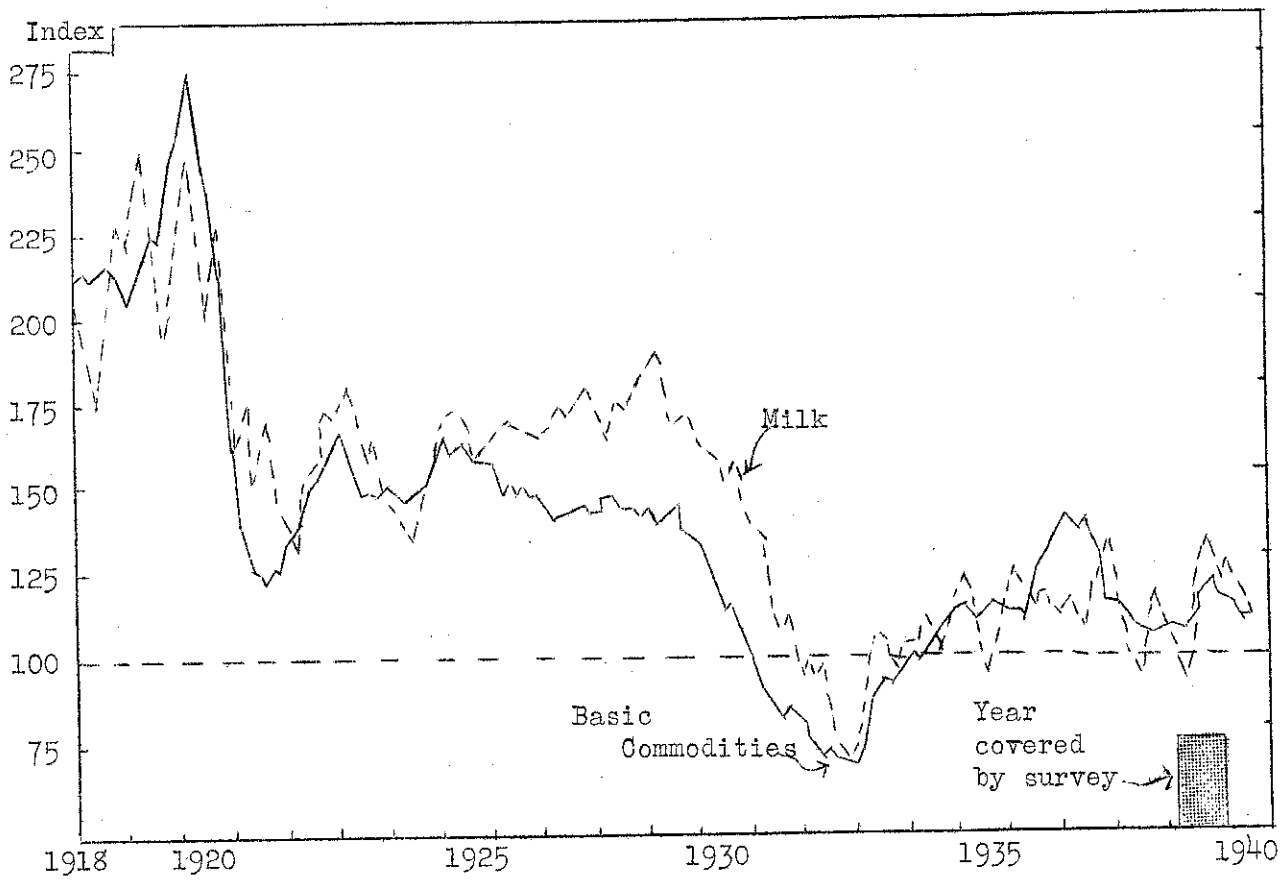


FIGURE 1. FARM PRICE OF MILK IN NEW YORK AND WHOLESALE PRICES OF BASIC COMMODITIES IN THE UNITED STATES (1910-14 = 100).

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 $13 a ton and succulents $4.45 a ton.

Wages paid by New York farmers were about 26 per cent above their average in the base period, and averaged $45 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 $153 to keep a dairy cow. Besides the milk produced, each cow on the average produced a calf valued at $5, and seven tons of manure worth $10. Other returns, such as fair premiums, amounted to $1 a cow. When the value of these other returns was deducted from the cost of keeping a cow, the net cost of producing milk was $137 a cow.

Total cost of feed per cow was $88. On the average, each cow required almost 2,200 pounds of concentrates, which, including home-grown grains, were valued at $34 (table 1). The value of the 2.4 tons of dry forage was $31 and the 4.0 tons of succulents were valued at $18. Dry forage included, besides hay, small amounts of corn fodder and other feeds. Corn silage made up most of the succulent feeds. The 163 days on pasture, between May 14 and October 23, cost 3.4 cents a day or $5 a cow for the season.

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

Feed	Average amount per cow	Average price	Cost per cow
Concentrates	2,159 pounds	$31.83 a ton	$34
Dry forage	2.4 tons	12.89 a ton	31
Succulents	4.0 tons	4.45 a ton	18
Pasture	163 days	0.034 a day	5
Man labor	165 hours*	0.22 an hour	37

*Does not include man labor hauling milk.

The 165 hours of direct man labor used per cow, exclusive of time spent hauling milk, at 22 cents an hour cost $37 a cow. Besides direct labor on cows, 6 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 $28 a cow.

On an average, the value of milk produced per cow was $125, including $116 for milk sold and $9 for milk used at home. The net cost of milk produced was $137 a cow, or $12 more than the value of the milk.

Since the charge for labor, including time spent hauling milk, was $38 a cow, and the loss on milk produced was $12 a cow, the return for labor was only $26 a cow, or 15 cents an hour.

Costs and Returns per 100 Pounds of Milk Produced

The average net cost of producing 100 pounds of milk for the year was $2.07, after credits of 24 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.

Feed costs amounted to $1.33 and made up almost three-fifths of the cost of producing milk. The 33 pounds of concentrates and the 72 pounds of dry forage fed per hundredweight of milk produced, each made up one-fifth or more of the feed cost. The 121 pounds of succulents were valued at 27 cents and the 2.5 days of pasture accounted for 8 cents per 100 pounds of milk.

The 2.5 hours of direct labor on cows cost 56 cents, or one-fourth of the total cost. Feed and labor together accounted for 82 per cent of the total cost of producing milk.

Although an average loss of $19 was taken per head for cows replaced, the cost of depreciation was only 6 cents per 100 pounds of milk, or 3 per cent of the total cost. Interest at 6 per cent on the value of the cows accounted for 9 cents. Other costs, including milk hauling, use of buildings and equipment, bull service and other items amounted to 27 cents.

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

Items	Amount	Cost of 100 pounds of milk produced	Per cent of total
COSTS			
Feed			
Concentrates	33 pounds	$ .52	23
Dry forage	72 pounds	.46	20
Succulents	121 pounds	.27	12
Pasture	2.5 days	.08	3
Total feed		$1.33	58
Labor on cows	2.5 hours	.56	24
Depreciation on cows		.06	3
Interest on cows		.09	4
Milk hauling/		.09	4
Use of buildings		.05	2
Use of equipment		.02	1
Bull service		.03	1
Bedding		.02	1
Miscellaneous		.06	2
Total costs		$2.31	100
CREDITS			
Manure		.15	63
Calves		.08	33
Miscellaneous		.01	4
Total credits		$ .24	100
NET COST PER 100 POUNDS OF MILK PRODUCED		$2.07	—
VALUE PER 100 POUNDS OF MILK PRODUCED		$1.88	—

*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.

Of the total credits of 24 cents, manure accounted for 15 cents and calves for 8 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 $1.53, as

compared to $2.43 for the winter season, and $2.07 for the year (table 3). Production per cow per day averaged 17 pounds for the pasture season, and 19 pounds for the barn-feeding season.

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

Items	Cost per 100 pounds of milk produced			
	Summer		Winter	
	Amount	Cost	Amount	Cost
COSTS				
Feed				
Concentrates	22 pounds	$ .33	40 pounds	$ .65
Dry forage	13 pounds	.07	113 pounds	.73
Succulents	60 pounds	.13	163 pounds	.37
Pasture	6 days	.20	—	—
Total feed		$ .73		$1.75
Labor on cows/	2.1 hours	.47	2.8 hours	.62
Other costs		.43		.40
Total costs		$1.63		$2.77
CREDITS		.10		.34
NET COST PER 100 POUNDS OF MILK PRODUCED		$1.53		$2.43
VALUE PER 100 POUNDS OF MILK PRODUCED		$1.64		$2.06

*All milk was standardized to 3.7 per cent butterfat basis.
/Does not include man labor hauling milk.

Feed costs during the summer amounted to 73 cents per 100 pounds of milk or more than two-fifths of the total cost. During the winter, feed costs amounted to $1.75, or about three-fifths of the total cost. In the pasture season only 22 pounds of grain were fed per 100 pounds of milk, as compared to 40 pounds in the barn-feeding season. The amounts of dry forage and succulents varied even more widely between the seasons. Only 13 pounds of dry forage and 60 pounds of succulents were fed per hundredweight of milk in the summer as compared to 113 pounds of dry forage and 163 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 20 cents.

Only 2.1 hours of man labor were used to produce 100 pounds of milk in the summer as compared to 2.8 hours for the winter season. The charge for labor of 47 cents a hundredweight in the summer accounted for somewhat more than one-fourth of the total cost in this season. During the winter, the cost of labor was 62 cents a hundred pounds of milk, but was less than one-fourth of the total cost.

Other costs were 43 cents during the summer and 40 cents per 100 pounds of milk produced during the winter. Credits during the summer, mostly for calves were 10 cents. The 34 cents of credits for the winter season included 26 cents for manure produced.

Variation in the Cost of Producing Milk

The average net cost was $2.07 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 104 farms, and the length of the line indicates the cost of producing 100 pounds of milk on that farm for the year 1939-40.

On about one-eighth of the farms, milk was produced at an average cost for the year of less than $1.60 a hundredweight, as compared to more than $3.00 on another one-eighth of the farms.

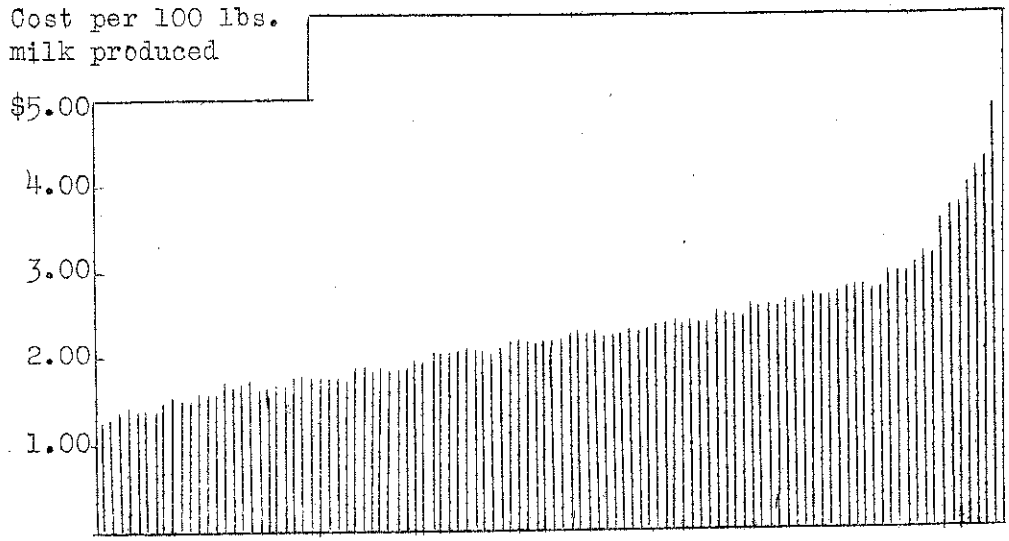


FIGURE 2. VARIATION IN THE YEARLY COST OF PRODUCING 100 POUNDS OF MILK

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

* * * *

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 15 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 of the 104 farms for the year covered by this study was $439.

There was a wide variation in both measures of returns between farms. On one-fifth of the farms, the cows paid all other expenses and made a return of 30 cents an hour for time spent on them, while on another one-fifth of the

farms no return was made to labor, and in some cases returns did not cover all other expenses. Nine farms had labor incomes of $2,000 or more. At the same time, almost one-third 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 25 farms with costs below $1.80 a hundredweight, returns per hour of labor on cows averaged $.37 and labor incomes $1,336, as compared to a loss of 14 cents an hour or $313 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
104 Farms, Chenango 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 $1.80	25	$1.58	$ .37	$1,336
$1.80 to $2.20	26	2.01	.17	357
$2.20 to $2.60	28	2.38	.06	384
$2.60 and more	25	3.19	-.14	- 313

Pounds of Milk Produced per Cow

Relation of production per cow to various factors

The herds with the lowest rates of production included, on the average, fewer cows than the herds with the larger amounts of milk produced per cow (table 5). Apparently no more labor was required to care for high-producing

cows than for low-producing cows, partly because more of the farms with the higher 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
104 Farms, Chenango 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 5,000	19	4,187	17	42	181	1,237
5,000 to 6,250	32	5,621	18	48	176	1,794
6,250 to 7,500	29	6,932	20	49	178	2,417
7,500 or more	24	8,431	25	53	185	2,554

*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. About twice as much grain was fed per cow to the cows that produced the most milk than was fed to cows with the lowest rates of production. Apparently the high-producing cows used the grain just about as efficiently, however, as the quantity of grain fed per 100 pounds of milk was the same for the lowest and highest producing groups.

The average amount of milk produced per cow on all farms was 6,373 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 $3.02 in the group of herds with the lowest production, as compared with $1.84 for the farms with the highest producing herds (table 6). In other

words, it cost farmers with an average production of less than 5,000 pounds per cow almost $1.20 more to produce 100 pounds of milk than farmers with cows producing 7,500 or more pounds of milk.

TABLE 6. RELATION OF PRODUCTION PER COW TO COSTS AND RETURNS
104 Farms, Chenango 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 5,000	19	$3.02	$-.08	$-153
5,000 to 6,250	32	2.39	.07	230
6,250 to 7,500	29	2.07	.15	480
7,500 or more	24	1.84	.28	1,135

On farms with less than 5,000 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 minus 8 cents. Labor incomes averaged $1,135 for the group of farms with the highest producing herds, and the herds in this group returned 28 cents an hour for time spent on them. In other words, the cows returned 36 cents more an hour for labor, and the farm operator received $1,200 more for his year's work on farms with herds producing 7,500 pounds or more of milk than on farms with herds producing less than 5,000 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 900 pounds, only 5,197 pounds of milk were produced per cow, as contrasted to 7,315 pounds per cow for herds with an average weight of 1,100 pounds or more. The average size of all cows measured was 1,010 pounds, with a production of 6,373 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*
104 Farms, Chenango 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 hundred-weight milk produced	Returns per hour of labor on cows
Less than 900	19	849	5,197	44	$2.58	$ .02
900 to 1,000	35	939	6,188	47	2.27	.12
1,000 to 1,100	31	1,043	6,778	49	2.33	.09
1,100 or more	18	1,158	7,315	53	1.93	.23

*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 $2.58 as compared to $1.93 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 central New York, near the middle of the New York City milkshed. For the 104 farms in the survey, 48 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 one-half or more of their milk during the period from October to March had an average production of about 7,000 pounds per cow, while herds producing less than 45 per cent of their milk during these months averaged 5,444 pounds per 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*
104 Farms, Chenango 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 45	27	38	5,444	922	181	1,733
45 to 50	23	47	6,095	976	203	2,048
50 to 55	39	52	6,916	1,032	176	2,154
55 or more	15	59	7,057	1,038	151	2,293

*All milk was standardized to 3.7 per cent butterfat.

Apparently, however, production per cow did not increase much as the proportion of milk sold during the six winter months increased beyond 50 per cent or about one-half of the total production. Slightly more grain was fed, but several hours less labor were used per cow on the farms with the largest share of winter milk, mainly because these herds had more cows in them.

Relation of season of milk production to costs and returns

As a result of higher rates of milk production and more efficient use of labor, the cost of milk production was lowest for the group of farms that produced the most milk during the six winter months (table 9). Returns per

hour of labor were highest for the group with the largest proportion of winter milk and the lowest costs.

TABLE 9. RELATION OF SEASON OF MILK PRODUCTION TO COSTS AND RETURNS*
104 Farms, Chenango 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 45	27	15	$2.61	$.01	$-122
45 to 50	23	17	2.41	.06	142
50 to 55	39	24	2.10	.18	956
55 or more	15	23	2.02	.23	557

*All milk was standardized to 3.7 per cent butterfat.

Although labor incomes tended to increase as the proportion of winter milk increased, the average labor income for the group of farms with the most winter milk was lower than for the third group, largely because the farms in the third group received more of their income from cash crops.

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 than herds on farms without silage (table 10). Along with the higher rates of production, more grain was fed per cow, but no more was fed per 100 pounds of milk produced. Somewhat more of the milk was produced during the winter season on farms with silage than for the other group of farms.

The cows on farms without silage averaged somewhat lighter in weight than the cows on farms producing silage.

TABLE 10. RELATION OF YIELD OF SILAGE TO VARIOUS FACTORS
104 Farms, Chenango 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	14	13	5,695	45	1,800	921
Less than 10 tons	34	19	6,024	47	1,944	986
10 to 12 tons	28	22	6,254	49	2,104	996
12 tons or more	28	22	7,254	51	2,218	1,030

Relation of yield of silage to costs and returns

On farms without silage, costs averaged $2.37 as compared to $2.01 on farms with high yields of silage (table 11). For the farms with the lowest silage yields, cost per hundredweight was higher, returns per hour of labor on cows was lower, and the average labor income was lower than for the farms without silage. As silage yields increased, cost of milk production decreased and both measures of returns increased. Apparently it did not pay to produce silage unless reasonably good yields could be obtained.

TABLE 11. RELATION OF YIELD OF SILAGE TO COSTS AND RETURNS
104 Farms, Chenango 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	14	--	$2.37	$ .11	$148
Less than 10 tons	34	7.1	2.48	.06	22
10 to 12 tons	28	10.4	2.29	.11	499
12 tons or more	28	14.1	2.01	.19	1,030

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 an extreme 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 explains why labor incomes were so much 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
104 Farms, Chenango 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 1.3 tons	27	19	6,210	1,881	969
1.3 to 2.0 tons	51	19	6,308	1,922	991
2.0 tons or more	26	23	6,670	2,442	1,017

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

Relation of yield of hay to costs and returns

The cost per hundredweight of milk produced decreased as hay yields increased (table 13). Returns per hour of labor on cows and labor incomes both were higher on farms with high yields than on farms with low yields.

TABLE 13. RELATION OF YIELD OF HAY TO COSTS AND RETURNS
104 Farms, Chenango 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 1.3 tons	27	1.0	$2.39	$ .09	$ 85
1.3 to 2.0 tons	51	1.6	2.29	.12	491
2.0 tons or more	26	2.8	2.18	.13	703

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
104 Farms, Chenango 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 12	23	9	200	6,168	$2.38	$ .10	$ 99
12 to 24	52	17	182	6,093	2.47	.05	151
24 or more	29	35	158	7,037	1.89	.24	1,224

In this area, large herds made possible much more efficient use of labor than small herds. On the average, only 158 hours were used per cow in the herds of 24 or more cows, as compared to 200 hours per cow in herds of fewer than 12 cows. About 5 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 medium-sized herds and highest for the herds with the most cows.

Cost per 100 pounds of milk produced averaged $2.38 for the herds with fewer than 12 cows, and $1.89 per hundredweight for the herds with 24 or more cows. The medium-sized herds, which had the lowest average production, also had the highest average cost of production. Returns per hour of labor was also lowest for the farms with medium-sized herds, and was highest for the farms with the largest herds. Labor incomes increased regularly for all groups as the number of cows in the herd increased. Apparently the higher costs per 100 pounds of milk in the medium-sized group was offset to some extent by the advantages of having a larger sized business.

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 12 cows, $685 was invested per cow (table 15). This was about $200 more than the investment per cow on the farms with 24 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 21 per cent for the large herds.

TABLE 15. RELATION OF NUMBER OF COWS PER FARM TO CAPITAL EFFICIENCY
104 Farms, Chenango 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 12	23	9	$87	$685	13
12 to 24	52	17	87	516	16
24 or more	29	35	101	473	21

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 27 cows, as compared to 18 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
104 Farms, Chenango 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	22	27	5,905	50	$2.20	$ .12	$ 500
130 to 210	58	18	6,391	48	2.26	.12	442
210 or more	24	18	6,758	47	2.44	.08	376

Even though the amount of milk produced per cow was lower on the farms with the fewest hours of labor per cow, the cost on these farms averaged $2.20 and labor income $500, as compared to an average cost of $2.44 and labor income of $376 on the farms with the most hours of labor per cow.

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.

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.

TABLE 17. RELATION OF NUMBER OF COWS PER MAN TO VARIOUS FACTORS
104 Farms, Chenango 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	21	6	11	6,371	54	228
8 to 10	34	9	17	6,424	56	188
10 to 12	22	11	23	6,850	60	167
12 or more	27	14	27	5,920	66	141

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 $2.38 (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. 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, the relationship was reversed.

TABLE 18. RELATION OF NUMBER OF COWS PER MAN TO COSTS AND RETURNS
104 Farms, Chenango 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	21	$2.38	$ .07	$-200
8 to 10	34	2.36	.08	385
10 to 12	22	2.06	.21	1,104
12 or more	27	2.31	.11	461

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 use of labor. 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 19 farms that were below average in all four 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 31 farms that were average or above in one factor were $2.46. There was a return of 6 cents an hour for labor on cows, and labor income for this group averaged $52. For the 10 farms that were average or better in all four factors, costs of production averaged $1.76, returns per hour of labor 31 cents, and labor incomes $2,102.

TABLE 19. COMBINED EFFECT OF IMPORTANT FACTORS*
104 Farms, Chenango 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	19	$2.74	$-.02	$- 73
Average or above in 1 factor	31	2.46	.06	52
Average or above in 2 factors	21	2.13	.15	309
Average or above in 3 factors	23	2.05	.18	778
Average or above in all 4 factors	10	1.76	.31	2,102

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

Ten farms, or about one of each 10 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 10 farms, as measured by number of cows per farm, was 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 7,676 pounds on the 10 farms, as compared to 6,373 pounds for all farms.

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

Factor	Average: 10 farms average or above in 4 factors	Average: 104 farms
Size of Business		
Number of cows per farm	30	20
Use of Labor		
Number of cows per man	12	10
Man hours per cow*	154	171
Rates of Production		
Pounds milk produced per cow	7,676	6,373
Yield of hay per acre	2.7	1.8
Yield of silage per acre	13.3	10.0
Other Factors		
Per cent milk sold Oct.-Mar.	54	48
Pounds grain fed per cow	2,570	2,159
Size of cow (pounds)	1,080	1,010
Costs and Returns		
Cost per cwt. of milk produced	$1.76	$2.07
Returns per hour of labor	$ .31	$ .15
Labor income	$2,102	$ 439

*Includes man labor hauling milk.

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 70 pounds larger than for all farms.

The cost of producing 100 pounds of milk was $1.76 or well below the all-farm average. Returns per hour of labor on cows was about twice and labor incomes five times the average for all farms.

AVERAGES OF IMPORTANT FACTORS
104 Farms, Chenango County, 1939-40

Items	Your farm	Average all farms
Size of Business		
Cows per farm	_____	20
Use of Labor		
Cows per man	_____	10
Man hours per cow	_____	171
Rates of Production		
Pounds milk produced per cow*	_____	6,373
Tons of hay per acre	_____	1.8
Tons of silage per acre	_____	10
Other Factors		
Per cent milk sold October to March	_____	48
Pounds of grain fed per cow	_____	2,159
Size of cow (pounds)	_____	1,010
Costs and Returns		
Cost per cwt. milk produced*	_____	$2.07
Returns per hour of labor on cows	_____	$ .15
Labor income	_____	$439

*All milk standardized to 3.7 per cent butterfat basis.

VARIATION IN IMPORTANT FACTORS
104 farms, Chenango 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
44	17	111	9,274	3.3	61	3,780	1,191	$1.42	$0.46	$2,811
32	14	122	7,936	2.6	55	2,809	1,107	1.66	0.33	1,373
26	12	135	7,470	2.1	53	2,510	1,067	1.81	0.25	842
21	11	149	7,084	1.9	52	2,318	1,036	1.99	0.17	526
18	10	160	6,544	1.7	50	2,060	999	2.15	0.13	384
16	9	177	6,079	1.5	49	1,850	968	2.28	0.09	209
14	9	188	5,656	1.4	47	1,718	932	2.39	0.06	88
12	8	205	5,305	1.2	44	1,460	911	2.58	0.03	-212
10	7	233	4,814	1.1	40	1,091	877	2.84	-0.08	-437
7	5	316	3,668	0.9	34	840	826	3.79	-0.31	-1,091

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.