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RESULTS OF FARM MANAGEMENT RESEARCH IN THE  
NORTHEASTERN UNITED STATES

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FARM management differs from the natural sciences in that it can not be studied in the laboratory or on sample plots. It must be studied in the actual operation of real farms. These individual farms differ so widely that large numbers of them must be studied in order to find enough farms similar in any one character to make a significant group. The farm management survey is the most practicable way of getting detailed business information on the operation of large numbers of farms at reasonable cost. It is now generally understood that in farm management studies a large number of observations is more important than extreme accuracy in individual observations.

The usefulness of accounts as a method of studying farm management problems is unquestioned. For the individual farmer accurate accounts are the most useful means of studying his business. From the standpoint of research, however, the very high cost of such investigations when large enough numbers of farms are obtained to make the results useful, makes it advisable to limit them to problems which can not be studied satisfactorily by the survey method.

The primary object of farm management research is to determine facts and principles that will aid individual farmers in working out the most profitable organization of their farms. In attacking this problem there are two possible points of view:

1. How to organize the most profitable business on a particular farm without changing the area.
2. How to organize the most profitable farm business for a particular farmer assuming that he can change the area of his farm or move to a more desirable farm if the possibilities of his present business are too limited.

Both points of view are important and should be given careful consideration. However, in the opinion of the writer, greater emphasis should be placed on the second, namely, how to organize the most profitable business for a particular farmer. Before attempting to work out the most profitable combination of enterprises for a given farm it is important to find out if the farm is large

enough to permit of economical operation, if the type of farming is adapted to the physical and economic situation, and in some cases, if the land is productive enough to be farmed at all.

Economic conditions affecting agriculture are changing constantly. Every such change makes necessary, changes in farm organization. For example, high labor costs have stimulated the use of brains and machinery in order to save labor. Intelligent planning of work and the use of machinery have made it possible for one man or one family to raise more crops and care for more animals. This calls for larger farm businesses in order to permit of efficient operation of the machinery. From 1918 to 1928 there was an average increase of 17 acres per farm in the average size of 514 farms in Livingston County, New York.

The rapid growth of cities has made necessary far reaching changes in farming and farm organization. In regions adapted to their economic production, the resulting increase in the acreage of intensive vegetable crops usually makes smaller farms desirable. Because of these and other conflicting forces the size of farms is unstable all over the world.

While farmers tend to adjust their farm businesses to changing economic conditions, there is a long lag in adjustment because of custom or habit or uncertainty as to the permanence of the change. Through research and education in farm management the necessary adjustments may be hastened with a corresponding reduction of suffering and financial loss. The fundamental problem of farm management is, and will continue to be, that of adjustment of farming to changing economic conditions.

The data obtained in farm management studies are also of value in furnishing facts on which public policies may be based. It is important to consider how national policies on taxation, land, and credit affect the individual farms of which agriculture is composed. Lack of knowledge or consideration of farm management principles has resulted in great loss and suffering, especially in national land policies. The tendency of governments seems to be to divide the available land by the number of people in order to determine the best size of farms. Millions of dollars have been wasted by governments in creating farms of uneconomic size which disappeared as fast as they were created. In the United States, a similar mistake was made in dividing up public lands into 160-acre farms regardless of rainfall, topography or soil. In the drier

regions, years of slow starvation and great economic loss resulted before farms gradually were combined into areas adapted to economical operation.

Economic theories are intended to apply to farming as well as to other industries but it is impossible to give the specific application of these principles to a given farm situation without statistical research. Farm management research contributes to economic theory by showing the application of the economic principles affecting financial success in farming to the region studied under existing conditions.

It has sometimes been assumed, erroneously, that the conclusions of one farm management study would be applicable to any farming region at any time. Even if the region and the sample included in the study have been selected intelligently, the resulting conclusions can be expected to apply only to the particular type of farming area studied under conditions existing at the time of the study. Changes in yields or prices of products or in prices of cost goods may alter relationships and conclusions before the study has been completed.

Knowledge of price trends and cycles and of the principles governing the movements of prices has been of great value to farm management workers in their attempts to show the application of farm management principles under changing economic conditions. Even with these aids it is desirable to repeat surveys at intervals of five or ten years. With types of farming that are subject to wide fluctuations in yields and prices from year to year, successive annual surveys for several years may be necessary to give a sound basis for conclusions.

The trend of farm management research has been from the general to the specific. It is not enough to know that high production per cow results in increased average incomes of dairy farmers. What rates of production are most profitable in a cheese factory region or in a Grade B or a Grade A market milk region? How can these rates of production be obtained most economically in any given dairy region? The combination of the typical farm management survey with an analysis of the cost of production of the dominant enterprise has been of great value in answering these and other similar questions. Both the enterprise study and the study of the farm as a business unit are needed in order to give a clear understanding of the principles of successful farm management.

In any useful analysis of a farm enterprise, its relationship to the farm as a whole must constantly be kept in mind. In dairy, poultry, potato, fruit or other farming areas having one enterprise of outstanding importance, this combination of an analysis of the farm as a unit and of the dominant enterprise is one of the most valuable types of farm management study yet devised.

The improvement of statistical technique has been one of the most important factors in the improvement of farm management research in recent years. These improvements include a better knowledge of the principles of sampling, greater accuracy in individual survey records, and the use of correlations in analyzing the results. Correlation analysis has been of value in giving a more trustworthy measurement of the relative importance of different factors affecting incomes and especially in indicating which of two associated factors is the more important causal factor.

In studying the farm as a business unit one of the first steps is to obtain a satisfactory measure of business success. "Labor income" was originally devised as a measure of the comparative financial returns of farm operators. It was used in order to determine the most successful farmers in a region so that the causes of their success might be analyzed.

There is no one measure of financial success in farming that is best for all purposes. Rather are there many measures for many different purposes. A safe general rule is to show the net financial returns in terms of the most important factor in production from the standpoint of the particular study.

From the standpoint of national welfare one of the best measures of financial success in farming is "returns per worker" including the operator, family labor and hired workers. It is computed by deducting from farm receipts all farm expenses except those for hired labor and family labor. From this result is deducted a charge for the use of capital and the remainder is divided by the average number of workers employed on an annual basis, including the operator.

In thickly populated countries where land is the limiting factor of production, returns per acre may be the best measure of financial success. If land is variable in productivity this measure should be used with care. Where capital is the most important factor in production, per cent return on capital may be used.

The writer believes that the farm operator should be the unit

of farm management study in the United States and that the primary object of farm management research should be to show how farm operators should organize their business operations so as to yield the greatest continuous profits. If this principle is accepted, the best measure of financial success for most farm management studies in the United States will be the income accruing to the farm operator after deducting all other expenses and a charge for the use of capital; in other words, either labor income or labor earnings. A corresponding measure for the interpretation of enterprise cost accounts would be "returns per hour of labor." In regions where the operator's capital is more important than his labor and management, the per cent return on capital may appropriately be used.

#### BUSINESS FACTORS AFFECTING FINANCIAL SUCCESS IN FARMING IN THE NORTHEASTERN STATES

One of the most important factors affecting financial success in farming is the size of the farm business. In discussions of this factor it is important to distinguish between the size of the farm (area) and the size of the farm business. While with similar farms there is a relationship between the area of the farm and the size of the farm business, there are many exceptions. Many vegetable or poultry or fruit farms have a relatively large business on a small area of land. On the other hand in dairy farming or livestock producing areas a relatively small business is often found on farms of large area. Unless farms are uniform in type and in the proportion of wasteland, woodland and cropland, the total area of the farm is an unsatisfactory measure of the size of the farm business.

#### SIZE OF THE FARM BUSINESS

There are many measures of size of business such as total acres in the farm, total farm capital, total receipts, total acres of crops, number of cows or hens or other important livestock, acres of fruit or potatoes or other dominant crop, number of work animals or power units, average number of men employed on an annual basis, and productive man work units.

While any one of these measures may be useful in a particular case, the best general measure of size of farm business is productive man work units. A productive man work unit is the average amount of productive work accomplished by a man in one day.

The total productive man work units of a farm business represent the number of days of income-producing work actually accomplished on the farm at the average rate of work in the region.

The relation of size of business, in terms of man work units, to labor income in a dairy and crop growing region in Livingston County, New York, is shown in table 1. As the size of the farm business increased there was a corresponding increase in the average labor income of these farm operators. While individual groups showed minor variations from this trend, the general relationship is clear.

The results of this table agree in general with the results of most

Table 1. Relation of Size of Business to Labor Income\*  
(514 Farms, Livingston County, New York, 1928)

Total productive man work units per farm		Crop index	Labor income
Group	Average		
Smallest..... 5%	111	90	\$ 10
Next..... 10%	184	92	143
Next..... 15%	275	94	133
Next..... 20%	366	100	261
Next..... 20%	481	100	463
Next..... 15%	630	102	452
Next..... 10%	870	102	1,138
Largest..... 5%	1,324	93	1,044

\* Warren, S. W. Unpublished data.

farm management studies with normal relationships between the price of farm products and the costs of labor and other items of production. Under normal conditions, within limits, moderately large farm businesses return larger average labor incomes to their operators than small ones. Under normal conditions there is little difference in the risk of loss between moderately large and small farm businesses, but the chances of making a large income or a large loss are much greater with a moderately large farm business.

The most important reason for the larger average labor incomes of the moderately large farms is greater efficiency. The relation of size of business to labor efficiency in the same area is shown in table 2. More than twice as much productive work was accomplished per man in the group of farms with the largest businesses as in the group with the smallest businesses. This principle has



been repeatedly demonstrated by farm management studies in many different areas. As the size of the farm business increases there is a rapid increase in the efficiency of man labor, horse labor, use of machinery, and use of buildings within the size limits in most farming regions. The moderately large farm businesses also have an important advantage in buying and selling.

Another reason for the larger average labor incomes of moderately large farms, under normal conditions, is the direct effect of volume of business. Even if costs of labor and other factors of production did not decrease with increasing size of business, a

Table 2. Relation of Size of Business to Labor Efficiency and Labor Income\*

(514 Farms, Livingston County, New York, 1928)

Total productive man work units per farm	Number of farms	Average productive man work units per farm	Work units per man	Labor income
Less than 200	54	144	125	\$-86
200-299	77	246	176	108
300-399	103	340	196	140
400-499	89	446	234	497
500-599	60	546	249	486
600-699	36	633	264	329
700 and over	95	979	300	998

\* Warren, S. W. Unpublished data.

larger number of units of products sold with a given profit per unit would result in a larger number of dollars for the operator.

The effect of size of business on labor income in a good year and in an unfavorable year in a dairy region in Chenango County, New York, is shown in table 3. In this table, size of business is measured by total capital per farm. In 1925, a favorable year, the larger farm businesses showed much higher average labor incomes than the small ones; in 1922, a very unfavorable year, the larger farm businesses showed larger average losses than the small ones. In both years the larger farms were more efficient in the use of labor and other factors of production. In 1922, a very unfavorable year, prices of farm products were so low that the larger volume of business of the moderately large farms resulted in larger losses to the operators in spite of their greater efficiency.

On the average for the five-year period, 1921-25, the moderately large farms showed somewhat higher average labor incomes than the small ones. This period included two or three years of such unfavorable farm prices that the effect of the greater efficiency of the moderately large farms was partially obscured by the losses resulting from a larger volume of business.

In table 4 is shown the relation of size of business to labor income on fruit farms in Niagara County, New York, on good and on poor soils. This table includes average incomes on both types of soils for the 13-year period, 1913 to 1925 inclusive. Since the farms are uniform in type, total acres per farm has been used as a measure of size of farm business.

Table 3. Relation of Size of Business to Labor Income\*  
(Dairy Farms, Chenango County, New York, 1921-25)

Capital per farm	Labor Income		
	1922	1925	1921-25
\$15,000 or less .....	\$ 179	\$1,130	\$534
\$15,001 to \$25,000 .....	43	1,993	600
More than \$25,000 .....	686	3,657	724
Average .....	32	1,676	580

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 59. 1929.

The Dunkirk soils are well-drained, fertile soils well-adapted to the production of fruit. On these soils the moderately large farms showed considerably higher average labor incomes over this period of years than the small farms.

The Clyde soils are found adjacent to the Dunkirk, but they are poorly-drained and not well-adapted to fruit production. A smaller proportion of the farm area was devoted to apples on the Clyde soils. On these soils over the same period of years moderately large farms showed greater average losses than small farms. In this case, in spite of the fact that the larger farms on the Clyde soils were more efficient in the use of labor and other factors of production than the small farms, yields were so low that the larger farms had greater losses.

In this area the Clyde soils are recognized as less productive than the Dunkirk soils and farm values are lower. However, the farm values on the poorer soils are not accurately adjusted to the dif-

ference in productivity. The results of these studies show that over this 13-year period a farmer could better afford to pay the going market price for a farm on the Dunkirk soils than to have a farm on the Clyde soils given to him without cost.

In table 5 is shown the relation of size of business to labor income in Livingston County, New York, with high and with low yields, using production index as a measure of yields. The production index is the weighted average rate of production of crops and animals combined on a percentage basis in terms of the average of the area.

Table 4. Relation of Size of Business to Labor Income\*  
(Fruit Farms, Niagara County, New York, Average 1913-25)

Clyde Soils			
Total acres per farm	Acres of bearing apples	Value of farm per acre	Labor income
Less than 60.....	3.3	\$205	\$131
60 to 99.....	6.4	173	— 20
100 or more.....	12.0	158	— 276
Average.....	5.2	182	41
Dunkirk Soils			
Less than 60.....	7.8	\$431	\$429
60 to 99.....	13.1	293	767
100 to 199.....	21.4	286	896
200 or more.....	31.0	202	1,056
Average.....	14.8	292	719

\* Scoville, G. P., Spencer, Leland, Rasmussen, M. P., Harriott, J. F., and Oskamp, Joseph. The Apple Situation in New York. Cornell Ext. bul. 172: 9. 1928.

In this region, with a very low production index, the large farm businesses had greater average losses than the small ones. With average or better yields, large farm businesses had much higher average incomes. While in all cases the moderately large farms were more efficient in the use of labor and other factors of production, with very low yields the relation of costs of production to prices received was so unfavorable that this factor more than obscured the favorable effect of greater efficiency.

During the period of rising prices from 1910 to 1920, farm management studies tended to over-estimate the importance of size of business as a factor affecting the incomes of farmers. When prices are rising, farmers obtain fortuitous gains because they usu-

ally sell on a higher price basis than that existing when their costs were incurred. Under such conditions the effect of mere volume of business is over-estimated and some large farms are able to show satisfactory incomes in spite of inefficiency in production.

In periods of falling prices such as from 1920 to 1930, farm management studies tend to under-estimate the importance of size of business as a factor affecting the incomes of farmers. Under such conditions farmers sell their products on a lower price basis than that on which their costs were incurred. Since wages lag and remain relatively high when prices are falling, the unfavorable relationship of costs to prices of farm products, results in a tend-

Table 5. Relation of Size of Business and Rate of Production to Labor Income\*

(329 Farms, Livingston County, New York, 1928\*\*)

Production index	Labor income	
	Total productive man work units below average	Total productive man work units above average
Below 80.....	\$-361	\$-840
80-99.....	234	285
100-119.....	651	1,270
120 and over.....	1,021	1,931

\* Warren, S. W. Unpublished data.

\*\* Includes only farms having 6 or more cows.

ency toward greater losses on the moderately large farms. In very unfavorable years the losses due to this effect of volume may offset the advantage of greater efficiency in production of the moderately large farms.

The most serious common weakness in the business organization of farms in the northeastern United States is too small size of business. Many farm businesses are so small that the gross income is not large enough to permit of a satisfactory standard of living, even if there were no expenses. This is primarily the result of a lag in the adjustment of size of farm business to the use of labor-saving machinery. The use of this machinery has enabled farmers to perform their work in less time but the business has not been enlarged to enable them to use the time saved in a profitable manner. While the operators of the small farm businesses may be

busy, they are not busy at productive work as is shown by comparisons of labor efficiency of these farms with moderately large farm businesses.

A comparison of small and moderately large farm businesses is not one of family farms and farms employing large gangs of labor, but a comparison of farms having approximately the same labor force with partial and with full employment as is shown in table 8. The operators of the very small farm businesses get incomes consistent with the small amount of productive work accomplished. Similarly, the operators of moderately large farms get incomes consistent with the larger amount of productive work accomplished.

The larger average incomes of the moderately large farms have sometimes been ascribed to differences in the ability of their operators. The primary reason is one of physical obstacles and not mental limitations. Under normal conditions it is much easier for a farm operator of average ability to make a good income with a moderately large business than with a small business because he can produce more products at a lower cost per unit. No evidence has ever been presented that indicated a close correlation between the size of the farm business and the ability of the operator.

There is no definite answer to the question "How large should a farm business be?" The solution to this question depends upon the experience of the farmer, his financial situation, the relation of labor and other costs to the value of products produced, and many other factors. In starting farming it is usually wise to begin with a medium sized business and then increase as financial resources and experience justify.

In general terms the best size of farm business for the northeastern United States is one employing from two to four or five men, including the operator. Such a business usually requires from \$20,000 to \$40,000 capital, or even more. The area of such a farm will vary widely depending on the type of farming. It should be large enough to permit of the efficient use of well-established labor-saving machinery. In any region, the minimum size of business for any farm that is worth operating is enough income-producing work to keep the available labor force profitably employed.

There are many ways of increasing the size of a farm business and the best method for any particular farmer depends upon many

factors. In the northeastern United States it is frequently possible to increase the size of a farm business without increasing the total area, by increasing the acreage of intensive crops that are adapted to the region or by increasing the number of productive livestock. If a greater area is needed, more land can usually be obtained by renting, even by a farmer with limited capital.

#### RATES OF PRODUCTION OF CROPS AND ANIMALS

It has long been recognized that yields of crops and rates of production of animals have an important effect upon farmers' incomes. The relation of production index to labor income is shown

Table 6. Relation of Rate of Production to Labor Income\*

(329 Farms, Livingston County, New York, 1928\*\*)

Production index	Number of farms	Total productive man work units per farm	Labor income
Less than 70.....	22	495	\$-689
70-79.....	39	565	-508
80-89.....	43	617	-173
90-99.....	63	614	560
100-109.....	66	561	901
110-119.....	46	611	1,073
120-129.....	23	687	1,456
130 and over.....	27	572	1,763

\* Warren, S. W. Unpublished data.

\*\* Includes only farms having 6 or more cows.

in table 6. As the production index increased the average labor income increased rapidly and consistently, from \$-689 for the group of farms with the poorest rates of production to \$1,763 for the highest group.

The average size of the farm business in terms of man work units is also given for each group of farms. The irregular variation in average size of different groups indicates that this factor is not associated with rate of production and that the differences in average labor incomes of the different groups are primarily due to differences in rates of production.

The relation of production per cow to labor income in a dairy region is shown in table 7. On the average of the five-year period, 1921 to 1925, there was a steady and striking increase in average labor income with increases in the production of milk per cow.

The higher average labor incomes of the farms with high rates of production are due to the fact that within the limits of ordinary farm practice, higher yields of crops and higher rates of production of animals are usually obtained at a lower cost per unit. Good rates of production are an important means of obtaining efficiency of production of crops and of animal products.

The relation of the rate of production to labor income is often mis-stated in order to emphasize the importance of this factor. Advising farmers to "keep fewer and better cows" or to "raise fewer acres of crops with better yields," is spoiling good advice with bad. It is not necessary to have an inefficient-sized farm business in order to obtain good rates of production of crops and of ani-

Table 7. Relation of Production Per Cow to Labor Income\*  
(Dairy Farms, Chenango County, New York, 1921-25)

Production of milk per cow (pounds)	Average production per cow	Per cent income from crops	Labor income
Less than 6,000.....	5,000	18.0	\$ 106
6000 to 7,500.....	6,800	15.8	769
More than 7,500.....	8,700	15.4	1,177

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 44. 1929.

mals. In general, the moderately-large farm businesses obtain at least as good yields as the small ones as was shown in table 1.

Rates of production obtained by farmers are dependent on prices and costs as well as on knowledge of how to increase production. The importance of this statement is recognized by farmers, but often is not recognized by persons carrying on experiments with crops and animals, the expenses of which are borne by governments.

With staple extensive crops, the limit of profitable yield is usually not more than 50 per cent above the average of the region. With intensive crops the limit of profitable rates of production is higher—perhaps double the average of the area. Since the environment of animals can be controlled more closely than that of field crops, the limit of profitable increase of production of animals is usually approximately double the average rate of production of the area.

Where crops are raised for seed or pure-bred animals are being tested for production, the profitable limit of the rate of production is the approximate limit of physical capacity. In such cases the unit price of the product depends partly on the yield and since higher yields mean higher prices per unit, higher rates of production are justified.

Farmers generally recognize the limits to profitable production that are set by costs and prices as is shown by table 6. Only 27 farms in this area obtained rates of production of crops and animals averaging 30 per cent or more above the average of the region. There is no danger to an individual farmer in too high rates of production provided they are obtained economically. In general, very high yields mean increased costs per unit.

The primary production problem of the individual farmer is how to get good rates of production economically. When costs are relatively higher than the prices of farm products, as during the period from 1920 to 1930, the importance of good rates of production is increased. However, under such conditions it is more important than usual to obtain good rates of production economically. The most important single means of achieving this aim is to keep only good animals and farm only good land.

#### LABOR EFFICIENCY

The relation of labor efficiency to labor income in a dairy and crop growing region is shown in table 8. In this region the average labor income increased rapidly with increases in the productive man work units per man. While labor efficiency has always been important on American farms, in periods of falling prices, when wages are relatively high, the importance of this factor is greatly increased.

As the average labor efficiency of these farms increased there was a corresponding increase in the average size of the farm businesses. The differences in labor income between the different groups are therefore partly the results of labor efficiency and partly the result of the greater efficiency of the larger farm businesses in other factors of production. The close association between these two factors indicates that one of the most important factors in labor efficiency is a moderately large farm business. Moderately large farm businesses make it possible to keep the available labor force profitably employed. In this area the group of farms with



highest labor efficiency accomplished more than three times as much income producing work per man as the group with lowest labor efficiency.

There are many other ways of promoting labor efficiency such as planning work, use of machinery and convenient arrangement of the farm fields and the farm buildings. Much labor can be saved by knowing how and when to spray or to control weeds and by doing this work in the proper manner and at the proper time. The importance of labor-saving machinery is too well recognized

Table 8. Relation of Labor Efficiency to Labor Income\*

(514 Farms, Livingston County, New York, 1928)

<i>Productive man work units per man</i>	<i>Number of farms</i>	<i>Total productive man work units per farm</i>	<i>Man equivalent</i>	<i>Labor income</i>
Less than 150.....	77	218	1.9	\$- 395
150-199.....	124	348	2.0	45
200-249.....	133	477	2.2	440
250-299.....	96	622	2.3	505
300-349.....	51	734	2.3	1,318
350 and over.....	33	892	2.3	1,479

\* Warren, S. W. Unpublished data.

to need discussion. Much labor can be saved by a good farm layout and by conveniently arranged buildings.

BALANCE OR ORGANIZATION OF ENTERPRISES

The term "balance" refers to the organization of the enterprises of a farm business so as to return the largest average labor income to the operator.

On most farms a considerable number of crop and animal enterprises are well enough adapted to the physical and economic situation to permit of their profitable production. In deciding on which enterprises to include and the sizes of the various enterprises, many factors must be considered, such as labor distribution, use of untillable pasture, rotation, fertility maintenance, use of by-product feeds, risk, and many others. The best balance of the enterprises of a given farm represents the most profitable adjustment of the enterprises to these important factors.

In the early days of farm management research the opinions of

research workers were influenced by the commonly-accepted opinion that farms should be diversified. Much time was spent in working out measures of diversity and in attempting to find a relation between diversity and labor income. Failure to find a definite relationship led eventually to a more thorough analysis of the problem of the organization of the enterprises of farms and resulted in discrediting the diversity myth.

There is still a wide-spread popular belief that diversity is a panacea for all the ills of agriculture. This is usually interpreted to mean that the farmers in a region should raise less of the profitable product in which they tend to specialize and more of some relatively unprofitable product.

In general, diversity lessens risk. It may result in a better distribution of income. However, these are only two relatively minor factors in the consideration of a complex problem. Specialization is an important means of obtaining greater efficiency in production. The importance of this factor has increased with the development of specialized labor-saving machinery.

The degree of specialization that is most profitable for the farmers in any given region depends largely on the relative profitability over a series of years of the enterprises that are adapted to the region. Where two or three non-competing enterprises are of approximately equal profitability narrow specialization will not often be found. Where one enterprise is very much more profitable than any other, advice to diversify at the expense of the dominant enterprise will usually receive from farmers the attention that it deserves.

In table 9 is shown the relation of sales of crops to labor income on some dairy farms in Chenango County, New York. As shown by this table, the dairy farms that obtained a considerable percentage of their income from the sale of crops made higher average labor incomes over the period 1921 to 1925 than did the farms selling only milk.

Similar results have been obtained in practically all farm management studies of dairy farms made in the northeastern United States. Since the dairy enterprise does not provide full profitable employment for the labor force during the summer months, it is possible to increase the farm income by producing some profitable cash crop, in addition to forage for the cows, without much increase in expense. Where possible, the addition of an-

other source of income to dairy farms in this area usually results in an increased labor income to the operator.

The trend of northeastern agriculture is toward increasing specialization. Narrow specialization in one single product is not often most profitable because of the difficulty of keeping the labor force profitably employed throughout the year with one enterprise. The tendency of northeastern dairy farms is not toward general diversification, but toward specialization in two or three products such as milk and cabbage, or milk and potatoes, or milk and eggs or other similar combinations.

The returns per hour of labor of some of the important enter-

Table 9. Relation of Sales of Crops to Labor Income\*

(Dairy Farms, Chenango County, New York, 1921-25)

<i>Per cent of income from crops sold</i>	<i>Average per cent of income from crops sold</i>	<i>Labor income</i>
10 or less.....	4	\$ 228
11 to 25.....	17	579
More than 25.....	40	1,220

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 50. 1929.

prises on New York farms are shown in table 10. These results are taken from farms keeping complete cost accounts in cooperation with the New York State College of Agriculture. While these farms are larger and more efficient than the average, the returns per hour from the different enterprises indicate the approximate relative profitableness of these enterprises with usual yields under New York conditions.

These enterprises show a wide variation in returns per hour of labor. In general the grain crops give a very poor return for labor with average yields under New York conditions. The crops showing relatively high returns per hour of labor are, in general, the bulky and perishable products that are best adapted to a farming region near consuming centers.

The results given in table 10 indicate the relative profitableness of these enterprises with average yields under New York conditions. Farms obtaining high yields of oats or buckwheat or any other crop with reasonable costs would usually obtain better re-

turns per hour of labor than those shown in this table. With very low yields, the returns per hour of labor would usually be less. The returns per hour of labor to be expected from these enterprises on any given farm would thus depend in part on their relative yields on that farm.

While relatively unprofitable enterprises can seldom be eliminated from a farm business, it is possible to emphasize the profitable enterprises that are adapted to a given farm by producing as

Table 10. Returns Per Hour of Labor on Some of the More Important Enterprises on New York Farms\*

Enterprise	Average		
	7 years 1914-20	5 years 1925-29	1929
Alfalfa.....	\$.97	\$.81	\$.64
Apples.....	—	.83	.83
Buckwheat.....	.07	— .37	— .10
Cabbage.....	.51	.61	.81
Corn for grain.....	.14	— .14	— .11
Cows.....	.33	.48	.53
Hay.....	.88	.05	.09
Oats.....	.01	— .21	— .73
Potatoes.....	.55	1.25	1.47
Poultry.....	.67	.49	.53
Wheat.....	.57	.19	— .21

\* Harriott, J. F. Results of Farm Cost Accounting on Selected Farms in Various Parts of New York—Preliminary Statistical Report. Cornell University Agr. Exp. Sta. mimeographed report, 1930.

If the total charges except those for man labor are deducted from the total returns from any enterprise, the remainder (labor returns) represents what the farmer has as pay for the labor on that enterprise. Dividing this remainder by the hours of man labor on that enterprise gives "returns per hour of labor."

large a proportion of them as possible and by giving them first consideration in planning work.

It is seldom wise to vary the balance of the enterprises of a farm widely from year to year in an attempt to adjust to temporary price fluctuations. The greatest value of outlook information to a farmer is in warning him of the danger of jumping in or out of production of a given enterprise because of a temporary price situation. In general the wisest procedure is to plan the combination of enterprises that will be most profitable over a series of years, making such minor modifications in this program from year to year as seem to be warranted by changing economic conditions.

SUMMARY

The relative importance of different business factors affecting labor incomes of farmers in a dairy region is shown in table 11. The three factors considered are capital—a measure of size of business—per cent of income from crops, and cost of producing milk. In this table the relative importance of these factors on labor income is measured by their percentage determination of labor income. The percentage determination of each of these factors indicates its effect on labor income, holding other factors constant.

Table 11. Percentage Determination of Labor Income by Various Factors\*  
(Dairy Farms, Chenango County, New York, 1921-25)

	1922	1925	Average 1921-25
Capital.....	2	9	—
Per cent of income from crops.....	1	31	17
Cost of producing milk.....	24	9	18
Total.....	27	49	35
Average labor income.....	\$32	\$1,676	\$580

\*Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 37. 1929.

In 1922, a year of very unfavorable prices of cash crops, the most important of these factors affecting labor income was the cost of producing milk. In 1925, a year of favorable crop and milk prices, the percentage of income from crops was the most important factor, but capital and cost of producing milk were of considerable importance. On the average of the five-year period, cost of producing milk and per cent of income from crops were of almost equal importance, while capital had a negligible effect.

It should not be assumed from table 11 that size of business as measured by capital was not an important factor affecting the labor income of these dairy farmers during this period. As previously stated, the most important effect of a moderately large business is to increase efficiency in production. In this table the effect of size of business on the cost of milk production is

eliminated since the percentage of determination of capital is the effect of this factor holding other factors constant. Since the period 1921 to 1925 included several unfavorable years, size of

Table 12. Relation of Cost of Milk Production to Labor Income\*  
(Dairy Farms, Chenango County, New York, 1921-25)

Cost of milk per 100 pounds	Average cost of milk per 100 pounds	Production per cow (pounds)	Labor income
\$2.00 or less . . . . .	\$1.72	7,500	\$1,334
\$2.01 to \$2.75 . . . . .	2.35	6,700	590
More than \$2.75 . . . . .	3.41	5,700	5

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 40. 1929.

business did not have an important direct effect on labor income because of the larger volume of business handled.

The relation of cost of milk production to labor income on these farms for the same period, is shown in table 12. Farms with a low cost of milk production had much higher average labor incomes than farms with a high cost.

The cost of milk production is a convenient measure of efficiency

Table 13. Relation of Number of Cows Per Farm to Cost of Milk\*  
(Dairy Farms, Chenango County, New York, 1921-25)

Number of cows	Average number of cows	Cost of milk per 100 pounds (5-year simple average)
16 or less . . . . .	14	\$2.61
17 to 25 . . . . .	21	2.57
More than 25 . . . . .	33	2.44

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 41. 1929.

in dairying, which in turn is affected by several factors. In table 13 is shown the relation of the number of cows per farm to the cost of milk production. Farms with more than 25 cows had a considerably lower cost of milk production than those with a

smaller number. This is another example of the relation of size of business to efficiency.

The most important factor affecting the cost of milk production is production per cow as is shown in table 14. As milk pro-

Table 14. Relation of Production Per Cow to Cost of Milk\*  
(Dairy Farms, Chenango County, New York, 1921-25)

Production per cow (pounds)	Average production per cow (pounds)	Cost of milk per 100 pounds
Less than 6,000	5,000	\$2.97
6,000 to 7,500	6,800	2.36
More than 7,500	8,700	2.18

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 42. 1929.

duction per cow increased, the average cost of milk production decreased, the difference between the lowest and highest groups being about 79 cents per hundred pounds.

Production per cow is, in turn, the result of many factors, such as quality of cows, feeding practices, and time of freshening. The relation of season of freshening to production per cow and cost of milk production is shown in table 15.

Table 15. Relation of Time of Freshening of Cows to Various Factors\*  
(Dairy Farms, Chenango County, New York, 1921-25)

Per cent of cows freshening from September to December	Production per cow (pounds)	Cost of milk per 100 pounds
Less than 25	5,600	\$2.70
25 to 50	6,300	2.70
More than 50	7,200	2.33

\* Neethling, J. C. Economic Studies of Dairy Farming in New York. IX. Cornell University Agr. Exp. Sta. bul. 483: 45. 1929.

In this region the farms having more than 50 per cent of their cows freshening from September to December had a higher milk production per cow and a lower average cost of milk production than the farms with a smaller proportion of cows freshening during these months.

Although there are many factors that affect the relative incomes of the farmers in any region, the most important business factors are size of business, rates of production of crops and animals, labor efficiency and balance. While mistakes may be made in many other things, farmers whose businesses are strong in each of these factors seldom fail to make satisfactory incomes. It is not enough for a farm to be strong in one factor. In order to obtain a satisfactory income it is necessary to have all of them in proper adjustment.

The 41 Livingston County farms that were above the average

Table 16. Comparison of Good Farms with Average\*  
(514 Farms, Livingston County, New York, 1928)

	8 farms 15% above average in four factors**	41 farms above average in four factors**	All farms
Total man work units per farm . . . . .	862	801	486
Acres operated . . . . .	221	227	166
Work units per man . . . . .	311	285	223
Crop index . . . . .	129	122	100
Pounds of milk sold per cow . . . . .	7,900	7,005	5,599
Age of operator . . . . .	42	47	50
Labor income . . . . .	\$2,886	\$1,897	\$ 386
Labor earnings . . . . .	\$3,438	\$2,392	\$ 856
Per cent return on capital . . . . .	11.0	7.3	1.8
Labor returns per man . . . . .	\$1,612	\$1,229	\$ 573

\* Warren, S. W. Unpublished data.

\*\* Total productive man work units, work units per man, pounds of milk sold per cow, crop index.

of their region in size of business, labor efficiency, yield of crops and production per cow had labor incomes averaging almost five times as much as the average of the region (table 16). In this same region there were only 8 farms that were 15 per cent or more above the average of the region in the four factors previously enumerated and the average labor income of these farms was \$2,886 as compared with \$386, the average of the region.

Better-organized farms do not mean an increased total production for agriculture, but fewer farms more efficiently operated. The best way to decrease the total production of agriculture is by ceasing to work poor land and by ceasing to keep poor animals.



The decisions of agriculture are the sums of the decisions of individual farmers. Thus a wise production program for agriculture necessitates a sound basis for the business plans of individual farmers. The primary object of farm management research is to determine facts and principles that will aid farmers in adjusting their farm businesses to changing economic conditions.