ORANGE COUNTY COST OF MILK PRODUCTION SURVEY

1939-40

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Orange County
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Mr. C. C. Davis, County Agricultural Agent, helped to plan the survey. C. G. Borglum, E. A. Eklund, Richard Holdreth, R. G. Latimer, R. J. Peacock, and R. H. Anderson of the Department of Agricultural Economics assisted in taking the records.

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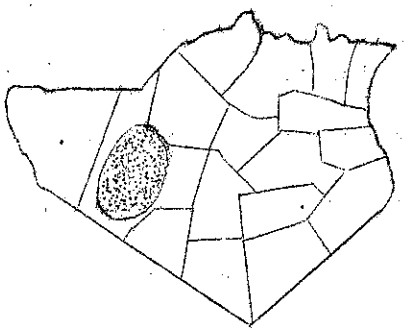
PRELIMINARY REPORT
ORANGE COUNTY
COST OF MILK PRODUCTION SURVEY
1939-40

A farm management survey of 114 farms was made in the area around Westtown in Orange 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 co-operation with the Orange County Farm Bureau. The information was obtained by personal visits to the farms.



Orange County

Area surveyed

The area included in these surveys is part of the intensive winter-dairy section of southeastern New York. About one-fourth of the farms were delivering milk to grade A, and three-fourths to grade B plants during the year covered by the survey.

Pastures in 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 the winter-dairy region of southeastern New York. 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

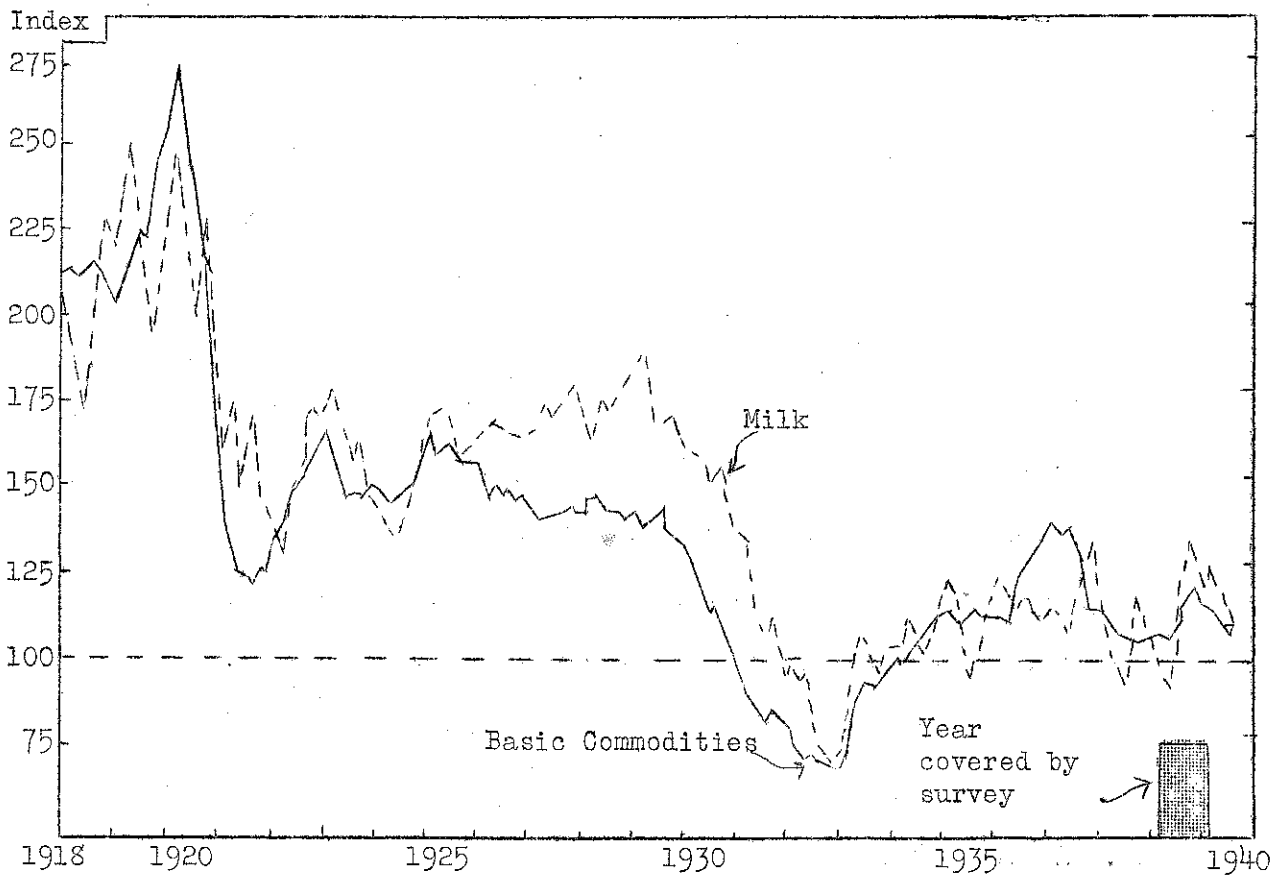


FIGURE 1. FARM PRICE OF MILK IN NEW YORK AND WHOLESALE PRICES OF BASIC COMMODITIES IN THE UNITED STATES (1910-14 = 100).

near New York City, the average price received for 3.7 milk sold was $2.38, including grade A premiums. Average prices paid to New York farmers for all farm products were only six per cent above 1910-14.

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 $33. Hay prices averaged $17 a ton and succulents $5.97 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 $168 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. 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 $156 a cow.

Total cost of feed per cow was $93. On the average, each cow required almost 2,409 pounds of concentrates, which, including small amounts of home-grown grains, were valued at $40 (table 1). The 2.0 tons of dry forage cost $33, and the 2.2 tons of succulents were valued at $13. Dry forage included, besides hay, small amounts of corn fodder. Corn silage made up most of the succulent feeds. The 161 days on pasture, between May 16 and

October 25, cost 4.5 cents a day or $7 a cow for the season.

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

Feed	Average amount per cow	Average price	Cost per cow
Concentrates	2,409 pounds	$33.45 a ton	$40
Dry forage	2.0 tons	16.87 a ton	33
Succulents	2.2 tons	5.97 a ton	13
Pasture	161 days	0.045 a day	7
Man labor	175 hours*	0.24 an hour	42

*Does not include man labor hauling milk.

The 175 hours of direct man labor used per cow, exclusive of time spent hauling milk, at 24 cents an hour cost $42 a cow. Besides direct labor on cows, 7 hours of man labor worth $2 were used hauling milk. Other costs, including bedding, milk hauling, use of buildings and equipment, bull service and other items amounted to $32 a cow.

On an average, the value of milk produced per cow was $157, including $151 for milk sold and $6 for milk used at home. The net cost of milk produced was $156 a cow, leaving a profit of $1 a cow.

Since the charge for labor, including time spent hauling milk, was $44 a cow, and the profit on milk produced was $1 a cow, the return for labor was only $45 a cow, or 26 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 $2.37, after credits of 18 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*
114 Farms, Orange County, 1939-40

Items	Amount	Cost of 100 pounds of milk produced	Per cent of total
COSTS			
Feed			
Concentrates	36 pounds	$ .61	24
Dry forage	59 pounds	.50	20
Succulents	65 pounds	.19	7
Pasture	2.4 days	.11	4
Total feed		$1.41	55
Labor on cows	2.6 hours	.64	25
Depreciation on cows		.13	5
Interest on cows		.08	3
Milk hauling/		.10	4
Use of buildings		.06	3
Use of equipment		.03	1
Bull service		.03	1
Bedding		.01	≠
Miscellaneous		.06	3
Total costs		$2.55	100
CREDITS			
Manure		.10	56
Calves		.07	39
Miscellaneous		.01	5
Total credits		$ .18	100
NET COST PER 100 POUNDS OF MILK PRODUCED		$2.37	---
VALUE PER 100 POUNDS OF MILK PRODUCED		$2.375	---

*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.
≠Less than $0.005.

Feed costs amounted to $1.41 and made up more than one-half of the cost of producing milk. The 36 pounds of concentrates and the 59 pounds of dry forage fed per hundredweight of milk produced, each made up one-fifth or more of the feed cost. The 65 pounds of succulents were valued at 19 cents and the 2.4 days of pasture accounted for 11 cents per 100 pounds of milk.

The 2.6 hours of direct labor on cows cost 64 cents, or one-fourth of the total cost. Feed and labor together accounted for 80 per cent of the total cost of producing milk.

Although an average loss of $47 was taken per head for cows replaced, the cost of depreciation was only 13 cents per 100 pounds of milk, or 5 per cent of the net cost. Interest at 6 per cent on the value of the cows accounted for another 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 18 cents, manure accounted for 10 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 $1.80, as compared to $2.71 for the winter season, and $2.37 for the year (table 3). Production per cow per day averaged 16 pounds for the pasture season, and 20 pounds for the barn-feeding season.

Feed costs during the summer amounted to only 74 cents per 100 pounds of milk or about two-fifths of the total cost. During the winter, feed costs amounted to $1.82, or three-fifths of the net cost. In the pasture season only 25 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 14 pounds of succulents were fed per hundredweight of milk in the summer as compared to 94 pounds of dry forage and 96 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 29 cents.

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

Items	Cost per 100 pounds of milk produced			
	Summer		Winter	
	Amount	Cost	Amount	Cost
COSTS				
Feed				
Concentrates	25 pounds	$.41	44 pounds	$.73
Dry forage	1 pound	.01	94 pounds	.80
Succulents	14 pounds	.04	96 pounds	.29
Pasture	6 days	.29	—	...
Total feed		$.75		$1.82
Labor on cows**	2.3 hours	.57	2.8 hours	.68
Other costs		.57		.45
Total costs		$1.89		$2.95
CREDITS		.09		.24
NET COST PER 100 POUNDS OF MILK PRODUCED		$1.80		$2.71
VALUE PER 100 POUNDS OF MILK PRODUCED		$2.16		$2.50

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

Only 2.3 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 57 cents a hundredweight in the summer accounted for almost one-third of the total cost in this season. During the winter, the cost of labor was 68 cents a hundred pounds of milk, but was less than one-fourth of the total cost.

Other costs were 58 cents during the summer and 45 cents per 100 pounds of milk produced during the winter. Credits during the summer, mostly for calves were 9 cents. The 24 cents of credits for the winter season included 17 cents for manure produced.

Variation in the Cost of Producing Milk

The average net cost was $2.37 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 114 farms, and the length of the line indicates the cost of producing 100 pounds of milk on that farm for the year 1939-40.

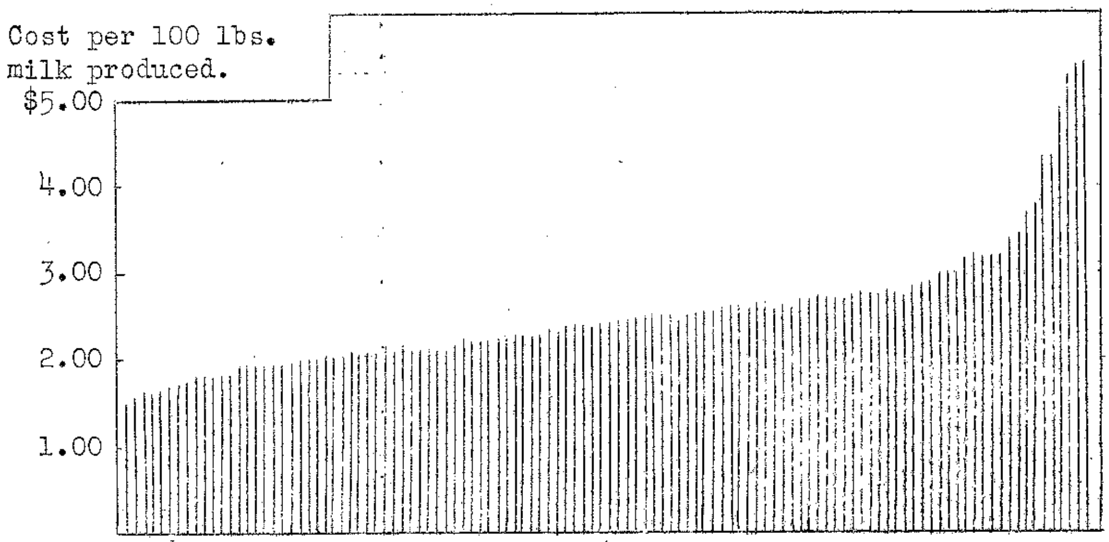


FIGURE 2. VARIATION IN THE YEARLY COST OF PRODUCING 100 POUNDS OF MILK

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

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On about one-sixth of the farms, milk was produced at an average cost for the year of less than $2.00 a hundredweight, as compared to more than $3.00 on another one-sixth 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, labor income was used as the measure of returns on the individual farms. Labor income is the return that the farmer gets for his year's work, after paying all farm expenses and allowing 5 per cent interest on the money invested. During 1939-40, the average labor income of the 114 farms in this study was $700.

There was a wide variation in labor income between farms. Eleven farms had labor incomes of $2,000 or more. At the same time, almost 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. None of these farms made any return to the operator for his year's work.

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 21 farms with costs below $2.00 a hundredweight, labor incomes averaged $1,989, or about $2,300 more than on the farms with costs of $2.80 or more a 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
114 Farms, Orange County, 1939-40

Cost per 100 pounds milk produced	Number of farms	Average cost per 100 pounds milk produced	Labor income
Less than $2.00	21	$1.80	$1,989
$2.00 to $2.40	32	2.19	890
$2.40 to $2.80	35	2.61	505
$2.80 or more	26	3.46	- 313

Pounds of Milk Produced per Cow

Relation of production per cow to various factors

The 25 herds with the lowest rates of production included, on the average, only 24 cows as compared to 28 or more cows in the herds with larger amounts of milk produced per cow (table 5). The average amount of milk produced per cow on the 114 farms was 6,560 pounds. Apparently only a few hours more labor was required to care for high-producing cows than for low-producing cows. 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
114 Farms; Orange County, 1939-40

Pounds of milk produced per cow	Number of farms	Pounds milk produced per cow	Per cent of milk sold October to March	Number of cows per farm	Man hours per cow*	Pounds grain fed per cow
Less than 5,500	25	4,673	53	24	180	2,104
5,500 to 6,500	28	6,084	53	28	187	2,414
6,500 to 7,500	34	6,955	54	30	182	2,385
7,500 or more	27	8,314	56	28	215	2,800

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

For the highest producing herds, slightly more of the milk was produced during the winter season than for the other herds. About one-third more 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 more efficiently, however, as the quantity of grain fed per 100 pounds of milk decreased regularly as milk production per cow increased.

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

$3.21 in the group of herds with the lowest production, as compared with $2.17 for the farms with the highest producing herds (table 6). In other words, it cost farmers with an average production of less than 5,500 pounds per cow about $1 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
114 Farms, Orange County, 1939-40

Pounds of milk produced per cow	Number of farms	Cost per hundredweight of milk	Labor income
Less than 5,500	25	$3.21	$-124
5,500 to 6,500	28	2.59	622
6,500 to 7,500	34	2.29	853
7,500 or more	27	2.17	1,351

On farms with less than 5,500 pounds of milk produced per cow, there was no return to the operator for his year's work. The labor incomes averaged $1,351 for the group of farms with the highest producing herds.

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 averaging less than 950 pounds, only 6,007 pounds of milk were produced per cow, as contrasted to 7,518 pounds per cow for herds with cows averaging 1,050 pounds or more. The average size of all cows measured was 979 pounds, with a production of 6,560 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*
114 Farms, Orange County, 1939-40

Size of cow (pounds)	Number of farms	Average size of cow (pounds)	Pounds milk produced per cow	Average age of cows	Per cent milk sold October to March	Cost per hundred-weight milk produced
Less than 950	41	893	6,007	5.7	53	$2.65
950 to 1,050	51	1,001	6,601	5.6	54	2.56
1,050 or more	21	1,095	7,518	6.2	57	2.26

*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 $2.65 as compared to $2.26 per hundredweight on farms with the largest cows.

Relation of season of milk production to various factors

The region in which the area included in this survey is located is the extreme winter-dairy section of southeastern New York. For the 114 farms in the survey, 54 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. Some 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). Since most of the farms sold the greater part of their milk during the winter, however, the relationship was not striking. Herds that produced more than one-half of their milk during the period from October to March had an average production of about 6,700 pounds per cow, while herds producing less than one-half of

their milk during these months averaged 6,058 pounds per cow. The average weight of the cows tended to increase as the proportion of winter milk increased.

TABLE 8. RELATION OF SEASON OF MILK PRODUCTION TO VARIOUS FACTORS*
114 Farms, Orange 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 50	24	46	6,058	943	206	2,392
50 to 55	34	52	6,694	974	192	2,459
55 to 60	35	57	6,733	985	189	2,391
60 or more	21	63	6,641	1,020	175	2,486

*All milk was standardized to 3.7 per cent butterfat.

Apparently, however, production per cow did not increase as the proportion of milk sold during the six winter months increased beyond about 55 per cent, or about the average for the 114 farms. Slightly more grain was fed, but several hours less labor were used per cow on the farms with the largest share of winter milk.

Relation of season of milk production to costs and returns

The cost of milk production was lowest, and labor incomes were highest for the farms that produced from 50 to 55 per cent of their milk during the six winter months (table 9). This group also had the most cows per farm. For the farms that sold less than one-half of their milk during these months, the lower rate of production probably largely accounts for the high cost per hundredweight and low labor income in this group.

For the farms that sold more than 55 per cent of their milk during these months, costs per hundredweight increased as the proportion of winter milk increased, because production per cow remained about the same while the cost of the extra feed to maintain a high level of winter production in-

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

Per cent milk sold October to March	Number of farms	Number of cows per farm	Cost per hundredweight of milk produced	Labor income
Less than 50	24	25	$2.87	$371
50 to 55	34	31	2.36	850
55 to 60	35	29	2.46	798
60 or more	21	23	2.55	670

*All milk was standardized to 3.7 per cent butterfat.

creased. Labor incomes for these farms declined as the proportion of winter milk and costs per hundredweight increased.

Yields of Roughage Crops

Relation of yield of silage to various factors

Herds on farms that produced corn for silage had higher rates of milk production with less grain fed per cow than on farms without silage (table 10). Slightly more of the milk was produced during the winter season on farms with silage than for the other group of farms.

TABLE 10. RELATION OF YIELD OF SILAGE TO VARIOUS FACTORS
114 Farms, Orange 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	22	6,439	53	2,668	973
Less than 9 tons	35	29	6,487	55	2,209	975
9 tons or more	32	34	6,827	56	2,319	992

The cows on farms without silage were approximately the same size as the cows on farms producing silage. About 15 per cent less grain was fed per cow on farms with high silage yields than on farms with no silage. More cows were kept per farm on farms with silage than on farms without silage.

Relation of yield of silage to costs and returns

On farms without silage, costs averaged $2.60 as compared to $2.44 on farms with high yields of silage (table 11). Labor incomes were much higher for farms growing silage than for the farms without silage.

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

Yield of silage per acre	Number of farms	Average tons silage per acre	Cost per cwt. milk produced	Labor income
No silage grown	47	...	$2.60	$366
Less than 9 tons	35	6	2.54	748
9 tons or more	32	11	2.44	1,138

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 most farms were abnormally low. Silage yields were relatively good. Because of an extreme hay shortage, hay prices were very 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 partly explains why labor incomes were so much higher for farms with 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. As a result of the severe drought in this area in the summer of 1939, however, hay yields were abnormally low on many farms. Cows on farms with high hay yields were fed slightly less grain, but produced more milk than cows on farms with low hay yields (table 12). The number of cows

per farm was about the same for all groups.

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

Yield of hay per acre	Number of farms	Number of cows	Pounds milk per cow	Pounds grain per cow	Size of cows (pounds)
Less than 1.0	32	27	6,277	2,528	948
1.0 to 1.5	53	28	6,623	2,355	983
1.5 or more	29	27	6,768	2,455	1,007

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

Relation of yield of hay to costs and returns

There was no consistent relationship between hay yields and the cost of producing milk (table 13). This may have been the result of the abnormally low yields of hay on most farms due to the drought, and to the relatively heavy feeding of grain common to this intensive dairy region. Labor incomes increased regularly as hay yields increased.

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

Yield of hay per acre	Number of farms	Average tons hay per acre	Cost per hundredweight milk produced	Labor income
Less than 1.0	32	0.7	$2.62	$467
1.0 to 1.5	53	1.2	2.42	724
1.5 or more	29	1.8	2.64	913

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
114 Farms, Orange 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	Labor income
Fewer than 20	26	14	225	6,561	$2.79	$364
20 to 26	26	23	198	6,587	2.61	517
26 to 32	28	28	192	6,670	2.53	774
32 or more	34	41	158	6,456	2.28	1,035

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 32 or more cows, as compared to 225 hours per cow in herds of fewer than 20 cows. About 6 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 large herds and about the same for the other groups.

Costs per 100 pounds of milk produced averaged $2.79 for the herds with fewer than 20 cows, and declined regularly as the number of cows increased to $2.28 per hundredweight for the herds with more than 32 cows. This decline in cost as the number of cows increased was the result largely of the saving in labor.

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. More than $550 was invested per cow on the farms with fewer than 20 cows (table 15). This was about $100 more than the investment per cow on the farms with more than 32 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 fewer than 20 cows, only 16 per cent of the money was invested in cows, as compared to 20 per cent for the large herds.

TABLE 15. RELATION OF NUMBER OF COWS PER FARM TO CAPITAL EFFICIENCY
114 Farms, Orange 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 20	26	14	$91	$556	16
20 to 26	26	23	92	496	19
26 to 32	28	28	89	428	21
32 or more	34	41	91	453	20

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.

Relation of number of cows per farm to cost of bull service per cow

Because the cost to feed, care for, and house a bull was about the same regardless of the number of cows kept, the cost of bull service per cow decreased as the number of cows per farm increased (table 16). In herds of fewer than 20 cows, the average cost of bull service amounted to $3.62 per cow, as compared to $1.75 per cow in herds of 32 or more cows.

Nearly all farms kept one bull, and two bulls were kept on some of the larger farms.

TABLE 16. RELATION OF THE NUMBER OF COWS PER FARM TO THE COST OF BULL SERVICE PER COW
114 Farms, Orange County, 1939-40

Number of cows per farm	Number of farms	Average number of cows	Average cost of bull service per cow
Fewer than 20	26	14	$3.62
20 to 26	26	23	3.19
26 to 32	28	28	2.47
32 or more	34	41	1.75

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. 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 17). The group of farms that were most efficient in use of labor kept 32 cows, on the average

as compared to 21 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 17. RELATION OF MAN HOURS PER COW TO COSTS AND RETURNS
114 Farms, Orange 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	Labor income
Less than 140	22	32	6,043	55	$2.37	$1,081
140 to 220	64	29	6,551	54	2.46	744
220 or more	28	21	6,996	53	2.83	299

Even though the amount of milk produced per cow was lower on the 22 farms with the fewest hours of labor per cow, costs on these farms averaged only $2.37 and labor incomes $1,081 as compared to costs of $2.83 and labor incomes of $299 on the 28 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, varied widely between individual farms. On the 24 farms with fewer than 10 cows kept per man, the average number of cows per farm was 17 (table 18). For the 20 farms with 14 or more cows per man, the size of herd averaged 35 cows. Although production per cow was highest for the group with the fewest cows per man, there appeared to be no consistent relationship between labor efficiency and the amount of milk produced per cow. About the same proportion of the milk was sold in the winter season in all groups. Man hours per cow decreased rapidly as the number of cows kept per man increased.

TABLE 18. RELATION OF NUMBER OF COWS PER MAN TO VARIOUS FACTORS
114 Farms, Orange 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 milk sold Oct.-Mar.	Man hours per cow
Fewer than 10	24	8	17	6,887	54	268
10 to 14	53	11	28	6,443	55	186
14 or more	37	16	35	6,523	54	147

Relation of cows per man to costs and returns

The average cost of producing 100 pounds of milk on farms with fewer than 10 cows per man was $2.80 (table 19). The cost per hundredweight decreased as labor efficiency increased, and the average cost for the group with 14 or more cows per man was $2.33. Labor income for the most efficient group averaged $1,098, as compared to $145 for the group with fewer than 10 cows per man.

TABLE 19. RELATION OF NUMBER OF COWS PER MAN TO COSTS AND RETURNS
114 Farms, Orange County, 1939-40

Number of cows per man	Number of farms	Cost per hundredweight of milk	Labor income
Fewer than 10	24	$2.80	$ 145
10 to 14	53	2.56	673
14 or more	37	2.33	1,098

Combined Effect of Important Factors

The three most important factors that were found to be related to costs and returns in producing milk in this area were production per cow, size of herd, 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 21 farms that were below average in allthree factors, the cost of producing 100 pounds of milk average $3.06 and the average labor income was $54 (table 20). Costs on the 34 farms that were average or above in one factor were $2.65 and labor incomes for this group averaged only $388. For the 18 farms that were average or better in all four factors costs of production averaged $2.04, and labor incomes averaged $1,604.

TABLE 20. COMBINED EFFECT OF IMPORTANT FACTORS*
114 Farms, Orange County, 1939-40

Number of factors	Number of farms	Cost per hundred-weight milk produced	Average labor income
Below average in all 3 factors	21	$3.06	$ 54
Average or above in 1 factor	34	2.65	388
Average or above in 2 factors	41	2.39	892
Average or above in all 3 factors	18	2.04	1,604

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

Eighteen farms, or about one-sixth of those in the survey, were average or better in all three factors. The averages for these farms were not spectacular, but were well above the averages for all farms (table 21). 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-fourth greater than the average for all farms. The amount of milk produced per cow averaged 7,382 pounds on the 18 farms, as compared to 6,560 pounds for all farms.

TABLE 21. COMPARISON OF GOOD FARMS WITH THE AVERAGE
114 Farms, Orange County, 1939-40

Factor	Average 18 farms arranged as above in 3 factors	114 farms
Size of Business		
Number of cows per farm	41	28
Use of Labor		
Number of cows per man	15	12
Man hours per cow*	162	182
Rates of Production		
Pounds milk produced per cow	7,382	6,560
Yield of hay per acre	1.1	1.2
Yield of silage per acre	8.7	8.6
Other Factors		
Per cent milk sold Oct.-Mar.	55	54
Pounds grain fed per cow	2,194	2,409
Size of cow (pounds)	1,014	979
Costs and Returns		
Cost per cwt. of milk produced	$2.04	$2.37
Labor income	$1,604	$700

*Includes man labor hauling milk.

Crop yields on the above-average farms were about the same as the averages for all farms. Although production per cow was higher, slightly less grain was fed per cow. The cows averaged about 30 pounds larger than for all farms.

The cost of producing 100 pounds of milk was $2.04, or well below the all-farm average. Labor incomes for the 18 farms average or better in all three factors averaged $1,604, as compared to $700 for the 114 farms.

AVERAGES OF IMPORTANT FACTORS
114 Farms, Orange County, 1939-40

Items	Your farm	Average all farms
Size of Business		
Cows per farm	_____	28
Use of Labor		
Cows per man	_____	12
Man hours per cow	_____	182
Rates of Production		
Pounds milk produced per cow*	_____	6,560
Tons of hay per acre	_____	1.2
Tons of silage per acre	_____	8.6
Other Factors		
Per cent milk sold October to March	_____	54
Pounds of grain fed per cow	_____	2,409
Size of cow (pounds)	_____	979
Costs and Returns		
Cost per cwt. milk produced*	_____	$2.37
Labor income	_____	$700

*All milk standardized to 3.7 per cent butterfat basis.

VARIATION IN IMPORTANT FACTORS
114 farms, Orange 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	Tons silage per acre	% milk sold Oct.-March	Pounds grain fed per cow	Size of cows (lbs.)	Cost per cwt. milk produced	Labor income
54	18	110	8951	2.2	14	65	3973	1114	$1.68	$2813
37	16	133	8003	1.7	11	61	3125	1071	1.95	1701
33	14	150	7443	1.5	10	59	2845	1035	2.10	1281
29	13	162	7045	1.3	10	57	2592	1016	2.21	1004
27	12	170	6786	1.2	9	55	2427	995	2.36	852
25	11	179	6455	1.1	8	53	2300	971	254	576
23	11	195	6130	1.0	8	52	2083	946	2.64	303
20	10	217	5723	0.9	7	50	1918	919	2.77	22
17	9	256	5043	0.8	6	48	1708	892	3.02	-321
11	7	338	4103	0.5	4	44	1336	837	4.11	-1287

There are ten numbers in each column. The number at the top is the average of the highest 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. The red lines show how your farm compares with the others.