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Eastman, M. Gale

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By M. GALE EASTMAN

UNIVERSITY OF NEW HAMPSHIRE
DURHAM, N. H.

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An Economic Study of Dairy Farming in Grafton County, New Hampshire, 1930.*†

Very few business records of farms have been obtained in New Hampshire in recent years. An early survey was made in 1909 by the New Hampshire Agricultural Experiment Station and the Office of Farm Management of the Bureau of Plant Industry of the United States Department of Agriculture.[1] Two hundred and sixty-six records of farms were obtained in four townships in Hillsboro County, and the area was resurveyed and reported on ten years later. A somewhat more extensive survey was conducted by the same departments in 1911 and comprised the financial results of 428 farms.[2] Two areas were involved in this latter study, one in the Suncook valley in Belknap and Merrimack Counties and one in Grafton County along the Connecticut River in a part of the same area covered by the present work. The average labor incomes in the two surveys were $337 and $266, respectively.

The few more recent business surveys that have been made have usually included small groups of farms and have been used principally for demonstration purposes in the communities where taken. For example, such a survey was made by the Station in 1915, embracing two areas and some 160 farms in Cheshire and Sullivan Counties in the southwestern part of the State.[3] A similar study was made in the same year by the Office of Farm Management at Washington.[4] This study was purposely confined to the same area in Grafton County that had been covered in 1911. The average labor income in Cheshire and Sullivan Counties for 146 farms amounted to $230. The average labor income in Grafton County for 74 farms was $248.

There is no more fundamental enterprise in New Hampshire than that of dairying. While it may be less sensational than some others, it contributes in the long run much more surely and largely to the rural income. The State's agricultural prosperity depends to a consid-

*Acknowledgments. The writer wishes to express a large measure of appreciation to the hundreds of farmers who so wilingly co-operated to make this study possible, and to the milk buying companies whose unstinted co-operation made the farmers' milk sales records available in detali. To President E. M. Lewis and Director J. C. Kendall of the University of New Hampshire, the writer is indebted for many privileges; and to Professors W. I. Myers, G. F. Warren, Leland Spencer and H. L. Reed of Cornell University for personal help and advice incident to this and other graduate work.

Field assistance was given by Max Abell, Leon Batchelder, Meredith Brill, Paul Hobbs, Samuel Hoitt, Eric McNab, Earl Robinson and Henry Wightman. Mr. Hoitt, as a graduate assistant in the Department, also rendered valuable assistance in the final checking and tabulation of the data.

†Also presented in practically this same form to the Faculty of the Graduate School of Cornell University, September 1931, as a major thesis in partial fulfillment of the requirements for the degree of doctor of philosophy.

erable extent on successful dairy farm management. This is particularly true of the northern counties where the choice of enterprises is much more limited than farther south.

Most farm surveys embrace too few businesses to provide conclusive evidence concerning the problems involved. Out of 1592 separate investigations made in the United States up to 1929, only 210, or 13.2 per cent, have included more than 100 records, and the average number for all was only 64.* That this study might provide ample data for drawing some definite conclusions regarding the present status of farming in one of the most intensive wholesale milk regions in the State, was one of the reasons for its inception. A much more important objective was the probability of discovering ways and means of organization and management that should contribute to the personal welfare of some or all of the present and potential farmers concerned.

Every farm is by nature and necessity a miniature experiment station. Few, indeed, are the possible practical practices that have not been tried out by some farmer, somewhere. An analysis of the financial results of these experiences, whether successful or otherwise, cannot fail to be of value to others confronted with similar problems. It is to the interpretation of these experiments and experiences among farmers and on their own farms that the analysis to follow is devoted.

METHODS

The records were taken between the middle of April and the first of July, 1930. They included the farm business for the year beginning April 1, 1929, and ending March 31, 1930. Four hundred and fourteen records were obtained for as many farms distributed through fifteen towns in Grafton County and one adjacent town in Coos County. Ten of these towns border on the Connecticut River and the remaining six are contiguous to these. The location of the towns is shown graphically in Figure 1.

Through the assistance of the county agent, the farmers' names were secured from the lists of patrons at the several milk stations in or near the area. As practically every farmer in this region sells milk at some time during the year, this method provided a reasonably complete list. The county agent, managers at the milk stations, selectmen, grocery men, and others gave further assistance in locating the farms and in attaining the co-operation of their owners.

Through the co-operation of the milk-buying companies and their agents at the respective stations, accurate accounts of the amounts and prices of wholesale milk delivered to them by each farmer were made available. This eliminated some chances of error through failure to find the farmer's pay slips and having to accept his estimate of receipts for milk. Much more important, it relieved the farmer of considerable

* Compiled from figures in United States Department of Agriculture Yearbooks, 1925 and 1931, pp. 1285 and 984, respectively.

monotony by decreasing materially the time required for the enumerator to record the details of his business.

Within the area previously described, the only method employed in the selection of farms was to include those for which complete sales records of dairy products were available for the year ending March 31, 1930. This information was occasionally supplied by the farmer, particularly in cases where the milk or milk products were sold locally either wholly or in part. The ten-page questionnaire used was detailed and comprehensive; the farmers are to be commended on their patience and perseverance in submitting to the ordeal.

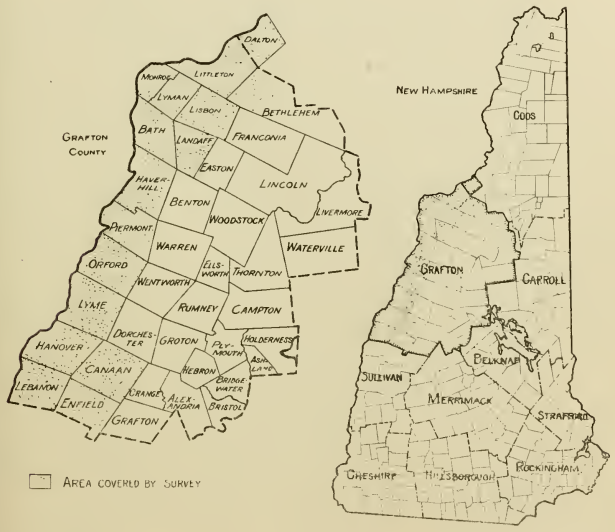

Figure I. Maps showing area covered by the survey.

Some of the important data are presented from a group of 395 farms instead of 414. Nineteen records were finally eliminated from certain calculations for various reasons. A majority of them lacked complete information concerning the production of milk and the receipts therefrom for a part or all of the year. A very few evidenced abnormal results from dealings in lumber, trading in cattle, or because the operator purposely gave inaccurate information. On the whole, however, the farmers were most agreeable, willing to co-operate and painstaking in their efforts to further the interests of the undertaking.

LOCATION AND DESCRIPTION OF THE AREA STUDIED

Location

Grafton County is in the west central part of New Hampshire. Its western boundary is the Connecticut River while its natural eastern limit is roughly defined by the White Mountains and their foothills. The better automobile roads, as well as the railroads, follow the Connecticut, Mascoma, Baker's, and Ammonoosuc rivers, for the most part. Along these rivers, also, the better appointed farms are likely to be found.

Area

The land area of the county is approximately 1,106,560 acres, 31.4 per cent of which is in farms.[5] Coos, embracing some 1,150,720 acres, is the only county in the State having a larger land area. Grafton County, however, exceeds each of the other nine counties of the State in the area included in farms, 347,743 acres. The total farm land has decreased here in recent years in common with the rest of the State. The census figures indicate a decrease of 8.2 per cent for this county between 1925 and 1930. In 1930, there were 2,077 farms in contrast to 2,698 reported for 1925, a decrease of 23 per cent. However, the farms have increased in average size from 140.4 acres in 1925 to 167.3 in 1930. This change of some 27 acres is probably significant. Some variation probably results from combining farms to get a larger business in accordance with the economic requirements of present-day agriculture, and possibly some from different instructions to enumerators.

The 414 farms surveyed represented 19.9 per cent, or approximately one-fifth, of the total number of farms in the county (Table 1) and 27.8 per cent, or more than one-fourth, of all the land in farms. The aver-

Table I—*A comparison of the area surveyed with Grafton County as a whole.*

	Grafton County.*	Farms included in survey.	Per cent of county figure.
Number of farms	2,077	414	19.9
Average acres per farm	167.3	233.3	139.4
Average acres in crops per farm	36.5	50.8	139.2
Average value of land and buildings per farm	$5,056	$7,237	143.1
Average value of land and buildings per acre	$30.22	$31.09	102.9
Average value of buildings per farm	$2,763	$4,055	146.8
Average value of buildings per acre	$16.52	$17.38	105.2
Average value of land per farm	$2,293	$3,182	138.8
Average value of land per acre	$13.70	$13.64	99.6
Average number of cows per farm	7.1	15.9	222.5

* Fifteenth Census of the United States, Agriculture, 1930.

age size of the farms surveyed was 233.3 acres, or some sixty-six acres larger than the average for all. The value of land and buildings for the whole county averaged $5,056 per farm; while for the 414 farms, it was $7,237, or 43.1 per cent more. The average values of land and buildings per acre and buildings and land separately per acre were nearly identical.

Figure 2. Map of the town of Haverhill with farm identification number.

There were more than twice as many cows per farm for the smaller group. The survey was intended to be representative not of the whole county but of the particular section involved.

Population

Census figures indicate that the county had a population of 42,816 in 1930. The five towns having more than 2,000 inhabitants each were Lebanon (7,073), Littleton (4,558), Haverhill (3,665), Hanover (3,043), and Lisbon (2,324). There are no incorporated cities within

the county, but each of the towns enumerated includes a village of appreciable size which largely accounts for its superiority in numbers. The population per square mile for the area was 24.8, as compared to 51.5 for the whole State. There has been a net gain of some 3,000 in population over a period of forty years, resulting from slight increases in every census period excepting that of 1910-1920.

The county seat is at the village of Woodsville in the town of Haverhill and on the Connecticut River. Woodsville is also the railroad center of the county.

Physiographic Features

The topography is varied. Elevations of 300 to 500 feet near the Connecticut River on the west easily change to 1,000 feet within scarcely a mile to the east. Bethlehem's main street, in the north end of the county away from the river, is some 1,500 feet above sea level. Small hills in some cases rise almost immediately from the river to heights of 1,500 feet or more until toward the northeastern boundary one encounters the Presidential Range of the White Mountains, and just over the line, in Coos County, the highest peak in the State, Mount Washington. Sometimes the transition in elevation is so abrupt that no tillage land is provided adjacent to the river. Such is the condition in Hanover and Lebanon, but in this case an irregular plateau of good farm lands is found on a terrace considerably higher than the present river channel.

The Connecticut River may be emphasized as defining an area of good farms. Tributaries of this river tending to reach in an easterly direction toward the mountains, or branches of the Merrimac River system flowing southeasterly out of the southern part of the county may provide some other isolated pockets or narrow ribbons of alluvial soils fairly well adapted to farming. Furthermore, there are many fields scattered over the rounded tops or half way up the sides of the smaller hills. Here, in the past, a vast amount of energy expended in removing stumps and in building houses and stone walls has contributed to the present generation a doubtful heritage of farms encumbered not only with sloping fields but often with shallow, rocky soils.

Soils

There is no soils map of this county, but something of the nature of the soils may be suggested from observation or from a study of other areas of similar topography in neighboring states adjacent to the river. Over the county as a whole, the soils are predominantly glacial in origin. Throughout the uplands, then, there is an unassorted mass of glacial debris of varying thickness, but tending to be shallow with much rough, stony land and rock outcrop. This soil is not naturally unproductive, but lack of depth, the presence of rocks, inaccessibility or sloping topography render much of it unsuitable for machine cultivation. The origin of this soil mantle from crystalline rocks of granite, gneiss or similar formations has endowed it with little if any lime. Near the Connecticut River, the benches or terraces that occur more or less continuously in narrow strips consist of old stratified deposits of

excellent soil, mostly to be classified as Merrimac fine sandy loam. Adjacent to the present river bed, the overflow lands are made up of recent alluvium. All these river-lain soils are productive and easily worked, and are usually distributed in sufficiently large areas of level topography to make excellent fields for dairy farming. They will not support lime-loving plants like alfalfa, however, without liming.

The illustration on page 11 shows an area of the better alluvial soil rather typically distributed along the river, in width about sufficient for one or two farms and almost immediately giving way to rolling, rocky, or hilly topography. Provided with some of this intervale land for tillage, the farmer can make good use of the nearby hills for pasture and water supply, and for wood and lumber.

Climate

Climatological data for the region were taken from two stations, one at Bethlehem, in the northern end of the county, and one at Hanover, in the southern part. The average mean temperatures for the two stations during the five growing months of May, June, July, August, and September are reported as approximately 54, 62, 67, 65, and 57, F. respectively, (Table 2). These figures are based on records covering twenty-one years at the northern station and seventy-one years at Hanover. For the season of 1929, the temperatures were 54, 64, 66, 62, and 60 for the corresponding months and stations, indicating that in this respect the year studied was reasonably normal.

Table 2—*Mean temperatures for selected months of 1929-30 compared to the normal as given by stations at Bethlehem and Hanover, Grafton County, New Hampshire.**

	Monthly mean temperature					
	Bethlehem			Hanover		
	Normal 21 years.	1929-1930.	Per cent of normal in 1929-30.	Normal 71 years.	1929-1930.	Per cent of normal in 1929-30.
April, (1929)	40.0	39.4	98	41.3	42.8	104
May	52.5	53.2	101	54.7	55.6	102
June	60.4	62.6	104	64.1	64.6	101
July	66.6	65.0	98	68.2	67.2	98
August	63.6	60.6	95	65.7	63.5	97
September	56.6	58.6	104	57.4	60.6	106
October	45.8	44.8	98	45.5	46.2	102
November	31.8	32.0	101	33.7	35.6	106
December	16.4	18.6	113	21.0	22.5	107
January, (1930)	15.5	17.6	114	17.4	20.6	118
February	16.3	19.0	116	18.3	22.8	124
March	25.7	26.2	102	29.1	31.0	106
Twelve months	40.9	41.5	101	43.0	44.4	103

* United States Department of Agriculture, Weather Bureau, Climatological Data, New England Section, Vols. XLI, XLII.

The average annual precipitation is shown in Table 3. Bethlehem has an average precipitation of 36.23 inches and Hanover, 35.82. For the twelve-months period covered by this survey, the rainfall was considerably below normal with a total for Bethlehem of only 24.14 inches and of 31.34 for Hanover. Inasmuch as the deficiency was most noticeable in the fall and winter months, rather than through the hot growing weather of summer, there is little indication of any detrimental effect on crops.

Table 3—*Amounts of precipitation for selected months of 1929-30 compared to the normal as given by stations at Bethlehem and Hanover, Grafton County, New Hampshire.*

	Precipitation in inches					
	Bethlehem			Hanover		
	Normal 34 years.	1929-1930.	Per cent of normal in 1929-30.	Normal 83 years.	1929-1930.	Per cent of normal in 1929-30.
April, (1929)	2.73	2.81	103	2.54	4.57	180
May	2.98	3.47	116	3.22	3.65	113
June	3.83	3.45	90	3.55	3.20	90
July	4.07	2.96	73	3.45	2.26	66
August	3.67	2.63	72	3.44	2.30	67
September	3.89	1.25	32	3.19	4.58	144
October	2.94	1.78	60	3.15	1.80	57
November	2.76	.86	31	2.85	1.46	51
December	2.45	1.86	76	2.64	2.04	77
January, (1930)	2.21	.85	38	2.69	1.95	72
February	2.25	.87	39	2.41	.66	27
March	2.45	1.35	55	2.69	2.87	107
Twelve months	36.23	24.14	67	35.82	31.34	87

As a usual thing, the rainfall is quite ample, assisted somewhat by reduced evaporation due to a northern, cooler climate. Considerable inconvenience resulted from a lack of adequate water supplies for stock in the fall and winter, but, here again, the evidence points to a pretty faithful supply of this dairy farm necessity by means of natural springs.

From twenty-five years of observation, the average amount of snowfall at Bethlehem is recorded as 81.1 inches, while at Hanover, over a period of thirty-six years, it has averaged 71.8.

The average date for the last killing frost in spring is reported by the Bethlehem station as May 22, and the first in the fall as September 19. The corresponding dates at Hanover are May 17 and September 28. This allows for 119 days of growing season in one case, and 133 days in the other. Part of this two-weeks' difference is due to latitude and considerable to altitude. The elevation at the southern station is 603 feet and at the northern one 1,470. The real growing season is probably somewhat shorter than is apparent from these figures, due to the fact that relatively continuous cool weather prevails. Cool nights, especially, inhibit the growth of heat-loving plants like corn to an eas-

ily recognizable extent. For the crop year covered by this study, the growing season was from May 23 at both stations to September 19 in one case and September 20 in the other. This was shorter for both stations than the average for either. Doubtless the fluctuations in length of growing season also contribute to considerable difficulty in growing crops which require nearly the maximum period of time for reasonable development. Again, the variations due to local topography as it affects air drainage and frost pockets as well as the immediate influence of water in facilitating the formation of fog or in affording other frost-preventing influences are hardly measured by these general averages.

A scene in the Connecticut River Valley looking north toward the village of Woodsville. (Courtesy of the State Department of Agriculture, Concord, N. H.)

GENERAL ECONOMIC CONDITIONS

During the period, 1914 to 1931, some of the most violent price fluctuations in history have taken place. Compared to the 1910-1914 average as 100, wholesale prices of commodities rose to 225 for the year 1920 and fell to 142 in 1921. United States farm prices for farm products dropped from 205 to 116 in the same years.[6] Wholesale prices continued between 140 and 150 for the most part until 1929, while farm prices fluctuated from 116 to 147. In June, 1931, the index of the wholesale prices was 102. The index for farm prices of farm products stood at 80 for the same month.

In other words, the farmers of the United States were getting 80 cents in June, 1931, for the same quantity of commodities they sold for $1.00 in 1910-1914, and for $2.05 in 1920. Agricultural products in the United States sold at the farm for 20 per cent below pre-war prices in June, 1931, while the farmer paid 30 per cent above pre-war prices for the commodities he must use in living and producing.

The major reason for these discrepancies in farm prices is to be found in the increased costs of handling and transporting farm products from the place of production to the consumer. All through these years, costs of distribution in the United States have been practically twice as high as before the War.[7] With a given supply of goods, the farmer gets the retail price minus the costs of delivering the product. Because of nearby markets, this situation is much less serious for New Hampshire farmers than for the majority of producers in the United States who happen to be less strategically located.

For the year 1929, grain prices had declined somewhat and milk prices in this region were higher than for any year since 1920. Farm wages for the State were also reported somewhat higher, but probably not enough to more than offset the saving in grain (Table 4). Probably the period for which these records were taken represented the most successful year experienced by this group of farmers since 1920.

Table 4—*Prices of milk, grain and farm labor for various years.*

YEAR.	Net prices per hundredweight received by farmers for milk in tenth zone from Boston.*	Wholesale prices of "Dairy Ration" in straight cars at Utica, New York.**	Wages of male farm laborers per month with board in New Hampshire.***
1920	$3.43	$64.01	$55.00
1921	2.52	40.25	39.00
1925	2.47	41.81	45.75
1926	2.50	37.26	46.25
1927	2.60	40.33	47.50
1928	2.68	45.45	46.75
1929	2.72	42.70	48.88
1930	2.41	36.81	45.50

* Prices furnished by the New England Milk Producers' Association, Boston, Mass. W. H. Bronson, Statistician.

** Dairy ration made up of nine different grain products, Farm Economics, June, 1931, p. 1548, Cornell University, Ithaca, N. Y.

*** United States Department of Agriculture Yearbooks for the years designated.

From 1929 to July, 1931, there was a general decline of prices for dairy products in the United States to a point 15 per cent below the pre-war average. This general decline in prices of dairy products together with larger supplies of milk in the Boston market, a decreased demand and the lack of a more unified sales organization for northern New England milk, were all reflected in the price returned to New Hampshire farmers for milk. The accompanying decline in dairy cattle prices promised to make the combined effect on farm incomes serious.

THE FARMS STUDIED

Following the Civil War, the exploitation of the Middle West offered advantages in the ownership and development of farm lands which attracted many people from the older rural districts of the East. More recently, real or assumed advantages offered by the city have proved

alluring to some of the young people of the farms. Loose thinking may easily lead to the conclusion that the trend is toward older farmers remaining, or that too large numbers of the young people of rural parentage are being lost to other callings than agriculture. The abandonment of some of the unprofitable hill farms, leaving visible evidence in dilapidated buildings, contributes to this idea.

In this era of keen competition, many young men are leaving the farms of New England, as elsewhere, in an attempt to obtain other occupations which offer better opportunities. However, such a migration affects the poorer farms—too small, on the hills and among the rocks, far from the market, associated with inadequate roads and infertile soils—much more than the good ones.* The age distribution on good farms is likely to be much more stable than on the inferior farms. Many of the older operators retire to the villages, or continue to live in the country but turn their business over to some younger members of the family or to a neighbor. These adjustments apparently balance each other to such an extent that the average ages of operators fluctuate but little through the years or between different communities of good farms.

In order to present a more comprehensive idea of the relative characteristics of farms found in this area, some comparisons will be made with data from a similar farm survey recently conducted in northern Livingston County, New York.[8] This is recognized as one of the more prosperous regions in the United States. It has been studied periodically for twenty years by the survey method. The area is characterized by level and rolling limestone soils, good roads, and easily accessible markets.

Ages of Operators

The ages of 410 operators interviewed in this survey compared with those of 514 obtained in Livingston County are shown in Table 5.

Table 5—*Showing the age distribution of farm operators. A comparison of two regions.*

AGE IN YEARS.	Grafton County, N. H.			Livingston County, N. Y.	
	Number	Per cent	Av. age	Number	Per cent
Less than 30	22	5.4	26.1	22	4.3
30 — 39	85	20.7	35.3	96	18.7
40 — 49	100	24.4	44.4	146	28.4
50 — 59	117	28.5	54.7	115	22.4
60 — 69	60	14.6	63.3	107	20.8
70 and over	26	6.4	73.4	28	5.4
Total or average	410**	100.0	49.1	510	100.0

* For a description of personnel in a less prosperous area, see University of New Hampshire, Extension Circular 68, pp. 6-7.

** The ages of four operators were not enumerated.

In general, there is much similarity in the two distributions. A slightly larger proportion of the New Hampshire farmers are found in the oldest group, but they are offset by a larger proportion in the youngest group. The average age of all operators in the New York area was 50 years. The New Hampshire group, with an average of 49 years, compares favorably. The average age of 428 operators in the Suncook Valley and Grafton areas in 1911 was 51 years.[2]

Size of Family

The average number of individuals per household on the farms is given in Table 6. The resident adults, which included the operator and his wife and often members of an older generation, averaged practically 2.5 persons per farm. Children up to 18 years of age constituted 1.64 persons. Altogether the families comprised 4.57 persons per farm. In Livingston County, New York, the average number per household was 4.64 and hired men boarded represented .40, but there were more hired men with families who lived in a separate house provided by the farm for that purpose.[8]

Table 6—*Members of operators' household, 413 farms.**

Average adults	2.49
Children from 10 to 18 years	.84
Children under 10 years	.80
Hired men, boarded	.44
Total	4.57

* Information lacking for one farm.

Acreages

The 414 farms included in the survey had an average of 233 acres. The distribution of this acreage is compared with Livingston County in Table 7. The New Hampshire farms had 52 acres of crops and 95 in open pasture, or its equivalent. The New York farms had almost twice as much crop land, 93 acres, and somewhat less than half as much pasture, 47 acres. Much of the larger size of the Grafton holdings was due to woodland. Mainly because of physiographic conditions involving rock outcrop and hills, more territory has been left in permanent pasture and woods in the New Hampshire area. In the New York area, 10.7 acres of the pasture were rotated; in New Hampshire 6.2 acres of pasture were considered tillable, but were not so used.

Because of rotation and the presence of more fertile and less rocky soils, Livingston County had better pastures. The acres of pasture per cow were 3.9 as compared to nearly 6 acres in Grafton County. Farmers in the latter section obtained an additional estimated value of $24.63 per farm from pasturing hay fields, after harvest.

Crops

Of the total 96,574 acres in these 414 farms, 21,028 acres, or 21.8 per cent, were in crops. This agrees with the proportion of crop land reported for the county as a whole as computed from the 1930 census.

The smallest acreage in all crops reported by any farm of the 414 was 0.1 of an acre. This was used for a garden. The farmer had 20 cows and bought hay. The largest farm had 178 acres in crops. Over fifty per cent fell between 20 and 50 acres of crops per farm (Table 8).

Table 7—*Average distribution of land per farm in Grafton County, New Hampshire, (414 farms) and Livingston County, New York, (514) farms.*

	Average acres per farm.		Per cent of total acres.	
	Grafton	Livingston*	Grafton	Livingston
Crops	52	93	22	56
Pasture, tillable	6	45	3	27
Other open pasture	63		27	
Woods pastured	83	7	36	4
(Equivalent to open pasture)	(26)	(2)	(11)	(1)
Timber and woodland, not pastured	26	6	11	4
Roads, farmstead, waste land, etc.	3	15**	1	9
Total	233	166	100	100

* Adapted from, Warren, S. W.: *An Economic Study of Agriculture in Northern Livingston County, N. Y.* Unpublished Thesis, p. 46, Cornell University Library, Ithaca, N. Y.

** This figure includes gardens and idle fields, a somewhat different classification than for the other group.

Table 8—*Acres in crops, 414 farms.*

Range of Acres in Crops.	Farms.		Acres in crops.	
	Number.	Per cent.	Total.	Per cent.
0 — 20	26	6.28	343.2	1.6
20 — 30	58	14.01	1484.2	7.0
30 — 40	79	19.08	2774.2	13.2
40 — 50	76	18.36	3418.9	16.3
50 — 60	50	12.08	2683.8	12.8
60 — 70	41	9.90	2611.7	12.4
70 — 80	28	6.76	2101.8	10.0
Over 80	56	13.53	5610.0	26.7
Total	414	100.00	21027.8	100.0

(Smallest acreage 0.1; more than 100 acres, 22 farms or 5.31 per cent of all; largest acreage 178.)

Fifty-six farms had over 80 acres in crops with an average of 100 acres per farm. The average acreage in crops for the whole 414 farms was 50.8.* A complete list of all the crops grown in 1929 is given in Tables 9 and 10. The most important crops are grouped according to the number of acres in crops per farm.

* This figure is based on the acres of crops actually cared for during 1929. It does not agree with the figure 52 given in Table 7, which is the amount of land usually considered available for cropping.

Table 9—*Acres and yields of important crops.*

CROP.	Range in acres of all crops.	Number of farms. In group.	Number of farms. Reporting.	Total acres in this crop.	Average acres per farm. All farms.	Average acres per farm. Farms reporting.	Yield per acre.	Unit.
Timothy and clover	0 — 30	84	78	1397.5	16.6	17.9	1.48	tons
	30+ — 50	155	143	4526.0	29.2	31.6	1.54	tons
	50+ — 70	91	83	3476.5	38.2	41.9	1.54	tons
	Over 70	84	76	5396.0	64.2	71.0	1.43	tons
Total or average		414	380	14796.0	35.7	38.9	1.49	tons
Fine hay (old ground)	0 — 30	84	11	132.5	15.8	12.0	1.19	tons
	30+ — 50	155	26	535.0	3.4	20.6	1.02	tons
	50+ — 70	91	18	573.0	6.3	31.8	1.06	tons
	Over 70	84	16	609.0	7.2	38.1	1.03	tons
Total or average		414	71	1849.5	4.5	6.0	1.05	tons
Corn silage	0 — 30	84	14	49.8	.6	3.6	12.55	tons
	30+ — 50	155	55	277.8	1.8	5.0	12.17	tons
	50+ — 70	91	35	229.0	2.5	6.5	12.17	tons
	Over 70	84	45	443.0	5.3	9.8	11.51	tons
Total or average		414	149	999.6	2.4	6.7	11.90	tons
Timothy hay	0 — 30	84	0	0.0	0.0	0.0	0.00	tons
	30+ — 50	155	7	162.0	1.0	23.1	1.40	tons
	50+ — 70	91	14	297.0	3.3	21.2	1.87	tons
	Over 70	84	9	362.0	4.3	40.2	1.73	tons
Total or average		414	30	821.0	2.0	27.4	1.71	tons
Oats for hay	0 — 30	84	41	85.8	1.0	2.1	2.38	tons
	30+ — 50	155	75	225.6	1.5	3.0	2.08	tons
	50+ — 70	91	21	192.5	2.1	4.7	2.04	tons
	Over 70	84	31	172.5	2.0	5.6	1.92	tons
Total or average		414	188	676.4	1.6	3.6	2.06	tons
Oats for grain	0 — 30	84	6	20.0	0.2	3.3	43.25	bushels
	30+ — 50	155	21	86.0	0.6	4.1	41.22	bushels
	50+ — 70	91	26	137.0	1.5	5.3	48.43	bushels
	Over 70	84	28	232.0	2.8	8.3	48.48	bushels
Total or average		414	81	475.0	1.2	5.9	46.93	bushels
Potatoes	0 — 30	84	58	38.1	0.4	0.7	164.30	bushels
	30+ — 50	155	120	79.5	0.5	0.7	148.30	bushels
	50+ — 70	91	69	77.1	0.8	1.1	172.20	bushels
	Over 70	84	63	133.4	1.6	2.1	160.70	bushels
Total or average		414	310	328.1	0.8	1.1	160.80	bushels
Clover hay	0 — 30	84	2	6.5	0.1	3.2	3.80	tons
	30+ — 50	155	13	73.5	0.5	5.6	2.55	tons
	50+ — 70	91	14	117.0	1.6	8.4	2.15	tons
	Over 70	84	13	124.5	1.5	9.6	2.12	tons
Total or average		414	42	321.5	0.8	7.6	2.25	tons

TABLE 10—*Acres and yields of less important crops (414 farms)*

CROP.	Number of farms reporting.	Total acres in crop.	Average acres per farm. All farms.	Average acres per farm. Farms reporting.	Yield per acre.	Unit.
Soiling crops	127	202.8	.5	1.6	4.66	tons
Millet hay	58	135.9	.3	2.3	2.42	tons
Corn for grain (shelled)	27	57.5	.1	2.1	51.27	bushels
Alfalfa	11	42.5	.1	3.9	2.44	tons
Small grain and legumes	9	42.5	.1	4.7	2.12	tons
Fodder corn	14	36.2	.1	2.6	3.14	tons
Hungarian and soy beans	3	29.0	.1	9.7	1.95	tons
Barley hay	4	21.0	0	5.2	2.00	tons
Dry beans	14	20.7	0	1.5	11.5	bushels
Apples*	20	22.8	.1	1.1	80.0	bushels
Sweet corn	9	10.3 (.8)	0	1.1	886	dozen
		(.5)			90	bushels
		(9.0)			1.94	tons
Barley grain	6	14.5	0	2.4	47.72	bushels
Oats and barley hay	3	13.5	0	4.4	1.7	tons
Market garden	1	7.8	0	7.8	$179.49	dollars
Squash	2	5.0	0	2.5	7.0	tons
Swamp hay	2	5.0	0	2.5	1.0	tons
Buckwheat	2	4.0	0	2.0	25.0	bushels
Strawberries	2	2.0	0	1.0	2640.0	quarts
					82.5	bushels
Wheat	1	1.0	0	1.0	25.0	bushels
Cabbage	1	1.0	0	1.0	2.5	tons
Soy beans	1	1.0	0	1.0	1.5	tons
Popcorn	1	0.2	0	0.2	125.0	bushels
Oats and barley grain	1	3.0	0	3.0	50.0	bushels
Garden	392	81.5	.2	0.2	$332.31	dollars

* Most of the apples were scattered—no definite area. The total number of trees and bushels reported for all farms was as follows:

Number of farms.	Total Trees.	Total Production.	Trees per farm.	Production per tree.
137	3209	4704	23	1.5 bushels

In Table 11 the distribution of the major crops is shown by acreages and percentages. Relatively few crops are grown except for hay, which required 89.2 per cent of the total area in crops.

Table 11—*Acreages of crops, Grafton County, New Hampshire (414 farms)*

		Acres.	Per cent.
Hay crops			
Timothy and clover		14,796.0	70.4
Fine hay (old ground)		1,849.5	8.8
Timothy alone		821.0	3.9
Clover		321.5	1.5
Oats for hay		676.4	3.2
Millet hay		135.9	0.7
Alfalfa		42.5	0.2
Small grain and legumes		42.5	0.2
Hungarian and Soy beans		29.0	0.1
Barley hay		21.0	0.1
Oats and barley hay		13.5	0.1
Swamp hay		5.0	0.0
	Total	18,753.8	89.2
Corn crops			
Corn silage		999.6	4.7
Corn for grain		57.5	0.3
Fodder corn		36.2	0.2
	Total	1,093.3	5.2
Small grains			
Oats for grain		475.0	2.3
Barley for grain		14.5	0.1
Buckwheat		4.0	0.0
Wheat		1.0	0.0
Oats and barley grain		3.0	0.0
	Total	497.5	2.4
Soiling crops	Total	202.8	1.0
Potatoes	Total	328.1	1.5
All other crops	Total	152.3	0.7
	Grand total	21,027.8	100.0

LIVESTOCK

The numerical importance of various kinds of livestock on these farms is shown in Table 12. A smaller group of farms for the same area in 1915 is also included for comparison. All kinds of livestock in this table are given in animal units.* There was an average of 25.4 animal units per farm on these farms, 63 per cent of which were cows.

* One cow, bull, steer, or horse, is counted as one in figuring animal units. Two calves, heifers, or colts; seven sheep, fourteen lambs, five hogs, ten pigs and one hundred hens each count as one animal unit. (See definitions.)

Cows, young cattle and bulls, all dairy cattle, represented a total of 85 per cent of the animal units. Livingston County farms had 23.2 animal units per farm with 80 per cent of them in dairy cattle.[8] The New York farms had 3.9 fewer cows per farm and two more work horses than those in this study.

Table 12—*A comparison of the average distribution of livestock by animal units found in two different years on farms in Grafton County, New Hampshire.*

Class of animal.	Farms reporting. Number.	Farms reporting. Per cent of total.	Average number of animal units per farm for all farms.	Per cent of total animal units.
414 farms in 1929				
Cows	414	100	15.9	62.6
Young cattle	405	98	5.0	19.7
Bulls	304	73	0.8	3.1
Steers	10	2	0.1	0.4
Horses	406	98	2.8	11.0
Colts	7	2	—*	—
Ponies	5	1	—*	—
Sheep	31	7	0.3	1.2
Hogs	87	21	0.1	0.4
Poultry	316	76	0.4	1.6
Total			25.4	100.0
74 farms[4] in 1915				
Cows	74	100	13.8	59.5
Young cattle	71	96	4.1	17.6
Bulls	51	69	0.6	2.6
Steers	10	14	0.6	2.6
Horses	73	99	2.9	12.5
Colts	24	32	0.2	0.9
Ponies	0	0	0.0	0.0
Sheep	9	12	0.3	1.3
Hogs	52	70	0.3	1.3
Poultry	71	96	0.4	1.7
Total			23.2	100.0

* Less than 0.05 animal unit per farm.

There has been little significant change in types of livestock as indicated by the present survey figures compared to those for the smaller group in 1915. Dairy cattle of all kinds had assumed a little larger importance both in absolute members and in percentage. Steers had nearly disappeared in 1915, and five-sixths of those remaining had gone by 1929.

Dairy Cows

The average number of cows per farm was 15.9 for 414 herds. One farmer reported Shorthorn cows, one some Brown Swiss, but with very few exceptions, these farms harbored cows of the four most important

dairy breeds. Holstein animals far outnumbered all others. Many farms had mixed herds made up usually of two breeds. In these cases, the main herd was likely to be composed of Holsteins, but would include a very few Jerseys or Guernseys to improve the fat test.

Of the whole group of farms, 90 per cent had done some tuberculin testing. Registered cows were found in 23 per cent of the herds. There were only seven farms that had all pure-bred cattle—four Holsteins, two Ayrshires and one Jerseys. The average value per head for 6,351 cows on 414 farms, April 1, 1930, was $111. The farmers estimated that the average value of cows of equal quality one year before, April 1, 1929, was $116. This is in accord with price changes for the country as a whole. The price per head for dairy cows received by farmers as estimated by the United States Department of Agriculture was $92.80 on March 15, 1929, and $81.00 on March 15, 1930.* The price was going up until the last quarter of 1929 when it started down in conformity to previous cycles. The purchasing power, or exchange value for other commodities, of dairy cows and beef cattle since 1880 is shown in Figure 3. The peaks of high prices and troughs of low prices for beef cattle and dairy cows occur at the same time. There has been evidence for several years that too many heifers were being raised. Prices are likely to decline for several years now and to recover for another peak by 1943 or 1945. The estimated change in value for this group of farms of only $5 a head is probably too low. A majority of the farmers did not realize that the trend in prices had so definitely turned downward because they had not been buying or selling cattle.

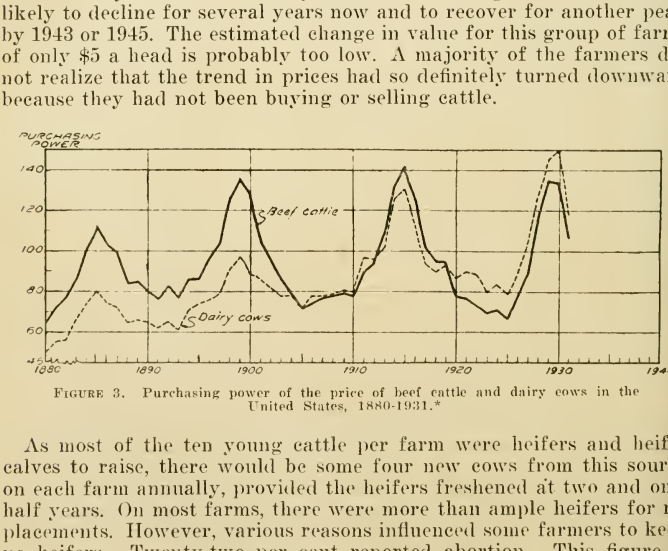

Figure 3. Purchasing power of the price of beef cattle and dairy cows in the United States, 1880-1931.*

As most of the ten young cattle per farm were heifers and heifer calves to raise, there would be some four new cows from this source on each farm annually, provided the heifers freshened at two and one-half years. On most farms, there were more than ample heifers for replacements. However, various reasons influenced some farmers to keep no heifers. Twenty-two per cent reported abortion. This figure is doubtless low. Some had dispensed with young stock in anticipation of the tuberculin test. A few devoted all their stable room and available feed and pasture to the production of milk.

*(Farm Economics, No. 69, February, 1931, p. 1477, published by Cornell University, Ithaca, New York)

This farmer's barn burned shortly after the hay harvest in 1929. He had two kinds of insurance—the usual fire insurance and a farm lumber lot.

Horses

In spite of the increased use of automobiles, the number of mature horses per farm in this area had decreased between 1915 and 1929 by only one-tenth of a horse. (Table 12.) The number of colts showed more change. In 1915, there was one colt to every three farms; in 1929, there was only one colt to every fifty-nine farms. The number of horses by age groups is shown in Table 13. It will be noted that more than 40 per cent of the horses were fifteen or more years of age. Probably the situation is somewhat similar for the whole United States, but less exaggerated.

TABLE 13—*Age distribution of 1,143 horses,* on 414 farms.***

Age in years.	Number of horses.	Per cent of total.	Average age.
1 — 4	12	1.0	2.7
5 — 9	223	19.5	7.6
10 — 14	435	38.1	12.0
15 — 19	272	23.8	16.3
20 — 24	161	14.1	20.8
25 — 29	34	3.0	25.8
30 or more	6	0.5	31.7
Total	1143	100.0	
Average			13.7

* A lack of information as to the ages of 27 horses has eliminated that number from the group.

** Only 406 farms of this number reported horses.

No one knows just how many horses are needed. Horses on farms in the United States have been declining steadily in numbers at the

rate of one-half million per year for a decade. In spite of this drastic readjustment to a permanently smaller number, horse prices have remained low because of the substitution of motor power. Some day, the adjustment of numbers of horses to this lower level of uses will be accomplished. At that point, there will not be enough colts to maintain the horse population, and a violent upswing in prices is likely to result. The regular horse cycle will probably continue and with increasing violence although temporarily interrupted by the advent of automobiles, trucks and tractors. The purchasing power of horses reaches a peak about once in 23 years as indicated in Figure 4.

Probably Grafton County farmers have too many horses. Judging from the ages of the ones now owned, time will soon make amends. But some horses will always be needed on these farms. One might venture the guess that it will be a bad time to be buying necessary horses between 1937 and 1943.

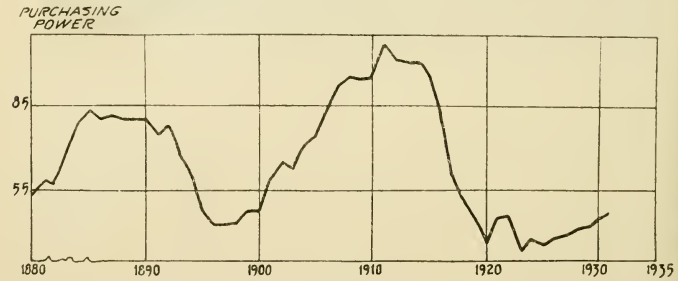

Figure 4. Purchasing power of the price of horses in the United States, 1880-1931.*

Hens

Practically all farms kept a few hens for home use. The average was 38 birds per farm. Only eight had as many as 200 hens. Three had 500 or more, and one had over 1,000. On the 86 farms that had as many as 50 birds each, the average number was 119 (Table 14.). The sales of poultry were more than the average inventory, and a fairly good production of eggs sold at a good price swelled the receipts to over $500 per animal unit.

While chickens cannot economically use extensive pasture or eat the hay on New Hampshire farms, they may constitute a rather important additional source of income and provide some summer work with reasonable pay. Small flocks may often be kept at little expense for feed and labor. Women and children may do most of the work for the purpose of reducing the grocery bill or providing a source of extra spending money. Some of the feed may come from the table and considerable from spilled grain. Again, the use of poultry and eggs in the home may offset retail prices otherwise likely to be paid out for similar products. In this way, the small flocks become very profitable.

* Farm Economics, No. 69, February, 1931, p. 1477, published by Cornell University, Ithaca, New York.

TABLE 14—*Hens on 86 farms*
(Farms with less than 50 birds omitted)

		Total.	Per farm.
Number of birds		10,210	118.7
Animal units		102.1	1.19
Last inventory	$16,061		
Sales	20.291		
Total		$36,352	$423
First inventory	$15,392		
Purchases	2,948		
Total		$18,340	$213
Net increase		$18,012	$210
Eggs sold	$27,450		
Eggs used	4,740		
		$32,190	$374
Meat sold	$366		
Meat used	1.281		
		$1,647	$19
Total returns		$51,849	$603
Per animal unit		$508	
Per bird		$5.08	
Average eggs produced per bird exclusive of eggs set			6.7 dozen
Estimated average price of eggs sold			39.4 cents

When one attempts to raise poultry on a commercial scale, buying all feed, paying labor for definite time devoted to the project and selling eggs in quantity at wholesale prices, the problem becomes quite different. Healthy, vigorous, growthy chickens, good egg production per hen and good markets become necessary for success. This involves much care and skill. Disease control, well-selected stock, and properly constructed and equipped houses are prerequisites to success. Only persons who are willing to exercise great care and to give much attention to detail are justified in embarking on a commercial poultry enterprise. However, next to the dairy cow, the hen comes nearest to satisfying the requirements of a region of high-priced feed and nearby markets in producing a perishable product, easily susceptible to mechanical injury. The poultry enterprise, then, is one of the possibilities for improving the farm income in this region.

Hogs

One hundred and twenty-two farms reported hogs. Many farmers bought a pig, fed it a few weeks and dressed it for home use. Only 87 farms had as much as one hog for six months or more (Table 15). The average number for the 87 farms was 2.3 head per farm. These hogs

Table 15—*Hogs on 87 farms having at least an equivalent of one hog for six months.*

Animal units of hogs.	Number of hogs.	Last inventory sales and used.	First inventory and purchases.	Net increase plus sales and used.		
				Total.	Per animal unit.	Per hog.
39.8	199.0*	$13,428	$5,664	$7,764	$189.37	$37.87

* Animal units times 5.

are kept largely for home use or to sell locally. Table 33 records 126 of these animals as having been used in the farm house. The returns of $189 per animal unit might be misleading in that they do not represent a wholesale price at which many hogs might be marketed in Boston or elsewhere, but rather the local or home price approaching retail for a very limited number. Quite in contrast to selling cream or making butter, the marketing of whole milk provides no by-products for hogs. So long as a very few hogs are kept for home use, there will be a small local demand for pigs, however, to replenish the supply. The furnishing of these pigs and in turn providing the local pork supply seems to approach the limits of hog production in this region where grain is purchased and by-products are next to nil.

Sheep

Thirty-five farms reported sheep. Thirty-three had as much as one-tenth of an animal unit in sheep, and this group averaged 26 head per farm, or nearly four animal units (Table 16). The net increase in these

Table 16—*Sheep on 33 farms having an equivalent of at least one sheep for eight months.*

Animal units sheep.	Number of sheep.	Last inventory and sales including wool.	First Inventory and purchases.	Net increase plus wool sales for each.	
				Animal unit.	Sheep.
123.6	865.2*	$15,881	$10,513	$43.43	$6.20

* Animal units times 7.

sheep plus wool, hides or any other products sold from them amounted to about $6 a head or $43 per animal unit. Sheep on relatively small farms where there is little opportunity to raise cash crops are certainly of very doubtful economy. Seven sheep need practically as much pasture and other feed as a dairy cow. The average cow in this area produced in milk alone a value of $150. Furthermore, one may increase the cow's production 50 or 100 per cent much more easily than that of the sheep.

Stable Manure

In Table 17 are shown the estimated production and value of manure from all livestock. Stable manure is a valuable by-product of dairying,

but its utility is enhanced when used in small amounts and on cash crops. The feeding of cows to get more manure to produce more crops to feed more cows is a rather vicious circle that does not redound in any great advantage to the person who does the work.

Table 17—*Production and value of manure.*

	411 farms.*	Average per farm.
Estimated tons of manure recovered	86,272	209.9
Estimated value of manure	$163,483	$398
Value per ton	$1.89	
Number of animal units	10,491.1	25.5
Tons of manure recovered per animal unit	8.2	

* Out of 414 farmers, one had no land; one made no use of manure that year; one had no cows the previous winter.

Estimates varied from nothing to three or four dollars per ton for the value of stable manure at the barn. The average value of $1.89 is probably high in the sense that these farmers could supplement a part of this manure with cheaper sources of plant food and get equally good results.

Approximately 12 tons of manure including bedding are made per year by an animal unit. The proportion of this amount recovered at the barn for use on crops depends on the pasturing practices and methods of handling the manure. These farmers' estimates averaged 8.2 tons per animal unit available for application to crops. This provides over 200 tons per farm and would make possible the use of 20 tons per acre for one-fifth of the crop acres each year.

FERTILITY PRACTICES

How the Manure Was Used

More than half of the manure was applied to hay, as shown in Table 18, and in addition, hay benefits mostly from the liberal applications on oats at time of seeding. In Livingston County, New York, only three per cent of the acres in hay received manure and only six per cent of the spring grain acreages. Most of the manure was applied to silage corn and intensive cash crops.[8] In Madison County, New York, where more cows were kept in proportion to crops, 33 per cent of the manure was applied to corn silage and 44 per cent to hay on old ground.[10]

Outside of the noticeably large applications of manure per acre, particularly in the cases of hay and potatoes, the most striking peculiarity in comparison to other regions is the use of so much on oats. This is partly accounted for by the fact that a large proportion of the oats are used for hay. The stimulation of leaf and stem growth by the use of manure is all to the good in this case and provides just so much better conditions for the hay crop that is to follow.

Table 18—*Crops on which manure was applied.*

Crops.	Farms reporting.		Application of manure.			
					Per acre.	
	Number.	Average acres.	Total amount.	Per cent of total.	Amount.	Value.
Corn, for silage or grain....	180	5.8	19,934	23.1	19.15	$36.19
Oats, for hay or grain.....	174	4.1	11,023	12.8	15.46	29.22
Potatoes	198	1.1	4,233	4.9	19.07	36.04
Hay, mostly top dressing...	363	12.6	46,416	53.8	10.17	19.24
All other, including gardens, millet, and other miscellaneous crops of small acreage	163	1.8	4,666	5.4	16.03	30.30
Total or average	(411)	(16.6)	86,272	100	12.63	$23.87

A pocket of alluvial soil which is utilized for crop production. The hill is used partly for pasture and partly for woodland. From a spring on the sidehill is piped a never-failing supply of water.

Use of Commercial Fertilizers and Lime

In spite of the fact that these farmers have plenty of stable manure with which to maintain their cultivated land in a high state of productivity, certain crops and conditions may justify the use of some commercial fertilizer. Corn may need a small application to stimulate early growth or aid maturity. Oats for grain may need a better balanced food supply than is afforded by manure alone. Potatoes can be more directly stimulated by chemicals because close contact with manure engenders scab. These are reasons for a previous suggestion that some of the manure might be replaced with other sources of plant food to advantage.

The distribution of commercial fertilizer by crops and amounts is given in Table 19. About two-thirds of the potato growers used ferti-

lizer. The average application per acre was 918 pounds. Two-fifths of the corn growers used fertilizer at an average rate of 295 pounds per acre. Miscellaneous crops means all other kinds of crops that are grown, such as garden crops, millet, and one case of a pasture application.

There was little uniformity in grades used. It is certainly a reflection on both manufacturers and users to have so many fertilizer formulas. Many are so similar that their comparative values are hard to distinguish, yet the multiplicity of mixtures must continually add to the

Holstein cows predominate over the area but are often supplemented with a few Guernseys or Jerseys to improve the fat test. Not all the dark spots on these animals are black.

TABLE 19—*Use of commercial fertilizer and lime on 414 farms.*

Crop.	Number of farms growing crop.	Farms using fertilizer.		Fertilizer.			
		Number.	Average acres per farm.	Average cost per ton.	Average pounds per acre.	Average value per acre.	Total value.
Potatoes	310	202	1.3	$47.94	918.0	$22.01	$5,661
Corn	200	81	5.8	45.22	295.3	6.68	3,120
Miscellaneous—		37	4.5*	36.63	414.2*	7.58*	1,260
		Farms using lime				Lime	
Miscellaneous		10	**	9.69			$715
Total value							$10,756
Average value per farm (414)							$26

* These figures are not accurate because of indefinite acreages in many cases.

** Six farms used 90,500 pounds of lime on 39.7 acres of alfalfa at the rate of 2,280 pounds per acre. The remainder was used on corn, oats, and pasture, but the acreage was indefinite.

expense of manufacture and distribution. Acid phosphate was used alone in many cases, particularly on corn. It is doubtless the most economical material to use on these farms as a supplement to so much stable manure and on most crops with the possible exception of potatoes.

Lime was used mostly for alfalfa. Plants of medium lime requirements like red clover will usually respond bountifully on well manured soils without liming, but alfalfa is much more exacting.

The average expenditure for fertilizer amounted to $26 per farm on the whole group of 414 farms.

FARM MACHINERY

The average value of all machinery per farm including that part of all automobiles used for farm purposes amounted to $1,064 (Table 28). The manure spreader, milking machine and one or two hay-harvesting machines constitute the most obvious large or expensive pieces of equipment outside of automobiles likely to be found on these farms. Practically every farm has a mowing machine, a hay rake and a hay wagon. The number of milking machines owned and some information regarding their use are shown in Table 20. Thirty-nine per cent of the farms had milking machines. The numbers of a few other selected machines are shown in Table 21.

Table 20—*Number of milking machines found on 414 farms and the months used.*

	Months used.						
	0	1-2	3-5	6-8	9-11	12	Total
Number of machines.....	16	1	10	9	5	121	162
Per cent of total number.....	9.9	0.6	6.2	5.5	3.1	74.7	100

Table 21—*Number of selected machines reported for 414 farms.*

Name of machine.	Number of machines.	Farms using.	
		Number.	Per cent.
Disc harrow	386	352	85.0
Manure spreader	283	273	65.9
Corn planter	205	191	46.1
Sulky plow	204	199	48.1
Two-row cultivator	108	103	24.9
Hay fork (in barn)	105	96	23.2
Corn harvester	78	78	18.8
Potato sprayer	48	48	11.6
Potato digger	25	25	6.0
Potato planter	16	16	3.9

Gasoline Motors and Power

The numbers and makes of automobiles, trucks and tractors are given in Table 22. Thirty-two makes of automobiles were found, with

Fords, Buicks, Chevrolets and Oaklands leading, in order of numbers. Over half of the 184 trucks were Fords, and nearly one-fourth Chevrolets. Forty-nine out of sixty-one tractors were Fordsons.

Table 22—*Makes of automobiles, trucks and tractors (414 farms)*

Automobiles.		Trucks.		Tractors.	
Make.	Number.	Make.	Number.	Make.	Number.
Ford	80	Ford	97	Fordson	49
Buick	46	Chevrolet	40	Farmall	7
Chevrolet	40	Reo	17	Cletrac	4
Oakland	20	Dodge	9	Avery	1
Nash	17	International	6		
Dodge	15	Buick	4		
Studebaker	10	Graham	4		
Pontiac	8	Nash	2		
Essex	6	Chalmers	1		
Hudson	5	Mack	1		
Oldsmobile	5	Overland	1		
Willys Knight	5	Pontiac	1		
Whippet	4	Yellow Cab	1		
DeSoto	4				
Chrysler	4				
Hupmobile	3				
Plymouth	3				
Fifteen others	22				
Total	287*		184		61

* This number was used partly or wholly for farm purposes. Eleven more cars were kept entirely for personal use.

The average cost per mile of operating all automobiles for both farm and pleasure purposes was 5.94 cents per mile (Table 23). The average distance traveled was 3,950 miles per car during the year. In spite of the fact that there were many second-hand cars in use which contributed somewhat to a low inventory value, nearly 45 per cent of this cost was for depreciation. The cost of gasoline and oil represented the next highest item with 26.4 per cent of the total. Repairs are doubtless somewhat low at $20 per car due to the fact that considerable labor was expended in repairing these machines, or in the replacement of parts, by persons on the farm. No estimate of the labor value thus contributed was obtained.

The fact that 137 of the trucks were light weight Fords and Chevrolets, coupled with more miles per machine, largely accounts for their lower cost of operation per mile in comparison to the automobiles. The truck bodies were most often of the small "pick-up" type with limited capacity.

Tractors were found on 59 farms. The total average cost of maintenance and operation was $139 per tractor. This does not include the additional costs for extra tractor equipment which is necessary if tractors are to be used efficiently for much farm work. Gilbert found in New York that an average of $573 was invested per farm for special

Table 23—*Average value and costs of automobiles, trucks and tractors for the year on 41¼ farms.*

	Automobiles.	Trucks.	Tractors.
Number of farms reporting...	288	172	59
Average value per farm.....	$429	$370	$318
Average miles per farm.....	4087	4703	——
Total number of machines....	298	184	61
Average value per machine...	$415	$346	$307
Average miles per machine...	3950	4397	——

	Amount.	Per cent.	Amount.	Per cent.	Amount.	Per cent.
Costs per machine:						
Interest at 5%	$20.76	8.9	$17.34	7.0	$15.30	11.0
License and insurance....	26.63	11.3	30.27	12.2	0.23	0.2
Repairs, including tires..	19.92	8.5	30.90	12.1	13.19	11.2
Depreciation	105.37	44.9	92.91	37.4	38.11	27.4
Gasoline at 22 cents.....	53.98	23.0	66.50	26.8	60.05*	43.2
Oil at $1.00.....	7.94	3.4	10.08	4.1	9.69	7.0
Total costs	$234.60	100.0	$248.00	100.0	$138.97	100.0
Cost per mile.....	5.94c		5.64c			

* A small proportion kerosene.

NOTE: The amount of hard grease used and the value of farm labor spent in repairing cars or replacing parts were not obtained. The cost of gasoline and oil was charged at a flat rate of 22 cents and $1.00 a gallon, respectively, for all cars. From a few estimates and general prices in the community, these were assumed to be the usual prices paid.

tractor equipment on 42 dairy farms.[11] The New Hampshire farms had little special equipment, and the detail of tractor equipment was not enumerated. Gilbert also found that the average cost of tractor operation for 181 tractors on 175 New York farms in 1926 was $269 with tractors averaging 313 hours of work per year. The average value of these tractors was $432. The cost per hour without a driver was 86 cents.

The number of hours used was not enumerated with sufficient accuracy on enough farms to give a usable average for the New Hampshire tractors. On the basis of fuel consumption, they were used only about half as many hours as the New York machines. Assuming that the 61 tractors on these farms worked 156 hours on the average, the cost per hour would be 89 cents.

Table 24—*Distribution of costs of gasoline motor vehicles and power to selected uses.*

Kind.	Total cost per machine.	Distribution of use and cost. Farm. Per cent.	Farm. Dollars.	Cows. Per cent.	Cows. Dollars.	Personal. Per cent.	Personal. Dollars.
Automobiles	$235	16.7	$37	12.2	$26	71.2	$172
Trucks	248	45.4	131	46.2	99	8.4	18
Tractors	139	100.0	139				

In Table 24, the proportions and amounts of motor costs are distributed to the farm, cows and personal, as estimated by the operators. Seventy-one per cent of the automobile cost and 8 per cent of the truck cost were for personal use.

Gasoline engines were used on many farms for sawing wood, filling silos, running milking machines, clothes-washing machines and similar jobs. On 242 farms, a total of 129 gas engines were reported. Six of the farms each had two. For the other 172 farms, gasoline engines were not enumerated separately from the milking machines or ensilage cutters with which they were used. On one farm, this power was connected with a hoist and a horse fork for unloading hay. Ninety milking machines were driven by gasoline engines, while 70 were equipped with electric motors. No power was available for two of the milking machines that were not used.

BUILDING EQUIPMENT

Household Equipment

In a very general way, the prosperity of a farming region may be measured by the living conditions provided. A standard of living for farmers comparable to that in other businesses is desirable.

Some of the equipment and conveniences reported for the 414 farm houses are given in Table 25. As many as 394 had running water. This large number is made possible largely because of the prevailing conditions which afford natural and easily accessible springs. On 377 farms, the laying of a pipe from the source of supply to the house had been the only requirement for a continuous flow of water. Hot-water systems were provided in 42 per cent of the homes, and 41 per cent had bathrooms. Electric lights were used on 44 per cent of the farms. Largely because of easy accessibility to power lines, most of the home-

Table 25—*Household Conveniences (414 farms)*

Homes provided with	Number.	Per cent.
Running water	394	95
Hot water	172	42
Bath rooms	169	41
Toilet facilities		
Flush toilet	167	40
Chemical toilet	6	2
Out house	241	58
Lighting facilities		
Kerosene lights	232	56
Electric lights	182	44
Heating facilities		
Steam heat	19	5
Hot air	153	37
Stoves	242	58
Oil stoves (cooking)	243	59
Washing machines	155	37
Refrigerators	267	64
Radios	274	66

steads that were located on or near the State roads were equipped with some facilities for using electricity.

Many of the farms provided an adequate wood supply to heat the houses. This fact may be largely responsible for the use of kitchen ranges and other small stoves for heating in 58 per cent of the cases. Hot-air central heating systems were found in 37 per cent of the houses. This type of furnace usually had a large fire box and was adapted to burning wood. However, not all of these farmers burned wood exclusively. One hundred and thirteen families used some coal. In nineteen homes, steam heating systems had been installed.

Oil stoves for cooking were found in nearly three-fifths of the kitchens. Over 60 per cent of the families had refrigerators, nearly two-thirds were equipped with radios, while only 37 per cent had washing machines.

In Livingston County, New York, 21 per cent of the houses had running water, 18 per cent had bathrooms, 28 per cent had electric lights and 47 per cent were provided with a furnace.[8] Quoting from the text:

> "This region is generally more prosperous than the average of the State. The farm houses are better and have more conveniences than the average. However, in 1928, 79 per cent of the farm families were still getting along without running water. Much improvement along these lines is still needed, and can be expected just as soon as the farmers become more prosperous."

Barn Equipment

Only 21 farm barns were provided with a wing for the cows. The cow stable was located on the main floor in 258 cases and in the basement in 156 cases. Wooden floors were noted in 355 stables, concrete in 50, and both wood and concrete in 9. The most common arrangement of cows was in one line along the side of the main barn and was found on 331 farms. Two rows of cows were found in 78 cases.

Swing stanchions had been installed in 262 stables. Straight fixed stanchions were used in 95 cases and chain fasteners in 38 cases. The remaining 19 farms used two or all three of these types.

The cows were turned outdoors for water on 268 farms and turned loose to drink from a trough in the barn on 57 farms. The herds that went outside the barn for water usually drank from a trough in the yard; a few went to a nearby brook. Individual drinking cups were provided in 75 barns. The herds of the remaining 14 farms were watered in various ways. One barn was equipped with a wood trough, extending in front of the cows and above the feeding floor. A flush trough of cement before the cows furnished the water facilities for one or two herds. Some farmers even carried water in pails to individual animals in sizable herds. Some of these methods are very inefficient—they waste labor, the most costly and important factor in herd management.

Stables were cleaned through the floor in 197 barns. Manure was lifted and thrown out a window on 97 farms. Carriers were used in 78 stables and wheelbarrows in 26. Several used a combination of these methods.

The disposal of manure is a problem that involves considerable space and equipment on these farms. If stored under cover, 200 tons of manure occupy a large amount of room. The daily spreading of manure in the field is a good practice, but may involve considerable inconvenience by interfering with other work or on account of inclement weather. On nearly half of these farms, the basement was used to store the winter's accumulation, while more than a third placed the manure in large outdoor piles to be spread later (Table 26). Many of these outdoor piles were near the barn and built by means of a carrier from the stable. Others were built in the field by hauling with a team from the barn. These outdoor piles, especially those in the field, may involve an excessive amount of hand labor.

Table 26—*Methods used in caring for the manure on 414 farms.*

Method used.	Number of farms.	Per cent of total.
All stored in basement	194	46.9
All in outdoor pile	148	35.8
All stored in manure pit	29	7.0
All spread daily	20	4.8
Part spread daily with remainder in outdoor pile	8	1.9
Part spread daily with remainder stored in basement	4	1.0
Part spread daily with remainder stored in pit	2	0.5
Part in outdoor pile with remainder stored in basement	8	1.9
Part in outdoor pile with remainder in pit	1	0.2
Total	414	100.0

Manure pits, which keep the product at a distance from the cows and conform to certain high-grade milk requirements, were used for storage by seven per cent of the farms. A specially constructed pit is likely to be better insurance against waste in storing than most basements. About five per cent of the operators attempted to spread manure every day and to avoid handling it over by placing the cleanings from the stables directly in the spreader and hauling it at once to the fields. In winter, when snow prevented the use of wheels, a cart body mounted on a sled made it possible to spread by hand directly in the field, barring days when the road could not be kept open. This method would seem to be most economical of hand labor.

Some three or four per cent more of the farmers attempted a combination that approached daily spreading in the field, but provided some temporary storage for certain periods in large piles, in the basement, or in a pit. About two per cent stored in large piles outdoors when the basement or pit was full.

The numbers of hay forks and milking machines are shown in Tables 20 and 21.

DEFINITIONS

Acres operated or total acres per farm is the number of acres used in the farm unit. This may include acres rented, so that to avoid duplication, acres rented out are not considered a part of the farm to which they originally belonged.

Capital is the value of all farm property, including houses, barns, land, livestock, machinery, feed, seed and cash reserved for farm purposes. It does not include house furniture or other household equipment. Unless otherwise stated, "capital" refers to the average amount for the beginning and end of the year.

Farm income is the difference between farm receipts and farm expenses. This is the remuneration to the operator for his manual labor, his managerial ability, and his capital invested in the farm business for one year.

Labor income is obtained from the farm income by subtracting interest on the average capital invested. In these computations 5 per cent was used for the annual value of capital invested. This is the usual rate of interest on farm mortgages in New Hampshire and is the one most commonly used in figuring labor incomes. Labor income, having eliminated the contribution made by capital, is comparable to the cash wages of a married man who is given a house to live in and various farm products besides. Labor income is the best measure of financial success for comparing one farm with another. It is not comparable to city salaries.

As used for this work the term "labor income" means the farm labor income, or the operator's labor income on the assumption that he owns the farm and does not pay rent. Most of these operators did own their farms, in which case there is no distinction between farm labor income and labor income.

Labor earnings is the labor income plus the value of farm products used from the farm by the operator and his family, and an allowance for 12 months' use of the farm house. Unless otherwise stated, it is figured as if the operator owned the farm, or as farm labor earnings.

Labor returns per man is the sum of labor income and all expenses for labor including board for both paid and unpaid labor, divided by the average number of men working on the farm for the year.

Man equivalent is a figure that expresses the average number of men working on a farm for a year. It is obtained by dividing by 12 the total number of months that the operator and paid and unpaid laborers have worked. The time of women and children is reduced to its equivalent in man time.

Number of cows means the average number of cows for the year. It may not be the average of the two inventories because a farmer may have had extra cows for a few months to establish a milk rating, or he may have sold a large number just previous to the final inventory. In such cases, it was assumed that an estimate could be made which would more nearly represent the average.

Man work units is used in lieu of the expression productive man work units to mean the amount of productive work accomplished in a year. Man work units are based on the average amount of labor required to

take care of one animal or one acre of crops, in terms of a ten-hour day. For example, it takes about 10 hours of labor to cut and harvest one acre of hay, and it takes about 150 hours to care for an ordinary grade cow one year. Therefore, each acre of hay cut once represents one man work unit, and each grade cow cared for per year represents 15 man work units. A list of crops and animals and their corresponding work units for both men and horses is given in Table 27. These units are developed and periodically adjusted in accordance with the most recent findings of farm cost accounts.

Table 27—*Productive work units.**

Man units.	Horse units.	Crops
6	6	Corn for grain, husked from shock
9	6	Corn for seed
4	6	Corn for silage
3	5	Fodder corn
5	6	Sweet corn for canning factory
10	10	Potatoes, table stock
14	10	Potatoes, certified seed
10	10	Cabbage
16	10	Tomatoes for canning factory
4	5	Field beans
15	12	Roots (sugar beets, field beets, mangels, etc.)
2	3	Small grains, buckwheat, barley, oats, wheat, rye, field peas, and mixtures of these—for feed whether threshed or cut hay
22	4	Peas for market
1	1	Hay per cutting, alfalfa, clover, timothy
15	8	Apples, bearing, when cared for in a commercial way
3	1	Apples, bearing, when little or no care is given
15	8	Other tree fruits, bearing
2	1	Fruit not of bearing age
20	5	Berries
10–35	2–10	Truck crops—onions, lettuce and spinach usually represent 35 man and 5 horse units
1	1	Seeds—alfalfa, clover, timothy
Man units.	**Horse units.**	**Animals**
15	2	Cows, ordinary dairy (majority grades)
20	2	Cows, purebred dairy (majority purebred)
15	15	To be added per cow when milk is retailed
15	2	To be added per cow when certified milk is produced
2	0.1	Heifers, calves, bulls, steers and colts
2	0.1	Steers or other cattle fattened or only wintered
2	0.1	Stallion, if not worked
0.5	0.05	Breeding ewes and bucks (covers work on lambs)
0.2	0.02	Other sheep, or lambs fattened or only wintered
3	0.5	Brood sows (covers work on pigs till weaned)
0.5	0.1	Boars
0.5	0.1	Other hogs raised during the year
15	2	Hens and other mature poultry, farm flocks, per 100 birds
20	2	Hens and other mature poultry, commercial flocks per 100 birds
5	0.5	Pullets raised, per 100 birds (includes work on cockerels sold as broilers)
0.5	0.15	Bees, per hive

* Adapted from figures developed and used by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York.

Table 27—*Continued.*

Man units.	Horse units.	Miscellaneous
3	0	Day-old chicks, per 1000 chicks hatched
0.5	0.5	Stallion fees per fee collected
1	—	Man for every day worked or $4—$5 receipts
1	2	Man and team for every day worked or $8—$10 receipts
1	2	Man, team and machine for every day worked or $10—$12 receipts
1-2	1-2	Cord wood, per cord or $6—$8 receipts
2	2	Lumber per thousand or $12 receipts
1.5	1	Pulp wood per cord
1	—	Wood, standing per $20 receipts
1	—	Boarders, per $10—$12 receipts
1	—	Pasturing stock, per $20 receipts
1	—	Truck hauling own milk and others, per $12 receipts, or one-third time on road
1	2	Team hauling own milk and others, per $6 receipts, or one-third time on road
1	—	Gravel sold, no hauling, per $20 receipts

There is much work about the farm that is not directly productive such as building fences, repairing buildings, caring for work horses, etc., and as such is not included in this measure. Work units have nothing to do with yields or production, so that an acre of hay counts one work unit for each cutting regardless of its yield, and one cow counts as 15 work units whether she produced 25 hundredweight of milk or 75. A work unit does not measure the actual amount of time that a man works, but rather gives him credit for accomplishment in terms of the hours that the average worker would require. If he is credited with more work units at the end of the year than his neighbor, he is more efficient; he may not have worked longer hours.

Man work units per man is the result obtained by dividing total man work units on the farm by the man equivalent.

Crop index is a percentage comparison of the crop yields on one farm with the average yields of the region or state. In this analysis, the averages for yields on the 414 farms surveyed were used as a base. These average yields are given in Tables 9 and 10. As some 85 per cent of the crop land is occupied by hay, hay yields are a controlling factor in crop index. In this study, the crop yields on each farm were weighted by man work units. Hay represents one work unit and potatoes ten; therefore, an acre of potatoes had ten times the weight of an acre of hay in determining crop index.

Production index. A production index attempts to measure both crop and animal production and to express the result in per cent of the average of the region for that year. All cows, chickens on farms having 50 birds or more, and sheep on farms having one animal unit or more of sheep per farm were included in the index for these farms. Cows were figured on the basis of milk production per cow, chickens on eggs produced per bird, and sheep on net increase plus sales of wool.

Output index is a figure expressing the relative quantity of products produced per man by combining on each farm the work units per man and the yields of crops and animals. The production index for each farm was multiplied by the percentage that man work units per man on that farm were of the average man work units per man for all farms.

Pounds of milk per cow is the amount of milk produced including the equivalent of butter or cream sold or used on the farm divided by the average number of cows on that farm.

Animal Unit. As a general method of comparing livestock, the animal unit is used. This measure is based on the amount of feed consumed and the amount of manure produced. Seven sheep, for example, eat about as much feed as a cow and produce about the same value in manure, although the manure is drier and weighs less. One cow, bull, steer, or horse is counted as an animal unit and other animals are compared to these. Young stock are usually counted as equal to one-half of a mature animal. Seven sheep, fourteen lambs, five hogs, ten pigs, two heifers, two colts, and one hundred hens are each counted as an animal unit.

Labor costs per man work unit is the sum of the estimated cash value of the operator's time and all expenses for hired labor including board for both paid and unpaid labor divided by the total number of man work units represented by the farm business.

November-June ratio is a percentage comparison of the amount of milk produced on the farm in November with the amount produced in June. It is an attempt to get some measure of the production in winter as compared with that in summer. With spring freshening cows turned on pasture, June typifies a high-production month. In northeastern markets, any shortage of milk for consumption is usually manifested in the fall. November is assumed to be typical of a low-production month.

FINANCIAL SUMMARY

Capital

The average amount of capital invested per farm for the Grafton County area was $11,210 (395 farms). The distribution of the capital is given in Table 28. Of the total value, 36 per cent was in buildings

Table 28—*Showing the average distribution of capital (395 farms).*

	Value per farm.	Per cent of total.
Buildings	$4,034	36.0
Land	3,164	28.2
Total real estate	$7,198	64.2
Livestock	2,724	24.3
Farm motors	254	2.3
Milking machines	83	0.7
Other farm machinery	727	6.5
Feed and supplies	93	0.8
Cash	131	1.2
Total	$11,210	100.0

and 28.2 per cent in land, making a total of 64.2 per cent in real estate. Livestock comprised 24.3 per cent; motors, used for farm purposes, 2.3 per cent; milking machines, 0.7 per cent; other farm machinery, 6.5 per cent, and supplies and cash the remaining 2.0 per cent. This percentage distribution corresponds very closely to that found in the survey of 74 farms in Haverhill, Piermont and Bath in 1915, to which previous reference has been made. The average distribution at that time was as follows: real estate, 66 per cent; livestock, 23 per cent; machinery, 8 per cent; feed and supplies and cash, 3 per cent. The total capital at that time was $6,322 per farm.

The Livingston County investigation found the average amount of capital per farm to be $18,195, which is 62.3 per cent more than in Grafton County.[8] The difference was largely in the value of real estate which was $13,431 for the New York farms and $7,198 for those in New Hampshire.

Mortgage Indebtedness

The 1930 census gives mortgage indebtedness for full owners. Out of 1,634 farms reporting in Grafton County, 650, or 39.8 per cent, were mortgaged. The average indebtedness was $1,995, or 38.7 per cent of the average real estate value.[5] The 395 farms in this study included full owners, part owners and tenants. The average investment in real estate was $7,198; the average mortgage indebtedness on 135 was $2,888. Principally because of differences in ownership, the figures are not comparable, but they indicate that 34.2 per cent of the farms were mortgaged in an amount equal to some 40.1 per cent of the value of real estate. Other figures relating to sizes of mortgages and their relation to total capital per farm are given in Table 29.

Table 29—*Mortgage indebtedness.*

Amount of mortgage April 1, 1930.	Farms reporting.		Average amount of mortgage.	Average capital.	Per cent of capital represented by mortgage.
	Number.	Per cent.			
Not over $1,000.....	38	28.1	$626	$7,254	8.6
$1,001 — $2,000.....	26	19.3	1,631	8,755	18.6
2,001 — 3,000.....	24	17.8	2,652	12,170	21.8
3,001 — 4,000.....	13	9.6	3,538	13,118	27.0
4,001 — 5,000.....	16	11.8	4,684	17,547	27.0
Over $5,000	18	13.4	7,727	23,458	32.9
Total or average	135	100.0	$2,888	$12,362	23.4
All farms	395	100.0	$997	$11,210	8.9

New England farm sentiment holds a mortgage in much disfavor. As a matter of fact, good business ability is often shown when a young man selects a better farm than his cash resources might warrant and buys it through the instrumentality of a mortgage. When one starts out to buy a farm to fit his pocketbook, most of the advantage is likely

to accrue to the seller. Not only is a mortgage a stimulus to a young man to save and "clear" his farm, but, much more important, a good farm can usually be paid for in fewer years than a poor one. One should guard against property incumbrances that cannot be liquidated or interest charges that cannot be met, but profits on a reasonable equity are as legitimate in agriculture as elsewhere.

Receipts

The average receipts per farm were $3,878 (Table 30). The largest item of receipts was dairy products, largely whole milk, averaging $2,296 per farm. Crop sales represented a very small item on these farms, only $164, or 4 per cent of total receipts. Livestock sales are offset partly by livestock purchases. The net increase in all livestock was $399 per farm, computed from Tables 30 and 31. Miscellaneous includes a great variety of enterprises or undertakings. Sales of lumber, wood, maple sugar, honey, wool and similar items are included here as well as the money received from the more important extra-farm activities, such as teaching school, night watchman, store-keeping, blacksmithing, selectman, and a nominal amount of month or day labor with or without a team or tractor. There is little uniformity in these items, but altogether they constitute a rather important source of receipts.

Table 30—*Sources of receipts, 395 farms.*

Source.	Amount.	Per cent.
Dairy products	$2,296	59.2
Livestock (including meat)	612	15.8
Miscellaneous	493	12.7
Increase in value of livestock	168	4.3
Crops	164	4.2
Eggs	84	2.2
Increase in feed and supplies	61	1.6
Total	$3,878	100.0

In Livingston County, New York, the sales of dairy products amounted to $1,771 per farm, and cash crops brought in $1,451.[8]

The variations in total amounts of receipts per farm will be shown later in tabulations designed to express the relationship of receipts to profits.

Expenses

The details which contributed to a total expense per farm of $2,924 are shown in Table 31. The biggest single item, $986, was for feed and bedding. This item was largely grain feed. Hired labor, including the estimated cash value of board furnished by the farm, represented nearly half as much, $464. Unpaid labor including cash value of board represented over eight per cent of the expenses, or $239.

Table 31—*Distribution of expenses, 395 farms.*

Item.*	Amount.	Per cent.
Feed and bedding	$986	30.6
Hired labor and board	464	15.9
Unpaid labor and board (except operator)	239	8.2
Livestock	381	13.0
Miscellaneous	292	10.0
Taxes	194	6.6
Other farm machinery: Repairs and depreciation	138	4.7
Buildings: Repairs, allowance for depreciation (2%)	105	3.6
Farm motors: Repairs, license, depreciation	101	3.4
Gasoline and oil	66	2.3
Insurance	34	1.2
Milking machines: Repairs and depreciation	14	0.5
Total	$2,924	100.0

* Decreases in inventory of livestock or supplies are not included here. They were deducted from the increases to get the net increases for Table 30. No decreases in the inventory value of cows due to a change in price level or to cyclical changes were allowed.

Because of the relative size of the grain bill on such farms as these, this item is one of the first to receive consideration in regard to cutting expenses. One may conclude that he should curtail the use of grain. This is a negative economy when milk prices are as good as they were in 1929. It involves a decrease in production per cow, and production is one of the most important factors related to profits.

The substitution of home-grown grain for purchased feed is a further possibility. There are many considerations involved here, but the final criterion is whether one can get as much pay for growing grain as he can for keeping more cows and buying grain or for raising cash crops.

This involves problems in threshing and grinding grain, as well as in raising. A consensus of opinion seems to be lacking. Corn for grain is doubtless out of the question. Naturally good yields obtained in this section may justify the raising of oats, or oats and barley, provided that with a little neighborhood co-operation a small threshing machine and a community crusher or grinder may be economically maintained. A little adventuring and study might help to settle this problem.

Oats seldom show a profit when all labor is charged at full price, but they do have the advantage of interfering very little with other work and of providing some employment for labor and teams when other business is not pressing. Oat straw for bedding on the farm is no longer a very decided asset. Plenty of hay can be obtained at bedding prices. However, there is a tendency among farmers in this area to buy considerable bedding in the form of sawdust. Chopping the straw or hay with a power cutter might provide a more convenient bedding material. It would certainly enhance the value of manure in contrast to the use of sawdust.

Probably the surest and best ways to curtail feed costs are through shorter rotations providing more legumes in the form of clover, and

by cutting the hay crop earlier for the sake of palatability and protein content. In so far as the roughage feed becomes more palatable so that cattle will readily eat more, it is likely to reduce the necessary feed requirements from other sources, more or less, regardless of its inherent protein content. Nevertheless, both these practices will increase the amount of protein in the roughage.

Corn silage is recognized as an economical dairy feed wherever it can be grown with any degree of success. Its succulence contributes unmistakably to the palatability of the ration and to the good health of heavy producing herds irrespective of its intrinsic feed value.

Profits

In order that all farms in this group might be comparable for most purposes, they have been figured in all cases as if owned by the operators. The labor income as used here means the farm labor income, or what the operator's labor income would have been had he owned the entire property. (See definitions.) Interest is figured at 5 per cent, the usual mortgage rate, on the total capital investment regardless of the mortgage indebtedness.

Maple groves are common in this area. In a very few cases they served as an important source of income.

Labor Income

The receipts on these farms exceeded the expenses by $954 (Table 32). This is the operator's pay for his labor, managerial ability and use of capital, and may be called the farm income. Assuming that the money is worth 5 per cent interest, $561 is obtained as a fair charge for the use of the capital invested. Deducting this amount from the farm income leaves $393 as the average labor income. Labor incomes vary from year to year as well as between communities. The average labor income for 578 Livingston County farms in 1908 was $589; for 697 farms in 1918, $203; for 514 farms in 1928, $386.[8]

Table 32—*Average profits, 395 farms.*

Receipts	$3,878	
Expenses	2,924	
Farm income		$954
Interest on average capital at 5 per cent		561
LABOR INCOME		$393
Milk and milk products used in house	$79	
Poultry and other meat and eggs used	53	
Potatoes, fruits, and garden crops used	114	
Allowance for house rent (11%)	207	
Wood and miscellaneous used in house	154	
Total privileges	$607	
Less privileges for labor	121	
		$486
LABOR EARNINGS*		$879
Value of operator's time**		$792
Return on capital ($954-$792)		$162
Per cent return on capital		1.4

* Labor income plus house rent and other privileges used by operator and other members of the family when not doing farm work. The estimated value of privileges used by paid and unpaid labor for 241.2 days per farm was $242.38, or slightly more than a dollar a day. The estimated cash cost of board already included in farm expenses was $121.38. The difference, therefore, or $121, is deducted from total privileges in computing labor earnings.

** The average value of the operator's time as estimated by them, i. e., what they thought they were worth on the job or what they would have to pay to get the work done that they were accomplishing.

Labor Earnings

In addition to labor income, the farmer has a house to live in and certain products from the farm. The estimated average value of house rent and products contributed by the farm toward the operator's family living amounted to $607. A part of this was shared with paid and unpaid labor used in the farm business. Therefore, the net privileges for the farmer and his family are reduced to $486. This added to his labor income amounts to $879, and is called labor earnings.

The Significance of Labor Income

Farm incomes are difficult to compare with the incomes in other business. In farming, the home and the business are one; in other business they are usually separate. The easiest comparison is with hired men. In the days long after the Civil War and before the World War, say the period from 1910 to 1914, often used today as a norm or base, hired men's wages amounted to about one dollar a day and board. Spillman,[12] Warren[13] and others estimated the average labor income of farmers of the United States at that time as about $300, or

approximately the same as wages. In recent years, hired men's cash wages in rural communities of the Northeastern States have been approximately $600 a year. That the farmers' incomes have tended to be considerably out of line is not a new idea.

Hired men are not likely to work as long hours nor as conscientiously as operators. In a depression period of low returns, especially, the operator is spurred to greater activity. The estimate of $792 as the average cash value of the operator's time is probably reasonable.

The question is sometimes asked how farmers can live on so small an income. Assuming that a man's farm business conforms to the average of these 395, he will have a labor income of $393. If he owns his farm free from debt, he will not have to pay the $561 interest. The item of unpaid labor amounting to $239 shown in Table 31 is available for living expenses as it is not actually paid out. Thus, if this farmer were free from debt, he would have $393 + $561 + $239, or a total of $1,193 available for cash family living expenses or for saving.

If to the cash income some $500 worth of privileges be added, a total of approximately $1,700 becomes available to offset the costs of supporting a family. Comfortable houses, comparable in size to these farm dwellings are not easily rented in cities or villages for $207 a year, $17 a month. Milk is not delivered in glass bottles on the streets at six cents a quart, the price in Table 33. Possibly the increased cost of some of these items if bought elsewhere might change the total to $1,900 or better. With his property free from debt and plenty of unpaid labor, a farmer might continue with a minus labor income for years. On the other hand, high school education, electric lights, sewage systems, and most other home conveniences cost more in the country than in the city.

TABLE 33—*Quantity and value of produce raised on the farm and used in the house—414 farms.*

Product.	Total amount.	Value per unit.	Total value.	Average per farm.	
				Amount.	Value.
Milk	511,212 qts.	$.06	$31,167	1234.8 qts.	$75.28
Cream	2273.5 qts.	.60	1,353	5.5 qts.	3.27
Butter	1,381 lbs.	.47	655	3.3 lbs.	1.58
Eggs	36,897 doz.	.36	13,441	89.1 doz.	32.47
Poultry	2,800 birds	1.30	3,634	6.8 birds	8.78
Pork	126 animals	24.70	3,112	.3 animal	7.52
Beef	25.3 animals	52.25	1,324	.06 "	3.20
Potatoes	13,672.5 bu.	1.41	19,339	33.0 bu.	46.71
Apples			2,652		6.41
Garden			24,376		58.88
Wood, stove	6243.5 cords	10.23	63,890	15.1 cords	154.32
Maple products	300 lbs.	.25	75	.7 lbs.	.18
	785 gals.	2.22	1,740	1.9 gals.	4.20
Berries			116		.28
Miscellaneous			576		1.39
Total			$167,450		$404.47

Variations in Labor Incomes

The largest labor income in this group of farms was $5,138; the smallest lacked $2,679 of being able to meet all expenses and interest on the investment (Figure 5). The number of minus labor incomes was 143 and of plus labor incomes 252. The largest number was in the 0 to $500 group, 103 farms. The average labor income for this group was $244.

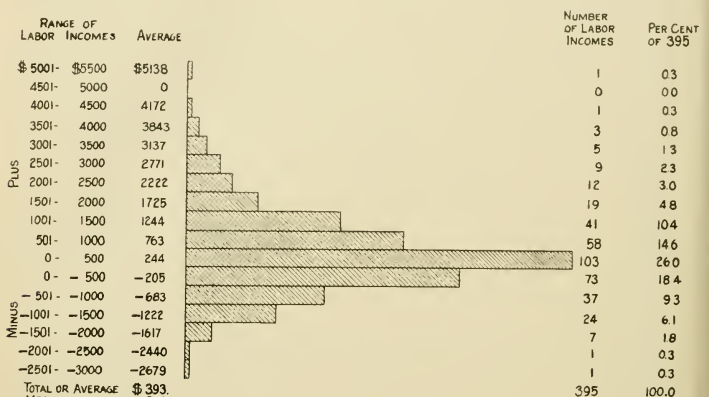

Figure 5. Distribution of labor incomes by classes.

Privileges

The items contributed by the farm to the 414 families amounted to an average of $404 worth of produce per family, as listed in Table 33. Milk, eggs, potatoes and wood made up three-fourths of the total value.

Returns on Capital

Each farmer was asked to estimate the value of his own time. This was usually made in comparison with hired men's wages. In this region, hired men are most often unmarried men that live with the family. The average estimate of all farmers was $1,180, $792 cash plus $388 worth of privileges. The privileges of $1.06 per day correspond to those of unmarried hired men. The estimated average cash value of the operator's time may be subtracted from farm income (return from capital and operator's labor) to give the return on capital. The average return for the whole group was $162 per farm or 1.4 per cent on the capital invested.

Price Adjustments

To illustrate what can happen to farm profits as a result of changing prices, some comparisons will be made with more recent conditions.

Starting with an average labor income of $393 as shown in Table 31, an allowance might be made for changes in the inventory value of cows. In accordance with the usual practice, no depreciation on cows due to changes in the general price level or to cyclical fluctuations was allowed in computing labor incomes. The average number of cows per herd for the 395 farms was 15.7, the average estimated depreciation per head $4.30. Subtracting a corresponding loss of $68 from the average labor income would leave $325 as the average for this group after suffering the depreciation on cows due to changing prices. Indications are that this price change was much under-estimated by the farmers due to its recent change of direction in trend and to the fact that many had not bought or sold cattle in the meantime. In the 12 months covered by the study, prices of cows continued upward during the first six months and turned downward during the last half of the year. They have continued to decline up to the present time (August, 1931).

Because both grain and milk prices have decreased in 1931, it is easy to assume that farm profits have not suffered seriously. But the total cost of purchased feed and bedding averaged less than $1,000 per farm, while milk sales represented over $2,000. A ten per cent change in prices for both commodities would be disproportionate in its effect. From the same sources of information as the figures in Table 4, an average net price of $1.75 for milk during the first four months of 1931 was obtained. Compared with the average price for the corresponding months of 1929, this is a reduction of 39.7 per cent. Grain prices at Utica for the same four months averaged $30.87—a reduction of 30.2 per cent. Disregarding wages because comparable figures are not available, a new labor income statement may be constructed as follows:

Average labor income for the year ending April 1, 1930, 395 farms		$393
Estimated changes in average labor income for the year 1931, if milk and grain prices were to remain comparable to January-April, 1931 averages:		
Loss of 39.7 per cent on $2,296 worth of milk sales	$912	
Gain of 30.2 per cent on $986 worth of feed and bedding	$298	
Net loss		$614
Resulting estimated labor income for same 395 farms in 1931		—$221

Inaccuracies can be pointed out in these assumptions, but the figures help to visualize the seriousness of price declines in the farmer's economy. His taxes, interest, and insurance bills will scarcely be reduced during the depression.

Tenant Farms

There is no definite system of renting farms in this area except that the transaction is usually on a cash basis. The census reported 126 tenant farms in Grafton County, 107 of which were cash rented.[5] Out of the 414 in this study, 44 might be classified as tenant farms. However, 21 of these paid no rent, but had the use of the farm by paying certain fixed costs. Usually the tenant paid the taxes and often the insurance. One or both of these items were likely to constitute the entire charge for the use of the farm. With a very few exceptions, these were family affairs.

There were 23 farms mostly on a cash rent basis that had the appearance of being business propositions. A financial summary of these is shown in Table 34. Incidentally, the method of figuring the corresponding farm labor income for tenant farms is also illustrated.

The average farm labor income for this group was $508, which is considerably better than that for all farms in the survey. The tenants' labor incomes averaged $705, and their returns on capital averaged 3.89 per cent because they had little capital and paid the landlord rent corresponding to a low interest rate.

BUSINESS ANALYSES

Size of Farm Business

A proper size is necessary for the most successful development of any business undertaking. This is emphasized by the recent tendency for industry to form corporations and super-corporations in order to exercise control over large amounts of capital. Farming is one of the few business undertakings in which the individual manager still continues to meet competition with a good measure of success. This is particularly true of dairy farming. Nevertheless, within the individual farmer's range of control, there is a choice of size of business which is important.

New Hampshire is typical of an early settled region with farms laid out in small fields to accommodate the use of hand tools in a self-sufficient type of agriculture. The hoe and the sickle limited a man's efforts to few acres. Irregular patches of potentially tillable land and plenty of movable stones for building fences have contributed to the definiteness of these small dimensions. Under present conditions even the dairyman has his six-foot mower, a horse-rake, a manure spreader. He may have a milking machine and a tractor. The original farm is inadequate. The operator must produce more units with less human labor. The volume of production must be increased in order that smaller increments of profit per unit may contribute to an increased total net income.

To undertake any industrial enterprise without first giving regard to size would be considered suicidal. Because present-day farmers have grown up on these acres and, scarcely realizing, have been forced out of conditions in which small farms were adequate, they are often han-

TABLE 34—*Summary of farm business, 23 tenant farms.*

	Farm.	Operator.	Landlord.
Average capital			
Real estate	$7,512	$78	$7,434
Livestock	2,672	2,661	11
Farm motor	204	204	
Milking machine	110	110	
Other farm machinery	578	539	39
Feed and supplies	100	100	
Cash	115	115	
Total capital	$11,291	$3,807	$7,484
Receipts			
Dairy products	$2,291	$2,291	
Eggs	32	32	
Livestock (including meat)	557	557	
Crops	227	227	
Miscellaneous	314	314	
Rent			$332
Increased value of livestock	88	88	
Increased value feed and supplies	84	84	
Total receipts	$3,593	$3,593	$332
*Expenses**			
Feed and bedding, purchased	$873	$873	
Hired labor and board	350	350	
Unpaid labor and board	143	143	
Livestock, purchased	373	373	
Farm motors, repairs, etc.	69	69	
Milking machine, repairs, etc.	13	13	
Other farm machinery, repairs, etc.	109	102	7
Buildings, repairs, etc.	77	2	75
Gas and oil	49	49	
Miscellaneous expenses	238	238	
Rent		332	
Taxes	200	141	59
Insurance	26	12	14
Total expenses	$2,520	$2,697	$155
Farm income	$1,073	$896	$177
Interest on total capital at 5%	565	190	
Labor income	508	706	
Privileges	509	509	
Labor earnings	1,017	1,215	
Value of operator's time	748	748	
Return on capital	325	148	177
Per cent return	2.88	3.89	2.37

* Decreases in inventory of livestock or supplies are not included here. They were deducted from the increases to get the net increases in receipts.

dicapped. Only the larger units as found today are likely to be commensurate with the average operator's ability. Some farmers have recognized this fact and have moved to larger places, purchased additional land, or combined their farms with others.

Size of the farm business is not always a matter of acres. The number of cows kept or the acres planted to intensive crops like potatoes may be more important. The amount of capital invested and the number of man work units are also used as measures. As long as the farms are uniform, any one of these yardsticks will measure satisfactorily the size of the business. Usually, conditions vary so much from farm to farm that some indices are much more trustworthy than others. For example, if a man owns 200 acres of land, but most of the pasture has grown up to worthless bushes and the fields produce scarcely anything except run-out hay, total acres would be a poor measure of the size of his farm business.

Total Capital

In Table 35, the total capital invested in the farm business was used as a measure of size. There were 54 farms having an average investment of $3,991. Their average return in labor income was $204, or less than one-fourth as much as that of the 71 farms having an average total capital of $22,785. There is an unmistakable tendency for incomes to increase with the amount of capital. The larger farms got better milk production per cow and better prices for milk. They got more work done with less man labor as evidenced by the increasing man work units per man.

Table 35—*Relation of total capital to labor income.*

Total capital.	Number of farms.	Average. Total capital.	Man work units per farm.	Man work units per man.	Milk per cow (pounds)	Price of milk per cwt.	Labor returns per man.	Labor income.
Less than $5,000	54	$3,391	222	179	4,696	$2.80	$385	$204
$5,000 — $7,999	84	6,269	274	191	5,032	2.96	411	195
8,000 — 10,999	96	8,869	341	219	5,186	2.89	490	206
11,000 — 13,999	46	12,100	428	235	5,172	3.12	649	468
14,000 — 16,999	44	15,016	550	279	5,370	3.00	735	622
17,000 or more	71	22,785	728	301	5,434	3.17	893	834
Total or average	395	$11,210	413	231	5,150	$2.98	$609	$393

Total Acres

The total number of acres in the farm has considerable to do with income (Table 36). The 67 farms having less than 126 acres made labor incomes of $163, while those with 355 or more acres made incomes of $695, or nearly twice the average of all.

Acres in Crops

Acres in crops is a doubtful measure of size. Nearly half of the farms sold no crops at all, but simply grew feed for cows. Under these conditions, crop acres contribute their influence rather indirectly to size of business and its effect on labor income is often masked by differences

Table 36—*Relation of total acres to labor income.*

Total acres.	Number of farms.	Average. Total acres.	Total capital.	Milk per cow (pounds)	Man work units per farm.	Man work units per man.	Labor income.
Less than 126	67	83	$6,296	4,939	244	184	$163
126 — 174	95	143	7,309	5,020	296	204	302
175 — 234	77	202	11,704	5,203	397	227	266
235 — 294	61	257	12,338	5,508	454	248	571
295 — 354	38	321	14,261	5,155	534	254	545
355 or more	57	491	19,589	5,156	705	302	695
Total or average	395	229	$11,210	5,150	413	231	$393

in production per cow or by the prices received for milk. One farmer may raise sufficient feed on half as much crop land as his neighbor possesses to produce equal amounts of milk and obtain a similar labor income. What one operator takes out of his mowing machine, the other may spend in extra fertilizer. In order to get any consistent effect from this measure of size, certain farms selling milk at other than wholesale prices had to be eliminated because of their influence on prices, and the remaining farms had to be arranged in large groups (Table 37). The farms having an average of 88 acres in crops provided twice as large average labor incomes as the ones that had only 26 acres. The influence of more acres of crops is in the direction of larger incomes.

Table 37—*Relation of acres in crops to labor income.*

Acres in crops.	Number of farms.	Average. Acres in crops.	Man work units per farm.	Man work units per man.	Number of cows.	Milk per cow (pounds)	Milk price per cwt.	Labor income.
Less than 35	102	26	252	185	8.8	5,028	$2.96	$234
35 — 64	159	48	382	228	15.3	5,266*	2.93	370
More than 64	79	88	659	288	25.5	5,105	2.93	528
Total or average	340*	51	407	229	15.7	5,157	$2.94	$366

* Farms left out on which local selling affected price of milk.

Number of Cows

In a dairy region where milk sales represent a large proportion of the receipts, the number of cows in the herd becomes a good measure of size of business (Table 38). Farms in Grafton County having an average of 36.5 cows made average labor incomes 14 times as large as the group having 3.6 cows. The operators got better production per cow, better prices for the milk, and, more important, they accomplished more than twice as much per man. These are some of the rea-

sons why size contributes to better incomes. Under conditions existing in the year of the study, the table suggests that one should have about the average number of cows to expect an average labor income; he should have 25 cows to get hired man's wages; still better results could be obtained by keeping more cows.

Table 38—*Relation of number of cows per farm to labor income.*

Number of cows.	Number of farms.	Average. Number of cows.	Milk per cow (pounds)	Man work units per farm.	Man work units per man.	Price of milk per cwt.	Labor income.
Less than 5	30	3.6	4,883	179	151	$2.95	$64
5 — 12	155	9.3	4,955	279	199	2.93	235
13 — 20	117	16.1	5,344	414	241	2.98	425
21 — 28	54	24.6	5,426	616	275	3.05	599
29 or more	39	36.5	5,167	845	329	3.15	896
Total or average	395	15.7	5,150	413	231	$2.98	$393

Man Work Units

One of the best measures of size for comparing farms would be to add up all the work that each farm provided during the year. Such a measure is the man work unit. A work unit may be thought of as representing approximately a day's work. There were 43 farms that provided less than 200 days of work to be done for the year (Table 39). The average man on a well-organized farm would have done the average amount of work on these farms in 146 days, or some six months. The average labor income of this group was minus $12; that is, these farms lacked $12 of furnishing the operator with enough receipts to pay all expenses including interest on capital. In contrast to this situation, there were 109 farms that provided an average of 711 work units.

Table 39—*Relation of man work units per farm to labor income.*

Man work units per farm.	Number of farms.	Average. Man work units per farm.	Number of men.	Number of horses.	Number of cows.	Milk per cow (pounds)	Milk price per cwt.	Labor income.
Less than 200	43	146	1.2	2.0	5.7	4,991	$2.94	—$12
200 — 294	90	243	1.4	2.6	9.2	4,844	2.90	77
295 — 394	93	338	1.6	2.7	12.5	5,330	2.98	261
395 — 494	60	436	1.9	3.2	16.8	5,198	2.97	374
495 or more	109	711	2.4	3.4	26.9	5,284	3.07	937
Total or average	395	413	1.8	2.9	15.7	5,150	$2.98	$393

A little over two men, accomplishing 306 work units per man, did all the work. The reward was an average labor income for the group of $937. The very consistent changes in labor incomes with increasing

numbers of work units reflect the importance of this factor. Representing, then, the best measure of size, this use of work units in the table emphasizes the importance of a good-sized business in the farm economy.

The relation of man work units per farm to various other factors is shown in Table 40. All figures given in Tables 39 and 40 that relate to factors of size increased with this measure,—number of men, number of horses, number of cows, total capital and acres in crops. Some of the other factors listed afford a clue to the reason why size is important in the farm economy.

Table 40—*Relation of man work units per farm to other factors.*

	Average.							
Man work units per farm.	Total capital.	Value of house.	Value of barns.	Value of barns per cow.	Per cent of capital in buildings.*	Acres in crops.	Crop index.	Production index.
146	$5,391	$1,237	$956	$168	41	27	92	95
243	6,658	1,322	1,044	113	36	36	94	92
338	9,367	1,735	1,395	112	33	47	101	101
436	11,382	1,898	1,712	102	32	53	100	100
711	18,747	2,916	2,911	108	31	74	105	102
Average	$11,210	$1,937	$1,734	$110	33	51	100	99

	Average.								
Man work units per farm.	Man work units per man.	Horse work units per horse.	Cows per man.	Tons of milk per man.	Output index.	Labor cost per man work unit.	Per cent using milking machine.	Value machinery per acre of crops.**	Distance from market (miles)
146	125	32	5.0	13	56	$5.56	5	10	5.8
243	183	34	6.9	16	72	4.45	3	10	5.2
338	230	48	8.5	23	101	3.72	23	9	4.3
436	244	54	9.4	24	104	3.62	33	10	4.5
711	306	83	11.6	31	134	3.19	53	11	3.1
Average	231	56	8.7	23	100	$3.93	26	10	4.4

* Houses and barns only.
** Automobiles and milking machines not included.

The larger average incomes of the larger farm businesses were due primarily to greater efficiency in the use of human labor, horses, machinery, and capital. A particularly striking relationship is shown in the output index (see definitions), which measures the relative quantity of farm products produced per man.

In this study, it was found that the larger farm businesses obtained higher average yields both of animals and of crops. Because of this chance relationship, the higher average labor incomes of the larger farms shown in Tables 35 to 39 were due in part to their higher average yields.

This whole group of 395 farms with 15.7 cows and 229 acres of land per farm is made up of units much superior in size to the average for the State. The State's average was 6.2 cows, and 131.5 acres of land per farm.* This comparison would indicate that the farms surveyed were twice as large as the average for the State, but other areas may have had more cash crops or more poultry to offset a part of this apparent discrepancy.

Total Receipts

This measure of size of business, often used in industry, changes not only with volume, but also with prices. Individual farms may be eliminated from certain groups because of losses due to poor management or misfortune. In other words, this measure is very close to net income, because all that remains to be done is to subtract expenses. There are two observations to be made in connection with Table 41, in which this measure is used. The first one is trite. Receipts must be built up to several thousand dollars before even a fair labor income can be expected. Satisfactory labor incomes are impossible with small receipts. The second observation is to call attention to the fact that $5,000 receipts on one farm is better than $2,500 on each of two farms. Two men working on one farm in the group having average receipts of $5,449 would each get hired men's wages of around $600, one presumably as a laborer and the other as an operator. The two men as operators of farms each averaging $2,455 receipts would get only $74 a piece for their time. In other words, the proportion of income that accrues to labor increases with gross receipts. This fact is evidenced in the last column of the table, which indicates that 17 per cent of total receipts accrued to labor income in the last group but only 3 per cent in the second group.

Number of Men

Because it takes more men to run a large business than a small one, it should be possible to measure size by the number of men employed on the farm. Such a method was used in making Table 42. The size of farms increases as indicated by a consistent change in average man work units per farm from 244 to 769. Production per cow or price of milk or both tend to increase, but there is little response in labor incomes. The reason is not far to seek. The number of men employed on farms is a result of size and not a cause. When we select farms because they have more men employed there is no guarantee that the men will be used efficiently. The group that employed an average of approximately two men was the least efficient of all with 212 work units per man, and the group having 2.5 men was next in inefficiency. When size was measured by work units per farm, the work units per man ranged from 125 to 306; and when size was measured by number

* United States Census, 1930. Agriculture, New Hampshire, pp. 6 and 9. Cows and heifers born before 1928, kept mainly for milk production, 68,792, reported by 11,018 farms.

Table 41—*Relation of total receipts to labor income.*

Total receipts per farm.	Number of farms.	Average. Receipts per farm.	Man work units per farm.	Man work units per man.	Milk per cow (pounds)	Price of milk per cwt.	Labor income.	Per cent that labor income is of total receipts.
Less than $1,950	88	$1,399	215	165	4,322	$2.79	—$162	12 loss
$1,950 — $2,949	89	2,455	299	210	4,973	2.98	74	3
$2,950 — $3,949	71	3,459	371	234	5,293	2.93	216	8
$3,950 — $4,949	37	4,451	468	259	5,573	3.06	442	10
$4,950 — $5,949	35	5,449	545	258	5,343	3.05	595	11
$5,950 or more	75	8,552	734	302	5,897	3.18	1,430	17
Total or average	395	$4,010*	413	231	5,150	$2.98	$393	10

* Does not agree with Table 30, because of adjustment of increases and decreases in value of livestock, etc.

of cows, work units per man changed from 151 to 329. One of the biggest advantages of a large sized farm business is in increasing the amount of productive labor that can be accomplished by each man, but hiring more men does not in itself contribute to that end.

Table 42—*Relation of number of men per farm to labor income.*

Number of men per farm.	Number of farms.	Average. Number of men per farm.	Man work units per farm.	Man work units per man.	Milk per cow (pounds)	Price of milk per cwt.	Crop index.	Labor income.
Less than 1.2	74	1.04	244	234	5,009	$2.94	98	$439
1.2 — 1.4	78	1.27	305	239	5,062	2.97	97	349
1.5 — 1.7	51	1.57	363	232	5,018	2.84	95	366
1.8 — 2.0	93	1.96	417	212	5,253	2.94	97	317
2.1 — 2.3	35	2.20	548	248	5,561	3.04	112	458
2.4 — 2.6	21	2.50	566	227	5,519	3.06	106	607
2.7 or more	43	3.10	769	246	4,957	3.24	103	434
Total or average	395	1.78	413	231	5,150	$2.98	100	$393

By first sorting the farms into groups that represent about the same amount of work done per man, the effect of having more men under different conditions of efficiency may be illustrated. When the farm organization was such that men accomplished less than 200 work units per man, a hired man was a losing proposition (Table 43). But when men were able to accomplish a medium or good allotment of work, to hire men was profitable.

Table 43—*Relation of man work units per man and number of men to labor income.*

Man work units per man.	Number of men. Less than 1.75.	1.75 or more.
Less than 200		
Number of farms	69	74
Average labor income	$66	—$255
Other averages:		
Man work units per man	148	146
Number of men	1.3	2.2
200 to 294		
Number of farms	95	80
Average labor income	$432	$544
Other averages:		
Man work units per man	243	242
Number of men	1,3	2.4
295 or more		
Number of farms	39	38
Average labor income	$841	$1,375
Other averages:		
Man work units per man	362	338
Number of men	1.2	2.4

Rates of Production of Crops and Animals

In spite of a large farm business, the operator's ultimate profits must be seriously impaired if rates of production of crops and animals are low. In fact, it is entirely possible for crop yields and animal production to be so poor that profits will decrease with increasing size.

Crop Index

Bushels and tons are hard to compare in respect to production. To alleviate this difficulty, a single figure for indicating crop yields has been developed which expresses the average yields of all crops on a given farm in terms of some group or regional average. This is called the crop index. (See definitions.) For practically the same reasons that crop acres failed to measure size in the area studied, crop index falls short of measuring quality in a highly significant way. Since 85 per cent of the crop land on the farms surveyed was found in grass and clover and a very small volume of intensive cash crops was grown, crop index is largely a reflection of hay yields regardless of its weighting by work units.

The best yields of timothy hay, which once commanded a good market price, have never provided a highly desirable feed for dairy cows. Smaller yields, mixed grasses and larger areas may actually satisfy the roughage requirements on a dairy farm quite as acceptably. New

seedings which provide a desirable clover hay do not have a predominant influence on crop index because of the relatively small total acreage.

Regardless of all these considerations, crop indexes above the average did show a considerable tendency to increase labor incomes (Table 44). They were assisted somewhat by better production per cow, larger businesses, and more work accomplished per man.

Table 44—*Relation of crop index to labor income.*

Crop index.	Number of farms.	Average. Crop index.	Value crop land per acre.	Milk per cow (pounds)	Man work units per farm.	Man work units per man.	Labor income.
Less than 70	49	57	$26	4,759	362	212	$312
70 — 90	97	81	30	5,127	377	220	264
91 — 110	124	100	34	5,098	403	232	274
111 — 130	75	119	35	5,275	452	239	474
Over 130	50	147	46	5,518	502	256	898
Total or average	395	100	034	5,150	413	231	$393

Milk Production Per Cow

Something of the quality distribution of cows among the farms of this region and the effect of that characteristic on labor incomes are shown in Table 45. The average total production of milk per cow for 395 farms was 5,150 pounds. This is not high. The cows in Livingston County, New York, which represented a less important proportion of farm receipts, averaged 5,658 pounds exclusive of milk fed to calves.[8] In Madison and Chenango Counties, New York, the cows on 114 farms produced an average of 7,010 pounds of milk per cow in 1925-1926.[10] Average milk production per cow had not been below 6,000 pounds in this area for five years.

It seems deplorable that 54 farmers out of this group should be attempting to produce milk in this day and generation with a production averaging less than 3,000 pounds per cow. If this situation is due

Table 45—*Relation of milk production per cow to labor income.*

Milk produuction per cow (pounds)	Number of farms.	Average. Milk per cow (pounds)	Number of cows.	Man work units per farm.	Man work units per man.	Price of milk per cwt.	Labor income.
Less than 3,451	54	2,833	13.3	393	226	$2.89	—$390
3,451 — 4,450	60	3,992	16.8	434	238	3.00	34
4,451 — 5,450	113	4,927	15.6	399	230	2.98	235
5,451 — 6,450	99	5,925	15.3	408	228	3.02	636
6,451 or more	69	7,222	17.2	444	234	2.98	1,228
Total or average	395	100	$34	5,150	413	231	$393

to disease over which the farmer has lost control, State agencies should offer some assistance; if it results from a lack of understanding of the principles of sanitation or dairy management, certainly here is a fruitful field for dairy extension work. In any case, these farmers cannot expect any measure of success so long as this condition prevails. It is useless to hope for a time when consumers will pay prices that will justify a reasonable farm income from such a low production.

These 54 farms with an average milk production per cow of 2,833 pounds had an average labor income of —$390. The second group, with an average production of 3,992, obtained an average labor income of $34. The table indicates that under conditions existing in the year of this study, a production of some 6,000 pounds per cow was necessary, if the operator expected to get hired men's wages. The last group of 69 farms, with an average milk production of 7,222 pounds per cow, was rewarded with an average labor income of $1,228.

Production per cow is one of the important factors most susceptible to improvement in this area. Farms with herds averaging less than 5,000 pounds of milk per cow, especially, should strive for ways and means of improvement. A production of 7,000 pounds is good income insurance. That it is possible and practical is evidenced by the fact that 69 farmers out of 395 attained a somewhat better average production and received labor incomes nearly twice as high as the nearest competing group. Their labor incomes were more than three times the average for all the farms.

Production Per Cow and Crop Index

These factors are combined in Table 46. Something of their relative importance is indicated by observing the change in labor incomes from left to right and from top to bottom. With every improvement in milk production for all three columns, there is a definite and decided increase in average labor incomes. The influence of crop index is less pronounced although the tendency is for incomes to improve with better yields. The average labor income for 52 farms that were below average in both crop yields and milk production per cow was —$97; the average labor income for 47 farms that were above average in both factors was $1,093.

Production Index

This same combination of crop yields and production per cow plus eggs per hen and net increase and other returns from sheep, when of any importance, are included in production index. (See definitions.) The importance of production index as a measure of profits on these farms is indicated in Table 47. The first group of 47 farms which lacked 40 per cent of being up to average production in crops, cows, hens and sheep lacked $469 on the average of paying interest and farm expenses. The group which was average in respect to production averaged practically the same labor income as the average for all farms, $396. The 24 operators who qualified for the last group by having production more than 30 per cent above average received labor

TABLE 46—*Relation of milk production per cow and crop index to labor income.*

	Crop index.		
	Less than 90.	90 to 110.	Over 110.
Production less than 4,650 pounds per cow			
Number of farms	52	41	33
Average labor income	—$97	—$439	$291
Other averages:			
Crop index	70	99	127
Milk per cow (pounds)	3,488	3,432	3,770
Number of cows	12.2	14.5	19.8
Milk price per cwt.	$2.90	$2.86	$3.15
Man work units per man	217	222	265
Production from 4,650 to 5,650 pounds per cow			
Number of farms	36	43	45
Average labor income	$161	$364	$499
Other averages:			
Crop index	74	99	127
Milk per cow (pounds)	5,047	5,077	5,124
Number of cows	12.8	17.1	17.2
Milk price per cwt.	$2.92	$2.99	$3.07
Man work units per man	212	246	236
Production over 5,650 pounds per cow			
Number of farms	54	44	47
Average labor income	$789	$770	$1,093
Other averages:			
Crop index	74	101	135
Milk per cow (pounds)	6,511	6,568	6,734
Number of cows	14.2	15.5	18.6
Milk price per cwt.	$3.01	$2.89	$3.06
Man work units per man	223	222	243

TABLE 47—*Relation of production index to labor income.*

		Average.							
Production index.	Number of farms.	Production index.	Output index.	Man work units per farm.	Man work units per man.	Number of cows.	Milk per cow (pounds)	Price of milk per cwt.	Labor income.
Less than 71	47	60	57	394	216	13.8	2,828	$2.90	—$469
71 — 90	94	82	82	391	234	15.1	4,167	2.95	36
91 — 110	139	101	102	413	230	15.5	5,326	2.99	396
111 — 130	91	119	122	427	236	16.4	6,459	3.07	919
More than 130	24	145	146	491	233	19.2	7,562	2.98	1,469
Total or average	395	100	100	413	231	15.7	5,150	$2.98	$393

incomes averaging $1,469 per farm. This is striking evidence of the importance of having good production in all enterprises which concern the farm. Size of business changed but little between groups in

this table; work units per man indicate no increase in efficiency; even the price of milk lends no aid, but milk per cow is significant of the change which accounts for a range in average labor incomes from —$469 in the first group to $1,469 in the last group.

Production and Size

Previously, the suggestion was made that yields might be poor enough so that the larger the business, the less the income. In Table 48, such an instance is illustrated. Size is measured by number of cows and production by yield of milk per cow. When production was less than 4,650 pounds, the more cows the farms supported, the worse off were the operators. When there was an average of 8 cows, the average labor income was —$28, but when there was an average of 30 cows, the income was —$275. This loss occurred with increased size of business in spite of the fact that the average price of milk per hundredweight, as well as the work units per man, increased with the number of cows. The better the production per cow, the greater the

Table 48—*Relation of milk production per cow and number of cows per farm to labor income.*

	Number of cows.		
	Less than 11.	11 to 20.	More than 20.
Production less than 4,650 pounds per cow			
Number of farms	49	50	27
Average labor income	—$28	—$153	—$275
Other averages:			
Number of cows	7.3	13.9	30.7
Milk per cow (pounds)	3,429	3,598	3,652
Milk price per cwt.	$2.88	$2.94	$3.12
Man work units per farm	255	390	724
Man work units per man	185	241	296
Output index	58	81	98
Production from 4,650 to 5,650 pounds per cow			
Number of farms	44	49	31
Average labor income	$14	$372	$807
Other averages:			
Number of cows	6.9	15.9	28.8
Milk per cow (pounds)	5,082	5,051	5,145
Milk price per cwt.	$2.98	$2.98	$3.06
Man work units per farm	222	388	703
Man work units per man	170	240	309
Output index	72	105	135
Production over 5,650 pounds per cow			
Number of farms	42	68	35
Average labor income	$617	$768	$1,419
Other averages:			
Number of cows	7.1	14.7	29.4
Milk per cow (pounds)	6,486	6,593	6,754
Milk price per cwt.	$2.93	$2.98	$3.09
Man work units per farm	257	375	710
Man work units per man	185	225	290
Output index	91	117	155

effect on labor income of increasing the size of the herd. Even with the best production, the farmers with herds averaging 7.1 cows per farm obtained an average labor income of only $617. The average output per man as measured by output index (see definitions) was nearly three times as large in the last group of farms having good production and a large number of cows as in the first group with poor production and few cows. The average output per man for the 27 farms having a large number of poor-producing cows was practically the same as that for the 42 farms having a few high-producing cows. Output per man may be augmented either by adding more cows, or by increasing the production per cow. With this group of farms, in 1929, the advantage was decidedly in favor of getting production first and then accumulating plenty of cows.

If size of business is measured by man work units, other things may take the place of cows to some extent in contributing to an increased volume. Therefore, increased incomes might result from a larger business in spite of poor cows. Apparently, this happened in Table 49. The largest farms made the best average incomes in spite of low production of cows, although with high-producing cows the effect on labor income of increasing the size of the business was much more pronounced.

TABLE 49—*Relation of production per cow and man work units per farm to labor income.*

	Man work units per farm.		
	Less than 295.	295 to 494.	More than 494.
Production less than 4,650 pounds per cow			
Number of farms	49	44	33
Average labor income	—$182	—$201	$40
Other averages:			
Man work units per farm	221	378	730
Number of cows	8.2	13.2	27.3
Man work units per man	180	238	298
Milk price per cwt.	$2.84	$2.94	$3.15
Production from 4,650 to 5,650 pounds per cow			
Number of farms	45	45	34
Average labor income	$28	$213	$971
Other averages:			
Man work units per farm	201	384	714
Number of cows	8.0	15.2	27.3
Man work units per man	156	239	324
Milk price per cwt.	$2.94	$2.98	$3.09
Production over 5,650 pounds per cow			
Number of farms	39	64	42
Average labor income	$361	$719	$1,614
Other averages:			
Man work units per farm	214	371	693
Number of cows	7.9	14.2	26.3
Man work units per man	153	230	298
Milk price per cwt.	$2.96	$3.00	$3.00

Marketing Milk*

Closely related to rates of production are the questions of quality and price of the product. Price depends on a market. Quality of product tends to be reflected in price. New England stays in the dairy business in contrast to beef production because of nearby markets for a bulky perishable product in the form of whole milk. The market for milk becomes more exacting in its demands and continually requires a better product. There are worth-while premiums to be obtained for low bacteria counts, especially in summer, and for Grade A producers.

Table 50—*Average net price of milk by months.***

(Tenth zone, 10 year average, April 1920 to March 1929.)

Month.	Net price.	Per cent of yearly average.
April	$2.39	93
May	2.22	86
June	2.13	83
July	2.41	93
August	2.66	103
September	2.76	107
Average for summer period	$2.43	94
October	$2.82	109
November	2.95	114
December	2.88	112
January	2.69	104
February	2.59	100
March	2.48	96
Average for winter period	$2.74	106
Average for 12 months	$2.58	100

The Boston market demands at least 3.35 per cent fat in milk, which is also a quality factor and requires watching. The market pays for extra fat in the milk, but usually at a lower price per pound. Prices are figured from a fat content of 3.7 per cent for a base and dealers may discriminate against producers of low fat milk.

Market prices also tend to be higher during the fall and winter months than in spring and summer (Table 50). Various rating systems may exact appreciable penalties for a distribution of production widely differing from the market requirements.

* These tables and discussions have to do with conditions as they were in 1929 under the "Modified Surplus Plan." They are not applicable to the "Rating Plan" which has recently gone into effect and which is consequently in an experimental stage so far as this region is concerned.

** Prices furnished by the New England Milk Producers' Association, Boston, Mass., W. H. Bronson, Statistician.

Skill in the management of the herd is involved in the problem of seasonal production. Suitable equipment in the barns and elsewhere for handling milk in deference to its high susceptibility to contamination by ever-present bacteria may provide some means to the end of getting a better product. Beyond this, with a given supply, the farmer is largely at the mercy of the market demand.

Prices

That there is considerable variation in prices received for milk in this region is evidenced by figures in Table 51. There were 66 farmers that sold their product at an average price of less than $2.56 per hundredweight, and there were the same number that sold for more than $3.46. Among these farms are represented various methods of selling, including a very few operators who retailed all their milk and several who sold enough products locally, appreciably to affect average prices. That prices are important no one would question. The change in labor incomes from $95 to $868 through the groups in this table is a reflection of their significance. Associated with better prices there was some increase in fat test, an increase in production per cow and better size and efficiency as measured by man work units.

Table 51—*Relation of price received for milk per hundredweight to labor income.*

Milk price per hundredweight.	Number of farms.	Average. Milk price per cwt.	Fat test (per cent)	Number of cows.	Milk per cow (pounds)	Man work units per farm.	Man work units per man.	Labor income.
Less than $2.56	66	$2.37	3.7	14.6	5,135	409	229	$95
$2.56 — $2.85	121	2.70	3.9	14.0	4,913	370	217	128
2.86 — 3.15	83	3.00	4.1	15.1	5,242	401	234	410
3.16 — 3.45	59	3.30	4.1	18.7	5,249	479	244	717
3.46 or more	66	3.80	4.0	17.8	5,392	453	242	868
Total or average	395	$2.98	4.0	15.7	5,150	413	231	$393

Price and Production

The results of sorting by a combination of prices and production are shown in Table 52. While low price and poor production resulted in an average labor income of —$260 for 39 farms and high price and good production in $1,162 for 65 farms, one important consideration is the fact that by increasing production per cow, the farmer can offset some of the disadvantages of poor prices. In spite of poor prices for milk, good production per cow brought an average labor income of $580 to 34 farmers. With about average prices for milk, the middle group of 46 farms through a production no better than 6,426 pounds of milk per cow, got an average labor income of $708, or considerably better than hired men's wages.

Table 52—*Relation of milk production per cow and price per hundredweight of milk sold to labor income.*

	Price per hundredweight.		
	Less than $2.66.	$2.66 to $3.05.	Over $3.05.
Production less than 4,650 pounds per cow			
Number of farms	39	44	43
Average labor income	—$260	—$184	$42
Other averages:			
Milk per cow (pounds)	3,326	3,664	3,619
Milk price per cwt.	$2.48	$2.82	$3.52
Man work units per farm	389	346	489
Man work units per man	228	213	252
Production from 4,650 to 5,650 pounds per cow			
Number of farms	36	40	48
Average labor income	—$141	$265	$799
Other averages:			
Milk per cow (pounds)	5,047	5,065	5,131
Milk price per cwt.	$2.51	$2.83	$3.50
Man work units per farm	381	421	418
Man work units per man	214	233	245
Production over 5,650 pounds per cow			
Number of farms	34	46	65
Average labor income	$580	$708	$1,162
Other averages:			
Milk per cow (pounds)	6,685	6,426	6,680
Milk price per cwt.	$2.38	$2.83	$3.42
Man work units per farm	379	406	456
Man work units per man	227	232	228

Seasonal Production

Something of the results of seasonal production are shown in Tables 53 and 54. With about the same number of cows, 167 farms averaging 31 per cent of the year's production during October, November and December got an average labor income of $534, while 173 farms that averaged less than 18 per cent of total production for the same period of time got an average labor income of $203 (Table 53). Apparently, most of the advantage accrues from getting a better production per cow, but some comes from better prices.

In Table 54 the farms were first sorted by production per cow. The resulting effects of the relation of production in November to that in June are shown for each production group. In spite of higher costs of feed and the extra labor involved, winter production seems to be advantageous. Variations of from 29 to 40 cents in the price of milk per hundredweight accompanied changes in the November-June ratio.

TABLE 53—*Relation of proportion of year's milk produced in October, November and December to labor income.*

(340 farms selling wholesale milk, almost exclusively)

Proportion of years' milk produced during October, November and December.	Number of farms.	Average. Per cent of milk produced October, November, December.	Man work units per farm.	Man work units per man.	Number of cows.	Milk per cow (pounds)	Milk price per cwt.	Labor income.
Less than 26 per cent	173	17.9	414	227	15.7	4,901	$2.84	$203
26 per cent or more	167	31.0	401	230	15.8	5,423	3.05	534
Total or average	340	24.4	407	229	15.7	5,157	$2.94	$366

TABLE 54—*Relation of November-June ratio of milk production to labor income (349 farms).**

Milk production in pounds.	Per cent that milk production in November was of June production. Less than 65.	65-100.	Over 100.
Milk per cow less than 4,550 pounds			
Number of farms	43	22	28
Average labor income	—$195	—$162	$12
Other averages:			
Milk per cow (pounds)	3,430	3,745	3,443
November-June ratio	41	81	151
Milk price per cwt.	$2.83	$2.90	$3.12
Man work units per man	238	257	230
Milk per cow from 4,550 to 5,450 pounds			
Number of farms	35	38	30
Average labor income	—$6	$398	$372
Other averages:			
Milk per cow (pounds)	4,969	4,884	4,937
November-June ratio	43	82	144
Milk price per cwt.	$2.79	$3.00	$3.10
Man work units per man	220	231	247
Milk per cow more than 5,450 pounds			
Number of farms	38	55	60
Average labor income	$621	$896	$911
Other averages:			
Milk per cow (pounds)	6,353	6,485	6,402
November-June ratio	47	86	140
Milk price per cwt.	$2.73	$3.10	$3.13
Man work units per man	214	239	231

* A considerable number of farms omitted because they produced practically no milk either in June or in November.

Methods of Selling

Thirty-three farmers received 10 per cent or more of their gross receipts from milk and milk products in local sales (Table 55). This affected total average prices enough to make the corresponding farms somewhat less comparable in respect to prices. Of this number of operators, a very few retailed milk and several others sold to retailers either a part or all of their output and got better than usual wholesale market prices. One or two sold butter to retail customers, and about as many had a special local market for cream. Several sold milk products to camps or other summer places during the summer.

Table 55—*Relation of methods of selling to labor income and other factors.*

	Number of farms.	Average. Milk per cow (pounds)	Milk price per cwt.	Man work units per farm.	Man work units per man.	Tons of milk per man.	November-June ratio.	Labor income.
Retail and other local selling ...	33*	4,991	$3.25	435	231	21	83	$406
Selling standard market milk wholesale	195	5,038	2.82	415	234	23	84	217
Selling Grade A milk wholesale..	121	5,529	3.16	421	232	26	103	713
Total or average	349**	5,204	$2.98	419	223	24	91	$407

* Includes farms on which the value of retail milk or other local sales represented 10 per cent or more of the total receipts for milk and milk products, thus affecting prices.

** Farms omitted which showed no sales either in June or in November.

This group obtained an average price of $3.25 per hundredweight for milk, had poorer yields per cow and lower production of milk per man than the wholesalers and a lower November-June ratio of seasonal production. Out of this combination of conditions, they received an average labor income of $406.

There were several companies buying "standard market" milk in this territory, some under the modified surplus plan of the New England Milk Producers Association and others under proprietary methods of their own. Out of 349 operators in the table, 195 sold this grade of milk. They received an average price of $2.82 per hundredweight and obtained an average labor income of $217. Seasonal production was practically the same as for the first group, which for purposes of identification may be called the retailers.

The Grade A producers, 121 in number, got an average price of $3.16 per hundredweight. They got 10 per cent better production of milk per cow than the other groups and produced a much larger proportion of milk in the fall. In fact, the November-June ratio is evidence that on the average they had a production 3 per cent greater

for the month of November than for June, while the other groups had 16 or 17 per cent less. The average labor income for the Grade A producers was $713.

Some influences resulting from the production of more milk in the fall and winter are indicated for the different methods of selling in Table 56. The averages for the "retailers" are not very reliable on account of the small numbers of farms included in the groups. Doubtless, variations in methods of selling rather than seasonal production are responsible for some change in prices for these groups.

TABLE 56—*Methods of selling milk and November-June ratio of production (349 farms)*

Method.	November-June ratio of production. Less than 65.	65 to 100.	Over 100.
Selling milk locally			
Number of farms	15	6	12
Average labor income	$84	$582	$722
Other averages:			
November-June ratio	42	83	135
Number of cows	14.7	10.3	20.2
Milk per cow (pounds)	4,873	5,517	4,875
Milk price per cwt.	$3.07	$3.22	$3.50
Man work units per man	206	250	252
Tons of milk per man	17	22	25
Selling standard market milk wholesale			
Number of farms	81	63	51
Average labor income	$98	$283	$324
Other averages:			
November-June ratio	44	81	150
Number of cows	15.8	16.7	15.5
Milk per cow (pounds)	4,760	5,194	5,286
Milk price per cwt.	$2.74	$2.85	$2.90
Man work units per man	231	239	235
Tons of milk per man	21	24	24
Selling Grade A milk wholesale			
Number of farms	20	46	55
Average labor income	$290	$859	$745
Other averages:			
November-June ratio	42	87	140
Number of cows	14.2	18.7	16.0
Milk per cow (pounds)	5,205	5,748	5,464
Milk price per cwt.	$2.76	$3.24	$3.24
Man work units per man	214	240	231
Tons of milk per man	19	30	24

In general, better prices and better labor incomes are associated with more fall milk. More efficiency and better production are contributing causes. The extreme variations in seasonal production among these farms indicate a lack of consistency that must be due to one of

two causes, either a lack of control of the time of freshening or uncertainty as to the best practices in that respect. Of course, milk can be produced much more cheaply on pasture feed, but prices are better in the winter and spring-freshening cows are seldom fed to produce as well as fall-freshening cows. A fall and winter production considerably better than spring and summer could be easily accomplished by breeding cows at the proper time, and probably the increased production incident to more care and better feeding would contribute to larger labor incomes. Very likely, the Grade A producers, who represent a rather selected group of dairymen, in so far as they are able to meet certain rather exacting requirements, are nearest right in seasonal production with a November-June ratio of 103, even though a rigorous rating requirement does not leave the matter entirely to volition. Catherwood found Grade A producers in New York had a November-June ratio of 104 while the farms that sold Grade B milk averaged only 53.[14] He also says: "In general, on the farms with the best milk markets, the cows are bred to freshen in the fall and are fed the most grain and silage. This results in high production per cow."

Labor Efficiency

With relatively high-priced labor and the possibility of substituting machine for hand methods, labor efficiency becomes a very important factor in farm management. He who would make money out of hiring labor must so organize and direct his business that he can make better than average use of labor. The farmer's personal income is largely from his own and his family's labor, and for that reason his interests should tend to be served by high wages rather than low. However, this condition does not prevail with a falling price level because wages drop more slowly than the prices of things which the farmer sells.

The average for all workers on these 395 farms was 231 man work units of productive labor per man. The corresponding figure for 578 farms in Livingston County, New York, in 1928 was 223.[8] While practically the same basis was used for computation in both cases, the small amount of difference in the two results is not significant. The measures previously given in Table 27 are, of course, not sufficiently accurate to justify precise comparisons.

Although a work unit represents the amount of work that an average man accomplishes in 10 hours, there are many reasons why the average accomplishment of a region should fall below a theoretical limit, say, of 300 working days. In computing work units, no allowance is made for repairs and other unproductive work. The difficulty of providing a uniform supply of productive work month by month and week by week is apparent to every person with farm experience.

Milking Machines

Estimates by 326 farmers regarding the time necessary to do the work in caring for their cows a year averaged 162 hours per cow. There were 96 of the number that had milking machines, and their estimates averaged 130 hours per cow. The remaining 230 averaged

175 per cow. Not all of this efficiency can be attributed to milking machines, however, because the farms with milking machines were larger as evidenced by numbers of cows per farm (Table 57). The greatest advantage of the milking machine may be in alleviating fatigue, rather than in saving time.

Table 57—*Relation of milking machine to various factors and to labor income.*

Milking machine.	Number of farms.	Average. Number of cows.	Milk per cow (pounds)	Man hours per cow.	Man work units per man.	Cows per man.
No	230	14.8	5,024	175	222	8.6
Yes	96	22.8	5,469	130	277	10.9

Man Work Units per Man

Out of the 395 farm organizations in this study, 67 operators were able to obtain more than 300 work units per man. This number of work units is a very laudable attainment. A farmer who has developed an organization of his business which provides a distribution of labor good enough to enable each worker to average 300 units of productive work may be sure he is in efficient company. Few farmers do that well.

Varying success in labor efficiency among these farms is to be seen in Table 58. In the first group, 61 operators got an average of 113 work units per man. In other words, the laborers, including the operator, each averaged to accomplish about one-third of a year's work.

Table 58—*Relation of man work units per man to labor income.*

Man work units per man.	Number of farms.	Average. Man work units per man.	Man work units per farm.	Number of cows.	Milk per cow (pounds)	Milk price per cwt.	Labor income.
Less than 146	61	113	196	7.9	4,982	$2.93	—$270
146 — 194	82	172	309	11.5	5,117	3.03	26
195 — 245	96	221	393	15.2	5,295	2.86	307
246 — 294	79	269	466	17.8	5,218	3.07	698
295 — 345	34	315	595	22.0	5,115	2.91	913
346 or more	43	394	725	26.6	5,030	3.08	1,256
Total or average	395	231	413	15.7	5,150	$2.98	$393

Their inefficiency is reflected in an average labor income for the group of —$270. Under conditions existing in the year of the study, over 150 work units per man were required to get a plus labor income, 225 work units to get a labor income equal to the average for the survey, 250 to get hired men's wages, and over 300 to get $1,000. The consistent change from an average labor income of —$270 in the first group of low-efficiency farms to $1,256 for the last group with high

efficiency is indicative of the importance of this factor. There is no more significant criterion by which to judge a man's success as a farmer than to analyze his business organization from the standpoint of labor efficiency. The large-sized business lends itself most easily to plans for using labor economically. With every increase in man work units per man, the table registers an appreciable and consistent prerequisite in the form of more cows and more work units per farm.

Number of Cows Per Man

A simpler method of checking efficiency would be to compare the number of men with the number of cows to learn how many cows were cared for per man. Table 59 bears evidence of the effectiveness of this measure. The 60 farms on which the average number of cows cared for per man was 15.4 got an average labor income of $832. The production of milk per cow was not appreciably more than for those in the second group who average 5.7 cows per man, but the average labor income was increased by more than four-fold. In so far as an average of only 59 per cent of the income on all these farms is from dairy products and a small amount from net sales of cattle, this is not a thorough measure. Some farmers were more efficient because, with few cows, they did other things to effectively bring increased incomes; others had increased the production per cow.

Table 59—*Relation of number of cows per man to labor income.*

Number of cows per man.	Number of farms.	Average. Number of cows per man.	Number of cows per farm.	Milk per cow (pounds)	Price of milk per cwt.	Man work units per farm.	Man work units per man.	Labor income.
Less than 5	62	3.4	5.7	4,766	$2.92	229	140	—$73
5 — 6	59	5.7	10.9	5,198	3.02	349	182	193
7 — 8	84	7.6	13.2	5,260	2.97	394	224	400
9 — 10	70	9.5	16.9	5,234	3.00	418	235	506
11 — 12	60	11.4	20.2	5,195	2.90	483	270	492
13 or more	60	15.4	28.0	5,215	3.08	620	339	832
Total or average	395	8.7	15.7	5,150	$2.98	413	231	$393

Milk Production and Cows Per Man

The results of efficiency as measured by number of cows per man may be shown better by first arranging the farms in groups according to milk production per cow (Table 60). Even more cows per man may not save the situation with poor-producing cows. With medium or good production per cow, the importance of this measure is emphasized. With poor production and poor efficiency, 43 operators lacked $57 on the average of being able to cover all their expenses and interest from the proceeds of the business, but another 43 operators, with good production and good efficiency, obtained average labor incomes of $1,371.

Table 60—*Relation of production of milk per cow and number of cows per man to labor income.*

	Number of cows per man.		
	Less than 7.	7-10.	11 and over.
Production less than 4,650 pounds per cow			
Number of farms	43	47	36
Average labor income	—$57	—$242	—$72
Other averages:			
Milk per cow (pounds)	3,312	3,698	3,619
Cows per man	4.3	8.6	13.2
Man work units per man	170	231	304
Milk price per cwt.	$2.96	$2.95	$2.96
Production from 4,650 to 5,650 pounds per cow			
Number of farms	33	50	41
Average labor income	—$188	$532	$573
Other averages:			
Milk per cow (pounds)	5,024	5,152	5,054
Cows per man	4.4	8.4	13.9
Man work units per man	143	231	306
Milk price per cwt.	$2.97	$2.97	$3.05
Production over 5,650 pounds per cow			
Number of farms	45	57	43
Average labor income	$345	$859	$1,371
Other averages:			
Milk per cow (pounds)	6,533	6,611	6,658
Cows per man	4.8	8.3	12.9
Man work units per man	165	225	303
Milk price per cwt.	$2.98	$3.02	$2.97

Crop Acres Per Man

The relative unimportance of crops in contributing directly to receipts for all the farms surveyed renders crop acres per man rather unsatisfactory as a measure of efficiency. In general, twice as many crops per man in the lower half of Table 61 resulted in a 40 per cent

Table 61—*Relation of crop acres per man to labor income.*

		Average.						
Crop acres per man.	Number of farms.	Crop acres per man.	Man work units per farm.	Man work units per man.	Milk per cow (pounds)	Milk price per cwt.	Number of cows per man.	Labor income.
Less than 20	84	15	353	180	5,094	$3.05	6.1	$326
20 — 25	88	23	374	208	5,226	2.99	7.8	325
26 — 31	84	28	453	230	5,321	2.97	9.0	306
32 — 37	55	34	431	256	5,085	3.01	10.3	558
38 or more	84	48	463	290	4,996	2.89	11.1	512
Total or average	395	29	413	231	5,150	$2.98	8.7	$393

increase in labor incomes as compared to the first part of the table. In a region selling cash crops, this measure of efficiency becomes very effective. With a given crop, say potatoes, the number of acres per man, or a saving in man labor per acre, would be very important on these farms as elsewhere.

Tons of Milk Produced Per Man

This depends on size, production per cow, and efficiency. The number of cows per man may contribute as well as the production of milk per cow. On farms selling milk, it is a rather important measure of results. The average production per man for these farms was 22.7 tons (Table 62). There were 105 farms, not one of which had as much as 15 tons per man; in fact, an average of only 9.4 tons. On these, the averge labor income was —$96. Between 21 and 26 tons of milk per man returned an average labor income of $324 to 67 operators. This is about the minimum amount with which one might expect to qualify as a reasonably good dairyman. Over half of the operators failed to attain this level of efficiency. There were 79 farms on which the operators attained the excellent record of practically 41 tons of milk per man with average labor incomes of $1,118. The prerequisites for success as indicated by the table are plenty of cows, good milk production, and an efficient organization for getting things done—good size, good quality and labor efficiency.

Table 62—*Relation of tons of milk produced per man to labor income.*

		Average.						
Tons of milk per man.	Number of farms.	Tons of milk per man.	Number of cows.	Milk per cow (pounds)	Milk price per cwt.	Man work units per farm.	Man work units per man.	Labor income.
Less than 15	105	9.4	8.1	4,244	$2.96	287	167	—$96
15 — 20	93	18.0	14.0	4,794	2.93	388	220	143
21 — 26	67	23.2	16.4	5,290	2.94	429	237	324
27 — 32	51	29.5	18.5	5,925	3.09	446	249	824
Over 32	79	40.9	25.1	6,154	3.04	577	311	1,118
Total or average	395	22.7	15.7	5,150	$2.98	413	231	$393

Size and Labor Efficiency

Size and labor efficiency as measured by man work units per farm and man work units per man, are shown in their relations to labor income in Table 63. Previous tables have included their combined influence in so far as they are usually associated, but the present table was intended to separate the effects of the two factors.

In the first place, one should note that the limits of the work units per man have been changed for each size group. There were no small farms that were highly efficient in the use of labor. The average of 220 work units per man for the least efficient group of large farms is the same as the average work units per man for the most efficient group of small farms.

TABLE 63—*Relation of man work units per farm and man work units per man to labor income.*

Man work units per farm.	Man work units per man. Less than 135.	135-185.	186 or more.
Less than 286			
Number of farms	48	38	35
Average labor income	—$282	$172	$256
Other averages:			
Man work units per farm	175	212	238
Man work units per man	108	164	220
Milk per cow (pounds)	5,042	4,884	4,614
Milk price per cwt.	$2.89	$2.98	$2.90
Production index	94	93	90
Output index	48	66	85
	Less than 195.	195-254.	255 or more.
286 to 454			
Number of farms	46	51	52
Average labor income	—$165	$242	$608
Other averages:			
Man work units per farm	360	356	360
Man work units per man	164	223	300
Milk per cow (pounds)	5,072	5,502	5,102
Milk price per cwt.	$3.11	$2.85	$2.91
Production index	97	104	98
Output index	69	100	127
	Less than 245.	245-314.	315 or more.
455 or more			
Number of farms	34	47	44
Average labor income	$409	$910	$1,372
Other averages:			
Man work units per farm	584	669	768
Man work units per man	220	278	387
Milk per cow (pounds)	5,585	5,368	5,084
Milk price per cwt.	$2.95	$3.19	$3.12
Production index	106	105	98
Output index	101	126	163

Considering the least efficient third of the farms in each size group, efficiency increased from 108 work units per man in the small-farm group to 220 in the large-farm group. The change in average labor incomes was about $700. The most efficient third in each size group changed from 220 work units per man to 387, and the average labor income difference was $1,116. With efficient labor, a large sized business becomes increasingly important.

Among the small farms, increasing the labor efficiency from 108 to 220 work units per man gave a corresponding change in average labor incomes of $538, but on large farms a corresponding change from 200 to 387 work units per man made a change in average labor incomes of $963. Large farms provide easier conditions for getting efficiency, and the rewards are much greater.

The 48 farms representing the lowest third both in efficiency and size had an average labor income of —$282, while the group of 44 farms in this table having the best efficiency and the best size provided an average labor income of $1,372.

The operators of the least efficient group among the largest third of the farms got an average labor income $153 better than the most efficient group among the smallest third of the farms. Size of business is important.

Output Index

The number of work units per man measures the number of acres or animals cared for without allowance for differences in yields. The output index of a given farm is the per cent that the quantity of products produced per man on that farm is of the average for the region. A production index of 80 on a dairy farm might be partially justified by a labor efficiency percentage of 130. The product, or output index, would be 104. When both production and labor efficiency are low, the output index exaggerates the discrepancy; the product of 80 by 80 is 64.

There were 50 farms with an output index of 50 or less (Table 64). The labor incomes averaged —$499. With an average output index of 99, there were 62 farms that got slightly better labor incomes than the average for the whole group. Fifty-one farms that qualified with an output index above 150 returned labor incomes averaging $1,679. Good production from both crops and animals together with large size and good labor efficiency represent the most important factors of business

Table 64—*Relation of output index to labor income.*

		Average.						
Output index.	Number of farms.	Output index.	Man work units per farm.	Number of cows.	Man work units per man.	Milk per cow (pounds)	Price of milk per cwt.	Labor income.
Less than 51	50	39	220	7.9	122	3,920	$2.92	—$499
51 — 70	62	62	291	11.5	166	4,694	2.94	—252
71 — 90	75	81	340	13.0	211	4,739	2.91	8
91 — 110	62	99	439	16.6	234	5,232	3.00	431
111 — 130	57	121	495	18.4	275	5,667	3.03	789
131 — 150	38	140	518	20.1	296	5,937	3.15	996
More than 150	51	178	658	24.9	343	6,251	3.05	1,679
Total or average	395	100	413	15.7	231	5,150	$2.98	$393

management that can be measured on these farms. A good output index presupposes a good-sized business, since, as previously shown, size of business is the most important factor affecting labor efficiency.

Compared with dairy farms in general, this whole group is better in respect to size, with an average of 15.7 cows per herd, and in labor efficiency, with an average of 231 work units per man, than it is in respect to production with an average of only 5,150 pounds of milk per cow. It is always important in any business organization to adjust a weak factor first. Therefore, an improvement of these herds from the standpoint of milk production per cow should first be sought for this region through better sanitation, better breeding, better feeding, or any other legitimate means to that end. Better cows will often involve a readjustment of size in respect to more cows and sometimes, more acres. There are two reasons why: first, with better cows, a large sized business becomes more important, and second, many of the farms at present are much too small to allow reasonable labor efficiency. In other words, with the individual small farm, size may well be the first and most important adjustment to consider.

Balance of the Farm Business

Labor efficiency usually is much more dependent on size of business and distribution of work through the year, a well balanced business, than upon the managerial capacity of the farmer. Hiring and directing the few men likely to be employed on a farm at any one time is not a serious problem. Because of the seasonal requirements of many farm enterprises, a good labor distribution is difficult to attain. Hay must be cured when the sun shines, and crops can hardly be raised in winter.

Dairying is well adapted to Grafton County conditions because it makes good use of land for pasture that is unsuited for cropping, utilizes hay and other forage easy to grow but having little market value, provides manure for the maintenance of fertility in soils naturally responsive to its use, and is within reasonable distance of a good market for a highly perishable and bulky product like whole milk. Without dairying, there would be little use so far north for the rich alluvial soils of the Connecticut River. Many intensive cash crops are unsuited to the short growing season, and extensive crops are hardly accommodated by the small fields.

Under usual conditions, a dairy farm needs some diversification. It is seldom that the wholesale milk business alone has provided the best organization for farms in any region. In the past, when cows were milked by hand, to care for ten was a man's job, but it only provided about half a year's work as measured by man work units. The milking machine has made it possible for a man to milk more cows, but it has not eliminated all the advantages to be obtained from combining other enterprises with wholesale milk. There are fewer chores in summer, and the days are longer. Therefore, it is usually good management to develop one or two enterprises other than dairying for a part or all of the year to provide additional receipts without a commensurate increase in expenses. The variety of enterprises to choose for this purpose in Grafton County is somewhat restricted.

Receipts from Crops

Receipts from crops were very small, averaging 3.7 per cent for the whole group. There were no sales of crops on 193 farms. An attempt was made in Table 65 to discover any advantage that might result from having the receipts from milk supplemented by some crop sales. The group of 54 farms that averaged 18 per cent of its receipts from crops got an average labor income of $514. This rather favorable result was in spite of poor quality cows and a low average price for milk. There is scant reason to believe that the production of a reasonable proportion of crops is necessarily prejudicial to a favorable milk production per cow. Personal prejudices might be so reflected, but hardly would the average farmer's capacity as a manager be that circumscribed on these small farms. There was little or no increase in man efficiency apparent as a result of more crops, but the size of the farm business was increased. Doubtless, many of the crops were grown in too small areas and with too much hand work to use labor efficiently.

Table 65—*Relation of per cent of receipts from crops to labor income.*

Per cent of receipts from crops.	Number of farms.	Average. Per cent of receipts from crops.	Man work units per farm.	Man work units per man.	Milk per cow (pounds)	Price of milk per cwt.	Labor income.
None	193	0.0	396	234	5,203	$3.01	$428
1 — 4	103	2.2	419	227	5,278	2.92	268
5 — 8	45	6.3	421	228	5,060	3.06	384
9 or more	54	18.0	460	230	4,793	2.92	514
Total or average	395	3.7	413	231	5,150	$2.98	$393

Potatoes

Grafton County farmers have been decreasing their potato acreage for twenty years or longer. The acreage is about one-third of what it was in 1909.* Competition and high-priced labor have made the production of small acreages unprofitable. Without machinery, labor costs are prohibitive, and the expense of providing adequate potato-growing machinery is prohibitive unless it can be spread over many acres. Speculation has added to the discouragement of occasional growers. There is no rule that always works for potato prices, not even the one so seldom heeded, to plant cheap seed.

The climate in Grafton County is well adapted to potatoes; there is plenty of land in areas and physical condition suitable for potato production with up-to-date machine methods. Granting that the crop

* United States Census, acreage in potatoes in Grafton County in 1909, 2,802 acres; in 1929, 1,060 acres.

must be grown in comparatively large acreages and with a minimum of hand labor to be profitable, it should still appeal to more dairy farmers as a means of diversifying a large business.

Cabbage

Cabbage has hardly been tried in this area. It is adapted to a cool climate and plenty of rainfall. Some liming would probably be required on New Hampshire soils. Cabbage fluctuates in price even more than potatoes, but may be easily harvested as a succulent feed in years when it cannot be sold. It is merely suggested here as a possibility because, unlike potatoes, it requires no expensive machinery.

Poultry

The only animal enterprise other than dairy cows that had been found feasible as a commercial undertaking by farmers included in the survey was poultry. Hens have combined reasonably well with cows in other intensive dairy regions of the United States. They are economically sound for New Hampshire in producing a high quality and perishable product to supply a high-class trade in neighboring cities. As handled commercially, chickens are likely to provide more work in summer than in winter. The climate in Grafton County is somewhat rigorous for poultry, but with good buildings and proper care, this enterprise should contribute to better labor incomes. As there were only eight farmers that had an average inventory of 200 hens or more, no tabulations regarding poultry were attempted.

Miscellaneous Receipts

Miscellaneous items of income included work off the farm, maple products, honey, lumber, fair premiums, wool, wood, summer boarders, and similar projects of great variety and of difficult classification. Of all receipts, an average of about 13 per cent came from this source. There were two ways of adding other sources of income to the dairy farms in this region. One was to develop additional enterprises on the farm itself, and the other was to seek work off the farm, and oftentimes in unrelated business. With industry paying relatively high wages and with farming none too profitable, the advantage in income has often been with the person who was successful in finding other things than farming to do. In so far as the farm is kept as insurance against the uncertain continuity of some other occupation, it contributes some value in addition to that of reducing the probable costs of maintaining a family. The variations in these opportunities make any attempt at comparing them futile.

The farmers in this section may well seek some one or two enterprises to fit in with the dairy business, but they should make them subsidiary and not allow competition with quality or quantity in the dairy enterprise itself. This statement is not significant for him who has a good opportunity to do other things than farming and who wishes to use his farm merely as a home. A very small business, even disregarding quality, may well suit his convenience.

One should not make the mistake of assuming that no enterprise can add to the profits of a dairy farm unless it pays equally as well as milk production. The advantage may lie in keeping hired men and horses busy with a small remuneration when otherwise they would be idle and contribute no value at all.

Even without any other enterprises, good production per cow and the efficient use of a milking machine may enable a person to get a reasonably well organized business in the production of wholesale milk alone. Sixty of these farms averaged over 15 cows per man and many did better. With an average of 20 cows for each man, one already has a labor efficiency of 300 work units per man, and with a production of 6,000 pounds of milk per cow the yield per man would be 60 tons of milk.

The beginning of a period of low and decreasing prices should be accepted by the dairy farmer as a challenge to rid his farm of all poor-producing animals by vigorous and thorough culling. Before prices have recovered, he should find it possible to replace poor animals with good ones. Farming like other business should be vigorously overhauled occasionally for possibilities of saving labor, and a depression period is the accepted time to do it. The world moves. The only thing that does not change is change itself and that even may become accelerated.

Miscellaneous Factors

Hill and Valley Farms

In Table 66 the farms were grouped in relation to distance from market and from the better roads and soils of the Connecticut River valley. Using as crude a measure as calipers on the map, there were 93 farms that were within one mile, as the crow flies, of the Connecti-

Table 66—*Hill and valley farms and distances to market.*

Upland farms, buildings more than one mile from Connecticut River.					Valley farms, buildings within one mile of river.				
Miles to milk station.	Number of farms.	Average miles to station.	Total capital.	Labor income.	Miles to milk station.	Number of farms.	Average miles to station.	Total capital.	Labor income.
Less than 1.5	44	0.5	$11,100	$452	Less than 1.5	19	0.6	$16,268	$614
1.5 — 2.4	78	2.0	11,901	448	1.5 — 2.4	33	2.0	15,394	468
2.5 — 5.4	95	4.0	9,633	336	2.5 and more	41	5.2	12,680	498
5.5 or more	85	10.3	8,938	247					
Total or average	302	4.7	$10,237	$357	Total or average	93	3.1	$14,376	$511

cut River. There were 302 outside this distance. The total capital invested in the smaller group averaged $14,376 per farm, while the other farms had an average of only $10,237. That the increase in incomes

for the valley farms over those of the upland was considerably more than sufficient to pay interest on the difference in investments is evidenced by average labor incomes of $511 and $357, respectively. There is a suggestion here of why some boys leave home. They happened to be born on a hill farm. Under present conditions the farm is hardly commensurate with their abilities; it might better be used for pasture or woodland contributing to a larger business with headquarters on good alluvial soil in the valley.

Increasing distance from market also reduced both capital and labor income. It is more evident with the hill farms, not primarily due to the hills, but because of poor roads. The average distance to market for milk from the hill farms was 4.7 and from the valley farms 3.1 miles. There were 85 of the hill farms from which milk had to go an average distance of 10.3 miles to be delivered at the station.

With a bulky perishable product like milk that must be delivered every day, distance to market is a very important factor. The advantages to dairy farmers of easily accessible markets are seldom entirely capitalized in the values of nearby land.

Values of Crop Land

In most regions there are different grades of land selling at corresponding prices. A decision must be made between having the best at a high price or putting up with poor land because it is cheap. In general, the best land for farming purposes is the most economical to buy, but this does not necessarily mean the highest priced land. Farm buildings very near villages and cities often have a certain residential value, or some of the land reflects the price of potential house-lots. Outside any appreciable influence of this nature, equally good land for farming purposes sells considerably cheaper. If hard roads prevail, the slight additional distance to trading centers may be negligible in the farm economy.

TABLE 67—*Relation of value of crop land per acre to labor income.*

Value of crop land per acre.	Number of farms.	Average. Value of crop land per acre.	Crop index.	Man work units per farm.	Man work units per man.	Crop acres per man.	Milk per cow (pounds)	Milk price per cwt.	Labor income.
Less than $15	32	$10	90	372	211	27	4,728	$2.82	$344
$15 — $25	164	20	95	395	230	32	5,065	2.93	357
26 — 35	64	30	97	397	225	30	5,167	2.90	298
36 — 45	52	40	106	464	227	25	5,181	3.01	568
46 — 55	34	50	108	421	241	27	5,359	3.11	580
56 or more	49	84	112	464	251	27	5,404	3.23	357
Total or average	395	$34	100	413	231	29	5,150	$2.98	$393

Forty-nine farms in Table 67 had crop land with an average value of $84 per acre. In spite of larger businesses on the average, better milk production per cow and better prices for milk, this group did not obtain such good average labor incomes as groups having somewhat cheaper land. Although better average crop yields were also obtained, there is a suggestion that the majority of these farms had land that was considerably over-valued for farming purposes and for some of the reasons suggested.

On the other hand, the next higher grades of land as sorted in the table appear to contribute to better businesses and better incomes than the poorer grades. Crop land values averaging $40 or $50 an acre are associated with labor incomes averaging nearly $600 while less valuable land provides scarcely half as much in labor incomes. Not all the advantage is due to better crop land because the farms increased in average size, in production per cow and in price of milk as well as in crop yields.

If hay be grown on $100 land for $25 an acre, the cost of the land, including interest, taxes, etc., might represent from one-fourth to one-third of the total cost. But with intensive crops like potatoes where the total cost per acre is high, say $150, it becomes increasingly important to have the land suitable regardless of price. If the difference in annual cost between $100 and $200 land were $8, this might be offset by an increased potato yield of 10 bushels or less.

Expenses for Labor and Feed

These represented 54.7 per cent of all the expenses (Table 31). Labor, including unpaid, represented 24.1 per cent. To spend wisely is quite as important as to earn, except for the question of priority. One cannot spend that which he has not accumulated or over which he has no command.

Having a given amount of work to be done, one might hire it all done, or hire some help to get it done, or by longer hours and more efficient methods do it all himself. It is obvious that the proceeds of the last method would all accrue to the operator, while the other methods would distribute a part or all of the proceeds to others.

On some of these farms the proportion of expenses that went for labor in getting a given amount of work done was much different than on others (Table 68). As would be expected, the farms in each size group on which a large proportion of expenses went for labor provided a small average labor income for their operators. With small farms having a large proportion of expenses in labor, the average labor income was —$395. Operators of large farms with a small proportion of expenses in labor obtained average labor incomes of $1,245. In all cases a larger proportion of expenses for labor meant less labor income. The trouble was not in paying higher wages—probably the wages paid were actually lower—but in getting less done per man. Large expenses in any size group always involved much less done per man than in the other groups.

A station provided with equipment for handling Grade A milk.

TABLE 68—*Relation of per cent of expenses in all labor except operator's to labor income.*

Man work units per farm.	Per cent of expenses in labor. Small.	Medium.	Large.
Less than 275			
Number of farms	65	22	34
Average labor income	$200	$106	—$395
Other averages:			
Per cent for labor	7	20	41
Man work units per farm	195	211	219
Man work units per man	176	158	123
Milk per cow (pounds)	5,120	4,632	4,835
275 to 454			
Number of farms	61	31	57
Average labor income	$554	$471	—$211
Other averages:			
Per cent for labor	8	19	37
Man work units per farm	346	358	372
Man work units per man	283	221	183
Milk per cow (pounds)	5,334	5,677	4,873
455 or more			
Number of farms	24	50	51
Average labor income	$1,245	$1,144	$586
Other averages:			
Per cent for labor	11	19	35
Man work units per farm	614	683	710
Man work units per man	360	310	263
Milk per cow (pounds)	5,217	5,542	5,169

Quite in contrast, apparently, to the results in Table 68 are those of Table 69. The larger the average proportion of expenses paid for feed, the better the average labor incomes. Advantage results from efficiency, because with a larger proportion of expenses for grain there is a tendency to a smaller percentage spent for labor. As a result, a considerable change in man work units per man may be noted. The direct advantage is that of increased production of milk per cow consequent to better feeding.

Table 69—*Relation of per cent of expenses in purchased feed to labor income.*

Man work units per farm.	Per cent of expenses in feed. Small.	Medium.	Large.
Less than 275			
Number of farms	50	45	26
Average labor income	—$226	$69	$390
Other averages:			
Per cent for feed	17	32	49
Man work units per farm	201	206	209
Man work units per man	140	164	181
Milk per cow (pounds)	4,568	4,996	5,227
275 to 454			
Number of farms	57	56	36
Average labor income	—$272	$453	$736
Other averages:			
Per cent for feed	18	32	48
Man work units per farm	370	352	351
Man work units per man	198	245	264
Milk per cow (pounds)	4,525	5,436	6,025
455 or more			
Number of farms	38	60	27
Average labor income	$564	$852	$1,646
Other averages:			
Per cent for feed	17	31	48
Man work units per farm	713	658	686
Man work units per man	286	292	339
Milk per cow (pounds)	4,821	5,402	5,874

Education

There is some significance to the fact that the 92 operators in Table 70 who had had some training beyond the local district school got average labor incomes two and one-half times as high as the group with less education. Without exception, they excelled in the average of every factor tabulated whether it related to production, efficiency, or prices.

In Livingston County, New York, in 1928, the common school group made labor incomes averaging $137; the high school group, $803; and the agricultural school group, $1,218.[8]

TABLE 70—*Relation of education to labor income.*

School.*	Number of farms.	Average. Man work units per farm.	Man work units per man.	Production index.	Output index.
Local district school only	146	387	214	95	89
More than district school	92	490	256	103	114

	Other averages. Value of buildings. House.	Barn.	Milk cost per cwt.	Hours labor per cow.	Tons milk per man.	Labor income.
Local district school only	$1,675	$1,399	$2.67	132	21	$187
More than district school	$2,361	$1,997	$2.50	124	26	$452

* This information was obtained definitely for only 238 operators.

More than district school means that the person had had some experience in high school, some business school training, or a term or two in two-year college work, etc. It does not mean completing any definite length of time or any course of study.

Summary of Business Analyses

Size, Efficiency, Production and the Price of Milk

These are all important factors influencing the profits of the farm business. In Table 71 all farms were grouped on the basis of the numbers of these factors that were average or better. There were 52 farms on which not one of these factors was equal to the average of the region. The average labor income for the group was —$406. There was only one farm out of this number which got a labor income as high as $500.

TABLE 71—*Effect on labor income of keeping certain selected factors up to the average for the whole group.*

Number of factors as good as average.*	Number of farms.	Average. Man work units per farm.	Man work units per man.	Milk per cow (pounds)	Price of milk per cwt.	Labor income.	Average. Per cent of labor incomes as much as $500.	$1,000.
0	52	243	162	3,890	$2.63	—$406	2	0
1	110	291	180	4,832	2.86	—18	11	4
2	112	395	235	5,345	3.00	277	39	14
3	84	582	303	5,533	3.14	985	66	43
4	37	690	301	6,405	3.40	1,755	84	79
Total or average	395	413	231	5,150	$2.98	$393	38	23

* The factors used were as follows: (1) man work units, per farm, measuring size; (2) man work units per man, measuring efficiency; (3) pounds of milk per cow measuring production; and (4) price per hundredweight of milk, measuring the market price. The averages for these are shown in the last line of table.

There were 110 farms that had only one factor up to requirements and their average labor income was about $400 better than the previous group, but still minus. About one in ten of this group got a labor income as high as $500.

The group of 112 farms that had two factors as good as average provided labor incomes averaging $277, and the group with three factors average or better returned their operators an average labor income of $985. The group in which every farm was as good as average in size, efficiency, production, and price received for milk, comprised only 37, but the average labor income for the group was $1,755. Seventy-nine per cent of the number got labor incomes of $1,000 or more.

It is usually more important in the farm organization to improve a factor that is very low than to attempt perfection with one that is already above average. The striking results from sorting farms with respect to factors that are average or better are due to the elimination of extremely weak spots in the organization and to a general summing up of the several important factors that contribute to better incomes. It is unfortunate when a farmer, who has gained some success in developing a high-producing herd, gets so enthusiastic over the results that he loses sight of similar advantages to be obtained from improvement in other factors like size or efficiency. Compared to improvement in a weak factor, perfection is hard to approach in any line; the results will be less striking, and the costs will be exaggerated. One of the advantages to be derived from an analysis of normal conditions within a region is to provide averages by which one may measure his failures and successes.

Table 72 indicates the results from a similar grouping of the farms, but with three of the factors raised to 110 per cent of average. In this case only 18 farms qualified with man work units per farm 454 or more, man work units per man 254 or more, milk production per cow 5,665 or more, and price of milk sold not less than the average of all, or $2.98. The average labor income for the group was $2,223, and 61 per cent of the operators received labor incomes of $2,000 or more.

No one need doubt that additional advantages will accrue from setting higher standards of attainment. In fact, the adjustment and improvement of all the factors in a farm business, ever cognizant of their dependence on climate and prices, is a job worthy of the best brain and brawn.

COSTS AND RETURNS OF MILK PRODUCTION

Methods of Calculation

Barn feed and bedding including concentrates, hay and other dry forage, silage and other succulence, and straw and sawdust were evaluated by the farmer. The prices used were the values on the farm for home-grown crops (local selling prices less the cost of marketing) and the cash paid for purchased materials. The feed and bedding were distributed to the animals using them in accordance with each farmer's judgment.

TABLE 72—*Effect on labor income of keeping certain selected factors 10 per cent above average and having the price of milk as good as average.*

Number of factors up to requirement.*	Number of farms.	Average: Man work units per farm.	Average: Man work units per man.	Average: Milk per cow (pounds)	Average: Milk price per cwt.	Average: Labor income.	Average: Per cent of labor incomes as much as $500.	$1000.	$1500.	$2000
None as good as average	52	244	162	3,890	$2.63	—$406	2	0	0	0
Average but Not so good as 110 per cent	33	292	190	4,579	2.66	—187	3	3	0	0
1	124	319	197	5,048	2.93	147	26	9	5	2
2	93	436	245	5,578	3.05	428	52	24	6	2
3	75	634	311	5,552	3.26	1,127	69	56	33	21
4	18	740	327	6,650	3.41	2,223	94	89	78	61
Total and average of all farms	395	413	231	5,150	$2.98	$393	38	23	13	8
Factors 110 per cent average		454	254	5,665						

* The factors used were as follows: (1) man work units per farm, 10 per cent better than average; (2) man work units per man, 10 per cent better than average; (3) pounds of milk per cow, 10 per cent better than average; (4) price per hundredweight of milk, average only. The average of all farms, and the factors increased by 10 per cent are shown in the last two lines of table.

Pasture. Details in the costs of pasture such as fencing, interest, and taxes were not enumerated. Pasture values were charged on each farm to cows, young stock, sheep, and any other animals pastured as the farmer directed. The basis for his judgment, presumably, was his experience in hiring or renting similar pasture. The results are shown in Table 73.

TABLE 73—*Pasture costs on 414 farms*

Kind of pasture.	All farms.: Total animal units pastured.	All farms.: Total value.	Average value per animal unit pastured.	Per cent of total pasturing value.
Farm pasture	7771.3	$37,994	$4.89	72
Farm mowing fields*...	4192.7	10,198	2.43	19
Hired pasture	935.9	4,682	5.00	9
		$52,874		100

* Mowing fields pastured: average acres per farm 28.4; average animal units pastured per farm 10.1; average days used 21.1.

Man and horse labor. The hours of man and horse labor expended on chores, leading cows, delivering milk and all similar work in connection with the dairy herd were separated, with each operator's assistance, from the time spent on young cattle and other farm enterprises.

The rate used per hour for hired labor was the actual cost plus the estimated cash cost of board. The values used for unpaid labor and for the operator, including the cash value of privileges, were those estimated by the operator in terms of what it would cost to hire comparable labor. The work of women and children was expressed as an equivalent of man labor. The range of estimates of the value of the operator's time is shown in Table 74. The estimated value of privileges is that comparable with unmarried hired men with whom these operators had had experience. In other regions, the privileges are usually those of a married hired man often provided with a separate house and other additional conveniences and farm products.

Table 74—*Variations in estimates of the value of their time for twelve months by 413 farm operators.**

Range of wages.**	Number of farmers.	Per cent of total.	Average for group.
Under $500	3	0.7	$360
$500 — $699	22	5.3	614
700 — 899	16	3.9	772
900 — 1099	140	34.0	965
1100 — 1299	126	30.5	1,207
1300 — 1499	45	10.9	1,435
1500 — 1699	29	7.0	1,580
1700 — 1899	23	5.6	1,806
1900 — 2099	1	0.2	2,060
2100 or more	8	1.9	2,433
Total or average	413	100.0	$1,179

* Because of illness, the value of one operator's time was not included.

** These estimates include privileges comparable to those of unmarried hired men. The average estimated privileges for the whole group were $388, or $1.06 per day, per person.

Bull service costs were based on the estimated costs of feed, bedding, labor and pasture for the bull as given by the farmer. Interest and taxes were computed in the office. Any hired service was also included and any net depreciation on bulls after considering the operator's sales and purchases. Any appreciation of animals and credits for manure and services sold were deducted to get the net cost of bull service for the year. This net cost was divided between cows and heifers according to the respective number of animals of breeding age.

Use of buildings. All buildings used for cows and bulls were charged at a flat rate of 11 per cent on average values to cover interest, taxes, repairs, depreciation and insurance. The proportion of the building to be allotted to cattle was obtained from the farmer. The percentage of this amount to be charged to cows, heifers and bulls was made in the proportion that each represented of total cattle units* on the farm.

* A cattle unit is the same as an animal unit which includes only cattle.

Milking machines were charged directly to cows. The expenses for maintenance and the inventories of milking machines were obtained from the farmers. The present value subtracted from the original cost was divided by the number of years in service to get depreciation for one year.

Use of other equipment was based on its average value and was computed at 19 per cent for all costs. This corresponds to the costs for all farm machinery on these farms. The average inventory value of this equipment for 414 farms was only $60.

Interest on cows and bulls as well as on a small amount of supplies was charged at 6 per cent. These are the only places in this study where any rate except 5 per cent has been used.

Taxes on livestock were very difficult for the farmer to separate. A blanket tax rate for all cows was computed in the office as follows: The tax rate in each town was multiplied by the corresponding number of farm records obtained in that town to get a weighted average tax rate of 3.09 per cent. This was adjusted to a difference in valuation of cows on April 1, 1929, as listed by the tax assessors and as enumerated in this survey to a corresponding figure of 2.05 per cent for use here. This rate was applied to cows and bulls, with the exception of purebred registered sires which are exempt from taxes under Section 17 of Chapter 60 of the Public Laws of New Hampshire.

Miscellaneous costs included medicine, fly spray, solution for the milker, association fees or dues, registration fees and other similar items. They were apportioned by the farmer to the cost of milk or otherwise at the time of giving his record.

Ice. The costs of cutting, hiring teams or special labor for getting ice for farm purposes, in contrast to household use, were charged directly to cows. The time of regular farm labor and teams was included in the labor on cows.

Electricity charges for farm purposes were separated by the operator from those for household uses. They were apportioned in the office to cows as seemed most equitable, taking into consideration the presence of any special electrical equipment like milking machines and refrigerators.

Milk used on the farm included that fed to calves or other stock and some waste, as well as all milk and milk equivalents of other dairy products used by the operators' and landlords' families. The operators' estimates were used for the value of this milk.

Calves were credited to cows at value at birth as estimated by the operators. Calves to be kept for bulls, for cows, or for veals were kept separately as indicated in Table 75. This table also shows other details concerning the cow enterprise for 414 farms.

Manure. The amount and value of manure produced per farm was estimated by each operator. These figures have been previously given in Table 17. Manure was credited on all farms at the average value of $1.89 per ton.

Table 75—*The cow enterprise (414 farms).*

	Farms reporting.	Number of animals.	Value.	Average value per unit.	Average per farm.	
					Number.	Value.
Cows on hand April 1, 1929	414	6,127	$684,283	$111.68	14.8	$1,652.86
Cows purchased during year	150	914	114,790	125.59	2.2	277.27
Heifers that became cows	213	843	81.659	96.87	2.0	197.24
Total			$880,732			$2,127.37
Cows sold	244	1,372	$142.901	$104.16	3.3	$345.17
Cows died or killed by accident	45	64			0.2	
Cows dressed for food	34	97	7,653	78.90	0.2	18.49
All hides sold, including calves'	7	22	46	2.09	0.05	0.11
Calves at birth:						
Bulls	68	105	1,541	14.68	0.3	3.72
Heifers	364	1,883	13,800	7.33	4.5	33.33
Veals	372	3,803	14,499	3.81	9.2	35.02
Cows on hand April 1, 1930	414	6,351	$706,400	$111.23	15.3	$1,706.28
Total			$886,840			$2,142.12
Gain			$6,108			$14.75

Costs and Returns of Milk Production

Costs

The total average gross cost of keeping a cow on 326 farms having not less than 6 cows each was $160.75, as shown in Table 76. Of this total, 23.9 per cent was for grain feed, which may be added to dry forage, 15.8 per cent, and succulence, 5.8 per cent, to make up a total barn feed cost that was 45.5 per cent of all costs. Pasture represented 4.1 per cent. Direct human labor constituted 24.3 per cent with 3 per cent more for hauling milk. This labor and feed together represented a total of 76.9 per cent of all costs.

The average amount of feed per cow was 1,595.5 pounds of grain, 4,449 pounds of dry forage, and 3,408.8 pounds of succulence. Direct human labor averaged 140.4 hours per cow with 17.3 more hours per cow for hauling milk, exclusive of the hauling hired.

Returns

When all returns except milk were deducted from total costs, the net average cow cost of producing milk was reduced to $140.44 per cow, as indicated in Table 77. The corresponding cost per 100 pounds of milk was $2.69. The returns for milk sold plus the value of that used on the farms amounted to $3.02 per 100 pounds of milk, which represents a net gain of 33 cents per 100 pounds. Thirty cents of this is represented in a credit for manure. If one does not have good use for so much manure on cash crops, or in the intensive production of hay, it becomes a doubtful asset at so high a value.

TABLE 76—*Milk production. Summary of costs for 5,566 cows.* (326 farms with 6 cows or more)*

Cost items.	Per farm.			Per cow.		Per 100 pounds of milk.	
	Amount.	Value.	Per cent.	Amount.	Value.	Amount.	Value.
Concentrates, lbs.	27,241	$657	23.9	1,595.5	$38.47	30.6	$0.74
Dry forage, lbs.	75,957	435	15.8	4,449.0	25.45	85.3	0.49
Succulence, lbs.	58,198	160	5.8	3,408.8	9.35	65.3	0.18
Pasture (including fields pastured)		112	4.1		6.58		0.13
Bedding		21	0.8		1.22		0.02
Man labor, hours	2,397	667	24.3	140.4	39.04	2.7	0.75
Horse labor, hours	52	10	0.4	3.0	0.61	0.1	0.01
Bull service		32	1.2		1.90		0.04
Housing costs		101	3.7		5.90		0.11
Milking machine		35	1.3		2.06		0.04
Other equipment costs		12	0.4		0.72		0.01
Interest on cows at 6%		117	4.3		6.85		0.13
Milk hauling, cash		46	1.7		2.67		0.05
Man labor, hours	296	82	3.0	17.3	4.82	0.33	0.09
Horse labor, hours	151	30	1.1	8.8	1.78	0.17	0.03
Motors, truck—miles	794	48	1.7	46.5	2.79	0.9	0.05
Automobile—miles	309	18	0.7	18.1	1.05	0.35	0.02
Taxes		40	1.4		2.33		0.05
Miscellaneous		25	0.9		1.49		0.03
Ice		18	0.6		1.04		0.02
Electricity		7	0.3		0.42		0.01
Net decrease in inventory		72	2.6		4.21		0.08
Total costs		$2745	100.0		$160.75		$3.08

* Some farms were omitted which had six cows or more but lacked one or more items of detail necessary in figuring costs of milk production.

In contrast to the excellent net gain of 33 cents per 100 pounds of milk when figured on the basis of costs and returns per cow, and quite as important from the individual farmer's standpoint, are the costs and returns per farm for producing milk. The corresponding average cost for producing 100 pounds of milk per farm was $3.05, and the returns for all milk sold and used were $3.00, a loss of 5 cents per hundredweight.

If one operator produces 200,000 pounds of milk from 30 cows at a cost of $2.50 per hundredweight, and another obtains only 20,000 pounds from 6 cows at a cost of $3.50, the average cost per farm is $3.00, but the average cost per hundredweight is $2.59. Therefore, the figures in Table 77 indicate that operators of large businesses were able to produce milk considerably cheaper than small producers and that they got a little better price for milk.

Significance of Cost Figures

The most important use of cost of milk production figures for dairymen lies in the opportunity afforded to analyze methods of production

Table 77—*Milk production. Summary of returns and profits for 5,566 cows.*

(326 farms with 6 cows or more)

Returns.	Per farm.			Per cow.		Per 100 pounds of milk.	
	Amount.	Value.	Percent.	Amount.	Value.	Amount.	Value.
Milk							
Sold	82,156	$2,515	82.7	4,812.0	$147.32	92.2	$2.82
Used on farm	6,909	178	5.9	404.7	10.43	7.8	0.20
Calves born during year	16	82	2.7	0.93	4.80	0.02	0.09
Manure recovered	140	265	8.7	8.19	15.50	0.16	0.30
Miscellaneous		0*			0.01		.00**
Total returns		$3,040	100.0		$178.06		$3.41
Gain		$295			$17.31		$0.33
Total credits except milk		347			20.31		0.39
Net cow cost for all milk produced		2,398			140.44		2.69
Milk cost per farm (simple average)							$3.05
Milk price per farm (simple average)							$3.00

* Less than $0.50.
** Less than $0.005.

on individual farms for the purpose of determining ways and means of reducing expenses or increasing returns. As indicating actual losses or gains, they are much less valuable. If the cost of producing milk on a given farm were $3.00 a hundredweight, and if the milk sold at the same price, the enterprise would have paid for labor, including the estimated value of the operator's time and other unpaid family labor, as well as for all other expenses incident to its production. The direct cash costs in Table 76 may include most of the grain, possibly the bedding, cash milk hauling, taxes, electricity and a part of the labor; but there are many items like hay, silage, pasture, housing costs, interest on cows, and labor furnished by the operator which do not represent cash outlay. If the operator estimated his time worth $100 a month, that part of it expended in milk production has been paid for at that rate. Likewise the hay, silage corn and pasture furnished by the farm have been paid for at an estimated price.

If a farmer's cost of production were $3.00 per hundredweight and the milk had to be sold for $2.95, the 5-cent loss would be less significant than the question of what he should do in place of producing milk. With milk, he paid nearly all costs including the estimated value of his own time and that of other members of his family who may have assisted. With other enterprises, he would probably have lost more. Furthermore, cost of production figures should stimulate him to improve his methods in the milk business and thus to eliminate even the 5-cent loss.

Cost of Milk Production and Labor Income

The cost of milk production varied widely from farm to farm and had an important bearing on labor income (Table 78). On thirty-nine farms the milk was produced at an average cost of $1.74 per hundredweight. There were nearly twice as many farms on which the average cost was $4.72, and there were all gradations in between. The first group, producing milk at the lowest cost, had an average labor income of $1,299 in spite of a rather low selling price of $2.85 per 100 pounds of milk. The last group of 72 farms with the highest average cost of production provided an average labor income of only —$177, although the price of $3.01 for milk sold was about average. The most obvious prerequisite for low cost indicated in the table is milk production per cow, which averaged 6,423 pounds in the first group and only 3,856 in the last one. Another contributing cause is more cows per farm. Decreasing efficiency accompanied increased costs as indicated by additional man hours per cow.

TABLE 78—*Relation of cost of milk to labor income and other factors.*

Milk cost per hundredweight.	Number of farms.	Average.								
		Grain per cow (pounds).	Dry forage per cow (pounds).	Succulence per cow (pounds).	Man hours per cow.	Cows per farm.	Milk per cow (pounds).	Milk cost per cwt.	Milk price per cwt.	Labor income.
Less than $2	39	1,438	5,056	2,708	128	20.3	6,423	$1.74	$2.85	$1,299
$2.00—$2.39	58	1,616	5,155	3,329	144	19.7	5,955	2.20	3.02	799
2.40— 2.79	67	1,651	5,030	3,445	146	19.0	5,482	2.61	3.00	601
2.80— 3.19	54	1,420	5,343	2,672	168	17.4	5,054	3.00	3.03	458
3.20 — 3.59	36	1,564	4,361	2,314	170	15.4	4,633	3.39	3.05	—150
3.60 or more	72	1,429	5,431	2,629	199	11.8	3,856	4.72	3.01	—177
Total or average	326	1,522	5,232	2,903	162	17.0	5,155	$3.05	$3.00	$441

Factors Influencing Cost of Milk Production

Number of Cows

Number of cows should affect total milk produced and account for some of the difference between a weighted average cost per hundredweight of milk and a simple average cost per farm. In Table 79, the first group of farms had an average of 9.4 cows and the last group, 36.1. The average cost of producing milk on the farms with fewer cows was about 50 cents above average and on the larger farms about 50 cents below average,—a difference of nearly $1.00 per hundredweight. There was also a difference in selling price of 25 cents per hundredweight, favorable to the larger farms. Much of the saving in cost comes from the better use of labor. An average of less than half as many hours of human effort was required to take care of a cow in the last group as in the first. Man hours per cow were only 102 in one case but 209 in the other. Average labor incomes reflected all these differences by changing from $240 to $867.

Table 79—*Relation of number of cows per farm, to cost of milk and labor income.*

Cows per farm.	Number of farms.	Average. Cows per farm.	Milk per cow (pounds)	Milk per man (tons)	Man hours per cow.	Output index.	Milk price per cwt.	Milk cost per cwt.	Labor income.
Less than 13	128	9.4	4,859	17	209	80	$2.91	$3.49	$240
13 — 20	111	16.2	5,378	26	149	108	3.01	2.94	438
21 — 28	51	24.5	5,435	30	112	124	3.06	2.57	652
29 or more	36	36.1	5,119	37	102	139	3.16	2.54	867
Total or average	326	17.0	5,155	24	162	103	$3.00	$3.05	$441

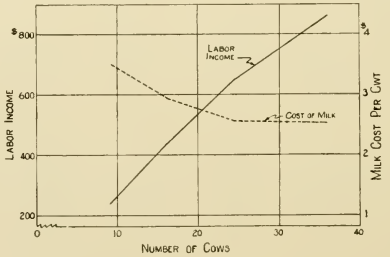

Figure 6. Relation of number of cows per farm to cost of milk and labor income.

Milk Production per Cow

This also contributed to an increased volume of milk. That it had a striking effect on cost of milk production is shown in Table 80. With an average production per cow of 2,809 pounds, the average cost of milk per hundredweight was $4.72; but with an average production of 7,238, milk was produced on 56 farms at an average cost of only $2.23. With milk relatively high-priced and grain comparatively low in price, production per cow probably had the most important influence on cost of milk production. By increasing production, the operator gets much more milk per man with little additional expenditure of time and little, if any, extra cost for labor.

TABLE 80—*Relation of milk production per cow to cost of milk and labor income.*

Milk production per cow.	Number of farms.	Average. Number of cows.	Milk per cow (pounds)	Milk per man (tons)	Man hours per cow.	Milk Price per cwt.	Milk cost per cwt.	Labor income.
Less than 3,451	44	14.9	2,809	11.9	165	$2.92	$4.72	—$450
3451 — 4450	52	18.1	3,992	19.5	160	3.00	3.41	44
4451 — 5450	88	16.9	4,920	24.2	153	2.97	2.92	291
5451 — 6450	86	16.3	5,942	26.1	171	3.05	2.64	689
6,451 or more	56	19.0	7,238	34.9	159	3.03	2.23	1,364
Total or average	326	17.0	5,155	24.1	162	$3.00	$3.05	$441

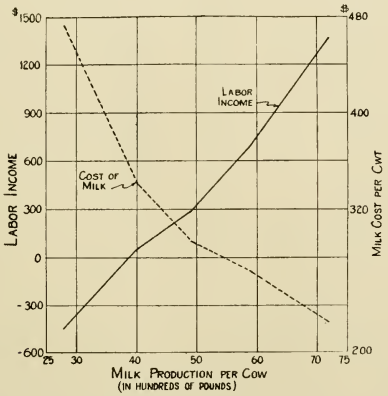

FIGURE 7. Relation of production per cow to cost of milk and labor income.

Production per Cow and Number of Cows

The average cost of milk production with a small number of poor-producing cows was $4.52 per hundredweight; with a large number of good-producing cows, it was only $2.15, or less than half as much (Table 81). Large herds and poor production resulted in an average cost of $2.95 per hundredweight, while small herds and good production resulted better, with an average cost of $2.64. With every change in this table to a group of more cows per farm or to a group of better production per cow, the average cost of milk production decreased. That these two factors have a dominant influence on costs in the milk enterprise can hardly be over-emphasized. For each hour of labor per cow in the first group, of 43 farms, a man averaged 15.7 pounds of milk in return; the corresponding response in the last group of 29 farms was 59.5 pounds of milk, or nearly four times as much.

Average differences in prices received for the milk of 36 cents a hundredweight in the two extreme groups contributed a further advantage. Because of variations in season of production and other differences, the larger volumes of milk per farm tend to command better prices.

Table 81—*Relation of production per cow and number of cows to cost of milk production and labor income.*

Milk production in pounds.	Number of cows per farm. Less than 13.	13-20.	Over 20.
Milk per cow less than 4,451 pounds			
Number of farms	43	24	24
Average milk cost per cwt.	$4.52	$4.31	$2.95
Other averages:			
Milk price per cwt.	$2.78	$3.09	$3.11
Number of cows	9.6	15.2	31.1
Milk per cow (pounds)	3,249	3,512	3,550
Per cent having milking machines	5	21	54
Hours per cow	207	150	99
Average labor income	—$147	—$240	—$163
Milk per cow from 4,451 to 5,450 pounds			
Number of farms	55	50	34
Average milk cost per cwt.	$3.14	$2.81	$2.62
Other averages:			
Milk price per cwt.	$2.95	$3.03	$3.06
Number of cows	9.3	16.6	28.1
Milk per cow (pounds)	5,138	5,166	5,176
Per cent having milking machines	7	38	47
Hours per cow	199	152	107
Average labor income	$256	$399	$583
Milk per cow more than 5,450 pounds			
Number of farms	30	37	29
Average milk cost per cwt.	$2.64	$2.21	$2.15
Other averages:			
Milk price per cwt.	$3.03	$2.94	$3.14
Number of cows	9.5	16.3	29.3
Milk per cow (pounds)	6,657	6,876	6,907
Per cent having milking machines	13	35	66
Hours per cow	231	145	116
Average labor income	$767	$930	$1,673

Hours of Man Labor per Cow

These are based on estimates by each operator as to the average time he spent doing chores, hauling milk, and performing other labor involved in the care of his cows. A compilation of these amounts resulted in an average figure of 161.6 hours per cow per farm. In Table 76 the total man labor averaged 157.7 hours per cow—a somewhat smaller number because on the larger farms less time was required per cow than on the smaller ones. That this figure exceeds the average of 150 as allotted by man work units (Table 27) for grade cows may be accounted for by the presence of some purebred cattle on these farms and the fact that several operators retailed a part or all of their milk.

The variations in the hours of man labor per cow for the different groups of farms and some of the resulting relationships are recorded in Table 82. Apparently, fewer hours of work per cow is an indication of efficiency rather than of neglect on these farms. More cows, more milking machines, better prices, better incomes, and scarcely less milk production per cow are all common to the upper part of the table with fewer hours of labor per cow.

TABLE 82—*Relation of hours of man labor per cow to cost of milk and labor income.*

		Average.						
Hours of man labor per cow.	Number of farms.	Hours of man labor per cow.	Number of cows per farm.	Milk per cow (pounds)	Per cent having milking machines.	Milk price per cwt.	Milk cost per cwt.	Labor income.
Less than 105	64	86	27.0	5,103	52	$3.01	$2.50	$561
105 — 134	59	120	21.2	5,392	76	3.07	2.66	666
135 — 164	70	150	15.3	4,994	26	3.02	3.08	401
165 — 194	44	178	13.6	5,207	23	3.07	3.16	388
195 — 224	35	207	11.7	5,069	17	2.96	3.57	305
225 or more	54	268	9.1	5,180	7	2.83	3.66	236
Total or average	326	162	17.0	5,155	36	$3.00	$3.05	$441

This table may be taken to emphasize the dependence of efficiency on size of herd. The more efficiency, the more cows. Over twice as much done per hour on the average involved having three times as many cows per farm. Sorted by number of cows per farm (see Table 79), four times as many cows resulted in an average of only half as much time spent per cow. One factor depends on the other.

Good production did not necessitate squandering time. The best average production was obtained in the group having next to the best labor efficiency; the second poorest average production was in the group having next to the largest average expenditure of time per cow. Apparently, about the same proportion of farmers got good production as poor with a small outlay of time.

In addition to unhandy buildings for doing chores, labor systems that are wasteful of time, and too few cows to justify washing the milk pails, other causes that may contribute to excessive labor are long distances to the milk station, poor roads, and a lack of co-operation in getting a suitable volume of product and adequate equipment for the daily task of transportation.

Distribution of Production

Some effects of seasonal distribution are shown by means of the November-June ratio in Table 83. The average for 297 farms in this table was 91 per cent as much milk produced in November as in June. Cost of milk decreased apparently until a ratio was obtained representing about the same amount of milk in November as in June. Thus, with an

increasing proportion of milk produced in November average milk costs decreased for the first three groups. This is explained by other averages for the groups which indicate increases in production per cow, fewer hours of human labor per cow, and more milk per man. Milk costs had a tendency to increase in the last two groups although not very consistently. As would be expected, average prices for milk increased rather regularly with more winter milk production.

Table 83—*Relation of distribution of milk production to cost of milk and labor income (November-June ratio)*

November-June ratio.	Number of farms.	Average. November-June ratio.	Milk per cow (pounds)	Milk per man (tons)	Man hours per cow.	Cows per farm.	Milk price per cwt.	Milk cost per cwt.	Labor income.
Less than 50	59	35	4,620	20	170	16.5	$2.78	$3.26	$172
50 — 74	63	62	5,030	23	157	16.2	2.82	2.92	61
75 — 99	73	88	5,667	28	160	18.5	3.10	2.84	741
100 — 124	47	111	5,523	27	152	17.1	3.09	3.01	713
125 or more	55	173	5,002	24	156	17.7	3.18	2.90	488
Total or average	297*	91	5,178	24	160	17.3	$2.99	$2.98	$432

* Farms omitted on which milk was not produced in either of the months of June or November.

Labor incomes reflected the advantages of lower costs, higher prices and better production. The labor incomes of the first two groups comprising 122 farms with less than 75 per cent as much milk production in November as in June were conspicuously low. The 120 farms with a November-June ratio around 100 provided labor incomes averaging over $700. The last group of farms with a ratio of 173 and an average production of only 5,002 pounds of milk per cow got an average labor income of $488. In contrast to the groups with low ratios of milk production, this last better average income can be mostly explained by higher prices for milk.

In Table 84, this same group of farms was sorted by the per cent of total milk produced in October, November and December. If milk production were equal throughout the year, the figure for three months would be 25 per cent. Again, this table indicates that more milk production in the fall was advantageous, resulting in better production per cow, higher prices for milk and less cost per hundredweight. Both the amount of milk handled per man and the man hours per cow were improved by a proportional increase in production for the herd during the last three months of the year.

A few operators, by chance or otherwise, got twice or even three times as much milk in November as in June. Doubtless, this condition resulted occasionally from planning to establish a new or better rating and, as such, may have been justified. There is no indication from the

TABLE 84—*Relation of distribution of milk production to cost of milk and labor income.*

(Per cent produced in October, November, December)

Per cent milk in October, November, December.	Number of farms.	Average. Per cent milk in months October, November, December.	Milk per cow (pounds)	Milk per man (tons)	Man hours per cow.	Cows per farm.	Milk price per cwt.	Milk cost per cwt.	Labor income.
Less than 25	151	19	4,882	22	165	16.8	$2.85	$3.10	$164
25 or more	146	31	5,484	27	154	17.8	3.14	2.85	710
Total or average	297	24.6	5,178	24	160	17.3	$2.99	$2.98	$432

analysis of these farm records that excessive production in the fall or winter was economical. Eliminating the farms that sold local milk or milk products in amounts equal to 10 per cent or more of total milk receipts and separating the Grade A producers from the other wholesalers provided the basis for Table 85.

TABLE 85—*Distribution of milk production on farms selling Grade A and other milk wholesale (269 farms)*

Kind of milk.	November-June ratio. Less than 80.	80-120.	Over 120.
Grade A			
Number of farms	26	49	28
Average cost of milk	$3.03	$2.78	$2.92
Other averages:			
Price of milk	$2.90	$3.30	$3.35
November-June ratio	53	98	158
Cows per farm	17.4	18.3	16.4
Milk per cow (pounds)	5,088	5,933	5,275
Milk per man (tons)	23.2	29.7	24.5
Man hours per cow	187	155	175
Output index	103	118	104
Labor income	$471	$975	$715
Standard Market Milk			
Number of farms	90	49	27
Average cost of milk	$3.11	$2.94	$2.78
Other averages:			
Price of milk	$2.76	$2.87	$2.86
November-June ratio	50	97	179
Cows per farm	16.1	18.9	16.9
Milk per cow (pounds)	4,773	5,361	5,137
Milk per man (tons)	21.4	26.5	26.2
Man hours per cow	157	153	153
Output index	90	108	113
Labor income	$70	$450	$329

No striking contrasts were evident in the two groups of records when arranged according to the November-June ratio of milk production. A less proportionate number of the Grade A farms fell in the low-ratio group, and a somewhat larger proportion in the high-ratio group. For both groups, labor incomes were best with the November-June ratio near 100. Labor incomes were decidedly better when the production ratio was near 150 than when it was only 50. The greater change in price of milk came between the low and medium ratio groups. Costs of production were considerably higher for the groups with a low November-June ratio.

Grain Feed per Cow.

In the adjustment of feed to milk production, consideration must be given to the inherent productive capacity of the cows and the relative prices of milk and concentrates. In Table 86, the farms were arranged according to the amounts of grain fed per cow. There was considerable variation among the farms from the average of 1,522 pounds of grain per cow. The cows in one group of 29 farms received an average of only 521 pounds of grain per head, while at the other extreme were 38 farms on which they received 2,689.

Table 86—*Relation of grain per cow to cost of milk production.*

Grain per cow (pounds).	Number of farms.	Average.							
		Grain per cow (pounds).	Hay per cow (pounds).	Succulence per cow (pounds).	Milk per cow (pounds).	Milk per man (tons).	Number of cows per farm.	Milk price per cwt.	Milk cost per cwt.
Less than 751	29	521	5,359	1,110	3,845	16	14.3	$2.69	$3.50
751 — 1149	78	971	5,288	2,738	4,592	20	15.6	2.85	3.23
1150 — 1549	71	1,335	5,068	2,087	4,932	24	16.9	3.01	2.94
1550 — 1949	68	1,750	5,213	3,072	5,478	26	19.8	3.09	2.91
1950 — 2349	42	2,131	5,190	4,019	5,936	29	18.8	3.06	2.75
2,350 or more	38	2,689	5,255	4,597	6,284	30	15.6	3.26	3.13
Total or average	326	1,522	5,232	2,903	5,155	24	17.0	$3.00	$3.05

For cows of a given capacity and with given prices of grain and milk, there must be a reasonably definite amount of concentrates most economical to feed. Among these farms, there was a consistent increase in production per cow with each additional increment of grain. That is the reason for feeding grain—to get a response in milk flow. The price of milk per hundredweight increased also in the same direction, and for no better reason than because it is the most important factor in conditioning the amount of grain to be fed. For most farm-

ers, at that time, the only practical method of getting better prices for milk was to produce more in winter. This always involves heavier grain feeding.

The cost of milk production declined consistently from an average of $3.50 per hundredweight in the first group, with an average of 521 pounds of grain per cow, to $2.75 in next to the last group, with an average of a little more than a ton of grain per cow. In the last group for which grain averaged 2,689 pounds per cow, the cost of milk went up to an average of $3.13 per hundredweight. There is an indication here that the point of most economical feeding for this group of farms had been exceeded. In the following table are shown the changes in average amounts of grain and the resulting average milk production from group to group of Table 86. For each of the 558 pounds of increased grain in the last group of farms, an average of only 0.6 of a pound of milk was obtained, but for each additional pound fed in the second group as compared to the first, there was a response in milk production of 1.7 pounds. Additional grain in the last group resulted in only one-third as much increase in milk as in the second group and only half as much as the average for all.

Between groups.	Pounds of change.		Milk—grain ratio.
	Grain.	Milk.	
1 and 2	450	747	1.7
2 and 3	364	340	.9
3 and 4	415	546	1.3
4 and 5	381	458	1.2
5 and 6	558	348	.6
Average	434	488	1.1

This is an example of "diminishing returns." The more grain fed, the more milk, but a decreasing amount of milk for each additional increment of feed. When milk is high priced and grain is cheap, relatively large amounts of grain may be fed to cows of a given capacity; but when grain is dear and milk is cheap, less grain can profitably be fed.

The figures in Table 86 indicate that for the price conditions and quality of cows found in Grafton County in 1929 one ton of grain per cow on the average was about the limit of intensity in profitable feeding. This does not indicate, however, that a yield of 6,000 pounds of milk per cow was necessarily the highest yield desirable or most economical. There are other factors than grain feed that contribute to better production such as breeding, selection of stock, disease control, better balanced rations and other items of care and management. A cow with inherent capacity to produce only 3,000 pounds of milk cannot be corrected by feeding, but a cow endowed with natural ability to furnish 10,000 pounds can be limited easily by poor feeding.

Succulent Feed

Somewhat similar results were obtained in Table 87 by arranging these farms according to the amount of succulence fed. The climate of this region is near the limit for economical corn production. Some of the farms away from the Connecticut River which have a short growing season because of elevation or frost pockets are ill adapted to producing silage corn. The average amount of succulence used per cow in this region was less than a ton and a half. On about one-third of the farms no succulence was used.

Table 87—*Relation of total succulence per cow to cost of milk production.*

Total succulence per cow (pounds)	Number of farms.	Average. Succulence per cow (pounds)	Grain per cow (pounds)	Dry forage per cow (pounds)	Man hours per cow.	Milk per cow (pounds)	Milk price per cwt.	Milk cost per cwt.
None	125	0	1,463	5,514	182	4,907	$2.98	$3.11
Less than 2050	75	676	1,375	5,364	150	4,797	2.86	3.05
2050 — 5950	48	4,356	1,406	5,308	149	4,897	3.16	3.13
5951 — 9950	57	7,775	1,812	4,625	141	6,075	3.08	2.76
9951 or more	21	11,590	1,881	4,562	164	6,000	3.01	3.29
Total or average	326	2,903	1,522	5,232	162	5,155	$3.00	$3.05

The lowest average cost of milk production occurred in the group which fed an average of 7,775 pounds of succulence per cow. A full feed of silage to good producing cows in regions well adapted to growing corn does not exceed five or six tons per cow. The last group of 21 farms doubtless exceeded an economical amount for Grafton County with 11,590 pounds per cow. Silage is an excellent feed for dairy cows, but its use in large amounts is often limited on these farms by a lack of suitable conditions for economical production. Where corn can be grown with any reasonable success, some two to four tons of succulence per cow should contribute to better feeding.

EFFECT OF FIVE SELECTED FACTORS ON LABOR INCOME

An average of more than 59 per cent of the total receipts on the Grafton County farms enumerated in this survey came from milk. Contributing so largely to the salable products of these businesses, milk represented the outstandingly important enterprise. Therefore, the cost of producing it had a most important influence on the financial success of the business. This relationship has been previously shown in tabulations with labor income. In Table 88 milk cost has been associated with milk price and with factors of size, efficiency and production in the farm business to indicate some of the combined effects of all five factors on labor income. The method of selecting farms has been to require that the factors be as good as average. This means average or below for cost of production and average or above for other

factors. The five factors used were: (1) man work units per farm, (2) man work units per man, (3) production index, (4) milk price per hundredweight, and (5) milk cost per hundredweight.

TABLE 88—*Effect on labor income of having certain selected factors as good as average.*

Number of factors average or better.	Number of farms.	Average. Man work units per farm.	Man work units per man.	Production index.	Milk price per cwt.	Milk cost per cwt.	Labor income.
0	34	263	172	72	$2.65	$4.61	—$455
1	56	298	199	84	2.86	3.56	—126
2	72	376	204	98	2.91	3.16	31
3	78	467	259	107	3.08	2.66	468
4	55	580	293	109	3.09	2.37	1,202
5	31	733	313	117	3.45	2.34	1,985
Total or average	326	441*	238*	99*	$3.00*	$3.05*	$441

* Averages for the five selected factors by which the farms were sorted. Because it is desirable to have low cost of milk production, this factor was selected in reverse order of size.

There were 34 farms out of the 326 for which cost of milk production was figured that had none of these five factors as good as average. The average labor income of the group was —$455. The average labor income for the group of 56 farms that had only one factor as good as average was —$126. The group of 72 farms that had two factors as good as average barely provided a positive labor income. When more than half of the factors were up to average, the operators obtained an average labor income of $468. Four-fifths of the factors up to average made possible average labor incomes of $1,202 for a group of 55 farmers. The 31 operators having all factors up to average had farms large enough to provide an average of 733 man work units; they were efficient enough to get an average of 313 man work units of productive labor per man; they had a production index 18 per cent higher than the average for the table; they got $3.45 a hundredweight for milk, and they produced it at a cost of $2.34. Their average labor income was $1,985.

CONCLUSIONS

Grafton County is located in the west central part of New Hampshire and borders on the Connecticut River. It is rather far north for growing corn for grain and for tree fruits. Corn for silage can be grown to advantage near the river. Oats and potatoes are well adapted and possibly cabbage.

This survey was confined largely to the western part of the county along the river and included only a few adjacent hill towns to the east and one town in Coos County to the north. Some farm records were taken in 15 out of the 39 towns in the county.

Grade cows kept for the production of wholesale milk for the Boston market represented the most important type of animal enterprise. Very few hogs or sheep were raised. With a market for whole milk and practically no corn grown, by-products are lacking for commercial hog production. Sheep are out of the question largely because they return much less per animal unit for high-priced feed than the dairy cow and because there are few cash crops in this region to use summer labor at as good an advantage as dairying.

Poultry furnishes a perishable product for sale and can make good use of high-priced feed in supplying a quality product for a relatively nearby market. In most dairy regions some poultry combines well with milk production. A few farmers in this region maintained commercial flocks of poultry, but there were hardly enough to judge of their success. A distance of 200 miles from Boston and a rigorous climate are rather unfavorable for poultry production in this area. Some poultry as a side-line would probably prove profitable.

The part of Grafton County included in the survey is one of the most intensive wholesale milk-producing areas in the State. Cows were found on practically every farm. A few farmers retailed milk to small villages within or near the county.

The twelve months included in the survey from April 1, 1929, to March 31, 1930, represented one of the most prosperous years experienced by these farmers. Milk prices had been creeping up since 1925, and grain prices had dropped considerably in the last half of the survey period. The depression beginning in 1929 has quite reversed the general situation. Labor incomes for 395 of the farms enumerated averaged $393. The lowest labor income was —$2,679 and the highest $5,138. The corresponding current (1930-1931) average labor income has probably been reduced by not less than $600.

In a region selling whole milk almost exclusively, average labor incomes are likely to be low because dairying tends to be overdone. Many operators undertake or continue to farm on small farms who are satisfied with very meagre incomes. Many such add to the total volume of milk and contribute to an increased surplus which must reflect on the price returned to all producers. This condition is augmented in Grafton County because of the ease with which outlying farms already provided with livable buildings can be bought or hired.

The year of this study was one in which incomes responded to proper organization. The real problems arise in depressions like the present (1931) which result from discrepancies in changing price levels. However, the farmer can live; this is worth something. There will be no bread lines in the country. No one will starve. If the prosperity peaks in city business are higher, the depression troughs are certainly deeper. All mechanical business takes account of stock during a depression period, if, indeed, it has any stock left, and the business of agriculture should do the same. Depression is the birthplace of efficiency. It is important that farmers dispense with wasteful methods of doing work, that they displace unprofitable cows.

The most important consideration for this area is an increase of the average production per cow. There are some herds in this area that

are good in this respect, practically none that are exceptional, and the average of 5,150 pounds of milk per cow for all is very low. On the whole, production per cow is the weakest condition in farm management in this area. If certain insidious diseases are responsible for this condition, the State should take cognizance of the fact and set up machinery to enable the farmer to learn, at least, the best and most efficacious means of control. Tuberculosis eradication is already well under way in this county, but contagious abortion is still prevalent. In so far as breeding and farm sanitation have to do with better production and better milk, there is a fertile field here for more research and extension work.

There are other factors which contribute to better milk production per cow. One is better quality cows to be obtained through better breeding or by purchase. This is fundamental, because without inherent capacity other methods of appreciably increasing production per cow may be futile. Feeding in sufficient amounts and with ingredients properly balanced is important, and its results are obvious to every farmer. Breeding for reasonably uniform production throughout the year is important, not only because it has considerable effect on total production per cow, but also because it puts milk on the market in accordance with consumer demand.

Because these are reasonably large businesses with 15.7 cows and 233 acres of land per farm, no other factor needs correcting for the group as a whole as badly as production. However, size and efficiency are subject to improvement, and for individual farms either one or both factors may easily become of paramount importance.

The best measure of size was man work units per farm, and the average was 413. In general, a two-man farm business is more easily organized for efficiency than a smaller one. There are many kinds of work that require two men. Farming may be less monotonous for two. In case of illness or necessary absence, an extra worker provides for getting the milking done. Probably the most desirable business unit in this area is from 30 to 60 cows with such other enterprises as can be fitted into the organization and avoid serious conflicts with the dairy. Such a business should provide at least 600 to 900 man work units per farm and be susceptible to such an organization as shall enable each worker to accomplish some 300 work units of productive labor per year.

In other words, with reasonable price conditions the first requirement for successful farming in this region is to have some good cows, and the second is to have enough of these good cows to require a large farm and thus provide a good labor organization for from 2 to 3 men. This will make necessary the use of modern labor-saving machinery and conveniences and will provide for their economic utilization.

Much more than half the income on these farms came from milk. A decrease in the cost of milk production resulted in a sure response in better labor income. Here again a good sized herd and high-producing cows were the most important prerequisites to efficiency and thus contributed unmistakably to lowering the costs of producing milk.

Grafton County has some excellent farms. She offers a challenge to the best brain and brawn. The reward will depend largely on proper adjustments in animal production and in size and efficiency of the business. Present-day farming in Grafton County, as elsewhere, is not an easy task, but it is worth while. It demands all-around skill in mind and body and it has its compensations in satisfaction and service. It is worthy of a man.

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