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FARM MANAGEMENT

G. F. WARREN

L. H. BAILEY
EDITOR

The Rural Text-Book Series

EDITED BY L. H. BAILEY

FARM MANAGEMENT

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FARM MANAGEMENT

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The requirements of a good farmer are at least four:

The ability to make a full and comfortable living from the land;
to rear a family carefully and well;
to be of good service to the community;
to leave the farm more productive than it was when he took it.

— L. H. Bailey.

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PREFACE

Farm Management is the study of the business principles in farming. It may be defined as the science of the organization and management of a farm enterprise for the purpose of securing the greatest continuous profit.

Successful farming requires good judgment in choosing a farm and in deciding on a type of farming. It demands clear business organization and management for the efficient use of capital, labor, horses, and machinery. It requires good judgment in buying and selling.

The change from cheap land, hand tools, and farming to raise one's own food and clothing, to farming as a commercial undertaking has come upon us so suddenly that business principles are not always well understood by farmers. Nor do those who understand the application of such principles to city conditions often know how to apply them on the farm.

Long ages of experience and a generation of scientific research have resulted in a fund of popular knowledge on how to raise crops and animals. But there is less background of tradition concerning business methods on the farm, and colleges have given little attention to this kind of problems. The success of the individual farmer is as much dependent on the application of business principles as it is on crop yields and production of animals.

The best way to find out what methods of farm organization and management are most successful is to study the methods now used and the profits secured on large numbers of farms, and determine how the more successful ones differ from the less successful, and find to which of the differences the success is due. After such principles are found, they need to be tested by use in reorganizing farms.

The conclusions in this book are based on investigations of the kind given above, and on cost accounts, census data, travel and study in different parts of the United States and experience in farming. It is hoped that the conclusions may be of use to farmers and students.

In preparing the book the writer has received much aid from K. C. Livermore, who helped in working out some of the data and read all the manuscript, and with whom many of the points have been discussed. Acknowledgment is also due to A. L. Thompson and C. E. Ladd for reading the manuscript and making many helpful suggestions.

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G. F. WARREN.

ITHACA, NEW YORK,
February 22, 1913.

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FARM MANAGEMENT

FARM MANAGEMENT

CHAPTER 1

SHALL I BE A FARMER?

When one is trying to decide as to the best occupation to follow, he should first consider the personal characteristics that are necessary for success in the kind of work that he proposes to undertake. Some persons, who may succeed well in the very specialized callings in the town or city, may not be qualified for farming, because farming calls for such versatile ability. The farmer is a combination of business man, mechanic, naturalist, and laborer.

1. The farmer as a business man. — In the days of our fathers the farm family raised practically everything that it needed. The few things not raised were received in trade at the village store. A few dollars a year were sufficient for the family needs. The measure of the farmer's success was his ability to raise his own food and clothing rather than his ability to organize his business and buy and sell. The changes that took place in agriculture from the time David tended his flocks up to the last century, were small in comparison with the revolution that has since occurred. With the introduction of machinery in the factory and on the farm, money has become necessary for the farmer. The farm no longer supplies his needs. He sells most of his products and buys most of his necessities. Not only must he have money to buy the innumerable necessary things for his living and equipment, but land, which was once to be had for the asking, is now dear. All these changes mean that the farmer has become a business man. He produces and sells and buys. These changes demand the application of business principles in farming. So long as the family lived directly from the farm, there was very little need for such principles.

The kind of business ability needed is not so much that of the trader as of the executive who can organize a farm into a successful business enterprise. The idle horse in the barn is a more frequent source of loss than is the bad bargain in buying a horse.

More farmers fail because of poor farm management than because of poor production. This is to be expected, since the principles of crop growth are much the same as they always were, while the proper organization of the farm changes with every new invention. More farmers fail because the size of farm or kind of farming does not keep men, horses, and machinery properly employed than fail because of poor crops.

The successful farmer must plan his work ahead of time. It is not enough that he have a plan for field work. He should always have a plan of what to do if it storms. He must foresee most things that are about to go wrong and prevent them from going wrong.

2. The farmer as a mechanic. — Mechanical ability has always been desirable for a farmer, but in the last twenty years the great increase in the number of complicated machines has made this ability of much more importance than formerly. Grain and corn binders, manure spreaders, potato diggers, gasoline engines, and all the other new and expensive machines call for mechanical ability if they are to be used efficiently. There is something to farming besides taking a pleasure drive with a team of fine horses on one of these machines. A little carelessness or inexperience may cause a loss of more than a month's wages. Occasionally a farmer can depend on hired men for this mechanical ability, but usually he must not only be the mechanic, but must instruct the men and guard against their carelessness. There are still some kinds of farming in which machinery is little used, but more and more the farmer-mechanic with his machine is replacing the hand laborer.

3. The farmer as a naturalist. — The farmer has ever been a naturalist. He used to conspire with the moon and the almanac to coax nature to yield a bountiful harvest. But he has always had many good ideas on plant and animal growth, gained from his intimate companionship with his crops and stock. The farmer must always be a naturalist. The great fund of knowledge that has been acquired by the many generations of farmers is now being organized on a scientific basis, and some new knowledge is being added by investigation, so that we are coming to have a large body of knowledge about crop growth and animal feeding and breeding. The farmer is not now entirely dependent upon the experience of his community. He may learn from the experiences in other states and countries and from scientific investigation. If a farmer is to compete with his neighbors, he must study the science of plant and animal production. If he takes a keen delight in watching crops and animals thrive, it will add much to his pleasure, and, if tempered with good judgment, will go far toward bringing success.

4. The farmer as a skilled laborer. — A generation ago, the farmer was primarily a laborer. His machinery consisted of a wagon, walking plow, harrow, cultivator, hand corn planter, grain cradle, scythe, hand rake, flail, ax, hoe, pitchfork, and a few other tools. All of these were muscle testers. If he worked hard all day, he was ready for a night's rest. He did not have to read a bulletin on scientific agriculture to put him to sleep. Physical strength and physical skill were among the greatest assets, and were so recognized by all farmers. If a man had common sense, and if he and his wife were strong, their success was assured, for success was in raising each summer a little more than enough food and clothing for the winter.

Many persons, who are not closely in touch with farming, believe that the introduction of machinery has done away with the necessity for strength and skill in manual operations, but these will always be very important considerations for the farmer. Few people realize how hard it is to acquire this manual skill. The writer has had an opportunity to see the efforts of many city persons, and has been surprised to see how difficult it is to acquire manual dexterity. The children on the farm learn by years of practice. It takes thousands of efforts for the boy to learn to throw a baseball straight. Apparently it is just as difficult to learn to pitch hay. If this skill is acquired by ten years of practice in childhood, little is thought about it, but if it is to be acquired by a mature man, it is a serious undertaking. Milking, using a saw, using an ax, and a thousand other manual operations are hard for a grown person to learn; but if one has been used to manual labor so that he has trained muscles, new operations are not so difficult. Grown persons who have never learned to do manual work of any kind rarely become successful farmers. The time to train the muscles is when they are young. The prospective farmer who is skillful with his hands and likes to do manual labor has two of the very desirable traits for a farmer.

But some persons ask if the farmer should not spend all his time with business affairs and leave the manual work to hired help. There are instances on large plantations where the farmer need do no manual work, but the great majority of farmers must always work with their hands. In the factory one manager can supervise the work of a thousand men and can see all these men in a few minutes, but with most kinds of farming this would be men enough for half a county. If this factory manager can increase the effectiveness of each man by a little, he will earn a good salary. With most kinds of farming the farmer can use but one to five men. To have one idle manager for so few workers would make the expense of supervision ruinously large. The simple fact that the workers must always be scattered makes it necessary that the farmer be a worker as well as a manager.

The man who works with his men and who treats his men as equals usually gets them to do much more work and at the same time keeps them better contented. Where cheap labor is used, this is not always desirable, but it is the best way when the hired-man is the farmer's equal, as is the case in most parts of the United States, where the hired-man is a neighbor's son. We have learned how to plow with a team of three to six horses. We no longer have one man to hold the plow and one to drive, but we have not yet outgrown, nor are we likely ever to outgrow, the thought of Benjamin Franklin: —

"He that by the plow would thrive
Himself must either hold or drive."

5. Experience necessary for success. — A successful engineer would not expect to buy a bank and become a successful banker without some experience in the business, yet many men feel that since they have made a success

Fig. 1. — One of the better farm homes in the newer part of Texas.

in the city they can start farming without any experience and expect to make a profit at once. There is probably no occupation in which experience is more necessary and in which so much time is required to obtain the experience. City industries are very specialized. Farming calls for experience with weather, diseases, insects, plant feeding, animal feeding, breeding, machinery, business affairs, and a hundred other things that it takes time to learn. The only safe way for an inexperienced man to begin farming is by working for a good farmer. If one begins for himself, he should put his theories in cold storage and follow the practice of the most successful neighbors as closely as possible for the first few years. Even then he will make mistakes enough. The worst mistake of all is to assume that the farmers are all ignorant and unbusinesslike. They are the fathers and brothers of our mighty "captains of industry" and are usually as efficient for their conditions as the successful city man is for his.

Inexperience is so serious a handicap that farmers are very loath to hire any one from the city except for very

FIG. 2.— One of the better farm homes in Minnesota.

simple kinds of work, as picking fruit, picking up potatoes, weeding, and similar tasks.

If one desires to have a chance to learn all phases of farming, he should not expect much pay until he becomes of use. If an inexperienced person is allowed to use machinery and take care of stock and crops, the farmer is almost certain to have serious losses, unless he has another person to watch the beginner almost constantly.

6. The farm a home enterprise. — The home and the business are so closely united on the farm that success depends to a large extent on the home.

Much of the farm work is done in the house. The hired-man may be boarded, the milk pails are washed, the eggs are cleaned for market, and butter is sometimes made. In many cases the women help with the milking, take care of hens, work in the garden, and do other kinds of outside work. A limited amount of such outdoor work is a good thing for health and happiness. When the farmer is away, his wife usually takes the responsibility of seeing that things go well.

For these reasons, a single man or woman finds it difficult to manage a farm successfully. One may succeed in a city whether he has a family or not, but on a farm the chances are much better for married persons.

The young farmer usually hires out until he marries. This usually marks his start as a tenant, or, if he has the capital, his start as an owner. For success in farming, health, strength, and ability for the wife are almost as important as for the farmer.

On 947 farms in New York it was found that only 4 per cent of the families consisted of one person.[1] Many of these were widows and widowers who had not yet disposed of the farm. Very few men continue in farming unless they have wives or daughters, and very few women continue in the occupation unless they have husbands or sons. Farming is distinctly dependent on the home.

There are some cases where the farm is independent of the house. The hired men board themselves or live in boarding houses. If cows are kept, the dairy work is done in a dairy house. Some of these are successful farms, but most of them are owned by men who have the money and are willing to run a farm at a loss. For every such enterprise, there are probably a hundred where the farmer and his family are partners in the farm business.

One great advantage of farming as compared with city

[1] New York, Cornell Bulletin 295, p. 555.

life is that the farm furnishes work for children. Under modern conditions there are thousands of children who are more in need of a chance to work than of laws to prevent child labor. It is so hard to provide desirable work for children in cities that laws are passed to prevent them from working. This is not because work is bad for a child,

FIG. 3. — A typical farm home in western New York.

but because of the kind of work, the surroundings, or the danger of overwork.

Every child should have some regular work to do from the time he is five years old, when he begins to carry in a few sticks of wood for his mother. The city home cannot readily provide work for boys, hence they are often kept in idleness when not in school. The boy sees little of his father; all his companions are boys. On the farm the boy has companionship with his father as well as with boys. He helps his father work and feels that he is taking a man's part in the world. As he grows older, he learns how to do many things. He has responsibility for the care of live-stock. He learns that he must not neglect his stock, even if he is tired or desires to play. He learns the value of time. Every one who is to be of real use in the world must learn to work when he would rather not. No school can ever offer such an opportunity as the farm boy has. He has manual training, responsibility, and companionship with his father as well as school and play. No wonder that such a boy is better prepared for the world's work than is the boy who never did anything but go to school and play on the streets.

At the same time that the farm boy is being trained by work, he is contributing to the success of the farm. Occa-

Fig. 4. — One of the better farm homes in the East.

sionally a boy has to work too hard, but boys are not often injured by farm work.

This opportunity for the children is one of the considerations that leads many persons to be farmers, even though they may not expect so great financial success as may be had elsewhere.

The farm will always be somewhat isolated. The ability to entertain one's self is, therefore, a desirable trait for a farmer. Some persons secure entertainment by reading, by thinking, by watching crops grow, by seeing cows at pasture. Some families furnish their own music and are best pleased by the old-time songs without any vocal gymnastics. Other persons are never happy when alone. They need moving pictures, theaters, a new song every day, and crowds of people in order to be happy. The farmer sees fewer people, but gets acquainted with his own family. The family that can go a long way toward self-entertainment is in this respect best fitted for farm life.

7. The farm is not the place for the inefficient. — To manage a farm successfully requires business ability and

Fig. 5. — A negro cabin with two rooms. One of the better class.

skill in farm operations. Certainly this is not an occupation for inefficient persons. Nor can the farmer use unskilled labor to good advantage.

In 1890 there were 13.1 per cent of the farm laborers foreign born; in 1900 only 8.5 per cent were foreign born.[1] Many persons have wondered why the immigrants are not hiring out to farmers as much as they once did. One reason is that they are of less use than formerly. There was a time when the farm laborer from Europe made a good farm-hand as soon as he arrived, because so much of the work was done with hand tools which he had learned

[1] U. S. Dept. Agr., Yearbook, 1910, p. 191.

to use in the Old Country. The farmer from northern Europe is still useful on a farm; he knows how to care for live-stock, but little about machinery. Few farmers from southern Europe know much about either. The man who knows nothing but how to use a hoe, spade, and scythe is not of much use now. Of course he can learn how to use horses and machinery, but in the meantime he may do more harm in a few minutes than he can pay for in a month. Naturally he drifts into work where he is of immediate use.

There are some kinds of farming where such labor is valuable. Around some cities truck growing is passing into the hands of Italians. Nearly everywhere Italians or other cheap laborers are hired for growing vegetable crops. The same is true of sugar-beet growing. Farmers near cities often ship out such labor for temporary use in picking fruit, picking up potatoes, for ditching, and for other operations where unskilled labor can be used. Some cheap labor is used in dairying, but the demand for clean milk makes it very hard to use ignorant labor. No one can produce clean milk who does not have a clean body and a clean mind. Cotton picking is the most extensive farm operation using unskilled labor.

Farm work is individual work. Each worker has to take responsibility. It is not often possible to give such supervision as can be had in a factory, because the number of workers that would be employed under one roof in a factory may be scattered over half a county. Each worker must be a foreman of his own work, and usually the owner must work, because he cannot supervise enough workers to justify him in being idle. The man who is afraid that he will work overtime is of no use on the farm. A storm may come up, stock may require unusual attention, or the owner may be called away. The farm-hand, as well as the owner, must be a man who will finish his job.

Well-meaning persons have tried all kinds of philanthropic schemes for putting the submerged population from the cities on farms. Such attempts always have failed and always will fail, except in the few instances where the submerged man has real ability. The inefficient person is much better off in a city, where he can sweep streets, dig ditches, or work in a factory. Under constant supervision, such as can then be given, the most will be gotten out of his feeble talent. He will there contribute most to the world and will receive a better reward than he can obtain on a farm. There is now a tendency for the extremes to move to cities, the inefficient and weak-willed and the strong executive to manage them.

Usually the attempt to place inefficient persons on farms is further doomed to failure by the kind of land chosen. In nearly all cases cheap or abandoned land is chosen — land on which the most intelligent farmers have failed to make a good living. If such persons are to be placed on farms, they should have the best land. They have handicaps enough without adding the one almost insurmountable one of poor land.

This does not mean that reform schools and similar institutions should not be on farms. This is the best possible place for such institutions. A discussion of such farms is given in Chapter 20.

8. Summary of personal traits of successful farmers. — From a study of the most successful farms, it is found that the preceding qualifications are desirable. Occasionally a man makes a fair success when he has no particular qualifications except muscle, but success under this condition is much more difficult than formerly. Occasionally a good executive makes a fair success when he does no manual work, but higher profits are usually made by those who combine executive ability with labor. Some very successful men have very little mechanical ability, while a good mechanic may fail. Sometimes the mechanical genius spends so much time puttering with his tools that he does not get time to use them in raising crops. Good common sense, which is another definition for business ability, is the most important trait, but the highest profits are made by those who combine this ability with experience, scientific knowledge of plant and animal production, manual and mechanical skill, and hard work.

PROFITS TO BE EXPECTED IN FARMING

9. Comparison of farming with other occupations. — In order to compare farming with other occupations, we must consider the capital invested, the safety of the capital, the average income, the average number of hours of labor, and the cost and standard of living.

Such a comparison is very hard to make. The farmer goes without many things that the city man enjoys, but has many things that are luxuries for the city. In each case the value of the things to be had cheaply is underestimated, while the value of the things denied is overestimated. Each one is impressed with the greater pleasures that the other has. We find the aim of many farmers to be to make enough money to be able to retire to town, while the city dweller hopes to save enough money so that he may be able to retire to a farm. In each case the pleasures left behind are better appreciated when they are out of reach.

The hours of labor on a farm are usually longer than in the city, but when allowance is made for the trip to and from work, there is not much difference. The successful farm owner works long hours, but so does the successful business or professional man in a city.

One advantage of farming as of any other independent business is that one does not face a "dead line." If one who works on a salary loses his position when he is past middle life, he is likely to find it hard to get another, because young men are wanted.

10. Ways of measuring profits. — If all business expenses are subtracted from the farm receipts, we obtain the income that has been produced by the farmer and his money. If from this we subtract the value of his work, we can determine the per cent made on the investment. If instead we subtract the interest that his money would have earned if placed at interest, we will have left the pay that the farmer received for his year's work or his labor income.

If the capital is very large, the rate of interest made on the capital is the more important figure, but with the amount of capital that is usual in farming, the labor income is much more significant. Furthermore, the interest rate is easily determined, while it is difficult to estimate the value of the farmer's labor and supervision. If a farmer makes a labor income of $300, it means that his farm has paid interest on the investment at the prevailing rate in the region, has paid all business expenses, and has left $300 to pay for the farmer's management and labor.[1] If a

[1] In calculating labor income, the value of board of hired labor is counted as an expense, but no personal or living expenses are counted. If the farmer's sons or other members of the family do farm work without pay, their labor is counted as an expense and rated at what they would

farmer's labor income does not equal hired-man's wages, he would be as well off if he sold his farm, placed his money at interest, and hired out.

11. Comparison of labor income with city salaries. — The labor income made on a farm is one of the best measures of its efficiency. Labor incomes show which farmers are making most for their year's work. In addition to his labor income the farmer receives the use of a house and some products for home use. This gives a measure of profit that is very good for comparing farms and is comparable with hired-man's wages. It is not intended for comparison with the city, but may be suggestive for such comparisons. In order to compare with city salaries, we must add to the labor income the amount that the house rent and farm produce used by the family are worth.

12. Labor incomes made by farmers. — In Tompkins County, New York, in 1907 the average labor income made by 615 farmers was $423. About one-third of the farmers made less than $200, about one-third made $200 to $400, and one-third made over $400. Or, one-third failed to make hired-man's wages, one-third made wages, and one-third made more than wages.[1]

The house rent and farm products used in the house in this region probably average about $300, so that these farmers average about as much as a $700 salary in the city.

have received had they worked for their neighbors. An increase in stock, feed, or other inventory items is counted as a receipt; a decrease is counted as an expense. In succeeding pages Livingston and Tompkins counties are referred to. In these counties interest was counted at 5 per cent, but taxes were not included with expenses. These averaged about ½ per cent, so that the labor incomes in these counties are pay for labor above 4½ per cent interest on capital. Taxes should be included and were included in Jefferson County because money can be loaned on farm mortgages for 5 per cent net.

[1] New York, Cornell Bulletin 295, pp. 396–397.

They can save more than they could on this amount in a city, because they go without many things that they would be tempted to buy in a city.

Some of the farmers made much less than hired-men receive; some received nothing for their year's work and lost money besides. Others made very good profits. Nine per cent of the farmers in this county made labor incomes of over $1000, and one per cent made over $2000. This is a general farming region that is about as prosperous as most of the North Atlantic States.

In northern Livingston County the average labor income on 578 farms in 1909 was $666. This is one of the most prosperous regions in the United States. This labor income added to the value of house rent and farm products would probably be equal to about $1000 in a city. Again, some of the farmers worked for nothing, while others did well. One hundred fifty-three, or 26 per cent, of the farmers made over $1000, and 34, or 6 per cent, made over $2000. The highest was $7780.

Jefferson County, New York, is a dairy region. Very little is sold except milk and hay. The average labor income of 670 farms in this county in 1910 was $609. One hundred forty-five, or 22 per cent, of the farmers made over $1000, and 17, or 3 per cent, made over $2000. The highest was $4222.

Labor incomes on 178 farms scattered about New York State, many of them noted farms, showed 14 making labor incomes of over $2500.

The results on 2932 farms in New York have shown but 10 making labor incomes of over $4000. The highest was $9490.

The average labor income of 266 farmers in southern New Hampshire in 1909 was $337. Half of the farmers made less than $200. Eleven per cent of them made labor incomes over $1000; none made as high as $2000.[1] One of the chief aims of this book is to disclose the principles of farming that result in the larger profits.

Similar studies in the Central West, on the Pacific coast, and in other parts of the United States indicate that in the best regions the farmers' labor incomes rarely average over $500. It is not probable that the average for the United States is as much as $300, or about one dollar per day for the farmer's labor.[2] Besides this, the farmer makes interest on his capital and has a house and some farm products.

13. Profit on real estate. — The figures given above do not include any profit due to increase in the value of real estate. This may be a source of loss or may bring more profit than the farm business. Many farmers in parts of the United States, particularly in the Central West, have made most of their money on the rise in land values. Many a farmer who never made more than a living while on the farm has retired on the increased value of his land.

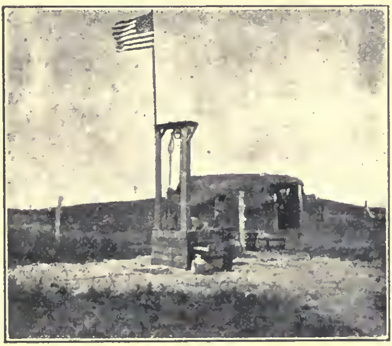

Fig. 6. — A pioneer's barn.

Real estate will probably always be a part of the farm business. In buying a farm the probability of a rise in

[1] U. S. Dept. Agr., Bureau of Plant Industry, Circular 75, p. 8.

[2] The Farmer's Income, U. S. Dept. Agr., Bureau of Plant Industry, Circular 132.

value of land is one of the very important considerations. But the gain from this source will gradually decrease as the country grows older. There are still parts of the country where good land is for sale for much less than it is really worth. Doubtless many farms will double in value in the next twenty years. But we will probably not see such a wonderful land boom of a large area as occurred in the Central West from 1897 to 1912. It does not now appear as if this land would go much higher until other parts of the country have had their prices adjusted.

FIG. 7. — A pioneer's sod house. Part of the so-called "unearned increment" in land values was earned while living in such houses.

Many of the fortunes that are attributed to farming are due to buying land when it was cheap and holding it until it became valuable. We should distinguish clearly between profits from producing crops and animals, that can probably be repeated, and profits from real estate that are not so likely to occur again.

14. Safety of the investment. — While farming does not offer large profits, yet it offers comparative safety for the capital invested. The very fact that credit is much easier to secure on city enterprises of equal size makes the chance of loss of capital greater. Farm land is a comparatively safe investment. A farmer finds it difficult to borrow enough money to make the capital unsafe. This does not apply to renters. All their capital is invested in stock, equipment, and costs for the growing crops. It is possible to buy machinery and horses on time so that a tenant may be too much in debt to be able to weather hard times or poor crops. Stock may die, crops may fail, or prices may be low. If a sale is necessary, the loss is very heavy. Second-hand machinery does not sell well. The conditions that cause the tenant to sell usually affect the possible buyers so that they are not likely to offer good prices for stock. The tenant's capital is not a very safe investment compared with city enterprises.

15. Estates left by farmers. — Another way of judging profits in farming is by the estates left by farmers. In most parts of the United States the total savings of the life's work, together with what has been inherited, commonly amount to $3000 to $15,000. In most parts of the country the majority are nearer the lower figure. Estates of farmers who have never done anything but farm are very rarely as high as $25,000, except in the most favored regions. In the Central West during the past 15 years estates of $50,000 or even $100,000 have not been uncommon. These are usually due to increased land values.

16. Summary of profits in farming. — When comparing farming with city work, the mistake is often made of comparing farmers who have $5000 to $40,000 capital with teamsters and day laborers in cities. Farmers cannot be compared with any class in cities, because the farm does not sort men so closely as does the city. Among farmers there are some who may be compared with teamsters, but a larger number are the fathers and brothers of bankers, lawyers, doctors, engineers, business men, and "captains of industry," and have quite as much ability as these men. Neither should we make the mistake of comparing the city man who rents his house with the farmer who owns both his house and business. If the city tenant has only a rented home, we must remember that there are farm tenants who have the same conditions.

The relative profits on the farm and in the city vary from time to time, as there are cycles of over and under production of farmers. From 1870 to 1895, farm opportunities were very poor compared with the city. This is now being followed by better times for farmers and will probably again be followed by overproduction within a generation. The cycles of good and bad times on farms last for about a generation.

Farming is a conservative business. Money invested in it is comparatively safe, but it is evident that it does not offer much opportunity to make a fortune. Neither is there so great danger of poverty as in the city. The city is a place of extremes. The farm is more moderate both in its successes and in its failures. It is not often that a person engaged in farming can retire while young, but it is possible to make a good living by farming. With diligence and good management, one may hope to make a comfortable living on a farm, to be able to travel some, to be able to send his children to college, and to have something for his old age. Beyond this, it is doubtful if much of an estate is for the best welfare of his children.

COST OF LIVING ON FARMS

17. Cost of living on farms and in cities. — While the usual pay that the farmer gets for his time is small, yet the living expenses are also low. It is usually said that the farmer gets half his living from the farm. While there are many exceptions, it is probable that this is about right on the average. The food for families in New York City in 1907 with an income of $1000 per year cost on the average about $451. Families with $1500 income spend an average of about $572 for food.[1] With larger incomes the cost of food increases, but is a smaller proportion of the total expense. Farmers nearly always underestimate the value of products furnished by the farm, and city persons are just as prone to overestimate it.

A part of the reduced cost of living on farms is due to a reduced living as well as a reduced cost. Not all farm families live on the fat of the land. More frequently the best is sold. The chief items in the cost of living in city or country are not food, but the miscellaneous items. On many of these the farmer saves because he goes without. Most conspicuous of these is a bathroom and running water. Running water and sewage disposal can be had at small cost in the city, but on most farms are very expensive for installation and still more expensive for operation. The cost of higher education is another very expensive item for the farmer. Usually his children must be furnished a horse to drive to high school, or must pay board while attending. In the city the children can go through high school and often through college while living at home.

The farm-grown produce and the house are usually cheaper on the farm. Less expensive clothing is needed. Horses for pleasure driving are cheaper.

There are many items in the cost of living that are cheaper in cities than on farms. Schools, libraries, churches, and theaters are cheaper because of less cost to get to them. Running water is much cheaper. Light is cheaper, if the farmer is not content with kerosene lamps. If the farm produces wood, it is cheaper than in the city, but if fuel is purchased in town, it is cheaper there because of less expense in hauling. All food that is shipped from

[1] R. C. Chapin, The Standard of Living among Working Men's Families in New York City, p. 70.

other regions is usually a little cheaper in large cities than in the small town where the farmer makes his purchases.

One of the chief reasons why living may be cheaper on the farm is because the farmer can live his own life. If he has money to spend, he can find ways of disposing of it. If he needs to economize, he can do so. In the city the standard of living is not so flexible. One of the chief reasons for the high cost of living in cities is the effort to live as other people do. The custom of using all the salary as fast as it comes is so general that it is hard to resist the pressure. The farmer sees fewer cases of expensive living. He is much freer to economize.

18. Products furnished by the farm. — Table 1 gives the average quantity of products furnished by the farm on 106 farms in northern Livingston County, New York, as found by H. N. Kutschbach. This is one of the most diversified farming sections in the United States as well as one of the most prosperous. The diversity of farm products as well as the prosperity makes the quantity used in the house very large, probably at least twice as large as the average for the country.

The average number of members of the family living at home was 4.2. The average number per family, including hired help boarded, was 5. These families are considerably larger than the average, again indicating a prosperous region. The total value of food furnished by the farm averaged $249 per farm. In the same year it is probable that this same food would have cost $350 in nearby cities if bought in quantities, and it might have cost $500 in small lots. It must be remembered, however, that in few farming sections is so much furnished by the farm, and that about one-fifth of this was used for boarding hired help.

On 22 farms in Minnesota in 1907 the average value of produce furnished by the farm for use in the house was $199.[1]

TABLE 1. AVERAGE QUANTITY OF PRODUCE RAISED ON THE FARM AND USED IN THE HOUSE, 106 FARMS IN LIVINGSTON COUNTY, NEW YORK, IN 1909

PRODUCT	AVERAGE AMOUNT PER FARM	AVERAGE AMOUNT PER INDIVIDUAL	AVERAGE VALUE PER FARM	AVERAGE VALUE PER INDIVIDUAL	PER CENT OF FARMS USING
Potatoes	50.3 bu.	10.1 bu.	$28.15	$ 5.63	100
Beans	35.0 qt.	7.0 qt.	2.19	.44	80
Wheat flour	738.0 lb.	147.6 lb.	22.14	4.43	63
Buckwheat flour	3.7 lb.	.7 lb.	.13	.03	7
Apples	23.6 bu.	4.7 bu.	11.81	2.36	90
Milk	730.7 qt.	146.1 qt.	29.96	5.99	96
Butter	133.9 lb.	26.8 lb.	38.29	7.66	87
Eggs	103.3 doz.	20.7 doz.	22.72	4.54	99
Honey	6.4 lb.	1.3 lb.	.85	.17	16
Wood	22.8 cords[2]	4.6 cords[2]	40.99	8.20	83
Other fruit			8.92	1.78	82
Garden crops			14.65	2.93	90
Poultry			15.26	3.05	95
Other meat			54.06	10.80	93
All other produce			.40	.08	4

[2] Eighteen inch wood.

Probably the same materials could not have been purchased in a city for much less than $350 to $400. Again, a part of this produce was used for boarding the hired-men, so that it is not all to be counted as a gain on the family cost of living.

Table 2 shows the quantity of some of the farm products used per farm on 22 farms in Minnesota. These farmers are producing more butter, eggs, and meat for home

[1] Journal of Home Economics, Vol. I, No. 1, pp. 34-51.

use than are the farmers in Livingston County, New York, but are not using so much fruit and vegetables.

TABLE 2. QUANTITY OF CERTAIN PRODUCTS RAISED ON THE FARM AND USED IN THE HOUSE, AVERAGE OF 15 FARMS IN 1906 AND 22 FARMS IN 1907 IN MINNESOTA[1]

Milk	1221 qt.
Cream	125 qt.
Butter	200 lb.
Pork	365 lb.
Beef	201 lb.
Veal	34 lb.
Mutton	9 lb.
Poultry	79 lb.
Eggs	195 doz.

[1] Data furnished by the Minnesota Agricultural Experiment Station. The number of persons per family was reduced to the equivalent in men and averaged 4.6; that is, the number of persons would probably use as much food as 4.6 men.

19. Cost of living on farms. — Table 3 shows the cost of living on 106 farms in Livingston County. It does not include the value of man or horse labor used by the family or the value of the time of the farmer's family in doing household work. The total cost of living per family averages \$915, or \$183 per individual. The costs per individual varied from \$81 to \$523, but 86 per cent came between \$100 and \$300 per individual.

The farm furnished 62 per cent of the food used and half the fuel. Counting the value of the use of the house at 8 per cent of the value of the house (in addition to the cost of repairs), we find that the farm products furnish 45 per cent of the cost of living.

On the 22 farms in Minnesota the average value of produce furnished by the farm was \$199. The average amount paid for groceries and fuel was \$195; for house furnishings, \$25.

TABLE 3. — COST OF LIVING ON 106 FARMS IN LIVINGSTON COUNTY, NEW YORK, IN 1909

	AVERAGE PER FARM	AVERAGE PER INDIVIDUAL
Furnished by the farm.		
Food	$249	$50
Fuel	41	8
House rent (8 per cent of value)	126	25
Cash expenses.		
Food	152	30
Fuel and light	41	8
Household expenses, furniture, bedding, clothing, dishes	93	19 [1]
Repairs on house	52	10
Household help	51	10
Miscellaneous expenses, books, papers, postage, church, carfare, telephone, amusements, doctor's bills, Grange dues, etc.	110	23 [1]

[1] Miscellaneous expenses are divided by 4.2, as the hired help do not share in these. Household expenses are a little too low per individual, as the hired help do not share in all these.

THE FARM FROM THE STANDPOINT OF THE HIRED-MAN

20. Opportunities as a farm-hand. — The farm-hand who receives $25 per month with board and washing can readily compare his wages with the wages in a city where he would usually pay $15 to $30 per month for board and room and $2 to $3 for washing. In most parts of the country his $25 is as good as $50 per month in a city. If he is inclined to save, he will find it much easier to save on the farm, even if he gets only half the wages.

A married man on a farm, who receives house rent and more or less farm products, will usually find that he needs double the farm wages if he is to live equally well in a town or city.

There is little chance on the farm for an able man to advance in pay as he can in the city. Of course, a good man will receive more than a poor one, but the farm does not offer the chance for increase in wages that is offered in the city. The farm does not need so many grades of men. The farmer himself is the foreman and everything above that grade. Only here and there is there a farm that needs high-priced men. The hired-man who proves his worth will receive his reward by being able to rent a good farm, after he has saved some money.

The place of hired-man should be looked upon as a stepping-stone to rental and ownership. For this reason he should consider the value of the experience that he is going to get as well as the wages. Very many of the most successful farmers in every region are following a system of farming that they learned while working for a good farmer.

Very few men continue as farm-hands for many years. If they are able men, they change to tenant; if they are not good men, they usually drift to cities, where they can be used in gangs. Most of the farm-hands in the United States are young men who will later be farmers. The chief exceptions are harvest and seasonal help shipped out from cities, and the negro.

THE FARM FROM THE STANDPOINT OF THE TENANT

21. Opportunities as a tenant. — Tenancy is a second step toward ownership. Few persons expect to remain tenants permanently. Many tenants secure land on such terms that the rent is no more than interest on the land. The best forms of renting for the tenant are usually those in which the landlord does the least supervising. Not because his supervision is of no value, but because the system of rental is so adjusted that he gets paid for the supervision. If the tenant has the ability, he should supervise himself. If a tenant secures a good farm, he may hope to get ahead enough to buy a farm and make a part payment before many years. (See also Chapter 9.)

FARM INVESTMENTS

22. Land as an investment. — Persons who do not desire to be farmers often invest money in land. This is the very common outlet for surplus money in the Middle West. The rise in land values has greatly stimulated this movement. Under such conditions it is possible to have inflated prices, but, in general, land wisely purchased is a conservative investment. It usually pays a moderate rate of interest. In a new country the rental system is simple, and little attention is given to keeping up the land. As the country develops, farm property requires considerable attention from the landlord or his agent. Those who wish investments that will not call for much attention then prefer stocks and bonds. The most satisfactory way to handle farm property held as an investment is to rent it. It is rarely so profitable to hire a manager unless the owner understands farming and lives on the place or can give it constant attention.

One must never expect so high returns when he invests money as when he goes into business with his money. Money lent on farm mortgages is usually safe, and calls for very little attention, hence the rate of interest is moderate at the present time, — about 5 per cent in the North Atlantic States, 6 per cent in the Middle West, and 8 per cent in the South and on the Pacific coast. These rates are constantly changing. Cash rent involves more attention and on the average brings a little more returns than mortgages. Share rent, particularly if the animals are shared, involves much more attention on the part of the landlord and brings considerably higher returns. In each step, the landlord is coming nearer to going into business with his money, and so is entitled to greater returns. In Tompkins County, New York, when money was being loaned on mortgages at 5 per cent, landlords who rented for cash made an average of 5.2 per cent, and those who rented for a share of all products made an average of 9 per cent.[1]

THE BACK-TO-THE-LAND MOVEMENT

23. The aims of the movement. — Much of the back-to-the-land movement is an attempt to send persons to farms in the hope that this will result in more produce and so decrease the cost of living. Some of it is a desire of the city to get rid of its paupers. The subject is much confused, because many persons call a patch in the suburbs a farm. Men of wealth have country homes on which they play at farming. The alluring articles on the subject have led some persons of small means, who do not have the capital or experience necessary for success in farming, to buy farms whose value they were even less qualified to judge. Much of this exploitation has been encouraged by the mistaken idea that any "little farm well tilled" will support a family. The real estate dealer does not know any better, or if he does he does not tell. He has been very willing to find the attractive bargains desired. The farmer who owns the land consents to part with it when he gets enough more than it is worth for farm pur-

[1] New York, Cornell Bulletin 295, p. 541.

poses. He often has the pleasure of returning to the city one of its gold bricks with compound interest. He can then retire to town to take the house made vacant by the new farmer.

There are some fundamental principles of the adjustment of population between city and country that need to be considered by all persons interested in the question.

FIG. 8.—A comfortable farm home of a lawyer who went back to the farm in the Shenandoah valley.

24. With better farming fewer farmers are needed.— President Gilmore of the College of Hawaii, who spent some years teaching agriculture in China and the Philippines, estimates that 70 per cent of the Chinese are farmers. Others place the estimate as high as 80 per cent. Each man farms about 2 acres of land. Yet the greatest need of China is more men. Land is idle because, with the methods used, there are not men enough to farm it. Railroads and industry are held back because of shortage of men. The first step in progress is for each farmer to use machinery and animal power so that he can work more land. This would allow a larger proportion of the population to do other things.

In the days of our forefathers, the entire family worked on the farm. Little time was spent in going to school, in reading, or in travel, yet the few farm tools were so crude and the farming so poorly done that a family raised little more than it consumed. Work as hard as they could, the family was often threatened with famine. Nearly all persons had to be farmers to live. In India and China we have much the same condition to-day. One family raises little more than it uses, hence a very large part of the population are farmers. So long as this condition continues, it is impossible for a high state of civilization to develop.

When our fathers began to use machinery and better farming methods, it became possible for one family to produce enough to feed two families. This made it possible for half of the population to do other kinds of work. At the same time, the farmer became a purchaser of articles that formerly were unheard-of luxuries.

If civilization is to progress, this movement must continue. It allows men to engage in research and invention, to write books and magazines, to manufacture and transport the things that a higher civilization demands. Best of all, it allows the youth of the land more years of schooling. *All progress in civilization depends on having each farmer produce more than his father produced.*

Iowa furnishes an excellent illustration of increased efficiency of farmers. Farmers have learned to drive three-, four-, and five-horse teams. This has resulted in a decrease in rural population. Rather than a calamity, this decrease in population is an evidence of a wonderful increase in efficiency of farmers. The people of Iowa have not died. The sturdy sons, who have learned how to use human labor to such good advantage, have moved to Texas, Washington, Canada, and all the country between, and wherever they have gone they have been efficient.

With the spread of the improved methods that are used by our better farmers, it is probable that the time may soon come when one farmer will raise enough to feed five or six families. When this time comes, only 15 to 20 per cent of the population will be farmers. These farmers will purchase many things not yet invented, and all civilization will have taken a long step forward.

This means that we shall have a constant movement to cities, but there will always be a small number going from the city to the farm because they prefer farm life. The balance of the movement must always be cityward, so long as farmers continue to become more efficient.

All these fundamental principles are lost sight of by the enthusiast who would have everybody (except himself) go back to the farm. If any further evidence is needed of the futility of striving against an economic law that is as firmly established as the law of gravitation, this evidence is furnished by the few persons who have really gone from city to country, as a result of all the agitation and yards of writing on the subject.

25. Why the farm boy went to town. — The Civil War removed so many persons from production that prices were very abnormal. With the war over, the soldiers and others rushed to the great fertile prairies of the Central West, hoping to raise crops and secure these big prices. Just as they became well established, new machinery began to be introduced: binders, drills, gang plows, check row corn planters, and big threshing machines, making one of the most important and most dramatic revolutions of history. These machines so increased the productive capacity of the farmer as to result in great overproduction of crops. The proportion of the population required for farming was suddenly decreased so enormously that a rush to the cities was necessary. But men could not go fast enough to keep the balance between city and country. There were too many farmers! The overproduction was so serious that from 1875 to 1897 we had the most serious agricultural depression that the country has ever experienced. As late as 1896, the average price of corn on farms in Nebraska was 13 cents per bushel of shelled corn.[1] The corn from my father's farm, as good corn as ever grew, sold for 8 cents. In 1897, the average price for this state was 17 cents.[1] The Eastern farmers were even worse off. They had purchased their farms at inflated prices, and not only worked for almost nothing, but lost capital besides.

All this time, great fortunes were being piled up in the cities. The farm boys moved to town by the hundreds of thousands, because the city offered good wages and farming did not pay. This movement was the best possible thing for the country, and, in the vast majority of cases, was best for the individual.

26. The remedy is automatic. — When the balance of society is thrown so far out of adjustment, the tendency is to swing too far to the other extreme. The rush to the city continued a little too long, but no back-to-the-farm movement is necessary, or even desirable. A large proportion of the farm boys are now remaining on the farm, because it pays. It required only a few years of good prices to check the rush to cities. A good index to the

[1] U. S. Dept. Agr., 1897, Yearbook, p. 723.

situation is given by the agricultural college students. A few years ago, practically none of these returned to farms for the very good reason that they could not afford to do so. To-day the great majority of these students are planning to farm at once, or as soon as they can get the necessary capital.

There may be some danger that we shall keep too many boys on farms and again have an overproduction of farm produce ten or twenty years from now, when all these boys become farmers. Both city and country will be best off if the adjustment of population takes place without such violent shifts as the past generation experienced.

27. Movement to cities must continue. — It is not necessary, or desirable, that all farmers' sons remain on the farms. Much less is any large movement back to the farm desirable. There will always be some persons born in cities who are country-minded. These should go to the farm. But so long as farmers become more efficient, we will need a smaller and smaller per cent of the population engaged in farming. Farming paid so poorly that the flood to cities continued a little too long. It has already been stopped. It cannot be reversed. We will now expect a gradual current from farm to city, and a limited number of persons will always be going from the city to the farm.

28. How then may the city secure cheaper food? — A considerable part of the agitation on this subject is a desire of those who live in cities to get more persons to go to the farms in the hope that food prices will go down. We are not likely to again see such cheap food. Prices were so ruinously low that, even with virgin soil, the farmers could not make wages. During this period of cheap food, a very complicated and expensive system of handling farm products developed. In 1912, the New York State Food Investigating Commission estimated that the food supply for New York City cost 350 million dollars with all charges paid at the railroad terminals. This same food cost 500 million dollars when it reached the kitchens. This increase of 45 per cent is attributed to wasteful methods rather than excessive profits. The farmers did not receive the 350 millions, as the products had already been handled many times. Persons who desire to reduce the price of food had best turn their attention to the very wasteful system of handling farm products from the time they leave the farm until they reach the consumer. This is a city problem. The farmer is not likely to solve it. He does not understand city conditions. Half of the present expense of trading in farm products ought to be eliminated. Here is a problem worthy of the best thought.

29. Back-to-the-village movement. — "It seems to me that what is really needed is a back-to-the-village movement. This should be more than a mere suburban movement. The suburban development enlarges the boundaries of the city. It is perfectly feasible, however, to establish manufacturing and other concentrated enterprises in villages in many parts of the country. Persons connected with these enterprises could own small pieces of land, and by working these areas could add something to their means of support and also satisfy their desire for a nature-connection. In many of the villages there are vacant houses and comparatively unoccupied land in sufficient number and amount to house and establish many enterprises; and there would be room for growth. If the rural village, freed from urban influences, could then become a real integrating part of the open country surrounding it, all parties ought to be better served than now, and the social condition of both cities and country ought to be improved. We have over-built our cities at the expense of the hamlets and the towns. I look for a great development of the village and small community in the next generation; but this involves a re-study of freight rates." [1]

THE FARM AS A HOME FOR PERSONS OTHERWISE EMPLOYED

30. The farm as a home. — There are relatively few city persons who become farmers in the sense of making their living from a farm, but all over the country there are thousands of persons who live on farms while continuing their town or city business. Around every town and village, and for many miles out from the large cities, there are persons who have some other business than farming, but who live on farms. The custom is most prevalent in the East, not only because of the larger population and more railroads, but because farms are so cheap. There are great numbers of persons who have demonstrated that this is a desirable and economical way to live.

In Tompkins County, New York, the United States Census includes as farms about 500 small places that are occupied by persons who have some business other than farming. Many large farms are occupied in the same way. This county is not near any large city. It is 250 miles from New York. Ithaca, in the center of the county, has a population of about 15,000. There are a few small villages. A study of the larger places in six townships was

[1] L. H. Bailey, The Country-Life Movement, p. 26; see also his contrasts between the country-life and back-to-the-land movements.

made in 1907. Besides the small places, there were 42 farms among 983 that were occupied by persons whose chief business was something other than farming. Many others derived some income from outside work.

Among the occupations represented on the 42 farms were: laborers, politicians, carpenters, mechanics, engineers, store keepers, mail carriers, road commissioners, teachers and professors, salesmen, stock dealers, butchers, millers, lawyers, glass blowers, creamerymen, and others.

The average size of the farms was eighty acres. The average capital invested was $3804. Some of the owners worked on their farms nights and mornings. Most of them worked during their vacations and other spare time. This time averaged about one-fourth of the year. On the average the farm receipts were $296 above the farm expenses. The average pay for their regular work was $614.

With the same investment they could have lived in about equally good houses in town, but would not have had farm products for home use and would probably not have earned much of the $296. By living on farms they have gained half of their food and about $300 per year besides. They have increased their incomes by about 50 per cent, besides having the use of a house and farm products.

As an example, one man worked most of the year as a farm-hand, for which he received $375. He owned a farm of twenty acres, with a total capital of $1326. He kept two old horses worth $110, raised two and one-half acres of potatoes from which he sold $200 worth, kept one pure-bred Holstein cow from which he raised a heifer calf worth $50, and sold $93 worth of milk. He also kept about sixty hens from which he sold $109 worth of eggs.

Other sales were hay $89, hogs $85, poultry $6. His farm receipts exceeded the expenses by $202.[1]

The farm evidently offers an excellent opportunity for persons who are otherwise employed but who can arrange to live on a farm. The living expenses are much reduced, and the farm may frequently be a source of revenue besides.

31. An example of a city man on a farm. — On one of the farms mentioned above, a careful daily record was

FIG. 9. — The farm garden that produced $80.12 worth of products.

kept of the produce furnished for home use. Most of the time the family consisted of five persons. They were experienced in farm work, as both parents had grown up on farms. The farm had been purchased three years before, at which time all the small fruits were set. The apples, cherries, and pears came from a small orchard that also produced fruit for sale. The garden contained three-fourths of an acre. Considerable care had been given to planning and developing it for three years, but

[1] New York, Cornell Bulletin 295, p. 562.

the garden was so arranged that only a small amount of labor was involved. All the labor, except the gathering of products, was done by hired help. It required about 100 hours and cost $21.16. The horse labor was valued at $5.52. The garden was the best one seen in the county, so that it represents the possibility and not the average.

Table 4 shows the number of times that products were gathered and the amount that these would have cost, if purchased at the local stores. The number of meals of each was more than the times gathered, as enough for more than one meal was usually brought in.

It will be seen that this family makes an unusually large use of milk, eggs, and apples. In the next year, a little less garden produce was grown, but more cherries, peaches, plums, and quinces were raised, and a veal calf was butchered for home use. The purchased food for this household amounted to $225.10 for the year. It would not be safe for a city family without farm experience to count on doing so well. It must also be remembered that the products are charged at what they would have cost to buy. If one were selling, the milk would have been 3 cents instead of 6, and many other things in about this proportion.

On this farm of 90 acres the receipts for products sold paid all expenses except interest and left $135 to spare. The family, therefore, received this amount, the use of the house, and the farm products used in the house as interest on the investment. If they had lived in town, the same investment would have been required to buy an equally good house. The reduction in the cost of living enabled the family to save money. They could not have saved much of the salary, if they had lived in town. Of course, they had certain inconveniences that some persons

TABLE 4. — FARM PRODUCTS USED BY A FAMILY LIVING ON A FARM BUT EMPLOYED IN A CITY

	TIMES GATHERED	VALUE
Garden products.		
Asparagus	31	$4.56
Beans, string	27	1.91
Beans, for winter, 8 qt.		.80
Beets	9	.41
Beets, for winter, 2 bu.		.50
Blackberries	3	.30
Cabbage		1.00
Carrots for winter, ½ bu.		.30
Celery, 350 for winter		15.00
Chard	3	.13
Currants, 18 qt.		1.80
Gooseberries, 17 qt.		1.70
Grapes, 60 qt.		3.00
Horseradish	2	.20
Lettuce	15	.84
Onions	5	.17
Onions, for winter and to pickle		.95
Peas	23	1.51
Potatoes, new	33	2.40
Potatoes, 24 bu. for winter		18.00
Radishes	21	1.06
Raspberries	17	3.83
Rhubarb	12	.73
Salsify		5.00
Spinach	15	1.36
Strawberries, 45 qt.	15	5.40
Sweet corn	13	.78
Sweet corn, to dry		.75
Squash, summer	3	.30
Squash, for winter		1.00
Tomatoes	9	3.68
Tomatoes, to cellar for fall		.75
Orchard and farm.		
Apples, 37½ bu.		29.25
Cherries, 44 qt.		2.21
Peaches, ¾ bu.		1.00
Pears, 1 bu.		2.00
Eggs, 321⅓ doz.		81.36
Poultry, 38 chickens		20.90
Milk, 3009 qt.		180.54
Wood		10.00
		$407.38

would not accept, even if they did have to spend all their income.

SOME THOUGHTS FOR THE FARM BOY

32. The choice of an occupation. — One of the most important decisions in the life of every person is the choice of an occupation. One should carefully consider the advice of his parents and friends, but the final decision must be made by each individual for himself. It is not at all necessary that every boy follow his father's occupation. What distinguishes America from the old world is the mobility of its society. Every boy may do what he likes. He is not held by tradition. We must strive to maintain this freedom for all time. It is just as important as a free government.

Each person should choose the occupation in which he will be of most use in the world. Even from the selfish standpoint, this is usually best. The ultimate rewards in money and in pleasure are usually largest when one is doing the work that he can best do.

The farm boy has had a good apprenticeship that would require several years to acquire. This is a valuable training for any occupation, but is likely to be of most value in farming or in experiment station or agricultural college work.

The high salaries paid in cities are misleading. They sound much larger than they really are, when the cost of living is considered.

If one is sure that he prefers some other occupation and that he has a fair chance for success in it, he should certainly not be a farmer. But, in many instances, the dislike of farming is merely a "case of the blues." Periods of discouragement come to every one regardless of his occupation; a change of occupation will not prevent them. There is no occupation that looks good when one is considering all its disadvantages. Unfortunately, human nature is such that we are likely to see the bright side of the other man's work and the dull side of ours. If one is to succeed in any occupation, he must learn to work when he had rather not, and to keep at it even if he is tired.

Farming is not an easy task. It is worth while. It is worthy of a man. It combines physical labor with thought, so that it calls for an all-around development.

If one is to be a farmer, he should prepare for the business. An agricultural college education is desirable to-day. But a young man is preparing not only for to-day, but for forty years from now, when such an education will be much more necessary. The college course will help during every one of these forty years. We rarely see a man who regrets having gone to school too long. Nearly every one regrets having stopped so soon. Lack of money need not discourage any one. Any boy who has good health can work his way through an agricultural college, and there are ways of starting farming with little money.

It is not advised that any young man be a farmer. It may be very much better for him to leave the farm, but before leaving the farm, he should consider both sides of the question.

CHAPTER 2

TYPES OF FARMING

DEFINITIONS

TYPES of farming may be defined in many ways, depending on the contrast in mind. The most frequent distinction made is in source of income, as hog-farming, wheat-farming, apple-growing, and so on, or the distinction may be more general, as live-stock-farming, grain-farming, and fruit-farming.

The type may also be defined as to its diversity. If only one important product is sold, the farming is specialized. If several important products are sold, it is called diversified or general farming. This subject is discussed in Chapter 3.

Sometimes the contrast in the intensity of operation is considered. Systems that call for very intensive working of the land are called intensive; those that use less labor for the area are called extensive. This subject is discussed in Chapter 4.

As to the maintenance of fertility, farming may be defined as exploitive, when little attention is given to keeping up the fertility of the land, or conservative, when considerable attention is given to this question. This subject is discussed in Chapter 5.

33. Factors that determine the type of farming. — The chief factors that determine the type of farming in any region are: climate, soil, topography, transportation, distance to market or shipping point, market demand and supply, relation of the type to other competing types in the region, price of land, capital, labor supply, custom, insects, diseases or other pests, and personal desires of the farmer.

EXAMPLES OF THE INFLUENCE OF CLIMATE, SOIL, AND TOPOGRAPHY

These physical conditions are the most important factors in determining the type of farming, but it is the combination of these with many other factors that settles the matter. The other factors may be so important as to result in a type of farming very different from what the physical facts suggest.

34. Corn. — For corn-production, there is no other large area of land in the world that has such a favorable combination of soil, climate, and topography as is found in the corn-belt of the United States. Corn requires a mellow soil well supplied with vegetable matter, heavy rainfall in the summer months, hot days, and hot nights. In addition, if it is to be raised economically, the land must be fairly level. The fact that it must be cultivated and must have abundant rain makes it an unsatisfactory crop for hillsides, as the land will wash too much.

On first thought, it would appear that one might supply the plant food by fertilizers, and the water by irrigation, but this is not so simple as at first appears. Corn requires more organic matter than most crops. Fertilizers do not take the place of organic matter. If the soil is not well supplied with decaying vegetable matter, it is usually necessary to supply it by adding farm manure or plowing under sod. Some crops are much easier to raise with fertilizers alone.

The necessary water might be supplied by irrigation, but corn does not respond to irrigation as well as some other crops. The dry air of an irrigated region is favorable for some crops and injurious to others. Corn can be grown by irrigation, but the increase in crop compared with humid regions is not so great as is the increase with some other crops, such as alfalfa, sugar beets, and wheat.

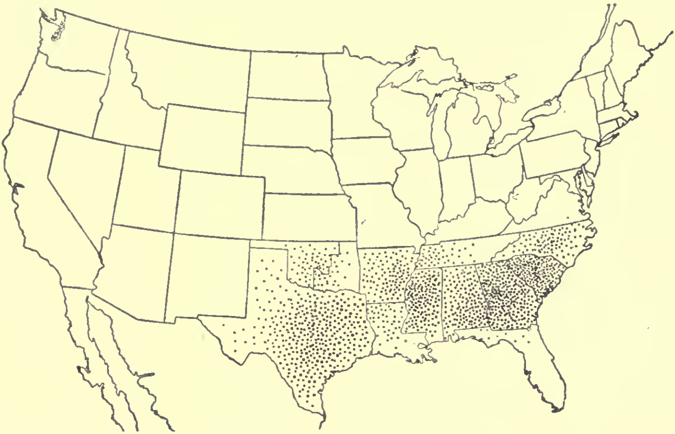

FIG. 10.—Distribution of the cotton crop in 1909. One dot represents 8000 bales.

We may expect that corn will always be the leading crop in the Middle West. There are a number of types of farming based on corn as the major crop.

35. Cotton. — For cotton, there is no other large area in the world that has such a favorable combination of climate and soil as is found in southern United States. We may expect that cotton will remain the leading crop of the South. Thus far, it has been grown too exclusively, just as corn has been grown with too little rotation in the corn-belt. In both regions, rotations and types of farming are developing that center around the important crop without making it the only crop.

36. Oats. — Oats require a cool, moist climate for best development. A climate that is best for corn is too hot for the best yield of oats. If oats are grown on the best corn land, it is of the utmost importance to plant them as

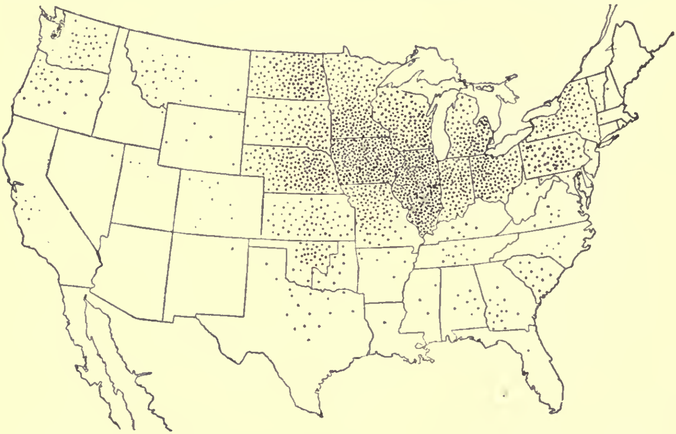

FIG. 11. — Distribution of the oat crop in 1909. One dot represents 500,000 bushels.

early as possible so as to give them the benefit of the cool part of the season. A little farther south oats do not pay at all, but if we go far enough south, the oats can be sown in the fall and thus grow during the cool season, and make a good crop. The best oat section is so far north that the weather is too cool and the season too short for the best yield of corn. Wheat is another cool weather crop.

Oats do not require as rich a soil as corn. Fair crops of oats can be grown on land that is so poor that it will not produce a crop of corn. If the land is too rich, it is injurious to oats, as they grow too much straw and too little grain, and are likely to lodge.

37. Potatoes are much like oats in their climatic requirements. They require cool, moist weather and do best on rather light, deep soils. Most of the potato supply of the country is grown north of the best corn land. In the irrigated sections of Colorado, Utah, and neighboring states, potatoes do well. The altitude keeps the weather cool, and the moisture is supplied by irrigation. Early potatoes are grown in the South during the cool season. Early planting provides fairly good climatic conditions, and the high prices received make up the difference.

Potatoes will grow on acid soils. This makes them the most important cash crop on many of the poor soils of northeastern United States. Root crops, such as sugar beets and mangels, are favored by the cool, moist weather, but these require considerable lime, so that they are not much grown except on good soils. The potato yields of Europe are often cited to show how poorly we in America farm. It would be just as fair to compare corn yields in the best parts of Illinois with Europe to show how poorly they farm in Europe. We can never hope to equal the potato yields of Europe, because their climate is so much better for the crop. For the same reason, they can never hope to equal our corn yields. The European climate is much better for root crops, oats, wheat, and grass. The Gulf Stream is quite as much responsible for their good yields of these crops as are the methods of farming.

38. Grass crops require cool, moist conditions for their best growth. One of the great problems of southern United States is the grass question. Except in the mountains, the states south of Kentucky find it difficult to raise good pastures or hay.

The best grass section of the United States is north of Washington and east of the one-hundredth meridian. In this section, timothy and red clover are the great hay

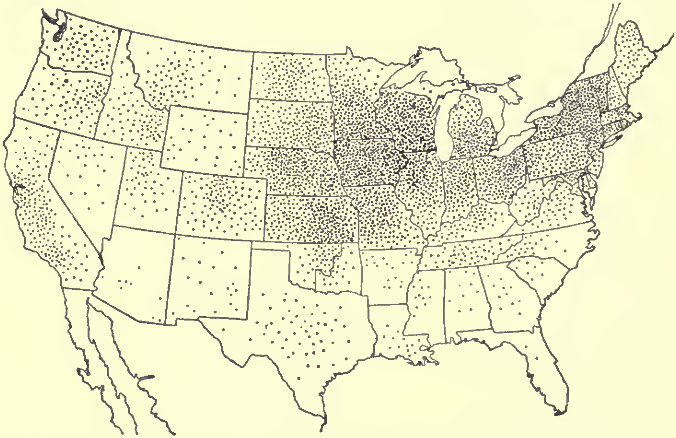

FIG. 12.—Distribution of the hay and forage crop in 1909. One dot represents 25,000 tons.

plants. Alsike clover, alfalfa, and redtop are also important.

Alfalfa is a lime-loving plant. It grows well on the limestone soils anywhere in eastern United States. If the soil is not too short of lime, it may be made to grow well by applying lime. But if the subsoil is very seriously deficient in lime, it is not often possible to grow alfalfa successfully.

Timothy and red clover are medium in lime requirements. They grow well on soils that do not have enough lime for alfalfa. There are many areas in this grass region that require lime for the best growth of these crops, particularly on the hill lands from southern Illinois to New England. Redtop will grow well on soils that are too poor or too short of lime to grow timothy. Alsike clover is somewhat more hardy in this and other respects than red clover.

The great pasture plant of this section is Kentucky blue-grass, sometimes called June-grass (*Poa pratensis*). White clover is also important. On soils that are too poor to grow Kentucky blue-grass, Canada blue-grass (*Poa compressa*) is the most important pasture plant. Kentucky blue-grass requires much more lime than Canada blue-grass. If a soil contains enough lime or is well supplied with lime, the Kentucky blue-grass will usually run out the Canada blue-grass.

If a region grows Kentucky blue-grass or alfalfa very abundantly, it is practically certain that the soils still have a fair supply of lime.

West of the one-hundredth meridian, the chief hay plant is alfalfa, and the chief pasture plants are the native grasses.

South of Washington, various forage plants are grown. Cow peas are one of the important hay plants, but these must be planted every year and are hard to cure. On some of the limestone soils, alfalfa is grown. Bermuda grass and Johnson grass are grown, but these are bad weeds. The pasture and hay question in the South is a difficult one, as the very climatic conditions that make it a great cotton region are unfavorable for grass. It is not a natural grass country.

39. Apples. — The apple crop is primarily adapted to the region that was by nature heavily wooded. In New York there are orchards with trees over one hundred years old that are still bearing. These trees have persisted in spite of neglect, because the climate is so favorable for tree growth. The heat that makes a good crop of corn or cotton is unfavorable for apples. Fruit trees do not require so rich a soil as is necessary for corn. The peach tree is as readily injured by too rich a soil as by too poor a soil. On the best corn land, apples and pears blight badly. There are some good apple regions in irrigated sections of the West, but their area is small in comparison with the vast area in the Eastern States that is adapted to apples. In 1909, New York raised more apples than all the states west of Iowa.

40. Truck-crops. — Crops that require much hand labor, as truck-crops, are usually grown on light soils, because such soils will grow a crop earlier and because there is much hand labor. Sandy soils are much easier worked than clay soils. The muck or peat soils are best of all. There are two general truck regions, one about each city and one in the South for supplying early vegetables.

41. Topography. — Danger of erosion may require that the land be kept in sod. Steep hillsides may prevent the use of machinery. When the work was done with hand tools, the side hills were not at so great a disadvantage. Many side hills have been turned into hay, pasture, or forest, or have been abandoned because machinery could not be used on them to good advantage. Every new machine that is invented makes the earning of a living more difficult for the man who cannot use the machine. If he must compete with a machine by his hand labor, he must reduce his standard of living or change his type of farming.

42. Animals. — Live-stock is also much affected by climate. One of the most striking cases is the failure of the horse in hot regions. The work must then be done by mules or cattle, or in the hottest regions by the water buffalo.

Indirectly, the climate affects stock raising by limiting the grazing period. Many attempts have been made to introduce beef cattle in the North Atlantic States, but the grazing period is too short. Pastures are cheap, but the winter feeding period is too long.

In spite of land values and feed prices, England and Scotland are better situated than New England for raising meat. The long grazing season more than makes up the difference in prices of land and winter feed.

By limiting the crops grown, the climate and soil limit the animals raised. All of the noted horse-breeding sections of the world are regions in which the soil is well supplied with lime and mineral matter. The quality of the horses from Kentucky is well known. They are grazed on blue-grass that grows on a soil rich in lime. The Percheron horse in France is raised on a limestone soil. The rich valley of the Clyde River furnished the opportunity for the production of the Clydesdale.

Such illustrations may be multiplied indefinitely. Among the first things to consider in deciding on a type of farming are climate and soil.

RELATION OF TRANSPORTATION TO TYPE OF FARMING

43. General principles. — The fundamental principle is that products that are easily and cheaply shipped and that will stand shipment will usually be produced far from the centers of population, because near market they cannot compete with bulky and perishable products. Perishable products or products that are bulky for their value will usually pay best when grown near the consumers.

All other factors limiting the type of farming affect the result, but next to soil and climatic limitations the freight and express rates and cost of handling produce are the most important factors in determining the type of farming.

The problem seems to be little understood by farmers, agricultural colleges, or city business men. Experience forces farmers to abandon types that are too far out of adjustment, but frequently the wrong cause is assigned.

44. Transportation and crop-prices and crop-production. — Table 5 gives the average farm values of certain crops on December first for the five years 1907–1911 inclusive. The states are arranged in order, extending from the Rocky Mountains to the Atlantic Ocean. Most of the products are cheaper in eastern Nebraska and western Iowa than at any other point. From here they are shipped both ways. All prices are compared with the Iowa price as 100 per cent. The primary factor in fixing the differences in these prices is the cost of transportation to the centers of population. For prices of other products and for other states, see Table 83, page 576.

Massachusetts has a good climate for hay-production, but the local supply is not sufficient to feed the horses and dairy cows. Hay must be shipped in. The high cost of shipment raises the price, not only of the hay shipped in, but of that grown in Massachusetts. Corn is also shipped in, but the cost of shipment is less in proportion to its value. The farm value of hay is 226 per cent of the Iowa price, corn 166 per cent, oats 157 per cent. Wheat is so little grown that no farm price is reported. The Massachusetts farmer can grow wheat and can get perhaps a fifth more than the Iowa price, but he can get two and one-fourth times the Iowa price for his hay. He would be very foolish to grow wheat.

TABLE 5. — AVERAGE FARM PRICE ON DECEMBER 1 FOR CERTAIN CROPS FOR FIVE YEARS (1907–1911).[1] WITH COMPARISONS WITH THE IOWA PRICE AS 100 PER CENT.

	Corn		Wheat		Oats		Hay		Potatoes	
	Price	Per Cent of Iowa Price	Price	Per Cent of Iowa Price	Price	Per Cent of Iowa Price	Price	Per Cent of Iowa Price	Price	Per Cent of Iowa Price
Colorado	$.69	147	$.85	98	$.50	135	$ 9.67	113	$.67	110
Nebraska	.47	100	.84	97	.37	100	7.15	83	.72	118
Iowa . .	.47	100	.87	100	.37	100	8.58	100	.61	100
Illinois .	.49	104	.93	107	.40	108	11.62	135	.73	120
Indiana .	.50	106	.94	108	.40	108	12.00	140	.68	111
Ohio . .	.55	117	.97	111	.43	116	12.55	146	.67	110
New York	.73	156	1.00	115	.51	138	14.71	171	.64	105
Massachusetts	.78	166			.58	157	19.40	226	.83	136

[1] U. S. Dept. Agr., Yearbook, 1910, pp. 505, 518, 530, 560, 566, and Yearbook, 1911, pp. 524, 535, 546, 569, 573.

A ton of hay in Massachusetts will buy 25 bushels of corn. In Iowa it would buy only 18 bushels. The same ton would buy 33 bushels of oats in Massachusetts, but would buy only 23 bushels in Iowa. It is easy to see why the New England farmer comes so near to a one-crop system. There are whole townships in New England in which there are no threshing machines. Corn is raised for the silo, and some is raised for grain. Comparatively little small grain is raised east of Syracuse, New York, and still less east of the Hudson River. In this section, shavings and sawdust are largely used for bedding. Straw is too valuable. In 1909, the area of hay grown in New England was five times the total area of all other crops combined. A common practice in New England is to keep nearly all the farm in grass. When a spot gets poor, it is plowed up, farmed for a year or two, and re-seeded. These small irregular patches of crops in the center of a hay field are amusing to a Western farmer, but the New Englander has a reason for his practice. Potatoes, truck crops, or fruit combined with hay and corn silage for the dairy make a very profitable kind of farming for this region.

As we go westward, the relative prices change. In New York a ton of hay will buy 20 bushels of corn or 29 bushels of oats as compared with 18 of corn and 23 of oats in Iowa. In 1909, hay occupied 62 per cent of the area in crops in New York and 40 per cent of the crop area in Pennsylvania, 29 per cent in Ohio, and 25 per cent in Iowa. From the prices it would appear as if corn might be the second crop in New York, but oats are second in area and corn third. In value, hay is first and potatoes second. There is much land not adapted to corn that grows oats fairly well. Oats are also desired as a crop with which to seed grass. The straw is also worth more than in Iowa. Winter wheat is grown to some extent in New York and Pennsylvania. Considerable of the wheat in New York is sown after beans without plowing. This greatly reduces the cost of production. In Pennsylvania it is often sown after corn and potatoes without plowing. The wheat is also a good crop with which to seed grass.

Similar comparisons can be made for other regions and other crops. These cases are cited to show the principle involved and how it works under modifying conditions. It is difficult to compare Northern and Southern states on this basis. Feed prices are usually higher in the South, but the pasture season is longer, so that more of the meat and butter can be grown on pasture. Pasture is also important for hogs and hens. Poultry obtain more green feed and more insect food in the South. This partly offsets the high feed cost.

45. Relation of cost of production to disposition of crops. — No subject seems to be more generally misunderstood than the relation of crops to stock. The usual theory seems to be that if corn and hay can be easily and cheaply grown, they should be fed to live-stock. Perhaps the basis of this error is the absurd practice of some institutions of charging feed to animals at the cost of producing it rather than at what it can be sold for, less the cost of marketing. Some farmers are able to produce hay at a cost of $5 per ton. On other farms it costs $25. When this is charged to cows, it should be counted at its selling value. The cost has nothing to do with the value. The farmer who produced it at a cost of $5 might feed it to steers and get $8 for it; by this means he could make a profit on the two things, and steers might be hailed a very profitable enterprise. This sort of figuring misleads some farmers. If hay is worth $15 a ton on the market, a farmer is very foolish to sell it to steers for $8, no matter what it cost him. It would be equally unwise to sell it if he could feed it to cows and get $16 for it. If the man whose hay costs him $25 can get only $16 for it by feeding it to cows, he will lose money on the two enterprises, but he should not blame the cows for his loss.

Every crop should be disposed of in the way that will pay best, regardless of the cost of producing it. In figuring on live-stock, manure should of course be counted at what it is worth, but no more and no less.

46. Transportation as affecting hog-production. — It requires about 5 to 6 pounds of corn to produce a pound of hog. The pound of pork can be shipped at a much less cost than the 5 pounds of corn. The opinion that corn and hogs go together and that the center of the corn-belt is the center of the hog-raising region is almost universal. Figures 13 and 14 show how far this is from the truth. The center of the hog-raising region is where feed is cheapest. The best place to raise hogs is as far west as one can go and yet be sure of a corn crop. Even between the neighboring states of Iowa and Illinois, the adjustment is very striking. Illinois produces more corn than Iowa, but has only about half as many hogs. At the time of the last census, Illinois had one hog for each 150 bushels of corn raised. Iowa had one for each 79 bushels. A difference of 2 cents per bushel in the price of corn has been sufficient to make this surprising difference in the number of hogs.

TABLE 6. NUMBER OF HOGS AND PIGS THREE MONTHS OLD OR OLDER ON APRIL 1, 1910

	HOGS AND PIGS BORN BEFORE JAN. 1, 1910.
Colorado	110,922
Nebraska	1,970,895
Iowa	4,299,499
Illinois	2,603,062
Indiana	1,906,258
Ohio	1,574,009
New York	364,375
Massachusetts	62,368

Comparing Illinois and New York, the difference is still greater. In 1910, the freight rate on corn in carload lots from Chicago to New York was 8.2 cents per bushel, or if shipped by lake 5.77 cents. The freight rate on dressed hogs was 45 cents per 100 pounds.[1] About 30 bushels of

[1] U. S. Dept. Agr., Yearbook, 1910, pp. 649–650.

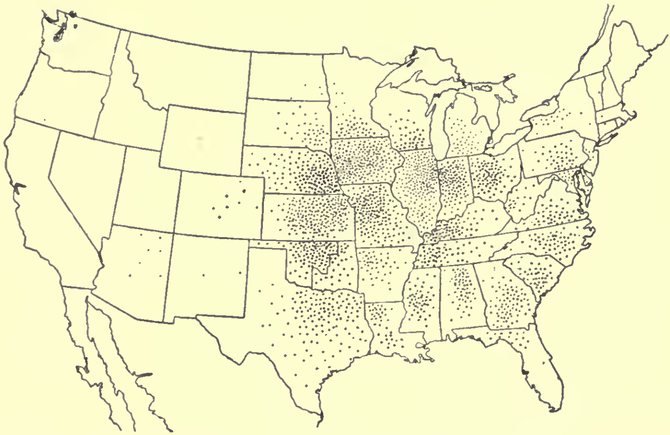

FIG. 13. — Distribution of the corn crop in 1909. One dot represents 1,000,000 bushels.

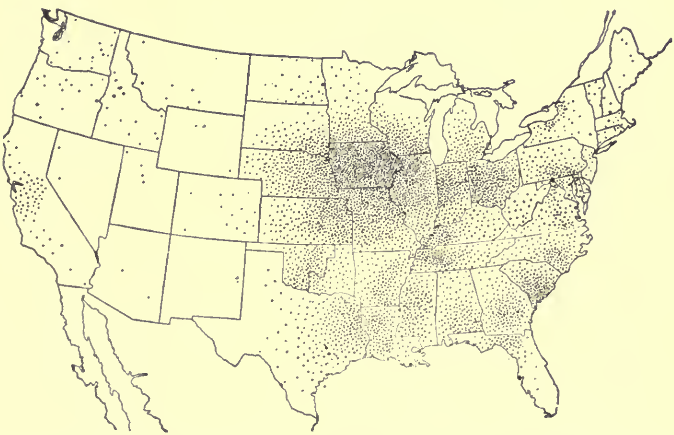

FIG. 14. — Distribution of hogs in 1909. One dot represents 14,000 hogs.

corn is required to grow a 300-pound hog. To ship this corn to New York would cost $2.46 in carload lots. The 300-pound hog would produce about 225 pounds of dressed pork that could be shipped for $1.01. On every hog thus produced, the freight rates make a difference of $1.45 in favor of growing the hog in Illinois. As a matter of fact, the difference is much more than this. The commissions and cost for handling corn are greater than for handling the pork produced by it. The farm price of corn is 24 cents more in New York than in Illinois, or a difference of about three times the freight cost.

The average farm price of corn on December first for five years (1907–1911) has been 47 cents in Iowa and 73 cents in New York. If an Iowa farmer uses 30 bushels of corn to grow a 300-pound hog, his feed will be worth $14.10. The same feed would be worth $21.90 in New York, or a difference in cost of $7.80 on every 300-pound hog raised. There are no figures showing the average price that farmers receive for hogs. By correspondence, I have obtained prices paid to farmers at the same date in the two regions. The difference is rarely as much as one cent a pound, or about $3 per hog. This would leave a difference of about $4 per hog in favor of Iowa. If the hogs are pastured on clover, the Iowa farmer has a still greater advantage, as the difference in the price of hay that is thus lost is still more in his favor.

A considerable number of hogs are raised in New York to consume waste products, such as whey, skim milk, garbage from the cities and villages. Aside from hogs thus fed, most of the hogs are grown for home use. On April 1, 1910, there was an average of three hogs and pigs per farm in New York. In Iowa the average was 35.

It often pays to raise products for home use that it would not pay to raise to sell. The difference between the price that a farmer receives and what he would have to pay at the meat market is a good profit.

Since one family does not need as many pigs as one sow will raise, only a portion of the farmers keep hogs. A limited number of pigs may be raised to weaning age and sold to neighbors at a good profit. Two litters are usually raised per year. Or one litter is raised while the hog is being grown for home use. Those who are in this business usually find that they cannot afford to raise hogs to sell. They must be disposed of as pigs.

Occasionally, hogs are so high in price compared with feed that grain can be used in the Eastern States to produce pork at a profit, but when this is the case, the profit is very much larger in Iowa. This results in an increased production there and a decrease in price. When one is on the danger line for the profitable production of any article, he needs to be very careful about entering the business when prices are temporarily high.

47. Transportation as affecting beef-production. — Because the North Atlantic States have cheap pasture land, many persons have thought that, for this reason, these regions should produce beef cattle. But the pastures can be used for only five to six months, and the value of winter feed is so high that the industry is usually unprofitable. It usually requires about 10 pounds of corn and 10 pounds of hay or the equivalent in other feeds to produce a pound of steer, good farmers do better.[1] If we assume that a 1000-pound steer is half grown on pasture, we would have the following comparison: —

[1] The Standard Cattle Co. fed 51,393 steers in eleven years. For each pound of gain these steers averaged 13.3 pounds of grain and 9.4 pounds of hay. W. A. Henry, Feeds and Feeding, 7th edition, p. 399.

	Iowa	New York
Pasture two summers	$20.00	$10.00
$2\frac{1}{2}$ tons hay	21.45	36.77
89 bu. corn	41.83	64.97
	$83.28	$111.74

These figures show that, even if we assume that pasture is worth twice as much in Iowa as in New York, the winter feed much more than offsets the difference. Using more or less feed than is called for above, or using a silo, may affect the figures, but does not affect the principle. It is the cost of the year's feed and not the cost of the feed for one season that must be considered. For profitable beef production, we must have a very long grazing period, or must have cheap winter feed, or both. England is better situated than our North Atlantic States for beef production, because it has such a long grazing season.

The adjustment that the farmers have made to meet the conditions is shown in Table 7. On April 1, 1910, Nebraska and Iowa had more than one-fourth as many yearling steers and bulls (3 months to 15 months) as they had cows and heifers (16 months old or older). Illinois, Indiana, and Ohio had less than one-sixth as many as cows, and New York and Massachusetts had only one for 25 to 30 cows. In these two states practically no steers are kept. The number reported represents practically the number of bulls kept. Instead of raising steers, these two Eastern States sell practically all their bull calves as veal. Near cities, the calves are often killed at birth, as feed is too expensive to make it pay to keep them to the legal age for veal. The East Central States sell many of their calves for veal, but raise some steers.

TABLE 7. — STEERS ON FARMS ON APRIL 1, 1910

	STEERS AND BULLS BORN IN 1909 PER 100 COWS[1]	STEERS AND BULLS BORN BEFORE 1909 PER 100 COWS
Colorado	18	46
Nebraska	26	40
Iowa	28	36
Illinois	15	20
Indiana	15	15
Ohio	14	15
New York	4	3
Massachusetts	3	3

[1] Number of steers and bulls for each 100 cows and heifers born before Jan. 1, 1909; most of these would be 2 years old or older.

The West Central States raise nearly all their calves. The age at which the steers are sold also shows an adjustment to feed prices. The Western States keep their steers to two or three years of age, as is shown by the fact that they have twice as many of the older ones as of the yearlings.

48. Relation of transportation to sheep-production. — Sheep are more efficient users of feed than cattle, but not so efficient as hogs. On an average, it takes about 3.5 pounds of grain and 5.1 pounds of hay to produce a pound of sheep,[2] 10 pounds of hay and 10 pounds of corn for a pound of steer, and 5.6 pounds of corn for a pound of pork. The hog has a still further advantage in that in butchering it dresses off about one-fourth, while cattle and sheep dress off about 35–50 per cent.

Sheep will eat many products that cannot be well used by other stock. They help to rid a farm of weeds. For these reasons, a few sheep are kept as scavengers on many farms where it would not pay to keep a large number.

[2] D. H. Doane, Sheep Feeding and Farm Management, p. 71.

In the bean-growing sections of New York and Michigan, sheep are kept because they make good use of bean pods and cull beans. Many farmers who have pasture, and who do not wish to keep dairy cows, keep sheep. They may not pay very well, but where feed is high, they are usually better than beef, and do not interfere with farm work as much as dairy cows.

Winter lambs are usually produced near market. They are seldom produced in large enough numbers to be

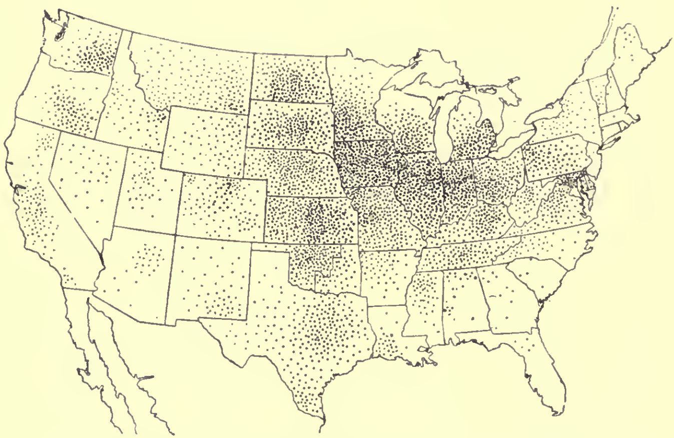

Fig. 15. — Distribution of yearling colts, 1910. One dot represents 400 colts.

shipped by freight. When raised near market and shipped by express, the cheaper transportation may offset the higher feed cost.

49. Transportation in relation to horse-production. — Horses are not so readily shipped as meat. They are more likely to be injured in shipment, and, in addition, must become used to a new climate before they are of much use. The brood mare can do nearly a full amount of farm work besides raising a colt, so that only a small part of her feed need be charged to the cost of raising colts. For these reasons, colts can be raised where it would not pay to raise beef. Table 8 shows that colts are most numerous where feed is cheapest, but are raised to some extent in other states. When the price of horses drops, it is the states with high-priced feed that are first forced out of colt production; as the price rises again, they are the last states to go into the business.

TABLE 8. — COLT PRODUCTION [1]

	NUMBER OF HORSE AND MULE COLTS PER 100 HORSES
Colorado	13
Nebraska	13
Iowa	13
Illinois	12
Indiana	11
Ohio	9
New York	4
Massachusetts	2

[1] Horse and mule colts for each 100 mares, stallions, and geldings born before 1909.

50. Relation of transportation to dairying. — Butter, condensed milk, milk flour, and cheese are easily shipped. The center of production of these products is constantly moving westward. Much distress has been caused by the persistence of butter making in some Eastern regions that are being forced out of the business. In a region that has to depend to a considerable extent on shipped-in feed, the competition with dairymen in the region from which the grain comes is ruinous.

Some of the cheese-making sections of the East are able to continue the business by roughing the cattle through the winter as cheaply as possible, and depending mostly on the cheap feed furnished by pastures for cheese making. In other cases, milk is shipped to the cities in winter when there is a good demand, and cheese is made in summer.

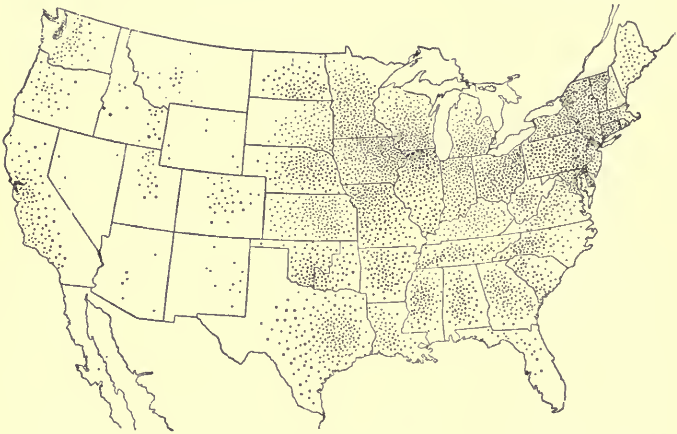

Fig. 16.—Distribution of dairy cows in 1910. One dot represents 5000 cows.

The average price received by farmers for butter in 1910 and 1911 was 25 cents in Iowa, 29 cents in New York, and 33 cents in Massachusetts (Table 9). The New York farmer receives 16 per cent and the Massachusetts farmer 32 per cent more than the Iowa farmer. These differences are sometimes cited to show how rich the Eastern farmer ought to get by making butter.

But the cost of production has just as much to do with profits as the price received. Comparing the cost of raw materials (feed) in these states, we find that corn is 56 per cent and hay 71 per cent higher in New York than in

TABLE 9. — AVERAGE PRICE RECEIVED BY FARMERS FOR BUTTER (1910 AND 1911)[1]

	Average Farm Price per Pound	Per Cent of the Iowa Price
Colorado	29	116
Nebraska	21	84
Iowa	25	100
Illinois	24	96
Indiana	22	88
Ohio	24	96
New York	29	116
Massachusetts	33	132

[1] U. S. Dept. Agr., Yearbook, 1910, p. 632; 1911, p. 634.

Iowa, but that butter, the manufactured product, is only 16 per cent higher. It takes 2.5 pounds of butter to buy a bushel of corn on a New York farm and only 1.9 pounds in Iowa. It takes 51 pounds of butter to buy a ton of hay on a New York farm, but on an Iowa farm it takes only 34 pounds. On a Massachusetts farm it takes 59 pounds of butter to pay for a ton of hay.

It is evident that the East cannot compete with the Middle West in butter production. The center of butter production is rapidly shifting to the region of cheap feed. Those farmers who persist in making butter in regions of high-priced feed are usually receiving very little for their work. Sometimes other things are so profitable as to overcome the loss on butter. Even those farmers who have special customers rarely receive enough to make the business very profitable.

In one county in New York it was found that farmers who made butter rarely made hired-man's wages, and when they did, it was because the profits from some other enterprise more than paid the loss on butter. Milk sold to creameries to be made into butter paid better, but required extra good production per cow to pay.[1] In Connecticut, with an extra good herd of cows, the average cost of producing butter for five years (1906–1911) was 38 cents per pound.[2] The average farm price of butter for the two years 1910 and 1911 was 33 cents. At this price, there was an average loss of $16 per cow per year.

Market milk must be produced near the consumer, because it is both perishable and bulky for its value. But it is not free from competition. Within the range of possible shipment of any of our cities, there are very many more cows than are required to produce the necessary milk. Whenever cheese or butter prices drop, there is a tendency for farmers who are farther from the railroad to sell milk instead of making butter. Along every railroad that hauls milk, there is a strip of land from which all the product is sold as milk, but a little farther back from the railroad, it does not pay to haul milk, so that butter or cheese are made. Milk trains can readily be put on more roads, or extend farther from the cities if necessary. Some regions have a milk train in winter, but none in summer. There is an immense reserve of milk that can be used for butter or cheese when milk is low, but that can be sold as milk whenever prices warrant.

51. Transportation and egg-production. — It is so difficult to get eggs to the consumer in good condition that the farmer near the market has the advantage. A dozen eggs will buy 16 pounds of wheat in New York, but will buy only 13 pounds in Iowa. The chief chicken food

[1] New York, Cornell Bulletin 295, p. 483.
[2] Connecticut, Storrs Bulletin 73.

in Iowa is corn. A dozen eggs will buy 23 pounds of corn in Iowa and 21 pounds in New York, 24 pounds in Massachusetts, 14 pounds in South Carolina and 14 pounds in Mississippi. There is about the same difference on poultry as on eggs. (Table 10.)

TABLE 10. — AVERAGE PRICE RECEIVED BY FARMERS FOR EGGS AND POULTRY (1910 AND 1911).[1]

	EGGS		CHICKENS	
	Average Farm Price	Per Cent of the Iowa Price	Average Farm Price	Per Cent of the Iowa Price
Colorado . .	26	137	13.4	140
Nebraska .	18	95	9.1	95
Iowa . . .	19	100	9.6	100
Illinois . .	20	105	10.9	114
Indiana . .	21	111	10.8	113
Ohio . . .	22	116	11.3	118
New York .	27	142	14.4	150
Massachusetts .	34	179	16.8	175

[1] U. S. Dept. Agr., Yearbook, 1910, pp. 643, 644, and 1911, pp. 634, 648. The prices are the averages for the first of each month. A farmer will receive a lower average for the total eggs or meat sold, because the largest sales come in the months of lowest prices.

With better methods of handling eggs and poultry, and more promptness in shipment, the ratio may be changed, but it appears as if the regions near market will always find egg production a profitable business. The home market will always be largely supplied by a home-grown product, even though it may ship in butter, flour, beef, and pork.

There seems to be no question but that hens pay better in the North than in the South.

If we assume that a hen lays 8 dozen eggs and that there is 5 pounds of poultry sold for every hen kept, we would have the following comparisons:[1] —

	MASSACHUSETTS	IOWA	SOUTH CAROLINA	MISSISSIPPI
8 doz. eggs	2.72	1.52	1.68	1.52
5 lb. meat	.84	.48	.58	.58
Total	3.56	2.00	2.26	2.10

The difference between Iowa and Massachusetts is enough to pay the entire feed bill for a hen a year. In South Carolina, corn costs more than in Massachusetts. The average egg production per hen is about half as much as in Massachusetts. Diseases are also worse in the South. Poultry in the South gathers more of its own food, because of the long season for green food, and because of the abundance of insects. The cost for housing is also less, but the cost of housing in the North should not be over 10 to 20 cents per hen per year. After allowing for all these differences, there is no question but that the profit is better in the North. The South will always raise poultry for local use, as will every other country, but it is not the place to go if one is thinking of locating a poultry farm. Such a farm should be located nearer large markets, or might be located in the region of cheap food, if the lower prices could be overcome by care and prompt shipment.

52. Fruit and vegetables in relation to transportation. — Fresh fruits that are very perishable must be produced relatively near market. Apples may be shipped long distances, but must be protected from freezing. Low-

[1] The actual price received would, in each case, be somewhat less than the amounts given above, because the prices are the average by months. More products would be sold during the months of low prices.

priced apples are bulky for their value and must, therefore, be produced near market. Only the very best are worth shipping long distances. For this reason the growers in the Western States have become skillful graders and packers. But the largest apple market is with the working people, who cannot afford to pay for fruit that is worth shipping across a continent. For every fancy box of apples that is sold in any city, many barrels of cheaper apples are sold. Most of the growers in the North Atlantic States strive for quantity and economy in production combined with fair quality, rather than sacrifice both of these for quality. There is an enormous demand for low-priced apples. Most farmers in the Central and North-eastern States find that they can make more money by supplying this demand than by trying to compete for the very limited fancy trade. The Baldwin, Greening, Ben Davis, and other wholesale types of apples are usually most profitable.

Truck and vegetable crops and flowers are, in general, perishable and very bulky, hence are grown very close to cities. A city's truck crops usually come from very near by; milk is shipped farther, eggs still farther, meat and flour still farther; clothing may be shipped around the world.

The only case in which fresh vegetables are shipped far is when they come from Southern to Northern markets. In this case they have no competition from nearer farms. Such products compete with greenhouses. Within the same latitude, long-distance shipment of truck is rarely profitable.

53. Marginal regions. — With every product, there are regions of greatest profit and regions where the type is out of the question, but it is very hard to draw the line between the two. In the best regions there are always some farmers who fail to make a profit. In regions not so well adapted to the product, some farmers may have the business so well organized as to make a profit, but the same effort would make a much greater success if expended under better conditions.

This idea is illustrated in Fig. 17. If each dot on the left of the vertical line represents a farmer who is producing

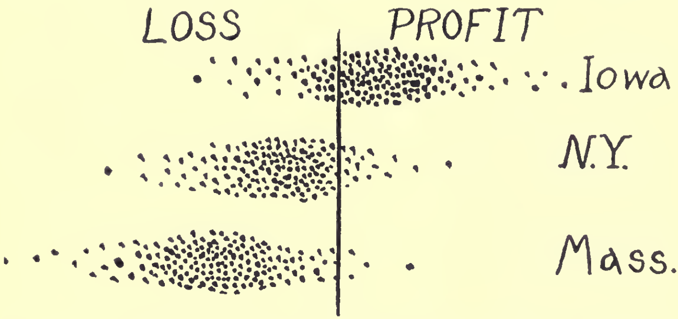

FIG. 17. — Diagram showing comparative chances of making a profit on pork production on grain feed in different states. Each dot on the left-hand side of the line represents a farmer who would lose by producing pork, and each dot on the right-hand side represents a farmer making a profit.

hogs at a loss, and each dot on the right-hand side of the line represents one who is producing them at a profit, we will have a distribution somewhat as shown in the figure. In Iowa most of the farmers make a profit on hogs. If the business is well handled, it may give a very large profit; if poorly done, it may still pay; but if too badly managed, it is possible to lose on the business. In Ohio, with higher-priced corn, the highest profits are lower and the danger of losing is much greater. In New York it is very difficult to make a profit on hogs that are raised on grain. In Massachusetts it is probably impossible. It is foolish to attempt to produce hogs on grain feed under such unfavorable circumstances. The same effort expended in types of farming that are adapted to the region will bring a much greater return.

RELATION OF TYPE OF FARMING TO DISTANCE TO MARKET OR SHIPPING POINT

54. General principles. — The distance that the farmer has to haul his products and the character of the road limit the type of farming, but this influence is not so striking as is the effect of transportation.

Products that are bulky for their value, such as milk and vegetables, are usually grown near the railroad or market. But if prices are high enough, the haul may be much farther. Much depends on the roads and the size of the load. A full load of milk may be hauled six miles at less cost per can than it costs a farmer to haul a few cans a mile. Near some of the large cities, immense loads of vegetables are sometimes hauled so far that the load has to start in the evening to reach the market in the morning. Wool is hauled long distances. (Table 11.) Sheep, cattle, and horses can be produced farther from market than most products. Grain can be profitably hauled for a greater distance than hay or potatoes.

In the case of some products, such as butter and eggs, the cost of hauling would be small if loads were taken, but the farmer must take these to town frequently. The very small amounts taken at one time often make the cost very high.

Farmers cannot afford to go to town often enough in summer time to keep eggs fresh. The poor quality of the egg supply and consequent low prices will continue until some system of frequent delivery is started. Possibly the parcels post law might be so modified as to allow the rural mail carrier to carry cases of eggs.

55. Cost of hauling. — In Table 11 are given the average distance to market, size of load, and cost of hauling for

TABLE 11. — AVERAGE COSTS OF HAULING PRODUCTS FROM FARMS TO SHIPPING POINT: TOTALS FOR STATES REPRESENTED [1]

PRODUCT HAULED	NUMBER OF COUNTIES REPORTING	AVERAGE					
		Miles to Shipping Point	Days for Round Trip	Pounds in One Load	Cost per Load	Cost per 100 Pounds	Cost per Ton per Mile
Apples	114	9.6	0.9	2,300	$2.79	$0.12	$0.25
Barley	226	8.8	.7	3,970	2.67	.07	.16
Beans	22	9.0	.8	3,172	2.75	.09	.20
Buckwheat	8	8.2	.8	2,438	2.90	.11	.27
Corn	981	7.4	.6	2,696	1.78	.07	.19
Cotton	555	11.8	1.0	1,702	2.76	.16	.27
Cottonseed	110	10.7	.9	1,654	2.42	.15	.28
Flaxseed	51	10.4	.7	3,409	2.70	.08	.15
Fruit (other than apples)	99	11.6	1.1	2,181	3.53	.16	.28
Hay	761	8.3	.7	2,786	2.32	.08	.19
Hemp	7	5.2	.7	3,393	2.10	.06	.23
Hogs (live)	316	7.9	.7	1,941	2.00	.10	.25
Hops	14	11.7	1.0	3,665	3.89	.11	.19
Oats	798	7.3	.6	2,772	1.82	.07	.19
Peanuts	19	8.1	.6	1,363	1.67	.12	.30
Potatoes	569	8.2	.7	2,679	2.34	.09	.22
Rice	18	7.5	.8	2,407	2.70	.11	.29
Rye	78	8.4	.7	2,625	2.23	.08	.19
Timothy seed	5	8.0	.8	2,410	1.92	.08	.20
Tobacco	113	9.8	.8	2,248	2.28	.10	.20
Vegetables (other than potatoes)	152	9.8	.9	1,852	2.84	.15	.31
Wheat	1,051	9.4	.8	3,323	2.86	.09	.19
Wool	41	39.8	5.6	4,869	21.39	.44	.22

[1] U. S. Dept. Agr., Bureau of Statistics, Bulletin 49, p. 16.

many counties in the United States. The cost of hauling, of course, changes constantly, but the time required to haul a given distance is not likely to change much. It will be seen that the average time required to haul a load is about a day for ten miles. Many factors affect the rate of hauling. Under usual conditions, farmers who haul two miles or less can haul three to four loads a day. If the haul is two to four miles, three loads are commonly hauled. For four to six miles, two loads are usually hauled.

In general, if the cost of hauling from the farm to the shipping point is not over 5 per cent of the value of the product, it may be regarded as reasonable. If the cost is 10 per cent, it is very high. The cost can often be reduced by hauling larger loads.

56. Cost of hauling milk. — In nearly all parts of the country a large amount of time is wasted in hauling milk. Not infrequently, the time spent is worth more than the milk. Every morning, thousands of American farmers take a drive of from half an hour to half a day with a little milk. The trouble is that the loads hauled are too small. Frequently one can see a half dozen farmers coming along the same road with so little milk that one wagon might haul it all. Sometimes farmers have milk enough to make a full load. Sometimes it can be hired hauled. Sometimes neighbors can take turns hauling. By these means the cost can be kept reasonable. The only excuse for the many long drives taken with a can or two of milk is that the farmer has nothing else to do. This is an admission that his type of farming ought to be changed.

The cost of hauling milk and of hiring it hauled in Delaware County, New York, is given in Table 12. The

Fig. 18.—Going to the creamery with two cans of milk. The cost of hauling is excessive.

Fig. 19.—A full load of milk from many farms. The cost of hauling is low.

men who haul for pay have full loads so that they can haul it at a low cost and yet make wages for themselves. In determining the cost when the farmer hauls the milk, his time was counted at 15 cents per hour, a boy's time at 8 cents, a team's at 15 cents or 8 cents for one horse. These prices are very low. It will be seen that the cost of hauling milk one mile is almost as much as the cost of hiring it hauled 8 miles. The time taken to get ready and to hitch up, as well as the size of the load, make the cost very high.

TABLE 12. — COST OF HAULING MILK FROM THE FARM TO THE CREAMERY, 148 FARMS, DELAWARE COUNTY, NEW YORK [1]

MILES FROM FARM TO CREAMERY	MILK HIRED HAULED		MILK HAULED BY THE FARMER	
	Number of Farms	Cost for Each Dollar's Worth of Milk	Number of Farms	Cost for Each Dollar's Worth of Milk
0.5			19	.047
1	3	.043	16	.064
2	12	.042	13	.066
3	18	.055	6	.097
4	12	.061	5	.155
5–6	24	.060	3	.138
7–8	9	.065	—	——
9–10	4	.068	3	.199
13	1	.068	—	——

[1] Thesis by E. H. Thompson, Department of Farm Management, Cornell University.

These dairies had good-sized herds, averaging 28 cows. With smaller herds it is evident that the cost of hauling is very high when the farmer hauls his own milk only. The profit from milk production is not high enough to stand very high cost for hauling.

From 21 farms the milk was hauled by the farmer to a platform from which it was hired hauled. The average distance to the platform was .55 miles. The cost to haul for each dollar's worth of milk averaged \$.058. The average distance from the platform to the creamery to which the milk was hired hauled was 5.4 miles, and the cost for each dollar's worth of milk averaged \$.056. It cost the farmer more to hitch up and haul the milk half a mile than to hire it hauled ten times as far.

Because of the high cost of hauling, we find along every railroad that carries milk to cities a more or less irregular boundary line at varying distances from the railroad, beyond which the milk is made into butter or sold to creameries, or cheese factories. If the price of milk rises a little, there is a very large supply that is available, on a day's notice. It is this great reserve supply that makes it difficult to raise the price of milk.

In choosing a farm or deciding on a type of farming, one must consider the cost of hauling the products.

RELATION OF SUPPLY AND MARKET DEMAND TO TYPE OF FARMING

Of the many phases of this subject, the following are here discussed: relation of yield per acre to value of the crop; changes in comparative values of products; periods of overproduction and underproduction; special demands of certain markets; supplying the home market; and supplying the farm family.

57. Relation of yield per acre to value of the crop. — Few other industries are so subject to violent changes in production and consequent changes in prices. When a manufacturer buys a certain number of hides, he knows fairly definitely how many shoes he will have to sell. But when a farmer plants a certain area of wheat or cotton, he knows little about what his yield will be. In the ten years, 1901 to 1910, the yield of potatoes in New Jersey has varied from 59 to 132 bushels per acre. Corn in Illinois has varied from 21.4 to 39.8 bushels. Wheat in

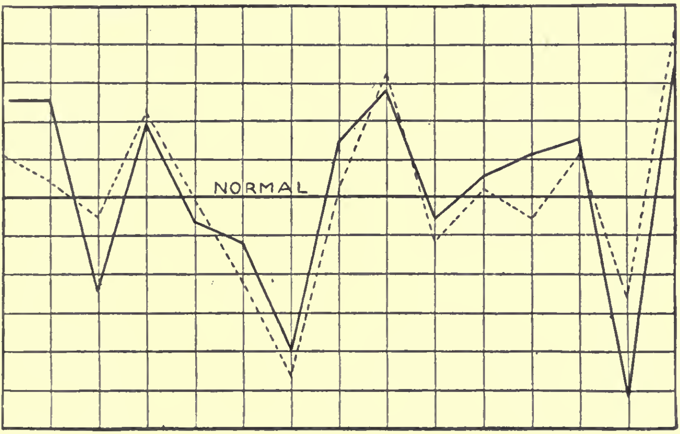

FIG. 20. — Rainfall for June, July, and August and yield of corn per acre.[1]
———Average yields of corn 1888 to 1902.
...... Average rainfall for June, July, and August.

Kansas has varied from 10.4 to 18.5 bushels. Cotton in Texas has varied from 125 to 225 pounds.[2] Such variations are to be regularly expected for all crops. The chief cause for them is the variation in rainfall. It is this great uncertainty that makes the opportunities for speculation in farm products, and for gambling on future prices.

The relation of rainfall to yield of corn in the corn-belt

[1] U. S. Dept. Agr., Yearbook, 1903, pp. 215–244.
[2] U. S. Dept. Agr., Yearbook, 1910.

states is shown in Figure 20. The yield of corn follows almost exactly the rainfall for June, July, and August.

For products that are easily stored, such as cotton and grain, the years of highest yields are often, but not always, the years of highest value per acre. But for perishable crops, like potatoes, cabbages, and apples, the years of high production are usually the years of lowest value per acre. More perishable crops, as fresh vegetables and strawberries, are still more subject to violent changes in price.

TABLE 13. — RELATION OF YIELD PER ACRE TO VALUE PER ACRE OF CORN, COTTON, AND POTATOES IN THE UNITED STATES [1]

YEAR	CORN		COTTON		POTATOES	
	Yield per Acre	Value per Acre	Yield of Lint per Acre	Value of Lint per Acre	Yield per Acre	Value per Acre
	Bu.		Lb.		Bu.	
1891 . .	27.0	$10.98	179.4	$13.10	93.7	$33.53
1892 . .	23.1	9.09	205.0	17.22	61.5	40.65
1893 . .	22.5	8.21	148.8	10.42	70.3	41.71
1894 . .	19.4	8.86	191.7	8.82	62.4	33.43
1895 . .	26.2	6.64	155.6	11.83	100.6	26.73
1896 . .	28.2	6.06	124.1	8.19	91.1	26.08
1897 . .	23.8	6.26	181.9	12.00	64.7	35.37
1898 . .	24.8	7.10	219.0	12.48	75.2	31.11
1899 . .	25.3	7.66	184.0	13.32	88.6	34.60
1900 . .	25.3	9.02	194.4	——	80.8	34.78
1901 . .	16.7	10.09	169.0	——	65.5	50.27
1902 . .	26.8	10.81	188.5	15.61	96.0	45.22
1903 . .	25.5	10.82	174.5	21.32	84.7	51.99
1904 . .	26.8	11.79	204.9	17.89	110.4	49.96
1905 . .	28.8	11.88	186.1	20.47	87.0	53.67
1906 . .	30.3	12.06	202.5	20.41	102.2	52.29
1907 . .	25.9	13.38	178.3	18.54	95.4	58.86
1908 . .	26.2	15.88	194.9	16.96	85.7	60.50
1909 . .	25.5	15.20	156.8	21.80	106.8	58.59
1910 . .	27.7	13.37	170.7	24.24	93.8	52.35
1911 . .	23.9	14.77	207.7	18.28	80.9	64.64

[1] U. S. Dept. Agr., Yearbook, 1900, 1910, and 1911.

The average yields per acre and values per acre for corn, cotton, and potatoes in the United States for 21 years are given in Table 13. One might expect that an increase in the yield of corn would give an increased value per acre, and a decrease in yield decrease the value per acre. For corn the yield and value have gone in the same direction 10 times and in opposite directions 10 times. For potatoes the yield and value have gone in the same direction 5 times and in opposite directions 15 times.

A very low yield of potatoes seems always to be worth more than a large crop. Even with corn, we find the 17-bushel yield of 1901 worth more than the 25-bushel crop of the preceding year, and almost as much as the 27-bushel crop of the following year. In the case of potatoes, the results are very striking. In 1891, the average yield per acre was 94 bushels, and the value per acre was \$34. The next year the yield dropped to 62 bushels, but the value per acre was \$41. In 1894, the yield was 62 bushels with a value of \$33. The next year the yield jumped to 101 bushels, but the value dropped to \$27 per acre. Two years later the yield again dropped to 65 bushels, but the value per acre rose to \$35. Again we see the 66-bushel yield in 1901 worth more than the larger crops of the years preceding and following. In general, the years of very large crops of potatoes bring low returns per acre, and very small crops bring high returns. This is merely another way of showing how easily the potato market is affected by too many or too few potatoes.

After a year of good prices, all the newspapers are filled with advice about increasing the area of potatoes or doubling the yield per acre. We constantly see figures given to show how many billions of dollars better off the farmers of a state would be if they followed some particular method that would double crops. These results always assume that the prices would be unaffected, — an assumption that is so absurd as to be humorous. If Mr. John Jones could double his crop, and have the world crop remain the same, he might receive all the good things promised. But when the general production is too great, the price drops so that the crop is usually worth less than a normal crop. Perishable products are constantly meeting the peril of overproduction. In 1912, beautiful peaches rotted in Texas, because they were not worth picking. Watermelons often meet this fate. In 1896, thousands of bushels of apples were left on the trees, because they were not worth picking. In the spring of 1910, potatoes sold on some farms for 10 cents a bushel. It was in 1898 that corn sold for 8 cents in Nebraska. It is desirable that production be increased, but a sudden increase is very unfortunate for city as well as for country. The low prices please the consumer, but discourage the farmer, and result in a too violent decrease in production that pleases no one.

One reason why this question is not better understood is because a community may have a large crop in a year when there is a general shortage of the crop and consequently get high prices, or a community may have a short crop in a year of good crops. These figures are for the whole country and reflect the general condition of the country. They show that in general the farmers receive as much or more for the potato crop in years of a general short crop.

One other factor enters into the question, so far as the individual is concerned. It is the amount of the product consumed on the farm by the family, by stock, or used as seed. This amount is more or less constant. In the years of poor production, the net amount to sell may be so small that the higher prices will not compensate for the short crop. The price of potatoes seems to be high enough so that the total value of the crop sold is likely to be highest in the years of small crops. Crops that are partly fed nearly always pay the farmer best in years of good crops, because in poor years the amount left after feed and seed is deducted is so small.

The prosperity of the farmer is, of course, influenced by the condition of the country, so that high yields and low prices are in part offset by general business conditions.

58. Variation in relative values of farm products. — The relative prices of farm products are constantly changing.

The value of wheat on the farm has been decreasing relative to the prices of corn, oats, eggs, and most other products. (Table 14.) Thirty years ago a bushel of wheat would buy 4 dozen eggs; now it buys only 2.7 dozen. It would then buy 2 bushels of corn; now it

TABLE 14. — COMPARATIVE FARM PRICES, SHOWING WHAT A BUSHEL OF WHEAT WOULD BUY AT DIFFERENT PERIODS, FROM TABLES 81 AND 82.

	BUSHELS OF CORN	BUSHELS OF OATS	DOZENS OF EGGS [1]
1866–1870	2.2	2.9	3.8
1871–1875	2.3	2.8	3.8
1876–1880	2.7	3.1	5.1
1881–1885	2.0	2.5	4.0
1886–1890	2.0	2.5	3.9
1891–1895	1.6	2.1	3.2
1896–1900	2.3	2.9	3.7
1901–1905	1.6	2.2	2.6
1906–1910	1.7	2.2	2.7

[1] The price of eggs used is the city wholesale price, Table 82.

buys only 1.7 bushels. It would then buy 2.5 bushels of oats; now it buys only 2.2 bushels.

Barley has decreased in price relative to other grains, but during the past few years seems to be rising again. (Table 81.)

Horses have shown the most striking increase. Fifteen years ago a horse would buy 156 bushels of oats; now it will buy 238 bushels. It would then buy 5.1 tons of hay; now it buys 8.7 tons. It would then buy 127 bushels of corn; now it buys 182 bushels.

All these shifts in price affect the type of farming. The area of wheat in the United States decreased 16 per cent from 1899 to 1909; hay increased 17 per cent, corn 4 per cent, oats 19 per cent. The relatively low prices now secured for wheat are doubtless the chief cause for its decrease in acreage.

Table 15. — Prices of Various Products Compared with the 1896–1900 Prices as 100 per cent. From Table 82.

	Corn	Oats	Wheat	Beeves	Hogs	Sheep	Butter	Eggs
	%	%	%	%	%	%	%	%
1896–1900	100	100	100	100	100	100	100	100
1901–1905	163	154	113	110	143	126	122	154
1906–1910	179	185	131	122	162	150	143	183

In Table 15 it is shown that since 1896 to 1900 the prices of corn, oats, and eggs have been rising more rapidly than the prices of wheat, beef, hogs, sheep, and butter. As population increases, we must expect that grain will rise in price relative to meat and butter. In China and Japan, this process has gone so far as to practically eliminate animal food except eggs and chickens. The hen is a much more efficient user of food than other animals.

The margin of profit on animals is constantly becoming closer, so that better stock and better feeding will continue as serious problems.

Table 16. — Comparative Farm Prices, Showing what a Horse Would Buy at Different Periods, from Tables 80 and 81.

	Bushels of Oats	Tons of Hay	Bushels of Corn
1866–1870	153	5.7	117
1871–1875	184	5.3	152
1876–1880	179	6.1	156
1881–1885	194	7.2	151
1886–1890	232	8.5	183
1891–1895	191	6.6	148
1896–1900	156	5.1	127
1901–1905	189	6.9	137
1906–1910	238	8.7	182

59. Cycles of over- and under-production and ways of foretelling them. — Man is so constituted that he is too likely to think that present conditions are to continue. If we have a wet year or two, we think that it will always be wet; if good prices, these are to remain forever. In the case of prices, it is the very feeling of certainty that present conditions are to continue that makes it impossible for them to do so. One of the most important gifts for man to cultivate is his ability to forecast the future. This ability is one of the most valuable business assets.

The usual guide that is followed in determining what crops and animals to produce is the profits of the last year or two, but since prices may be temporarily high or low, longer periods should be considered. Many factors are involved. The yields in the community may be good in a year of poor crops, or the community may have poor crops in a year of general overproduction and low prices.

Add to these uncertainties the fact that the weather has nearly as much to do with the total crop as the acreage, and it is no wonder that the farmer finds it difficult to tell what acreage to plant. With the annual crops, the acreage is kept fairly close to the country's needs. The longer the time required to grow a product, the worse the periods of over- and under-production become. A shortage of an annual crop may be made up in a year, but it takes ten to twenty years to adjust the area of apples, and fifty to a hundred years to grow a lumber crop to supply a shortage in lumber.

Apples in the Northeastern States are a good crop with which to illustrate this point. If the supply of apples is short, prices will be high. If this condition continues for a few years, planting will be encouraged, but the trees planted will have no effect on the next year's crop. Prices may go still higher and so stimulate more planting. This condition may continue for twenty years, after which comes the deluge of apples, with more trees coming on every year. This is what happened during the past generation. Apples paid well from 1854 to 1864. From 1864 to 1874 prices were very high. They continued fairly good till 1878. They then dropped and continued to drop till 1896, when thousands of bushels were not picked. Since 1896, prices have been rising, and for the last few years they are again so high that people are becoming wild about them.

Nearly all the bearing apple orchards in New York were planted between 1855 and 1878; planting then practically stopped. It had been much overdone. In the early nineties some orchards were cut down.

In one township in Monroe County, New York, which is in the center of the apple belt, 57 per cent of the apple trees were planted from 1859 to 1878; only 11 per cent were planted from 1879 to 1903; while 21 per cent were planted from 1904 to 1908.[1]

In 1908, less than 6 per cent of the apple crop of this county was borne on trees planted since 1878. From the fact that there were so few trees planted between

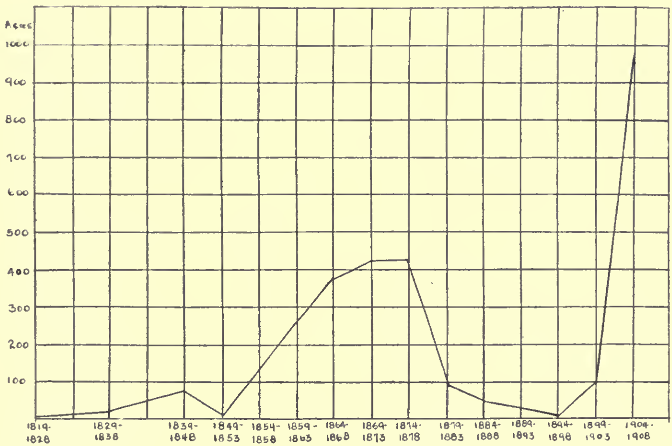

Fig. 21. — Areas of apples planted in different years, Parma township, Monroe county, New York.

1878 and 1903, we must expect high prices in most years until the recent plantings affect the result. Judging by past experience, this would be about 1920 to 1925. In the meantime, indications point to a very serious over planting just as occurred in the seventies (Fig. 21).

There is no shortage of apple land. Most of the tillable land in the North Atlantic States is well adapted to the crop. There is also much good apple land in the

[1] M. C. Burritt, Thesis in Cornell University Library. See also New York, Cornell Bulletins 226, 229, 262, 307.

other states. There is no reason why an average of fifty years of apples should pay better than other crops. Abnormally high profits are the peril of the industry.

The fact that apples are high in price is no indication that they will be high when the proposed new orchard comes into bearing, nor are low profits an indication that profits will be low. The only way to tell whether to plant apples is to study the comparative numbers of old and young trees, and the present rate of planting.

According to the 1910 census, there were in the United States 151,000,000 apple trees of bearing age, and 66,000,000 not of bearing age. These numbers do not appear to indicate over planting, but the danger at the present time is that we have just entered upon a period of planting, and it appears that too many are likely to be planted before the young trees come into bearing. It is unfortunate that the trees not of bearing age are not well distributed. Most of them are of very recent plantings.

From the figures thus far available, it appears that the periods of over- and under-production of apples last about twenty to twenty-five years, as it takes this time to get enough trees raised to bearing age to cause overproduction, and about another equal period of little planting before prices rise high enough to stimulate another planting wave. It would appear to be the part of wisdom for a farmer to start planting or buying orchards about the middle of the low-price period when every one is discouraged, and to stop planting at the time when prices are so high that every one is planting. Some farmers do follow this practice. The farmer who planted in the eighties has already been rewarded.

The same sort of cycle occurs with all farm products.

With potatoes, high prices are usually followed by increased acreage, but if the increase is too great, the farmers are told of the fact by the prices the next fall. They do not go on for ten or twenty years, as in the case of apples, before the wisdom of the acreage is put to test.

Hogs usually rise in price for two to three years and then drop for two to three years. A very abnormal corn

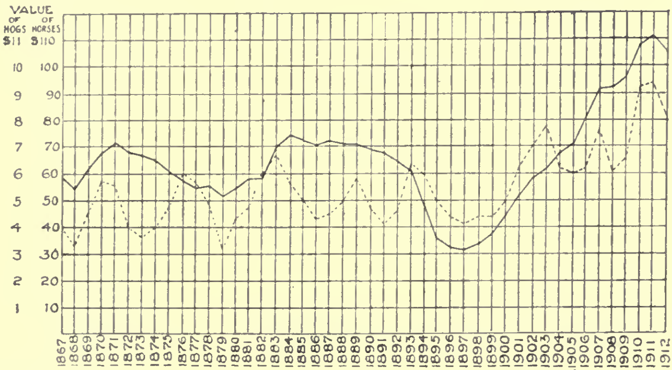

FIG. 22. — Solid line average farm prices of horses. Dotted line average farm prices of hogs. Periods of over- and under-production last about 10 years for horses and 3 years for hogs.

crop shifts the hog curve. Since 1866 the curve has been very regular until 1901, when the very short corn crop checked hog production, so that the drop in hog prices did not come until two years later. (See Figure 22.) It takes about two to three years of low prices to check hog production and get rid of the extra pigs that are coming on, and about two to three years to get production started and the pigs raised to marketable age so as to again cause overproduction. Those who have lived in the corn-belt know of this cycle of high and low prices. If a farmer in the corn-belt changes his production on account of prices, it would appear to be good policy to raise a considerable number of pigs in the second or third year of low prices, and to be cautious about the number raised in the second and third years of high prices. When the majority are disgusted with the business is a good time to buy; when the majority are declaring that prices will never again be low is a good time to sell. An axiom of those who speculate in stocks and bonds expresses the same idea, — to sell on a rising market and buy on a falling market.

Prices of horses show the same cycle, but it takes a long time to grow enough colts to overstock the market, apparently eight to ten years. (See Figure 22.) Those who were first to start raising colts after the ruinous prices of 1896 have made a good profit. When the price of horses drops very low, it would appear to be the part of wisdom to sell all the old horses and buy young ones that will still be living when prices rise. The old ones will not bring much, but even if they bring nothing, the prices of young horses are so low as to make this a wise practice. If one is in a region adapted to horse production, the young horses should be mares and should be bred. The fact that the neighbors are raising no colts indicates that when the colts raised are five or six years old, there will be a shortage of horses.

The fact that horses are high is no indication that they will be high when a young colt becomes a horse; neither does the fact that horses are low indicate that they will be low when the colt is grown. It is not the price of horses, but the number of colts that are being raised, that suggests the probable profits from colt production.

Products that cannot be kept from year to year have extreme variations in price. This results in considerable variation in acreage planted. Variations in the price of potatoes from twenty-five cents to one dollar are common. Cabbages vary from $2 to $60 per ton. Fresh vegetables are exceedingly sensitive to any overproduction. Farmers who are growing annual crops usually find it best to grow about the same area year after year, regardless of prices. The attempt to adjust the acreage to conditions is too uncertain. If conditions call for the abandonment of a crop in a community, as they sometimes do, one must distinguish between this and temporary overproduction, — a distinction that is sometimes hard to make.

Farmers who are on the marginal regions for the growth of a product should be very careful about taking up the enterprise when prices are abnormally high. Horses have to be very high to make colt production pay where feed is very high. When horses rise to an unusual price, it may be that it would pay to raise them, but this is just before the drop in prices is likely to occur. Instead of starting to raise colts when horses are cheap, the farmers of the Atlantic States usually start when the climax in prices has been reached, and get a good supply of colts on hand just as low prices come.

Farmers who live in regions only fairly adapted to apples, or hops, or oranges are not likely to be attracted by these crops until prices are abnormally high; that is, just before a drop is likely to occur.

It is best for the city, as well as for the farmer, if production can be so adjusted as to supply the market at a fair price, and so avoid the violent shifts in price that so frequently occur. The Crop Reporter is of much use in this way. Much more good could be done if the long-time enterprises were kept track of, such as colt production, apple and orange planting, etc. Another difficulty seems to be that agricultural specialists, who are dealing with such enterprises, usually seem to feel that it is their duty to encourage everyone to go to producing their specialty. They are likely to try to discredit the possibility of overproduction of their particular specialty.

Farmers who are growing such crops as apples, oranges, potatoes, cabbages, onions, etc., find it difficult to plan for their farm development. It is unsafe to go in debt as heavily as when one is growing more stable crops. These are the products that in some years give high profits, and in other years, heavy losses. Nearly all magazine articles that wish to show how rich farmers are getting, use some of these speculative crops and select years when profits are unusual. The farmer who depends entirely on such products must always be prepared to stand heavy losses. Regions that depend largely on such products are subject to successive years of booms and hard times.

For these reasons, such crops are usually combined with other things. In new regions, one crop farming may continue for a time, but this will usually change to a mixed farming as the country grows older. A common saying of the apple growers of the North Atlantic States is that they expect to live from the farm and depend on the orchard for profits. Such a farmer may have ten acres of apples on a 100-acre farm. If the apples fail, the farm will usually pay expenses and keep the family, so that the farmer is not forced to live a year with a large expense and no income. Most of the potato crop is grown in the same way on general farms. The truck growers also have a great variety of crops.

60. Special demands of certain markets. — Occasionally there are special demands of certain markets that affect the type of farming. White eggs in New York and Philadelphia regularly sell for about 3 to 15 cents a dozen above the price of brown eggs. In Boston the brown eggs bring more. For this reason, nearly all farmers who give much attention to poultry and who ship eggs to New York keep White Leghorn hens. Some other breeds are kept, but these are in the great majority. This involves many other changes. The breeds that lay white eggs are not very good for meat, nor are they good for raising chickens without incubators.

The Boston market prefers green asparagus; the New York market prefers it white. This results in level culture for Boston and ridged culture for the New York market. Such illustrations might be multiplied indefinitely. They all have more or less effect on the type of farming.

61. Supplying the local market. — Many small towns, particularly in the grain and cotton regions, are short of vegetables, fruit, and milk. These conditions often give a chance for some man, who has little capital and who is willing to work hard, to make a good profit by following a type of farming entirely different from the general type to which the region is adapted. Conditions may be such that a profitable fruit or vegetable business could not possibly develop on the basis of shipment from the region, yet such a business may pay very well until the local market is supplied.[1]

If a product is not grown locally, its wholesale price must be that of the nearest general market plus commissions and freight. But if produce is shipped out of the region, its local wholesale price will be that of the general market, less freight and selling charges. Thus, so long as

[1] U. S. Dept. Agr., Farmers' Bulletin 325.

the market is not supplied by local products, there is in effect a protective tariff of two freight charges and two selling charges in favor of local production. One of the most striking cases is the production of vegetables in Alaska — not because of favorable conditions, but because of high prices.

62. Growing products for home use. — Much the same principle applies in growing products for use on the farm. A farmer may raise a hog or two for home use when it would not pay him to consider raising hogs to sell. If he buys pork from the meat market, he will usually have to pay two or three times as much as he gets when he sells, besides having to haul both ways. For this reason, it generally pays a farmer to keep one or two cows, 50 hens, a hog or two, and raise for home use such fruits and vegetables as grow well, even where it will not pay at all to raise any of these to sell. In addition, the health and happiness of the family are likely to be much better if these products are raised.

RELATION OF TYPE OF FARMING TO COMPETING TYPES

63. The best-paying products crowd out those that pay less. — It is not sufficient that a crop pay; it must pay better than the other crops with which it competes. Corn may pay near cities, but if it cannot compete with potatoes, sweet corn, and other tilled crops that require work at the same time of year, it must give way.

Many efforts have been made to introduce root crops for stock feeding. But these crops compete with corn for labor. For a given amount of work, corn will give much more stock food than roots, in most parts of the United States. This is not true in Europe, where the climate is better for roots and not so good for corn and where labor is cheap.

The oat crop does not ,pay very well in the corn-belt, but it fits in the rotation. A farmer can raise all the corn that he can tend to and at the same time raise oats, because the work does not interfere. It is not necessary that oats pay as well as corn; they do not compete with corn except for land.

In some sections where dairying pays better than any other kind of live-stock, the profits from raising crops are so high that farmers would prefer cows for the winter, but because cows interfere with crop growing in the summer, they accept a less profitable kind of livestock. Under some conditions the extra crops that can be raised more than offset the difference in profits on stock. A further discussion of this question is given on page 119.

No matter how profitable a product is, it must give way to a competing product that pays better. Sometimes a product that does not pay well must continue to be raised, because there is nothing better.

RELATION OF LAND VALUES TO TYPE OF FARMING

64. Land values affect the type of farming. — The range business has been driven farther and farther west by the increasing land values. It cannot continue on land that is adapted to crop production. Systems of farming that paid in Iowa when the land was worth $50 may not pay now, when much of the land is worth $150. There is a constant adjustment to land values, but this has less effect on the type of farming than many of the other factors. A change in land values of $100 per acre represents an annual cost of about $5 per year. A change of 10 cents per bushel in price of a 50-bushel yield of corn will offset this.

RELATION OF CAPITAL TO TYPE OF FARMING

65. Adjustment of type of farming to capital. — Some types of farming call for much larger capital than others; some require that the money be invested for a long time; others bring quick returns.

In Table 17 is shown how the farmers in the same region in New York have adjusted their business to the amount of capital. The farmers with little capital raise more crops for sale and less animal products. Those with small

TABLE 17. — RELATION OF CAPITAL TO TYPE OF FARMING. 578 FARMS IN LIVINGSTON COUNTY, NEW YORK

AVERAGE CAPITAL	PER CENT OF RECEIPTS FROM CROPS	PER CENT OF RECEIPTS FROM ANIMALS AND THEIR PRODUCTS
$5,000 or less	73 %	27 %
$5,001–$7,500	68	32
$7,501–$10,000	65	35
$10,001–$15,000	65	35
$15,001–$20,000	55	45
Over $20,000	43	57

capital obtain only 27 per cent of their receipts from animals; those with larger capital obtain 57 per cent from animals. With any given farm, the animals represent added capital. As much or more machinery and horses are required to run the farm with live-stock, and, in addition, the investment in stock, feed, and extra labor must be considered.

66. Relation of type of farming to profits with varying capital. — The same farms give a good chance to study the relation of the amount of live-stock to profits with different amounts of capital. Table 18 shows that in this neighborhood the farmers who have less than $5000 capital make the largest profits if they derive about four-fifths of their money from cash crops. But of those who have over $15,000 capital, the ones who get about one-third of their money from cash crops make most. On the same farm, the type of farming that is best with small capital may not be best when the money increases. Farmers know this and increase both the amount and quality of the live-stock as they get more money.

TABLE 18. — SYSTEMS OF FARMING WITH DIFFERENT AMOUNTS OF CAPITAL RELATED TO LABOR INCOMES. 578 FARMS NORTHERN LIVINGSTON COUNTY, NEW YORK

PER CENT OF RECEIPTS FROM CROPS	LABOR INCOMES ON FARMS WITH CAPITAL AS DESIGNATED			
	$5000 or less	$5001 to $10,000	$10,001 to $15,000	Over $15,000
20% or less . . .	$253	$227	$554	$1000
21%–40% . . .	181	280	587	1399
41%–70% . . .	256	555	707	1038
71%–90%. . . .	424	436	834	1194
Over 90% . . .	231	320	714	473

67. Period of investment. — Perhaps the longest investment is in forest trees. Trees may pay a good rate of interest, but the money is invested from 20 to 100 years. Evidently one who is very short of capital will not want to invest much money or time in planting forest trees, even though they may be a very good thing for persons who can spare the investment.

In the Eastern States, apple trees pay very well, but very little return should ordinarily be counted on for the first fifteen to twenty years. The best yields are secured at about fifty years. The trees often continue to pay until they are one hundred years old.[1] Certainly one who does not have enough money to run his farm should go slowly in planting apple orchards.

Live-stock requires much more capital than crop farming. Pure-bred live-stock requires much more capital than grade stock. Extra good pure-bred stock requires still more capital. It is usually unwise for the farmer with little money to buy much pure-bred stock, and it may be just as unwise for the same man to keep anything but pure-breds when he gets more money.

All new or experimental things require more capital than established enterprises, because of the risk. If one is short of money, he should be slow to take up such things.

Types of farming that depend on extensive advertising require both time and capital before they become established.

RELATION OF LABOR TO TYPE OF FARMING

68. The type of farming must fit the laborer. — Many persons in the United States are prevented from going into the dairy business because owners, as well as hired-men, dislike to milk. Sugar beets depend on having a supply of cheap labor for doing the weeding and thinning. The cotton crop is well adapted to cheap labor. The supply of pickers limits the area that can be grown.

[1] New York, Cornell Bulletins 226, 229, 262, 307.

If a successful mechanical picker should come into use, it would revolutionize agriculture in the South. Cotton responds well to good care, but is a crop that will produce something of a yield even if neglected. This makes it a good crop for ignorant labor. On the other hand, the cheap labor that goes with the cotton crop tends to prevent the introduction of a more diversified farming. Profitable production of grain crops in America calls for the use of machinery and two to five horse or mule teams. This requires efficient labor. Improved live-stock that goes with diversified farming also requires intelligent care. If the negro could be removed from any Southern state, it is probable that land values would double in a few years, because great numbers of Northern farmers, who are now going to Canada, would go South. They would establish diversified farms, with cotton as the most important cash crop.

EFFECTS OF WEEDS, INSECTS, AND DISEASES ON THE TYPE OF FARMING

69. Pests may limit the type of farming. — There are hundreds of instances of an entire change in the system of farming because of pests.

One of the things that has held back the development of cattle raising and dairying in the South is Texas fever. This has modified the entire system of farming. Now the cotton-boll weevil promises to bring about diversified farming. A few years ago, the San José scale practically exterminated the peach industry in Delaware, Maryland, and New Jersey. In many cases land values were cut in half. Now farmers are learning how to control the scale, and the peaches and land values are returning.

The corn root worm is forcing crop rotation and consequent changes in farming in the corn-belt.

RELATION OF THE TYPE OF FARMING TO THAT OF THE NEIGHBORS

70. The value of community experience. — Under most conditions it is of very great importance to be in the same type of farming as the community. There is so much to learn about farming in any community that one man cannot hope to learn it alone. The experience of the community is of the utmost value to every farmer. Few farmers realize how much they owe to their neighbors. Different men try out new varieties of crops, new machines, different breeds of animals, different methods of raising crops, different kinds of building construction, different ways of saving labor. Each man gets the benefit of the experiences of all; if a man is following a type of farming different from his neighbors, he cannot hope to try all these things. He is not likely to progress very rapidly. Sometimes he may visit other similar regions to get the experience of other men, but then it may not apply on his farm.

71. Community labor supply. — If one is following a different kind of farming from his neighbors, he will always have difficulty in securing well-trained help.

The man who has the only apple orchard in a region will have to train his men for each operation The men will not know how to plow the orchard. They will be thinking of the plowing more than of the trees, and may injure the trees. They will not know how to prune, take out borers, spray, pick, or pack apples. But if the entire community is in the apple business, most of the hired-men will know considerable about the different kinds of work. They will also know what a day's work is, as there will be other farms with which to compare. This usually results in faster, as well as better, work. It will also be easier to change work with neighbors. The same principle applies to all kinds of farming.

72. Advertising value of the neighborhood. — The region that produces hogs, apples, hay, hops, or any other product attracts the corresponding buyers. The writer has seen apples sell in an apple section for $3 per barrel when equally good apples in another county could not be sold for more than $2. The buyers do not care to go to a region where only a little of the product is to be secured. They are also afraid of the product from such a region, because while a single farmer may have a good product, the average of the region is poor. The same fact tends to lower the price if the apples are shipped to a city. If they come from a region that is noted for its product, the price is almost certain to be better than for the same quality from a less known section. It is also difficult to take advantage of carload rates. All the facilities for shipment are better provided if there is a community business.

Pure-bred stock sells for most in regions where the breed is best developed. Syracuse, New York, is a great Holstein cattle center. Many farmers, who live a hundred miles from this center and who have no neighbors in the business, sell stock for much less than it would bring in the Holstein community. Some dealers who know this send out buyers to pick up the scattering animals at bargain prices, ship them to the developed community, and sell at a good profit. There is another important Holstein center in Wisconsin. Percheron horses are most developed in the Central West. A single breeder far from this region often finds it difficult to secure good prices. His neighbors do not know what the animals are worth, as they have no basis for comparison. The owner himself finds it very difficult to keep up on prices. The neighbors are often the best market if one has the right breed. Manufacturers realize the advertising value of the community, so that we have developed shoe centers, furniture centers, and clothing centers. Even within a large city, the similar industries tend to group themselves. Buyers are then attracted to the center in a way that no one firm could attract them. The skilled labor is also easier to secure.

Unless there is some definite reason for doing otherwise, one should follow the same general type of farming as his neighbors and keep the same breeds of live-stock.

Sometimes one may go in just the opposite direction so as to supply a local need, as has been previously mentioned, such as growing vegetables for local use in a grain and stock country.

73. Difficulty of changing the type. — Sometimes a type of farming that is not best for the region becomes established. Frequently a change in conditions makes a change in the farming desirable. The wrong type may continue for years, because it is so hard to make the change. The equipment, the farm buildings, city warehouses, the markets, the knowledge of the people, may all need to be changed. This makes the problem a very difficult one, even if there were no conservatism to be considered. It has been aptly said that no one but the sheriff can change a type of farming.

The opening of the grain country of the Central West required a complete readjustment of Eastern agriculture, but it took a generation to complete the change, and even yet some farmers are trying to farm as if Illinois had not been settled, and occasionally an experiment station still attempts to foster the exterminated types of farming.

The introduction of the hard winter wheats called for a complete readjustment of agriculture in parts of Kansas and Nebraska, but it took about twenty years to complete the change.

DIFFICULTY OF DETERMINING THE BEST TYPE

74. Experience the only sure way to tell the best type. — From all of the preceding discussions, it will be seen that there are so many factors involved that no one can hope to give proper consideration to all the more or less conflicting forces and tell the best type for the region, without trying it. Sometimes a type pays so well or so poorly as to leave no question for debate. But usually it is the varying interrelations of all these and other factors that determine the most profitable type, and, in most regions, there are several or many types that compete with each other and that one must decide between. Since most of the factors are subject to frequent change, the type of farming that was formerly best may at any time cease to be best.

The successful farmer must, therefore, ever be on the alert to see whether he is following the best type of farming. But there are so many factors involved that it is very difficult to tell what is best without trying it. New things are always being tried. Occasionally, something is found that succeeds for a series of years, and the neighbors will then take it up. It is so difficult to balance all these factors that farmers are justly very slow to change to untried things. They realize that no scientist can consider all these factors. Only experience can do that. Scientists showed that sugar beets could be grown in New York, and two big factories were built. They are gone now. The scientist forgot to consider which would pay better, the sugar beet or other crops of the region with which beets compete. So near large centers of population, the labor that might be used to grow sugar beets is more profitably employed in growing such crops as apples, potatoes, and cabbages. Scientists have urged these same farmers not to sell hay, but they go on selling it. The farmer of Nebraska and Iowa is told to put all of his corn in the silo or cut it up so as to save the stalks, but there is a labor question involved, and most of the corn continues to be husked from the standing stalks in the field.

One should always follow the type of farming of the region until he is very sure that something else will pay better. Even then, he should go slowly, as he is likely to find that he overlooked something. A progressive conservatism is most likely to bring success.

THE PERSONAL FACTOR

75. Personal tastes a minor factor. — The personal likes and dislikes of the farmer are often thought of as the most important consideration, but they are usually a minor factor in determining the type of farming. If a type of farming pays well, it is usually easy to learn to like it. It is interesting to observe the supposed likes of people. In good dairy sections nearly every farm boy learns to like cows. In some sections where hogs are the most profitable animal, nearly every one likes hogs. Farmers usually attribute these likes to some mysterious psychological influence. To one who has studied agriculture in many regions, it is evident that in most cases these mysterious likes and dislikes are merely the result of comparative profits with different types of farming.

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CHAPTER 3

DIVERSIFIED AND SPECIALIZED FARMING

MUCH of the discussion of this subject is confused because of lack of clearness in definition. It is usually assumed that diversified farming means a little of everything and not much of anything. It follows at once that such farming cannot pay very well, because there is not enough of it. It is likewise frequently assumed that specialized farming means a very large amount of one or two things. As a matter of fact, the size of the business may be large or small in either case. In making comparisons, we should compare the large diversified enterprises with large specialized enterprises and small businesses with small businesses.

Another point that confuses the subject is that such a word as dairying may mean many things. It may mean producing no important product except milk or butter for sale at wholesale prices. Or it may mean combining one of these with pure-bred cattle, in which case there are two important products for sale. Or retailing milk may be combined with pure-bred cattle. In this case, the farmer really has three enterprises; producing milk, producing pure-bred cattle, and retailing milk. Such a business should probably be called specialized, but it has the characteristics of a diversified business, while the production of wholesale milk from grade cows has the characteristics of a highly specialized business.

The subject is further confused by the use of such words as fruit, grain, truck, and live-stock as if they represented a single product. A farmer may grow many kinds of fruit and so have a diversified farm. He may grow nothing but grain crops and yet have a diversified farm.

If a farmer's only important sale is potatoes, his farm is specialized, whether he grows five acres or fifty. Another farmer may grow just as many potatoes, run a dairy, and raise hay to sell, and he will have a diversified farm.

General farming usually means that one grows the usual animals and field crops of the region. It is one kind of diversified farming. It is sometimes wrongly used to mean that nothing much is being done.

A farmer who sells only one important product has a highly specialized farm. If he sells several important products, his farm is diversified. In either case he may sell a number of relatively unimportant items.

NUMBER OF SPECIALIZED FARMS

76. Most farms have several important products. — There are very few highly specialized farms, — not nearly so many as is commonly supposed. If we except the cotton farms, probably over 95 per cent of the other farms in the United States derive most of their income from a combination of crops and animals, — general farming. The census results given in Table 19 are suggestive. The farms classified as live-stock, hay, and grain, are mostly general farms. Either of these terms includes many things. The farms classified as miscellaneous did not derive as much as 40 per cent of their income from any one of the groups of products listed. These classes make up 69 per cent of all farms.

A farm that gets only 40 per cent of its income from its chief source cannot be said to be specialized. If the standard were placed at 75 per cent of the income from one of the classes of products, nearly all the farms would have been miscellaneous. If, in addition, the hay and grain farms and other collective classes were divided into corn, hay, wheat, etc., there would have been practically no farms left to call specialized. With the classification given, we find that when all the fruits are combined, the fruit farms constitute only 1.4 per cent of the total farms. Only 6 per cent of the farms derived as much as 40 per cent of their income from the dairy. The farms that derived 40 per cent from vegetables, tobacco, fruits, sugar, flowers and plants, or nursery products, and rice, altogether made up only 6 per cent of the total farms.

TABLE 19. — CLASSIFICATION OF FARMS IN THE UNITED STATES IN 1899 BY PRINCIPAL SOURCE OF INCOME. AT LEAST 40 PER CENT OF THE INCOME WAS DERIVED FROM THE GIVEN SOURCE [1]

CHIEF SOURCE OF INCOME	NUMBER OF FARMS	PER CENT OF ALL FARMS
Live-stock	1,564,515	27
Hay and grain	1,319,854	23
Cotton	1,071,545	19
Dairy produce	357,544	6
Vegetables	155,788	3
Tobacco	106,250	2
Fruits	82,060	1
Sugar	7,174	0.1
Flowers and plants	6,159	0.1
Rice	5,217	0.1
Nursery products	2,029	0.04
Miscellaneous, no product equal to 40 per cent	1,059,237	19
	5,737,372	

[1] Twelfth Census of the United States, 1900, Vol. V, Part I, p. liii. Alaska and Hawaii omitted.

COMPARATIVE MERITS OF SPECIALIZED AND DIVERSIFIED FARMING

77. Merits of each type. — There are several ways in which special farming has the advantage. One may become more skilled if he has but one or two things to study. If he is very short of capital, he may have considerable of one thing when the same capital does not allow a fair amount of several things. With any given area, the fields may be larger and so greatly facilitate labor. Farmers who follow specialized farming find it easier to get away for a vacation, but this is only another way of saying that such farming does not provide a full year's work.

There are several considerations that so far outweigh all others that the vast majority of farmers find that it pays better to have several important products. Diversified farming provides for crop rotation. It usually provides against total failure. It usually distributes the income over the year and provides work for men, horses, and machinery for a large proportion of the time.

Persons who have never farmed fail to appreciate the importance of these considerations. Very naturally, they compare farming with city work, but such a comparison is very misleading. They are usually attracted by the idea of extreme specialization and are likely to prefer some fad rather than a staple product. The uncommon things are exploited in publications for the same reason that newspapers tell of the unusual things.

78. Diversified farming and crop rotation. — Nearly all kinds of farming require rotation of crops, if yields are to be maintained. A crop may occupy the land only one year, or several years as with alfalfa and nursery stock, or many years as with orchards, but in practically every case rotation is desirable. This usually involves diversified farming.

79. Diversified farming lessens the risk of total failure. — The farmer is so dependent on weather, pests, and prices that he hesitates to take the chance of total failure that he must assume if he has only one product to sell. Even if this product is an animal, the risk is very great, because if crops fail, feed must be purchased and often at prices that make the animals unprofitable. If there are several important crops, they are not likely to all fail in the same year. These risks are not so great when farming by irrigation, but even then the risk is great. A farmer must pay his living expenses, labor, interest, taxes, and farm running expenses. A failure when he has but one cash product is a serious matter, as he will have to carry all these expenses for another year.

80. Diversified farming may distribute the income throughout the year. — If the year's income is all received at one time, it is difficult to make the money last through the year, even when the same amount of money coming at convenient intervals might provide very well. Most kinds of diversified farming are better than special farming in this respect.

81. Diversified farming may distribute the labor throughout the year. — The most important consideration of all and the one that controls the situation in nearly every case is the problem of keeping men, horses, and machinery busy throughout the year. This subject is so important that an extended discussion of the problem will be given. Some types of special farming are satisfactory in this respect, but they are so very rare that only here and there do we find a profitable farm that sells only one important product.

82. Cases in which specialized farming may pay. — The most important cases when very specialized farming may continue to pay are when some one product provides for full employment of men, horses, and equipment, when some one product is extremely profitable, and when extra labor is very easy to secure. Sometimes there is a shortage of land adapted to an enterprise, so that there is, in effect, a corner on the product. Farmers may then make more with a partial year's work than with a full year's work with usual products. Such cases as this are very rare indeed and usually last for only a short time until some other region finds that it can grow the high-priced product. There are some instances when it is easy to get an abundant supply of labor at the particular season when it is required. Occasionally a farmer combines some manufacturing enterprise with farming.

SEASONAL DISTRIBUTION OF LABOR

83. Providing a full year's work. — No matter how profitable a product is, there is a limit to the amount that can be raised with a given amount of labor. Usually only a small fraction of the year can be devoted to the product. The farmer's problem is a very complicated one. It is not so easy as picking the most profitable enterprises. He must determine the combination that will give the greatest returns for the year's work. No one should expect to make a very large profit from farming, unless his business provides a full year's work.[1] It is even more important and more difficult to provide a full year's work for horses than for men.

The time at which crops require work varies with the

[1] See also U. S. Dept. Agr., Yearbook, 1911, pp. 269–284.

latitude. The discussion of details here given applies to latitude about 39° to 43°. Similar figures need to be worked out for each region. Farmers usually know what crops fit together in their region.

84. Distribution of labor on alfalfa. — Alfalfa is a very profitable forage crop in regions in which it does well,

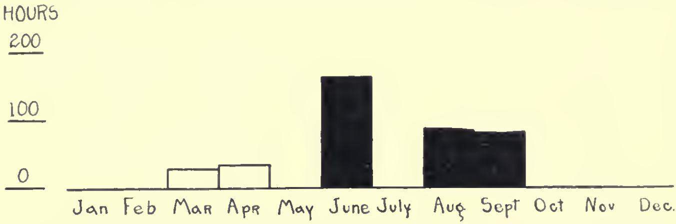

FIG. 23. — Distribution of man labor on 11 acres of alfalfa. White is manuring. Black is cutting 3 times and making hay.

but it interferes with many other crops. In the winter wheat regions of Kansas and Nebraska, it conflicts seriously with wheat and corn. These three are the most profitable crops in most parts of this region. The first crop of alfalfa.

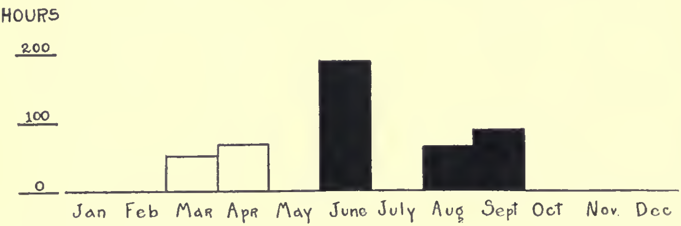

FIG. 24. — Distribution of horse labor on 11 acres of alfalfa. White is manuring. Black is making hay.

which is the heaviest and hardest to cure, the rush of corn cultivation, and wheat harvest all come within three or four weeks. Again, alfalfa haying interferes with plowing for wheat and the third crop with wheat planting.

This is an exceedingly serious conflict and strikingly affects the agriculture of the region. At the present time, wheat pays best for the labor involved, hence corn and

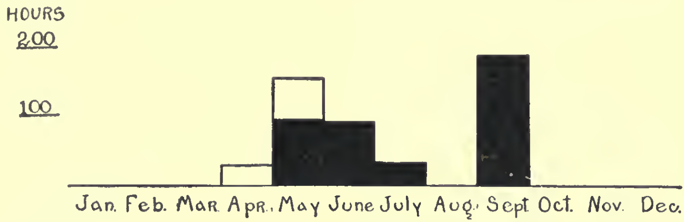

Fig. 25. — Distribution of man labor on 14 acres of silage corn. Black is work fixed as to time. White is plowing.

alfalfa are limited, and this in turn limits the live-stock.

In the corn-belt, corn pays better than alfalfa. This

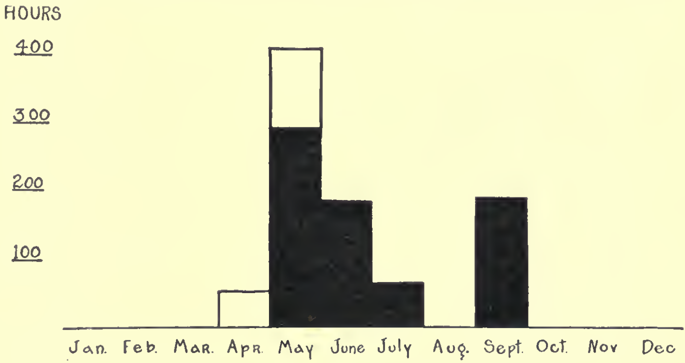

Fig. 26. — Distribution of horse labor on 14 acres of silage corn. Black is work fixed as to time. White is plowing.

checks the introduction of alfalfa. It will probably pay better than timothy and clover in some parts of the corn-belt, but does not combine so well with corn.

Figures 23 and 24 show the distribution of labor on alfalfa in latitude about 42°, about as far north as Chicago.

Because of the large amount of digestible food that can be produced per acre, some persons have recommended that corn for the silo and alfalfa and no other crops be grown by the dairy farmer.[1] This will perhaps produce the most food per acre, but to produce the greatest profit is another question. If a large area of corn for the silo and alfalfa are grown, there is a rush of work trying to get the heavy first crop of alfalfa cured, and, at the same time, trying to keep the weeds down in the cornfield. Again in Illinois, the last cutting of alfalfa and silo filling conflict. The teams can raise more corn than they can put in the silo. With such a type of farming, one would either be very short of men and horses at certain periods, or else have idle ones most of the year. The horses on such a farm might just as well raise oats and timothy and corn for grain in addition to the corn silage and alfalfa. A limited amount of corn silage can be grown with a limited amount of alfalfa and combine other crops to good advantage.

In the North Atlantic States, where hay is one of the most profitable crops, alfalfa combines well with clover and timothy. The alfalfa is cut before the new seeding of clover and timothy, then follows timothy, and then the second cutting of alfalfa. In the fall a third cutting of alfalfa is ready. This allows eight to ten weeks to be spent in haying — a very desirable condition when hay pays as well as it does in this section. Unfortunately, only a small proportion of the soil in this section is adapted to alfalfa.

In some irrigated sections in warm regions, as in Arizona, alfalfa alone provides almost constant work.

85. Distribution of labor on corn and cotton. — Corn conflicts more or less with cotton, alfalfa, winter wheat,

[1] Illinois, Circular 151.

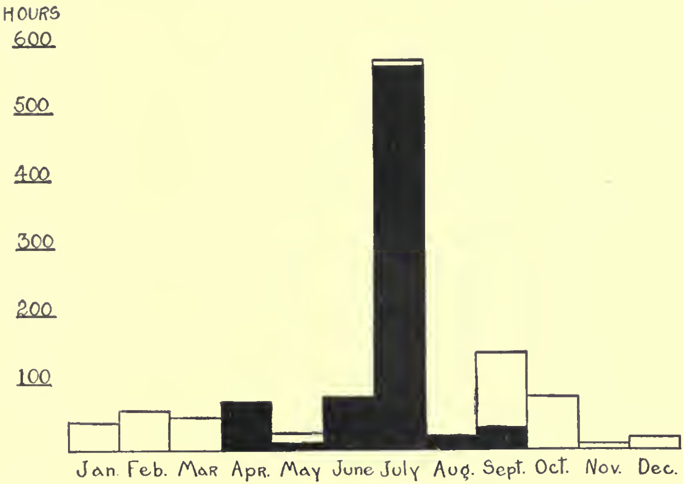

FIG. 27. — Distribution of man labor in raising 67 acres of timothy hay. Black is fertilizing, seeding, haying, etc. White is manuring, baling, and selling.

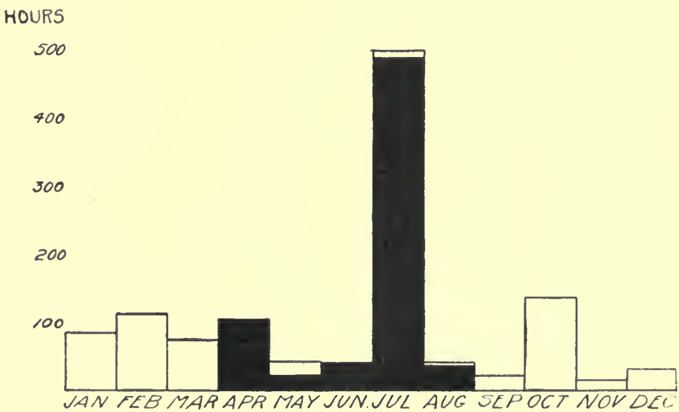

FIG. 28. — Distribution of horse labor in raising 67 acres of timothy hay. Black is work fixed as to time, applying fertilizer, seeding, haying, etc. White is manuring, baling, marketing, etc.

tobacco, sugar-beets. In the corn-belt, the chief crops are corn, clover and timothy hay, and oats. These fit together well. In the winter wheat belt of Kansas and Nebraska, there is very serious conflict between wheat, alfalfa, and corn, as previously discussed.

Cotton, corn, and tobacco are the great crops for the South. The work on these conflicts seriously, particularly in the northern part of the cotton region. Farther south cotton and corn go together better. Cotton interferes with most other crops. This is one reason why cotton farming has so often been a one-crop system.

In the North Atlantic States, corn conflicts with potatoes (see Figures 25 and 33), apples, truck crops, and, to some extent, with field beans and cabbage. For these reasons, corn growing, except in small areas for the silo, is on the decline, not because it does not pay, but because the other crops often pay better. The profits from these crops will often much more than buy the corn that the same work would produce.

The work on corn and sugar beets conflicts, so that few sugar beets are grown in the best corn regions. It has been shown that sugar beets grow well and factories have been built, but corn pays better, so that the factories have usually been moved to regions where corn is not so successful.

86. Distribution of labor on oats. — The spring-sown oat crop seems to be singularly free from conflicts (Figs. 29 and 30). For this reason, oats are extensively grown in regions where they are the least profitable crop in the rotation. Since there is nothing better to do, many farmers raise oats when they get small pay for the time so spent. Oats conflict with barley, with apple spraying, and some other crops, but only a comparatively few farmers grow these. Even with barley, the conflict is not direct. Barley harvest usually precedes oats. Barley may be planted a little after oats, as it stands heat better. Oats

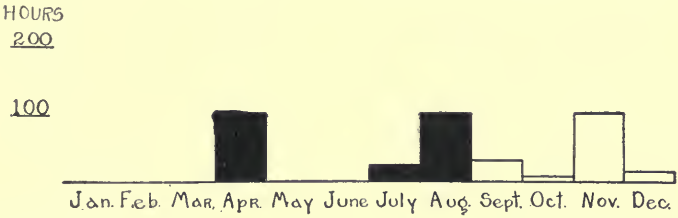

FIG. 29. — Distribution of man labor in raising 23 acres of oats. Black is work fixed as to time. White is threshing from stack and plowing.

also fit in well with corn. In most of the corn-belt, oats are grown on corn ground without plowing. They also furnish a crop with which to seed grass.

In regions where the land is plowed for oats, it is important that the land be fall plowed whenever possible.

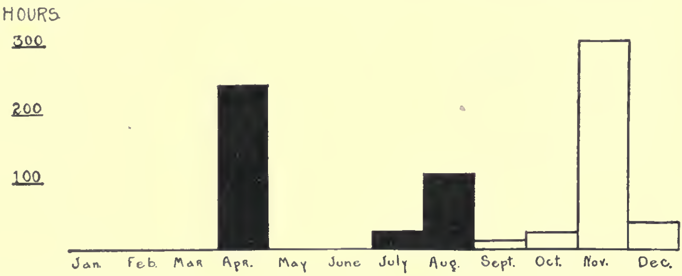

FIG. 30. — Distribution of horse labor in raising 23 acres of oats. Black is work fixed as to time. White is threshing and plowing.

This relieves the pressure of spring work and makes it possible to sow the oats earlier in the season.

In the South, both barley and oats are sown in the fall,

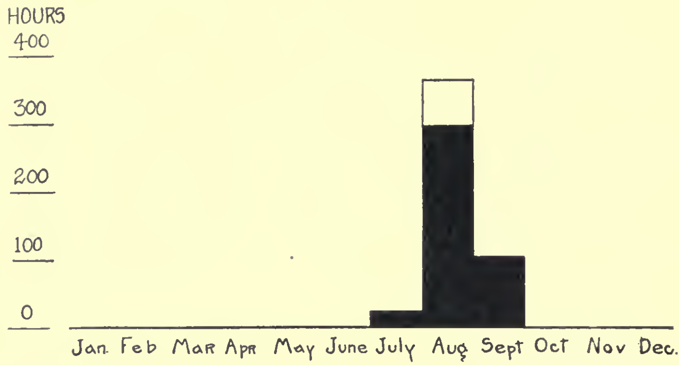

FIG. 31. — Distribution of man labor in raising 21 acres of wheat. Black is work fixed as to time. White is threshing from stack. Plowing and harvesting were both done in July and August. Planting in September.

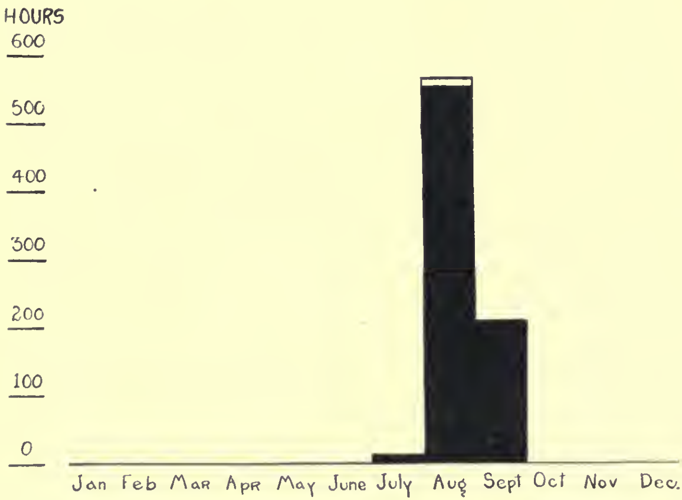

FIG. 32. — Distribution of horse labor in raising 21 acres of wheat. Black is work fixed as to time. White is threshing.

so that they have much the same labor distribution as winter wheat.

87. Distribution of labor on wheat. — Spring wheat has much the same labor distribution as oats. Winter

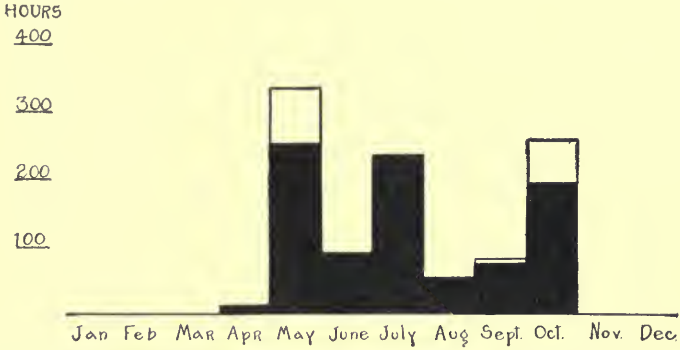

FIG. 33. —Distribution of man labor on 11 acres of potatoes. Black is work fixed as to time. White is plowing and marketing.

wheat harvest conflicts with alfalfa cutting in some regions; it sometimes conflicts with timothy and clover harvest.

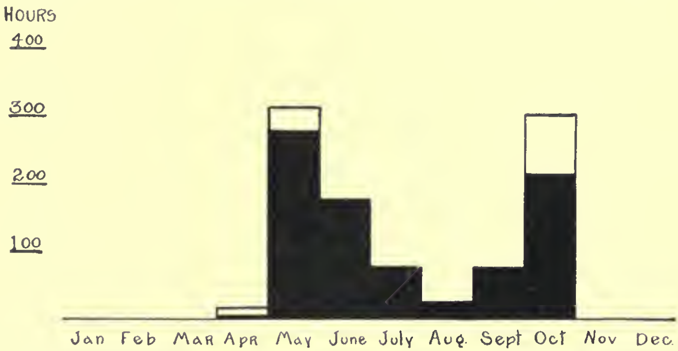

FIG. 34. — Distribution of horse labor on 11 acres of potatoes. Black is work fixed as to time. White is plowing and marketing.

The plowing should be done as early as possible. In some regions this makes it conflict with the second cutting of alfalfa.

88. Distribution of labor on potatoes and cabbages and apples. — In the North, potatoes conflict with corn,

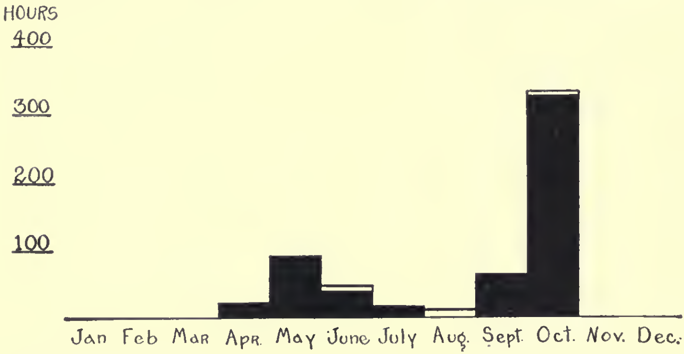

FIG. 35. — Distribution of man labor on 3 acres of apples. Black is work fixed as to time. White is marketing, manuring, etc.

and early potatoes conflict with the early spring crops. Late potatoes and winter apples conflict very seriously, not only at apple-spraying time but at apple-picking time.

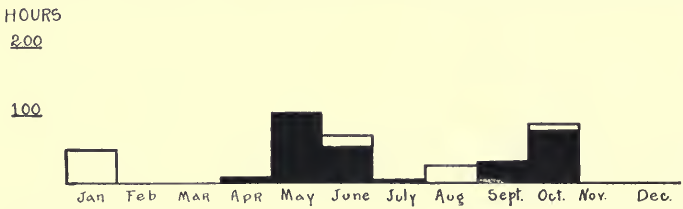

FIG. 36. — Distribution of horse labor on 3 acres of apples. Black is work fixed as to time. White is marketing, manuring, etc.

Late cabbages fit in almost perfectly with either winter apples or potatoes. We find many farmers combining cabbages and potatoes, and cabbages and apples, but the combination of late potatoes and winter apples is very unusual. Of course, a small acreage of each would require much the same labor as a larger acreage of one, but this requires double equipment and has many other disadvantages.

89. Distribution of labor on beef cattle and sheep and hogs. — None of the meat-producing animals requires much work. This is one reason why the margin of profit is so close on such animals. If one does not feed very skillfully, he has no other means of making up for the mistake.

Beef cattle interfere very little with farm work. During the summer they are at pasture, and if the water supply is convenient, they require very little attention.

Sheep require most attention at lambing time. This sometimes interferes with spring work, but usually is early enough so as to cause little trouble. Sheep shearing conflicts with spring work, but is a short job if only a few sheep are kept. If many are kept extra shearers are usually hired. Sheep interfere with crops so much less than dairying does that many farmers who have highly profitable crops keep sheep when cows would pay much better, if they did not interfere with crop growing. Winter dairying does not interfere quite so much, but, in general, sheep or winter feeding interfere with crops less than dairying does. If the region has profitable crops, the combination of sheep and crops may pay better than cows and crops, because cows limit the crops that can be grown. But if crops do not pay very well, the combination of cows and crops is usually better than sheep and crops.

Hogs require relatively little attention, except when the pigs are coming. The spring pigs sometimes interfere with spring work, and fall pigs may interfere with fall

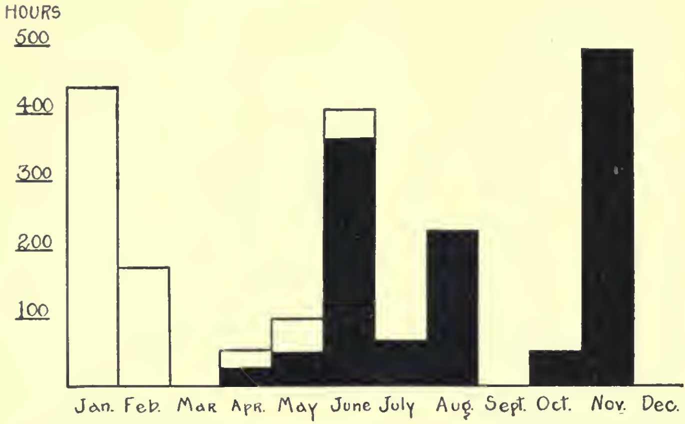

FIG. 37. — Distribution of man labor in raising 15 acres of cabbage. Black is work fixed as to time. White is manuring, plowing, and marketing.

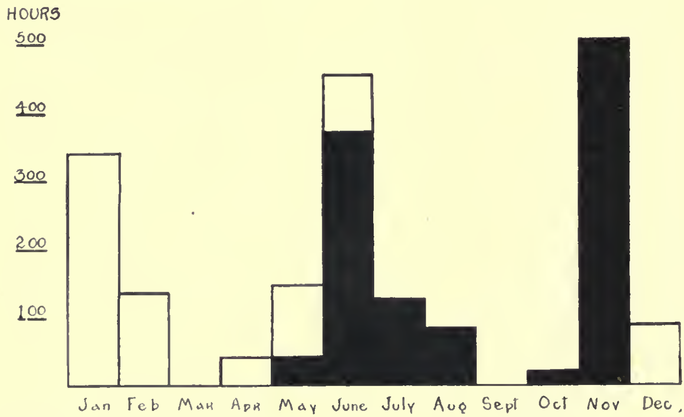

FIG. 38. — Distribution of horse labor in raising 15 acres of cabbage. Black is work fixed as to time. White is manuring, plowing, and marketing.

work. If the water and feed supply are conveniently arranged, there is usually little serious conflict with other work. Sometimes hogs are used to harvest or "hog off" corn and grains. They may then be a help in getting farm work done.

90. Distribution of labor on poultry. — The monthly distribution of labor in raising and caring for hens, washing and marketing eggs, is shown in Fig. 39. It includes all the time involved in keeping a flock of 500 and raising about 1200 chickens, or about 600 pullets. The flock was kept on a 318-acre diversified farm. The hens were in one large house. A feed bin in the house was filled from a wagon; the house was cleaned by driving through with a manure spreader. The chickens were raised in three lots by two incubators. The buildings and other arrangements were such as to facilitate labor. It will be seen at once that it would require many hens to keep one person busy, as the care of this flock only requires about two hours a day except during the incubating season, when it requires about six hours a day. This is a very unequal distribution of labor. The largest amount of work with poultry is in raising chickens. This comes at the same time as the largest amount of work with hens, washing eggs, and preparing them for market. "Seed time and harvest" come at the same time with poultry. This work interferes seriously with the spring work on a farm. It fits best on farms that have the highest pressure of work at some other season. It fits better with hay and winter wheat than with larger areas of spring-planted crops. Frequently, much of the poultry work is done by women so that it does not interfere with farm work.

DIVERSIFIED FARMING FOR DAIRY FARMS

91. Labor distribution in dairying. — Dairying is the standard illustration of an ideal type of farming, because it provides winter work. When it is combined with other enterprises, this is a very important point, but wholesale dairying alone is one of the worst possible kinds of farming

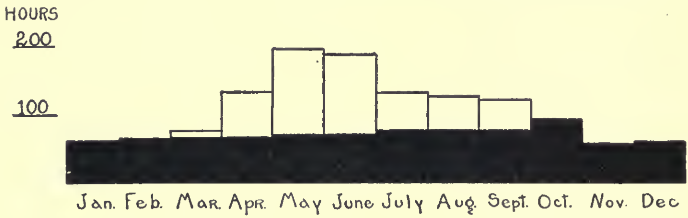

FIG. 39. — Black is distribution of man labor in caring for 500 hens. White is distribution of labor in raising 1200 chickens.

for keeping men and horses busy. If a farmer has nothing to do but milk cows and raise the feed for them, he has a labor problem between milkings every day, because the number of cows that a man can milk is not enough to keep him busy between milkings. Few men

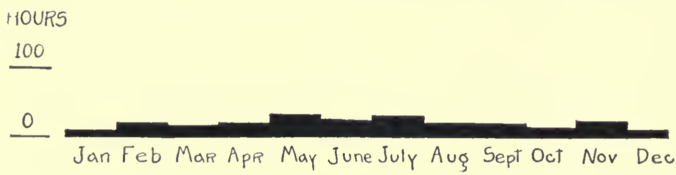

FIG. 40. — Distribution of horse labor for 500 hens and raising 1200 chickens.

can milk over ten to fifteen cows, because the muscles of the wrists become too tired.

In well-managed dairies where milk is sold at wholesale, it requires about 150 hours of work per cow per year. Ten or 12 cows furnish only about half work for one man.

But a man cannot ordinarily care for as many as 20 or 25 cows. This would mean full work seven days in the week, with no one to take the work if the man got sick. But two men can take care of this number of cows and work about half time at other things. If one man is away or sick, it is then possible to get the chores done. The two men can raise feed for horses, and hay and silage and some

FIG. 41. — Distribution of man labor on 18 cows and 11 other cattle. White is milk hauling.

grain for the cows, and in addition can raise cash crops to sell or do other kinds of work.

If the wife and children help milk, this provides for the extra help needed at milking time. One man can do his share of the milking, haul the milk, and, with a little help in harvest, raise the feed for twenty or thirty cows. If his wife and children milk, he may have a full year's work. This is merely another way of saying that dairying is only a partial day's work. The wife helps with the milking and does housework between milkings, or the children go to school between milkings. This is the common practice in all dairy sections where nothing but milk, butter, or cheese is sold. It is the custom not only in America, but in all other countries. Occasionally a farmer has such unusually good cows, or has money enough, so that he can hire men to milk, even though he does not have work for them between milkings.

A much more satisfactory way of solving the problem is to raise some kind of crops, fruits, or vegetables for sale. Men can then do all the milking and can be kept profitably employed between milkings. This is the way that the problem is usually solved on the most successful farms. Sometimes the crops sold will much more than pay the entire labor bill.

The same problem arises in keeping horses busy. To haul milk and manure and raise feed for the cows does not keep horses busy, but this combined with other enterprises makes a good business.

Winter dairying helps the labor situation, as there is then less work on cows at the time when crops require the most work.

There are some cases in which a specialized dairy farm may pay best. There is occasionally a dairy farm where one man milks as many as 20, and in one case the writer has seen 24 cows regularly milked by one man. To milk and care for this number of cows is a full day's work. But few men can milk this number.

If a soiling system is practiced, there is less loss of time, but this system is not profitable except under very unusual conditions (page 177).

If a dairyman retails milk, this provides work between milkings. Even with retail milk, many farmers combine other enterprises.

FIG. 42. — Distribution of field labor of men on a Dakota grain farm, raising 280 acres wheat, 127 acres oats, 60 acres barley, 49 acres flax, 20 acres hay. 52 acres fallow.[1]

FIG. 43. — Distribution of field labor of horses on farm given above.

[1] U. S. Dept. Agr., Yearbook, 1911, p. 278.

Sometimes pure-bred stock and wholesale milk production are combined, and the extra work and care necessary

Fig. 44. — Distribution of field labor of men on a general farm in the Middle West, raising 95 acres of corn, 28 acres of oats, 7 acres of spring wheat, 8 acres of winter wheat, 6 acres of barley, 37 acres timothy and clover hay, 7 acres of alfalfa hay, 48 acres of timothy seed, 4 acres of potatoes.[1]

may keep the men busy, but unless the stock is exceptional, it can best be combined with cash crops or with retailing.

A few farmers produce certified milk. The extra work

Fig. 45. — Distribution of field labor of horses on farm given above.

[1] U. S. Dept. Agr., Yearbook, 1911, p. 279.

involved in keeping things clean then keeps the milkers employed. Some certified milk farms raise other products with little extra labor. Thus far, much of the certified milk has been produced by wealthy men who have disregarded profits. But the business is now getting shorn of unnecessary fads and is beginning to attract farmers.

92. Other reasons for diversified farming on dairy farms. — Dairying combines so well with other kinds of farming, uses waste land for pastures, uses the poorer hay and roughage so well, makes manure, provides work that women and children can do if necessary, and has so many other good points that butter or wholesale milk alone can never provide a business of high profits. Dairying will always be done on a very close margin, and will usually tend to be overdone. For this reason, it is of the utmost importance that milk production be combined with some more profitable enterprise, such as cash crops.

A very large part of the milk and butter supply is produced by farmers who keep a half dozen cows and who derive most of their income from other enterprises. The cows use up some of the cheaper farm feed and produce manure for raising cash crops. The work on them is done at a small cost. The few cows may be kept whether they really pay or not. It is almost impossible for one who sells nothing but wholesale milk or butter to compete with these conditions. The special dairyman must secure a better price, have something else to sell, or be content with small pay, and sometimes no pay for his own work.

Some leading dairymen insist that milk is a by-product, that it cannot be expected to pay, that the chief reason for keeping cows is to get the manure. If this is the case, it will at once be seen that if the manure is not used to grow cash crops, the whole system fails. For if the manure is merely used to grow feed for cows to get more manure to raise more feed for cows, there is no cash coming in except from the milk. The milk must then pay for the manure. Placing a high value on manure does not then help the situation. But if part of the manure is used to grow profitable cash crops, the system may pay well.

93. Relation of diversified farming to profits on wholesale market milk farms. — The average results for 166 dairy farms in New York are shown in Tables 20 and 21. They are the farms in ten townships having six or more cows and selling milk at wholesale. Most of those in Tompkins County shipped to New York, and most of those in Livingston County shipped to Rochester.

For Tompkins County, the farmers who sold practically

TABLE 20. — DIVERSIFIED FARMING RELATED TO PROFITS ON FARMS SELLING WHOLESALE MARKET MILK — TOMPKINS COUNTY, NEW YORK[1]

Receipts from Crops for Each Dollar Received from Stock	Average Per Cent from Crops	No. of Farms	Area	Animal Units[2]	Labor Income	Receipts from Stock	Receipts from Crops	Per Cow	Total Labor[3]
			Acres						
No crops sold	0%	2	150	26	$251	$1,288	—	$79	$726
$0.10 or less	3%	13	83	18	321	1,012	$36	84	475
$0.11–$0.20 .	14%	13	138	22	476	1,136	178	69	606
$0.21–$0.50 .	23%	31	137	20	766	1,282	387	82	584
$0.51–$1.00 .	39%	25	177	20	725	1,093	707	75	675
Over $1.00 .	54%	5	128	23	768	911	1,085	63	753

[1] New York, Cornell Bulletin 295, p. 507.

[2] An animal unit means the approximate number of cows that the stock is equal to in food required and manure produced. One cow, horse, or bull are counted as one. Seven sheep, 5 hogs, or 100 hens are counted as one animal unit. Two colts, heifers, calves, 14 lambs, 10 pigs, are counted as one animal unit.

[3] Total labor includes the value of all paid and unpaid labor, the farmer's labor being estimated at $326.

no crops, depending almost entirely on their stock, on the average made less than a hired-man's wages. Their labor incomes averaged only $312. Those who derived more from crops than from stock averaged $768. Each of the groups that derived at least one-fifth of the income from crops averaged well.

It is evident that the farmers in this county who sell little but market milk find it impossible to make a reasonable profit. Of 28 farmers who received less than $0.20 from crops for each dollar from stock, only 7 made labor incomes as high as $600. Six of these men derived a considerable part of their income from other sources than cows. They sold crops, eggs, wool, colts, etc. But of the market milk farmers who derived over one-third of their receipts from crops, 57 per cent made labor incomes of over $600.

TABLE 21. — DIVERSIFIED FARMING RELATED TO PROFITS ON FARMS SELLING WHOLESALE MARKET MILK. — LIVINGSTON COUNTY, NEW YORK

Per Cent of Receipts from Crops	No. of Farms	Average Area	Labor Income	Receipts from Crops	Receipts from Stock	Receipts per Cow from Milk, etc.	Total Labor
15% or less .	14	209	$769	$392	$3,589	$82	$941
16%–30% .	28	218	1,210	988	3,403	92	979
31%–50% .	25	264	1,284	1,863	3,057	81	1,259
Over 50% .	10	174	1,225	1,972	1,284	57	761

A study was made of the individual farms that sold market milk and that derived over 80 per cent of their income from milk and cattle. There were 14 such farms. A number of these kept excellent cows. But only 4 of the farmers made labor incomes as large as $500. The largest was $881. This farmer received $242 from the sale of eggs and crops.

It is, of course, possible to make a living and some profit when selling little but market milk. The last farmer mentioned above ought to save money, but a few of his neighbors with no better cows are making labor incomes of nearly $3000 by combining cash crops with milk. It is often possible to make a fair profit with extreme specialization, but larger profits can nearly always be secured by combining other things with the specialty.

The farms selling the most crops are about the same size as the more exclusively dairy farms. The cows are doing a little better on these dairy farms than on the general farms. The number of animals kept, and the total receipts from animals, are about the same in each group of farms. The labor cost is a little more on the farms selling the most crops.

The only striking difference is in receipts for crops sold and consequent difference in labor income. *Those farmers who sell crops are increasing their receipts from 25 to 100 per cent by raising crops to sell, with practically the same man and horse labor that is required to take care of the cows.* This same point is shown by studying the most successful farms on pages 133 to 139.

If there is land enough, a little extra help in summer will make it possible to have $500 to $1500 worth of crops to sell.

The men who sell nothing but milk are not fully employed. They have work twice every day, but have time to raise crops for sale between milkings. Such men may keep busy by fussing with the cows, but the prices that the farmers receive for wholesale milk do not enable them to make much more than a hired-man's wages unless they have something besides milk to sell.

It is, of course, possible for a dairyman who depends entirely on cows to make a living if he has a sufficient capital or if he has unpaid help from the family, even though his labor income is no better than a hired-man's wages.

Suppose a man has $10,000 capital and has the help of a son whose labor is worth $300. If he receives $1000 above all farm expenses, he ought to be saving money. But the use of his capital is worth $500 and the son's time $300. This leaves $200 as pay for the farmer's work or his labor income. If he were in debt for the farm, and had to pay his son, he could barely live.

The principle shown by these results is probably of universal application wherever men do the milking, however well or poorly the production of milk at wholesale prices may pay. The combination of this with the proper cash crops or some other work is almost certain to pay better.

COMBINING FARMING WITH OTHER ENTERPRISES

94. Occasionally farming may be combined with other work. — The idea of combining farming with some sort of winter manufacturing is constantly coming up. Sometimes it is recommended for farmers, and sometimes it is a philanthropic scheme to establish a factory and farm community that shall use the inefficient persons from the city and at the same time figure out a handsome profit.

The idea of locating factories in small towns where each workman may have a little land for a cow, hens, and a garden has been proved a success by thousands of tests. But having a garden that helps to feed the family and farming to make a living are very different problems.

There are a few small manufacturing enterprises that are carried on by farmers at spare time, but these are very unusual and are constantly on the decrease.

Nearly every kind of manufacturing enterprise requires machinery and a considerable number of persons for successful work. The farmer does not have enough men to run an efficient factory.

The factory equipment must be idle when the farm work is being done. Usually this is just as serious as to have horses or equipment idle on the farm.

EXTRA LABOR AVAILABLE IN SUMMER

95. There is more labor available in summer. — It is not at all necessary that the farms provide as much winter work as summer work. A very large part of the summer work is done by the farmer's children who go to school during the winter. Nearly all the farm boys who are attending the colleges, high schools, and those who are old enough from the district schools are helping on the home farms in the summer. This is a vast army of seasonal labor. Every town and city contains a number of persons who because of age, health, or inclination do not care to work all the year. Many of these persons go out to help in harvest. There are many kinds of seasonal occupations in cities that do not provide summer work. Men from these industries often help in harvest.

The long days in summer make it feasible to work more hours than in winter. Factories are so well lighted that season is ignored. The farmer works long days in summer and short ones in winter.

EXAMPLES OF SUCCESSFUL TYPES OF FARMING

96. Successful farmers in New York. — The Department of Farm Management of the New York State College of Agriculture has secured records of a year's business on 2743 farms. These are practically all the farms in sixteen townships taken from three counties representing very different conditions, Tompkins, Livingston, and Jefferson. It also has secured records of 293 farms scattered about the state, most of which were successful farms. Table 22 shows the products sold on all of the farms that made labor incomes as high as $2500.

These farms sold from one to six major products, amounting to over $500 each, and sold from one to nine minor products. They averaged over 3 major products and over 4 minor products. In addition, nearly all of them raised some feed for farm use.

On two farms milk was the only product amounting to $500. On four other farms, milk and pure-bred cattle were the only products amounting to $500. One farm had no products so large except milk and profits from retailing milk purchased, and one had no $500 sales except milk and profit on stock dealing. One farm had no $500 sales except eggs and poultry. This makes 9 farms out of 46 that derived their major sales from one class of stock. But milk combined with pure-bred stock is a very different proposition from milk alone.

In these regions there are hundreds of farmers who sell little but dairy products, and many who sell only one or two kinds of fruit or crops, but only those with diversified farms often make labor incomes of $2500. The few exceptions are usually due to some special business, like pure-bred stock, that has been developed for many years

TABLE 22. — TYPES OF FARMING ON THE MOST SUCCESSFUL FARMS OUT OF 2743

Farm Number	Acres	Capital	Labor Income[1]	Chief Products Sold $500 or More	Other Sales	Acres of Crops Grown for Feed
1	300	$67,800	$9490	Pure-bred Holstein cattle and wholesale market milk	Eggs	Corn for silo, oats hay
2	57	25,000	8885	Apples $7000, peaches $3500, berries $1000	Tomatoes, sweet corn, poultry, pears, plums, $1000	4 corn
3	125	31,820	7545	Certified milk $10,200, pure-bred cattle, $3300	Chickens, $45	35 corn for silo, 20 oats, 24 hay, 7 alfalfa
4	1200	89,960	7250	Hay $4400, beans $3413, steers $3200, wheat $1640, sheep, lambs, and wool $1508, pears $900	Oats, colts, apples, $710	25 corn, 15 corn fodder, 50 oats, 300 hay
5	836	74,425	5045	Wholesale market milk $9000, potatoes $3900, wheat $2286, beans $950, cattle $1594, stock dealing $1500	Wool, lambs, pigs, eggs, $1055	25 corn, 60 corn for silo, 50 oats, 86 hay
6	291	17,421	1391	Wholesale market milk $3394, cabbage $1888, beans $684, wheat $665	Colts, eggs, pigs, $144	11 corn, 20 corn for silo, 25 oats, 56 hay
7	140	24,341	4222	Retail milk $6626, profit on milk bought $1442	Pure-bred Holstein cattle, eggs, etc. $515	17 corn for silo, 7 oats, 23 hay

8	64	8,050	4162	Apples $4556, miscellaneous $626		Corn, oats, hay
9	50	16,274	4110	Eggs $2231, cabbages $3340, White Leghorn poultry $1187, potatoes $788	Pears $250, calves $30	10 oats, 5 wheat, 8 hay
10	250	19,451	3786	Potatoes $2975, wheat $1200, labor $1000, breeding fees $700, beans $600, cattle $586	Apples, sheep, cream, hogs, lumber, eggs, bees, $1183	13 corn, 25 oats, 8 barley, 40 hay
11	20 +8	15,775 rented	3736	Celery $4900, lettuce $4000, onion seed $1500, onions $625	Celery plants $100, eggs $100	None — muck soil
12	270 +110	30,279 rented	3713	Horse dealing $1950, beans $1940, breeding fees $1000, hay $500	Potatoes, sheep, wool, wheat, cream, eggs, rye, cattle, hogs, turkeys, ducks, bees, $2267	8 corn, 30 oats, 10 barley, 10 rye, 100 hay, 8 alfalfa
13	93 +50	14,843 rented	3668	Fruit and berries $1500, wholesale market milk $1284, peas $800, tobacco $720, melons $700	Other truck, lambs, eggs, cattle, etc., $1724	30 corn, 10 corn fodder, 31 hay, 2 oats and peas

[1] Each of these farmers made enough to pay all farm expenses, interest on his capital at 5 per cent, and had left as pay for his labor, the labor income here given. In cases where additional land was rented, the capital is for the owned land.

Numbers 5, 6, 23, 32, 33, 37, 40 and 47 are rented farms. To compare these with other farms, the labor income calculated is what the operator would have received if he had owned all the farm.

Where corn, oats, or hay are sold, the area given as raised for feed includes the total area.

TABLE 22. — TYPES OF FARMING THE MOST SUCCESSFUL FARMS OUT OF 2743. — *Continued*

Farm Number	Acres	Capital	Labor Income	Chief Products Sold $500 or More	Other Sales	Acres of Crops Grown for Feed
14	114	$18,555	$3567	Potatoes $5400, apples $900	Wheat, sirup, milk, sheep, eggs, $790	20 hay
15	335	29,932	3536	Potatoes $1425, wheat $1385, beans $1109, hay $600, cabbage $588	Lambs, horses, barley, pigs, cattle, oats, eggs, etc., $1780	16 corn, 20 oats, 15 barley, 80 hay
16	184	17,900	3510	Apples $3300, hogs and pigs $900, potatoes $800, hay $600	Wheat, oats, plums, pears, $1025	Corn, oats, hay
17	108	15,793	3467	Ayrshire cattle $2777, butter $900	Pigs and hogs, hay, wheat, apples, turkeys, eggs, $1168	4 corn, 11 corn for silo, 10 oats, 30 hay
18	145	12,549	3462	Lambs, sheep, and wool $2089, pigs and hogs $1240, veals $855, apples, $800	Potatoes $105	16 corn, 20 oats, 30 hay
19	167	17,590	3457	Apples, peaches, pears, and other fruit $3172, crops and stock $825		Corn, oats, hay
20	22	17,650	3443	Lettuce $5724, celery $2200, spinach $1600		None — muck soil
21	148	17,500	3416	Apples, peas, plums, berries, carrots, $6460, wholesale market milk $2000		Corn, oats, hay

22	444	31,260	3270	Wholesale market milk $2400, hay $1100, beans $1013, oats $500	Straw, colts, peas, wood, cattle, sugar, etc., $1390	7 corn, 26 corn for silo, 60 oats, 130 hay
23	300	14,139	3205	Cabbage $2100, beans $1360, wheat $950, potatoes $600	Cattle, lambs, wool, eggs, turkeys, butter, etc., $842	12 corn, 12 oats, 40 hay
24	12	6,850	3195	Lettuce $3750, celery $600	Onions $360, rent $80	None — muck soil
25	10	6,805	3185	Eggs $2874, White Leghorn poultry $2718	Hay $5	½ oats, 2½ hay
26	225	21,786	3109[1]	Retail milk $6400, purebred Holstein cattle $2255	Hay, horses, eggs, etc., $641	12 corn for silo, 12 oats, 150 hay
27	300	27,200	3095	Apples $2640, cabbage $2200	Wheat, sheep, oats, beans, cattle, eggs, hogs, $1730	Corn, oats, hay
28	90	13,355	3091	Apples, peaches, grapes, pears, berries, $3600, farm crops $1003		5 corn, 15 hay
29	120	10,377	3087	Stock dealing $2120, cheese factory milk $1875	Hogs, hay, potatoes, eggs, etc., $1322	5 corn, 10 corn for silo, 11 oats, 25 hay
30	180	24,840	3044[1]	Wholesale market milk $4990, beans, $1740, wheat $1378, cattle $750	Hogs, pigs, hay, sweet corn, eggs, colts, etc., $1604	6 rye, 32 hay, 12 corn, 8 corn fodder, 9 oats, 15 oats and peas

[1] Farms 26 and 30 were each worked by a father and son in partnership. The labor income is divided by two to get the figure here given.

TABLE 22. — TYPES OF FARMING THE MOST SUCCESSFUL FARMS OUT OF 2743. — *Continued*

FARM NUMBER	ACRES	CAPITAL	LABOR INCOME	CHIEF PRODUCTS SOLD $500 OR MORE	OTHER SALES	ACRES OF CROPS GROWN FOR FEED
31	200	$23,473	$3035	Wholesale market milk $5256	Oats, potatoes, wheat, sweet corn, hay, apples, etc., $1940	8 corn, 15 corn for silo, 24 oats, 60 hay
32	487	36,428	2966	Wholesale market milk $5060, beans $1040, wheat $1040	Potatoes, cattle, lambs, wool, eggs, hay, apples, turkeys, etc., $1153	40 corn for silo, 38 oats, 9 barley, 120 hay
33	173	13,207	2934	Beans, $1530, cabbage $829, wheat $500	Colts, cattle, oats, potatoes, barley, apples, cream, rye, eggs, hay, turkeys, hogs, ducks, $2042	7 corn, 14 oats, 6 barley, 23 hay
34	8	3,088	2931	Lettuce $3000, celery $1000	Onions $270, carrots $198, eggs and chickens, $27	None — muck soil
35	140	14,300	2923	Apples $3119, potatoes $855	Peas, wheat, hay, strawberries, eggs, wood, etc., $1212	17 hay
36	266	19,565	2920	Wholesale market milk $3000, hay $1232, potatoes $963	Eggs, oats, cattle, etc., $774	4 corn, 14 corn for silo, 30 oats, 90 hay

37	210	22,097	2907	Wholesale market milk $3500	Hay, barley, potatoes, sweet corn, apples, wheat, cattle, colts, eggs, $1631	12 corn, 25 oats, 65 hay, 10 alfalfa
38	144	17,475	2886	Wholesale market milk $4000	Wheat, cattle, sweet corn, etc., $375	4 corn, 10 corn for silo, 15 oats, 35 hay
39	120	12,391	2878	Apples $2600, wheat $520	Beans, butter, sheep, lambs, wool, hay, eggs, cattle, hogs, turkeys, $1284	6 corn, 7 oats, 30 hay
40	350	26,695	2859	Hay $2568, wholesale market milk $2256	Colts, cattle, oats, etc., $782	22 corn, 66 oats, 165 hay
41	130	15,200	2855	Apples, $2000, peaches $800	Wheat, oats, beans, corn, potatoes, $2240	Corn, oats, hay
42	152	10,588	2819	Hogs and pigs $1010, cabbage $720	Hay, potatoes, wheat, beans, oats, corn, butter, apples, cattle, eggs, $2037	9 corn, 13 oats, 9 barley, 40 hay
43	203 +127	10,060 rented	2802	Wholesale market milk $3500, hay $628	Cattle, buckwheat, eggs, colts, $907	20 corn for silo, 20 oats, 125 hay
44	211	10,550	2750	Wholesale market milk $3449, potatoes $1050	Wheat, pure-bred Holstein cattle, lambs, wool, apples, eggs, hay $1018	10 corn for silo, 26 oats, 55 hay

TABLE 22. — TYPES OF FARMING THE MOST SUCCESSFUL FARMS OUT OF 2743. — *Concluded*

Farm Number	Acres	Capital	Labor Income	Chief Products Sold $500 or More	Other Sales	Acres of Crops Grown for Feed
45	210	$46,270	$2743	Fruit, mostly apples, $7945, crops, etc., $1600		Corn, oats, hay
46	112 +242	10,629 rented	2692	Beans $1347, wheat $720, cabbage $627	Potatoes, sheep, lambs, wool, butter, eggs, hay, apples, colts, peaches, turkeys, geese, $1662	19 corn, 58 oats, 86 hay
47	204	13,487	2611	Wholesale market milk $2130, cheese factory milk $550, hay $750	Cattle, potatoes, wheat, hogs, straw, beans, eggs, $860	2 corn, 15 corn for silo, 1 corn stalks, 25 oats and peas, 60 hay
48	150	21,026	2521	Wholesale market milk $2400, pure-bred Holstein cattle $1825, hay $525	House rent, eggs, potatoes, etc., $223	16 corn for silo, 0.3 mangel wurzels, 20 oats, 75 hay
49	125 +57	12,298 rented	2510	Apples $896, cream, milk, butter, $1288	Hay, cattle, wheat, beans, oats, eggs, hogs, colts, etc., $1270	8 corn for silo, 2 corn stalks, 17 oats, 45 hay, 3 alfalfa

until it has become so profitable that the other important products have been dropped. Nearly all such farms were more diversified in the early years.

97. Successful types of farming in various regions. — The most generally successful type of farming in New York is dairying, combined with potatoes and hay or other cash crops. Corn for the silo, hay, and oats are raised for feed. Eggs are usually a minor product on such farms. In those parts of the state where hay is cheap, colts are a minor product.

If the dairy cattle are pure-bred, the profits are usually larger, but more capital is required. It usually pays to gradually go into pure-breds as one's capital increases. Occasionally, the pure-bred stock become so profitable that it pays to drop the cash crops. But such cases are rare. Farms that retain cash crops nearly always make more than similar farms that omit such crops.

If the land is not adapted to other crops, hay may be the only cash crop. Those who have two or more cash crops are usually doing better than those with one.

The sale of milk for cities usually pays better than selling butter fat to a creamery. Selling to a creamery usually pays better than making butter.

In some sections where the soil is particularly good, cabbages, field beans, apples, potatoes, grapes, truck crops, or canning factory crops are so profitable that live-stock is somewhat reduced, or sheep and more young stock are kept so as to leave the farmer free to raise crops.

The same general conditions prevail in Pennsylvania and Ohio. In all these sections there is great diversity in farming.

For the corn-belt, the most generally successful type of farming is the raising of corn and oats for sale, together with hogs, dairying, colts, and eggs. Many of the successful farms sell all of these products. Corn and hogs are usually the most important sales. Near cities, milk is often the major product. But the most successful dairy farms combine corn and hogs with dairying.

As we go west, oats, corn, and hogs decrease and wheat increases. For central Nebraska and Kansas, the most successful types of farming combine wheat as the major cash crop, with colts, eggs, cows, and hogs. Still farther west, wheat, colts, cattle, and eggs are the most important sales.

Going north from the corn-belt, the most generally profitable type of farming is to raise wheat, oats, and barley as cash crops, combined with cows, colts, eggs, and some hogs.

In the South, most of the successful farms make cotton the major cash crop, and combine corn and hogs or other live-stock. Hay is grown for home use.

It is better to have two to four important products than one. It is usually not desirable to have a lot of little things. Except when grown for home use only, there should be enough of the product so that it can be produced economically.

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CHAPTER 4

INTENSIVE AND EXTENSIVE FARMING

SOME crops require much more work than others, and when successful bring high returns for the area grown. Greenhouse vegetables and fruits are typical examples. Farming with such crops is called intensive farming.

There are also intensive and extensive methods with any product. One may strive for very high production at the cost of much extra time and money, or may be contented with smaller production at less cost.

WAYS OF MEASURING PROFITS

98. Ways of measuring profit. — Perhaps more mistakes are made by using inaccurate ways of counting profit than by any other means. High-class agricultural papers have quoted the total value of all the descendants of a ewe to show that sheep raising pays.

Nearly all agricultural colleges call the difference between the value of the milk and the value of the feed of dairy cows, profit. The feed is usually about half the cost. With very extensive methods of dairying in Minnesota, the average costs for six years on many farms were, feed per cow \$23.13; other costs \$28.61.[1] With intensive methods of dairying, and higher priced feed, in Connecticut, the average costs per cow for five years were \$84 for feed

[1] Minnesota, Bulletin 124, p. 108.

and $65 for other costs.[1] This bulletin is a notable exception to the usual run of dairy bulletins that ignore all costs except feed.

Nearly all colleges, as well as farmers, speak of the difference between the cost of fertilizer or any other treatment and the value of the increased crop as profit from the treatment. How far the cash cost of fertilizer may be from the total cost of the increased crop is shown on page 164.

Profit per acre is usually considered rather than profit per farmer. All these and many other errors in arithmetic and business judgment often lead to the recommendation of methods that are entirely too intensive for present conditions. Farmers are gradually using more intensive methods, as prices of farm products and other conditions make such methods profitable. But it rarely pays a farmer to follow the revolutionary advice of the enthusiast who has just returned from Europe. America may waste land. Europe wastes labor.

Whenever the word profit or net profit is used in this book, it is used correctly. It means profit after all expenses of every kind have been subtracted.

99. Theory of limitation of land. — The usual assumption of nearly all writers is that the land available for the individual farmer is limited and that the profits that he can make are directly proportional to the production per acre. This mistaken idea seems to be firmly grounded in the minds of agricultural writers and speakers. One college has issued a circular in which the opening sentence is, "The amount of milk and butter fat produced per acre is, generally speaking, the final test of profitable dairying where all feed is raised on the farm."

[1] Connecticut, Bulletin 73.

Very rarely is an American farmer limited to any particular area. It is nearly always possible to buy or rent more land. It is not at all necessary that one have money enough to buy all the land that he farms. Fifty-four per cent of the farmers in the United States own all the land that they farm, 9 per cent own part of the land that they are farming and rent part of it, and 35 per cent rent the entire area.

The usual assumption seems to be that if a man has only $1000, he must find a farm and kind of farming that can be conducted with this capital as an owner. It is strange how universally writers ignore the opportunities as tenants and part owners. Nearly three million farmers in the United States are using these means of securing a start in farming rather than farm on the small area that their limited capital might buy. If a man has not money enough to buy and equip a fair sized farm, it is much better for him to rent all or a part of his land. (See page 309.)

Not only is land for an individual farmer fairly easy to secure by rental or ownership, but the land of the country as a whole is far from exhausted. The fact that most of our land is held by a deed does not mean that the supply of land is exhausted. One needs but to travel over the United States to realize how many millions of acres there are in swamps and other reclaimable areas not in farms. On the vast majority of the individual farms there are areas of little used land; land in woods, or brush, or wet places, that may be reclaimed whenever prices make such reclamation worth while. A trip through the Southern and Eastern States impresses one with our tremendous reserve supply of land that is little used, but that will some day be developed, — when we need it.

100. Land is a small part of the cost of crop production. — Labor is in nearly all cases the most important item in cost of production. Highest profits can only be secured when proper attention is given to all the factors of cost. But if only one factor is singled out as the important one it should be labor and not land. Under conditions of very extensive farming in Minnesota on new land that is not fertilized, the use of land varied from 11 to 51 per cent of the total cost.

TABLE 23. — RELATION OF LAND COST TO TOTAL COST OF CROP PRODUCTION IN MINNESOTA[1]

	Total Cost of Production per Acre	Land Rent	Per Cent of Total Cost
Clover and timothy hay	$ 5.59	$ 2.87	51 %
Oats	8.86	2.87	32 %
Corn husked from standing stalks	10.44	3.25	31 %
Silage corn	19.89	3.50	18 %
Potatoes	26.37	3.00	11 %
Mangels	32.68	3.50	11 %

[1] Minnesota, Bulletin 117.

As land becomes more valuable, the usual assumption is that rent will constitute a larger proportion of the cost. The opposite is more likely to be true, because more intensive crops and more intensive methods are then used. The average for a very successful New York farm is given in Table 24. Land is worth $100 per acre, so that rent is higher, but it constitutes only 6 to 50 per cent of the total cost of production, depending on the crop.

101. Profits per acre and profits per farmer. — A potato crop that may return $50 per acre, or a lettuce

FIG. 46. — A profitable business under glass. The most intensive type of farming. The soil is made to order. Water, heat, and light are controlled.

crop that may return $500, sound very much bigger than a corn crop that may be worth $30 per acre. These figures give no indication of the profits. When all costs are subtracted, the crop producing the highest receipts may not give the largest profit per acre. But even profit per acre has no significance, unless we know how many acres

TABLE 24. — RELATION OF LAND COST TO TOTAL COST OF CROP PRODUCTION ON A SUCCESSFUL NEW YORK FARM

	TOTAL COST OF PRODUCTION PER ACRE	LAND RENT	PER CENT OF TOTAL COST
Cucumbers	$81	$5	6%
Cabbage	74	5	7%
Potatoes	59	5	8%
Oats	18	5	28%
Clover hay	14	5	36%
Timothy hay	10	5	50%

a farmer can grow, how this fits into his year as a whole, and how much capital it involves.

The most important problem of the farmer, particularly of the American farmer, is how to get the most for his year's labor. If cherries give a net profit of $50 per acre, and hay a profit of $10, the farmer who refuses to raise cherries may still be wise, if cherries interfere with hay, because the time required to raise one acre of cherries may raise 10 acres of hay. There are some instances in which land is limited so that the acre basis has some importance, but it is usually easy to either buy or rent land.

The results of a set of cost accounts on a 90-acre farm in 1909 are shown in Table 25. This farm had about 45 acres of tillable land. From the usual method of figuring profits

FIG. 47.—One of the most extensive types of farming. Horse power replaces man power. A man raises the maximum amount of food per worker, but may secure only moderate yields per acre. (149)

per acre, it would appear as if this farmer should plant more apple trees, because apples gave him over six times the profit per acre that he secured from oats and hay. But for the time spent on it, timothy hay gave three times as much profit as the apple orchard. The word profit is here used in the correct sense. The hay paid for the use of the land, use of buildings, use of horses, machinery, all labor, interest on these costs for the time the money was invested, and all other costs, and, in addition, left a profit of 63 cents for each hour of labor. If we add this to the labor cost of 18 cents an hour, we find that the hay paid all expenses except labor, and paid 81 cents an hour for labor or $8.10 for each ten-hour day spent on it. The orchard paid $4.10 for a similar day. In addition, this was known to be an average year for hay and oats and an extra good year for the orchard.

Table 25. — Comparison of Receipts and Profit per acre with Profit per Hour of Labor

	Receipts per Acre	Profit per Acre	Profit per Hour of Labor
Orchard	$101.75	$38.28	$0.23
Oats	26.42	6.84	.33
Timothy hay	15.67	6.37	.63

After studying these figures, the farmer very wisely decided to go in debt for another farm so that he could raise more oats, wheat, and hay. He preferred to sell his labor to the crops that paid best for it. The wisdom of this procedure was shown by the results of the next three years, for he made more than he could have made in twice the time with the small farm.

INTENSIVE AND EXTENSIVE ENTERPRISES

102. Comparison of intensive and extensive enterprises. — Sometimes the crop that pays the largest profit per hour is also most profitable per acre. Such a crop is doubly desirable. But the vast majority of American farmers are wise in continuing to raise the staple crops. The world needs hay as well as strawberries. It needs cotton as well as oranges, and seems to be willing to pay its workers just as good wages for the extensive as for the intensive crops.

The more speculative enterprises have more violent ups and downs, so that if the best years are taken, very surprising results may be shown. On one farm in 1911 the profit on 15 acres of cabbages was $1174. In the same year on the same farm the loss on 14 acres of cucumbers was $555. It would be impossible to make either such a large profit or such a large loss on hay. The average of the cucumbers and cabbages was less than the profit made on the same area in hay. The next year, 1912, cabbages were so cheap that they failed to pay, but cucumbers paid well. When other conditions are right it is desirable to combine one or two of the more speculative intensive crops with general farm crops.

Whether oranges, grapes, strawberries, potatoes, chickens or roses, or some other intensive crop, will pay better than corn, oats, wheat, hay, and cotton, and cows, is chiefly a matter of adaptation to conditions. There are conditions under which apples pay better than corn, just as there are conditions under which corn pays better than apples. But the average of success for a series of years in the best apple or orange regions does not appear to be any better than the average in the best corn or hay regions. The more speculative enterprises have more violent ups and downs, so that in some years they pay better and in some years they cause greater losses. *But there do not appear to be any types of farming that are regularly more profitable than other types, provided each type is conducted where it belongs.*

This is just what we should expect, when we realize that no farmer has a corner on any crop. Whenever one product pays much better than others, there is always a rush of farmers into that industry. We may be fairly sure that if some one thing is paying abnormal profits, it will soon be at the bottom of the list because of overproduction. (See pages 76 and 89.)

103. Relation of intensive and extensive enterprises to capital. — The intensive products do not appear to require much less capital than the extensive for the same profit. It is popularly assumed that one may run a poultry or vegetable farm with little money and yet make a good profit. Less land may be required, but for an equally good profit, as large a capital is usually involved. There are many poultry and truck farms with small capital, but the poultry farmers or fruit farmers making a given labor income usually have as much capital as the farmers making the same labor income from more extensive enterprises. There may be less capital in land, but more capital in other things. It has been shown on page 95 that for persons with small capital, crops are likely to pay better than live-stock. In this case, the less intensive business pays best for persons with small capital.

In Table 22, we find three farms (Nos. 24, 25, 34) that are very intensive farms with small areas and small capitals. But four of the small intensive poultry, fruit, and truck farms (Nos. 2, 8, 9, and 20) have more capital than some of the farms of 150 to 200 acres.

FIG. 48. — Proper use of land. The muck soil in the foreground is worth $800 per acre. It is growing a crop of celery by most intensive methods. The higher rolling land is worth $40 per acre. It is mostly left in hay and pasture and given little care. The steep hillside is left in woods. It is worth about $10 per acre without the trees.

One very important advantage of the more extensive types of farming is that for the same capital more land can be owned. With the general tendency for land to rise in price, the profit from the increased value of the farm is often as great as the savings of the farmer.

104. Relation of crop to soil and treatment. — Intensive crops should be grown on the soil best adapted to them, unless there is a shortage of such soil. The farmer who tries to raise truck crops on soil that is not naturally good for this purpose will find it very difficult to compete with farmers on better soil. Apples can be grown on the cheap hill soils of Pennsylvania and New York. Some persons have considered that this is sufficient reason for recommending that large orchards be planted on this cheap, poor land. But there is plenty of good land in these states adapted to apples. The crop should be grown on the good apple land and leave the land that is not so good for apples, for less intensive crops. Most farmers realize this.

The least intensive way to use land is to leave it in woods; the next least intensive is pasture. Hay, small grain, and cultivated crops follow in order.

There is some land being farmed in the United States that cannot by any means be made to pay reasonable wages to the operator, at the present prices of farm products. The outlying hills of the Appalachian and other mountain ranges of the Eastern States have many such farms.

This fact is self-evident, but seems to be forgotten in the wave of "back-to-the-land" talk that now fills American publications. No one advocates working an iron mine that does not pay. Why work land that does not pay decent wages to the operator? It has often been demonstrated that such land can be made to yield big crops. But such a demonstration means nothing if the cost of production is more than the value of the crops grown. It may be interesting in showing us how easy it will be to increase crops when the prices received warrant the increase. Much of the hill land now in farms should be used in the least intensive way, that is, for forests.

FIG. 49. — Using land too intensively. This land should be kept in permanent pasture. The farmer cannot make reasonable wages by working it. When population becomes very dense, it may be needed for crops.

In the early days, when most of the work was done with hand tools or oxen, the farmers seemed to have no idea of the difference between vertical and horizontal. Much land was cleared that is too steep for profitable use, except in growing lumber. Hills were not such a serious obstacle to scythes and grain cradles. If land is too steep for the use of modern machinery, it should be allowed to grow lumber or pasture. A profitable way of using much of it is to fence it in fairly large tracts for pasture. If the pasture is too small, the cost of fencing is too great.

How farmers have been forced to give up farming much hill land that it does not pay to farm is shown by the census figures. In New Hampshire, there were 2,308,112 acres of improved land in 1880, and only 929,185 acres in 1910, less than half as much. Every New England State

FIG. 50. — Too steep to farm with much profit.

has shown a great decrease in improved land in farms. At the same time, the best land in these states is being used more intensively than ever before. Men are starved off the poor hillsides, that ought to be in white pine, at the same time that the most intensive systems of farming are yielding excellent profits on the good land. Merely because some one cleared land and built a house on it is not sufficient reason for farming it.

The same principle applies in the choice of places to plant various crops on the individual farm. The land that it will not pay to till should be used for woods or pasture. Crops that require much labor should be given as good a soil as other conditions will allow. Suppose that one is growing a young orchard, and that the trees will damage an intertilled crop by one-fourth. The crop planted in the orchard should be the least costly of the crops that will do. Such crops as strawberries or small fruits are too intensive to grow in orchards unless land is very limited. The injury to these crops may be enough to pay rent on additional land on which to raise them, and till the orchard besides.

Again the same principle holds in using fertilizers or other intensive methods. It is probably as easy to increase a potato or apple crop by 20 per cent as it is to increase a wheat or corn crop the same amount. But the increased crop of corn or wheat may not pay, while the same percentage increase may be very profitable on the higher priced crop. For this reason, the most extensive use of fertilizers is on potatoes and truck crops. Very high prices for the general farm crops accomplish the same result. The high price of hay near eastern cities often makes it pay to fertilize hay.

INTENSIVE VS. EXTENSIVE METHODS

105. How large crops does it pay to grow? — Much better crop yields may be secured by the use of more labor, more fertilizers, and more expense in general. Just how far it is wise to go in this respect is always a problem. Most farmers are not growing as large crops as their conditions warrant; some are growing larger crops than it pays to grow. With our increasing population, it pays to gradually intensify methods, and as in making any change, the majority do not advance quite so rapidly as conditions warrant.

With the revival of interest in country life, the country is being flooded with advice by persons who know little about farming. The usual theory is that every farmer ought to grow two or three times the yields per acre that he now secures, regardless of cost or profit. Farmers are usually wise enough to try these theories cautiously.

Such advice is most ruinous to the intelligent "back-to-the-lander," who is usually thoroughly convinced that all he has to do to insure his success is to raise a larger crop than his neighbors. He hopes to apply scientific methods and show his neighbors how foolish the old ways are. Usually his science is only that of increasing the yield. He fails to count the cost. No method is scientific that fails to count the cost. A little more intensive methods will pay in most regions, and sometimes a complete change is needed. But farming is not subject to such violent changes as manufacturing, because the climate and soil are its unchangeable basis.

This idea is not new. It is expressed by the farmer who, while viewing the enormous crop on some experimental grounds, says that he also could raise such a crop if the railroad or state would pay the bills.

The same idea is expressed by the economist when he speaks of the law of diminishing returns.[1]

Cato expressed the same idea when he said, "Know that with a farm as with a man, however productive it may be, if it has the spending habit, not much will be left over."

Pliny expressed it better, "I may possibly appear guilty

[1] Principles of Rural Economics, T. N. Carver, pp. 118–119 and 182–184.

of some degree of rashness in making mention of a maxim of the ancients which will very probably be looked upon as quite incredible, 'that nothing is so disadvantageous as to cultivate land in the highest style of perfection.'" [1]

I wish again to call attention to this wise maxim of the ancients, and I presume that many of the readers still consider this law as quite incredible.

106. Increased production due to natural causes. — Many times the results in one year are compared with the results in succeeding years with different methods. If the right year is chosen, we may expect wonderful results. For with the same methods, the weather and crop pests may show differences of over 100 per cent on succeeding years.

A more frequent source of error is the comparison of intensive methods on good soil with ordinary methods on ordinary soil. In nearly any community there are soils that will give twice the yield given by other soils of the same region.

107. Weather risk and intensive methods. — Just how much it is wise to spend on a crop is largely a matter of weather. If the rainfall limits the crop, no amount of fertilizer can save it. On the contrary, the fertilizer may result in very serious injury in dry weather. Because of this danger, much farm manure is thrown away in the semi-arid regions. In most cases, a way can probably be found to use the manure to a profit by making very light applications with a manure spreader, particularly as a top dressing.

It may be shown that certain methods will conserve moisture. Such methods are likely to be used in semi-arid regions, but are not likely to be adopted in humid regions.

[1] Cato's Farm Management, Translated by "A Virginia Farmer."

In the semi-arid region, the rewards for such work are fairly sure, because the drought is sure. But in regions of more rainfall, such methods may pay in one year in three and fail in all the other years, because there is water enough without them. On the occasional year, when the extra work of moisture conservation pays, it must pay for the intervening years when it was not needed.

In every dry year, the question of irrigation for the eastern half of the United States is raised. Many attempts have been made to irrigate, but only rarely has it paid. Irrigation in humid regions is likely to be delayed too long, in the hope of rain. Frequently, it is followed by a rain, so that there is injury from too much water. The occasional year when irrigation pays, must pay for the intervening years when irrigation was not needed, or was a positive injury.

There are some farms on which irrigation of market garden crops pays. As a result of eleven years' test of irrigation at the New Jersey Experiment Station with asparagus, blackberries, raspberries, currants, and gooseberries, the conclusion was reached that on no crop had irrigation paid.[1] As the population increases, the exceptional instances of success with irrigation will increase, but will never be numerous, except on high-priced crops. Overhead irrigation from pipes has paid on high-priced crops on a number of farms.

108. Business interpretation of results of fertilizer tests. — The use of fertilizers has increased enormously. As crops rise in price, their use is certain to continue to increase. Many farmers would make more money if they used more fertilizer, but a farmer needs to be very careful about applying the results that he reads about in bulle-

[1] New Jersey Agr. Exp. Sta. Report, 1906, pp. 218–220.

tins. The facts there recorded as to yields may be accepted, but the conclusions as to profits are usually absurd, because the difference between the cost of fertilizer and the value of the increased crop is called profit. All the other costs, such as interest, crop insurance, hauling and applying fertilizer, harvesting, storing, and marketing the increased crop are ignored. The primary object of such experiments is to determine the effect of any particular treatment. This part is usually well done and is of great value to farmers. The business interpretation of results is very poorly done.

The same point applies in the interpretation of results of any other intensive methods. The statement that it costs no more to handle a large crop than a small one is almost universally accepted by persons who have never kept any accounts of such work. It has even been assumed that it costs no more to grow, harvest, store, and sell 75 bushels of corn per acre than it does to raise 31 bushels.[1] Any conclusions based on such an assumption are worse than useless. We must know the extra cost of growing and handling the larger crop before we can tell how large a crop it pays to grow. There is a limit both ways in profitable crop production.

When the writer has called attention to the extra costs involved in handling the increased crop, at meetings of agronomists, there has always been some one present to object to assigning any value to the farmer's time, on the theory that the farmer's time is not worth anything anyway, and that if he gives a cow or a crop $10 worth of feed or fertilizer and gets back $11 he has made a fine profit, even if $5 worth of extra labor does have to be ignored. In the first place, the farmer's time is worth at least farm

[1] U. S. Dept. Agr., Yearbook, 1911, p. 326.

wages; if not, he had best hire out to a neighbor who will pay him wages. No farmer whose time is so used as to bring little or no return for his labor, is likely to have money enough to invest in improved methods. The farmer is interested in ways of earning more than farm wages. He owes no thanks to any one who persuades him to adopt methods that do not pay wages. A farmer can find plenty of ways of working for nothing without outside aid.

The almost universal method of interpreting fertilizer tests is shown by the following example taken from the very excellent work of the Ohio Experiment Station.

TABLE 26. — RESULTS OF SECOND FIVE YEARS IN A FERTILIZER TRIAL IN OHIO [1]

TREATMENT	COST OF FERTILIZER	VALUE OF INCREASED CROPS ABOVE COST OF FERTILIZER
Plot 2, phosphorus	$ 2.40	$13.99
Plot 6, nitrogen and phosphorus	14.40	19.29
Plot 8, phosphorus and potassium	8.90	14.34
Plot 11, nitrogen, phosphorus, and potassium	20.90	19.64

[1] Ohio, Bulletin 182, pp. 145 and 159.

This bulletin follows the universal error and calls the last column profit. The conclusion is therefore reached that the complete fertilizer used on plot 11 pays best. But the $19.64 is not profit. Of all the costs involved, only the cash cost of fertilizer has been subtracted from the increased value of the crop.

The fertilizer on plot 2 cost only $2.40, while that on plot 11 cost $20.90, a difference of $18.50. The increased crop on the latter plot pays this and leaves $5.65 to pay for the other extra costs. This must pay interest on $18.50, crop insurance, pay for hauling and applying the extra fertilizer, and for harvesting, storing, and marketing the increased crops of 10 bushels of corn, 15 bushels of oats, 9 bushels of wheat, and 1785 pounds of hay. The farmer is not likely to find any one who is willing to undertake this contract for $5.65.

Comparing plots 2 and 6, we find an increased cost of $12 and an increased return above cost of $5.30. This has to pay interest on $12, crop insurance, pay for hauling the extra fertilizer, and for harvesting and marketing.

Certainly plot 6 pays better than plot 11, for there is only 35 cents to pay all the extra costs of the larger crop.

Without a further analysis of the results, we would conclude that on this soil and under these conditions, one should use nitrogen and phosphorus. But the farmer who is short of money will spend all he has for phosphorus, because it gives a phenomenal return. Most farmers who have this type of soil are short of money and most of them use fertilizers that contain little but phosphorus.

It is probable that a fertilizer that is mostly phosphorus, but that contains a little nitrogen and, perhaps, a little potassium, will pay best on this soil. This is the experience of farmers on this soil in New York, Pennsylvania, and Ohio. It is also fairly certain that a little heavier applications than the farmer commonly uses would pay, if the farmer has the necessary money.

109. An example of cost accounts in the use of fertilizers. — Table 27 gives the results from a set of cost accounts in growing 60 acres of timothy hay on a New York farm. The increased crop, due to fertilizing, was about

60 tons. The table gives a close approximation to the cost of producing this increased crop.

It will be seen that the real cost of the fertilizer on this farm is \$634, not \$272. In this case, a so-called profit of over 100 per cent by the usual method of figuring would really be a loss, because the fertilizer is less than half the total cost.

Table 27. — Real Cost of the Increased Crop Due to Fertilizing 60 Acres of Timothy

Cost of Fertilizer		
8000 pounds nitrate of soda	\$185.00	
2080 pounds muriate of potash	39.77	
10354 pounds of acid phosphate	47.37	\$272.14
Other Costs		
Freight on fertilizer	26.66	
$39\frac{1}{2}$ man hours hauling fertilizer at 21.6¢	8.53	
58 horse hours hauling fertilizer at 13.2¢	7.66	
29 man hours mixing fertilizer	6.26	
$84\frac{1}{2}$ man hours sowing fertilizer	18.25	
$101\frac{1}{2}$ horse hours sowing fertilizer	13.40	
200 man hours hauling in and storing 60 tons hay	43.20	
160 horse hours hauling in 60 tons hay	21.12	
108 man hours pitching hay to baler	23.33	
Meals for hay pressers	14.40	
Meals for hay pressers' horses	7.30	
118 man hours hauling 60 tons to railroad	25.49	
208 horse hours hauling 60 tons to railroad	27.46	
Use of barn (proportionate share)	95.00	
Fire insurance (proportionate share)	3.00	
Interest on above costs for 7 mos. 6%	21.46	\$362.52
		\$634.66

The labor costs are charged at the average cost on this farm for the year 1911; not the cash paid the men but the real cost of labor, which includes wood, milk, use of house, etc. Horse labor is charged at cost, 13.2 cents per horse hour. A very moderate cost for a New York farm.

The time required for baling and hauling hay, barn storage room, and fire insurance are directly in proportion to the crop grown. These are charged at the average cost per ton for 1911. The charge for hay storage is low. The use of fertilizers on this farm has made it necessary to build more barns. The extra time of cutting, tedding, and raking the larger crop and additional use of machinery has not been counted. The time to load and haul to the barn is estimated from the time for the total crop, but is very close to correct. The farm is three miles from the railroad and has some bad hills, but over two tons of baled hay is hauled per load. No hay loader is used, but otherwise work is economized. The charge for baling of $1.25 per ton is not counted, as this is deducted from the price when selling.

In most years, the 60 tons of hay from this farm will sell for $900. This allows a profit of $265 from fertilizing, not a profit of $628 that would be indicated by usual methods of figuring.

With hay at $10 per ton, there would be a loss from using fertilizers, yet by the experiment station method of figuring the profit would be over 100 per cent.

It will be seen that the fertilizer is much less than half the total cost. The costs may be summarized as follows:

Fixed costs, fertilizer, freight on fertilizer, mixing and applying fertilizer, interest on these — $365.25.

Costs directly proportional to crop, hauling in, storage, fire insurance, baling, hauling to market, interest on these — $269.41, or $4.49 per ton.

We can then determine approximately what increases and prices are necessary for profit on this farm. With an increase of half a ton per acre from the treatment, the fixed costs are $365 and the variable costs $135. The 30 tons of hay would have to bring about $16.66 per ton to pay the cost. This would not be a very attractive investment with hay at less than \$18 to \$20.

In some extra good years, this treatment on this farm may give an increase of $1\frac{1}{2}$ tons per acre. The fixed costs would then be \$365 and the variable cost \$404. The cost of the 90 tons of hay would be \$8.55 per ton.

Fig. 51. — An irrigated pear orchard in Colorado. The high cost of irrigation and transportation makes very intensive methods most profitable.

We find that the increased crop costs approximately \$16.83 per ton if the increase is one-half ton, \$10.58 per ton if the increase is one ton, and \$8.55 if the increase is one and one-half tons. Farmers in New York often grow hay by ordinary methods at a cost of \$6 per ton. These results may suggest the reason why farmers are so slow to take up the fertilizing of hay. If one can grow more acres by ordinary methods, he may do as well or better than by spending his limited capital for fertilizer. If he cannot buy or rent more land or if he has plenty of money, he may use fertilizers. When land becomes worth more it will pay to be more saving of it.

The farmer who kept these cost accounts considers that it pays to fertilize hay on his farm. He has followed the practice for some years and expects to continue, but does not think that there is any very high profit when the risk and the new barns are all considered.

These results are, of course, given to show a method of business study and not to give a discussion of fertilizing hay. The additional cost in fertilizing some other crops, such as oats and wheat, are usually less.

110. Crop yields on successful farms. — Farms that secure large yields per acre often fail to make a good profit. Efficient management will bring fairly good profits with ordinary production, but the highest profits come from a combination of efficiency and good production.

Of 1317 farms in one county in New York, 13 made labor incomes of over $2000. The crop yields on these farms averaged 27 per cent better than the average for the region. Part of this difference was due to the soils being better than the average, and part was due to better farming. The average yield of hay on all farms was 1.3 tons; the most profitable farms averaged 1.6 tons. The average yield of oats was 33 bushels. The most profitable farms averaged 43 bushels. The potato yields on the most profitable farms averaged 219 bushels. Some farms secured much higher yields than these, but not higher profits. Twelve farmers, whose labor incomes were between $1500 and $2000, had crop yields 34 per cent above the average, so that their crops were better than the crops on the most successful farms.[1]

In five townships in Livingston County, New York, there were 19 farmers out of 671 who made labor incomes of over $2500. On 6 of these farms, the crop yields were below the average, but the crops on the 19 farms averaged

[1] New York, Cornell Bulletin 295, pp. 524 and 529.

18 per cent above those of the region. The average yields for the region were: hay 1.4 tons, oats 41 bushels, wheat 19 bushels, beans 16 bushels, potatoes 106 bushels. The most successful farms secured nearly one-fifth larger yields. If one were to compare the yields on these most successful farms with the average of the state, the difference would be greater, because the soils in this region are much better than the average of the state. By comparing with the neighbors in the same year, we see how much of the larger yield is due to better methods or better soil than the neighbors have.

Something more than large crop yields is necessary for large profits. There were 69 farmers in this region whose crops were over 25 per cent above the average; 28 of these farmers failed to make even average labor incomes, and only 29, or 42 per cent, made labor incomes of over $1000.

If we are to use only one measure of efficiency, size is more important than quality. There were 112 farms of over 200 acres; 54 of these, or 48 per cent, made labor incomes of over $1000.

When both quality and size of business are combined, the chances of success are much improved. There were 25 farms of over 200 acres on which the crop yields were over 15 per cent above the average; 17 of these gave labor incomes of over $1000. If we included the additional qualification that the animals kept be fairly productive, nearly all of the farms left would be highly profitable.

Of the eight large farms that failed to give a labor income of $1000, seven failed because after having grown the good crops, they fed them to animals that failed to pay, either because of poor quality of animals or wrong kinds of products.

One man had crops a third better than the average, and secured a production per cow of double the average, but at a labor and feed cost that was too great. His farm would have paid much better, had he discharged half his men and fed his cows less. Of the 18 men who had farms of 200 acres or more, and who secured good crops and good production per animal, he was the only one who failed to make a labor income of $1000. The other 17 averaged $2352.

In five townships in Jefferson County, New York, there were 17 farms out of 670 that gave a labor income of over $2000. On three of these, the crop yields were below the average. The crops on the 17 farms averaged one-fifth above the average of the region. Again, this difference was partly due to better soil and partly to better management. These same farms were three-fifths larger than the average farm.

111. Comparative importance of production and size of business. — In Jefferson County, the average labor income was $609. The 97 farms with the best crop yields (crops 32 per cent or more above the average) made an average labor income of $684. Twenty-three were above $1000, but 51, or over half, failed to make average labor incomes. Crop yields alone are important but do not seem to have a controlling influence on profits.

The 97 farms with the largest receipts per cow from milk and butter ($84 or more) made an average labor income of $968. Forty of these were above $1000.

The 97 largest farms (224 or more acres) made an average labor income of $898. Forty-two of these were above $1000.

The chief products sold in this county are milk and hay. Some oats, potatoes, eggs, pure-bred cattle, and other products are sold. Hay, silage, and oats are raised to feed. In this region, which depends primarily on dairying, the production per cow and size of farm are the most important factors affecting profits. The crop yields are important, but are not as important as either the cows or the size of the business. In a region where crops are more important, the yield per acre has more effect on profits.

TABLE 28. COMPARATIVE IMPORTANCE OF PRODUCTION, SIZE OF BUSINESS AND DIVERSIFICATION, JEFFERSON COUNTY, NEW YORK

	AVERAGE LABOR INCOME	NUMBER MAKING LABOR INCOMES ABOVE $1000	PER CENT MAKING OVER $1000
Average of 670 farms	$609	145	22
97 farms with highest crop yields	684	23	24
97 farms with highest receipts per cow	968	40	41
97 largest farms	898	42	43
23 farms in the class with best crops and best cows	994	9	39
71 large (over 200 acres) and diversified farms	1044	33	46
31 large farms (over 200 acres) with crops and cows as good or better than the average	1567	27	87
13 large diversified farms with crops and cows as good or better than the average	1968	13	100

The combination of large crop yields and high-producing cows is better than either one alone. There were 23 farms that came both in the class of high-crop yields and high production per cow. The average labor income on these farms was $994. Nine were above $1000. But even with this combination of good cows and good crops, 9 failed to make labor incomes as good as the average. These were small farms.

112. Comparative importance of yields and size and diversity of business. — The combination of size of business and diversity is even more important than high production. It appears that the reduction in cost by having a business large enough and diversified enough to keep men, horses, and machinery busy is greater than the reduction in cost that comes from high yields of crops and production of animals. There were 71 farms of over 200 acres that derived over 20 per cent of their receipts from crops. The labor income on these farms averaged \$1044. Thirty-three were above \$1000.

A farm ought to have crop yields and cows as good or better than the average. This means receipts per cow of \$59 or more from milk and butter. There were 31 farms of over 200 acres that secured crop yields as good or better than the average and that also had cows as good or better than the average. The average labor income on these farms was \$1567.

If we add the further qualification that the farms shall be diversified, the profits are still larger. There were 13 of these large farms with production as good or better than the average that derived over 20 per cent of their receipts from crops. The average labor income on these farms was \$1968. The lowest was \$1093.

The importance of high production has long been emphasized, but it appears that a size of business and type of farming that provide full work for labor and equipment are even more important than high production. *The largest profits come when good production is combined with the proper size of farm and type of farming.*

It appears that the average farming of any community is not quite as intensive as conditions warrant. It pays to use methods that will secure a little better crop than the average, but farmers are not so foolish as to be 100 per cent out of adjustment to their conditions, as is assumed when it is said that they ought to secure double the present yields on any given soil.

113. Raising the maximum yield of potatoes. — An intensive potato farm has attracted considerable attention.[1] The farmer has laid 10 miles of tile drain on his 57-acre farm. His average yield of potatoes for the last nine years reported was 282 bushels. One year it was 417 bushels.

The average receipts for the first nine years were $214 above farm expenses. This represents the pay for the owner's work and interest on capital, or the amount that the family had to live on and pay interest, but the farm increased in value during this time. For the second nine years, the average receipts were $2786 and the farm expenses $1775. This leaves $1011 per year as pay for the use of capital and owner's labor. Half of this was earned by the $10,000 capital. The other half represents pay for the farmer's labor, or his labor income. This is a little lower than the average for the neighboring townships in Livingston County. One in every twenty-five of the farmers in this region made over $2500.

The farm is a little over one-third as large, but the capital is as large as the average in the region. The same energy would undoubtedly have brought at least double the profit, if expended in farming by the usual methods of the region. The high yields attracted so much attention that one of the great railroads hired the owner to manage demonstration farms. Naturally, the farmers who have watched the

[1] U. S. Dept. Agr., Farmers' Bulletin 454.

expenses of the railroad farms have been slow to accept the so-called scientific methods. They have, however, been helped in some details of potato production.

The farmer who has accomplished these results deserves the utmost respect. He has shown great originality and has shown what high yields can be secured. They have another value in showing us what possibilities we have for the future, when conditions may possibly warrant more intensive methods. We need not be alarmed as to how we shall be fed in the future. It is always desirable to have such experiments, just as it is desirable to have experiments with aëroplanes. But to exploit such methods as an example for farmers to follow is as foolish as it would be for a farmers' society to try to demonstrate to the railroad that it could secure more business if a nice passenger station were built at every crossroad. The increased returns are easy to secure, but an increased profit is a different matter. Probably farmers, as well as railroads, can make more by a little more intensive methods, but not by trying to secure maximum crops.

INTENSIVE AND EXTENSIVE METHODS OF DAIRYING

114. Adaptation to conditions. — What intensive methods it will pay to use in dairying depends on many factors, chief among which are the relative prices of feed, labor, and milk. Near some of the large cities in Germany very intensive methods pay best. Land, feed, and milk are high in price, and labor is cheap. Under such conditions the problem is largely one of getting the greatest amount of feed from an acre. The soiling system is then used. All the feed is cut and carried to the cows, because in this way more stock can be kept on a given area. In northern Minnesota we have the other extreme. Labor is high, and feed, land, and milk are very cheap. Here the cows run out much of the year and pasture on prairie grass in summer and corn stalks in winter. No attempt is made to secure very high production per cow. Between these extremes we have all degrees of variation. The intensive method is as much out of place in Minnesota as the Minnesota method would be in Germany.

The least intensive method of dairying is to produce most of the product in summer on pasture and carry the cows over winter on hay and cheap roughage. This is the practice in Holland and in the parts of New York and Wisconsin where cheese is produced. It is better economy to produce the cheese on cheap feed and store it than it is to try to produce it on high-priced winter feed. The same practice is followed to some extent with butter making, but a larger proportion of the butter supply is made in winter because it is less easily stored.

A more intensive method of dairying is to feed hay and grain in the winter so as to get some production during this season. This is justified when butter or milk brings a fair price. This is the common practice of the majority of dairymen in America.

A still more intensive method adds corn silage and increases the grain. This is the usual method followed by dairymen who have fairly large herds and who are near enough cities to get a good price for milk. Silos are not often used with less than 10 to 20 cows.

With all of the above methods, summer pasture is used as far as possible. When land becomes very scarce and milk very high in price, the pasture is replaced by a soiling system. Farmers in the very edge of cities are the only ones that often find this profitable in America.

Table 29 gives an interesting comparison of the five-year average results for a dairy herd in Connecticut with the results of cost accounts on 27 farms in Minnesota. The cows in Connecticut were fed nearly three times as much grain as those in Minnesota. They were fed a

TABLE 29. — COMPARISON OF AVERAGE COSTS OF PRODUCTION OF MILK ON SOME MINNESOTA FARMS AND ON A CONNECTICUT FARM [1]

	MINNESOTA	CONNECTICUT
Pounds of grain	877	2525
Pounds of hay	5050 [2]	2284
Pounds of silage	——	8727
Days of pasture	164	133
Pounds of milk produced per cow	4499	6379
Pounds of butter (85 per cent fat)	201	324
Cost of feed	$23	$84
Other costs	29	65
Total cost	52	149
Value of product plus $15 for calf and manure	60	——
Value of product, milk 4¢ qt. calf and manure $15	——	133
Gain	8	——
Loss	——	16

[1] Minnesota, Bulletin 124, and Connecticut, Bulletin 73.

[2] Includes some stover, fodder, and a little silage.

little more roughage, but were pastured less. The more intensive methods in the East are further indicated by the fact that the other costs aside from feed are over twice as much, and are finally shown in the production of 61 per cent more butter per cow. The milk was counted at 4 cents a quart in Connecticut. The average prices received in Minnesota were 2.4 cents for milk and 22 cents for butter.

The herd in Connecticut failed to pay. If we assign the same values to the manure and calf in Minnesota as was done in Connecticut, then the Minnesota herds gave a profit of $8 per cow. Or, expressed another way, the manure and calf had to be worth $7 to come out even in Minnesota, and $31 in Connecticut.

If the Connecticut herd had paid Minnesota prices for feed and received Minnesota prices for the product, the milk would have been worth $72 per cow. The feed would have cost $43, or about one-half as much as it did in Connecticut. The other expenses would have been only slightly reduced, provided the same methods had been used. The calf and manure would then have to be worth about $50 to come out even.[1] But the Minnesota farmer, with his apparently slipshod methods, has secured the calf and manure for $7. It appears absolutely certain that as intensive methods as are used in Connecticut would not pay in Minnesota. Possibly the methods are a little too intensive, even for Connecticut. On the other hand, it is probable that the profits in Minnesota might be increased by a reasonable increase in intensity of the business.

If the cows in Minnesota had paid Connecticut prices for feed and received Connecticut prices for milk, the feed would have cost something less than $63 per cow, and the milk would have been worth $84 per cow. The profit would have remained practically unchanged. A few of the other charges would have been greater. It is also probable that the milk inspectors would refuse to take the milk, if these methods were used in Connecticut.

[1] Feed values in Minnesota averaged $4.92 per ton for hay, $1.71 for silage, about $20 for grain, and 83 cents a month for pasture. In Connecticut, hay averaged $16, silage $4, grain $30 per ton, and pasture $10 for the year.

115. The soiling system. Keeping the greatest number of cows per acre. — The farmer has been repeatedly shown that he can keep more cows per acre by a soiling system, that is, if green feed is cut and brought to the cows, rather than use a pasture, but few farmers have adopted this method. The farmer is concerned with profit for a year's work, not with entertaining the greatest possible number of cows. A soiling system is feasible in Europe, where labor is cheap and land very expensive; it is not feasible in America, except on a very few farms with entirely unusual conditions. A description of one of these farms, that has been published as a Farmers' Bulletin, is in great demand.[1]

The farmer had 15 acres of land near a large city in Pennsylvania and by a soiling system raised all the roughage for 30 head of stock, 17 of which were cows in milk. The milk was sold to a state institution two miles from the farm at the wholesale price of 25 cents a gallon the year around. This was at a time when farmers in the state were usually getting about 8 to 12 cents a gallon. The milk was unusually high in fat, but the price was equivalent to 50 cents a pound for butter fat. The value of the land is not given, but it was mortgaged for $480 per acre. At this time, good land for dairy purposes in the state could have been bought for $50 and rarely sold for as much as $100 per acre. With more than double the usual price of milk and with land worth ten times as much as that on most dairy farms, a soiling system was the only logical system. The owner developed a city-lot type of farming excellently adapted to his conditions, but absolutely out of place on farms that sell milk at usual prices. If he had sold his milk at usual prices, he would have lost money.

[1] U. S. Dept. Agr., Farmers' Bulletin 242.

Unfortunately, the bulletin was called, "An Example of Model Farming," and many persons have thought that this furnished a model for farmers who sell milk at 2 to 3 cents a quart instead of $6\frac{1}{4}$ cents. Because of his success under these very unusual conditions, this farmer sold his farm for a high price and was hired at a high salary as manager of another farm. Here the attempt to establish a similar system resulted in a very heavy loss for his employer.

There is not sufficient data given in the bulletin to calculate a labor income, but it appears to be less than $1000, — a good labor income, but not large. It is interesting to compare this with the results obtained by many other farmers; the one on page 537 is typical. This farmer made a labor income of $3414; the year before it was $2750. With about the same capital that was invested in the intensive farm, he made three times the labor income. This farmer kept a cow for each seven acres rather than a cow to the acre. He sold milk for an average of 2.7 cents a quart rather than $6\frac{1}{4}$ cents. Instead of spending any time hauling green crops to the barn, he raised cash crops for sale, while the cows were in the pasture gathering their own crops and distributing the manure. Each farmer followed the method best adapted to his conditions. There are thousands of men who are succeeding by usual methods for every one that is succeeding by the soiling system.

The amount of labor involved in hauling green crops, that are mostly water, and in hauling out manure is enormous. At the New Jersey Experiment Station the equivalent of 50 cows were kept for 6 months on various soiling crops. During this time 278 tons of green crops were cut and hauled to the barn, and probably over 300 tons of manure were hauled back to the fields.[1] The labor of hauling the feed and manure, to say nothing of the cost of growing the crops, would more than pay the pasture bill on most dairy farms. It is evident that land and milk must be very high in price, before a soiling system will pay.

A less intensive system that pays on most dairy farms is to have enough corn silage to supplement the pasture at times when the pasture is poor. But even this is too intensive a system in the newer regions and far from cities. In Minnesota, it was found that $1 expended for labor and other costs of production of a hay crop gave a product with a feeding value of $2.21. For the same cost, fodder corn gave $1.38, silage $.98, and mangels $.79. The last two failed to pay the cost of production.[2]

In some parts of Europe, and occasionally in the edge of large cities in America, it pays to follow a soiling system in the summer, with silage or roots for winter. In the Eastern States, and near cities in other states, it generally pays a farmer, who has 10 or more cows, to pasture in summer and feed corn silage and hay in winter. Farther west, where hay is cheaper, the silo is less profitable. In some sections it has not yet proved its worth. Root crops rarely pay in America, except when one is making advanced registry records, or under some other unusual conditions. Sometimes it pays to have a small amount of roots to furnish a succulent feed, if the herd is too small to justify one in having a silo.

The farmer's problem is to intensify his business up to the point of greatest profit for his conditions. Since conditions are gradually changing in favor of more intensive

[1] E. B. Voorhees, Forage Crops, p. 35.
[2] Minnesota, Bulletin 117, p. 31.

methods; and since there is a tendency for the average person to lag behind, it follows that a little more intensive methods than the average of the community will usually be best. (See also pages 181 to 182.)

116. Receipts per cow and profits. — In Tompkins County, New York, the 12 most profitable farms out of 1317 received 48 per cent better returns per cow than the average of the region. They purchased 89 per cent more grain feed per cow than the average. Those who kept sheep secured returns per ewe 83 per cent above the average.[1]

In Jefferson County, New York, there were 17 farms out of 670 that made labor incomes of over $2000. The average receipts from milk and its products were $59 per cow on all farms, and $92, or 56 per cent, more, on these most successful farms. The receipts from stock sold above purchases averaged $14 per cow on all farms, and $11 on the most successful farms.

By comparing with the crop yields on these farms (page 167), it will be seen that the production of the animals exceeds the average by very much more than does the production of crops. The factors that determine crop production are much less under control than are the factors that affect animal production. If one does his part for a half better crop yield than the average under his conditions, he is not at all sure of getting this yield, because the weather may limit the crop. But if one does his part for a half better production from animals, he is fairly sure of corresponding returns. (See also pages 169 to 171.)

[1] New York, Cornell Bulletin 295, p. 525.

INTENSIVE METHODS SHOULD BE PROPERLY BALANCED

117. Profits limited by the weakest point. — There is no use in using a heavy fertilizer treatment, if the rainfall or tillage is not in proportion, neither does it pay to give the same attention to common stock that should be

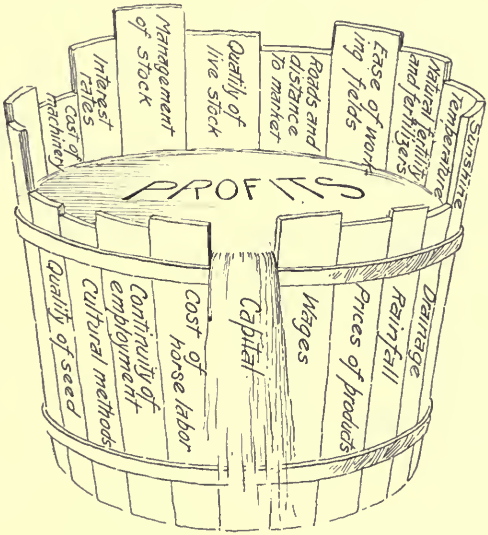

Fig. 52. — Profits depend on many factors. They cannot rise above the limits set by the weakest point in the system.

given to pure-breds. The false statement is often made that it costs no more to keep pure-bred stock than it does to keep grades. It takes more capital, more feed, and more care, if the business is to be made to pay. It is foolish to keep pure-bred stock and give it no better care than is given to common stock. This sort of a relationship should run throughout the farm business. One cannot afford to get the best machinery and continue to use cheap, weak horses. If he has good machinery and good horses, he cannot afford to use inefficient men. It requires experience and good judgment to keep somewhere near to the proper adjustment of all the factors of production. No farmer ever keeps all these factors just right. Figure 52 illustrates this point. The profits cannot rise above the limiting factor. Methods should be intensified with uniformity in attention to all the limiting factors. Whenever one point is improved, it is likely to call for improvement in other lines. In most regions it pays to spray apple trees. But after going to the expense of spraying, one cannot afford to neglect some other point — as tillage or pruning. After one has fed his cows more, he needs to be sure that he gives the care that should go with the larger feed.

References

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Cyclopedia of American Agriculture, L. H. Bailey, Vol. IV. pp. 94–96.
Agricultural Economics, H. C. Taylor, pp. 88–116.

CHAPTER 5

MAINTAINING THE FERTILITY OF THE LAND

No system of farming can be considered entirely satisfactory that does not maintain the fertility of the land. In periods of low prices, it is sometimes necessary for the farmer to neglect the future in order to make a living in the present. It is also sometimes necessary for a man who is heavily in debt to follow methods that he will change when he reduces the debt to a safe limit. But, in general, we desire types of farming that will maintain crop yields, and, as prices and land values increase, it becomes desirable to increase yields beyond what they were on the virgin soil.

118. Are our crop yields decreasing? — Somebody started the story that our crop yields are decreasing. It has been repeated so many times that it is now accepted as true. Figure 53 shows the facts in the case. It is the average of the ten leading crops of the United States. It shows that the highest crop yields ever secured have been in the last fifteen years. The increase in yield per acre has been very marked. We have good years and poor years, but crop yields are increasing very rapidly. All that is necessary to have them go up still farther is to pay the farmer more for his produce. By bringing in land that is now little used, and by better methods of farming, that are already known to farmers, it would probably be possible to increase our total production of crops 50 per cent in three years, if the farmer could be assured of prices high enough to warrant the expense involved.

119. Ways in which productivity may be decreased. — (1) The fertile surface soil may be carried away by erosion, by wind, or water. Probably more soil fertility is lost in this way than by cropping. This may be prevented by keeping the soil in sod, by keeping cover crops on it

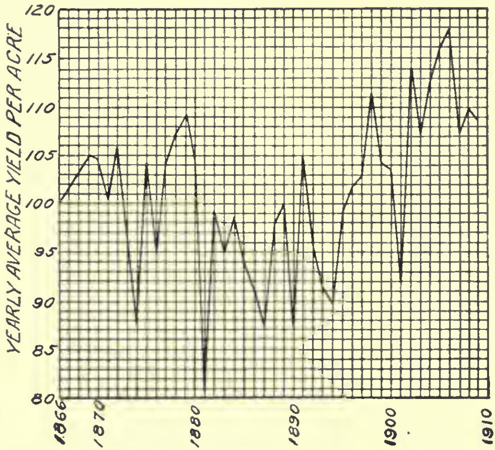

Fig. 53. — Yearly average yield per acre of 10 leading crops combined (representing in area nearly 95 per cent of all cultivated crops). 100 represents the average for the 43 years.[1]

during the winter, and by terracing the land as is done in the South.

(2) The soil may cease to hold the proper moisture supply. This may be remedied by drainage and tillage, and by additions of humus-making material.

(3) The soil may cease to be favorable for the development of soil organisms. This may be remedied as No. 2 and by the application of lime.

[1] U. S. Dept. Agr. Crop Reporter, Jan., 1911.

(4) The nitrogen and lime of the soil may be carried away in drainage water.

(5) The constant cropping may exhaust the available supply of some plant-food. Each crop removes a certain amount of nitrogen, phosphoric acid, potash, and lime. In time this may limit the available supply. Usually it is not a shortage of the absolute amount of such food in the soil, but a shortage of that which the plant can secure in soluble form. This may be remedied by drainage, tillage, additions of humus, lime, fertilizer, and manure.

(6) The exhaustion of the organic matter is the most frequent cause for decrease in crop yields. This affects crops in many ways. It may result in an unfavorable physical condition of the soil that will limit the crop when there is no shortage of food. The soil may " bake " or it may lose its water-holding power. Since the organic matter furnishes the nitrogen by its decomposition and encourages the fixation of free nitrogen, its exhaustion will be accompanied by a shortage of nitrogen. Or because of the lack of organic matter, the mineral elements may not be rapidly enough dissolved, although present in abundance. In such a case, the addition of phosphoric acid or potash might increase the crop, but it would usually be wiser to supply organic matter so as to render available the food that is already in the soil.

Many soils are losing their fertility in all of the ways mentioned above.

(7) In arid regions, the accumulation of alkali is one of the most frequent sources of decreased production. Too heavy applications of water make the problem worse. This may be remedied by tile drainage.

MAINTAINING THE ORGANIC MATTER

120. Importance of organic matter. — The most important soil problem in nearly all regions is the question of organic matter. This problem is particularly serious in the South. In regions with long seasons, a tremendous quantity of organic matter is used up each year. In colder regions, the "decay" is less rapid. In the South, the great soil problems are organic matter and erosion, and the latter problem is, to a considerable extent, a problem of organic matter, because this helps to hold the soil.

Each farm must ordinarily grow its own organic matter supply. Occasionally, a farmer may depend on purchased manure or hay, straw, or other feed, but these are expensive and bulky to handle, and cannot often be secured at prices that will enable a farmer to make a profit from them.

There are three general methods of adding organic matter to the soil. (1) By crop roots, stubble, etc. (2) The use of farm manure. (3) Plowing under of green crops.

121. Crop residues. — On some of the richer soils in the North, the clover and other crop roots and stubble seem to be sufficient to keep up the supply of organic matter, but on most soils some of the crop must be returned to the land, if the supply is to be maintained.

In parts of the corn-belt, the corn is husked from the standing stalks, because where feed is very cheap it does not pay to harvest corn stalks.[1] The stalks are then pastured more or less, and are plowed under for the succeeding crop. This is a valuable source of organic matter on these farms, and goes a long ways toward keep

[1] Minnesota, Bulletin 104, p. 86.

ing up the supply. Sometimes the stalks are burned. This may occasionally be desirable, but one should be very sure of it before he destroys such valuable material.

In a few sections in the western part of the United States, wheat is harvested with a combined harvester and thresher that leaves the straw scattered over the field. When this is plowed under without burning, it furnishes a large amount of humus-making material. In parts of the western wheat country, where grain cannot be safely left standing until it is dry enough to thresh, the threshing is done from the shock or stack. Here the straw is often burned. It is difficult to get this straw to rot in a region of short rainfall. It is, however, a serious waste to burn it, and, if possible, it should be worked down by stock and then spread very thinly on the land as a top dressing, or be saved in some other way. In this region, as well as in most of the country, the problem of organic matter is a serious one.

122. Farm manure as a source of organic matter. — About 40 per cent of the organic matter that is fed to animals is returned in the manure, and all of the bedding used is so recovered.

Heiden found that 47 per cent of the dry matter fed to a horse was recovered. A full-grown steer returned 56 per cent of the dry matter of the feed.[1]

R. E. Deuel fed 46 cows for one week and weighed and analyzed feed, bedding, and manure. The cows had been on the same ration for some time previous to the test. He found 45 per cent of the dry matter and 43 per cent of the organic matter of the feed eaten was recovered in the manure.

Young animals, lean animals, or those that are produc-

[1] Feeds and Feeding, W. A. Henry, 7th edition, pp. 34 and 265.

ing milk, or work, digest their food closely. From the limited information available, it appears as if one might count on a return of about one-half of the organic matter of the food, but with usual methods of handling probably not over one-fourth to one-third reaches the field.

123. Pasturing off crops. — The practice of pasturing down crops is on the increase. This is a method of saving labor as well as enriching land. It is particularly useful with hogs and sheep. This method has long been used in England. It seems destined to increase in this country. Cow peas, soy beans, rape, or other crops, may be sown in corn to be pastured off by sheep.[1] Hogging off corn is becoming increasingly popular. The hogs save the work of harvesting corn and hauling manure.[2] Rye, wheat, peanuts, and other crops, are similarly harvested by hogs. Very little grain is wasted. The straw or stalks are left on the land. With this system, the water supply should be moved from time to time, so as to secure a better distribution of manure. In addition to its advantages from the standpoint of labor, this method is one of the best for keeping up fertility. Over half of the manure is usually lost when stock is fed in yards.

124. Green manure. — Sometimes crops are grown for the purpose of plowing under for green manure. We are usually deceived as to the amount of material that this adds to the soil. It takes a good soil to grow two tons of dry matter per acre. More frequently, one-half a ton is secured. Three tons of farm manure usually give over a ton of dry matter[3] and, after being properly spread, are probably worth more than a ton of dry matter in green

[1] Sheep Feeding and Farm Management, D. Howard Doane.

[2] Minnesota, Bulletin 104.

[3] Cyclopedia of American Agriculture, Vol. I, p. 498.

Fig. 54. — A crop of corn with rape sown at last cultivation. Ready to be pastured by sheep. Or the rape and corn may both be hogged off.

manure. One objection to green manure is that where the soil is most in need of organic matter, the least quantity grows. The parts of the field that are richest get the heaviest application, just the reverse of what is desired. The same objection applies to farms as a whole. Farms that are seriously in need of organic matter cannot grow much of a crop of green manure. A manure spreader will apply farm manure evenly. If desired, parts of the field may be given a heavier application.

There are conditions under which a catch crop can be grown with very little extra cost. Such crops are most commonly grown in orchards, or sown in corn or cotton at the last cultivation. When this can be done, the extra cost is little more than the seed, and a good profit is usually returned.

It is very doubtful economy to spend a year raising a crop that is to be plowed under. Such a practice may pay as compared with no treatment, if organic matter is badly needed, but usually it pays better to pasture down the green manure crop, or harvest and feed it and return the manure. If pastured off in the field, all the roots and considerable of the tops are left where they grew, and 40–50 per cent of the material that is eaten is returned to the land.

There are a few potato growers scattered about the country, who follow a three-year rotation of potatoes, oats, and clover. Sometimes rye, barley, or wheat replaces the oats. The clover is allowed to fall back on the land for green manure. The cost of this green manure may be said to be the clover seed and use of the land, as little extra labor is involved. So long as land is cheap, this system may be followed. It usually makes the dry

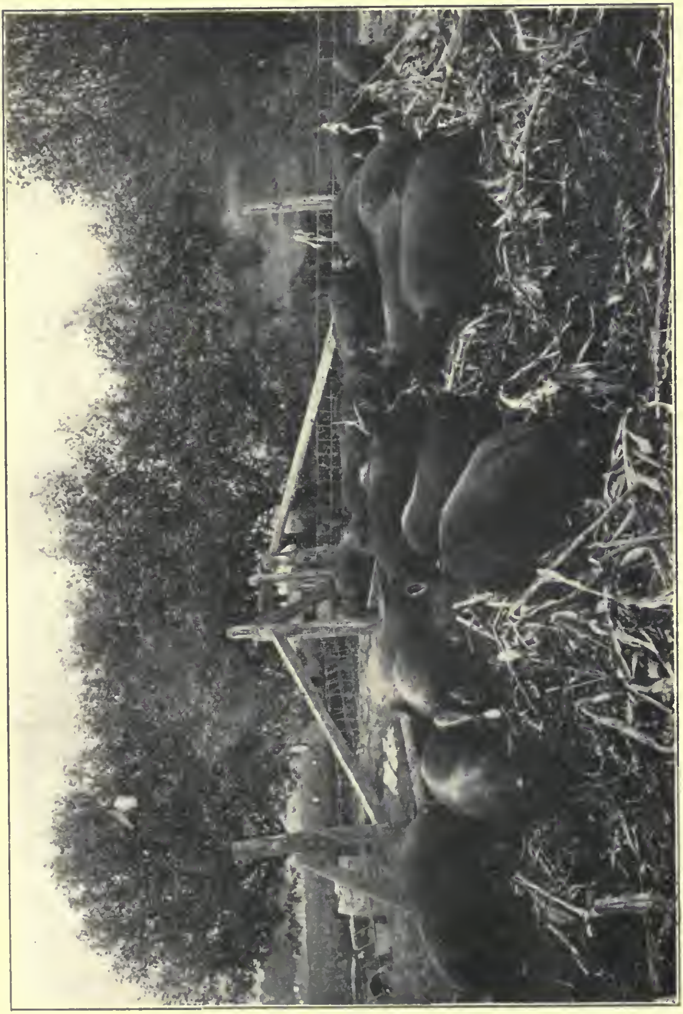

FIG. 55. — "Hogging-off" corn. Good for the hogs, good for the land, and saves labor.

Fig. 56. — Corn field after being hogged off. Most of the organic matter is left in the field.

matter cost from $2.50 to $10 per ton. The corresponding values of manure would be from 80 cents to over $3. But there is another way of looking at the question. What would the farmer make if he pastured off the clover, or fed the clover hay? On such a farm, some such crop as clover hay is needed to keep the horses busy at haying time, because the other crops then require little attention. And some sort of animals need to be kept to provide winter work.

On one such farm, 30 acres of clover were grown in 1910. Of this, 10 acres were mowed and plowed under as green manure.

The cost of green manure crop on 10 acres was: —

Clover seed and seeding	$35.00
Use of land	50.00
Mowing	7.32
Total	$92.32
Cost per acre	9:23
Cost per ton dry matter	8.87

After the crop is grown, the problem of whether to harvest it depends not on its cost, but on its value as feed and as green manure and the additional cost of harvesting. The remaining 20 acres were harvested and yielded 25 tons. Raking, bunching, and hauling in cost $48.31, or $1.93 per ton. The hay was worth $8. It was, therefore, worth $6.07 in the field. Figured at 83 per cent dry matter, this would be $7.31 per ton of dry matter. Since three tons of manure contain about one ton of dry matter, the corresponding value of manure, after it was spread in the field, would be $2.44. Whether it paid to plow this clover under depended on how good use his animals could make of it, and on how busy the farmer was, and on the comparative benefits of manure and green manure on the potato crop. It seems likely that it would pay better to feed it.

The next year (1911) on this same farm hay was worth $18 per ton, or about $16 above the cost of raking, bunching, and hauling in. This would make the dry matter cost over $19 per ton. The corresponding value of manure would be over $6 per ton. Part of this clover hay was fed to sheep, and part plowed under as green manure. The sheep paid for the hay at this price, paid for all other feed, the use of barn, horse labor, interest, and all other expenses, and left 41 cents per hour as pay for labor spent on them. So that in this case there was a great loss from plowing under clover, not only because the dry matter cost too much, but because it limited the number of sheep kept.

There are some cases in which it is best to plow under a green manure crop, because it does not pay to keep animals to eat it, or because animals might do injury, as in an orchard. But, in general, it is best to either harvest, or pasture down the crop after it is grown. Hay is usually too valuable a material to use as manure.

Weeds often help to keep up the supply of organic matter. Whenever there is any time that land is idle between crops, the weeds fill in the gap. Sometimes the weeds do much damage and sometimes they do no harm, but always they help to keep up the humus supply.

In some of the older parts of the country, there are large areas of hill lands that never were very productive, and that are always on the boundary line where it is a question whether they will pay for farming. The outlying hills in the region of the Appalachian and other mountains of the Eastern States are mostly of this nature. The valleys are usually fertile. Much of this hill land is either little used, or is not cropped at all. A common practice on such land is to mow it for hay as long as it pays for cutting, then let it grow up to goldenrod, daisies, and other weeds, until it is rich enough to give a small yield of potatoes, buckwheat, oats, or some other crop. One or two crops are grown, and it is again allowed to go back to hay and then to weeds. At first thought, it seems very wasteful to let land grow nothing but weeds, but this land is not idle when it is growing goldenrod. It is taking nature's slow way of renewing the organic matter and nitrogen. If land is worth only $10 per acre, the cost of letting it alone while it grows weeds is only about 60 cents per acre per year. Four years of such treatment at compound interest can be had at a cost of less than $3 per acre. There are few other ways of accomplishing so much at so small cost.

In some cases, other methods of management may pay better, but in many cases, the weeds furnish the cheapest source of organic matter. These farmers have not the necessary capital to follow very intensive methods, even if such methods could be shown to pay when once established. In many cases, the still less intensive farming would pay better, that is, raise lumber.

MAINTAINING THE NITROGEN SUPPLY OF THE SOIL

125. Fixation of atmospheric nitrogen. — If a soil is kept well supplied with organic matter, it usually has plenty of nitrogen, because most of the nitrogen of the soil is in the organic matter. The ultimate source of nitrogen is the air. Bacteria working on the decaying vegetable matter are able to take nitrogen out of the soil air, and so fix it for plant use. Bacteria working on the roots of legumes also fix nitrogen. Adding organic matter in any way, keeping the land in sod, or growing legumes are the chief ways of encouraging the fixation of nitrogen. A leguminous sod is usually better than a cultivated legume.

At the Rothamsted Experiment Station in England, two fields have been allowed to run wild since 1881. Nothing has been removed or added to the land. On one of these about one-fourth of the plants are legumes. During the past thirty years, this field has gained in nitrogen at the rate of 90 pounds per acre per year. On the other field where practically no legumes grew, the gain averaged 60 pounds per acre per year. Most of this gain was unquestionably due to the fixation of nitrogen by soil organisms living on the organic matter in the soil. In the former case, we do not know how much was due to legumes, because this soil contained more lime, and the lime favors the organisms that act independently of legumes as well as those that act on legumes.

Of course, the nitrogen supply may be maintained by the addition of farm manure or commercial fertilizers, but even when these are used, the farmer should take advantage of the natural means so far as possible.

MAINTAINING THE MINERAL MATTER OF THE SOIL

126. Sources of mineral matter. — The only way to keep up the mineral matter of the soil is to add the particular elements that are present in too small quantities. The mineral that is most likely to be present in too small quantities is lime. Fortunately, the supply of limestone in the world seems to be inexhaustible, so that the question of using it is simply one of the cost of lime and benefits from its use. Some soils have all the lime that they need, but much over half the soils east of the Mississippi River would be benefited by lime. Lime is also the most frequent need in England.[1]

The form of lime to use seems to be primarily a question of the cost of calcium, and the expense of application. Fifty-six pounds of pure burned limestone, or quicklime, is equal to 74 pounds of hydrated lime, or 100 pounds of ground limestone, or air-slaked lime. Wood ashes are about one-third lime.

Potassium is fairly abundant in most soils in America, but is needed in many places, particularly on sandy and swamp soils.

Phosphorus is practically always deficient on soils that need lime, and occasionally on soils that are well supplied with lime.

If any one of these minerals is deficient, it may be added by using fertilizers or farm manure.

No method of farm practice will add to the supply of any of the mineral substances, but the rapidity of loss is

[1] The Soil, A. D. Hall, p. 243.

less if erosion is prevented and if farm manure is all saved and is so handled as to prevent loss by leaching before it is used.[1]

The soils in arid regions are usually more troubled with alkali than with a shortage of minerals.

AMOUNT AND VALUE OF FARM MANURE PRODUCED

127. Fertilizing value of food and of manure. — From 65 to 75 per cent of the nitrogen, phosphoric acid, and potash fed to cows is recovered in the manure; with fattening animals, 85 to 95 per cent is recovered. In general, it is safe to assume that three-fourths of the fertility in the feed is recovered in the manure. This, of course, assumes that the liquid portion is saved and that leaching and other losses are prevented. On most farms, half of the value is lost. From one-third to one-half of the organic matter is recovered, but over half of this is usually lost when manure is left in piles or in the barnyard.

128. Amount and value of manure produced by farm animals. — A 1200-pound horse will produce about eleven tons of excrement per year, which, together with the bedding, will make about fourteen tons of manure. A cow produces a little more, but about the same amount of dry matter. Steers fed at the Ohio Station averaged at the rate of nine tons per year. An equal weight of sheep produces fewer tons, but the manure is drier, so that about the same amount of plant-food is produced. A fairly safe rule for any stock, except poultry and hogs, is to count one ton per month for each 1000 pounds of animals kept. To purchase an equal amount of plant-

[1] For a discussion of the use of fertilizers, see any book on soils; or Elements of Agriculture, G. F. Warren, pp. 107–147.

food in fertilizers would cost about $30 per year. Table 30 gives results obtained by Roberts.

Hogs eat nearly twice as much for their weight and give about twice as much value in manure. Hens eat over twice as much as cattle for their weight and return twice as much value in manure, but the manure is very dry and very concentrated.

How much manure is worth per ton depends on how much it is needed, what it can be bought for, the kind of crops to be grown, and many other factors. Much of the manure is always lost. The cost of hauling and applying is very great compared with using fertilizers. On most farms it is worth $1 a ton at the barn. On some truck farms near cities it is worth $2 or more per ton.

TABLE 30. — MANURE PRODUCED PER 1000 POUNDS OF LIVE WEIGHT

	Excrement per Year	Manure with Bedding per Year	Nitrogen per Year	Phosphoric Acid per Year	Potash per Year	Approximate Cost if Purchased in Fertilizers [1]
	Tons	Tons	Pounds	Pounds	Pounds	
Horse .	8.9	12.1	153	81	150	$33.72
Cow .	13.5	14.6	137	92	140	31.20
Sheep .	6.2	9.6	175	88	133	36.84
Calf . .	12.4	14.8	150	105	102	32.28
Pig . .	15.3	18.2	331	158	130	64.48
Fowls .	4.3	——	293	119	72	54.52

[1] The nitrogen is figured at 16 cents and the other constituents at 4 cents per pound.

The amount of manure produced must be considered in planning a cropping system for a farm. If one wishes to manure one-fifth of the land every year with ten tons per acre, there would have to be provided two tons per year for each acre of the farm. This will usually require about one cow or horse, or equivalent, for each six acres of land. If the stock runs in pasture most of the year, or if the manure is left to rot at the barn, more stock will be necessary.

METHODS OF HANDLING MANURE

129. Methods of handling manure. — The ideal way of handling manure is to haul it directly to the fields and spread every day. But on most farms this is not practical. A well-organized farm has so much important work during the summer that one cannot afford to take the time to haul manure. Many times the fields are wet, so that driving on them causes injury. At other times crops are growing, so that there is no place to put manure. A considerable number of dairy farmers who do little but produce milk, haul manure every day.

On most farms, manure must be stored and hauled in the fall, winter, and spring. One of the best places to store it is in the covered sheds where stock is fed. The animals pack it and keep it moist so that it is well preserved. If there is a cement floor, there is very little loss so long as the manure is kept moist and packed. Horse and hen manure lose by heating. If mixed with other manure, the loss is less.

Few farmers feel that they can afford a manure shed, but an even better arrangement is a covered shed with a cement floor where all manure is dumped and on which animals run.

The manure spreader is one of the most important tools on the farm, not only because it saves labor, but because it spreads the manure over more land. Usually a light application should be used so that one may get over the farm more frequently. There are few farms on which every field has been manured. The manure spreader makes it possible to get over all the land. Usually one of the largest sizes of spreaders should be used, one that uses 3 or 4 horses.

BEST WAY OF MAINTAINING FERTILITY; A BUSINESS QUESTION

130. A bank account with the soil. — Sometimes farmers have been told that they should return to the soil as much of each element of plant-food as is removed in the crop. Such advice is as foolish as is the opposite statement that no attention need be given to the plant-food removed. If there is potash enough in the first three feet of soil to last for several thousand years, as is often the case, it would be foolish to use potash as a fertilizer, unless it paid at once, and even then, one should try to find a way of making use of the supply in the soil. The future potash supply of such a soil need not worry one. On the other hand, there are occasionally soils that have only potash enough for a few crops; on such a soil, the future may need to be considered.

How much and what fertilizers and what other methods should be taken to keep the soil fertile are primarily questions of profits. In England, some farmers use many times as much plant-food as is removed in the crop. Their method is not due to any superior intelligence. It is due to high prices of products, high-priced land, and cheap labor. At the same time, there are soils in England that are open range because they are not worth fencing.[1]

[1] The Soil, A. D. Hall, p. 242.

We have already seen that whether it pays to fertilize a crop depends on the price of the crop. If the identical results given in the set of cost accounts on page 164 could be secured at the same cost, the treatment would not pay in most parts of the United States, because hay is too cheap.[1]

In the Eastern States, we often hear farmers boast that they never sell a pound of hay or straw. The common opinion seems to be that it is little short of criminal to sell hay. There is no merit or demerit in selling any particular crop. If one sells everything that grows, including the straw and hay, and gives no attention to the soil, he is sure to get into trouble sooner or later. But there are many ways of keeping up fertility. The question is which way pays best. Many of the most profitable eastern farms regularly sell hay, and, at the same time, keep the crop yields above those on the farms that never sell anything.

At Rothamsted, England, commercial fertilizers have maintained the yield of crops for 68 years at a point far above the crop of the first years. The same thing has been done in Pennsylvania for 30 years, and in Ohio for 18 years. Crop yields can be kept up without any kind of live-stock. Just how much or how little live-stock to keep is a question of finding the most profitable type of farming for the conditions. Usually it pays to keep at least enough stock to work up the low-grade products of the farm, and usually stock is necessary in order to provide a full year's work for men and horses.

Very frequently the argument is raised that no fertility leaves the farm if butter is sold. On most farms

[1] See also Soil Fertility and Permanent Agriculture, C. G. Hopkins, pp. 397–398.

selling butter, much less than half the fertility of the feed ever reaches the fields. It rots and wastes away around the barns, and is lost where cows stand in the pasture creek, or where they congregate in the corner or under trees. Arguments against selling milk assume that when the skim-milk is fed to hogs, the fertility is all saved. It would be interesting to know just how many acres in America have been manured with hog manure. There is no merit in not selling anything. Most farmers sell too little. What to sell and what to buy and what is the best way to keep up fertility can never be solved by formulas.

References

The Principle of Soil Management, Lyon and Fippin.
Soil Fertility and Permanent Agriculture, C. G. Hopkins.
Soils, S. W. Fletcher.
First Principles of Soil Fertility, A. Vivian.
Elements of Agriculture, G. F. Warren, pp. 60 to 153.

CHAPTER 6

THE FARM MANAGEMENT POINT OF VIEW ON SOME LIVE-STOCK PROBLEMS

AMOUNT OF LIVE-STOCK TO KEEP

131. Live-stock largely produced by cheap food. — All kinds of live-stock use a considerable amount of cheap food that would have little value for other purposes.

In 1910, there was an average of 50 chickens for the farms keeping chickens, and a little over four turkeys on farms that kept turkeys in the United States. This

Fig. 57. — Turkeys gathering their own food. Those who use expensive feed must compete with the product that is largely grown on cheap feed.

number of fowls can pick up a large part of their living around the farm at very little cost. The great bulk of the eggs produced come from these small farm flocks. If one keeps a large number of fowls so that nearly all the feed is good grain, he must be very skillful and have a good market, or he cannot compete with the general market that is dominated by eggs from the small farm flocks.

Most of the dairy products of the world are produced by small herds of cows that are kept by farmers who

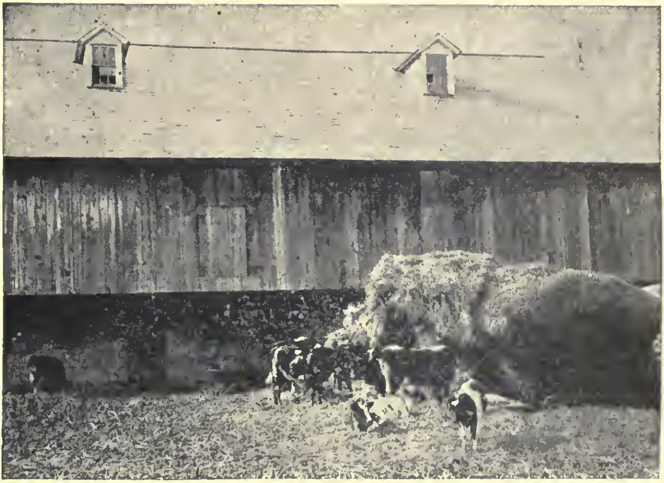

Fig. 58. — Using cheap feed to carry animals over winter and produce manure. Most of the butter and meat is then produced on pasture.

derive most of their income from some other source. In 1900, dairy cows were kept by 79 per cent of the farms in the United States, but only 6 per cent of the farms derived as much as 40 per cent of the income from dairy products. Butter production is particularly a side line;

63 per cent of the farms made butter in 1900. These small dairy herds are very largely fed on corn stalks, straw, and hay that is of poor quality. Most of them are pastured on land that is not well adapted to farming.

Beef cattle are, to a still greater extent, maintained on low-grade products. A considerable portion of them are raised in arid regions, where they range over large areas, gathering the little food that grows. In the central west, their chief foods in winter are straw and the standing corn stalks on which they pasture. Only in the finishing period are they given any large amount of food that has much selling value.

Any one who produces beef or dairy products must compete with products that are raised on cheap feed. For this reason, it is rarely wise to keep so many animals as to require that their food be chiefly composed of salable products. Only when the stock is very valuable, or when the product is unusually valuable, does it pay to stock a farm much more heavily than the average of the region.

In the corn-belt, hogs are given a considerable amount of good grain, but an increasing use is being made of pasture in hog production. One who grows hogs entirely on good grain must compete with those who use pasture for a considerable part of the feed.

Many farms in the older states keep a few sheep as scavengers. These sheep clean up weeds, use low-grade hay, bean pods, or other cheap food of the region. It may pay to keep a few sheep in this way when it would not pay at all to keep a large number.

One of the important costs in colt production is the time of the mare. Persons who have full use for horses every day rarely raise colts. Horses on farms are usually idle a considerable part of the year. The average time worked by a horse on farms where cost accounts have been kept is about 3 hours a day. Farmers usually count that by having the colt come at the right time of the year, they can raise a colt and yet have the mare do almost a full year's work on the farm.

As population increases, animals are fed less and less on grain that is good for human food, and more and more on low-grade products. One thousand bushels of grain has about five times as much food value and will support about five times as many people as the animal products produced from it.[1]

132. Live-stock produced on cheap time. — Not only are the foods used in animal production very largely waste products, but the time spent on animals is, to a large

Fig. 59. — Most of the poultry products are produced by woman and child labor.

extent, time that does not have full value. Most of the farm poultry is taken care of by women and children. Much of the milking is done by women or children, or by men who put in a fairly full day's work besides doing the milking.

[1] See also C. G. Hopkins, Soil Fertility and Permanent Agriculture, pp. 226–235.

133. Live-stock produced on a low margin of profit. — For all these reasons, live-stock in general is produced on a low margin of profit. The large amount of stock kept on low-grade products controls the price.

All work on cost accounting shows that the crops generally pay much better than live-stock for the time spent. Only when one has pure-bred stock, or some unusual condition, does it pay to stock a farm too heavily. It is not often wise to keep much more live-stock per acre than is kept by the majority of farmers in the neighborhood.

Neither does it often pay to go to the other extreme of keeping no live-stock. Every farm has more or less stubble, corn stalks, low grade hay, or some other kind of produce that will help to keep some animals. It is nearly always wise to keep stock enough to use up the low-grade and waste products.

The most profitable types of farming nearly always combine live-stock and cash crops. If one goes to the extreme on live-stock, he is spending all his time on products that, in general, are produced on a very low margin of profit. If he spends all his time on crops, he will not be making full use of the low-grade products, and is not likely to be able to keep busy all the year. To overstock or under-stock a farm are both serious mistakes.

134. Keeping stock enough to eat all the feed raised *vs.* always having feed enough for the stock. — Many farmers in the Eastern States boast that they never sell a pound of hay. The same statement is often made about corn in the corn-belt. In the South, feed is nearly always purchased.

If a farmer in the Eastern States keeps stock enough so that he will never have any hay to sell, then in years when the hay crop is short, he must either sell some of his animals or buy hay. In such years stock is not likely to sell well and hay is certain to be high in price.

If hay is worth \$15 a ton at the railroad station, it is usually not worth more than \$12.50 on the farm, because the cost of baling and hauling to the station must be deducted. Live-stock need only return \$12.50 for hay to make it pay to feed rather than sell. But the farmer who buys hay, particularly in the year of a poor crop, usually has to pay more than the market price, and often hauls it besides. In the spring of 1912 in some regions in the Eastern States, farmers had to pay much more than the price of hay in New York City, because hay had to be shipped to the farming regions. Many farmers in the Middle West paid more than the Chicago price.

One of the most profitable types of farming in the east is dairying combined with hay and other cash crops. Of the 23 dairy farms included in the 49 most profitable farms out of 2743, all but three sold some cash crops. (Page 134.) On six of these, hay was a very important cash crop. On most of the others, some hay was sold. Several of these farms that sold little or no hay had to buy hay in the spring of 1912, and lost heavily on that year's business.

It is very much safer, and usually pays better, for the dairyman in these sections to keep no more stock than he can raise hay and corn silage for in a rather poor year. Usually he will have some hay to sell.

The same point applies to pasture. Governor Hoard has humorously expressed the point by saying that "If a man has pasture enough for 10 cows, he should keep 20. He will get almost as much milk and have more cows."

If, after one is started in farming, he finds that live-stock is paying exceptionally well, he may gradually increase the amount kept so long as the increase pays. This often happens when pure-bred stock is kept. But in the start it is much safer to follow the general practice of the community, and let the business grow into an intensively stocked place. Even when the stock is found to pay exceptionally well, breeders usually find that it pays to enlarge the farm as the stock increases. See also pages 122 to 131.

Farmer no. 3, Table 22, page 134, has one of the most intensive types of farming. He produces pure-bred cattle and certified milk and is doing well with the combination. In the year when this record was secured, he had 87 acres of crops and 76 animal units. Almost an animal unit per acre of crops. All the crops were fed and a large amount of grain feed was bought. A few years later, the farm was enlarged to 232 acres and the animal units reduced to 69; there were 138 acres of crop or 2 acres of crops per animal unit. This year $967 worth of cash crops were sold. Only a little more help was hired in harvest. No more horses were required. The better organized business resulted in a larger labor income.

The farmer in the Middle West who produces hogs has a little different problem, because hogs can be prepared for market on short notice. Shoats can be sold while small, if corn is too scarce. The size to which the hogs are grown is to considerable extent determined by the relative price of corn and hogs.

The writer has no figures on this problem, but from many years' observation is of the opinion that it usually pays best to sell corn as well as hogs, so that corn will not often have to be bought.

135. Animal unit. — In order to have a basis for comparing the amount of live-stock kept, all kinds of live-stock must be reduced to some unit that can be compared. Comparison may be made on the basis of feed eaten and value of manure produced. If we call a cow or horse a unit, we can make an approximation of how many animals of other sorts will equal one. For instance, 7 sheep eat about as much as a cow and produce about the same value of manure. The figures will vary with different systems of farming. Some dairymen feed a cow almost twice as much as they feed a horse. Others feed horses more than they feed cows. This is the case in much of the corn-belt. It is not necessary that the figures be exactly correct in order to make a comparison of farms.

One cow, bull, steer, or horse two years old or older may be called an animal unit. Two head of colts or young cattle may be counted as one. Seven sheep, 14 lambs, 5 hogs, 10 pigs, 100 hens may each be called an animal unit. It is perhaps a little more accurate to count 2 colts or young cattle over a year old as one unit and count 4 of those under one year as one unit.

If a farmer has the following stock, he has 23 animal units, or the equivalent of about 23 cows, so far as feed and manure are concerned.

	Animal Units
4 horses	4
2 colts	1
7 cows	7
5 young cattle	2.5
3 hogs	.6
10 pigs	1.
30 sheep	4.3
25 lambs	1.8
70 hens	.7
	22.9

If he has 160 acres of land, he has an animal unit for each 7 acres of land. If he has 115 acres of crops, then there are 5 acres per animal unit. Such a farm is fairly well stocked. Such a farm will usually have about 200 tons of manure a year. If a manure spreader is used and 5 loads are applied per acre, the tillable land can all be covered in 6 years.

A farm that has an animal unit for each 3 or 4 acres is heavily stocked. One that has 5 to 7 acres for each animal unit is moderately stocked. One that has over 7 acres per animal unit is lightly stocked.

A better comparison is on the basis of crops grown. A farm with an animal unit for 1 to 3 acres of crops is heavily stocked. One with 6 or more acres of crops per animal unit is lightly stocked.

On most general farms it requires at least one animal unit for each 5 or 6 acres of crops to use up the low grade or waste products. If animals pay well, the number may be increased to one for each 3 or 4 acres of crops. But only when experience has shown animals to be very profitable should the number go much beyond this. Otherwise the animals will be using all the products. There will be no cash crops, and in years of shortage, when crops are high, feed will have to be bought rather than sold. Of course the crop yields decidedly affect the condition. The above discussion is approximately right for average conditions in general farming regions.

Table 54, page 272, shows the number of acres of crops per animal unit in ten typical counties in different parts of the United States. The area varies from less than 2 acres in an irrigated region and in a dairy region near New York to nearly 13 acres in a dry farming wheat region.

FEEDING ANIMALS

136. Balanced rations. — It is necessary that animals have enough of each of the different food elements as well as that the total amount be enough. In regions where the hay is nearly all alfalfa, clover, or some other legume there is usually little difficulty about balanced rations. If the roughage is largely timothy, corn stalks, corn silage, or other non-leguminous hay, it is necessary to study the feeds used to be sure that they contain enough nitrogen. With dairy cows this is usually accomplished if one-third of the grain feed is high in protein, one-third medium in protein, and one-third low in protein.

137. Short method of balancing rations for cows. — The following is a short method of balancing rations devised by H. H. Wing: —

Low Protein Group		Medium Protein Group		High Protein Group	
Total Protein 12 % or less		Total Protein 12 % to 25 %		Total Protein 25 % or more	
Corn	10.3	Wheat bran	15.4	Malt sprouts	26.3
Oats	11.4	Mixed wheat feed	16.3	**Linseed Oil Meal**	33.9
Wheat	11.9	Standard wheat middlings	16.9	**Cotton Meal**	45.3
Rye	11.3	**Flour Wheat Middlings**	19.2	**Gluten Feed**	25.0
Barley	12.0	**Cotton Seed Feed**	20.0	Brewers' dried grains	25.0
Buckwheat	10.8	Buckwheat feed (shuck in)	18.3	Distillers' dried grains (corn)	31.2
Hominy Chop	10.5	**Pea Meal**	20.2	**Buckwheat Midds** (free from shuck)	26.7
Dried beet pulp	8.1	**Cull Beans**	21.6		
Corn and cob meal	8.5				

The ordinary grain feeds may be divided into three groups: low protein (less than 12 per cent); medium protein (12 to 25 per cent); high protein (over 25 per cent).

" Heavy " foods are in dark-faced type, " light " foods are in ordinary type.

Mixed hay, corn silage, corn stalks, or fodder are very similar in composition so far as the balance between protein and carbohydrates is concerned.

For the sake of variety it is desirable to use at least three feeds. If one low protein, one medium protein, and one high protein food be mixed together in equal parts by weight, the mixture will make a well-balanced ration to be used with the above kinds of roughage.

An ideal grain ration should weigh about one pound to the quart. To secure this the mixture should contain at least one " light" food (printed there in ordinary type).

A dairy cow in full milk should have all the hay and silage that she will eat and if giving 4 per cent milk or richer should have one pound of grain for each 3 or $3\frac{1}{2}$ pounds of milk that she produces. A cow giving milk with less than 4 per cent of fat should have one pound of grain for each $3\frac{1}{2}$ or 4 pounds of milk that she produces. If clover or alfalfa hay are used, the feed mixture does not require any of the high protein feeds.

138. " Roughing " animals through winter. — Young animals seem to have a considerable power to recover from periods of short feeding without permanent stunting. Of course the period must not last too long. Farmers take advantage of this in raising calves. Calves are often carried along cheaply until they are old enough to eat hay, grass, and grain. This is often a great economy in raising calves. When such calves are a year old they are often as good as if they had been given more milk.

The same principle is used in carrying young stock over winter. The usual practice is to use straw, corn stalks, and cheap hay together with a very limited amount of grain so that the animals are usually very thin in the spring. If the summer feed is abundant, such animals promptly recover and usually catch up with those that were fully fed all winter. Young stock that is being thus "roughed through" the winter grows, — even though it is getting poor. It is growing bones or frame on which to put the muscle and fat when grass comes. This method of feeding must not be confused with never feeding animals enough. With it there is always an abundance of feed. But the winter feed is cheap feed on which an animal loses flesh but grows bone. Young stock may get very poor when fed on straw and corn stalks, but it does not starve. It gets plenty of bone-making material and grows bones while it is getting poor. To conduct the system successfully there should be an abundance of pasture.

Experiments in beef production at the Missouri and Kansas Experiment stations have strikingly verified the farmer's experience in raising young stock by such methods. Comparatively little grain is needed except to finish the animal for market. When the animal is producing milk or is being fattened, it usually pays to feed grain liberally.

In years when grain is cheap more of it may be fed. In years when it is high, practically none is fed to young stock that is being thus carried over winter.

One who is raising high-priced pure-bred stock will of course feed more at all times. The method described above is very different from that of the farmer mentioned on page 229 who uses $169 worth of feed in raising a heifer to 30 months old. He probably hopes that the heifer will be worth $500. Each method is the proper one for the kind of stock and other conditions.

TABLE 31. VALUES OF DIFFERENT FEEDS IN TERMS OF CORN OR FEED UNITS[1]

	CORN EQUIVALENT	VARIATIONS
Concentrates.		
Corn, wheat, rye, barley, hominy feed, dried brewers' grains, wheat middlings, oat shorts, peas, Unicorn Dairy Ration, molasses beet pulp .	1.00	–
Cottonseed meal	1.25	
Oil meal, Ajax Flakes (dried distillers' grains), gluten feed, soy beans . .	1.11	
Wheat bran, oats, dried beet pulp, barley feed, malt sprouts, International Sugar Feed, Quaker or Sugarota Molasses or Dairy Feed, Sucrene Dairy Feed, Badger Dairy Feed, Schumacher Stock Feed, molasses grains	.91	
Alfalfa meal, Victor feed, alfalfa molasses feeds	.83	
Hay and straw.		
Alfalfa hay, clover hay	.50	.33–.67
Mixed hay, oat hay, oat and pea hay, barley and pea hay, redtop hay . .	.40	.33–.50
Timothy hay, prairie hay, sorghum hay	.33	.29–.40
Corn stover, stalks or fodder, marsh hay, cut straw	.25	.17–.29
Soiling crops, silage, and other succulent feeds.		
Green alfalfa	.14	.13–.17
Green corn, sorghum, clover, peas and oats, cannery refuse	.13	.10–.14
Alfalfa silage	.20	
Corn silage, pea vine silage	.17	.14–.20
Wet brewers' grains	.25	
Potatoes, skim milk, buttermilk . .	.17	
Sugar beets	.14	
Carrots	.13	
Rutabagas	.11	.10–.13
Field beets, green rape	.10	
Sugar beet leaves and tops, whey . .	.08	
Turnips, mangels, fresh beet pulp . .	.08	.07–.10

The value of pasture is generally placed at 8 to 10 units per day, on the average, varying with kind and condition.

[1] Wisconsin Circular 37 and Research Bulletin 26.

139. Feed units. — In order to compare the feeding value of different feeds, various feed units have been used. The best one for American conditions considers corn as 1 and expresses the value of other feeds in terms of their corn equivalent. Such a system is of value in helping one to determine which feeds to buy at present market prices. Of course it cannot be followed blindly. In order to be able to compare the amounts of feed used by different animals or herds, some such system is necessary. The following table represents the comparative values of different feeds as based on many feeding trials with dairy cows. To a limited extent, a pound of one of the given feeds may replace one of the other feeds to which it is equivalent without decreasing the milk yield.

If a cow is fed 40 pounds of silage, 10 pounds of mixed hay, and 9 pounds of grain, made up of a mixture of equal parts of Ajax flakes, corn meal, and wheat bran, 19.86 feed units would be used. The method of calculating is as follows: —

	Corn Equivalent	Feed Units
40 lb. corn silage	.17	6.80
10 lb. mixed hay	.40	4.00
3 lb. corn	1.	3.
3 lb. wheat bran	.91	2.73
3 lb. Ajax flakes	1.11	3.33
Total		19.86

Of course there is great variation in the different grades of hay, corn silage, and similar products. The approximate range of variation is shown in the last column of Table 31. There is also poor corn. The unit is for good corn. If feeds are poor, an allowance may be made.

Some idea of the production to be expected per feed unit is given by Table 32 from results of a cow competition in Wisconsin. The cows in this test were better than average cows. The cows averaged about 6.5 pounds of butter fat per 100 feed units. The average milk production varied from 128 pounds for Jerseys to 186 for Holsteins per 100 feed units. The total solids in the milk varied from 18 for Jerseys to 22 for Holsteins per 100 feed units. There is of course great variation in individual cows. In this test, the poorest 30 cows gave 5 pounds of butter fat per 100 feed units, and the best 30 cows gave 7.6 pounds per 100 feed units.

TABLE 32. PRODUCTION PER FEED UNIT[1]

	HOLSTEIN	GUERNSEY	JERSEY
Number of cows	158	157	80
Pounds milk per cow	14689	8465	7047
Pounds butter fat per cow	503	421	363
Feed units per cow	7913	6420	5514
Pounds milk per 100 feed units	186	132	128
Pounds solids in milk per 100 feed units	22.2	18.5	18.3
Pounds butter fat per 100 feed units	6.36	6.56	6.59

[1] Wisconsin, Bulletin 226, p. 21.

ANIMAL RECORDS

140. Milk records. — Every dairyman who wishes to increase his profits should keep milk records of individual cows. Only in this way can he tell which cows are worth keeping. The prices of milk and butter are so low that the margin of profit in the dairy business is very close. The profit may easily be changed to a decided loss by the presence of a few poor cows. Under most conditions, it is difficult to make a profit from an average cow. Since about half the cows are below the average, the importance of milk records is apparent.

Most persons think that they know which are the best cows, but when the milk is weighed, they nearly always find that they were mistaken.

If the milk is to be weighed, one should buy a spring balance that weighs in pounds and tenths of pounds. This saves much time. Nearly any dairy supply house or hardware store can furnish this kind of a spring balance for about \$3 to \$4. It is also convenient to have two pointers, one of which is adjustable. This can be set to read 0 when an empty pail is hung on the scales. If there are several milkers, the pails may all be weighted to weigh alike by soldering lead on the bottom of each pail. Sometimes the results are accurate enough if the milk is weighed to the nearest pound.

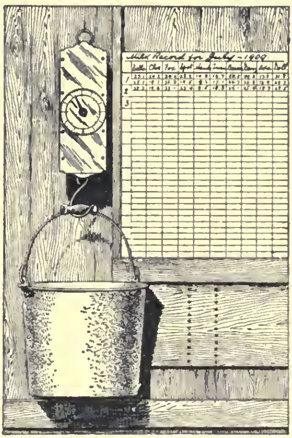

FIG. 60. — Weighing the milk to find which cows pay.

The record sheet should be ruled as in Figure 60 with the cow's name or number at the head of the column and place for morning and night's milk, one below the other, so that the month's column will add readily.

A. W. Sweeton kept track of the time required to milk a herd when the milk was weighed, and found the time for the same milker when not weighed. This was repeated a number of times. The difference averaged 0.52 of a minute per cow per milking, or practically one minute per cow per day. If the milk is weighed every day, this would amount to about 6 hours per year. This time would be worth from $1 to $1.20. This cost is usually more than made up in the gain made by selling a single poor cow. From one-tenth to over half of the herd are likely to be found to be resulting in a loss.

141. Short methods of weighing milk. — There are a number of short methods of weighing milk that are sufficiently accurate for ordinary purposes.

Probably the best method, if milk is not weighed every day, is to weigh it on the first three days of every month, or on three consecutive days at any other time in the month. J. L. Hills of Vermont [1] examined 579 yearly milk records and found that this method gave results within 4 per cent of the true yearly production in 98 cases out of 100.

Some of the other short methods that are more or less used are to weigh the milk one day per month, one day each week, or every seventh week. Any one of the short methods will give results that are accurate enough to be of great service in determining which cows to discard.

142. Butter-fat tests. — If one is selling milk to cities, the weight of the milk may be all that is necessary, but even then, some knowledge of the per cent of fat in the milk of each cow is desirable. If butter or cream is sold, or if milk is sold on a butter-fat test, it is just as important to know the per cent of fat in each cow's milk as to know the amount of milk given. The milk from each cow may be tested once a month or every other month, or each cow may be tested in the third, fifth, and seventh months after calving. Any of these methods will give fairly accurate results. The test every month is, of course, the most accurate.

[1] Vermont, Bulletin 128, p. 62.

143. Production required for profit. — The production required to pay a profit depends on many factors. The cost of the cow, labor, feed, and buildings, and the value of the products are the chief factors.

With present prices in most of the Northern States, the feed and pasture are usually worth \$50 to \$75 per cow; the labor varies from \$20 to \$40 per cow and probably averages about \$25. The interest, repairs, taxes, depreciation, and insurance on the barn in northern regions is usually about \$5 per cow. The many other expenses bring the cost up to \$80 to \$100 per cow for well-managed herds.

The Wisconsin Experiment Station[1] estimates that one-fourth to one-third of the cows do not even pay for their feed, to say nothing of other expenses. This is at once a strong argument for finding out which these cows are and a striking proof of the narrow margin of profit in the dairy business. When one is in a business that shows so low a margin of profit, he must be ever alert or he may find himself working for nothing. The only way that a living can be made from poor cows at present prices is to have the milking done by women and children who are not paid. The cows must be better than the average if they are to pay regular farm wages to the milkers and all other costs.

In Tompkins County, New York, in 1907, it was found that the products sold must exceed \$75 per cow in order to allow the owner to make as good wages as hired-men received. Only those herds from which the products sold for at least \$100 per cow resulted in much profit.[2]

On intensive dairy farms in the Northeastern States, it is usually considered that a mature cow should be sold, if

[1] Wisconsin, Bulletin 226, p. 3.

[2] New York, Cornell Bulletin 295, p. 485.

she does not give 7000 pounds of milk per year. If cream or butter are sold at wholesale prices, it is doubtful if there is much profit in keeping a mature cow that with good feeding fails to give 250 pounds of butter per year. (See also pages 170 and 180.)

In order not to discriminate against heifers, their productions may be increased as follows, in order to compare with mature cows: [1] —

Age at Beginning of Test	Percentage to Increase Record for Comparison with Mature Cows
$2\frac{1}{2}$ years	30%
$2\frac{1}{2}$–3	24
3 –$3\frac{1}{2}$	18
$3\frac{1}{2}$–4	15
4 –$4\frac{1}{2}$	8
$4\frac{1}{2}$–5	5

Milk records, like all other farm records, are an aid in making decisions. All such records must be used with judgment. A good cow may have an "off year" for some reason. One must not follow the records blindly.

144. Egg records. — If many hens are kept, an egg record becomes important. Such a record can readily be kept by having a sheet of paper on the wall with a lead pencil beside it. The eggs should be counted as they are taken from the nests, and put down every day. If it is desired to know how many eggs are used in the house, the number sold and incubated can be subtracted from the number laid, or if this is not accurate enough, those used may be counted. The following form may be fastened in a convenient place. If the hens are counted once a year, and the record kept of deaths, sales, and those eaten,

[1] Wisconsin, Bulletin 226, pp. 7–8.

January, 1911	No. Eggs	Died			On Hand 96 Hens, 216 Pullets, 9 Roosters
		Hens	Pullets	Roosters	Sold and Eaten
1	22				
2	22				
3	24				1 rooster sold
4	23		1		
5	24				
6	31				

the number of those on hand at the end of the month can be gotten by subtracting. At the end of the year, this results in some error, as some will die that are not found.

145. Animal records. — If many cows are kept, it is often desirable to keep a record of each animal. One of the easiest ways to do this is to use a blank book with numbered pages. If ear tags are used, the pages should be numbered to correspond with the ear tags. One or two pages will give room enough to keep a complete record of a cow or horse for a lifetime. Figure 61 shows a page from such a record book. It gives a complete history of a cow whose ear tag number is 24. Two of her calves were kept. Their records were on pages 27 and 31. At the bottom of the page, columns are ruled for the cow's milk record.

RELATION OF SIZE OF ANIMAL TO EFFICIENCY

146. Size of cows and profits. — Of two animals that are equally efficient users of food, the larger animal is usually much more profitable. Many tests of dairy cows have been made to see which ones produced the most butter for feed used. These tests do not indicate which is the

Sadie 24

Nov. 1904 Born, ½ Guernsey, nearly ½ Holstein
Mar. 10, 1908 Bought of Charles Unger
Dec. 24, 1908 Bull calf born—sold for veal $10
April 10, 1909 Bred to No. 7
Jan. 25, 1910 Heifer calf born. See No. 27.
April 22, 1910 Bred to No. 25.
Feb. 1, 1911 Heifer calf born. See No 31.
Mar. 3, 1911 Bred to No. 25
Dec. 11, 1911 Bull calf born—Sold $2
Feb. 7, 1912 Bred to No. 25.
Nov. 20, 1912 Heifer calf born. Sold for $5
Dec. 21, 1912 Bred to No. 37.

Milk	1909		1910		1911		1912			
Record	Per Day	Total	Per Day	Total	Per Day	Total	Per Day	Total		
Jan	40.1	1243		175			34.8	1079	34.8	
Feb	41.3	1156	35.2	986	43.2	1210	34.9	1012		
Mar	39.2	1215	37.0	1147	42.9	1330	31.9	989		
Apr	36.1	1083	40.5	1215	42.6	1278	32.4	972		
May	37.4	1159	41.7	1293	43.3	1342	36.9	1144		
June	42.3	1269	38.9	1167	42.4	1272	30.1	903		
July	30.1	933	30.4	942	26.9	834	19.4	601		
Aug.	25.6	794	17.1	530	21.3	660	14.1	437		
Sept.	20.1	603	16.6	498	20.8	624	9.5 Dry	162 Sept 17		
Oct.	15.3	474	14.2	440	18.2	564				
Nov.		121	9.4	282	10.0	240 Dry Nov. 24		400		
Dec.				140 dry Dec. 20	29	580	430	1333		
Total		10050		8815		9934		9032		

FIG. 61.—A page from an animal record book. One page used for each animal.

most profitable animal because labor and barn costs are not counted. The butter produced for a given amount of barn room and labor is nearly as important as the amount of butter produced for a given amount of feed. It is the animals that use large amounts of feed and use that feed efficiently that are most profitable.

It takes very little more barn room and usually no more labor to care for a 1300-pound cow than it does for a 900-pound cow. Twenty cows, each weighing 1200 pounds, weigh as much and, if equally efficient, will give as much milk as 24 cows averaging 1000 pounds. By the usual method of figuring, the 24 cows would be as profitable as the 20. But the fixed charges, aside from feed, were found to be \$65 in Connecticut and \$29 in Minnesota. Most of these other costs are nearly as great for small as for large cows. The labor, barn room, light, medicines, veterinary, and some other expenses are practically the same for small as for large cows. In Connecticut, these items were found to cost about \$39 per year and in Minnesota about \$23 per year.[1] The 20 large cows would appear to be about \$156 a year more profitable in Connecticut and \$92 more profitable in Minnesota.

The larger animals of any breed are much more economical of labor and barn room, and usually give as much or more milk for the food eaten. Table 33 shows the relation of size of cow to other factors for 355 cows in Wisconsin.[2] The larger cows used their feed with the same efficiency as the smaller ones. In fact, the very largest ones were a trifle more efficient than the small ones. The

[1] Connecticut, Bulletin 73, and Minnesota, Bulletin 124.

[2] The weights were determined by a system of measurements (Wisconsin, Bulletin 226, p. 8). The uniformity of the results makes it appear that actual weights would give the same results.

returns per cow above food cost varied from $54 for the small cows to $88 for the largest cows.

TABLE 33. — RELATION OF SIZE OF COWS TO VALUE OF PRODUCT ABOVE FOOD COST [1]

Weight of Cows	Average Weight	Number of Cows	Pounds of Butter-fat	Value of Product	Value of Feed	Value of Product for $1 in Feed	Value of Product above Food Cost
900 and under	847	87	366.2	$114.52	$60.32	$1.90	$54.20
901–1000	952	82	417.8	131.22	69.86	1.88	61.36
1001–1100	1071	53	447.8	142.56	76.28	1.87	66.28
1101–1200	1175	60	477.7	155.02	82.81	1.87	72.21
1201–1300	1276	31	506.2	163.52	91.51	1.79	72.01
1301–1400	1379	26	525.8	171.79	92.15	1.86	79.64
Over 1400	1556	16	566.6	184.61	96.60	1.91	88.01

[1] Data furnished by F. W. Woll, for cows whose records are reported in Wisconsin, Bulletin 226.

A herd of 10 of the cows weighing 1556 pounds each, would weigh more and give more milk than 18 of the 847-pound cows. According to the Connecticut results, the larger cows would cost about $300 a year less for labor, barn room, and the like. By methods used in Minnesota, they would cost about $184 a year less to keep. If the 10 cows could be purchased at the same cost as the 18, they would make a very much better investment. Farmers are correct in their almost universal prejudice against small cows.

As in most tests of large numbers, the Holsteins produced the most butter, with Guernseys second, and Jerseys third. These differences are primarily due to the size of the cows. When cows of the same size are compared, there does not seem to be a great difference in production. The size of each of these breeds, particularly of the Jerseys and Guernseys, is being increased rapidly in America by selection of high producers. There are conditions that offset the economy of labor in using large cows. In regions where the pastures are very hilly or very poor, small, active cows thrive better. Large cows usually pay best on rich, level pastures.

Thus far the small, light animals have been most popular in the South. Whether this is due to poor pastures, heat, or some other cause is not determined. It may be a fundamental difference in adaptation or may be because the larger animals have not been introduced.

147. Size of horses.— The same point applies in the use of horses, provided one has fairly steady heavy work. Three 1400-pound horses will usually do more heavy work, eat less feed, and require less labor and barn room than 4 horses each weighing 1050 pounds. For this reason, heavy horses sell for much more per pound than light horses.

When 1000-pound horses sell in Chicago for $140, equally good horses weighing 1300 pounds bring about $200 and 1700-pound horses $300. The corresponding prices per pound are 14, 15, and 18 cents. If the first 1000 pounds on a horse is worth 14 cents a pound, the next 300 pounds is worth 20 cents, and a further addition of 400 pounds is worth 25 cents per pound.[1]

Farmers on some farms do not have full work for horses. Such farmers prefer the small ones, as they can be worked hard when needed and have plenty of time to rest between work. In regions where only a small amount of field work

[1] M. W. Harper studied the sales of horses on the Chicago market in the fall of 1912. His estimates of sales were: 900 to 1100 pound horses, $120–$150; 1200 to 1400 pound horses, $175–$225; and 1500 to 1800 pound horses, $250–$300.

is done, the light horses predominate. It is sometimes said that light horses are best adapted to farming in a hilly country. It is the absence of work rather than the presence of hills that makes them best. In hilly farming regions, where farming is prosperous and where there is continuous work for horses, heavy horses are preferred. A very good combination for a farm that keeps six horses is to have four heavy ones and a team of light horses that can be used on the road and for the lighter farm work. In most parts of the country, the heavy horses should be mares and colts should be raised.

Large horses do not stand heat so well as small ones. This is strikingly evident in some parts of the South.

148. Size of animal and meat production. — Of two animals that at the same age make the same gains from a given amount of feed the large one is the more desirable, because the labor of caring for them is about the same. This point is not so important as with cows or horses because the labor item is much less with meat animals.

The age at which to sell meat animals is a different question. As feed becomes more expensive the age at which meat animals should be sold is reduced. It pays a farmer to keep a meat animal so long as the gain produced is worth enough more than the feed to pay for the other costs.

PURE BREED *VS.* GRADE STOCK

149. Profits from pure-bred stock. — The raising of pure-bred stock is a business requiring capital. Farmers who are very short of capital will usually do better by investing in land, equipment, and good grade stock rather than by going into pure-bred stock.

If one is to do much with the business, it requires that a considerable number of animals be kept. This is particularly true, if the animals are very valuable. Suppose that a farmer has cows that are so good that they should be bred to a $500 bull. The cost of keeping such a bull in most dairy sections will be $50 to $75 per year for feed, as much more for labor, barn, and other expenses, and $75 to $125 per year for interest and depreciation. The total annual cost will usually be over $200. If only 10 cows are kept, this cost will be $20 per cow, but if thirty cows are kept, the cost will be one-third as much. Only those who have large numbers can afford to have high-priced stock. By having large numbers they reduce the cost of male service and have many animals to be raised in price by the advertising that the valuable animals give.

If one has the necessary capital and experience it usually pays to keep pure-bred stock. When the right breed of stock is kept, the production is, on the average, considerably better than with grades. If the wrong breed is kept, it may be less. A meat breed of hens, when eggs are the important product, is usually worse than common stock. Grade dairy cattle are better than pure-bred shorthorns in a dairy section, but are not so good as pure-breds of a dairy type. The breed selected should usually be the one that is most popular in the region, because the neighbors are usually the best market for the surplus stock.

Pure-bred stock also requires much more attention than grade stock. It is necessary that both the owner and hired help be much more careful than with common stock. If the stock is very valuable, it becomes exceedingly important that there be no unreliable person about.

If high-producing pure-bred stock is kept, the cost is much greater than for grades. The chances for large profits, as well as of large losses, are increased. One noted breeder of pure-bred cattle reports that it costs him $169 for feed to grow a heifer calf to 30 months old.[1] Whole milk was counted at $1.80 and skim milk at 20 cents per hundred. Grain was charged at the actual cost at the railroad station; hay at $16 per ton, and corn silage at $2.50 per ton. None of these charges is high. The silage is much too low for the region. Silage is usually worth one-third as much as hay. It will be seen that these charges do not include labor, bedding, barn room, or any other of the many additional charges. The utter absurdity of the common practice of assuming that such stock can be grown at the same cost as ordinary stock will be seen at once. Every item of expense is greater when better stock is kept. When the business is successful, as it is on this man's farm, the profits are much better than could be secured by less intensive methods.

The real value of pure-bred animals is because, on the average, they are better producers. The best breeds of pure-bred hogs make pork at less cost. The best breeds of pure-bred dairy cows give more milk for their feed. The best breeds of beef cattle give more beef. However, there are high grades of all kinds of animals that are practically pure-bred. Such animals may have all the merits of pure-breds, except that they cannot be registered, and so the young cannot be sold at high prices for breeding purposes.

Of the 23 dairy farms included among the highly profitable farms on page 134, seven derived considerable income from pure-bred cattle. The other 16 kept mostly high-grade Holstein cows. Most of them kept pure-bred bulls, and a few kept some pure-bred cows. The two successful poultry farms had pure-bred White Leghorn hens.

[1] New York State Department of Agriculture, Bulletin 35, p. 1003.

The usual method of figuring to show the profit on pure-bred stock is to count only the increased receipts and forget the increased feed, care, interest, and depreciation. The interest and depreciation on a $40 cow is $4 per year; on a $200 cow it is $36. One must give attention to both sides of the question. In general, the extra profits to be derived from pure-bred stock are largely offset by the higher cost. Pure-bred stock usually pays better, but not so much better as to justify one who is very short of capital in sacrificing too much at other points in order to have pure-breds.

150. "Grading up" pure-breds. — It is just as easy to take pure-bred stock of ordinary quality and improve it by the use of a good sire as it is to improve common stock. After the improvement has been made, the pedigree goes with it. Many times it pays a young man who is short of capital to buy some low-priced pure-breds and improve them so that, in the course of time, he will have an excellent herd. Most of the noted breeders of pure-bred stock started in just this way. It is a very modest way of starting, but if one is patient, it may pay well in time.

Many beginners make the mistake of buying high-priced stock when they have neither the experience nor capital necessary to make a success of it. Only experienced persons who keep large numbers can afford to buy high-priced animals. The beginner had best buy low-priced or medium-priced animals and test his ability in improving these while he is learning the business.

151. Pure-bred poultry. — Poultry multiplies so fast that any one can keep pure-breds, if he desires, with very small cost in starting. If only a few hens are kept for home use, the chickens are usually raised by hens, and it is necessary to have a breed that will set well. It may pay to keep pure-breds, but the difference will be small, because the entire enterprise is so small. It may not be worth the bother to keep them pure. But if any considerable number of hens are kept, they should be pure-bred.

A year's test of 50 White Leghorn pullets, as compared with 50 mixed common pullets, was conducted at the West Virginia Experiment Station.[1] The Leghorns laid an average of 117 eggs. The mongrels ate more feed, but laid an average of only 96 eggs. The mongrels gained in weight an average of one pound per head more than the Leghorns. After considering feed, meat, and eggs, the Leghorns gave 40 cents more returns per hen than the mongrels.

DEPRECIATION ON LIVE-STOCK

152. Depreciation on cattle. — Not only is the cost of feed and care more with high-priced stock, but interest and depreciation are much more. In New York,[2] it was found that the deaths among 4343 cows averaged 1.2 per cent. The same average was found in Minnesota, but the deaths were less than this for common cattle, and more than this figure for pure-bred and highly graded cattle.[3]

In New York, the depreciation due to death and loss on cows sold was found to be 4 per cent on $40 cows. The average life of cows was 9 years, or about 7 years in milk. If we assume the same death rate, and $34 as beef value, we can find the approximate depreciation on cows of different values.

[1] West Virginia, Bulletin 102, pp. 272 to 274.

[2] New York, Cornell Bulletin 295, pp. 477 and 478.

[3] Minnesota, Bulletin 124, p. 102.

Interest and Depreciation on Cows of Different Values, with Beef Value of $34

Value of Cow	Depreciation per Year		Interest per Year at 6%	Total
$40 . . .	3%	$1.20	$2.40	$4
100 . . .	10	10.00	6.00	16
200 . . .	12	24.00	12.00	36
300 . . .	13	39.00	18.00	57

The depreciation on $100 cows can be determined as follows: of 7000 such cows, the loss from death would be 84 per year. The remaining 916 of the 1000 that would be replaced every year would be sold for beef. At $34, these would bring $31,144. This would leave a loss of $68,856, or nearly 10 per cent.[1]

No matter how valuable the cows are, the depreciation could not exceed $\frac{1}{7}$ or about 14 per cent, so long as the average period of usefulness is 7 years.

The depreciation and interest on $40 cows is $4 per year. On $100 cows it is $16, and on $300 cows, it is $57.

The care given to pure-bred animals is also much more than for grades. It will be seen at once that the statement that it costs no more to keep a pure-bred than a grade is far from correct. Pure-bred stock costs much more and usually gives very much higher returns.

In 1910, there were 33,662,194 cows and heifers born before 1909 in the United States. Most of these were two

[1] The exact formula for depreciation, when animals have a meat value in old age or other value at death, is:

$$\frac{\text{Value}}{\text{No. of years of use}} - \left(\frac{1}{\text{No. of years of use}} - \frac{\text{Deaths per 100}}{100}\right) \text{ times}$$

meat value.

The depreciation on stock that has no meat value or value at death is always the same per cent for animals living to the same age.

years old or older. At the same time, there were 7,365,265 yearling heifers. This is one heifer for each 4.6 cows.[1]

Ten years before, there was one heifer for each 4.1 cows. The change in date of the Census has some effect, but it appears that the length of time that cows are kept has increased, so that cows are now kept until they are a little over 6 years old. Dairy cows are kept longer than beef cows.

On New York farms, there were 7 cows for each yearling heifer in 1910, indicating that the average cow is probably kept until she is between 8 and 9 years old. This also agrees with the detailed study in Tompkins County.

In Wisconsin, there was one yearling heifer for each 4.7 cows. In Iowa, there was one heifer for 3.6 cows. As feed becomes more expensive cows are kept longer.

As population increases, the dairy cows increase faster than beef cows. During the ten years 1900 to 1910 dairy cows increased 20 per cent and other cows only 2 per cent.

153. Depreciation on horses. — The depreciation on animals that have no meat value is the same per cent regardless of the value of the animals, provided the high-priced animals live to the same age as the low-priced ones.

By making a study of Census figures and the excess of exports over imports, it appears that one colt is raised for 11.7 horses older than yearlings, in order to keep up the supply of horses. On the average, two-year-old horses may, therefore, be expected to live about 12 more years.[2]

[1] If correction is made for the increasing number of cows, the difference is not enough to change the ratio. Cows increased during the preceding ten years at the rate of 391,857 per year, so that the number of heifers will probably be enough to provide 34,054,051 cows. According to these figures, the average cow is kept 4.6 years.

[2] In 1910, there were 20,370,477 horses older than yearlings (born before 1909) in the United States. This includes horses in cities as well

The average depreciation on a large number of horses would, therefore, be a little over 8 per cent. Horses usually do little work before they are three years old, and do not do full work until about 4 years old. For work animals, the depreciation would, therefore, average about 10 per cent.

Horses usually rise in selling value until they are 4 or 5 years old. The selling value does not drop much until they are 8 or 9 years old. If one buys horses of this age, the depreciation will be much more than 10 per cent. Probably 15 to 18 per cent is none too high to estimate on horses 8 or 9 years old. Such a horse should certainly pay for himself in 6 years.

There is one basis for the high prices paid for 8-year-old horses. Such horses, if sound, may last about as long in cities as younger ones, but this is not true on farms. Usually it is better for a farmer to buy young horses.

154. Depreciation on mules. — Similar calculations from the Census figures indicate that one colt must be raised for each 13 mules, older than yearlings.[1]

This would indicate that, on the average, a mule lives a year longer than a horse. This agrees with the popular opinion. This is an important point in favor of mules.

as on farms. There were 1,764,188 yearling colts. During the preceding ten years, horses increased at the rate of 199,112 per year. Exports exceeded imports by an average of 42,411 per year. The number of colts raised seems to be enough to provide for 241,523 more horses, or 20,612,000. This would make 11.7 horses for each yearling colt. It appears that the average two-year old colt may be expected to live 11 or 12 more years. Similar calculations from the 1900 Census indicate that one colt raised for each 12.7 horses would keep up the supply.

[1] In 1910, there were 4,027,340 mules in the United States born before 1909. The average rate of increase for the preceding 10 years was 110,743 per year, and the average exports 14,313 per year. The 315,987 yearling colts appear to be sufficient to provide 4,152,399 mules, or 13.1 for each colt.

155. Depreciation on sheep. — Sheep are short-lived animals, hence the depreciation on them is high. In one county in New York, the deaths among mature sheep averaged 39 per thousand, while the deaths among cows averaged 12 per thousand. The loss in value of old sheep sold was more than the loss from death. With sheep having an average value of $6.67, the loss from both sources was found to be 10 per cent.[1] This would be a charge of 67 cents per year on such sheep. If we add interest at 6 per cent, the interest and depreciation amount to $1.07 per year for each sheep. The cost is higher on high-priced sheep and less on low-priced ones.

The Census of 1890 reported deaths among sheep as 1.7 per cent killed by dogs, and 6.7 per cent died from disease or weather, or a total of 8.4 per cent. We do not know how many of these were lambs.

156. Depreciation on hogs. — Hogs grow enough so that old ones are worth more than young ones, but the losses from death are very heavy. The Census of 1890 reported the loss from death as 17 per cent, but we do not know how many of these were pigs.

157. Depreciation on hens. — Deaths of hens are usually estimated at one per cent a month, or 12 per cent a year. This may be too high. In some exceptionally well managed flocks, the writer has found it to vary from 5 to 10 per cent a year.

The depreciation on common stock is not much more than the losses by death, because the meat value is nearly equal to the value of a pullet, but on higher priced stock the depreciation is very high.

If we start with 100 pullets, we may expect to have 88 at the end of the first year. If the hens are then sold for

[1] New York, Cornell Bulletin 295, p. 494.

meat at 40 cents apiece, they would bring $35.20. On pullets worth 50 cents apiece, this would give a loss of $14.80, or 30 per cent.

If the same pullets were kept two years, we would expect to have 77 left to sell for $30.80. This would be a loss of $19.20 for the two years, or 20 per cent a year.

If kept three years, we would expect to have 68 still living to sell for $27.20. This would make a loss of $22.80 for the three years, or 15 per cent a year.

The table on page 237 shows similar calculations for pullets worth $1 and $2.

If $2 pullets are sold at the end of one year, the depreciation would be $1.65 per hen, or 82 per cent. This would be equal to 7.5 dozen eggs at the average price in Ohio (page 576). Evidently, one could not use such pullets for producing eggs to sell at wholesale prices, unless they are kept more than one year. If such pullets were kept until 3 years old, the depreciation would be 58 cents a year, equal to 2.6 dozen eggs a year.

It is evident that common stock may be sold young, but that high-priced poultry should be kept until it is older. If the meat value is 40 cents, and pullets are worth 50 cents, it would not pay to keep old hens unless they laid within 10 cents' worth of as many eggs as a pullet. No old hens are likely to do this well.

If pullets are worth $1, it would pay to keep a hen as long as her eggs are worth within 60 cents of those laid by a pullet. This is a difference of two or three dozen. Hens two or three years old will usually do so well.

If pullets are worth $2, it will pay to keep a hen as long as her eggs are worth within $1.60 of those laid by a pullet. This would be a difference of 7 dozen at the prices in Ohio. If any pullet is really worth $2 for producing market eggs, it would appear best to keep her as long as she lives. However, if eggs from such stock are worth so much to sell for breeding purposes that the average price of all her eggs sold is 60 cents a dozen, then the old hen should go when her egg production falls 3 dozen below the pullet. This would probably be two or three years.

DEPRECIATION ON HENS THAT HAVE A MEAT VALUE OF 40 CENTS AND A DEATH RATE OF 12 PER CENT

	Value of Pullets		
	$.50	$1.00	$2.00
Hens kept one year.			
Depreciation	$.15	$.65	$1.65
Per cent depreciation . .	30%	65%	82%
Hens kept two years.			
Depreciation	$.19	$.69	$1.69
Depreciation per year . .	.10	.35	.85
Per cent depreciation . .	20%	35%	43%
Hens kept three years.			
Depreciation	$.23	$.73	$1.73
Depreciation per year . .	.08	.24	.58
Per cent depreciation . .	15%	24%	29%

The price of eggs, the price at which old hens are sold, the relative value of old and young hens for breeding purposes, and various other factors, affect the results. The above discussion shows the method of figuring.

INCREASING VALUE OF YOUNG STOCK

158. Increasing value of valuable young stock usually more than offsets depreciation. — The young stock from valuable animals usually rises in price fast enough to more than make up for the high depreciation on their parents.

In making calculations, this point is nearly always considered, but the higher depreciation on parents is forgotten. One must consider both sides of the question if he is to arrive at the truth.

References

Feeds and Feeding, W. A. Henry.
New York, Cornell Bulletin 295, pp. 473–539.

CHAPTER 7

SIZE OF FARMS

Throughout this book, the word farm is used to mean all the land operated by one farmer. If a plantation of 1000 acres is cropped by 20 tenants by any kind of a tenant system, each of the tracts farmed by one tenant is called a farm. But if the entire area is run as one farm by hired labor, then it would be a 1000-acre farm. If there were two separate centers of operation, with stock and equipment at each center, and each in charge of a hired manager, it would be called two farms. In each of these cases, the owner is likely to speak of the area as " my farm," but he would really have 20 farms in the first case, 1 in the second, and 2 in the third.

159. The American family-farm. — The typical American farm is a family-farm; one of such a size that the family does most of the farm work, with some hired help. In 1909, only 46 per cent of the farms had any hired labor. In 1899, there were a little over 1.5 male workers engaged in agriculture for each farm. This includes the operator, members of the family, and hired-men.

There is no large section of the United States where there is an average of a hired-man for each farm.

There is, of course, great variation. There are many farm families that have more labor than the farm calls for, so that members of the family hire out to other farmers, or go to the city to work. The majority of farm families do the work of the farm, with the aid of a little hired help during harvest. Other farmers hire a man by the year. A very small percentage hire more than two or three men by the year. Even with three men, the farm still has the characteristic of the family-farm. The farmer and his sons work with the men.

Table 34. — Average Size of Farms in the United States[1]

	Average Area per Farm	Average Improved Area per Farm	Average Area in Principal Crops[2]
1850	203	78	—
1860	199	80	—
1870	153	71	—
1880	134	71	41
1890	137	78	47
1900	147	72	47
1910	138	75	46

[1] Twelfth Census, Vol. V, pp. xxxi, 688, 692.

[2] Number of acres of barley, buckwheat, corn, rice, oats, rye, wheat, hay, tobacco, cotton, hops, and sugar cane.

Table 35. — Distribution of Farm Land in Different Sized Farms in the United States in 1910

Area in Acres	Per Cent of All Farms	Per Cent of All Farm Land	Per Cent of All Improved Farm Land
Under 20 acres	13.2	1.0	1.7
20–49	22.2	5.2	7.6
50–99	22.6	11.7	14.9
100–174	23.8	23.4	26.9
175–499	15.4	30.2	33.8
500–999	2.0	9.5	8.5
1000 and over	0.8	10.0	6.5

The whole policy of this country, since the passage of the Preëmption Act in 1841, has been for the establishment of farms of this kind. Most of the acts have indicated that 160 acres was considered the most desirable size of farm. The first Homestead Act in 1862 allowed soldiers 160 acres of land, and other persons 80 acres. This was the first land act that limited the area to such small tracts. At the time when this act was passed, 80 acres provided as full a year's work for a family as three or four times this area does now. The same policy put into effect to-day would call for larger areas.

Not only has the government policy favored family-farms, but economic conditions cause our farms to change to the size that is best for such a farm. The farms that are too large are being divided, and those that are too small are being combined.

160. How large should a family-farm be? — Most of the discussion of size of farms is confused, because it deals with extremes. Comparison is made of small family-farms with large farms where the owner does no work. For this reason, the usual discussions of the subject have little bearing on the question of the best size of family-farm. The great middle class is ignored. The farm that is large enough to employ the owner and one or two sons or hired-men has a great advantage over either the very large or very small farm. There are comparatively few of the large bonanza farms.

If we omit the minor types of farming, such as truck growing, floriculture, etc., we may say that farms in the north half of the United States of less than 100 acres are small, farms of 160 acres medium sized, and farms of 200 or 300 acres are large. Which of these is best? All these are of the family-farm type. The operator works with his sons or with his hired-men; any discussion that deals with bonanza farms has no bearing on the problem.

Many books and articles have been written about the delights of farming on a few acres. Such interesting titles as "Three Acres and Liberty," "Ten Acres Enough," and "Five Acres Too Much," have appeared, and now we have a "Little Farm Magazine." Five acres is enough for some types of farming. It might even be too much if it were all in greenhouses. But the cases where so small an area is enough for a good business are cases in which as much capital is usually invested as is common on a 200-acre farm. Such books are nearly always written by some one who has a comfortable income from some other source than the farm. Three acres is a very delightful place for a home, when one has a sure income, but three acres as a business proposition is different. The same idea has even broken out in poetry about a "Little-farm-well-tilled." There may be less poetry, but there is a better living, in a large farm well managed.

Much of the discussion of this subject is confused by the almost universal acceptance of the error that a saving of land is the most important factor in raising a crop. We have already seen that labor is the major cost item in all farming (page 146). This is particularly true for intensive crops, where the labor cost is often five to ten times the cost for use of land. The farmer is interested in profit per man, not profit per acre. The country will also prosper in proportion to the profit per worker. Some parts of China may be ideal in profits per acre, but the small profit per man does not allow a high development of civilization, either on the farm or in the city. The person who rides by a farm is at once struck by waste land, but little is thought of the idle horse or of labor lost by poor machinery or small fields, yet these are much more important items.

The assumption is often made that the yield per acre will be less with larger farms. This may be true for very large farms, but is not usually true for the good-sized farms compared with the small ones.

THE RELATION OF SIZE OF FARM TO FARM EFFICIENCY

161. Size of farm and profits. — Records of a year's business on 586 farms operated by owners were secured in Tompkins County, New York. This is a region of general farming. The products sold are milk, butter, hay, potatoes, eggs, buckwheat, wheat, and apples. Hay, oats, and corn are raised for feed.

In this region, the farmers with 31 to 60 acres of land made less than hired-man's wages.[1] They made interest on their money and an average labor income of $254. They could have lent their money and hired out for about $30 per month, or better yet, could have been tenants on larger farms. (Table 36.)

TABLE 36. — SIZE OF FARM RELATED TO PROFITS, 586 FARMS, TOMPKINS COUNTY, NEW YORK

ACRES	NUMBER OF FARMS	AVERAGE SIZE (Acres)	AVERAGE TILLABLE AREA (Acres)	LABOR INCOME
30 or less	30	21	18	$168
31–60	108	49	38	254
61–100	214	83	60	373
101–150	143	124	88	436
151–200	57	177	117	635
Over 200	34	261	160	946
Average		103		$415

Farmers who had from 61 to 100 acres made about the same as hired-men. The farmers on farms of over 200

[1] New York, Cornell Bulletin 295, pp. 414–423.

acres, averaging 261 acres, made interest on their money and about $80 per month for their time. Not only are the averages poor, but the chances of an individual are also poor on small farms. Of 352 farmers on farms of less than 101 acres, only 9 made labor incomes as high as $1000, but nearly one-third of those on the 200-acre farms made over $1000.

The farms of over 200 acres are not bonanza farms, they are none too large for family-farms. They provide work for two to three persons. On the average, they had about one hired-man per farm.

Similar records were secured for 578 farms in the northern part of Livingston County, New York. This is a region with rich soils and very prosperous conditions. The farmers with less than 51 acres made less than hired-man's wages. Those with over 200 acres, averaging 305 acres, made an average labor income of $1082, or $90 per month. (Table 37 and Figure 62.)

TABLE 37. — SIZE OF FARM RELATED TO PROFITS, 578 FARMS, LIVINGSTON COUNTY, NEW YORK

ACRES FARMED	NUMBER OF FARMS	AVERAGE ACRES FARMED	TILLABLE AREA (Acres)	LABOR INCOME
30 or less .	17	20	17	$54
31–50 . .	35	43	37	295
51–100 . .	147	79	64	437
101–150 . .	178	127	104	593
151–200 . .	89	175	142	934
Over 200 . .	112	305	241	1082

Not only are the average labor incomes much larger on the larger farms, but the chances of making a good profit are much better. No size of farm is large enough to insure a profit. Some persons on large farms have failed to make good labor incomes, but the proportion of such failures is smaller and the proportion of successes is much greater on the larger farms. All of the very highest labor incomes are made on large farms. Of the 52 farmers who had 50 acres or less, only 3 (or 6 per cent) made labor incomes of over $1000. The highest was $1159. But of 201 farmers with over 150 acres, 89 (or 45 per cent) made over $1000. Of the 199 farmers who farmed 100 acres or less, only two made labor incomes as high as $1500. The highest was $1747. But of the 201 farmers who worked over 150 acres, 46 made over $1500. The highest was $7250.

This is a region of excellent soils; several rather high-priced crops, as cabbages, potatoes, and beans, are raised. But there seems to be little chance of making a labor income of over $1000 on 50 acres of land, and almost no chance of making a labor income of $1500 unless one has over 100 acres.

There are plenty of good men among the 199 who are on farms of less than 100 acres. The reason for their chances of profit being less than on the larger places must be due to physical facts.

The tenants on the larger farms are doing much better than those on small farms. Not one of the tenants who farm less than 50 acres is doing as well as he would if he were a hired-man. (Table 38.) The landlords' profits are not so much affected by size of farm. This is to be expected, since the economy of the large farm is in labor of men, horses, and machinery, none of which the landlord furnishes.

Figure 62 shows how the labor income increases with the size of farm. Up to 200 acres, it increases very rapidly as the size increases. The increase from 127 to 175 acres adds 58 per cent to the labor income. The larger acreage

Table 38. — Area Related to Tenant's Labor Income and Landlord's per Cent on Investment, Livingston County, New York

Acres Farmed	Number of Farmers	Average Acres Farmed	Tenant's Labor Income	Landlord's per Cent
30 or less .	0	—	—	—
31–50 . .	3	42	$102	5.5%
51–100 . .	30	82	519	8.0
101–150 . .	65	130	497	6.8
151–200 . .	44	177	663	8.0
Over 200 .	62	314	875	6.1

can be farmed without any great increase in expense. But when the farm is much larger than 200 acres, it is necessary to begin to duplicate equipment, so that while the labor income increases, it does not increase so rapidly. Ap-

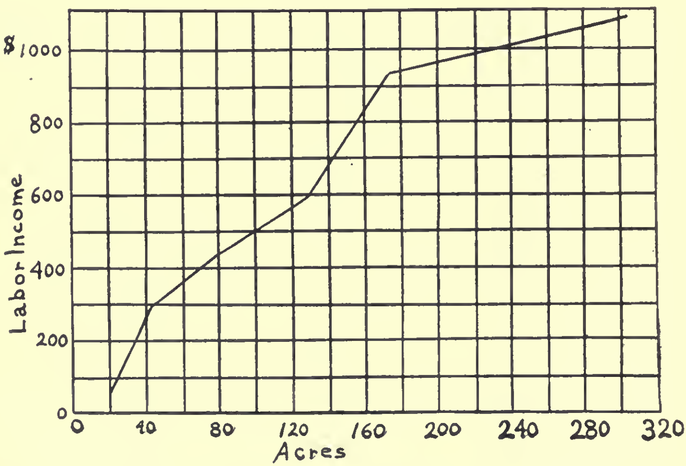

Fig. 62. — Relation of size of farm to labor income.

parently, 300 acres is near the point at which additional area would not result in a much greater labor income. If there should be a change in the size or character of machinery used, a still larger area might be called for.

Under present conditions, it appears that farms in Livingston County for general farming should not be less than 150 acres, and it does not seem that much is gained by having over 300 acres. About 200 to 400 acres seems to be a very desirable size.

Similar work in New Hampshire has shown that the farms making the larger labor incomes are larger than the average. This applies to the dairy and poultry farms, as well as to general farms.[1]

Wherever studies of this kind have been made, the same conclusions have been strikingly shown. The exact area that makes a large farm varies with the region and type of farming, but everywhere the farm that fails to provide employment for at least one man, besides the operator, is at a great disadvantage.

The larger farms also furnish the greater opportunity for losses. It is not possible to make a very large loss, or a very large profit, on a small business.

The Census figures for the United States do not give all the farm expenses, but there is data enough to show that the small farms are rarely profitable. The Census gives the value of products not fed to live-stock. This is more than the receipts per farm, because seed and other products used on the farm are included. Only two of the items of expense are given, labor and fertilizers.

If, from the value of products, we subtract the expenses given, and interest on the capital, we obtain a figure that is larger than the labor income of the farm-family. From

[1] U. S. Dept. Agr., Bureau of Plant Industry, Circular 75, pp. 11–16.

TABLE 39. — VALUE OF PRODUCTS NOT FED TO LIVE-STOCK ABOVE AMOUNT SPENT FOR LABOR AND FERTILIZERS, AND INTEREST ON CAPITAL AT 6 PER CENT. UNITED STATES CENSUS OF 1900 [1]

ACRES FARMED	AVERAGE ACRES	AVERAGE IMPROVED ACRES	AVERAGE VALUE OF PRODUCTS NOT FED	AVERAGE VALUE OF FARM PROPERTY	INTEREST ON PROPERTY AT 6 PER CENT	AVERAGE AMOUNT SPENT FOR LABOR	AVERAGE AMOUNT SPENT FOR FERTILIZER	VALUE OF PRODUCTS NOT FED ABOVE INTEREST, HIRED LABOR AND FERTILIZER
Under 3 . .	1.9	1.7	$592	$2135	$128	$77	$4	$1926
3–9 . . .	6.2	5.6	203	1105	66	18	4	115
10–19 . .	14	13	236	1055	63	16	5	152
20–49 . .	33	26	324	1280	77	18	7	222
50–99 . .	72	49	503	2499	150	33	9	311
100–174 .	135	83	721	4023	241	60	10	410
175–259 .	211	129	1054	6311	379	109	14	552
260–499 .	343	191	1354	8298	498	166	15	675
500–999 .	662	287	1913	11718	703	312	22	876
1000 or more	4237	520	5334	33156	1989	1059	66	2220

[1] Twelfth Census, Vol. V, page 187.

this should be subtracted the other farm expenses and the value of farm work done by other members of the family, to see what the farmer received for his time. (Table 39.)

The average farm family on farms of 50–99 acres, therefore, received considerably less than $311 for its year's work. It is evident that these farmers failed to receive wages, and it appears as if those on farms of 100 to 174 acres made farm wages, and that those on larger farms made more than farm wages. The high figures for the farms of less than 3 acres are due to the inclusion of sheep ranches on free ranges. These were farmers with little or no land, but they used large areas.

The chances of an individual are certainly poor if he has a very small farm. The Census gives the percentage of farms of each size with given values of products not fed to live-stock. Table 40 shows that of the farms of 3 to 49 acres, only about one in 200 produced as much as $2500

Table 40. — Percentage of Farms of Various Sizes in the United States in 1899 Producing $1000 Worth and $2500 Worth of Products not Fed to Live-stock[1]

Acres Farmed	Per Cent with $1000 to $2499 Worth of Products not Fed	Per Cent with $2500 Worth of Products not Fed
Under 3 acres	7.0%	5.2%
3–9	1.5	0.6
10–19	1.6	0.4
20–49	2.0	0.3
50–99	7.4	0.6
100–174	21.8	1.4
175–259	37.3	5.2
260–499	39.6	12.7
500–999	33.3	24.3
Over 1000	25.6	39.5

[1] Twelfth Census, Vol. V, p. xlvii.

worth of products not fed. Only about 2 farms out of a hundred reached the $1000 figure. But for farms of 175 to 259 acres, 37 in 100 reached $1000, and 5 of them exceeded $2500. This does not show just what their labor incomes were, because expenses and interest are not deducted, but it shows that the men on the larger farms at least have a chance to make money, while the persons on the very small farms rarely have a chance to make much, because the total value of products is too small.

162. Relation of size of farm to efficiency in use of labor. — On the 586 farms in Tompkins County, New York, the receipts per acre were more on small farms than on the larger ones, but the single item of labor cost was so great that it more than offset the difference in receipts. Other expenses were also more per acre on the small farms.

If the farmer's labor is worth $326, which is the aver-

TABLE 41. — SIZE OF FARM RELATED TO RECEIPTS, EXPENSES, AND LABOR. FARMS OPERATED BY OWNERS, TOMPKINS COUNTY, NEW YORK

ACRES	AVERAGE SIZE (ACRES)	RECEIPTS PER ACRE	LABOR COST PER ACRE [1]	RECEIPTS MINUS LABOR PER ACRE	OTHER EXPENSES AND INTEREST PER ACRE	NET PROFIT PER ACRE [2]
30 or less	21	$26.14	$19.90	$6.24	$13.76	loss $7.52
31–60	49	14.24	8.10	6.14	7.61	loss 1.47
61–100	83	12.49	5.60	6.89	6.32	gain .57
101–150	124	11.56	4.54	7.02	6.13	gain .89
151–200	177	10.89	3.92	6.97	5.22	gain 1.75
Over 200	261	10.93	3.33	7.60	5.22	gain 2.38

[1] Total amount paid for labor, value of board of laborers, value of unpaid labor by members of the family, and the farmer's labor estimated at $326 for the year.

[2] Profit after deducting expenses, interest on capital at 5 per cent, and all labor as defined above.

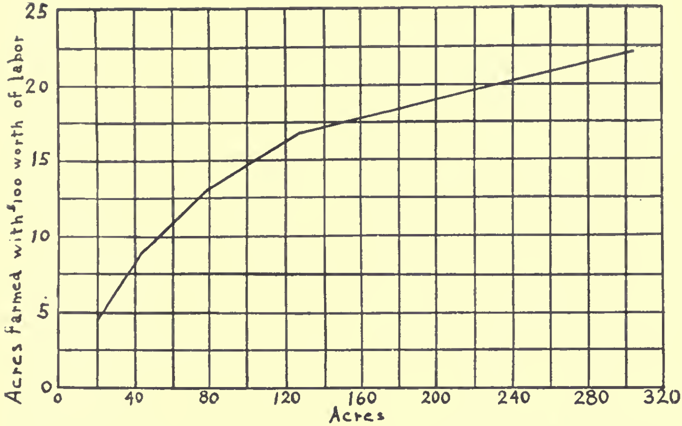

FIG. 63. — Relation of size of farm to acres farmed with $100 worth of labor.

age value placed on it by the farmers, then there is a net loss of $1.47 per acre on farms of 31–60 acres, and a gain on the larger farms. (Table 41.)

In Livingston County, New York, the area farmed with

TABLE 42. — SIZE OF FARM RELATED TO EFFICIENCY OF LABOR. 586 FARMS OPERATED BY OWNERS

ACRES	AREA FARMED PER $100 WORTH OF LABOR[1]
30 or less	5 acres
31– 60	12 acres
61–100	18 acres
101–150	22 acres
151–200	26 acres
Over 200	30 acres

[1] Total labor cost includes wages paid, board of laborers, value of unpaid labor by members of the family, and $326 for the labor of the farmer.

$100 worth of human labor is five times as great on the largest farms as on the smallest. On the farms of 31 to 50 acres, the labor cost is over twice as much per acre as on the farms of 151 to 200 acres. In spite of the fact that the labor cost is so high on the small farms, the crop yields are no better. The product of a man's work on the 151- to 200-acre farms is over twice as much as the product of a man's work on the 31- to 50-acre farms. The same point is shown by work in other counties. (Tables 42, 43.)

TABLE 43. — AREA RELATED TO EFFICIENCY OF LABOR. 578 FARMS, LIVINGSTON COUNTY, NEW YORK

Acres Farmed	Acres Farmed with $100 Worth of Labor [1]
30 or less	4.4
31–50	8.8
51–100	13.0
101–150	16.6
151–200	18.1
Over 200	21.8

[1] Total labor cost includes wages paid, board of laborers, value of unpaid labor by members of the family, and $420 for the labor of the farmer.

On a small farm it requires relatively much more time to do the chores. Six horses and 12 cows do not take nearly twice as much time as is required for 3 horses and 6 cows.

There are many farm operations that require two men, so that no matter how small the farm may be, one man cannot do all the work to good advantage. Even with the smallest farms, some help is hired. (Table 44.)

The farms of 151 to 200 acres are the smallest group that employ two men by the year. In this group there is an average of 2.3 men per farm; that is, 1.3 men besides the operator. (Table 44.)

One hired-man by the year is the smallest number that can be used to run a farm effectively. In this County, it appears that, on the average, a farm must be over 150 acres if it is to justify one in keeping a man by the year.

The farms averaging 79 acres employ an average of a man for half of a year. This is 53 acres per man. But 175 acres is farmed with a little less than one additional man. The additional man makes it possible to farm 96 more acres, almost twice as much per man. At the same time, the crop yields are just as good.

Table 44. — Relation of Size of Farm to Efficiency of Labor. Livingston County, New York

Acres Farmed	Average Acres	Value of Unpaid Labor Except Owner's	Cash Paid for Labor	Approximate Number of Men [1]	Additional Men	Additional Acres Farmed
30 or less	20	$7	$28	1.1	—	—
31–50 .	43	31	29	1.2	0.1	23
51–100 .	79	41	113	1.5	0.3	36
101–150 .	127	51	218	1.8	0.3	48
151–200 .	175	93	341	2.3	0.5	48
Over 200	305	129	633	3.3	1.0	130

On the average, the additional area is farmed at the rate of 130 acres per man. It appears that in Livingston County, after one has labor to run a given farm, he can farm 130 acres more by hiring one more man.

[1] The approximate number of men is found by adding the cash cost of labor to the value of unpaid labor, and dividing by the approximate cash cost of one man, $325, then adding the operator to the number secured.

For the United States, figures are not given as to the amount of farm work done by members of the farm family other than the operator. Allowing for this, it would appear that a man farms over twice the area on the farms of 175–259 acres as on the 50 to 99-acre farms. The Census figures do not give the crop yields that result, but from the work in New York, it would appear that the crop yields are likely to be as good on the larger farms.

Table 45 shows how the farmers of America have increased the area of crops raised per male worker. The area per horse has not changed much. The farmers are driving more horses per man and so saving man-time. They are driving a third more horses per man, and raising a third more acres of crops per worker, than the farmers did in 1880. This table would seem to indicate that improved machinery has not saved horse-time, but has saved man-time, because one man drives more horses.

TABLE 45. — INCREASING EFFICIENCY OF FARMERS IN THE UNITED STATES [1]

	1880	1890	1900	1910
Average number of acres of crops per male worker 16 years old or older	23.3	27.5	31.0	
Average number of acres of crops for each horse, mule, or ass one year old or older	13.5	12.4	13.5	12.7
Average number of horses, etc. per worker	1.7	2.2	2.3	

[1] Twelfth Census, Vol. V, p. xxxi. The crops included are buckwheat, barley, corn, rice, oats, rye, wheat, hay, tobacco, cotton, hops, and sugar cane. These are the only crops reported for every year. Other crops reported in 1900 averaged 1.2 additional acres per male worker, and 0.5 per horse.

The table does not include all the minor crops, because some of them were not reported before 1900. The area of all crops in 1900 averaged 33 acres per male worker.

Horses and mules are not much used before they are three years old. If only horses and mules three years old are included, and if all the minor crops are counted, the crop area per mule or horse in 1900 would be 17.1 acres.[1] The number of work animals per male worker was 1.9.

163. Relation of the size of farm to efficiency in use of horses. — Economy in the use of horse labor is becoming increasingly important. In most parts of the country, it costs as much, or more, to keep a team of horses as it does to keep a man. The best way to economize in the use of horses is to keep them employed. It is difficult to keep horses busy if the farm is too small.

Table 46 for Tompkins County, New York, shows how the number of horses increases with the size of farm. Colts

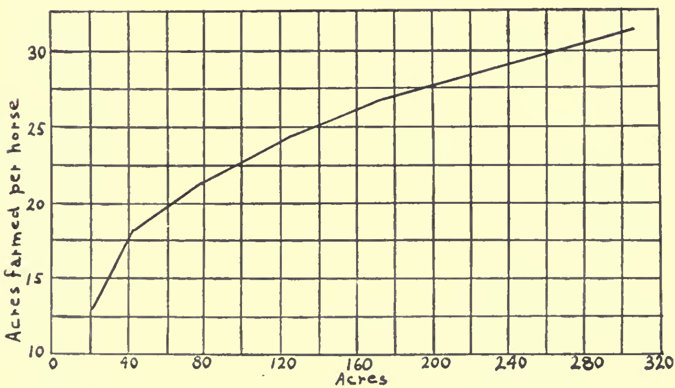

FIG. 64. — Relation of size of farm to acres farmed by a horse.

[1] The Census of 1900 reported 18,276,551 horses and mules 2 years old or older, and reported 1,727,672 as 1 and under 2 years old. Horses and mules increased at the rate of 395,807 per year from 1890 to 1900. We may, therefore, assume that there were about 1,331,865 two and under 3 years old. This would give about 16,945,000 three years old or older.

are not included with horses. The figures are for horses old enough to work. The farms of less than 30 acres average 1.4 horses per farm. Three or four horses are the smallest number that can be used efficiently with modern machinery. The farms of 151 to 200 acres are the smallest ones that have an average of four horses per farm.

TABLE 46. — SIZE OF FARM RELATED TO HORSES. 586 FARMS OPERATED BY OWNERS

ACRES	AVERAGE SIZE (ACRES)	AVERAGE NUMBER OF HORSES	ACRES PER HORSE
30 or less . .	21	1.4	15
31–60 . . .	49	2.3	21
61–100 . . .	83	2.8	30
101–150 . . .	124	3.4	37
151–200 . . .	177	4.3	41
Over 200 . . .	261	5.3	49
Average .	103	3.1	33

The figures of acres per horse are still more striking. The small farms have not enough horses to make efficient teams, and yet they are over-supplied with horses compared with their area. On these farms there are only 15 acres per horse. On the largest farms one horse farms three times this area, with no resulting decrease in crop yields. When we consider the cost of keeping a horse, we see what a great advantage the larger farms have.

In Livingston County, on the 31- to 50-acre farms, a horse farms 18 acres, but on the 151- to 200-acre farms, a horse farms 27 acres. Yet the crop yields are just as good on the larger farms. The cost of horse labor to produce a given amount of crop on the larger farms is little over half that for the smaller farms.

On a small farm, the horses cannot be kept in constant use, because there is not work enough.

On a one-man farm, the horses are kept out of the fields whenever the farmer does chores, hand work, or goes to town. On a two-man farm, one man may be using all the horses while the other man does other work. If there are four or five horses on the place, the man who is working the teams may be driving three or four horses. At the same time, the other man may make a trip to town with one horse. All the horses are then kept at work. A farm with five horses has a great advantage in being able to adjust the size of team to machinery and work. It allows a five-horse team, a four-horse team, or two two-horse teams, with a single horse for other work, and allows a three- and a two-horse team. By these means, the labor of men and machinery is economized, and work can be more promptly done. The chores are frequently done by the man not working the team, again keeping the horses in the field. It is almost impossible to keep the horses busy on a one-man farm.

If a farmer has only two horses, he cannot take advantage of the great economy that comes from driving three- and four-horse teams. Even if he could borrow the horses and machinery, he could not use them to advantage in his small fields.

The Census figures for the United States point to the same conclusion.

164. Relation of size of farm to efficiency in the use of machinery. — Most of the common farm machinery can be used to do the work on a 200- or 300-acre farm, as well as on a small farm. If the small farm buys the machinery, it is at too great a cost per acre. If it goes without machinery, the loss of time and yields is even more serious.

Table 47 shows the relation of size of farm to investment in machinery and tools. The farms of 61–100 acres had an average of $341 worth of machinery. These valuations are probably not over half of what new machinery would cost. Any one who has ever made a list of the necessary farm machinery will see how inadequately these small farms are equipped. Yet this machinery costs much more per acre than on the larger farms. The annual cost for housing, repairs, and depreciation, interest, oil, insurance, has been found by cost accounts to be about 20 per cent of the value of the machinery. The annual cost per acre for use of machinery would be about $1.75 on the smallest farms and $1 on the largest farms.

TABLE 47. — SIZE OF FARM RELATED TO EFFICIENCY OF MACHINERY. 586 FARMS OPERATED BY OWNERS, TOMPKINS COUNTY, NEW YORK

ACRES	AVERAGE SIZE (ACRES)	VALUE OF MACHINERY AND TOOLS	INVESTMENT IN MACHINERY PER ACRE
30 or less . .	21	$125	$5.95
31–60 . . .	49	243	4.96
61–100 . . .	83	341	4.11
101–150 . . .	124	495	3.99
151–200 . . .	177	592	3.34
Over 200 . . .	261	914	3.50
Average .	103	407	3.95

One mower, one hay rake, one tedder, one hay loader, one corn harvester, one grain harvester, one grain drill, one manure spreader, one potato digger, one potato planter, can do their work on a 250-acre farm as readily as on a small farm. Few of the small farms have half of these tools. If a small farm does have nearly all the list, it cannot use them enough to pay for the investment. The more efficient and numerous machines become, the larger our farms should be. It is interesting to notice how many of the tools are of very recent development. Almost half of the value of farm machinery on a well-equipped farm is invested in machinery that has been perfected in the last few years.

Apparently, the efficiency with which the labor of men, teams, and tools can be used is the important factor in making the larger farms pay better. The results on tenant farms also agree with these conclusions. The tenant who furnishes labor finds the larger farms more profitable. The profits of the landlord who furnishes no labor seem to be little affected by the size of the farm.

Table 48 gives the same results for another county. The small farms are under-equipped, but at double the cost per acre of the large farms.

TABLE 48.—SIZE OF FARM RELATED TO EFFICIENCY OF MACHINERY. 578 FARMS, LIVINGSTON COUNTY, NEW YORK

ACRES FARMED	VALUE OF MACHINERY	INVESTMENT IN MACHINERY PER ACRE
30 or less	$141	$7.05
31–50	226	5.26
51–100	503	6.37
101–150	523	4.12
151–200	707	4.04
Over 200	955	3.13

Exactly the same point is shown by the Census for the United States in 1900. The farms of less than 100 acres had a very poor equipment, but the investment per acre was much more than on the large farms. (Table 49.)

Table 49. — Area Related to Efficiency in the Use of Machinery, United States, 1900[1]

Acres Farmed	Value of Machinery	Investment in Machinery per Acre of Improved Land
Under 3 acres	$53	$31.18
3–9	42	7.50
10–19	41	3.15
20–49	54	2.08
50–99	106	2.16
100–174	155	1.87
175–259	211	1.64
260–499	263	1.38
500–999	377	1.31
1000 and over	1222	2.35

[1] Twelfth Census, Vol. V, p. 186.

Coöperative ownership of machinery is often desirable and helps, to some extent, to solve the problem for the small farm, but there is much time lost in taking machines from one farm to another, and it is much more difficult to plan the work so as to have the operations done at the proper time, when more than one farmer is concerned.

165. Relation of area to efficiency in the use of capital. — The small farm has relatively much more of its capital invested in unproductive ways. No matter how small the farm may be, the owner desires a respectable house. Table 50 shows that the smallest farms have 43 per cent of their capital in houses; the largest farms have somewhat better houses, but have only 9 per cent of their capital thus invested.

The barns on the small farms also take a much larger proportion of the capital. The smallest farms have 19 per cent of their capital thus invested, the largest farms have only 11 per cent thus tied up. An equally good barn for ten head of stock costs much more than half as much as a barn to house twenty head of stock. The smallest farms have an investment in barns of $164 per animal unit.[1] The largest farms have only $50 per animal unit. Yet observations lead to the conclusion that the stock on the larger places is better housed. If interest, repairs, depreciation, and insurance on a building amount to 10 per cent of the value, then the housing cost per animal unit would vary from $16 per year on the smallest farms to $5 per year on the largest.

TABLE 50. — AREA RELATED TO INVESTMENT IN BUILDINGS, 578 FARMS, LIVINGSTON COUNTY, NEW YORK

ACRES FARMED	VALUE OF HOUSES	PER CENT OF TOTAL CAPITAL IN HOUSES	VALUE OF OTHER BUILDINGS	PER CENT OF TOTAL CAPITAL IN OTHER BUILDINGS	VALUE OF OTHER BUILDINGS PER ANIMAL UNIT
30 or less	$1494	43%	$655	19%	$164
31–50	1000	23	681	15	95
51–100	1236	18	1091	16	87
101–150	1477	14	1408	13	74
151–200	1810	13	1900	13	73
Over 200	2113	9	2552	11	50

Again the figures for the United States show the same conclusion. The larger farms have better buildings, but at a less proportionate cost. The farms of less than 20 acres have over one-third of their capital invested in buildings and machinery. Those of over 175 acres have less than one-fifth of the money thus employed. Money thus invested is not only unproductive, but is a source of constant cost for repairs. If a farmer had all his money invested in buildings and machinery and mules, his income

[1] All animals reduced to their equivalent in cows or horses, see page 209 for definition.

would, of course, be zero. In fact, he would not be a farmer at all.

166. Relation of size of farm to size of fields. — The small farm of necessity has small fields, if a rotation is followed. Cost accounting has shown a considerable difference in the cost of producing crops on small and fairly large fields. Every operation costs more. It also costs very much more to fence small fields than large ones. (See page 368.)

TABLE 51. — RELATION OF SIZE OF FARM TO EFFICIENCY IN THE USE OF CAPITAL, UNITED STATES, 1900 [1]

ACRES FARMED	VALUE OF BUILDINGS	PER CENT OF TOTAL REAL ESTATE VALUE
Under 3	$653	54 %
3–9	428	45
10–19	316	35
20–49	303	29
50–99	532	26
100–174	724	22
175–259	1007	19
260–499	1127	17
500–999	1403	15
1000 and over	2261	10

[1] Twelfth census, Vol. V, pp. li and 187.

167. Relation of size of farms to economy in buying and selling. — Usually better terms can be obtained when a farmer is able to buy and sell in large quantities. There is a great saving when drain tile, lime, fertilizers, feed, and stock can be bought in carload lots, if any of these are wanted. There is also a gain when stock, hay, potatoes, cabbages, and apples can be shipped in carloads. Sometimes the same results can be secured by coöperative buying and selling.

168. Are the results due to the man? — Some persons believe that there are 40-acre farmers, 80-acre farmers, and 300-acre farmers, and that all these men have so shifted around that the larger farms are always in the hands of the better men. The better results are, therefore, all attributed to the man.

A study of the history of a large number of individual farms and farmers shows that the man is only one of the many factors that have to do with success. The soil and the area of crops grown are more frequent causes of success and failure.

To make even a moderate success on a small farm is very much more difficult than it is to make a good success on a fair-sized farm. When the necessary equipment and horses for an 80-acre farm will be almost sufficient for 160 acres, and when a family can do all the work on the larger farm, it will be seen at once that the larger farm will double the income without much more expense. It therefore becomes a task for a genius on the 80-acre farm to compete with a very ordinary mortal on the larger area.

It takes much less intelligence to make a profit out of a mowing machine that cuts 50 acres than it does out of one that cuts 10 acres a year. It takes less ability to make a profit out of four horses that raise 100 acres of crops than it does to make a profit out of half as many horses that farm only 40 acres. It takes much less intelligence to direct a hired man so as to make a profit from employing him, if he drives 3 or 4 horses, than it does if he drives two horses.

The confusion has arisen from the almost universal tendency to deal with extremes, and to think of the small farm as a one-man farm and the large farm as a farm where the operator directs many men. It certainly takes ability to handle a large number of men on a large farm, but the problem between a 100- and a 200-acre farm is not in number of men employed, but in having only half work for them on the smaller place.

The large farms operated by tenants show the same degree of efficiency as those operated by owners.[1] Frequently, after the tenant saves enough money, he becomes an owner of a small place. The efficiency in the use of his horses and machinery is then limited.

A study of the shifts of individuals is exceedingly interesting and instructive. A farmer frequently rents or buys more land and farms it without any more help, horses, or machinery.

The logic of the question ought to be sufficient without any of the preceding discussion. If small farms are more efficient than larger farms, then all the more able men would choose small farms, and if they had money left over, invest it in other ways.

169. Best size of farm. — Figure 62 shows that 300 acres is approaching the limit of the most profitable size of farm, for the type of farming. All the tables show that with a small farm, a little increased area results in enormously increased efficiency, but additional area for a larger farm does not result in the same saving. Ultimately, a size is reached that provides full employment for men, horses, and machinery. When this point is reached additional land requires more equipment. The point at which this change occurs varies with climate, soil, and other conditions, and for different kinds of equipment. Wagons soon have to be duplicated; grain binders are adapted to larger acreages.

[1] New York, Cornell Bulletin 295, p. 542.

Usually it is not possible to get much more than 300 acres that is well located with respect to the farm buildings. When the land is too far from the buildings, too much time is lost in going to work, and in hauling manure and crops. Even if one can buy land that is properly located, 640 acres is ordinarily the limit that can be run from one center. If the farm is laid out like Figure 80, this area would be as near the buildings as 160 acres usually is, because the buildings are so frequently at the corner of the farm. With some exploitive types of farming, such as occur in parts of the West, the products are not hauled to the farmstead, and manure is not hauled back to the fields, hence larger farms may pay. But with mixed farming that develops as the country grows older, 300 to 600 acres is all that it is generally profitable to run from one center. Men who have more land usually run it as separate farms.

The Taft Ranch in Texas has tried different sizes of units, from 50 acres for a farm rented to a Mexican, to 2000 acres of crops for a farm run by a manager with hired labor, and with the buildings all at one center. The plans for the future are to lay out the largest units in tracts of 1200 acres of tillable land, with 600 acres on each side of the road. Larger areas make the fields too far from the buildings. The crops are cotton and enough forage to feed the mules, so that there is a minimum of hauling. The land is level and all other conditions ideal for large farms.

In regions where the land is nearly all tillable, and the rainfall fairly good, a farm should contain at least 160 acres. This provides for a fairly efficient use of men, horses, and machinery, when the chief crops raised are grain and hay. But it takes less ability to handle a 320-acre farm efficiently. The sizes that are proving most efficient for various types of farming will be discussed in the next chapter. In order to use machinery and horses effectively a farm ought to be large enough to use five horses. It must be large enough to use at least one man, or grown boy, besides the operator, if it is to be run economically.

170. Profits on very large farms. — We have seen that the moderately large farm of 200 to 400 acres has a very great advantage over the small farm. These farms are essentially alike in character. But the "bonanza" farm is an entirely different proposition. All of the usual discussions of large farms apply to this class.

There are several reasons why it is very difficult to handle farms of several thousand acres profitably. The great variety of work that must be done makes it difficult to handle men in gangs and use them like machines. The large area over which operations must be carried on makes it impossible to use factory methods. The frequent change of work on a moment's notice, because of weather or other conditions, makes it difficult to prevent lost time in shifting from one job to another. It is difficult to keep a large gang employed on stormy days. Part of the difficulty of keeping men busy is obviated by giving each man some land to work for himself, with the agreement that he is to work by the day whenever he is needed. When not needed, he can work for himself.

The man who works with his men and who treats his men as equals has a great advantage over one who merely superintends work. The great majority of farm operations require judgment and interest on the part of the worker.

It is not often possible to run more than 600 acres, or in some cases 1000 acres, economically from one center, on account of the lost time in going to and from fields, and in hauling crops and manure. Occasionally, there is a successful enterprise made up of a number of such units all under one direction, but usually it then becomes desirable to give the man on the ground an interest in the business. The customary way of doing this is to rent the farm. In other words, to break it up into small farms. This is usually more satisfactory, even if the farmer is a negro. The great majority of southern owners find it better to rent the land in areas adapted to a negro family, rather than run large farms with hired labor.

There are some exceptions. Large farms have been most successful in growing sugar cane. Large nurseries have an advantage over small ones, particularly in selling the product. The same point applies to seed farms and plant-breeding farms. Some vegetable and fruit farms are able to use men in gangs at certain seasons of the year, and so handle large areas.

171. Relation of size of farm to crop yields. — The city man and the political economist at once ask what effect the larger farms have on the food production of the

Table 52. — Size of Farm Related to Crop Yields. 586 Farms Operated by Owners, Tompkins County, New York

Acres	Average Size (Acres)	Yields per Acre		
		Oats	Potatoes	Hay
		Bushels	Bushels	Tons
30 or less	21	35	117	1.38
31–60	49	32	111	1.36
61–100	83	32	119	1.33
101–150	124	34	114	1.35
151–200	177	32	127	1.24
Over 200	261	35	113	1.24

[1] New York, Cornell Bulletin 295, p. 425.

country. Apparently, the crop yields are as good, or a little better, on the large farms than on the small ones, with the exception of hay, which seems to yield a little better on the smaller farms. Certainly the small farms are not producing more per acre. In addition, much more of the food is consumed in the production, since more horses are kept per acre. The smaller farms seem to be too small for the best production from the standpoint of the city, as well as from the standpoint of the farmer.

172. Relation of size of farm to keeping the boys on the farm. — One of the chief reasons why boys leave the farm is because there is not enough work to make it pay to stay. There may be work puttering around, but a boy

TABLE 53. RELATION OF SIZE OF FARM TO BOYS LEAVING THE FARM, 674 FARMS, JEFFERSON COUNTY, NEW YORK

Acres Farmed	Number of Families	Per Cent of Sons		
		At Home	On Other Farms	Not Farmers
30 or less	25	21%	33%	46%
31–50	29	52	22	26
51–100	171	75	8	17
101–150	187	78	10	12
151–200	136	72	10	18
Over 200	126	84	8	8

of energy wants to do productive work. The writer recently heard a farmer on a 40-acre farm say that he could keep four men busy. His seventeen-year-old son added that he would be no better off in the fall than in the spring. They were both right. The boy will leave the farm, because there is not profitable work for him.

A study of this question was made in Jefferson County, New York, on 674 farms. On the smallest farms, 79 per cent of the sons had left home. On the largest farms, 16 per cent had left. About half of those who left the farms have gone to cities or towns. The others are farming or are working as farm hands for neighbors. The farmers on the small farms averaged a little older than those on the large farms. But the difference is not enough to account for the large number of sons away from home.

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CHAPTER 8

SIZE OF FARM AND OTHER FACTORS IN DIFFERENT REGIONS IN THE UNITED STATES

FIGURES on the average size of farm for the United States are hard to interpret, because greenhouses, arid ranges, and many other equally striking contrasts are all averaged together. There are few states that have a sufficiently uniform type of farming to make the figures of much significance. But it is possible to select counties in which nearly all the farms are of one type. The best way to study any problem in agriculture is to select a region that is an agricultural unit.

The counties here compared show conditions and tendencies in the corn-belt, the cotton-belt, truck-growing region, hard winter wheat region, spring wheat region, irrigated region, and semi-arid region.

173. A county in the cotton-belt. — Dallas County, Alabama, is a region of good soils. Its farms were typical large plantations before the war. In 1860, there were 7785 white persons in the county and 25,760 slaves. The colored population has increased faster than the white. In 1910, there were 9890 white persons and 43,511 negroes. One in 10 of the farmers in 1910 was white. The farmers are so largely negroes that the county may be used to study the adjustment of size of farm and other factors to farming by negroes.

The Census does not give the size of farms by counties before 1880, but we know that before the war the county was divided into large plantations of several hundred acres. By 1880, the average size of farm had decreased to 103 acres and in 1910 it had decreased to 44 acres, or 31 acres of tillable land. The proportion of farms operated by owners has rapidly decreased. In 1910, only 11 per cent were so operated. The land owners have found it best to divide up the land into tracts that can be worked by one negro family. The number of farms of less than 50 acres has more than doubled since 1880.

The average farm in 1910 grew about 19 acres of cotton, 5 acres of corn, and 2 acres of all other crops. There was an average of a little over one mature horse or mule per farm. This shows the typical farm of the colored farmer, "20 acres and a mule." There was a little over one cow per farm, two hogs, and 14 head of poultry, and less than $50 worth of machinery per farm.

These farms with 19 acres of cotton and a mule are family-farms. This is about all the work a mule can do and about all the work a colored family cares to do. It provides full work for a family in cotton-picking season, and nearly full work in the cotton chopping season, but not during the remainder of the year. How prosperous these farms are may be judged from the fact that the value of the house and all other farm buildings averages $189 per farm.

Any county in the cotton-belt, where nearly all the farms are operated by negroes, shows the same figures. Bolivar County, Mississippi, has over 12 colored farmers for each white farmer. The farms average 31 acres with 24 acres of tillable land. There was a little over one work animal per farm, less than one cow, nearly two hogs, 11 head of poultry, 15 acres of cotton, 4 acres of corn, 2 acres of hay and forage crops, and an acre or two of other crops.

TABLE 54. — SIZE OF FARM AND OTHER FACTORS WITH DIFFERENT TYPES OF FARMING

	Dallas County, Alabama (colored)	Coffee County, Alabama (white)	Gloucester County, New Jersey	Utah County, Utah	Delaware County, New York	McHenry County, Illinois	Shelby County, Iowa	Clay County, Nebraska	Lac qui Parle County, Minnesota	Sherman County, Oregon
Average acres per farm	44	91	62	82	152	129	167	182	249	799
Acres of improved land	31	47	47	43	93	92	159	163	216	588
Per cent of farms operated by owners	11	43	69	92	86	57	59	50	66	59
Value of all property per farm	$997	$1,583	$5,418	$6,576	$5,495	$13,982	$24,357	$19,350	$14,073	$24,593
Value of land and buildings per acre	$17	$14	$71	$68	$27	$93	$128	$96	$49	$27
Value of buildings per farm	$189	$291	$1,911	$794	$2,011	$2,675	$2,500	$1,727	$1,900	$1,304
Value of buildings per acre of improved land	$6	$6	$40	$18	$22	$29	$16	$11	$9	$2
Value of machinery per farm	$50	$69	$381	$191	$327	$383	$567	$412	$518	$767
Value of machinery per acre of improved land	$1.61	$1.47	$8.10	$4.44	$3.52	$4.16	$3.57	$2.53	$2.40	$1.30
Hired labor per farm[1]	$31	$35	$312	$109	$152	$202	$156	$105	$298	$496

Feed purchased per farm	$23	$59	$137	$30	$396	$97	$133	$78	$20	*
Fertilizer purchased per farm	$15	$72	$278	*	$15	*	$1	*	$1	*
Fertilizer purchased per acre of improved land	*	$1.53	$6	*	*	*	*	*	*	*
Approximate area of crops per farm [2]	25	37	30	25	39	68	114	140	170	306
Work horses and mules per farm [3]	1.2	1.3	2.7	2.7	2.2	4.4	6.4	6.2	6.2	13.3
Acres of improved land per work horse or mule	26	36	17	16	42	21	25	26	35	44
Acres of crops per work horse or mule	21	28	11	9	18	15	18	22	27	23
Milch cows per farm	1.3	1.1	2.6	2.7	15.5	17.7	5.8	3.8	5.9	2.0
Other cattle per farm	1.9	1.3	1.1	7.1	7.1	9.6	21.2	6.1	8.0	3.5
Mature hogs per farm	2.3	5.6	2.8	1.3	1.2	6.9	29.8	11.5	9.6	4.8
Mature sheep per farm	0.5	0.02	0.8	34	1.1	1.6	1.9	0.7	1.3	14.5
Poultry per farm	14	21	61	32	48	86	110	75	93	56
Animal units per farm [4]	4.5	5.1	7.3	17	23	32	40	20	22	24
Crop acres per animal unit	5.6	7.3	4.1	1.5	1.7	2.1	2.9	7.0	7.7	12.8

* Less than $1.

[1] Includes cash paid for labor and rent and board furnished to laborers.

[2] Includes all the important crops.

[3] To get the number of work horses and mules, it has been assumed that there are as many two-year-olds as yearlings (3–15 months) and this number has been subtracted from the number over 15 months old, because very little work is done by horses under three years old.

[4] For definition of animal unit, see page 210.

In 1910, there were seven counties in Mississippi that had over 10 colored farmers for each white farmer. The area of improved land per farm in these counties varied from 23 to 29 acres with an average of 25 acres.

When we realize that large plantations have been forced to divide into these small patches and use a tenant system rather than operate with hired labor, we are forced to the conclusion that these small farms are generally better adapted to the conditions, otherwise they could not have driven out the large farm.

174. Cotton farms of white farmers. — How large a farm would be best in the cotton-belt in a region where white farmers, who have the necessary capital, do the farm work as such farmers do in the North, is hard to say, because there are few, if any, counties where the land is nearly all worked by well-to-do white farmers.

In Coffee County, Alabama, there are nearly 5 white farmers for each colored farmer. The average size of farm in this county in 1910 was 91 acres with 47 acres of improved land. The farms had only one and one-third work animals per farm, but they raised about 37 acres of crops per farm, half of which was cotton.

These are family-farms, as indicated by the fact that hired labor cost only $35 per farm. These farmers were nearly all poor, as is indicated by the fact that the total value of all farm property per farm was only $1583. If these persons had more money so that they could use more mules and machinery, it is probable that larger farms would be found to be more efficient.

The difficulty of getting cotton picked usually limits the area of this crop to what the family can pick. But if there is money enough to provide mules and equipment, other crops can be grown. It will be seen that these white farmers are farming more land than the colored farmers not by increasing the area of cotton, but by adding on other crops. This also enables them to use their work animals to a better advantage. Each work animal raises 8 more acres of crops than in Dallas County. By carrying this a little farther, and by adding on more live-stock and with a little day help, a white family that has a grown son can raise 100 acres of crops, about one-fourth of which is cotton. There are a considerable number of farmers scattered throughout the South who are doing this. If there are no sons a hired man by the year will be needed.

In general, the area in crops, as well as the yield per acre, must be increased before the individual worker in the South can be very prosperous. Most of the white farmers of the South lack capital and many of them lack the education necessary for efficiency.[1] The South can never prosper so long as it drives a one-mule team.

175. A truck-growing region. — Gloucester County, New Jersey, is a region largely devoted to truck crops. In this county the number of farms of over 100 acres has decreased. Farms of 50–99 acres are most numerous, but there are more farms of less than 50 acres than there are of over 100 acres. The average size of the farm has decreased slightly in the past 40 years. In 1910, there were 62 acres per farm or 47 acres of improved land. There was an average of 14 acres of potatoes, sweet potatoes, and vegetables, and 16 acres of other crops per farm.

Small grain has almost disappeared from this county. A small area of corn and hay continues to be grown for

[1] North Carolina, Bulletin 84 calls the "one-horse farm" the chief enemy of progressive agriculture. See also U. S. Dept. Agr., Bureau of Plant Industry, Bulletin 259, p. 18.

feed. In 1909, there was about one acre of small grain, 8 of corn, and 7 acres of hay and forage crops per farm. There was an average of a little less than three work animals and three cows, nearly three hogs, and 61 head of poultry per farm. The total live-stock amounted to about 7 animal units.

The farms in this county are family-farms, as is indicated by a hired labor cost of $312 per farm. The income is mostly derived from truck crops and eggs. Most of the feed is raised. The largest single item of cash expense is $278 per farm for fertilizers. This amounts to about $9 for each acre of crops.

When one-third of the area is in vegetables, it appears that about 30–50 acres of crops, together with a little live-stock, provides full work for a farm family.

176. An irrigated region. — Utah County, Utah, has been settled for many years. There has been time for adjustment of the size of farm to meet conditions. General farming is followed. The chief products are alfalfa, wheat, sugar beets, and potatoes. Oats, corn, barley, vegetables, fruit, and eggs are also important.

The size of farm has been increasing for the past 20 years, but the area of improved land per farm has been fairly constant.

In 1910, there was an average of 43 acres of improved land per farm. The area of improved land, the total capital, and number of work animals are approximately the same as in the truck growing county in New Jersey.

177. A hilly dairy region in New York. — Delaware county, New York, is a noted dairy region. The county derives most of its income from cows. The average size of farm is 152 acres. There was an average of 39 acres of crops and about 16 cows per farm. There was an average of only 1.7 acres of crops to the animal unit. The cost of purchased feed amounted to about $400 per farm or $25 per cow. The farmers raise very little except hay and corn for the silo. The region is not very prosperous, although it has splendid buildings and so looks prosperous. The buildings were mostly built one or two generations ago when considerable income was being derived from lumber. It is now difficult for a young man of small means to buy a farm and pay for it out of the land, in spite of the fact that the women usually help milk. The small number of tenants shows that few persons are trying to start without capital. Most of the farmers inherited their farms. Some of the few tenants are on land in which they have, or will have, a part interest by inheritance. There are some rich, prosperous farms in the river valleys, but the averages reflect the condition on the hills, because most of the farms are hill-farms.

The greatest difficulty is the small area of tillable land. This not only fails to raise cash crops but fails to raise enough feed. The greatest need of the region is diversified farming. But this calls for more tillable land to the farm, or larger farms.

There are a few farmers in this region who have more tillable land and who sell cash crops as well as milk. These are usually doing well. The best thing for this region would be to combine farms so that there would be twice the area of land in crops and twice the pasture area. The best half of the cows from the two farms should be kept. Each of these cows would then have double the pasture area, so that the pasture would furnish feed for a longer period and be improved. Half the tillable land would then be available for cash crops. The profit on half as many good cows that have abundant pasture would be greater than on the present number. The combined farms could be farmed with one less horse than the separate farms. This would make an average of 88 acres of crops, 16 cows, and 3.4 horses per farm. Some farmers have made this change and prospered thereby.

178. A dairy region in Illinois. — McHenry County, Illinois, is an important dairy region. The farms average 129 acres with 68 acres of crops and 18 cows. There is an average of 2.1 acres of crops per animal unit. The farmers in this region usually raise most of their feed, raise corn for hog feed, and small grain and corn for sale. The combination of dairying with cash crops and hogs raised on home-grown corn makes a very good business. Some farmers in this region sell little but milk. Usually they are not doing as well as those that follow diversified farming.

Dairy farms follow the same principle as other American farms, they tend to the family size. About fifteen to twenty cows is the average number that a family can care for. Of course, some are larger and some are smaller. The farmers in McHenry County are doing fairly well. With only $202 worth of hired labor they raise an average of 68 acres of crops, keep about 18 cows, and raise hogs and young stock. There is a total of 32 animal units per farm.

179. Farms in the corn-belt. — Shelby County, Iowa, is typical of considerable of the corn-belt. It is a good county to study, because it does not have large cities that result in the mixture of many types of farms. Most of the farms in this county are typical corn farms.

In 1909, there were 58 acres of corn per farm, 31 acres of small grain, 23 acres of hay, and less than an acre of potatoes. There was an average of 6 work animals, 27 cattle, 30 mature hogs, and 110 poultry per farm. A total of 40 animal units are kept.

Most of the farms in this region were 80 or 160 acres when the country was first settled. The farms of less than 100 acres are rapidly disappearing, and the 160-acre farms are decreasing but are still the most numerous size. Farms of 175 to 500 acres are increasing.

TABLE 55. — SIZE OF FARMS, SHELBY COUNTY, IOWA

SIZE OF FARMS (ACRES)	NUMBER OF FARMS			
	1880	1890	1900	1910
Under 20 . . .	14	50	77	93
20–49 . . .	238	149	134	108
50–99 . . .	763	729	484	333
100–174 . . .			943	888
175–259 . . .	915	1474	469	479
260–499 . . .			257	285
500–999 . . .	15	22	23	26
1000 and over .	1	0	0	1
Average acres	123	103	156	167
Average improved acres	100	93	147	159

Since 1880, the number of farms of 20–99 acres has decreased from 1001 to 441. During the same time, the larger farms increased from 931 to 1679. The farms of less than 20 acres are mostly homes of retired farmers or of persons who hire out to farmers or do other kinds of work. Few of them are real farms. Few of the farmers on farms of 50 acres depend entirely on the farm for their living. Many of them work for neighbors.

The average farm in 1910 contained 167 acres, of which 159 acres were improved land. This is over three times the area of improved land in the county in New Jersey.

If we measure a farm by the amount of labor, these are really smaller farms than the farms in New Jersey. About the same labor was hired as in the county in Utah and half as much as in New Jersey, and less labor than in the dairy county in Illinois. These Iowa farms are not bonanza farms. They are family-farms. With the intelligent use of horses and machinery, a family in this county can farm 320 acres and do it well without hiring much help. The movement in this county is toward farms of 160 or more acres.

The counties studied in Alabama, New Jersey, and Utah are making only a limited use of machinery and horse power, because the types of farming are so largely dependent on hand labor. Shelby County, Iowa, is typical of an entirely different system of farming. When one man begins to drive four horses instead of one or two, we have entirely different conditions.

As we would naturally expect, the farmers who drive four-horse teams are prospering. Much of the rise in land values in the Central West is due to the great economy in production that has come from the use of modern machinery.

It is often said that this machinery has saved horse labor, but the saving is in men more than in horses. The negro's mule raises as many acres of crops as does the horse in Iowa, but the negro drives one mule. The Iowa farmer drives more horses, so that he raises nearly five times the crop area per man. After the county was settled, the size of farms began to decrease. The idea of driving more than two horses then came in and in twenty years raised the size of farms 65 per cent.

It is this change that has resulted in the decrease in rural population in Iowa.

The population of this county rose rapidly until 1890. It was a little larger in 1900, but decreased 8 per cent in the next ten years. To those who have not studied the situation, this appears as a great calamity, but it is an indication of the greatly increased efficiency of farmers, due to machinery and education. Probably the highest point in population was reached in the early nineties. Until this time, very few men drove over two horses on any farm machinery except on the grain binder and, occasionally, on a smoothing harrow. The two-horse team was the regular way of farming. Considerable corn cultivation was still done with one horse. During the nineties, men began to drive four-horse teams on discs, gang plows, and smoothing harrows. This practice has continued to increase, but has not yet reached its limit. We shall expect the driving of three, four, and five horses to continue to increase.

When a farm family with only $156 worth of help raises 58 acres of corn, 31 of small grain, and 23 of hay, besides caring for 8 horses and mules, 27 cattle, 30 mature hogs and their pigs, and 110 poultry, we do not need so many farmers as when it requires one man to drive each horse. To do this amount of work would probably have required two families in 1880. The population of rural Iowa has decreased because the farmers have learned how one man may do almost as much work as two did before, and do it better. Nearly one-fifth of the farmers who own their own farms rent additional land. This is because they find that they can farm more land without having to increase their horses, machinery, or labor to any great extent.

In spite of other types of farming near cities, Iowa as a whole shows the same changes. The farms of 20–49 acres decreased in number 27 per cent in the ten years from

1900 to 1910. Farms of 50–99 acres decreased 22 per cent. Farms of 100–174 acres were practically stationary. But farms of 175–499 acres increased 5 per cent.

It is evident that for the usual types of farming in Iowa, 160 to 320 acres is the most efficient size of farm. At the same time that the family farm is increasing in size, the number of large farms is decreasing. There is no tendency toward "bonanza" farms. There is also an increase in the number of places of less than 20 acres. Some of these are greenhouses, gardens, and other types of farming that cluster about cities. Probably more of them are homes of persons who derive most of their income from some other source.

At the same time that the farms in much of the Central West are increasing in size, the farms in New Jersey, Delaware, and Alabama are decreasing in area. The same change is taking place around the cities of the Central West. Whenever general farming is replaced by truck growing and other hand labor types, the farms become smaller. In such states as Ohio and Indiana, the farms in the general farming regions are increasing in area at the same time that farms around the rapidly growing cities are being divided up for truck patches. It is these conflicting movements that make it necessary to study areas that are fairly uniform in type of farming in order to understand the conditions.

180. The hard winter wheat region. — Clay County, Nebraska, is typical of much of the region growing hard winter wheat. This county has enough rainfall so that corn can be grown. Corn and wheat each occupy about two-fifths of the area in crops. Oats and hay each occupy about one-tenth of the area. Practically all of the wheat and some of the corn and oats are sold. A considerable part of the corn is fed to hogs. Colts, beef, butter, and eggs are minor products.

Most of the settlement of this county took place between 1870 and 1885. Many of the settlers were not soldiers and so were entitled to only 80-acre homesteads. In 1880, there were 886 farms of from 50–99 acres. Practically all of these were 80 acres.

TABLE 56. — CHANGES IN SIZE OF FARMS, CLAY COUNTY, NEBRASKA

SIZE OF FARM	NUMBER OF FARMS			
	1880	**1890**	**1900**	**1910**
Under 50 acres .	109	64	184	158
50–99	886	482	334	186
100–174			858	794
175–259	1176	1394	377	451
260–499			304	321
500–999	11	21	29	22
Over 1000 . . .	1	0	1	0
Average acres . .	134	160	172	182
Average improved acres	100	139	146	163

The county was not fully settled before grain binders and mowers came into general use. About 1895, the practice of driving four or five horses on gang plows and wide harrows started. In a few years the plowing, harrowing, discing, drilling, harvesting, and some other operations began to be done with four- or five-horse teams.

The 80-acre farm does not furnish full employment for one man who drives 4 horses. In thirty years, the number of farms of 50–99 acres has decreased from 886 to 186. This size of farm has been practically eliminated.

The 160-acre farm is not large enough to fully employ a small family. One man, with the help of a son during school vacations, can do all the work on 200 acres, except in harvest. The 160-acre farm is still the most numerous in the county and may so continue. While not large enough for greatest efficiency, it provides a fairly good living. Many persons are content with this area, if they do not have sons to help.

Some persons who have only money enough to own 160 acres do not always find additional land to rent even if they desire it. Sometimes a tenant cannot get more than 160 acres.

The number of farms of 100 to 174 acres decreased from 858 to 794 in the last ten years. During the same time, the number of farms of 175 to 259 acres increased 20 per cent and the number of 260 to 499 acres increased 6 per cent.

It is evident that farms of about 240 to 320 acres have a very great advantage over all other sizes. This is about the area necessary for a family-farm under the conditions in this region. How fully the owners, as well as the tenants, realize the importance of having land enough to provide full employment is shown by the fact that 36 per cent of the farmers who worked their own land rented additional land. There is no tendency to develop bonanza farms. There are only a few farms of over 500 acres, and the number is decreasing.

On one five-mile road in Clay county that the writer has traveled over many times there used to be 13 houses; now there are 8. If it were in the East, where lumber is cheap, the other 5 would be left as abandoned homes. But lumber is too valuable, so all are torn down. Sometimes a few trees that have not been removed are still standing. The land is all farmed.

Barton County, Kansas, is one of the leading counties in the production of hard winter wheat. Corn is more frequently injured by drouth in this county, so that more of the land is devoted to wheat. The average size of farm has increased from 180 acres in 1880 to 305 acres in 1910. The most numerous size of farm is 260 to 499 acres. This means that half sections, 320 acres, are the most popular size.

In 1909, there was an average of 152 acres of wheat, 36 acres of corn, 19 acres of hay, and 3 acres of other crops per farm, a total of 210 acres of crops raised per farm besides caring for cattle, poultry, and other live-stock. Yet the hired labor on these farms cost only $312, exactly the same as on the farms of 62 acres in New Jersey. Although five times the area, these farms are no larger than the New Jersey farms in terms of man-labor. They are family-farms, but there were 8 work animals per family instead of 3.

181. A spring wheat region. — Lac qui Parle County, Minnesota, is typical of much of the spring wheat region of Minnesota and the Dakotas. As might be expected, these farms are about the same size as in the winter wheat region. With the driving of more horses per team, the size of farms in this county has rapidly enlarged. In 1910, there were only half as many farms of 50–99 acres as in 1900. The 80-acre farm is practically eliminated. There are only three-fourths as many farms of 100–174 acres as there were ten years ago. The increases have been in the 175- to 499-acre groups.

In 1909, the crops grown per farm averaged 56 acres of wheat, 33 of oats, 23 of barley, 24 of hay, 24 of corn, 7 of flax, and 3 of other crops. This makes a total of 170 acres of crops per farm. In addition, there were approximately 6 dairy cows, 8 other cattle, 10 mature hogs, and 93 poultry per farm. All this is done with only $298 worth of hired labor per farm.

It is easy to see why the farmers in the Central West are prosperous. They have learned how one man may do the work of two by putting the two teams together and dispensing with one driver. In the older parts of the country, the farms have been divided into small fields, as well as small farms, and the farmers are more conservative, so that the use of four-horse teams is not so frequent. But the practice is gaining ground in all regions where large areas of small grain and cultivated crops are raised. Whenever this change takes place, it is inevitable that the farms become larger. They must be large enough to provide fairly full employment for a family.

182. A dry farming region. — As we go from humid to dry regions, the chances of securing a crop become less and the size of farm increases. It is necessary to have a large area in years when a crop is secured, in order to carry the family over dry years. Barton County, Kansas, is less certain of crops than Clay County, Nebraska, or the county in Minnesota, and has larger farms. As we proceed to semiarid regions, the farms become larger. The farms in Barton County average 305 acres. Rush, the adjoining county on the west, is much drier. Here the farms average 388 acres. The next county, Ness, is still drier, and the farms average 629 acres.

Sherman County, Oregon, is a good county to study for dry farming conditions. The rainfall is only about 10 inches, but the low evaporation makes it possible to raise wheat by dry farming methods. In this county, the farms of less than 500 acres decreased over one-half in the ten years from 1900 to 1910. There are almost as many farms of over 1000 acres as there are of less than 500. The average size is 799 acres, with 588 acres of improved land. The usual practice in this county is to till the land one year to save moisture and raise a crop the next year. The attempt is to save two years of rain for one year's crop. In 1909, there were 264 acres of wheat and 42 acres of other crops per farm. But when measured in terms of man-labor these farms were only a little larger than the 62-acre farms in New Jersey. But there were 13 work animals per farm instead of 3.

183. Size of farms in some typical states. — Table 57 shows the size groups in which the number of farms increased or decreased in the ten years 1900 to 1910.[1]

In nearly all states there is an increase in number of farms of less than 20 acres. Some of this increase is due to the very commendable tendency for persons who are employed in towns to live on small places where some products may be raised for home use. In some states, the retired farmers have many such small places around towns. Probably in every state there is an increase in greenhouses and other intensive types of farming near the towns and cities.

In the states where grain, hay, and live-stock farming predominates, the farms of 175 to 259 acres usually show the most rapid rate of increase. The sizes that show the largest percentage of increase are marked + +. In Ohio and Indiana, the most rapid increases have been in the 100- to 174-acre group; in New York and Minnesota in the 260- to 499-acre group. The farms of 20 to 100 acres are usually decreasing rapidly. This is the region where farmers are driving more horses per man. Under these

[1] In comparing states where the number of farms have increased in all groups percentages must be used, but for the states here used the numbers show the point.

conditions the farms of 20 to 100 acres are too small for farming with horses and machinery, and appear to be too large for greenhouses, homes of town workers, and others who make up the increase in places of under 20 acres.

TABLE 57. — INCREASES AND DECREASES IN NUMBERS OF FARMS

	UNDER 20 ACRES	20 TO 49	50 TO 99	100 TO 174	175 TO 259	260 TO 499	500 ACRES OR MORE
Grain, hay, live-stock							
New York	+ +	—	—	—	+	+ +	—
Ohio	+	—	—	+	—	—	—
Indiana	+ +	—	—	+ +	+	—	—
Illinois	+	—	—	—	+ +	+	—
Iowa	+ +	—	—	+	+ +	+	—
Missouri	+	—	—	+	+ +	+	+
Wisconsin	+	—	+	+	+ +	+	—
Minnesota	+	—	—	—	+	+ +	+
Truck growing							
Connecticut	+	+	—	—	—	—	+
Massachusetts	+	+	—	—	—	—	—
New Jersey	+	—	—	—	—	—	—
Delaware	+	+	+	—	—	—	—
Maryland	+	+	+	—	—	—	—
Cotton							
North Carolina	+	+	+	—	—	—	—
South Carolina	+	+	+	—	—	—	—
Georgia	+	+	+	+	—	—	—
Alabama	+	+	+	—	—	—	—
Mississippi	+	+	+	—	—	—	—
Louisiana	+	+	+	—	—	—	—

+ + indicates sizes showing most rapid rates of increase.

In regions where truck growing or cotton predominates, farms of less than 100 acres are increasing most rapidly.

Farms of over 500 acres are decreasing in number in nearly all the states except in arid regions and in regions where much of the land is kept in woods or pasture. These results agree with all the previous discussion of size of farm.

184. Conclusion on the size of farm. — From Table 54, it is evident that a work animal can raise 18 to 30 acres of crops. If nearly all the crops are tilled, 20 acres is sometimes full work. If most of the land is in small grain and hay, the area may be considerably more. With a mixture of all three, such as is common on diversified farms, a work animal can usually raise 25 to 30 acres of crops.

Every farm ought to have at least two men for efficient work. If there are no sons working at home, then there ought to be one hired-man. Most of the better class of farms have the equivalent of one man besides the operator.

If most of the work is done with one horse tools, and if a horse can raise 20 acres of crops, it is evident that there should be about 40 acres of crops and two work animals per farm. This is practically the condition in the truck growing counties.

If much of the work is done with three- and four-horse teams, it is evident that two persons can then raise 150 to 200 acres of crops if they have help in harvest. This is the condition in the general farming counties studied.

Most farms have pasture land and other land not in crops. It is evident that for types of farming where grain, hay, and live-stock are the chief products, the farms must be from 150 to 300 acres for efficiency. This agrees with the studies of profits in relation to size of farm.

For truck growing, 80 acres is usually as large a farm as 300 in general farming. An acre partly covered with greenhouses may be an equally large business.

Whatever the type of farming, the farm should be large enough to allow for the use of the well established labor-saving practices, and large enough to provide a variety of products that make a full year's work.

CHAPTER 9

CAPITAL

THE capital per farm was fairly constant until the last fifteen years. The amount of money required to buy a farm and equip it has now suddenly increased. Along with this change has gone an increase in the number of tenants, but it has been shown that the proportion of the agricultural workers who own their farms has not changed much. The proportion of hired-men has decreased as rapidly as tenants have increased. (Table 65.) The higher land values and greater investments in machinery all call for more capital than was once necessary. The average capital per farm in 1910 was $ 6444.

185. Relation of capital to profits. — We have already seen how important it is to have a farm large enough for efficient work. So long as we deal with one type of farming, size of farm is a good measure of size of business, but when many types of farming are compared, capital is a better measure.

The capital available is becoming increasingly important in farming. Some of this capital may be secured by renting land or borrowing money. Because of shortage in capital, 37 per cent of the farmers in the United States rent all the land that they operate, and 9 per cent own part and rent part of their land. Only a little over a half (54 per cent) of the farmers own their entire farms.

Of the farmers who own all or part of their land, 34

TABLE 58. — AVERAGE VALUE OF FARM PROPERTY PER FARM IN THE UNITED STATES

Year	Real Estate	Implements and Machinery	Live-stock	Total
1850	$2258	$105	$376	$2739
1860	3251	120	533	3904
1870	2799	102	462	3363
1880	2544	101	393	3038
1890	2909	108	506	3523
1900	2905	133	536	3574
1910	5471	199	774	6444

per cent are mortgaged. Only 36 per cent of the farmers own all the land that they operate and are free from mortgage. Rented land, mortgages, notes, and buying on time are different ways of trying to increase the capital available for use.

The fact that so large a proportion of the farmers secure additional capital by some means is an indication of how important farmers consider the capital to be.

Studies of profits made by farmers show the same results. In one county, in New York, the average owner with less

TABLE 59. — RELATION OF CAPITAL TO PROFITS. 615 FARMS OPERATED BY OWNERS, TOMPKINS COUNTY, NEW YORK

Capital	Number of Farms	Average Labor Income
$2,000 or less	36	$192
2,001–4,000	200	240
4,001–6,000	183	399
6,001–8,000	94	530
8,001–10,000	45	639
10,001–15,000	44	870
Over 15,000	13	1164

than $4000 capital has not made as much money as a hired-man receives. Those with a capital of $10,000 are, on the average, making very good profits.

It has been suggested that the more able men have the larger capitals, and that the results are due to the man rather than to the amount of capital. But most of the men who make successes in farming begin with small capital; there must be some able men beginning now. As a matter of fact, there are many able men, both young and old, who are farming with very little money. If the question is one of the man, then these should be doing well. Table 60 shows how many men with small capital are making fair profits.

TABLE 60. — RELATION OF CAPITAL TO PROFITS. 615 FARMS OPERATED BY OWNERS

CAPITAL	NUMBER OF FARMERS	PER CENT OF THE FARMERS MAKING LABOR INCOMES OF OVER $1000
$2,000 or less	36	0
2,001–4,000	200	0
4,001–6,000	183	8
6,001–8,000	94	14
8,001–10,000	45	22
10,001–15,000	44	32
Over 15,000	13	46

Of 36 farmers with capital of less than $2001, not one made a labor income of $600. Of 236 who had less than $4001 capital, not one made a labor income of $1000, and only one made as much as $800. The possibilities of large profits with so small a capital do not seem very bright.

The possibilities of a large loss are also greater when one has a large capital. It is almost impossible to make a large loss with a small capital. If one has $15,000 invested and is not in debt, and if the farm receipts are $300 more than the farm expenses, there will be $300 for the family to live on. But the labor income will be minus $450, since the farmer has made this much less than 5 per cent interest on his capital.

Six of the 57 farmers with capital of over $10,000 failed to make 5 per cent on their capital or had minus labor incomes. One of these had more farm expenses than receipts. The largest loss was a labor income of minus $948 made by a man with $22,385 capital.

Records for 578 farms in northern Livingston County, New York, give the same result. The farmers who are using a capital of less than $5000 are on the average not making as much as hired-men receive. They would be better off if they lent their money and hired out at farm wages. (Table 61.)

TABLE 61. CAPITAL RELATED TO LABOR INCOME. 578 FARMS, NORTHERN LIVINGSTON COUNTY, NEW YORK

CAPITAL	NUMBER OF FARMS	AVERAGE LABOR INCOME
$5,000 or less	87	$291
5,001–7,500	80	407
7,501–10,000	112	480
10,001–15,000	164	769
15,001–20,000	62	1001
20,001–30,000	55	1062
Over 30,000	18	1691

Of the 87 farmers who used less than $5000 capital, only six made labor incomes as large as $1000. One-third of those who had $10,001 to $15,000 capital made labor incomes of $1000 or more. Half of those who had over $15,000 capital made labor incomes of $1000 or more.

The need of more capital is strikingly shown. It is difficult to make reasonable wages if the capital is too small. With a sufficient capital, it seems to be much easier to make both interest on the capital and pay for the farmer's time.

TABLE 62. RELATION OF CAPITAL TO PROFITS. 578 FARMS, NORTHERN LIVINGSTON COUNTY, NEW YORK

CAPITAL	PER CENT OF THE FARMERS MAKING LABOR INCOMES OF OVER $1000
$5,000 or less	7
5,001–7,500	11
7,501–10,000	16
10,001–15,000	33
15,001–20,000	46
20,001–30,000	51
Over 30,000	50

The same point is shown for New Hampshire farms.[1] Wherever such studies are made, the importance of capital for successful farming is strikingly shown.

186. Distribution of capital. — The proportion of capital to be invested in land, stock, and equipment varies with the price of land and stock as well as with the type of farming. A farm may have its capital properly distributed, after which land may double in value and about the same stock and equipment may still be best, but the percentage of the capital that each of these represents may then be different. In 1900, the proportion of the money invested in buildings varied from 10 per cent of the capital on sugar plantations

[1] U. S. Dept. Agr., Bureau Plant Industry, Circular 75.

to 43 per cent on farms that derived their chief income from flowers and plants. The amount invested in machinery and implements was 3 to 4 per cent of the total capital with most types of farming, but was 22 per cent on sugar plantations. The investment in live-stock varied from 1 per cent on flower and plant farms to 21 per cent on live-stock farms.[1]

Table 63. — Average Capital and Its Distribution on Farms in the United States

	1900		1910	
Land exclusive of buildings	$2285	64%	$4476	70%
Buildings	620	17	995	15
Implements and machinery	133	4	199	3
Live-stock	536	15	774	12
Total	$3574	100%	$6444	100%

187. Relation of capital to type of farming. — The types of farming that require little land usually require more capital in other forms, so that the amount of money required for a given labor income is not strikingly different. In general, it appears that persons with small capital had best put most of their effort into raising crops to sell rather than in raising too much live-stock, because live-stock calls for additional investment above that required in crop production. (See pp. 94 to 96.)

188. Economy of cash purchases. — In most parts of the United States, there are no adequate facilities for obtaining credit for farmers. As a result, the manufacturers of machinery and fertilizers act as bankers as well as doing their regular business. So little farm machinery is

[1] Twelfth Census, Vol. V, p. lvii.

sold for cash that in some regions there are no cash prices. If machinery bought in the spring is paid for by October 1, the price is counted as cash.

Most of the chemical fertilizers are purchased on time. It is hard to realize what a tremendous credit business these agencies conduct. In order to sell the product, they must not only produce machinery and fertilizers, but must furnish the farmer credit. What really happens is that while banks do not furnish the necessary capital to farmers, they furnish it to the machinery and fertilizer companies, whose credit comes from the large number of farmers who owe them. It would be much better if farmers conducted their own credit associations, as is done in Europe.

The companies from which the farmer buys on time, charge enough to make a good profit on the credit business, as well as on their regular business. If there is no cash price on a piece of machinery, it does not mean that the firm has generously donated the use of money to the farmer. He pays a good high rate of interest in the increased price.

Some cases in which cash prices are offered give some idea as to what rates of interest are really charged. The writer obtained prices from one dealer as follows: a plow that regularly sold for $13 on a year's time at 6 per cent interest, could be purchased for $12 cash. If this plow is bought on time, the real interest charge is $1.78, or 15 per cent on the cash price. He sells a grain binder for $125 on a year's time at 6 per cent, or for $118 cash. The real interest charge in this case is $14.50. The rate of interest is 12 per cent, not 6. This dealer estimates that, on an average, the prices are enough more to make the real interest charge 12 per cent. This is in a region where farm mortgages rarely bring as much as 6 per cent. The practice of the dealers is justified by the expense of collection, bad debts, and by the fact that the dealers are forced to take on the functions of a bank, a business for which they are not well situated. It would be much better if we had means of securing adequate credit directly, and if the feed, fertilizer, machinery, and other articles were purchased for cash.

Farmers are not much given to buying on the installment plan. This is even a worse way of obtaining credit. The fact that there are many collections makes it necessary to charge a still higher rate of interest. Another objection to buying on the installment plan is that it is usually used as a bait to lead persons to buy things that they cannot afford. Houses in the city are sometimes bought on the installment plan to good advantage.

189. Farm mortgages. — If land values are fairly stable, it is usually safe to mortgage a farm for half its value, provided the money is wisely used in the farm business. If crop yields are uncertain, the danger from a heavy mortgage is greater than where yields are uniform.

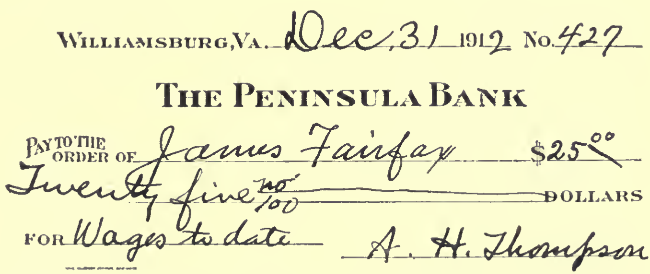
Farmers often come to look upon the money obtained by a mortgage as a permanent part of their capital. This is a dangerous view to take. One may sometimes continue to renew a mortgage from time to time to good advantage, but this money must never be looked upon as a part of the permanent capital. One must always be prepared in advance to either pay or renew a mortgage. The agreement for renewal ought to be made at least a year before a mortgage becomes due, so that there will be no trouble. It must be remembered that while money obtained on a mortgage greatly increases the chances of making money, it also increases the chances of losing.

190. Keeping one's credit good. — Since few farmers have money enough to conduct their business to good advantage, it is of the greatest importance that the credit be kept good. Nothing is more detrimental to one's credit than allowing innumerable little bills to go unpaid. It is much better to borrow enough from some one source, or allow one large bill to stand than it is to allow small bills to accumulate. In making promises to pay, one should be sure that he does not promise too soon. It is much better to make the promise far enough away so that one may do better, rather than not do so well, as he agreed.

Roberts has well expressed the experience of the farmer who always has things charged in his "Farmer's Business Handbook."

"Most sane people are extremely unhappy when their outgo is equal to or exceeds the income. Some are really unhappy only when the bills come in; while others live in dread of petty debts scattered they know not where, and in amounts which have been forgotten, not knowing whence the next dun will come or how or when disgrace may fall upon them. How often I have seen a noble, industrious farmer marketing his chief money crop of the year, the wheat or the wool, or the fat live stock! With what honest pride he laid the check for several hundred dollars on the bank counter and then stuffed that 'wad' of bills into his 'side pocket!' Then with what a cheerful voice he asks at the desk of the grocer for the amount of his account! 'Fifty-six dollars and seventy-two cents,' the clerk responds. 'There must be some mistake; it cannot be more than half that.' The items are looked up, the charges are correct, the bill is paid. In a voice out of which some of the courage has gone, he asks for his account at the dry goods store. This is nearly one hundred dollars. He disputes the account, says he never had the goods, there is some mistake, they have been charging neighbors' purchases to his account; he takes an hour to inspect the items, pays the bill under protest, and, concluding that he has had enough unhappiness for one day, takes something to drink and lets the half dozen other fellows wait for their pay. For it will be some pleasure to carry even a small roll of bills for at least a few days in the year."

The progressive farmer keeps his money in a bank and pays with checks. He no longer carries money


WILLIAMSBURG, VA. Dec. 31 1912 No. 427

THE PENINSULA BANK

PAY TO THE ORDER OF James Fairfax $25.00

Twenty five no/100 DOLLARS

FOR Wages to date A. H. Thompson

FIG. 65. — A properly written check. The statement of what the money was paid for makes a receipt.

about with him or hides it in an old boot. There are many advantages of using checks. One very important advantage is that the check makes a receipt.

191. Agricultural credit as a public question. — With the revival of interest in agriculture, the fact that we have no adequate system of agricultural credit is attracting attention. The condition is certainly a very serious one. Farm mortgages are made for too short a time when the slowness of returns from some of the best farm investments is considered. It takes time for tile drains and pure-bred stock to pay. Railroads issue bonds to run many years, but the farmer in America has no means of obtaining ten- and twenty-year loans. The rate of interest on mortgages in some regions is much higher than it would be if some sort of coöperative credit associations were formed. An even more serious consideration is the problem of securing credit for current expenses while the crop is being grown. There is really no system of securing such credit for American farmers, except in some of the highly prosperous regions.

The following discussion by H. C. Price in the *Rural New Yorker* of Oct. 19, 1912, presents some important phases of the question.

THE BANKERS AND THE FARMERS

The general awakening of interest in the necessity of a better system of credit for American agriculture has started the bankers studying the farmers' business, and it behooves the farmers in turn to study the bankers' business, and especially their interest in the establishment of agricultural credit institutions.

The necessity of a more readily available capital for carrying on the farmers' business is granted by every one who has given the least attention to the matter. But how this is to be done is the point at which the interests of bankers and farmers are likely to conflict. If there is money to loan and securities to sell, the banker naturally wants the business, and he wants the business in such shape that it will make him a good profit. The bankers' associations have taken the matter of agricultural credits up seriously, and have investigated the European systems; their periodicals are filled with articles on the subject.

It has become so much a live issue that the national political parties have included it in their platforms, and without doubt something will be done in the near future to establish either public or private institutions from which farmers may make loans on favorable terms.

Unless the farmers take a hand in this, the financial interests of our country are likely to shape such institutions to suit their interests first and the farmers' interests second. Already there are suggestions of a large central land bank with almost unlimited capital for financing farmers, of land mortgage associations with like gigantic capital to handle loans on farm real estate. But there are some fundamental factors concerned in the matter that must be observed if a system is established that will give the relief that is necessary and proves the success that similar institutions have proven in European countries.

First: *Farmers must be represented in its management and control.* The German agricultural credit organizations, which are the best in the world, are managed by farmers and for farmers. They are literally a union of the farmers for the farmers and by the farmers. Bankers and financiers can coöperate and assist such organizations, but they cannot do for the farmers what they must do for themselves.

Second: *Farmers' credit organizations must be on a limited liability basis.* For that reason the Raiffeissen system which is so widely distributed in Europe and by many advocated for introduction in America is not applicable to our conditions, because the *one* thing on which Raiffeissen built his association was the unlimited liability of members. It was literally "one for all and all for one." The American farmer will not become a member of an association by which he makes himself liable for all of his property. With a peasant population such as the one near where Raiffeissen founded his societies it made little difference to the members whether they pledged themselves for all their property or not, because they had nothing to lose anyhow. But the American farmer will not and should not willingly risk his farm and all he has by becoming a member of an association which has unlimited liability of its members.

THIRD: *Farmers do not want any subvention or subsidy from the Government.* France has established her agricultural credit institution on the basis of free government loans and granted legal monopolies the privilege of furnishing real and personal credit to farmers. The farmers of America have no need of free loans from the Government; all that they need is to sell their credit for what it is worth, so that they may borrow on as favorable terms as other industries.

FOURTH: *Agricultural credit organizations should be under Government supervision.* The bankers probably will not indorse this proposition heartily. But if the interests of the farmers are to be protected and the institutions are to be of undoubted security, they must be under direct Government supervision. The success of the German land mortgage association has been due to the fact that it has been under direct Government supervision and indirectly Government control.

FIFTH: *The credit institution that serves the farmer must be close at hand.* Whether it is a bank, a land mortgage association, or wherever the farmer gets his credit, it needs to be close at hand where he can go personally and make his arrangements. For this reason the large centralized institution located in the cities will not serve the purpose. The farmer needs a decentralized system that has its branches in every township. The success of the European rural banks is due to the fact that they are established in the rural communities where they are convenient for the farmers and they conduct their business to suit the convenience of the farmers, including business hours.

The reason the present situation of credit and banking facilities for the American farmer is so unsatisfactory is because the banking business has been developed to suit the needs of the city and not the country. The farmer has been left to adapt himself to the rules and regulations of banks conducted for city customers. And now the banks are awakening to the fact that they do not meet the situation as far as the farmer is concerned; moreover, that the farmers are threatening to take over their own business and establish their own financial institutions along lines that have proved successful in other countries.

The farmers and bankers may well confer together in this matter, and the bankers in their deliberations will do well to call upon the farmers to express what they think could and should be done. The farmers in turn can well afford to consult the bankers and get their point of view. The elimination of selfish interests and the promotion of American agriculture should be the goal of both bankers and farmers.

WAYS OF FARMING WITH SMALL CAPITAL

192. Ways of securing capital. — One of the easiest ways of securing the use of capital is to be a tenant. In 1910, sixty-four per cent of the farmers in the United States rented all or part of the land that they operated, or secured additional money by means of mortgages. It is not at all necessary that one own all the property that he operates. If one has only a small amount of money, it is usually very undesirable to try to farm on the small area that this money will buy.

There are many degrees of farming, adapted to varying capital. One may be hired-man, share renter, cash renter, or may own part and rent part of the land operated, may have the owned land mortgaged, or may own all the land free from debt. Each of these varying degrees of responsibility requires more capital than the preceding. Many farmers pass through each of the stages as they secure more money.

193. Changes from hired-man to tenant and owner.— There is no permanent class of tenants or hired-men in America. Most of the hired-men on farms are the sons of farmers. They are usually young men who are getting a little money ahead in order that they may become tenants.

The classification by ages of the males engaged in agriculture in 1900 is given in Table 64. Seventeen per cent of the persons who owned their farms were less than 35 years old, but 43 per cent of the tenants and 89 per cent of the

TABLE 64.—MALES ENGAGED IN AGRICULTURE IN 1900 BY AGE GROUPS[1]

AGES	OWNERS	TENANTS	OTHERS
10–24 years	2 %	10%	71%
25–34 years	15	33	18
35–44 years	25	25	6
45–54 years	25	19	3
55–64 years	19	9	1
65 and over	14	4	1

[1] Twelfth Census, Vol. V, p. lxxx.

other workers were less than 35 years old. Only 5 per cent of the laborers and 32 per cent of the tenants were over 45 years old, but 58 per cent of the owners had reached this age.

The proportion of tenants in the United States is rapidly increasing, but this increase seems to be in proportion to the decrease in other workers. It appears that when all workers are considered, the proportion of owners is practically constant. The hired-men are decreasing and the tenants increasing. This change is probably due to the combination of machinery and higher land values.

TABLE 65. — PERCENTAGE OF MALES ENGAGED IN AGRICULTURE AS OWNERS, TENANTS, AND OTHER WORKERS[1]

	1880	1890	1900
Owners	42.2	42.0	42.3
Tenants	14.5	16.6	23.1
Other workers	43.3	41.4	34.6

[1] Twelfth Census, Vol. V, p. lxxviii.

194. More capital necessary than formerly. — Much more capital is now required than formerly for successful farming. Land costs more. More and better machinery is used, and this calls for more horses and more acres to keep it busy. All this means that it usually takes longer to become an owner than formerly. But a well-equipped, modern farm is worth time and effort.

195. First secure an education. — The young man who proposes to start farming should first get an education. Education is much more essential in farming than it was 25 years ago. It will certainly be more essential in the future than it is to-day. A young man who is getting ready to start farming is not preparing for to-day only; he is preparing for forty years from now.

In one county the farmers who had attended high school made almost twice as much as those who had never been beyond the district school.

Table 66. — Relation of Education to Labor Income, 573 Farms [1]

Education	Number of Farmers	Labor Income
Attended district school . . .	398	$318
Attended high school	165	622
More than high school . . .	10	847

[1] New York, Cornell Bulletin 295, p. 552.

A high school course is worth more than an investment of $6000 in five per cent bonds. We do not have figures for a large number of college men, but a college course seems to be worth as much more. Time spent in high school seems to be worth about $7 per day to one who is to be a farmer.

Part of the greater labor income made by those with more education is due to the large capital available because of previous saving. But when the farms in this county were sorted into groups with equal capital at the beginning of the year, the farmers with more than a district school education made an average of $211 more during the year than did those whose education stopped in the district school.

It may be said that the more able persons are the ones who went to high school. This is partly true, but is by no means universal. Studies in this county showed that accidents, such as the distance to school, when the farmer was a boy, were very decided factors in determining the amount of education.

Of course, education does not insure success. Some men succeed without it, and some fail with it, but the chances of success are much better with a good education.

Every boy who proposes to farm should study in some agricultural school. He should, at least, take a three months' winter-course, if he cannot take a longer course.

Any one can check these ideas, if not the figures. We hear men regretting all kinds of acts. Those who have cows are sorry that they did not plant orchards. Those who have orchards wish that they had different varieties. Those who went West wish that they had gone South. But whoever heard of a man wishing that he had not gone to school so long? Franklin was right when he said that an investment in knowledge pays the best interest.

196. Starting as a hired-man. — For a farm boy without an agricultural college education, the best way to start is as a hired-man. If the neighborhood is a prosperous one, it is the place to begin; if not, go where farmers are prosperous. By working from two to five years, he may save enough money to become a tenant. If he has proved himself both worthy and efficient, he will have no difficulty in renting a good farm.

In whatever position one is working, he should strive to earn at least twice what he gets. Men do not buy cows, land, or labor unless they expect to make a profit on it. If one gets all he earns, why should any man desire to hire him? When the salary is raised, it is not because the employer thinks that the increase will be earned, but because it has been earned. This holds true on farms, in shops, in universities, everywhere; one must always earn his increase in pay before he gets it.

No matter what pay one gets, part of it should be saved. A young man who gets $20 a month as a farm hand and who cannot save part of it is not likely to save if he gets $200 a month. The writer has seen many just such changes in salary and has rarely seen a person who could possibly save a cent on $2400 a year who had not been able to save something on $20 a month. Saving is a habit. It is independent of the wages received. If one has the "spend-it-all" habit, better pay will make no difference. If he has the saving habit, he will save more as the pay increases, but may or may not save a larger per centage of the pay.

If a man has not had a good farm experience on a well-managed farm, he should find one of the most successful farmers in a region where farmers are prosperous and hire out for a year or more.

A graduate of an agricultural college who has grown up on a farm and who has no money can usually start best by teaching, in experiment station work, or as a farm manager. By taking the best position available, when experience, opportunity, and salary are all considered, he should be able to save more in a year than the farm hand receives.

A position that calls for travel and study on farms is very desirable for one or two years. A place as farm manager on a real farm is good both because of the experience and the low expenses. Some of the best paying positions are as managers of country places. The experience gained on such places is often harmful. If any ideas are gained, they are likely to be extravagant notions that are adapted to spending money — not to making money.

The college graduate usually skips the tenant stage. In such cases, the farm should be bought as soon as one has money enough to secure the place on contract or by part payment. The farm is then rented while one continues in his position. In this way a farm may be bought long before it could possibly be purchased if one were to attempt to equip and run it. The salary should usually pay the interest and some of the principal. The rent may be applied on the principal. Either the salary or rent should pay the interest. It is not likely that both will fail in the same year. If one were on the farm and had a crop failure, he might lose the place. When the farm is largely paid for, one may move on to it. This is the plan followed by nearly all the men who wish to farm and who are in experiment station and government work.

One great advantage of buying a farm as soon as possible is that it ties one to the land. A salaried position may wean one away from the farm. The farm furnishes a place to spend vacations. It forces one to economize in his youth. There is a general tendency for land values to rise. If wisely chosen, the rise in value of the farm may be equal to the interest.

The first farm purchased need not be the one on which the final home is to be made. If it is a good investment, it may be sold and a larger and more desirable place may be purchased.

In choosing a farm, productive soil is the first consideration. It rarely pays to work a farm that is not located in a prosperous community.

197. Starting as a tenant. — A young man who has worked hard and efficiently and has made a reputation for honesty usually finds it easy to rent a good farm as soon as he has saved enough money to start. Part of the pay for being a good "hand" is the better chance that is likely to come as a tenant.

Young men of small means are commonly recommended to use small farms and go into more intensive farming, or buy poor land that is cheap. Neither of these recommendations is generally applicable, for either one requires about the same capital as the usual type of farming in order to be equally profitable. The way that most farmers of small means get started is by being tenants.

In Tompkins County, New York, the average tenant with less than \$3000 capital made a larger labor income than the average owner with less than \$5000 capital. The chances of making a large labor income were also greater for the tenants.[1]

TABLE 67. — RELATIVE OPPORTUNITIES FOR MEN WITH SMALL CAPITAL AS OWNERS AND AS TENANTS, TOMPKINS COUNTY, NEW YORK

CAPITAL	AVERAGE LABOR INCOME, FARMS OPERATED BY OWNERS	PER CENT MAKING INCOMES OF OVER \$600
\$3000 or less	\$225	3%
3001–4000	242	10
4001–5000	339	15
5001–6000	459	32
Over 6000	673	45
131 tenants with capital of less than \$3001, averaging \$1187 made an average labor income of \$367, and 15 per cent made over \$600.		

It is evident that the opportunities of an owner in this region with less than \$5000 are not so good as are the opportunities of a tenant. Very few men in this region remain tenants after the total value of their farm property (capital) is over \$2000. Apparently, one should have a

[1] New York, Cornell Bulletin 295, p. 537.

capital of at least $2500 and be able to secure at least as much more on credit before he changes from tenant to owner, as $5000 seems to be the least capital on which one is likely to succeed as an owner unless he rents additional land.

If a tenant is on a good farm, it will usually pay to remain there until he has a chance to buy a good place. It is better to rent a good farm than to own a poor one. Half of the crop on good land is often more than the entire crop on poor land.

Similar figures for another county are given in Table 68. Tenants with less than $1000 were doing no better than

TABLE 68. — RELATIVE OPPORTUNITIES WITH A GIVEN CAPITAL AS OWNER, PART-OWNER, AND TENANT, NORTHERN LIVINGSTON COUNTY, NEW YORK

Capital of Operator	Owners Operating Their Own Land Only		Owners Renting Additional Land		Tenants	
	Number of Farms	Average Labor Income	Number of Farms	Average Labor Income	Number of Farms	Average Labor Income
$1,000 or less	0	——	0	——	20	$368
1,001–2,000	3	$38	0	——	65	481
2,001–3,000	10	81	8	$145	54	610
3,001–4,000	16	195	9	462	27	626
4,001–5,000	23	347	7	570	16	869
5,001–7,500	46	355	14	485	More than $5000 22	1282
7,501–10,000	62	400	19	583		
10,001–15,000	75	694	19	705		
15,001–20,000	28	935	3	1018		
Over 2,0000	29	1412	3	2269		

hired-men. In this region, a tenant with this capital is not prepared to work a good sized farm effectively.

In some parts of the United States it may pay a man to change from hired-man to tenant with less than this capital, but in most of the live-stock and grain and hay regions, one needs $1500 to $2000 worth of stock and equipment before he is ready to start. Part of this capital may be borrowed.

It will be seen that with any given capital, the tenants are making more money than the owners. Apparently, one should have about $5000 worth of property, or be able to borrow enough to make up this amount, before he should change from tenant to owner in this region. He ought then to rent additional land if it can be secured conveniently. If land values are likely to rise, the problem is more complicated.

The larger profits on tenant farms are not due to any advantage of tenancy over ownership, except in the question of capital. Renting is one means of getting the necessary capital for efficient work. Few owners have enough capital to farm to the best advantage. If the tenants owned the farms that they rent, their labor incomes would be larger. A tenant with $3000 in this region can run a business with a total capital of about $15,000. With this, he is able to do much better than he could do if he tried to make his little money furnish land as well as stock and equipment. It is much pleasanter to own one's farm and have no interference from a landlord, and to have a home of one's own, but in many cases the farmer loses too much to gain these pleasures if he changes to an owner before he has money enough.

198. Effect of rising land values on buying land. — In the above discussions, no attention is given to rising land values. If land is likely to rise, it will pay a tenant to buy a farm much sooner than would otherwise be desirable. The rise in land value is sometimes more than the rent or interest paid. This is one of the reasons why tenants change to owners when they do not have money enough to farm to the best advantage. The loss from farming with too little capital must be balanced against probable rises in value of land in order to tell just when to change from tenant to owner.

The time to take risks is when one is young enough to start over if he loses by the venture. A young man may buy a farm when it would not be wise for an older person with the same amount of money to do so. Of course no one should buy a farm unless he has a reasonable chance of paying for it.

199. Cash and share rental. — When the landlord takes part of the risk, particularly if he owns any of the stock, he has to give the place considerable attention. He must be paid for his risk of crop failure, risk of a poor tenant, and for his oversight. For these reasons, share rent has to be higher than cash rent. It usually pays the tenant to rent for cash and so assume these risks. The risk of a poor tenant and the cost of oversight can then be eliminated, so that the pay for these is added to the tenant's profit. Even the risk of crop failure due to weather is sometimes slightly reduced when one owns all the crop.

Table 69 shows the results for two counties. Tenants who share the crops have a little less capital and make less than those who share the animal products. Those who rent for cash have more capital and assume more risk, but get much more for their labor. Landlords who share the crops or animals have more risk and get a higher interest on investment, but much of this higher return is pay for the extra oversight.

200. Farming as a part-owner. — The opportunities of farming as a part-owner seem to have escaped public notice, but have not escaped the attention of farmers. The number of farmers who own as much land as their money will allow, and who rent additional land, is rapidly increasing. The number increased about a third from 1900 to 1910. There are now over half a million such farms in

TABLE 69. — TENANT'S CAPITAL AND LABOR INCOME WITH CASH AND SHARE RENT[1]

	CASH RENT	SHARE OF RECEIPTS	SHARE OF CROPS
Tompkins County			
Number of farms	29	109	6
Tenant's capital	$1584	$1264	1177
Tenant's labor income	604	342	467
Landlord's per cent	5.2	9.0	12.4
Livingston County			
Number of farms	91	80	33
Average acres per farm	207	181	152
Tenant's capital	$3781	$2168	$1736
Tenant's labor income	870	502	372
Landlord's per cent	5.5	8.2	8.3

[1] New York, Cornell Bulletin 295, p. 541.

the United States. Nearly one-fifth (18 per cent) of the farmers who own land rent additional land.

These farmers usually have less capital than those who do not rent more land. Table 70 shows that in two counties these part-owners had less land than owners, yet by renting more land they had larger farms than the owners and made larger labor incomes.

The additional acreage is usually farmed with the same horses, machinery, and men that would be required anyway.

201. Types of farming with small capital. — Tables 17

Table 70. — Labor Incomes of Owners who Rent Additional Land [1]

	Owners	Owners who Rent Additional Land
Tompkins County		
Acres owned	105	89
Acres rented	0	51
Total acres farmed	105	140
Labor income	$407	$522
Livingston County		
Acres owned	126	81
Acres rented	0	57
Total acres farmed	126	138
Labor income	$575	$609

[1] New York, Cornell Bulletin 295, p. 426.

and 18, page 94, show that the most successful types of farming with small capital are usually those that sell a large amount of cash crops.

Long time investments should in general be avoided so long as one is heavily in debt. Wood lots, orchards, pure-bred stock are usually best added after one has at least made enough so that he can be fairly sure of paying for his farm. Buildings, fences, and other improvements should be made with great caution if one is heavily in debt. The best way to pay off a mortgage is usually to spend most of one's energy in raising all the crops possible. The improvements and pure-bred stock may be excellent things to add as soon as one is able.

LIFE INSURANCE FOR FARMERS

202. Forms of life insurance. — Nearly every one should carry life insurance. If one is heavily in debt and has any one dependent on him, he should be sure to carry enough insurance to protect his family in case of death. There are several forms of life insurance. Some of the more common forms are, (1) renewable or convertible term, (2) ordinary life, (3) limited payment life, and (4) endowment policies.

(1) The renewable term is the cheapest form of life insurance for a short time. If one needs more insurance than he can readily pay for, it is a good form to take out temporarily. With this form one pays a certain premium for a definite number of years. If this policy is continued, the amount to pay is increased from time to time. During the time that the policy is in force it may be changed to one of the other forms by paying at the proper rate for the age at that time. This is a higher rate than would have been charged at the beginning, because one is then older.

(2) The ordinary life requires the same payment yearly so long as one lives. But the dividends allowed by most companies act to reduce the amount of the payment year by year so that the amount usually decreases. This is usually the best form of insurance for one who has a good place to invest money safely at a rate of interest above $3\frac{1}{2}$ per cent, provided he has the strength of character to save money.

(3) The twenty payment life or other limited payment policies call for a still larger premium. One pays enough to pay the yearly premium and enough more to be put at 3 or $3\frac{1}{2}$ per cent interest so that by the end of the twenty years the accumulated excess and interest on it will pay the future premiums. If one takes out an ordinary life policy and puts the difference between the payments on this and on a twenty payment policy in a savings bank and con-

tinues this for twenty years, the amount in the savings bank at 3 or $3\frac{1}{2}$ per cent will pay the future premiums.

The 10, 20, or 30 payment policies are good forms for one who has a salaried position. He can then get his insurance paid for before he is too old. Usually such a person does not have a good safe way to invest money, so that the low rate of interest is all right.

(4) Endowment policies include still more of the investment feature. At the end of the 10, 20, or 30 year period the policy has a cash value as great as the amount for which one is insured. With a twenty year endowment policy for $1000 one pays enough to carry his life insurance and invests enough more so that at the end of twenty years the investment is worth $1000.

Since most insurance companies are on a 3 or $3\frac{1}{2}$ per cent basis, it is evident that one gets a low rate of interest. But many persons in cities are not able to secure good safe investments for small sums. Persons on a salary are not likely to save unless they have obligations coming due. They will pay the premium on an endowment policy when they would not otherwise save the money. For such persons these are good forms of policies.

A farmer usually has plenty of ways to invest money at better rates of interest. His investment in land is usually a safe investment. Few farmers have enough money to properly conduct their business. Furthermore, the farmer's money is not so likely to be wasted on trinkets as is the money of the salaried man in town. The farmer is much more likely to use his money in improving his farm or his stock because he sees so many things that he would like to do. In short, the farmer is not looking for 3 per cent investments. If he has nothing else to do with his money, he can pay off the mortgage that is perhaps held by a life insurance company at 5 per cent. There is not much profit in investing money with a life insurance company at 3 per cent and borrowing it back at 5 per cent, as is sometimes done.

The best form of life insurance for the man who has a good safe way to invest money is the ordinary life policy. One may then expect to be able to continue to pay the premiums after the twenty years, but even if he is so unfortunate that he has to stop payment the policy will go on at about half its face value.

203. Typical results with different policies. — A definite example will illustrate the merits of the different policies. The following are the rates of the Connecticut Mutual Insurance Company for a man twenty-five years of age: —

A ten-year renewable term policy for $1000 costs $14.93 a year. After the first year the dividends reduce the amount to be paid by about $1.50. At any time during the ten years the policy can be changed to some other form of policy by making proper payments. At the end of ten years the rate is raised. This policy is little used. It is adapted to the single condition where one needs more insurance than can be paid for in another form of policy and expects later to drop it or to have more money so that it can be changed to another form of policy.

An ordinary life policy for $1000 at the same age, 25 years, costs $20.14 a year. At the end of twenty years such a policy has a cash surrender value of $230.50, or if payment of premiums is stopped there is a paid up insurance value of $457 at no farther cost. The amount to be paid is reduced by the annual dividends. These dividends reduced the actual amount paid for such a policy taken out twenty years ago to $315.44.

A twenty payment life policy for $1000 at the same age costs $29.98 a year. The cash surrender value of such a policy at the end of twenty years is $504.59. At the end of twenty years one is insured for life for $1000 without any more payments. The actual amount paid or cost of such a policy taken out twenty years ago was $478.93 above the annual dividends.

A twenty year endowment policy for $1000 costs $49.21 a year. At the end of twenty years this policy has a cash value of $1000.

The ordinary life and twenty payment life are the most popular policies. Let us see what one would get for the same yearly payment with these two forms. A twenty payment life policy for $1000 at 25 years of age costs $29.98. This same annual payment would pay for $1489 of ordinary life insurance. The comparisons are as follows: —

	Twenty Payment Life	Ordinary Life
Premium per year	$29.98	$29.98
Probable total cost for 20 yrs. above dividends as based on experience of previous 20 yrs.	478.93	469.69
Amount of the Insurance during the 20 yrs.	1000.00	1489.00
Paid up Insurance at the end of 20 yrs.	1000.00	680.00

It will be seen that the same payment will carry nearly a half more ordinary insurance. It is to be expected that a farmer will be able to pay the premium after 20 years, and so continue the larger policy, but if he cannot do so, he will still have a paid up policy for $680.00. Having settled the amount that one can pay annually it is usually better for the farmer to carry a half more ordinary life insurance rather than the smaller amount of twenty payment life that the same cost will carry.

The best form of policy for persons on a salary is usually the 20 payment life or other limited payment policy, but for persons in as conservative a business as farming, who will save and invest their money, it appears that the ordinary life policy is usually best.

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CHAPTER 10

METHODS OF RENTING LAND

METHODS of renting land are becoming of increasing importance. Thirty-seven per cent of the farmers in the United States now rent all the land that they operate and 9 per cent rent part of the land. Renting is the common means by which the young man gets started in farming. It is the usual means of handling land when the farmer wishes to retire. Most of the rented farms in the northern part of the United States are owned by retired farmers and rented by younger men.

204. Basis of rental. — The profit required by the landlord is in proportion to his risk and trouble. Cash rent requires least risk and is the cheapest rent. If the landlord receives a share of the crops, he takes a risk on weather and on the kind of farming done by the tenant. In return, he requires a higher rent. If the landlord furnishes part of the machinery and stock, his risk is still greater. He has risk of loss by natural causes and because of a tenant's carelessness. Not only is the risk greater, but the time and bother in looking after the place are increased. The rental rates become still higher. If the landlord furnishes everything, and even trusts the tenant for his groceries, as is the system with many negro tenants, it is evident that the risk and supervision required are at their maximum. The landlord must then receive a very high rental.

In Tompkins County, New York, the landlords who rented for cash made an average of 5.2 per cent. Those who owned part of the stock, paid part of the expenses, and received half of the receipts, made 9 per cent. The tenants who rented for cash made an average of $604 for

Fig. 66. — One of the troubles of a tenant.

their labor. Those who rented for a share made an average of $342. (See Table 69, page 314.)

With all systems where the landlord shares in the risk of poor crops, he also has a risk of the tenant not doing his work well. This risk is greatly increased when the landlord shares stock and part of the expenses. The landlord must be paid for this risk. The best system of rental for a tenant who is a good farmer and who has the money, is to rent for cash. He assumes all the risk that the landlord must take of having a poor tenant, and by tending to his business makes this much more. There are tenants who are better off if watched, either because of carelessness or lack of knowledge. Such a man may do better if he rents of a landlord who knows how to farm and who will give considerable time in looking after the place.

The landlord who does not desire to give much personal attention to the farm had best rent for cash or a share of the crops. If the landlord has time and desires to watch the farm rather closely, it is better to rent for a share of the crops or for a share of all receipts. In regions where the common system of rental is a share of receipts, as in some dairy sections, land is not so attractive an investment for persons who live in town as it is in regions where the landlord furnishes nothing but the land. The fact that farm investments are so easily looked after when the landlord furnishes nothing but land is one reason why all classes of people in the Middle West like to invest money in land. This, in turn, has been one reason for the very great rise in prices of land in that region.

205. Methods of share renting. — There are three more or less definite systems of share rental with all degrees of variation. 1. The landlord may furnish nothing but land. 2. He may furnish part of the productive livestock, part of the feed, seed, and fertilizer, and pay part of the threshing, silo filling, and similar bills. 3. He may furnish everything except the human labor.

Share of crops. — In the newer regions, where the chief product sold is grain, the common system of rental is for the landlord to furnish nothing but land. The tenant delivers the landlord's share of the crop to the railroad. The tenant usually gets about three-fifths of the grain. He also has the straw, corn stalks, etc., for use on the farm. In regions where the land is very rich, the rent is sometimes as high as one-half. In regions where the crops are not so good, the tenant gets two-thirds to three-fourths of the crop, and on land that is very uncertain, he sometimes gets even more. The rent also varies with the kind of crops grown. If there is any considerable area of sugar beets, or other crops requiring much labor, the tenant gets a larger share. Naturally there are all sorts of minor variations. One of the very common ones is to require the tenant to pay cash rent for pasture. Sometimes this is placed so high that it is really a bonus paid to get the farm. The landlord sometimes pays part of the threshing and similar bills.

206. Share of receipts. — In dairy regions, and generally in the Eastern States, where a large part of the farm products are fed to live-stock, the usual system is for the landlord to pay for half of the seed, feed, fertilizer, threshing bill, silo filling, hay pressing, and furnish half of the stock, except horses, and get half of the receipts from all sources. The tenant furnishes horses, machinery, and all labor. If no cash crops are grown, this system is unfair to the tenant, because he furnishes half of all expenses on stock, except buildings, and does all the labor. As a result, in such regions the landlord is often forced to furnish all the cows and sometimes part of the horses and equipment in order to get a tenant. The straight half and half is fair when the tenant sells considerable hay. If the chief crop sold is potatoes or some other crop requiring considerable labor, the system again needs modifying. The general tendency is to hold too close to the half and half system. As a result, the tenant desires to sell all the hay possible and the landlord desires him to keep many cows and raise potatoes, cabbage, or other laborious crops. It is fairer and results in better profits for both parties if the landlord gets a larger share of hay sold than he does of potatoes or other laborious crop.[1]

All sorts of variations occur as a result of bargaining. The landlord may get half the eggs. The tenant may get all the eggs and furnish feed for hens, or he may get permission to keep a certain number of hens on undivided feed. On 109 farms in one county in New York, there were only a very few leases that were exactly alike, yet the general principle was that labor of men, horses, and machinery offset land, everything else being divided equally.

In sections where little stock is kept, the tenant sometimes gets permission to keep a little stock on undivided feed.

As live-stock increases in the newer regions, the tendency is for the landlord to share in stock or rent for cash.

207. Everything furnished by landlord. — The common system of rental to negroes and Mexicans in the Southern States is for the landlord to furnish everything and get one-third or half the cotton. The exact share varies according to the soil in different regions. A man who rents in this way is sometimes called a "share hand." The tenant merely does the work with the landlord's mule and machinery. Often the landlord runs a store from which the tenant buys his food and clothing on time. The limit that he is allowed to buy is determined by what the landlord thinks the tenant's share of the crop is likely to be worth. By this system, the tenant is always in debt and rarely saves anything. Of course, there are exceptions. An increasing number of negroes are furnishing their mule and machinery and getting a larger share of the crop, but the majority are "share hands."

208. Systems too rigid. — Too little attention is given

[1] New York, Cornell Bulletin 295, p. 540.

to the comparative costs of different crops and animals. If the general system is for the landlord to get a certain share of the crop he often insists on having the same share of an intensive crop like potatoes as he gets of a hay crop. The result is that the tenants try to reduce the area of intensive crops when a fair system of rental might make this the best crop for both parties. If every farm grew just the right area of crops of each kind, the differences on different crops might average up even. But with a rigid system some tenants are persuaded to grow crops on which the landlord makes a big profit and the tenant makes nothing. Other tenants grow crops on which they make more than their fair share of profit. Such cases are exceedingly frequent. The writer knows of many farms every year where considerable areas of such crops as potatoes, cucumbers, and cabbages are grown for half when the tenant has no extensive crops to balance up the system. In other cases, men get half of a good hay crop for cutting when they do not raise any intensive crops. In 1911, one of the very successful farmers in New York rented seven acres of land from a neighbor for growing potatoes. The usual system of rental is a half, so that neither of them thought of any other basis. The tenant turned over $350 worth of potatoes for the use of seven acres of land when the land was not worth over $500. The landlord made about 70 per cent on his investment. The farmer made very little.

In Tompkins county, New York, about three-fourths of the rented farms have such a combination of crops and stock as to result in a fair division of the profits. But about one-fourth are unfair to one party or the other. There were such cases as a tenant making a labor income of $835 when the landlord made less than 3 per cent. At the other extreme a landlord made over 20 per cent when the tenant made a labor income of only $142. A considerable number of landlords made over 10 per cent when the tenants made less than hired-man's wages. Most of these were cases where the tenant spent most of his time milking cows and raising potatoes for half.

When the landlord pays for half the feed for productive stock, half the seed, fertilizer, etc., and gets half the receipts, he really pays for part of the labor cost. He furnishes the houses and half the milk and other products that are given to men. He furnishes the barn for horses, and usually furnishes half the hay that horses eat, so that he pays part of the cost of horse labor. And since he furnishes part of the cost of man labor, he really pays for part of the time that men spend on horses. Part of the machinery cost falls to him because he furnishes the barns to house machinery and part of the man and horse labor to care for machinery.

The cost of hay and apples for the farm from which accounts are given on pages 445 to 471 was divided as suggested above. By the usual system of rental in this region the tenant and landlord share receipts equally. But the hay crop would cost the landlord $220 more than it cost the tenant, while the small orchard would cost the tenant $60 more than it cost the landlord.

If a farm is mostly devoted to hay, the tenant has the best of the bargain. If it is mostly devoted to cows or intensive crops, the landlord has the best of it. It would be better if we had a more flexible system, so that the share would vary with the kind of crops more than it does.

209. Relation of systems of rental to profits. — The best form of rental for a tenant, who has money enough and who is a good farmer, is cash rent.

What is best for the landlord depends on how much attention he can give to the place and on his knowledge of farming. Share rent will pay him better if he has the time and knowledge necessary.

The form that is best for keeping up the farm is usually for the landlord to share in live-stock. But cash rent, or any other form of rental, may do as well if the conditions are so made that live-stock keeping is encouraged.

It is often best to have the tenant pay the taxes. This prevents the taxes from being raised too high because the owner is not present to protest.

There are some points on which both parties gain. For instance, if the farm is large enough so that the tenant can get the most out of his horses and equipment, he can afford to pay a higher rent and yet make more for himself. Tenant farms are usually larger than farms operated by owners. The system of rental used by the Wadsworths, who own large tracts of land in western New York, is successful from every standpoint. The owners get a fair rate of interest, the tenants do well, and the soil is kept up. The secret of this success is that the farms are large enough so that the tenants can do the work economically. Most of the farms contain 200 to 300 acres. The leases also favor the keeping of live-stock by charging a low rental on pasture and hay land and require that the hay and straw be fed on the farm.

A successful system in Maryland, described in Farmers' Bulletin 437, accomplishes the same results. The lease is so drawn that it pays the tenant to keep stock. The farms are large enough so that the tenant may make a good profit for himself and the owner. In this estate, there are twenty-one farms. The smallest farm had 150 acres in cultivation. On the average, there were 269 acres of cultivated land per farm. The bulletin states that only about 72 per cent of each farm is in cultivation, so that the total area is considerably larger.

This is the right kind of economy for the landlord. He gives the tenant land enough so that the tenant can get the most out of his horses and machinery. In this way, both parties prosper. If the farms were half as large, the waste of horse and machine time would ultimately result in a loss to each party. In many cases, it would pay the landlord to combine two farms. He could then get better tenants and make more. A tenant cannot take advantage of the gain that comes from driving three- and four-horse teams unless he has about 100 to 200 acres of crops, because each horse ought to raise 20 to 30 acres of crops.

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CHAPTER 11

FARM LABOR

MAN LABOR

210. Why farm labor is scarce. — There are several reasons why farm labor is not so abundant as formerly: —

(1) Perhaps the most important cause is education. Most of the farm work is and always has been done by the farm family. Formerly the children began farm work as soon as they were old enough and continued to work for the family until 21 years of age. They went to school for a few months in the winter. To-day most of the farm chlidren remain in school longer. The age of employment has been raised. The children probably work as much when not in school. In the typical agricultural state of Kansas, one-third of the population is in school.

(2) The farm families are probably smaller than formerly.

(3) Women are doing less farm work.

(4) Tenancy is increasing, apparently about as rapidly as the proportion of hired-men decrease. Farms that used to be large enough to employ a hired-man by the year do not require two men all the year when more horses are driven by each worker. Many men who might be hired-men, therefore, become tenants.

(5) Until 1898, farming was subject to frequent and disastrous overproduction, so that farming rarely paid well. At the same time, the cities were prospering. The better

opportunities caused a stampede of young men to cities. As in most cases of violent readjustment, the pendulum went a little too far. See also page 32.

(6) Foreign immigrants are not going to farms so much as formerly, because our methods now depend on machinery with which the emigrant from European farms is not generally familiar. The hand labor types of farming, like truck growing, are getting more foreign labor than ever before, but probably 95 per cent of American farming calls for machinery.

211. The labor problem for the individual. — The average farmer makes interest on his money and wages for the work he does.

The labor problem is not to be solved by having more laborers or cheaper laborers, but by directing labor better than the average farmer directs it.

The individual had just as bad a labor problem when wages were $10 a month as now that wages are $30. Whenever it becomes easy to make money out of labor by average methods, hired-men change to tenants and effect a readjustment of wages. The problem of making money out of hired labor can never change. If labor is abundant and cheap, it is because the average profit from using it is low. He who is to make by employing labor must direct it better than the average. Whenever labor is effective, it is high priced. Wages are low in China because little is accomplished in a day.

The individual farmer is always better off in periods when wages are high. At these times, the problem of making money out of hired labor is the same as it always is, but much of the farmer's profits are on the labor that he and his family do. When wages are high, the average returns for this family labor are good.

The one way to solve the labor problem is to organize the farm business so well that the labor used on the farm is unusually effective. In other words, to so manage the farm work that a given amount of labor accomplishes more than on the average farm.

212. Using labor efficiently. — The most striking differences in the effective use of labor are due to size of

FIG. 67. — Saving time on a Virginia farm.

business. Our farms are not yet adjusted to our machinery. The farm that has the proper adjustment has a very great advantage over the farm that is too small. (See Chapters 7 and 8.) The type of farming also limits the efficiency in use of labor, as discussed in Chapter 3.

The farm fields have not yet been adjusted to meet the conditions called for with modern machinery. The farmer who has his land in large fields has a great advantage over the farmer who has small fields. The layout with respect to the buildings is also of great importance.

Farm buildings and water supply are common sources of loss of time and money. There can be no profit on time spent in doing chores in an unhandy barn.

Proper intensity of culture will bring highest returns for labor. Too much or too little work on crops or animals will result in loss. Too much work will cause a loss just as surely as too little.

One of the easiest ways to make a profit on hired labor is to have each man drive more horses. Much may be saved by hauling large loads in marketing products. Three-horse wagons should come into more general use.

The character of the hired labor should correspond with the work. High-priced labor is cheapest for exacting work, but low-priced labor is cheapest for work that requires little judgment. Picking up potatoes, picking cotton, picking fruit, and weeding vegetables are kinds of work that can be done by cheap labor. Such labor is often shipped out from cities, and is usually paid by the amount of work done,— quart, or pound, etc. Figure 73 shows a gang of Italians picking strawberries in New Jersey. Men, women, and children all work. Ordinary farm help is too expensive for such work.

For work where intelligence is required, as in handling machinery and horses, it is often easier to make a profit by paying more than the usual wages. One man may be worth twice as much as another, but wages are not so variable. By paying a little more, one can often get very much more work done. But merely paying higher wages does not bring this result. One must be a good enough judge of men to be sure that he is getting better men when he pays higher wages.

A greater use of telephones and mail delivery will save much time. Parcels post will save many trips to town for small repairs.

If work is done at the proper time, it may result in great saving of labor. This is particularly true in the control of weeds. The chief purpose of cultivation is to control

Fig. 68.—Saving time on a Nebraska farm, the regular practice in most of the wheat country. One man to a team. No loader or driver is necessary.

weeds. The time to kill weeds is when they are just sprouting, before they can readily be seen. If one uses a weeder or other tool that will cover a wide area at frequent intervals the weeds may often be controlled at small cost. A proper crop rotation will go far in reducing the cost of weed control.[1]

Every farmer should carry a memorandum book and keep a list of work to do. Weather and other conditions are so variable that one may need to change work at a moment's notice. No one can keep in mind all the things that need to be done about a farm. A rain may come up and the

[1] The Weed Factor in the Cultivation of Corn, U. S. Dept. Agr., Bureau of Plant Industry, Bulletin 257.

men stop work. A few days later, teams may be kept out of the fields while some inside work is done that might as well have been done during the rain. Extra trips are often made to town to get something that might have been gotten before, had it been thought of. The way to think of it is to always carry a memorandum of work to be done and jot down things whenever they are thought of.

On one profitable farm where such a memorandum book has been kept for five years, there has never been any time lost on account of weather either in summer or winter. There is always work ahead for rainy days and

FIG. 69. — Saving time in a New York timothy field.

for cold or stormy days in winter. The farm employs four men most of the time and sometimes as many as seven. The winters are long and summer rains frequent, yet by always keeping a memorandum of work, there is work for men whenever it storms. As soon as the storm is over, there is practically always work for horses until the ground freezes. Even in the winter, the horses work nearly every day when the weather is good.

The following lists of winter and stormy day work show some of the work that is done on this farm in advance of

Fig. 70. — Saving time in a Maine potato field.

the time that it is needed. Much of this work, such as cleaning the henhouse and barn, oiling carriages and wagons, setting horses' shoes, and sharpening tools, is kept as regular rainy day chores.

Fig. 71. — The low-down potato wagon that saves labor. See Figure 70.

213. Work for stormy days. — The following list of rainy day work includes a few of the things done on the above farm. These are more or less regular things. Many other things have been done but once in the five years: —

Clean barn.
Sweep down cobwebs in barn (4 times a year).
Set horses' shoes.
Get machines ready to use (about 1 month before each operation starts, so as to have time to make repairs if necessary).
Replace broken window lights in buildings (every fall).
Clean oats, wheat, etc., with fanning mill (long before needed).
Clean shop.
Oil wagons and carriages.
Repair machinery.
Sharpen all tools.
Clean cellar (twice a year).
Mix feed.
Mix fertilizer.
Oil harness.
Sharpen mower sickles.
Wash and pack eggs.
Clean henhouse.

214. Winter work. — Live-stock demands more attention in winter, so that by combining live-stock with crops, a part of the winter work problem is solved.

The following are some of the kinds of work that are done in winter on well-organized farms. Some of these, as repairing machinery, are universal; others, as work in the wood lot, apply to certain regions only: —

Repair each piece of farm machinery.
Make tools and do other carpenter and repair work.
Oil and repair harness.
Haul manure.
Sharpen all tools.

Sharpen mower sickles.
Mix fertilizer.
Sharpen posts for fence.
Prune orchard and other trees.
Clean seed.
Repair buildings, particularly inside work.

If the farm is in a region where wood-lots pay, the work in the woods getting out posts and lumber and fuel will provide work for good days.

Such crops as hay and grain may be marketed in the winter.

Near cities, some of the teams and men do teaming work in winter; near forests, they sometimes do lumbering.

Fig. 72. — Home mixing of fertilizers, good work for winter.

If one keeps a memorandum of work, there will always be plenty to do on a diversified farm. The winter is also the time for the farmer to take his vacation. Some of the time should be spent in going to meetings and in reading and study.

Considerable is said about having the farmer manufacture articles for sale during the winter. A few farmers do this kind of work. It usually pays better to do work on the farm that prepares for the next season rather than try to do manufacturing. On a diversified farm it is usually possible to find work enough for every day in the year. Manufacturing enterprises would not usually provide work for horses, and idle horses are as serious a problem as idle men. Furthermore, any manufacturing enterprise requires equipment. This equipment must be idle when farm work is being done.

215. Hours of labor. — The eight-hour day is coming to be the ideal in cities, although the vast majority of workers still work more than eight hours, and thousands work twelve hours.

The day's work on the farm is usually longer than in cities. There are very good reasons why it should continue to be a longer day. Farm work is so varied that it is not so monotonous as most kinds of city work. A man on a farm usually takes care of live-stock before breakfast. After breakfast, he may get his team out for field work. At noon, he again does chores, and usually has a warm dinner at a table rather than a cold one from a dinner pail. Some chores are usually done after supper. During the day, a great variety of things may be done, bringing into play many different muscles rather than using the same ones all day. The city worker often has a half hour to an hour to ride or walk night and morning to go to his work, so that an eight-hour day may be as long as a ten-hour day on the farm. When the farmer's day ends, he is usually at his home.

Some farmers say that they work 16 hours a day, when they mean that they are out of bed 16 hours. They fail to distinguish between work and meal time, but there are some farmers who do work as much as 14 hours a day in the summer.

On a number of farms in Minnesota, it was found that the average in a region where considerable dairying was done was 8.6 hours, and in a region largely devoted to grain farming, 7.4 hours. The corresponding hours of Sunday work were 3.4 and 2.2 hours.[1] The averages were for 313 days. If holidays and other days off were counted out, the average would be higher. These averages do not give all the facts. The days in summer were long, and on many days in winter very little was done.

Another side of the question is the necessity of caring for live-stock. Stock requires attention early in the morning and again at night. A ten- or eleven-hour day is long enough to give this attention.

A ten-hour day of actual work is long enough for a farmer except in harvest, threshing, and other times of unusual pressure. Of course, no set time can be made on a farm, because the weather, the stock, or other circumstances may make it necessary to work very long days at any time. The farm crops and property must be cared for. But for normal occasions, when there is no great pressure of work, ten hours is a good standard to set. When dealing with ignorant labor, as the negro or Mexican, the common rule is to work from sun to sun. This is a natural day, particularly where men do not carry watches.

216. Management of men. — The most satisfactory farm hand is the son of a neighboring farmer. Such men know how to work and are more likely to be interested, as

[1] Minnesota, Bulletin 97, p. 11.

they usually plan to farm for themselves later. Most of the farm labor is from this source. Estimates by farmers scattered all over the United States indicate that 70 to 80 per cent of the farm laborers and tenants find it reasonably possible to acquire farms of their own.[1]

This class of help should be treated as the equal of the farmer in every way. The almost universal custom is for the farm family to take such men into the family circle as members of the family. Usually it pays to discuss plans for work with such a young man. In this way, his interest will be held. Very frequently such a man will take as keen an interest in the farm as does the owner, provided the owner discusses plans with him.

Men of this kind do not need to be worked in gangs. In fact, it is usually desirable to scatter men so that if a breakdown or delay occurs, few men will be stopped.

Another kind of hired help is the less reliable kind that gets drunk whenever occasion arises. The farmer can sometimes help to hold such a man on the farm by providing reading matter or something else to hold the interest. Sometimes the best thing to do is to discharge him.

The best men usually hire by the year. They do not want to spend the winter loafing. It follows that one must so organize his farm as to provide a full year's work if he is to secure his choice of men.

In the Eastern States, married men are more frequently employed. Probably this is because there are more houses on the farms than are needed. In many cases in other sections, it will pay to build a house, if good married men can be secured regularly. When the house and all other items are counted, married men usually cost more than single men, but are often more reliable.

[1] U. S. Dept. Agr., Yearbook, 1910, p. 199.

The pay should vary with the season of the year. If a month hand receives the same pay the year around, the owner will feel that he is getting too much in winter; and in harvest, when day hands are getting big wages, the month man will feel that he is working for nothing. By varying the pay, the year's total may be the same, but both farmer and laborer will be better satisfied.

When dealing with Mexicans, negroes, or Indians, the problem is entirely different. All contracts should then be simple. Men must be treated fairly, but with great firmness.

These men do not often desire to work as regularly as does a man who hopes to own a farm as soon as possible. Usually the negro saves little. A good way to hire such labor is to furnish a house and about an acre of land which the man can work for himself with the agreement that he is to work for the farmer at a certain wage per day whenever he is needed. Instead of providing rainy day work, as is done with men who want to earn money every day, such a man works only on days when he is needed. He takes his much desired vacation on days when there is no work. Usually he will take time off anyway, and he may as well do it when there is no work.

217. Profit sharing. — Schemes for profit sharing have been worked out for some railroads and factories. Farming also has its method of profit sharing. It is by renting farms. Some persons have thought that the farm laborer might share in the profits on a farm, but the first problem is to know what the profits are. It is hard enough to answer this question when one is disinterested. It becomes practically impossible when two parties are interested. The writer has known of many attempts to share profits, but has seen very few satisfactory results. A share of the receipts or other definite rental system is usually the only satisfactory profit-sharing plan.

218. Farm managers. — On nearly all farms in America, the one who directs the work does as much labor as any of the men. The owner or manager usually works with his men, unless there are 10 to 20 men employed. When only 3 or 4 men are working, the cost of supervision

FIG. 73. — Enough workers to justify the farmer in spending most of his time directing the work. The farmer raised the crop with his own work. He becomes a non-worker in the picking season only.

is altogether too heavy if the manager does nothing but direct work. No industry that does not have a monopoly can afford a non-working manager for so few men. The man who works with his men usually gets them to take an interest in the work and to accomplish much more.

Business men who own farms often make mistakes in this matter. They often employ farm managers who feel too important to work. But what else is a farm manager to do, if he has only two or three men to direct? With so few men, he should be the best worker of the lot. Suppose that the manager is paid $1000 a year, as is frequently the case on farms owned by city business men. If he directs three men, the expense of supervision is about as much as the wages paid the men. If the farm raises only 150 acres of crops, the cost of supervision will be over $6 per acre, or more than the rent on $100 land.

The Taft ranch in Texas is an example of a well-organized large business. Here a foreman has charge of 1200 to 1800 acres of crops. He directs 25 to 35 men and about 60 mules. They raise 50 acres of crops per man and 25 acres per mule. Cotton is the chief crop. Other help is, of course, required to pick the crop. The cost of the foreman here is about 50 cents for an acre of crops. The supervision of the entire ranch may add 25 cents to this.

Many farmers in the South are losing by having too great an expense of supervision. Before the War, one manager directed many slaves. To-day there are many cases where one man directs only a very few workers and yet does no work himself. This makes the cost of supervision too great. Either the number of workers directed should be increased, or the manager should go to work. The only other alternative is that the workers and manager all remain poor, because they are following such a bad system.

HORSE LABOR

219. Cost of horse labor. — The economical use of horse labor is as important as man labor. In Minnesota, in 1907, the cost of an hour's work of a team in different counties varied from 15 to 22 cents per hour. (Table 71.) In the same region, the cost of man labor averaged about 12 cents. The time of the team is, therefore, worth much more than the time of the driver. Where feed is worth more, the difference is still greater. Table 71 gives the results for a number of farms in three counties in Minnesota and for three very successful farms in New York.

There are few, if any, regions in the United States where horse labor is cheaper than in Norman County, Minnesota. The chief reason for the higher cost in the other counties and in New York is the higher prices of feed. The other

TABLE 71. — COST OF HORSE LABOR[1]

	Year	Food Cost per Horse	Total Cost per Horse	Hours Worked per Day	Cost per Hour
Norman Co., Minn. . .	1907	$47	$77	3.0	7.7
Lyon Co., Minn. . .	1907	64	93	3.4	9.0
Rice Co., Minn. . .	1907	75	104	3.1	11.0
Farm 1, New York . .	1911	92	131	2.9	14.9
Farm 2, New York . .	1911	90	174	3.8	14.8
Farm 3, New York . .	1911	117	177	4.9	13.1

[1] Minnesota, Bulletin 117, pp. 15, 16.

costs were about $30 per horse in each of the regions in Minnesota. Farmer No. 2 in New York had a very high cost of depreciation by death of two horses. On the New York farms, the man labor cost 12, 19, and 22 cents per hour. The 19 cents is more typical. Farmer No. 1 hired only one person, a half-witted boy. This reduced his labor cost. Farmer No. 3 paid rather high wages.

On New York farms, horse labor usually costs 25 to 30 cents per hour for a team. Man labor costs 15 to 20 cents per hour. Economy of horse labor is, therefore, seen to be even more important than economy of man labor. The chief reason for the high cost of horse labor is the large amount of time that horses do not work. On the farms in Minnesota, the horses averaged a little over 3 hours a day for 300 days. On farm No. 3 in New York, an unusually well-organized farm, they worked 4.9 hours. This farmer

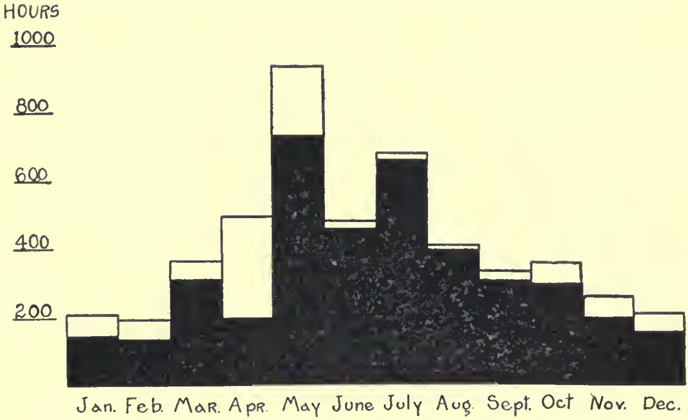

FIG. 74. — Distribution of horse labor on farm No. 1. Seven horses kept. If done at the proper time, the work could be better done with 5 horses. Black is work fixed as to time. White is work that might have been done at some other time.

is the one previously mentioned who kept lists of work for all kinds of weather, so that all odd jobs were done when teams could not work. A farmer should look upon an idle team in the barn in exactly the same way as he looks upon a hired-man asleep in the hay mow. If the high cost of horse labor were realized, horses would be worked more. The chief reason why it is not realized is because the cost has suddenly increased with the rise in value of feed and labor, and farmers have not yet realized the change.

220. Ways of saving horse labor. — There are many ways of saving horse labor. The most evident way is to keep the horses busy and so reduce the cost per hour. By planning the work ahead it is often possible to do the work with fewer horses. The horse labor for farmer No. 1, Table 71, is shown in Figure 74. The farmer kept two extra horses at a cost of $262, when the only time that he needed them was in plowing for oats and corn.

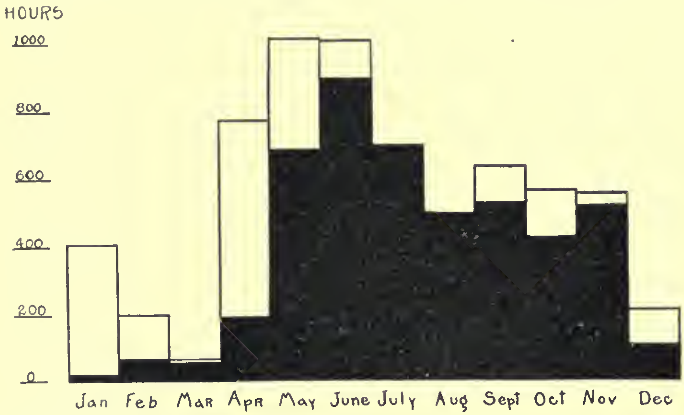

FIG. 75. — Distribution of horse labor on farm No. 2. Six horses kept. Five could have done the work with a little hired horse labor. Black is work fixed as to time. White is work that might have been done at some other time.

If he had fall plowed for oats, he would have secured a better crop of oats, could have fitted his corn ground earlier and better with two less horses, and had considerable time to spare.

The horse work for farm No. 2 is shown in Figure 75. There were 6 horses on the farm and 105 acres of crops were grown. After studying the results of his cost accounts the farmer decided to farm more land and to hire some horse labor. He increased his crops to 170 acres and did the work with 7 horses and 30 days of hired horse labor. The regular policy on a farm should be to keep the horses, as well as the men, at work.

By pasturing and by roughing horses through the winter, farmers are able to reduce the cost of horse labor.

Another way to reduce the cost is to keep large mares and raise draft colts to sell.

Farmers who have only a small amount of work often reduce the cost by having cheap horses. Such animals

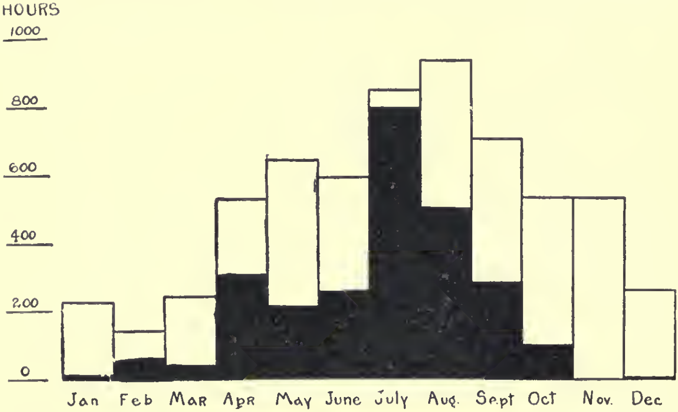

Fig. 76. — Distribution of horse labor on farm No. 3. Black is work fixed as to time. White is work that might have been done at some other time. Four horses kept.

can work hard for the short periods when there is work to do, and rest between times. Such horses should not be bred. A better way is to increase the business so as to provide full work.

221. How much work should a horse do? — By studying Table 54 it will be seen that a horse raises 9 to 28 acres of crops in the different counties studied. In all these regions the larger and better managed farms doubtless raise more crops per horse. If a farm is diversified, good-sized, and well-managed, a horse can raise almost twice the average area of crops. On many well-managed farms there are 30 acres of crops per work horse or mule, and occasionally 50 acres when the crops include tilled crops, small grain, and hay in such combination as to make a full season's work. If the crops are mostly tilled crops, the area per horse should rarely fall below 25 acres. Even with this area, the cost of horse labor will be $3 to $6 per acre, depending on the value of feed.

SUBSTITUTION OF ENGINES FOR HORSES

222. Engines adapted to heavy work. — On large wheat farms, where the heaviest work of the year is plowing, engines may be used in place of horses. Engines have also replaced horse labor in threshing and many other operations. Thus far, engines have replaced horses only in those operations that require a large amount of power. An engine that draws 8 plows is replacing 16 to 20 horses. In order to replace as many horses on a mowing machine, an engine would have to cut a swath about 50 feet wide. The operations in which a horse finishes a wide strip of land at one trip have not often been economically done by engines.

223. Engines must reduce work at the season of greatest pressure. — Many attempts have been made to introduce engines in the Eastern States, but such efforts have not usually been successful. In the Northeastern States, the hay harvest determines the number of horses that must be kept. Mowing, tedding, raking, and hauling in hay are all light, rapid operations. For some of this work, a light team is as good as a heavy one. An engine is too powerful and cumbersome for these operations. There is no economy in having an engine for plowing if the same number of horses must be kept anyway, and are standing in the stable while the engine works.

In the corn-belt, the greatest pressure of work comes when corn cultivation and hay and small grain harvest follow close together or overlap. The engine is not adapted to these operations, hence few engines are used. Occasionally, there is a farm in each of these regions that follows a type of farming that can use an engine to good advantage. In a considerable number of cases, an engine that is primarily used for some other purpose may help on the farm at times when it would otherwise be idle. This is the greatest field for engines in all regions.

Where large areas of winter wheat are grown, it is of great importance that the plowing be done promptly. An engine may then be of use because it does the work at the proper time. Where half the land is fallowed in arid regions, the engine may have a place. In some regions, the danger of storms is so slight that wheat may safely be left standing until it is dry enough to thresh. An engine may then be used to draw a combined harvester and thresher. But even in these regions, horses are used by most of the farmers.

Before one buys an engine, he should see whether it is to do work at the time of year when horses are most needed. There is little point in having an engine, if one has to continue to keep as many horses as he needed without it.

PRODUCTIVE WORK UNITS

224. Definition. — Just as we must reduce the animals to some comparable unit and the feed to a comparable unit, so we must reduce the labor to a comparable unit when we desire to compare the efficiency with which different farms are organized. The animal unit is a cow or horse. The best feed unit is a pound of corn. A work unit is the time required to raise an acre of hay, cut once. When all these are reduced to units we may say that a farm is as heavily stocked as if it had a certain number of cows. It uses feed equivalent to a certain number of pounds of corn, has work equal to a certain number of

TABLE 72. — PRODUCTIVE WORK UNITS

	MAN WORK UNITS	HORSE WORK UNITS
Timothy, alfalfa, clover, per acre per cutting	1	1
Oats, wheat, barley, rye, buckwheat, per acre	2	3
Corn, husked from standing stalks, per acre	3	5
Corn, husked from shock per acre	6	6
Corn for silo, per acre	6	7
Field beans, per acre	5	5
Cotton, per acre	12	6
Tobacco, per acre	20	7
Potatoes, per acre	12	10
Cabbage, per acre	13	12
Apples, per acre	15	5
Dairy cow	15	2
10 cattle or colts running loose	20	1
10 brood sows and raising pigs to weaning	30	5
50 hogs not brood sows	25	5
100 ewes	50	3
100 hens	15	2
Raising 200 chickens	15	2

work units, and has a certain number of units of horse labor.

The labor involved in raising a crop is very much more than the time ordinarily counted when one estimates how long it will take for each operation, because there are so many things that must be done besides the actual operations. The only way to find how long it takes to raise different crops is by keeping a work record. The units here given are only approximately correct. As more figures are available, more accurate figures will be obtained. It will also be desirable to have units worked out for different methods of production.

The unit should represent the average comparative time required for a given crop or animal. Some farmers will do the work quicker, some will waste time and take longer.

With very rapid work and extensive methods it is possible to do a unit of work in 5 hours. With intensive methods 20 hours is sometimes spent to advantage in doing a unit of work. With methods of average intensity and average efficiency 10 hours is usually required. In any case the comparative figures are about the same. With extensive, rapid work on both hay and small grain, the grain usually takes twice the time of the hay. With slow work or intensive methods both take longer, but the grain still takes about twice as long.

A farmer may lose time because of irregular fields, too small an area of the crop, or too few animals, because fields are too far away, because milk is hauled too far or in too small loads, because the soil is hard to work or is too weedy, or for many other reasons. It makes no difference how time is lost. If it is lost, the farm is inefficient. This may be the fault of natural conditions or of the management.

The time spent on a horse is usually about the same as that spent on a cow, but this is not productive work. Much other work is done, such as repairing machinery. But only the raising of crops, the producing of animal products, and the raising of young animals is productive.

Work units are not a measure of how hard men work but of what is accomplished. They are a measure of the amount of productive work done on the farm. Much unproductive work must always be done. Well-organized farms are able to do 300 productive work units per man and yet get good crops. On some farms the men average as high as 400 work units. Horses may do as high as 150 work units, but 75 to 100 is more common.

By comparing the productive work or work units on different farms we may get an approximate measure of what is being accomplished. For instance, the farmer reported on page 537 had the crops and animals shown in Table 73: —

Table 73. — Productive Work Units

	Man Work Units	Horse Work Units
31 cows	465	62
9 other cattle	18	2
27 sheep	14	1
75 hens	11	2
10 acres corn for the silo	60	70
15 acres potatoes	180	150
2 acres cabbage	26	24
22 acres oats	44	66
9 acres wheat	18	27
67 acres hay	67	67
2 acres buckwheat	4	6
2 acres apples	30	10
	937	487
Units per man and horse	234	122

The farmer kept 2 men by the year and hired about 12 months of extra labor. The average work units done per man were 234. Four horses were kept. The work units per horse averaged 122.

A neighbor of this farmer, who was also a good farmer, had the crops and animals shown in Table 74:—

TABLE 74.—CROPS AND ANIMALS ON A FARM NEAR THE ONE GIVEN IN TABLE 73

	MAN WORK UNITS	HORSE WORK UNITS
8 cows	120	16
2 other cattle	4	—
112 hens	17	2
2 pigs	1	—
4 acres corn for the silo	24	28
1 acre wheat	2	3
6 acres oats	12	18
13 acres hay	13	13
2 acres potatoes	24	20
$\frac{3}{4}$ acre cabbage	9	9
	226	109
Units per man or horse	113	55

This farmer kept one man by the year. The work units per man were 113 and per horse 55. Men and horses are accomplishing half as much as on the neighbor's farm.

Of course other work was done on both farms. The work units do not show how hard the men worked, but when taken together with crop yields and milk yields they show what was accomplished. A man or horse on the first farm was accomplishing about twice as much as on the second farm. In this case the difference is mostly due to size of farm.[1]

[1] See farm No. 1, page 511 and No. 25, page 531. New York, Cornell Bulletin 295.

A Normal Day's Work in Various Farm Operations, U. S. Dept. Agr., Bulletin 3.

Distribution of Farm Labor, Missouri Research Bulletin No. 6.

CHAPTER 12

FARM EQUIPMENT

This is the age of machinery on the farm as well as in the city. In fact, it is machinery on the farm that enables the small number of farmers to grow food enough to support the large number of persons who are engaged in making machinery for town and country. The farmer's problems are to determine what machinery to buy, what makes are best, and to so handle his machinery as to get the fullest use of it and make it last well.

225. The maintenance of equipment. — The question of housing machinery has been discussed for years, and its importance sometimes over-emphasized. For every machine that is ruined by exposure, two are probably spoiled by not being properly oiled, or not having the bolts kept tight. These are less conspicuous mistakes and so attract less attention.

Every farm should have a shop for the repair of equipment. It will usually pay to have a forge and some blacksmith tools, as well as carpenter tools. Blacksmith work can, perhaps, be hired done as cheaply as to fit up a shop at home, but the time spent in going to the shop is the important item. A forge and a few tools do not cost much, but save much time. On rainy days, and in winter weather, the farm equipment may be repaired and painted. If there are boys on the farm, the shop will be a great help in their education.

The machinery shed for housing the equipment should be a cheap building. It is possible to build a shed that will depreciate as much as the machinery that it stores would depreciate if exposed.

226. Depreciation on machinery. — Table 75 gives the average depreciation on different machines on a number of farms in Minnesota: —

TABLE 75. — AVERAGE DEPRECIATION PER YEAR, BASED ON ORIGINAL COST AS 100 PER CENT.[1]

MACHINE	DEPRECIATION
Threshing outfit	12.00%
Hay loaders	11.78
Manure spreaders	11.67
Corn binders	10.03
Harrows	8.72
Sulky plows	8.42
Reapers	8.13
Grain binders	7.91
Mowers	7.80
Hay rakes	7.80
Hay racks	7.76
Gang plows	7.40
Gasoline engines	7.35
Corn cultivators	7.25
Corn planters	7.15
Grain drills and seeders	6.75
Harness (heavy)	6.17
Walking plows	6.09
Sleds	5.81
Horse weeders	5.71
Disks	5.19
Wagons	4.89
Hay tedders	4.84
Fanning mills	4.58
Grain tanks	3.47

[1] Minnesota, Bulletin 117, p. 17.

Farmers' Bulletin 303 states that a corn binder lasts an average of 8.17 years. The annual depreciation is, therefore, 12.2 per cent of the original value.

The depreciation is more on the more complicated machines, such as threshing machines. Machines that have as heavy usage as corn binders depreciate rapidly. Manure spreaders depreciate rapidly, because the manure rots them. New kinds of machines always depreciate more rapidly than those that have been in use for many years.

227. Machinery costs. — The cost of machinery includes not only depreciation, but repairs, cost of housing, interest on the money invested, and oil. These items usually exceed the cost of depreciation. Table 76 shows part of these costs for a considerable number of farms in Minnesota. The costs of housing and oil were not counted. Interest is counted at 6 per cent.

Nearly all the farms included were fairly large, so that the machinery was as fully employed as on farms in any part of America.

The total cost of machinery per acre of corn varied from $1.14 to $1.75 in different regions of the state. Of this cost, the corn binder amounted to over half. For corn husked from the standing stalks, the machinery costs varied from 49 to 55 cents per acre in the different regions.

The heavy expense for the corn binder is one of the reasons why farmers in this region continue to harvest corn from the standing stalks. So long as hay is cheap, it does not pay to go to the many expenses involved in saving corn stalks.

The total machinery costs per acre of small grain, not including threshing machine, varied from 37 to 56 cents.

The machinery costs for hay varied from 29 to 55 cents per acre in the different regions. The lowest cost is in the region of largest farms.

Table 76. — Machinery Costs per Acre [1]

Machine	Cost per Acre
Grain machinery	
Binders	$0.181
Reapers	.171
Drills, seeders	.075
Fanning mills	.010
Grain tanks	.011
Wagons, sleds, and racks	.034
Corn machinery	
Binders	.826
Planters	.087
Cultivators	.155
Wagons, sleds, and racks	.158
Hay machinery	
Mowers	.206
Rakes	.085
Tedders	.113
Loaders	.151
Ropes, forks, etc.	.120
Wagons, sleds, and racks	.059
All crop machinery	
Plows	.087
Harrows	.017
Disks	.089
Threshing outfit	.335

[1] Minnesota, Bulletin 117, p. 18.

It must be remembered that these costs do not include the cost of housing machinery or of oil.

When interest, housing, oil, depreciation, and all other costs are counted, the cost of machinery on a farm is usually equal to 20 per cent of the inventory value. The inventory value is, of course, far below the cost price, because on most farms there is machinery of all ages.

Cost accounts on New York farms usually show a machinery cost of 2 to 5 cents for each hour of horse labor. This usually amounts to a cost of 75 cents to $2 for each acre of crops grown. In regions like Minnesota, the machinery cost is probably 20 per cent of its value, but since more acres of crops are grown the cost is less per acre.

228. Duty of machinery. — The number of acres that one may expect a machine to work is sometimes called the duty of machinery. An average of a large number of estimates of rates of work for different machines gave 1.4 acres as a day's work for each foot wide that the machine covers. That is, a day's work for an average machine that completes one foot at a trip would be 1.4 acres per day, and for a machine that covers 6 feet, it would be 8.4 acres per day.

The rates of work varied from 1 acre per day for each foot covered by the machine to over 2 acres. One acre per day is very slow work, and 1.75 acres is rapid work. It is usually safe to estimate that a machine of light draft with good horses will cover 1.5 acres for each foot that it is wide. If the machine is a heavy one, if the horses are slow, if the fields are small, or if there are delays, the rate of work will be much less.

If one knows the period in which the work is to be done and the probable proportion of days on which work can be done, he can make an approximate estimate of the acres that a machine can handle.

Suppose that one wishes to be able to make all his timothy hay in a period of about two weeks, and that in his climate he can count on two-thirds of the days being suitable for haying, he would then expect about 8 days on which the mower could be used. If a six-foot mower is drawn by two fairly good horses, it will be a machine of medium draft, and may be expected to cut about 8 acres per day, or about 64 acres in the haying season.

But if one wishes to do most of the mowing in the late afternoon and early morning, so as to have all the teams haul in hay during the dry part of the day, he will want two machines. There is also a considerable advantage in having two machines in order to have two teams mowing at times when not otherwise busy. There is also a gain in safety; if one machine breaks down, the other can go on with the work. Most farmers who have over fifty acres to cut like to have two mowers. One of these may be an old one.

A 9-foot hay tedder or hay rake is fairly light draft and may be made to cover 12 to 15 acres, or even more, per day, so that in 8 days one of these will do the work on about 100 acres if kept going, but the process of hay curing does not allow steady use. The hay should be tedded and raked at the proper time. Farmers usually desire an additional tedder or rake if they have over 60 or 75 acres of timothy hay.

In parts of the wheat country, the work that a binder can do is of great importance. In regions where there is danger of storms, the wheat should be cut in a period of one or two weeks. An eight-foot binder, drawn by four good horses, is a fairly rapidly moving machine. It may be expected to cut 12 acres a day. Sometimes horses and men are changed, and the machines kept going all the day and most of the night, in order to get the grain cut. If there are over 100 acres of wheat to cut, it is usually considered desirable to have two machines.

Similar estimates may be made for any machine, but practical experience in the region is the final guide to follow.

229. What machinery to buy. — Whether or not it will pay to buy any particular machine depends primarily on how much the capital is needed for other purposes, the area on which the machine is to be used, and the possibility of hiring the work done at the desired time.

For instance, the depreciation on a corn binder amounts to about $14 per year. Interest, insurance, and housing will usually bring the cost to a fixed charge of $20 per year. If there are only 20 acres of corn to cut, this will make a cost of $1 per acre besides the time and labor. At this rate, it is usually cheaper to cut the corn by hand or hire a neighbor to cut it. The total charge for cutting, including the horses and driver, is often $1 per acre. No one can afford to buy a binder to cut corn at this rate. But farmers often own machines when they do not have work enough to keep them busy, and also have idle horses. For this reason, they can often be hired at prices so low that one cannot afford to own the machine. If a machine cannot be hired, and if men cannot be secured to cut by hand, then it will pay to own a corn binder if one must cut 20 acres of corn.

The majority of farmers have about the right amount of machinery, but there are some in every community who have too much machinery for their farms and, perhaps, an equal number who have too little. There are thousands of farmers who have $100 machines on their farms that are used only two or three days in the year. A $100 machine that is used only three days a year usually costs about $7 per day. If one could not afford to hire a machine at this price, he should not buy one.

One should be very slow in buying new inventions. When a new invention is put on the market, the depreciation must be expected to be very high. A machine has to be used under all kinds of conditions by all kinds of farmers before the makers find which parts should be strengthened. A still greater source of depreciation is due to improvements that make the later machines so much better that the old one must be thrown away before it is worn out.

The experience when grain harvesters were introduced is typical. My father bought a Marsh harvester. Two men stood on a platform to bind the grain. One man drove three horses. Usually two more horses were hitched on in front and a boy rode one of these. The machine had so much side draft, and was so heavy on the horses' necks that it was very hard on them. With all its defects, it was a great improvement over the self-rake that it displaced. It was used all over the neighborhood. But it was never worn out; before it had paid for itself, the wire self-binder was introduced. A neighbor bought one of these, and the wonderful Marsh harvester became a chicken roost. But the machine was not yet perfected. Before the wire binder was worn out, and before the neighbor got his money back, the twine binder displaced it. Another neighbor bought one of these. It was a better machine, but the knotter was far from perfect. The machine was good enough, however, so that it was used a number of years, and probably paid its cost before it was displaced by machines with a better knotter, lighter draft, and wider cut, and that carried bundles to be dropped in rows. Improvements are still being made on the machine and will likely continue, but one who buys a grain harvester to-day may expect to wear it out and not have to throw it away because it is out of date.

The early history of nearly every new invention is the same. The automobiles bought a few years ago went out of date because of the improvements made before they were worn out. In recent years the models have become standardized and the depreciation is less, but is still high.

Milking machines have been greatly changed since the first ones were sold to farmers. They will doubtless be much changed in the near future. It is very doubtful if they have yet paid any farmer, when depreciation and interest are counted. The following quotation about milking machines is typical: "Owing to the numerous changes in the milker on account of improvements which have been introduced, there has been no opportunity to determine the expense of maintenance due to the wearing out of various mechanical parts of the machine.[1]

With machinery, as well as with anything else, the safe advice is to "Be not the first by whom the new is tried, nor yet the last to lay the old aside." If one has the money, he may do some of the experimenting with new things for the fun of it or for the benefit of the community, but not for profit.

The young man who is short of money can usually buy most of his machinery at public sales and save considerable of his money for other uses. If good judgment is used, one may buy very cheaply in this way. The man with plenty of money usually prefers to buy most of his machinery new.

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CHAPTER 13

FARM LAYOUT

The present arrangement of practically all farms is the result of accident. The older the country the worse the farm layout, because as new obstacles are introduced, the fields become smaller and more irregular. As new buildings are built and old ones patched up, numerous unrelated buildings collect. Every farmer should make a more or less definite plan for the development of his farm, so that new fences and other changes will gradually work toward a definite plan.

FIELD ARRANGEMENT

230. Size and shape of fields. — For economy in work, fields should be large. The more horses one drives per team, the more important it is to have long rounds so as not to waste time in turning. The negro farming with one mule can farm rather small fields, but when three- to five-horse teams are used, fields should be large.

The time required to plow an acre on stubble land in England gave the following comparisons: —

Length of Land in Rods	Time to Plow One Acre	
	Hours	Minutes
8	10	45
18	9	30
25	8	45
58	8	0

In one trial in New York, E. L. Baker found that it took 5 hours and 37 minutes to plow an acre in a field 16 rods long, and took 6 hours and 23 minutes in a field 7 rods long. He found the time required to turn around with two horses to average one-half minute before the farmer could be ready to start again.

For most kinds of general farming, fields ought to be at least 40 rods long; 80 rods is very much better, and 160 is still better.

The shape of fields is also very important. All irregular shapes are objectionable. Square fields are not satisfactory, unless they are very large. If large enough to be cut in two for operations that require going around the field, they are satisfactory. In harvesting and mowing, a square field must be cut in two, or there will be many very short rounds in finishing the field. Unless the fields are very large, a field about a half longer than wide is a very desirable shape. Many of the operations can be done the long way of the field and so have long rounds. Yet such a field, if of reasonable size, is wide enough so that it may be harrowed or cultivated crosswise without great loss of time.

The time required to plow an acre in a triangular field averaging 7 rods wide was found to be 6 hours and 51 minutes. The time for a rectangular field of this width was 6 hours and 23 minutes.

The cost of fencing is very heavy for small fields, and is still worse for irregular fields. The cost of construction and permanency of a fence depend largely on the corner posts. Irregular fields have too many corners. On most farms, all posts except the corners can be driven from a wagon, so that it does not take very long. But properly set and braced corners take time.

Fig. 77. — Farm layout that has not been adjusted to farming with machinery. The small, irregular fields and trees in the fields make the cost of producing crops very high. Very much time is lost in every operation. Much time is also spent in keeping the brush down along the numerous field lines. The small fields make the cost of fencing high.

A square field of one acre requires 50 rods of fence. A square field of 10 acres requires 160 rods, or 16 rods for each acre. A square field of 40 acres requires 320 rods, or 8 rods per acre. A 620-acre field requires 1240 rods of fence, or 2 rods per acre.

The materials and labor for a woven wire fence cost 50 to 75 cents per rod. Interest and depreciation on this cost will usually amount to 5 to 10 cents a rod per year. This makes the annual cost of fencing about $2.50 per acre for one acre, 80 cents per acre for the 10-acre field, 40 cents per acre for the 40-acre field, and 10 cents per acre for the 620-acre field.

The value of farm land is determined by its earning power. If interest rates are five per cent, then a change in a field that makes it permanently earn $2 more per acre every year increases the value of the land $40 per acre. Or a change that permanently reduces the expense by $2 per acre per year has the same effect. On this basis, the 10-acre field would be worth $34 per acre more than the one-acre field, if they both were to be kept fenced permanently. In other words, the $1.70 difference in fencing cost is rent at 5 per cent on $34 worth of land.

So far as possible, the main fields on the farm should be of the same size. So far as possible, the farm should be laid out so that the soil in a field is uniform. It is particularly important that it be uniform in drainage, otherwise the entire field must wait for the wet spots to dry up before it is worked. Tile drainage for the wet places will help in this matter.

231. Distance to fields. — The fields should be so arranged that they will come as near to the barn as possible.

For any given condition, the relative value of fields near the barn and far away may be determined. If a five-year rotation is used with corn one year, small grain two years, and hay two years, and if 10 loads of manure per acre are used during the rotation, then there will usually be more than 20 round trips to the field for a man and more than 40 for a horse in the five years for each acre in the field. This would be an average of 4 man trips and 8 horse trips per acre per year. If corn silage is grown, or if the field is small, the trips will usually be more because more days are required.

If a field is 40 rods from the barn, each round trip would make 80 rods of travel. Such a field would require a mile of extra travel for a man and 2 miles of extra travel for a horse each year over the time required by a field next the barn. This will take about one hour of horse time and half an hour of man time. This time should be worth about 20 cents a year. But this is interest at 5 per cent on $4. It will, therefore, appear that with the above considerations a field near the barn is worth $4 per acre more than a field 40 rods away. Similarly, there would be a difference of $8 for 80 rods, and $16 for half a mile. If a neighbor owned land near one's barn, it would pay to buy this and sell land as far away as half a mile, if the difference in price were not over $16. If such crops as potatoes, apples, and cabbages are grown, the difference is much more.

Any one can figure the approximate time lost in going to and from distant fields with his particular type of farming, and determine the approximate value of such fields as compared with fields near by. All over the country, farms are so laid out that land near one man's barn is farmed by some one farther away. In the Western States, land just across the road from one farmstead is often farmed by a neighbor who lives half a mile away. Frequently, it will pay to buy such land so as to make a better laid-out farm. It is worth much more to the farmer who lives near it.

The ideal arrangement is to have half of the land on each side of the highway. Unfortunately, the excellent system of laying out land in square miles in the West resulted in making the road the usual farm boundary. In much of the area, every other section was given to the railroads. This was usually held until the free land was all settled. This method of settlement usually prevented farmers from getting land on both sides of the highway. This error has cost the farmers many millions of dollars' worth of lost time in going to and from the fields.

232. Four methods of farm layout. — Very frequently, the farmstead on a 160-acre farm is on one corner of the farm. The land is then no nearer the buildings than it is on a 640-acre farm with the buildings in the center. Such a farm has the chief disadvantages and none of the advantages of the 640-acre farm.

Figures 78, 79, 80, and 81 show four different arrangements for a 160-acre farm. In each case, the barn is 10 rods from the road, and a little over 6 acres is allowed for farmstead, garden, yards, paddocks, and minor crops.

The average distance from the barn to the nearest corner of the different fields in Figure 78 is 68 rods. If the farmstead is placed in the center, as in Figure 79, the average distance is 48 rods. This makes a saving of 40 rods on every load hauled and on every other round trip to the field.

The fields with the arrangement in Figure 78 are too long for their width. Those in Figure 79 are better shaped, but with this arrangement there are two fields that are too near square.

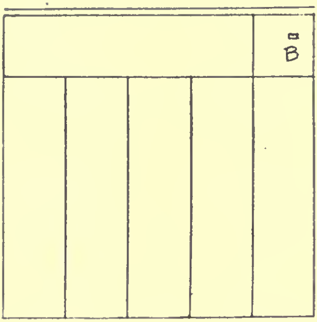

Fig. 78. — Farm layout with the buildings on one corner of the farm.

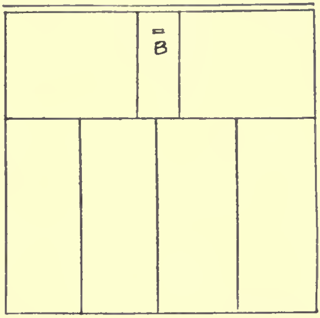

Fig. 79. — Farm layout with the buildings in the center on one side of the farm.

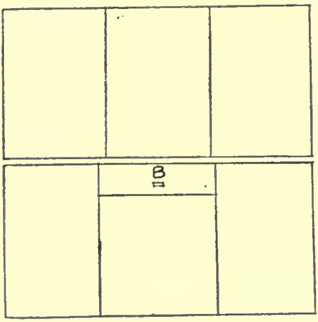

Fig. 80. — Farm layout with the buildings in the center of the farm. A good layout.

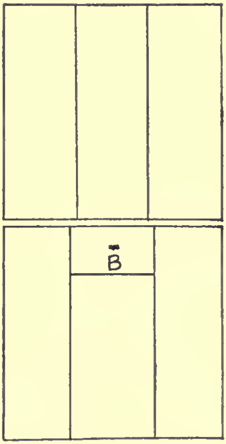

Fig. 81. — Farm layout with a square area on each side of the road. A good layout.

With the layout in Figure 79, it requires 122 rods less fence to fence the entire farm.

It is sometimes said that the farmstead should be on the side nearest town. One bulletin has the contradictory statements that the farmstead should be in the center of the farm and should be on the corner nearest town.

For practically any conditions, a comparison of the time lost by having farther to go to town with the time lost by having the fields farther away, results in a decided advantage for locating as near the center of the farm as possible and yet remain on the highway. Even a retail milk farm that must send a load to town every day saves time by locating near the fields, rather than near town.

TABLE 77. — RELATION OF FARM LAYOUT TO DISTANCE TO FIELDS[1]

LAYOUT	160-ACRE FARM		640-ACRE FARM	
	Average Distance Barn to Fields	Average Distance Barn to Center of Fields	Average Distance Barn to Fields	Average Distance Barn to Center of Fields
	rods	rods	rods	rods
Figure 78 . . .	68	143	136	286
Figure 79 . . .	48	112	96	224
Figure 80 . . .	26	78	52	156
Figure 81 . . .	23	84	46	168

[1] Farmstead, minor crops, paddocks, 25 acres on 640-acre farm, and $6\frac{1}{4}$ acres on 160-acre farm. Public roads 4 rods wide on two sides of each parcel of land for 160 acres. Road on all sides of each parcel for 640 acres in Figures 78 and 79, and on three sides of each parcel in Figures 80 and 81.

Barn 10 rods from the road on 160 acres and 20 rods on 640 acres. Reducing the farmstead, etc., or moving the barn nearer the road, makes the difference a little more in favor of the farms with land on both sides of the road.

In Figure 80 is shown how the fields might be laid out, if the farm consisted of 80 acres (80×160 rods) on each side of the road. This is a very much better arrangement than either of the preceding. The average distance from the barn to the fields is 26 rods, — a saving of 84 rods on every round trip to the fields, as compared with having the farmstead on the corner of the farm. From the barn to the center of the fields averages 65 rods less than for Figure 78. For many kinds of work, this represents the saving to be made. The fields are also better shaped, except the one that is nearly square.

To fence the entire farm with this layout requires less fence than Figure 78, but more than Figure 79.

The time saved every year with this arrangement would pay interest at 5 per cent on a difference in value of about $1000 for the 160 acres over Figure 78.

How the farm would look if the area on each side of the road were a square instead of being 80×160 rods is shown in Figure 81. This arrangement requires more fence than Figure 80. The corners of the fields are nearer, but the centers are farther away. There seems to be little choice between having the farmstead in the center of a square and having two squares, one on each side of the road, with the farmstead in the middle.

We may consider the figures to represent 640 acres of land with the farmstead and all fields 4 times as large. If one had 640 acres of land with buildings on one corner, and the land laid out like Figure 78, the average distance to the fields would be 136 rods and to the centers of the fields, the distance would average 286 rods. These distances are too great for economical work. But with 320 acres (half sections) on each side of the road, the distances to fields would average 52 rods, and to the centers of the fields 156 rods. These distances are reasonable. The fields are then as near the barn as with one-fourth the area laid out like Figure 78.

233. Locating the farmstead off the highway. — We have seen that the ideal place for the buildings is in the center of the farm with a public road going by the buildings.

If the land all lies on one side of the road, the best place for the farmstead is in the center of the side of the farm on the road. The many objections to locating away from the public road more than offset the advantages of being near the fields. With rural mail delivery, one must go to the highway every day for mail. As the parcels post is developed, it will become increasingly important to live on the highway. If there is anything to sell to neighbors, it is much more likely to be sold if one lives on the highway. Many times one can send to town by neighbors who are passing the house. If the farm is not located on the highway, the strip of private road must be kept up. Every trip to town is a longer trip. Farms with buildings off the highway do not sell as well. When all these things are considered, it will be seen that the farmstead should be on the public road. Wholly aside from all the above considerations, it is desirable to live where people can be seen occasionally. Farm life is isolated enough at best. Sometimes the buildings may be located in the center of the farm, and a new public road opened that will pass them. One can well afford to give the right of way for such a road in return for the advantages of locating in the center of the farm.

234. Present conditions on farms. — In the country that was covered with trees in the eastern part of the United States, small, irregular fields were gradually cleared by the early settlers. The fields were surrounded with rail or stump fences that helped to keep off some of the wild animals. Much of the land was more or less stony. The stones were used to make stone fences, or were piled into the field lines. In this haphazard way, the field lines became obstacles. Brush and trees promptly grew so that the fence lines often became 10 to 15 feet wide. In the early days, small fields and irregular shapes were not a very serious matter. Such fields were not obstacles to the scythe, grain cradle, and hoe. A five-acre field was larger in terms of labor than a 20-acre field is to-day. At the same time that small fields were developed, small farms also became the rule. Lumber for building houses was cheap. A small area was all that could be worked with the poor equipment. In addition, lumbering furnished occupation, so that the farm was not the only means of support. The public roads usually developed in the same haphazard manner.

Conditions have now changed. Larger farms and larger fields are needed, and irregular shapes are serious difficulties. Where the obstacles are not too serious, it pays to gradually combine fields, so as to get fields of good sizes and shapes.

In Figure 82 is shown the layout of 8 farms in Western New York. This is in a prosperous farming community. As one rides by these farms, he does not realize how small and irregular the fields are. Maps show the defects much more strikingly than the farms do. Except for a hill on one farm, there are no serious obstacles to laying out these farms in any way desired. The land has gentle slopes. A few open ditches would have to be filled. There are some hedgerows that would have to be grubbed out, but not many stones along the fence lines. The wood-lots could not profitably be cleared in less than 20 years, because it is cheaper to pasture them while the stumps rot than to clear at once. None of the wood-lots are of much value. It is excellent farm land, altogether too valuable to be left in woods. Figure 77 also shows typical farms in the older country.

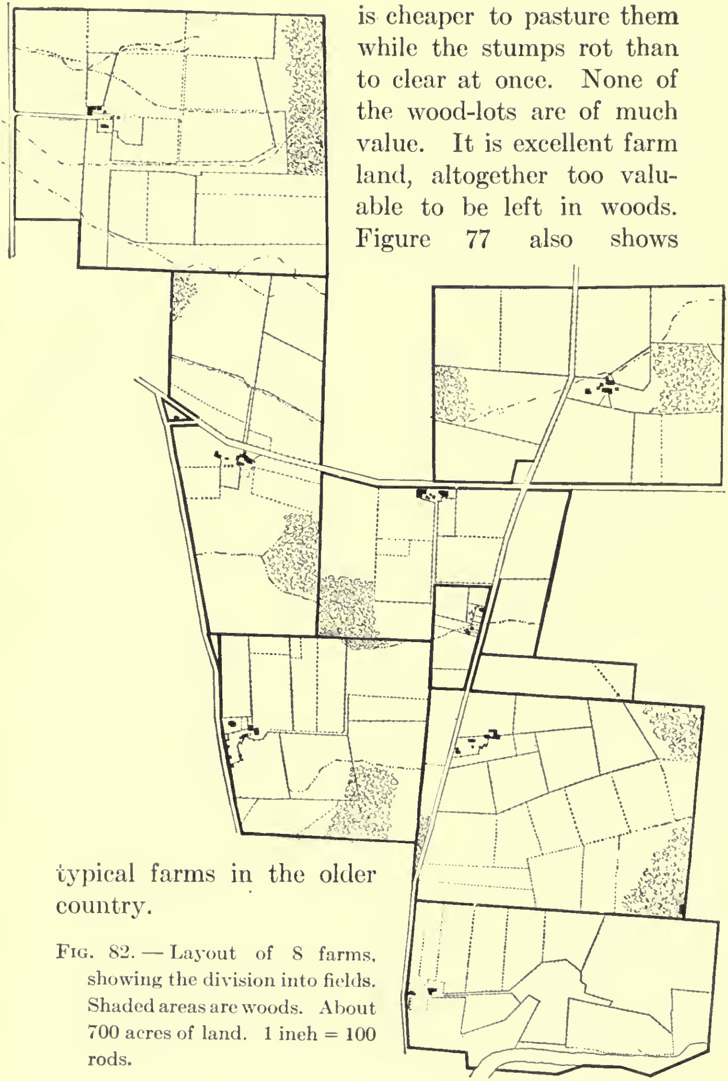

FIG. 82. — Layout of 8 farms, showing the division into fields. Shaded areas are woods. About 700 acres of land. 1 inch = 100 rods.

The layout of a number of farms in Kansas is seen in Fig. 83. This was a treeless country. There were few obstacles to laying out in any desired shape. The land was worked with machinery when first broken up, so that

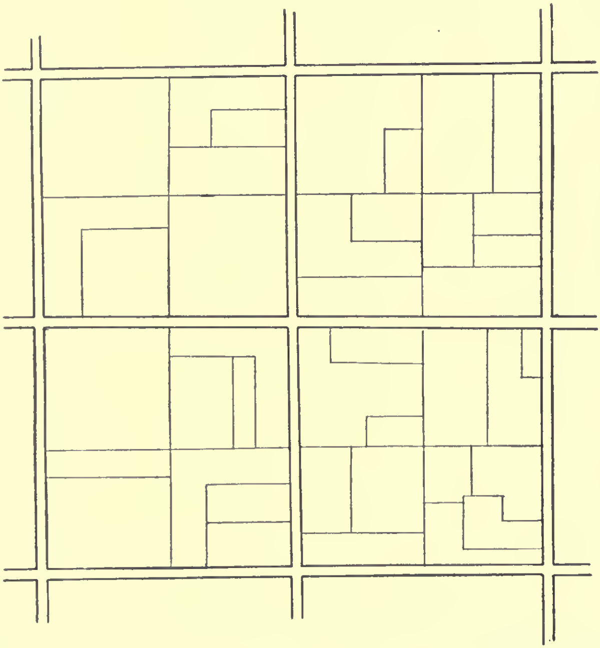

FIG. 83. — Layout of 2560 acres (4 sections) of land in Kansas, showing the division into large fields.

there has been no temptation to make small fields. Even this section could be much improved.

235. Rearranging farms. — The farmsteads on most farms are located, and usually the amount of capital invested makes it inadvisable to change the present location, but there are some cases in which it would pay to move. In many more cases, it will pay to buy land so as to get a good shaped area surrounding the farmstead.

Unfortunately, it is difficult to make the necessary sales and purchases in order to rearrange farms so that they can be worked to the best advantage. Sometimes such changes can be made.

Nearly always some improvement can be made in the arrangement of fields. Such changes can be made

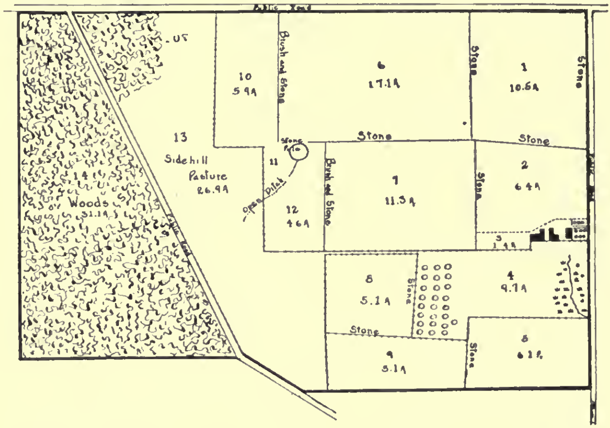

FIG. 84. — Layout of a farm as it was in 1902. See Figure 85.

gradually, and the necessary work done at odd times, so that the expense will not be felt.

In Figure 84 is seen the field arrangement on a New York farm as it was when the present owner bought the place in 1902.[1] The farm had been rented for some time, and some of the fence lines had been allowed to grow up to brush. Between fields 6 and 10, there was a brush line about 8 feet wide, and about 65 loads of stone. There was also about 1 acre of brush in field 10. Between fields 7

[1] Maps and data on this farm were furnished by C. E. Ladd.

and 12, there was a brush line about 25 feet wide and about 120 loads of stone. Between fields 11 and 12, there was an open ditch that could not be crossed; along this was the usual thicket of trees, brush, and weeds. All these lines of trees ran diagonally across the fields, so as to make short rows on both sides. In fields 6 and 10, there were 15 short rows when planted to potatoes. Between fields

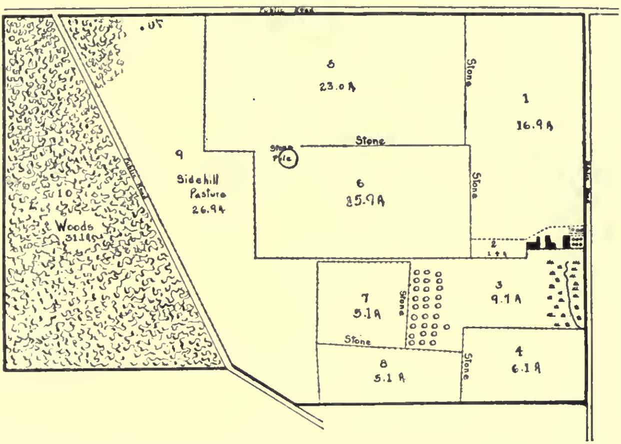

FIG. 85. — Layout of the farm shown in Figure 84 as it was in 1911. Three large fields instead of 7 small ones.

1 and 2, there was a tumbled down stone wall. This also ran diagonally across the fields, so as to make short rows.

When the owner fixed over his barn, the stone wall between fields 1 and 2 was sorted over and the best stones taken for foundation. The balance was hauled to the stone pile. The owner estimated that there were three good two-horse loads to the rod, or 114 loads in the 38 rods. Stones were hauled to the barn by two men and a team at the rate of about 3 loads per hour, and were hauled to the stone pile at the rate of about 2 loads per hour. To remove the entire stone wall required about 91 hours of man time and 91 hours of horse time. At 20 cents per hour for a man and 30 cents for a team, the work would have cost $32. About 23 square rods of land were added to the farm worth $60 per acre, or $9. Much of the stone was used for a useful purpose. All was hauled at odd times when there was no important work for teams and men, so that the net charge of $23 is too high. But this is a small amount to pay for changing two small fields to one large one, getting rid of short rows, and saving the work of mowing the stone line every summer.

The farmer has gradually cleared out the hedgerows at odd times, and brought this land into cultivation. In 1910, he laid a stone drain in the open ditch and filled it. He now has three good-sized and good-shaped fields where there were 7 small, irregular fields. Figure 85 shows the present condition. He plans to extend field 6 into the pasture so that it will be as long as 5, as there is some good land in the pasture. Fields 7 and 8 are still in bad shape. It will take a number of years yet before the farm is all straightened up.

FIG. 86. — A neglected fence line.

This rate of development may sound slow, but this is the way to do such work. It should be done at odd times. The owner started on the farm with only money enough to make a small payment. During the ten years he has paid for the place and incidentally made these and many other improvements.

On another farm where cost accounts were kept, it required 183 man hours and 102 horse hours to clear and plow a hedgerow 121 rods long. About half of it was small brush. The other half was thorn-apple, brush, and some fairly large trees. There were also about 20 loads of stone. At 20 cents an hour for labor and 30 cents for a team, this work cost $51.90, or 43 cents per rod. About 90 square rods of land were gained, worth $70 per acre, or $39. The real cost of the improvement was, therefore, only about $13. The time saved in working the larger field would pay this cost in a year or two.

Fig. 87. — Clearing up a fence and brush line so that two fields may be worked together.

Another hedgerow on this farm, that was probably 35 years old and contained some large trees and more stone, cost 80 cents a rod. The land gained paid about half the cost.

On this same farm, an old apple orchard was removed. The trees were about 75 years old and a foot and a half in diameter. This work required 8 hours of man labor and 4 hours of horse labor per tree. About 2 pounds of dynamite were used per tree. The labor, dynamite, fuse, and caps cost $2.59 per tree.

An enlarged view of one of the farms in Figure 82 is in Fig. 88. This is a farm of 100 acres and, except for the public road, it could all be worked in one field. There are no physical obstacles. Fields 9 and 12 were the first

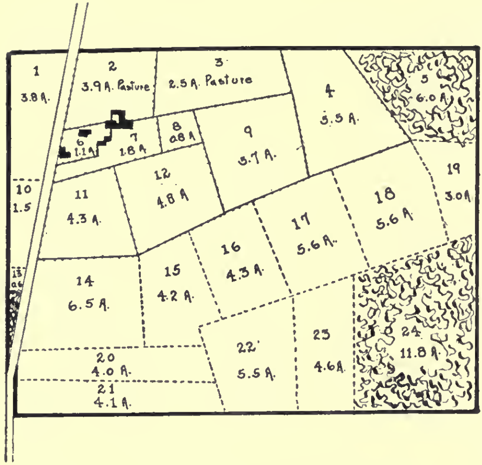

FIG. 88. — Layout of a 100-acre farm.

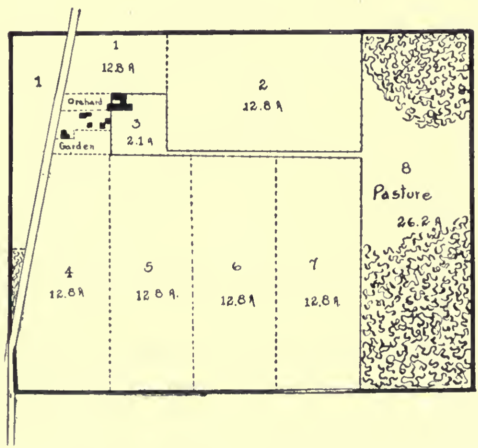

FIG. 89. — Farm in Figure 88 rearranged for efficient use.

fields cleared. They are a little drier and warmer soils than the remainder of the farm. They happened to be

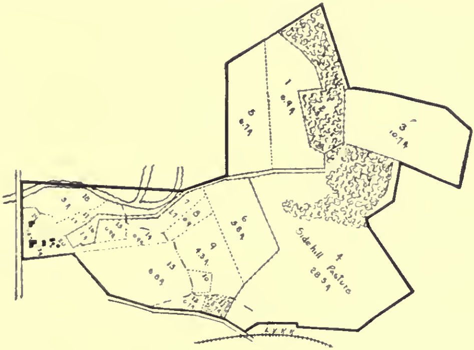

FIG. 90. — Layout of a farm in a hilly country.

laid out cornerwise of the farm. This fact seems to have determined the layout of all the other fields. For seventy years, these small, irregular fields have continued, because in any particular year it was easier to let them alone than to change. Figure 89 shows how such a farm would look if rearranged for convenience. This farm is so easy to rearrange that a few years would pay the entire cost of making the change. With the old arrangement, to plow all the fields in this farm with a 14-inch plow required 12,514 turns at the ends of fields. The new arrangement requires 5270 turns.

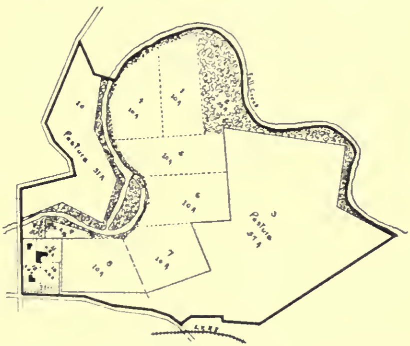

FIG. 91. — Showing how the farm in Figure 90 could be combined with a neighbor's farm to make a fairly good layout.

In Figure 90 is shown the layout of a farm in a hilly region. This farm has about 36 acres of good bottom land and 56 acres of hillside pasture, creek, and woods. Not only are the fields too small and irregular, but the farm is

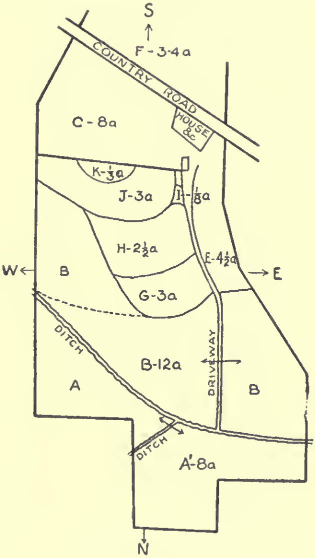

Fig. 92. — Layout of a farm in the south.[1]

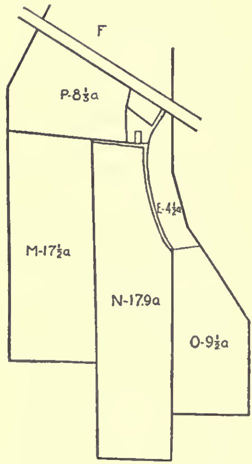

Fig. 93. — Proposed rearrangement of farm shown in Figure 92.

too small for a profitable business. There is about $2\frac{1}{4}$ miles of fence in the lane and pasture. This fence has something like 50 corner posts where the fence changes direction. The entire pasture would not rent for enough to pay for keeping up a good woven wire fence of this length. There is considerable other fence on the farm.

Joining this farm is another even worse farm. Neither of the farms has been profitable for a generation, but if

[1] Cyclopedia of American Agriculture, Vol. I, p. 146.

the two were combined, they would make a profitable farm, as shown in Figure 91. Other farmers in this region, with such a farm as this combination would make, are almost invariably doing well.

The layout of a southern farm is illustrated in Figures 92 and 93, and a proposed rearrangement, when tile drains take the place of the terraces.

PASTURES AND FENCES

236. Construction. — The important point in a fence is the corner posts. Wherever a permanent fence is required, such posts should be set deeply — usually 4 feet deep, and be well braced. The other posts should always be driven from a wagon, unless there is some condition that makes this impossible.

Fig. 94. — The corner posts are the weak point in a fence.

It rarely pays to use trees for posts. The trees grow around the wire and ruin the fence. It is very difficult to remove wire from trees. Occasionally, it pays to use a tree for a corner post, because this saves so much work, but rarely, if ever, does it pay to use trees elsewhere.

Another exceedingly important point in fence construction is to leave the staples projecting far enough, so that they can be readily pulled with a staple puller when a post is to be changed or the wire removed. Driving the staples too far, as is the common practice, also injures the wire.

237. Lanes should be wide enough to furnish some pasture rather than so narrow as to be muddy or dusty roads. Stock is also likely to be injured in narrow lanes by fighting. The width of the lane depends on the value of the land and amount of stock in the pasture, but should rarely be less than 2 to 4 rods.

FIG. 95. — A tree makes an unsatisfactory post. The wire spoils the tree and the tree spoils the fence.

238. Permanent pastures *vs.* rotated pastures. — Permanent pastures require much less work and much less fence. Rotated pastures usually carry more stock per acre. Light soils do not usually hold grass well and so do best if rotated. As land becomes more valuable, it may pay to rotate pastures. In all parts of the United States where permanent pastures do well, the farmers generally use some of the poorer land for pastures rather than pasture in rotation. The permanent pasture may at times be supplemented by pasturing fields. There is no very important dairying or live-stock-producing section in America that does not depend primarily on permanent pastures, or pastures that last many years. In the northeastern fourth of the United States, Kentucky blue-grass is the great pasture plant. In the arid regions, the native grasses furnish pasture on land that is too dry to farm.

239. Field fences. — If there is a permanent pasture on the farm, it rarely pays to fence the fields. If the fields are pastured in rotation, it may pay to fence them.

There are many objections to fenced fields. The fences prevent the easy adjustment of field lines to changed conditions. It is often desirable to change the size of fields. Adjoining fields can sometimes be worked as one if there is no fence.

In hauling, and other work, much time is often saved by being able to go across the fields. If fenced, one must go around to the gate.

The fence lines cause more or less waste land. On one farm the area of untilled land, including that on both sides of the fence, was found to be as follows: —

	Width of Waste Land	Rods of Fence to Waste an Acre
Rail fence	9 ft. 8 in.	273
Barbed wire	4 ft.	660
Board	3 ft. 8 in.	720
Woven wire	3 ft. 7 in.	737

If land is worth $100 per acre, the land wasted would be worth 59 cents a rod along a rail fence, and 22 cents along a woven wire fence.

Not only is there much actual untilled land, but the crops are injured along a fence by turning, and considerable is lost in harvesting. The actual loss is probably double what the above figures indicate.

The fence line also makes a harbor for weeds and other crop pests.

In the eastern third of the United States, a fence line must be mowed by hand every year or it will grow up to brush and trees. This mowing is a very expensive operation. With small fields, it not infrequently takes a man as long to mow the fence line as to mow the field with a mowing machine.

If the fields are fenced, stock is almost certain to be turned on at times when the land is likely to be injured.

The aftergrowth and stubble that is saved by pasturing is not all lost if left on the land. It serves as green manure to help to keep up the humus supply.

The cost of up-keep of fences is much more than is commonly supposed.

To offset all the above points is the time of putting up and taking down fences, if fields are to be pastured. Comparatively few farmers have all the fields fenced.

Unless the fields are pastured much more than is usual, it will pay better to take down fences and put up when needed, rather than keep the fields fenced. Sometimes it is cheaper to herd the stock.

THE FARMSTEAD

240. Location of farmstead. — If possible, the farmstead should be located so that it will be convenient to the fields, as indicated in the previous discussion. The ideal place for the buildings is on a slight elevation sufficient to secure good drainage, but not high enough to make hauling difficult. It is desirable to have a dry soil around the buildings in humid regions.

The farmstead should be so laid out that the work can be done without loss of time. The garden should be near the house. The barns and water should be conveniently located. The barns should be at least 100 feet from buildings in which there is a fire, otherwise the insurance rates are usually about twice as high.

When the land lies on both sides of the road, the barn should be back of the house, rather than across the road in front of the house. The space between the house and the barn should be the farmer's private yard. The barn and necessary accompaniment of more or less machinery does not make a desirable front view. But wholly aside from appearances, it is very undesirable to have automobiles going between the house and barn. Chickens and stock are much more likely to be injured, or cause injury.

The farm is a home as well as a business. The farmstead should be an attractive place. The necessary piles of lumber and other miscellaneous material should be kept behind the barn or trees, so that the space between the house and barn will be a pleasant place. It is the farmer's front yard.

241. The farmyard. — The first essential for an attractive farmyard is neatness. After this, a little attention to planting will accomplish the rest. Nothing is more attractive than a good lawn; add to this a few trees and shrubs and flowers, and nearly any farmyard will be attractive. The shrubs should be planted in groups in the corners, around the house, and to serve as screens to shut off undesirable views. Scattered, aimless planting is not effective. Flower beds should also be placed at the sides and in corners, so as to keep the center of the lawn open. Such an arrangement is not only attractive, but it also makes the care of the lawn much easier. See Figure 96. At the same time, over planting should be avoided. The farmyard should not be a pattern of city properties, unless it is the country home of some city man who is able to hire a gardener to take care of it. The farm home should be attractive, but not ostentatious.

Flowers are often best raised in the garden. The lawn should be as open as possible, and not so large but that it can be mowed without too much work. Figure 97 shows a drawing that is marked, "Good example of a planting plan" in a bulletin on "Planning and Adorning the Farmstead." This plan is 20 rods square. The bulletin does not state how much more land there is in the

Fig 96. — A well-laid-out lawn.

farmstead. The barns are somewhere in the distance not on the plan. To take care of this elaborate yard of $2\frac{1}{2}$ acres would keep one man busy most of the time. No such plan has any place on a farm. It is designed for a rich man's home where a gardener is kept. The plans made by landscape architects nearly always call for too much work. The farmer must take care of the yard at odd times, usually after a hard day's work. Such plans are usually too artificial to put out in the country where things are plainer than in cities. They are too much like a dress suit in a hunting camp. But there are some underlying principles that a farmer needs to apply.

The factory laborer can care for a larger yard. He has worked indoors all day. Some outdoor work is a change. But after a farmer has cultivated corn all day or has been in the hay field, he is not looking for the sort of a change that a lawn mower brings. The grass in the yard grows fastest just when the weeds grow fastest in the corn field. For farmers of moderate means, the yard to mow with a

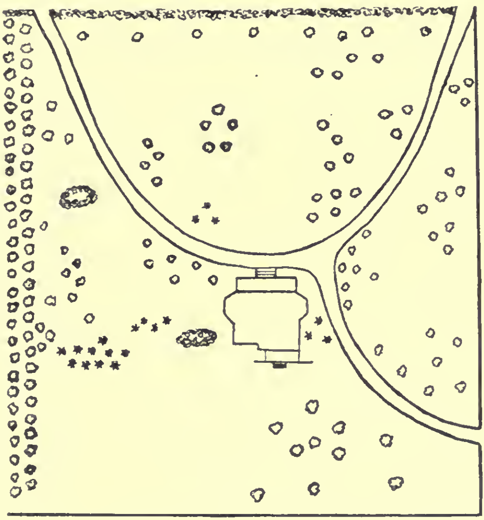

FIG. 97. — A layout adapted to a country place, but too elaborate for a farmer.

lawn mower should not be over $\frac{1}{4}$ acre. Sometimes a large lawn is mown with a mowing machine, but the smaller area is usually more satisfactory.

THE GARDEN

242. Arrangement of the garden. — The crop from a vegetable garden of one-half acre at the University of Illinois had an average value of $105 for five years. During this time, the average expense for seeds, insecticides, and labor was $30.[1] Every farmer should have a family orchard and a garden, not only for pleasure, but for the profit that results from a saving on living expenses.

A good layout for a farm garden is shown in Figure 98. The particular crops will vary with the region, but the principle is the same everywhere.

The long-lived plants, like grapes, raspberries, blackberries, gooseberries, currants, rhubarb, and asparagus,

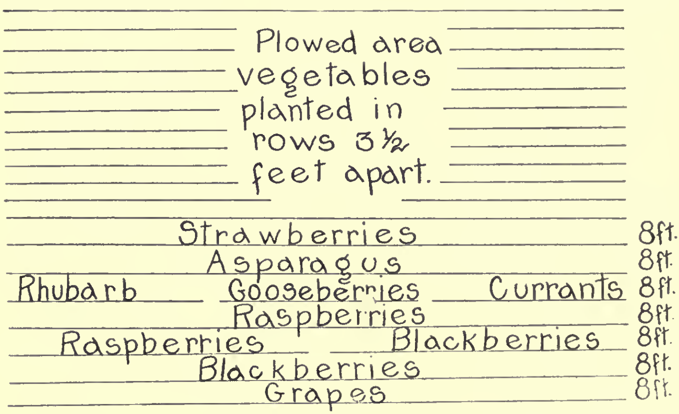

FIG. 98. — A farm garden laid out for convenience in working.

should be planted in long rows on one side of the garden. These rows should be 6 to 10 feet apart. While they are young, a row of vegetables should be raised between them. Such plants as raspberries and blackberries should be confined to solid rows about 2 feet wide. This allows for regular horse cultivation. Strawberries and other shorter lived plants should come next. The land that is to raise

[1] Illinois, Bulletin 105.

vegetables can then be plowed in one block every year. This strip can be planted from one side. The land for the later planting can then be kept harrowed until it is planted. Interplanting of small fruits and trees is very inadvisable unless land is very limited, because more work is required.

If all perennials are at one side, the remainder of the garden will be straight for plowing. The rows of vegetables should be at least two and one-half feet apart to allow for continued cultivation with a horse or team. Cultivation should be so frequent that weeds will never get started. In this way, little hand labor will be required.

The soil should be generously manured. It is not profitable to raise so valuable a crop on poor land. If any crop is short of manure, let it be the cheapest crop.

The garden and orchard should contain every kind of fruit and vegetable that will grow in the region and that the family likes. There should be enough varieties to cover the season. The season may be prolonged by bringing vegetables into the cellar. Full-grown green tomatoes may be kept for about two months by wrapping them in paper. Watermelons will keep some time. Celery may be transplanted to the cellar and kept watered. It will then grow new shoots that are of the finest quality. If one becomes interested, he will find many ways of adding to the usefulness and pleasure of the garden.

A small hotbed, perhaps four by eight feet, will grow several crops of lettuce and radishes and also plants for the garden. A hotbed is a simple affair. Old boards may be used to make a tight frame, which is about 24 inches deep on the north and 18 inches deep on the south. This is filled with firmly tramped horse manure that is just beginning to heat. It is covered with about six inches of good soil, and is then ready for the window-sash. Before making such a hotbed, one would do well to buy the sash and make the bed to fit it.

See also pages 23 and 38.

FARM BUILDINGS

243. Relation of buildings to the farm. — All the farm buildings should be in keeping with the farm. One should not build an expensive house on a cheap farm. If an expensive house is desired, a good farm should be bought on which to put it. The same principle holds in cities. It is very unwise to build an expensive house on a cheap lot, or a cheap house on an expensive lot.

The barns should be in keeping with the amount and quality of the land. One should be very sure that he is going to use the buildings for many years before he builds

Fig. 99. — Too many buildings for a 190-acre farm, hence they are in poor repair.

a larger barn than the farmers of the community usually desire for the farm in question. Some of the money wisely invested in farm buildings is usually lost in selling a farm, but if the farm is over-built, the loss is heavy.

There seems to be little consideration given to this relationship. As the country grows older, the number of places with too many or too expensive buildings increases. One does not need to travel far in any old country to find examples of very expensive farm buildings neglected and out of repair, because too expensive for the farm to carry.

One should consider the matter very carefully before he puts up buildings. A delay of a year or two is better than a serious mistake. A mistake in permanent buildings is a mistake that lasts more than a lifetime. It passes on to the next generation. So long as a farmer spends his

FIG. 100. — A set of barns that cost $600 for each animal housed. At least six times too expensive. Too large for the farm. Poor construction, as the low, many-gabled roofs allow little storage room and are very expensive to maintain.

energy and money in raising crops he usually has little to regret.

Two thousand years ago Cato gave advice on this subject that is just as good and just as much needed to-day as it was when he wrote it. " In his youth the farmer ought diligently to plant his land, but he should ponder before he builds. Planting does not require reflection, but demands action. It is time enough to build when you have reached your thirty-sixth year, if you have farmed your land well meanwhile. When you do build, let your buildings be proportioned to your farm, and your farm to your buildings. It is fitting that the farm buildings be well constructed, that you should have ample storage room, so that you can wait for high prices, something which will redound to your honor, your profit, and your self-respect."[1]

Cato is also quoted as advising to buy what others have built and thus "enjoy the fruits of another's folly." This again is good advice to-day.

244. Capital in buildings. — Very little can be said about the proportion of the capital to be invested in buildings, because the prices of land and lumber change so frequently.

It is said that the city worker ought not to spend over 20 per cent of his salary in rent. Ordinarily not over 10 to 20 per cent of the capital should be invested in the farmhouse.

Barns for stock should rarely cost over $50 for each 1000-pound animal housed. In the South, this cost should be

Fig. 101. — An expensive brick henhouse that the hens can never pay for. It would take 5 dozen eggs per hen per year to pay her house rent.

much less. This cost includes materials and all labor. Money invested in a barn would not be looked upon as a

[1] Cato's Farm Management, translated by a "Virginia Farmer."

very attractive investment if it did not pay at least 8 to 10 per cent a year. This amount has to cover interest, repairs, depreciation, insurance, and taxes. If one invested \$1000 in a dairy barn to house 20 cows, the annual rent that the cows should pay would be \$80, or \$4 per cow. If butter sells for 30 cents a pound, this would require 13 pounds of butter from every cow to pay her barn rent. In many parts of the United States the barns cost less than \$50 for each cow or horse.

Nearly all persons from the cities who go to farming invest too much in farm buildings. There are many cases where the barns and milk rooms cost as much as \$1000 for every cow housed. Each cow ought to pay \$80 a year for the privilege of living in such a palace. These cow-palaces are often built by misguided wealthy men, who feel that they are building a barn that is to be a model for farmers.

But farmers are far from free from the same error of over-investment. Many times a farmer finds that he has money enough to build a new barn and starts out to outdo his neighbors, regardless of whether his farm would justify such a barn or not.

The cost of a henhouse ought not to exceed \$1 per hen. If a comfortable house can be built for less, so much the better. This cost would make the yearly charge about 10 cents per hen.

There are also many cases in which too little money is invested in buildings.

245. Arrangement for convenience. — Even more important than the capital invested in buildings is the arrangement for saving labor. The average farmer makes more mistakes in this than in over-capitalization. Farm buildings are put up at different times, and usually without any definite plan. On any particular day, it is easier to do the chores as the buildings stand than it is to rearrange them, hence they go on generation after generation. On one of the most profitable dairy farms that the writer knows, the milk house where the milk is strained is so far

Fig. 102. — The dairy barn on the farm given on page 537. Over 75 years old, but serviceable and economical. See Figure 103.

from the cows that the total distance walked in milking 20 cows is over a mile a day.

The problem on the vast majority of farms is not the building of new houses and barns, but the rearrangement of old ones so as to make the work easier.

246. Rearrangement of buildings. — Prices and other agricultural conditions change so frequently that it is often desirable to build on a plan that allows for possible changes in the type of farming. In the Northeastern States, a barn 34 or 36 feet wide is a desirable width. Such a barn is wide enough for two lines of cows. It will make a good horse barn and provide for one row of stalls and a row of box stalls. It is a good width for a henhouse or machinery storage. If a barn is narrower than this, it does not give room for two lines of cows. If wider, it makes the work of mowing away the hay too great.

The critical points in a building are the roof and foundations. Paint is usually more emphasized because it is

FIG. 103. — Cows in the barn shown in Figure 102. The capital is invested in the stock rather than in the building.

more conspicuous, but it is the roof and foundations that really limit the life of buildings.

247. The farmhouse. — The type of house that is suited to the city is wholly out of place in the country. The superabundance of gables and striking shapes may not be conspicuous in a city, but in the country they give an appearance of lack of dignity. A house that is to stand alone must have strong lines.

City houses are almost always too tall to look well if standing alone. When flanked by equally tall neighbors, they may look better than low buildings, but when set off by themselves the appearance is entirely changed. It is much like a forest tree that appears well surrounded by tall trees, but that looks like an exclamation point when standing by itself.

FIG. 104. — A city house in the country. It is too tall to look well.

There are certain good types of houses that always look well. The latest fashions are soon out of date. The farmhouse should be built in a style that always looks well. One builds a house for 50 or 100 years, not for a season only.

Nearly everything about a farmhouse should be entirely different from a city house. This is the reason why architects' plans are nearly always out of place on a farm. Such plans are usually for city conditions. The fees for planning farmhouses are not large enough to attract architects to study the problem.

The back door of the farmhouse, or the side door, is the chief entrance. Most persons who come to the house go to the back door, because this is where the people are working. The back door should, therefore, be as good as the front door. The farm activities center in the back part of the house, in the back yard, and at the barn. The back yard should be an attractive place.

The farmhouse should provide storage room. The farm family does not depend on a half dozen deliveries a day. The cellar must provide storage not only for products for home use, but usually for products to sell. Very rarely does a city home provide a place where a barrel of apples can be kept without spoiling.

The first floor, the cellar, and the fuel shed should all be handy, as these are the center of operations. The back door should be near the ground so that there will be few steps to climb.

There should be a place in the back part of the house for men to wash. If the farm has running water and sewage disposal, there should be a wash room in the back part of the house on the first floor. It is also desirable to have a bathroom on the second floor.

The second floor of the farmhouse is usually used for sleeping rooms. The outdoors is so much a part of the house that there would be too much going up and down stairs, if the second floor were used for any other purpose.

Since household help is hard to secure, and since the farm family usually has to do its own work, all arrangements for saving work are of great importance. It is usually desirable to use the same room for a dining room and living room. The majority of farmhouses also have this same room for a kitchen, but a separate kitchen is preferred if it can be afforded, on account of the heat in summer.

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CHAPTER 14

CROPPING SYSTEMS

ROTATION of crops means that the crops grown on each field are changed from time to time in a fairly regular way. Practically every farmer does change crops occasionally on at least part of his farm, but the changes are often more or less haphazard. There are many fields in America that have been in cotton, corn, or wheat for 10 to 50 years. As the country grows older, the enemies of crops increase, and the need for rotation becomes more apparent. The majority of farmers will ultimately come to use more or less definite rotations.

The advantages of having a variety of crops are often confused with the advantages of crop rotation. There are many reasons why diversified farming pays best. Some of these are given in Chapter 3. But one may have a diversity of crops and yet not do much rotating of crops. There are many farmers who grow corn, alfalfa, and wheat, but who do not do much rotating.

248. Reasons for crop rotation. — There are many reasons why crop rotation is a good thing. The final factor that forces farmers to change crops is usually either weeds, insects, or diseases. Crop rotation (1) helps to control these enemies; (2) may provide for keeping up the humus supply of the soil; (3) may provide for the growth of grass and legumes on each field; (4) often saves labor; (5) may keep the land occupied with crops a greater part of the time; (6) allows for the alternation of deep and shallow-rooted crops; (7) may provide for a balanced removal of plant food; (8) may control toxic substances; (9) systematizes farming.

(1) Nearly every crop is accompanied by certain weeds that are able to grow with it, but that do not bother other crops. The weeds that bother tilled crops are different from those that interfere with hay.

If small grain is grown continuously, the land may become very weedy. These particular weeds are usually easily killed by cultivation. Wild oats are a serious pest in various parts of Minnesota and Dakota. If tilled crops are grown, they are readily controlled. Wild mustard is a very serious weed in small grain in some regions. Daisies and wild carrot are weeds in some regions where hay is left continuously, but are not bad weeds in corn. The opposite is true of pig weeds and foxtail.

Similarly, there are many diseases that injure one crop, but that are not harmful to some other crop. Flax-sick soils are merely soils that are infested with a flax disease; rotation can control it. Potato scab may become serious if this crop is grown on the same land year after year.

The same principle holds for insect pests. The corn root worm and root louse often force rotation. Nearly all of the insect enemies of crops are checked to some extent by crop rotation. Many of them are controlled.

(2) If crops are not rotated, the fields that are constantly in tilled crops will soon have their humus supply seriously decreased. Small grain crops bring the same result, but less rapidly. All the serious results that follow the exhaustion of the humus then follow. This is most disastrous in the Southern States, where cotton is the chief crop. The land is usually cultivated for a long season. This, together with the hot weather, favors the

rapid destruction of humus. The clovers and grass crops usually increase the humus. The control of weeds, insects, and fungi, and the maintenance of the humus supply are the chief reasons for rotating crops.

(3) If crops are rotated, the other benefits that come from growing legumes and grass may be secured for each field.

(4) Labor is often saved by crop rotation. Grasses are sown in small grain, so that one fitting of the land does for two crops. In some parts of the country winter wheat is sown after potatoes or beans, so that one plowing of the soil does for three crops — the tilled crop, the wheat crop, and the grass crop seeded in the wheat. In most of the Middle West, oats are disked or cultivated in on corn ground without plowing. In some parts of this region, the yields are better on disked than on plowed land. In other parts, plowing is better. Cowpeas may be grown between the rows of corn without additional fitting of the soil.

(5) By crop rotation, the land may be occupied more of the time. Wheat may follow oats and grass follow wheat, so as to keep the soil in use. If the season is long enough, it is possible to grow more than one crop a year.

(6) Deep and shallow rooted crops may be alternated, thus making use of the deeper soil.

(7) Formerly it was thought that the chief reason for rotating crops was because plants use the plant foods in different proportions, so that when the soil became exhausted for one crop, it might contain the kind of food that the other crop required. As a matter of fact, the increased yields resulting from rotation cause the removal of more of each kind of food than is removed by the smaller yields that are secured if one crop is grown con-

tinuously. However, the fact that plants use foods in different proportions may be of some importance.

(8) It is thought by some persons that each plant gives off certain substances through its roots that are injurious to the plant, but that may not harm another crop. If the theory is true, it furnishes another reason for rotation.

(9) Crop rotation systematizes farming. It makes farming less complex rather than more so. It may require considerable study to get a rotation established, because the fields may need to be rearranged, and one of the new fields may have several kinds of crops to be adjusted. Usually a cropping system simplifies the farm layout and reduces the number of fields on the farm. See Figures 88 and 89.

249. Characteristics of a good cropping system. — There are a number of things that a crop rotation should provide if possible: —

(1) The area of each crop should be nearly the same year after year, unless there is a definite reason for changing it.

(2) The rotation ought ordinarily to provide an abundance of roughage and pasture for the number of animals kept. The cost of handling such bulky products as hay, straw, silage, and roots is too great if these are bought from other regions.

(3) It is very desirable that the rotation include one tilled crop for the elimination of weeds.

(4) It is very desirable that the rotation include a sod. A sod is favorable for the fixation of nitrogen and the increase of the humus supply. If the sod includes clover or alfalfa, the fixation of nitrogen is further favored by the legume.

(5) The rotation and feeding system should in some way provide for keeping up the organic matter of the soil.

Fertilizers may be used to supply plant food, but the farm must grow its own organic matter, unless hay, straw, or manure are purchased.

(6) The rotation should provide as large an area of the most profitable cash crop or crops as can be cared for. Nearly every region has one crop that pays better than any other for the time spent on it. In the Northeastern States, it is hay. In the Middle West, corn. In the northern and western part of the Middle West, wheat. In the South, cotton. In each case, the farmers desire to grow as many acres as possible of the profitable crop, hence the tendency to one-crop systems.

A cropping system for the Northeastern States should grow as much hay as possible, because this is the most profitable cash crop for the labor involved. In the Central West, there should be as much corn as possible. In the South there should be as much cotton as possible.

Scientific men are likely to underestimate the importance of the farmer's experience. The crop that the farmer persists in growing as a single crop should not be reduced too much.

Even on a dairy farm in the South, it is usually advisable to grow as much cotton as the labor can cultivate, because this is such a profitable crop. A dairy farm in Illinois should grow as much corn as the men and horses can possibly care for, because it is so profitable as a cash crop, or as hog feed. The New York, Pennsylvania, or New England farmer should raise all the hay his men and horses can harvest, even though his main business may be dairying, poultry, or fruit. In each of the above regions, the most successful farmers follow this practice.

250. Crop rotations used in different regions. — The actual practice in most parts of the cotton belt is to grow cotton almost continuously. It is rotated more or less with corn and other crops. This system fails to provide stock food and fails to provide for keeping up the humus supply of the soil.

A highly recommended rotation that has not yet come into general use is: —

First year, cotton.
Second year, corn with cowpeas between the rows.
Third year, oats followed by cowpeas.

This rotation makes the area that a family can farm practically three times as great as when nothing but cotton is grown. A family can raise all the cotton that it can pick and by properly organizing the work, raise the other crops besides. This requires that two- and three-horse teams be used.

In the winter wheat belt of Kansas and Nebraska, wheat, corn, alfalfa, and oats are the most profitable crops. In the drier parts of the region, wheat does much better than the other crops, and the area of these is reduced or almost eliminated. It is difficult to provide a very satisfactory rotation with these crops, because alfalfa is a long-lived plant and because wheat does not follow corn readily, and the area of oats desired is usually less than the area of corn. The practice of some of the best farmers usually provides a rather long and somewhat indefinite rotation. Corn may be grown on the same land for two years and sometimes a little longer. It is followed by oats one year. The oats are followed by wheat. The wheat continues several years. It is then followed by alfalfa that is left several years.

In the northern part of the spring wheat region of the Dakotas and Minnesota, good rotations have not yet been generally adopted. The most profitable cash crops are wheat, barley, oats, and flax. All these are spring planted crops. As the farming is becoming more diversified, more corn and hay are being grown. These provide a good rotation. In regions where the crops do well, corn or potatoes may be followed by several years of small grain crops, and these followed by timothy and clover. This may leave half or more of the land in small grain and yet provide a good rotation and provide for the keeping of live-stock.

In the corn-belt, a very satisfactory rotation is: corn two years, followed by oats in which timothy and clover are seeded. If the grass is left one year, half of the land may be kept in corn, or the grass may be left longer, if desired.

The farmers in the Northeastern States usually raise corn, potatoes, cabbage, or other tilled crops on sod. These are usually followed by oats. In most of the region, timothy and clover are seeded with the oats. In some parts, the oats are followed by wheat in which grass is seeded. In either case, the grass is left as long as it is good. This is generally three or four years. The first year of grass is mixed clover and timothy. The later years are mostly timothy. The standard rotation of all this region is a tilled crop followed by one or two years of small grain, and this followed by about three years of hay. This is a region of many kinds of farming, and there are many variations, but the above is the rotation on the majority of farms.

There is not room to give many of the multitudes of rotations that have proved satisfactory in different regions. For a very extended list of rotations used or recommended for different regions in this and other countries, see "Cyclopedia of American Agriculture," Vol. II, pp. 99 to 109.

Nearly all farmers will want to vary the rotation from time to time as prices and other conditions change. It is not often desirable to follow an absolutely fixed system year after year. The example of England is often cited as a region where farmers have fixed rotations, but this is not the case. The farmers of England vary the areas from year to year and change the rotation to meet changes in prices of products. The farmers in the Northeastern States probably have about as definite rotations as do those in England.

In the South and in the new regions of the United States, very much more attention should be given to crop rotation.

251. Two rotations on one farm. — Many farmers use more than one crop rotation. Potato growers often grow potatoes in a three-year rotation of potatoes, small grain, clover; and at the same time, use a longer rotation on other parts of the farm. A rotation of corn, small grain, and hay, making a five- or six-year rotation, is often used for the other land. The two rotations often change fields, so that a field is sometimes in one of the rotations and sometimes in the other.

In the bean-growing section of New York and Michigan, the beans are usually grown in a rotation of beans, wheat, and hay. The same farms often have another rotation of corn, oats, wheat, and hay. The two systems are usually worked in together, so that a field is sometimes in one and sometimes in the other rotation.

In tobacco-growing sections, tobacco is often grown in a very short rotation on the richest land, and the remainder of the farm used for a longer rotation with general farm crops.

Often it is desirable to have a rotation on small fields near the barns, that is independent of the main farm rotation. This may be to provide pasture for hogs or sheep, to grow root crops, or other minor crops. (See Figure 105.)

252. Fixed cropping systems with irregular acreages. — It is not always desirable to grow exactly the same area of each crop year after year, because prices and other conditions are too changeable. On the other hand, the

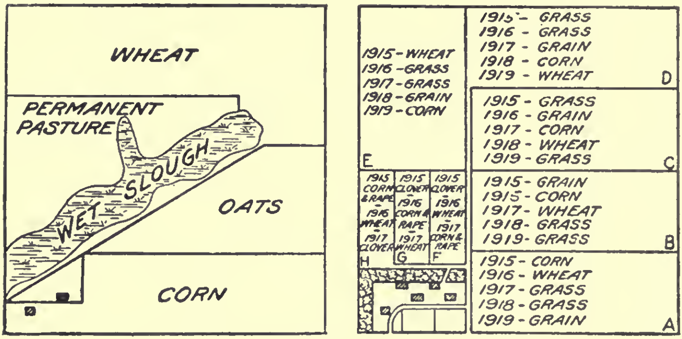

FIG. 105. — A Minnesota farm and proposed rearrangement. Two rotations are given. One near the barn for hog pastures and one for the general crops.[1]

variations in areas on many farms are without any definite reason.

If one wishes fixed areas, it is not necessary that the same area of each crop be grown. A fixed rotation can usually be arranged with any area desired. Suppose that a farmer desires to raise 46 acres of hay, 35 of oats, 12 of corn, and 15 of potatoes, he would proceed as follows in order to see what his best field arrangement and rotation would be: —

[1] U. S. Dept. Agr., Bureau of Plant Industry, Bulletin 236.

He will grow 108 acres of crops each year. If he divides the area into three fields of 36 acres each, he might use the following rotation and arrangement: —

Field	1912	1913	1914
1 . . .	12 A. corn 15 A. potatoes 9 A. hay	36 A. oats	36 A. hay
2 . . .	36 A. oats	36 A. hay	12 A. corn 15 A. potatoes 9 A. hay
3 . . .	36 A. hay	12 A. corn 15 A. potatoes 9 A. hay	36 A. oats

The poorest 27 acres in the hay field is plowed up each year for corn and potatoes. The remaining 9 acres is left for hay.

The next year oats are planted on all of this field. The area in sod should be fall plowed in order to get a good oat crop on this part. Timothy and clover are seeded with the oats.

The third year this field is in clover and timothy hay.

Each field follows this same rotation, so that there is always the same area of each crop. There are always two large fields, and every year one field is divided into three parts. This gives one acre too much of oats and one too little of hay. If this is not satisfactory, one acre of oats may be cut for hay, or one acre of oat and pea hay may be grown.

The same crops might be grown in a four-year rotation on four fields of 27 acres each.

A field of hay is plowed up for corn and potatoes. The next year this is sown to oats and 19 acres of the field is seeded to clover and timothy. The remaining 8 acres is planted to oats again the next year, and is then seeded.

Field	1912	1913	1914	1915
1 . .	12 A. corn 15 A. potatoes	27 A. oats	19 A. hay 8 A. oats	27 A. hay
2 . .	27 A. oats	19 A. hay 8 A. oats	27 A. hay	12 A. corn 15 A. potatoes
3 . .	19 A. hay 8 A. oats	27 A. hay	12 A. corn 15 A. potatoes	27 A. oats
4 . .	27 A. hay	12 A. corn 15 A. potatoes	27 A. oats	19 A. hay 8 A. oats

The most important differences between this and the three-year rotation are that part of the oats are grown after oats rather than after hay. Most of the corn and potatoes are grown on a two-year-old rather than a one-year-old sod. The oats are in two separate patches each year rather than in one large field. Usually the three-year rotation will be preferred.

In a similar manner, a rotation may be planned for almost any acreage that may be desired, by trying three, four, five, six, or more fields and the corresponding rotations, and picking the best one.

253. Combining separate fields for crop rotation. — If the farm is composed of fields that cannot be thrown together, the problem can ordinarily be solved.

The following is an example from a much-cut-up farm, showing how the operator arranged the fields for a five-year rotation. In the farm there were seven fields, no two of which could be thrown together, as they were separated by public roads, streams, or other obstacles.

Before the rearrangement was made, the fields were as follows: —

Field	Area and Crop
1	12 oats not seeded with grass 6 clover
2	30 hay
3	9 hay
4	12 hay
5	10 corn 9 wheat seeded to grass
6	5 hay
7	12 hay

The total area is 105 acres. This would make five areas of exactly 21 acres. Field 1, and 3 acres of 6, made one of the new fields. The balance of 6 and 5 made another. Number 2 made one. The balance of 2 and 7 made one; 3 and 4 made one new field.

The land had formerly been farmed as 9 separate fields. The new arrangement leaves the number of

New Field	Old Field	Condition Spring First Year	First Year	Second Year
1	1–18 A. 6– 3 A.	12 A. oat stubble 6 A. clover 3 A. timothy	Oats	Wheat
2	2–21 A.	Timothy	Corn	Oats
3	2– 9 A. 7–12 A.	Timothy	Timothy	Corn
4	3– 9 A. 4–12 A.	Timothy	Timothy	Timothy
5	5–19 A. 6– 2 A.	10 A. corn stubble 6 A. wheat 2 A. timothy	10 A. oats seeded 6 A. wheat 2 A. oats seeded	Clover

separate pieces the same, because the old fields 2 and 6 are both divided. The table shows how the rotation of corn, oats, wheat, and two years of hay could then be started. By the end of the second year the rotation is fully established. It is not always so quickly done.

254. Relation of cropping and feeding systems. — The cropping and feeding systems naturally go together. The variety of such systems makes a discussion of them very difficult. Usually the farm should provide abundant pasture for the stock kept, or, stated another way, no more stock should ordinarily be kept than can be pastured. The stock and stock products produced on pasture are the cheapest gains.

Usually the cropping system provides all the pasture and roughage for stock. It is usually desirable to raise most of the grain fed, except in the Northeastern States and other regions where cash crops may pay enough better to make it profitable to buy grain rather than raise it.

A horse or mule usually eats about three tons of hay or equivalent in a year, and about 100 bushels of oats or equivalent. Pasture may reduce the hay. In much of the country, it is cheaper to replace half or all of the oats with corn. About 70 bushels of corn is usually fed. The amount varies with the work and other feeds. Before one can do much figuring on such problems he must find out the practice of the community.

In fairly intensive dairy sections, in regions north of Washington, cows usually eat about one ton of grain, one ton of hay, and 4 tons of silage, or $2\frac{1}{2}$ tons of hay if silage is not fed. Again these amounts are exceedingly variable. Some farmers feed very little grain and get most of the milk in summer.

It is usually considered that about 7 sheep eat as much as a cow.

Well-fed hens eat a little more than twice as much for their weight as do other farm animals. The common estimate of a bushel of wheat or equivalent for a hen a year is not far from correct. If only a few hens are kept, a large part of this may be picked up around the farm.

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CHAPTER 15

MARKETING FARM PRODUCTS

VERY much is said about the marketing of farm products, and yet there is, perhaps, no subject on which really helpful advice for the individual farmer is so lacking.

FIG. 106. — Faneuil Hall market, Boston. The historic Faneuil Hall in the background overlooks a busy market place.

The reason appears to be that marketing is so much a community or public question that there is little that the individual can do.

The marketing of fruit, high-priced stock, and other specialties is almost as important as good management of the farm. The marketing of staple products is an easier problem.

TIME TO SELL PRODUCTS

255. Cost of holding products. — If products are held for higher prices, the prices received must be high enough to cover interest, insurance, shrinkage, pay for storage room, and extra cost of handling.

The interest and insurance can be determined in any community. The extra cost of handling depends primarily on how conveniently the storage is arranged. It varies from no cost to a very high percentage of the value of the product. Some helpful information is available on shrinkage and prices in different months.

256. Shrinkage of farm products. — The shrinkage of ear corn stored in cribs on 8 successive years at the Iowa Experiment Station is shown in Table 78.

TABLE 78. — SHRINKAGE OF EAR CORN STORED IN CRIBS AT AMES, IOWA. AVERAGE OF 8 YEARS

	TOTAL SHRINKAGE TO DATE	AVERAGE FOR THE MONTH
November	5.2%	5.2%
December	6.9	1.7
January	7.5	.6
February	7.8	.3
March	9.7	1.9
April	12.8	3.1
May	14.7	1.9
June	16.3	1.6
July	17.3	1.0
August	17.8	.5
September	18.2	.4
October	18.2	.0

On a farm in Kansas, 16,155 bushels of corn, 70 pounds to the bushel, was weighed as it came from the field during the husking season. It was weighed again in July when it was sold, and weighed 14,896 bushels. This is a shrinkage of 7.8 per cent.

A number of tests in Illinois showed a range of shrinkage of 12 to 20 per cent during the first year. This was for corn husked in October and early November.

From the results in Iowa, it will be seen that the shrinkage is very rapid when first stored. There is little decrease in weight during the winter, but a heavy shrinkage when hot weather comes on.

Average figures on shrinkage of corn must be used with judgment, because the condition of the corn at the time of storage is so variable, and because the weight depends so much on the weather. During damp weather, corn absorbs moisture so that it gains in weight. In one case in the Illinois tests, a crib of corn gained 3 per cent during a wet week in March.

The shrinkage is also dependent on the number of rats and mice that one is raising. In parts of the South, the loss due to the grain moth is exceedingly heavy.

All the examples of shrinkage are for ear corn. The cob shrinks relatively more than the grain, so that if corn is sold shelled, the shrinkages here given are a little too large.

Wheat, oats, barley, and rye shrink comparatively little after the grain has gone through the "sweat" either in the stack or in the bin. When stored in large elevators, the shrinkage is estimated to be about $1\frac{1}{2}$ per cent in six months. The chief source of shrinkage on the farm is the grain eaten by rats and mice.

Well-cured hay, as it is ready to go to the barn, usually loses from 10 to 15 per cent in weight by the time it has gone through the "sweat." Sometimes the loss is less than 5 per cent, and sometimes it is over 20 per cent. Clover and alfalfa usually lose more than timothy.

After hay has passed through the "sweat," it loses very little. After this time, if damp weather follows dry weather, it will often gain in weight.

H. W. Gilbertson reported eight cases in which from 7 to 15 tons of baled hay were stored from one to three months. The dates of baling varied from October 1 to December 22. The average time stored was 61 days. The total amount of hay in the eight lots was 185,038 pounds. The total loss from shrinkage and shattering was 2264 pounds, or 1.2 per cent. Most of the lots were timothy, but some were clover and timothy mixed. It is evident that there is very little shrinkage of hay after it is dry enough to bale.

There is more loss from shattering than from shrinkage. Gilbertson also reported the losses from shrinkage and shattering on 18 car loads of hay shipped to New York by one dealer. The hay was baled at different times during the year, and came from different farms. The total weight in the barns at time of baling was 399,378 pounds. The average time of storage was 73 days. The loss from shrinkage and shattering in hauling and shipping and errors in weights was 15,533 pounds, or nearly 4 per cent.

On 20 other car loads, the loss from shattering and errors in weights amounted to an average of nearly 1 per cent.

Potatoes shrink by loss of water from the individual potatoes, by loss of adhering dirt, by freezing, and rot. On only the first of these are figures of any general value. The other shrinkages apply to individual cases only.

The shrinkage by evaporation varies greatly. If stored in a warm, dry cellar, the shrinkage from this cause may be as much as 20 per cent. If stored in a cool, moist cellar, the evaporation is much less. When buried in pits, the loss from this source is usually small.

Farmers and managers of potato exchanges usually expect a loss of 10 per cent when potatoes are stored in quantity and kept till April. Occasionally, the losses are very small, and in a very few instances, potatoes have been stored several months without any loss. On the other hand, the loss may be very much above 10 per cent. With the best storage conditions, a loss of 5 per cent is very good. With fairly good conditions, 10 per cent is to be expected.

Sound apples in cold storage shrink very little, usually not over 1 to 5 per cent. When stored in a cellar, the loss is usually much more. The loss from rot of apples is usually much more than the loss from evaporation.

257. Prices of products in different months. — Table 84 gives the average prices of some farm products by months for ten years. New corn is usually not ready to sell until December. Using the Chicago price of No. 2 corn, and the Iowa tables of shrinkage, what will one make by holding corn for the July market, so as to get the higher price? The shrinkage from December 1 to July 1 was 7.6 per cent. If one has 1000 bushels of corn on December 1, he would have 924 bushels on July 1. The comparative receipts at average prices would be: —

December 1, 1000 bushels at 52.9¢	$529
July 1, 924 bushels at 60.5¢	559
Gain by holding	$ 30

On the average, it appears that one might expect to receive $30 more by holding for the high price. This must cover interest, insurance, and storage. This is enough to pay these costs.

But there are yet other problems to be considered. If corn is sold and hauled during the winter months, the work can be done when it will not interfere with farm work. This point is usually enough to offset any gain from holding.

How much one needs the money must also be considered.

Sometimes more pounds per bushel are required when corn is very green. It rarely pays to sell under this condition. Elevators do not want corn that is too wet to ship. When they buy such corn, they find some way of cutting the price very heavily, either directly or by taking more pounds for a bushel. It rarely pays to sell until a product is fit to be handled by shippers.

If a farmer is carrying considerable stock, it is very desirable to hold some corn until July. If prospects are good for a crop, it can then be sold; if not, it can be kept. In years when corn is very high, it is usually best not to do much of this holding. In years when corn is low, it pays to hold for feed or for sale.

In selling live-stock, it sometimes pays to plan to have the stock ready at the season of high prices. This is particularly true of horses. Carriage horses are usually very low in the fall and high in the spring. A farmer who is raising such horses can winter them cheaper than they can be wintered in town, so that he makes money by holding.

Draft horses are highest in the spring. They have a second slight rise in price in the late fall, probably when horses are being purchased for winter teaming in cities. It usually pays a farmer best to sell draft horses in the spring. The fall seems to be the second best.

In determining when to sell products, farmers should make careful studies of reports of prices given in agricultural and daily papers and government crop reports. The *Crop Reporter* is of great value in studying crop conditions. This is sent free on request by the United States Department of Agriculture, Washington, D.C.

258. Conclusions on the best time to sell. — It is evident that the higher prices received for products held are just about enough to cover shrinkage and interest and storage costs.

This is to be expected when one stops to consider how prices are fixed. The prices offered in the large storage centers represent the average opinions of men who are constantly studying the supply and demand. These men use every available source of information and make the business a life study. If prices are not as high as the future demand is likely to warrant, there is a great demand for products to store. This demand comes from manufacturers as well as speculators. Such a demand tends to raise the price until the profits from storage are reduced. If prices are considered too high, storage is checked and prices fall. The price offered for wheat is the consensus of opinion of farmers, millers, warehouse owners, and speculators as to the present and probable future demand and supply of this article. The majority are not always right. Often the supply is not correctly estimated and sometimes war, panics, or periods of prosperity upset all calculations on the demand. More frequently, exceptionally favorable or unfavorable prospects for a succeeding crop make the prices wrong. Occasionally, a product is cornered, but this does not often happen. The price to-day is a better indication of the price a few months from now than is the opinion of any one farmer.

FIG. 107. — Packing Colorado apples. Only the finest quality pays for the long shipment to the large markets.

Since the profits on holding products are, on the average, only interest and pay for other costs, it follows that other things will usually determine whether it pays a

FIG. 108. — Packing New York apples. The short shipment allows a profit from a lower grade of fruit that is produced with less care and cost.

farmer to hold his products. The two most important factors are how much the money is needed and how the work of marketing fits in with the other farm work. The majority of farmers can make better use of the money in some other way. Sometimes it pays to hold products to be marketed in seasons when there is less farm work. Very frequently the condition of the roads overshadows all other considerations. The question of storage on a farm that has good storage room that would otherwise be idle is very different from the problem on a farm where such a building must be put up.

Often there is a rush of marketing grain as soon as a product will do to sell, and sometimes before it is ready. Such grain is difficult to handle without spoiling. It sometimes congests the elevators so that there is an abnormally low price. When any such condition arises, it is, of course, desirable to hold the product.

Usually the need for money, the pressure of farm work, and the condition of the roads determine the best time to sell.

WAYS OF SELLING PRODUCTS

259. Retailing *vs.* wholesaling. — There is now very much discussion about sending products direct to the consumer. The general farm products, as cotton, wheat, corn, beef, wool, and pork, cannot often be so marketed. The discussion applies mostly to vegetables, eggs, and other perishable products that are ready for food when they leave the farm. Around every town and city there are farmers who do more or less retailing of products. Sometimes the business is large and profitable, as on some farms that retail milk. But in the great majority of cases, the retailing is done by farmers with small farms and little money, who do not count their time very valuable. Somewhat higher prices are received for the products. The objection to retailing is that the man and horse time are often worth more than the increased prices received. If one has important work to do on the farm, retailing is usually undesirable. If there is little to do on the farm, so that time has a very low value, retailing is more likely to pay. If much of a business is being done on the farm, the owner is needed there to manage the work.

Usually when a man makes enough by retailing so that he can enlarge his business, he changes to wholesale and sells his products to the grocery stores, or ships them, because he cannot afford to leave the farm as much as is necessary for a retail business. Very rarely do we see a farmer changing from a wholesale to a retail business.

Another objection to retailing is that the farmer usually has too much or too little of different products. By handling products through a distributing agency of some kind, the deficiencies of different farms are evened up. The more direct marketing of farm products is likely to come about by coöperation rather than by any great increase in retail business. If farmers and consumers were properly organized, consumers' associations could buy direct from farmers, or farmers' organizations, and so eliminate some of the unnecessary costs of handling products.

260. Selling on commission. — The chief difficulty in selling on commission is that the seller is at the mercy of the commission man. Goods should never be sent to an unknown commission man. Bank references should always be written to, in order to see if the dealer is responsible. Even then, the risk is very great. Some states are now advocating laws to control the commission business. The condition is now intolerable. Like our whole marketing system, it needs a thorough overhauling.

261. Farm auctions. — Farmers usually sell products that are staple. For this reason, they do not realize the importance of advertising when the occasion demands it. When one is to have a farm auction, or if he wishes to sell equipment or stock at a private sale, the advertising is of great importance. Very rarely is a farm auction properly advertised. Farmers do not make enough use of papers or the rural mail delivery. In addition to the posted hand bills, an auction ought to be advertised in each of the papers of the region. It is not enough to advertise in the paper that agrees with one in politics. The bid of a Democrat is just as acceptable as the bid of a Republican at a sale. The advertisements need not be very expensive. A few lines in the proper place in each paper will accomplish the purpose. It is also desirable to get the names of farmers from telephone books, assessors, or otherwise, and mail each one a sale bill.

Only rarely are the products at a sale properly arranged. The essential thing is that all the articles be so arranged that they can be readily seen by all the bidders. Hogs in a pen that is not readily accessible do not sell well. Whenever possible, the arrangement should be such that the bidders can form a half circle around the article. A little attention to these matters will save many dollars. Nothing so reduces the desire to bid as uncertainty as to what one is bidding on.

It is well to have a list of cost prices of articles. These may be given out by the owner or auctioneer. Many a bidder hesitates because he does not know just what the article cost when new. Prices should be absolutely honest;

any attempt at deception is almost certain to be detected and result in loss.

Time spent in cleaning animals is well spent. A dirty animal rarely brings what it is worth. Animals should be in good condition. Farmers do not realize how much the fat on a horse or cow sells for. So little is this understood, that near the larger cities, a good business is done in buying and fattening horses for market. Horses that the farmer let go in what seemed to him good condition, are bought, fattened, and resold. The farmer's loss is enough to cover the extra cost of selling twice and a profit for the feeder.

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CHAPTER 16

FARM RECORDS AND ACCOUNTS

KINDS OF ACCOUNTS

ACCOUNTING is usually concerned with keeping track of who owes you and whom you owe. Probably these were the first kinds of accounts that mankind learned to keep. Such accounts avoid mistakes and disputes as to how much one man owes another. They are necessary whenever much business is done on credit. It is this kind of accounting that is usually meant by the term "bookkeeping." It shows the relation of the business to outside persons or firms, or may be called *external accounting*, or *personal accounting.*

Merchants who have a large amount of this kind of accounting are likely to think that the farmer who does not keep such accounts is very careless, but in many cases the farmer does so little buying or selling on time that he does not need to keep such accounts.

262. Accounting as a means of studying the business. — But the uses of accounting have now extended far beyond the mere recording of debits and credits. Men are now beginning to keep careful cost accounts and other records of the internal affairs of the business for the purpose of learning how to conduct the business more efficiently. These two kinds of accounting are entirely different. One kind is a very simple matter of arithmetic. Nearly any person who is accurate can make a good "bookkeeper," but cost accounting is an investigation into the internal organization and management of the business. The keeping of such accounts involves a thorough knowledge of the business. The interpretation of the results and their application in the reorganization of the business call for the highest type of business ability. These two kinds of accounts are commonly confused. The statement is frequently made that the farmer ought to keep accounts as the merchant does, and that he ought to know how much his wheat costs and whether his cows pay. Such statements confuse bookkeeping and cost accounting. The merchants keep personal accounts, but these are nothing like cost accounts. Farmers probably keep personal accounts as well as city persons who have the same amount of such accounting to do. The chief reason why they do so little bookkeeping is because they have so little to do. A study of this question in one county showed that 47 per cent of the farmers kept some accounts of receipts and expenses. In this same county, there were two farmers who kept accurate cost accounts. Much over half of the population lived in cities and villages, but few if any of the city business men keep cost accounts. The fact is that cost accounting is used by very few persons in city or country, but this method of studying the business is rapidly increasing.

There is very little relationship between bookkeeping and cost accounting. Bookkeeping is an exact science. If John Jones buys 100 pounds of sugar at 6 cents, and has it charged, the account is exactly $6. There can be no other answer. But cost accounting contains estimates. Two persons studying the same business will not have exactly the same results, although the results ought to point to the same recommendations for the future management. A railroad cannot determine what it costs to haul freight. By cost accounting methods, it can arrive at an approximation of the cost. How reliable the result is depends on how much technical knowledge of the business the one who keeps such accounts has. The same road bed is used to carry passengers, mail, express, and freight. In order to determine approximately what it costs to haul a man or a car of coal, a very large part of the cost of railroading must be more or less arbitrarily divided between these items. The same questions arise in all kinds of cost accounting.

The Tariff Board tried to find the cost of producing wool "at home and abroad." It had an impossible task. The feed that the sheep eats is used in growing both wool and meat, and sheep are only one of a number of enterprises on most farms. The best the Board could do was to make some very rough guesses at the cost. The cost of producing a pound of pork cannot be exactly determined. If it were determined, change in rainfall, in wages, land values, or any one of a hundred other items would change it next year.

Every farmer and every business man makes some estimates of costs and what things are paying him. Often the estimate is carefully made and is fairly accurate. More frequently, it omits many items of expense and may be far wrong on others. The object of cost accounting is to aid in arriving at a more accurate estimate.

It will be seen that there is little similarity between bookkeeping and cost accounting. All attempts to apply city methods of bookkeeping to farm cost accounting must fail as they always have failed. The first essential in all cost accounting work is intimate knowledge of the business and good business judgment.

There are many other kinds of records that are desirable on some farms, such as milk records of individual cows, apple variety records, and other performance records, feeding records, breeding records, crop yields, weather records, maps showing orchard plans, lines of tile drain, and many other kinds of records.

ACCOUNTS WITH PERSONS OR FIRMS

263. Object of bookkeeping. — Whenever anything is bought or sold on time, some record should be made of the transaction. This will often save money. It may save paying the bill twice. If accounts are not kept, the bills have a way of creeping up in the most impossible manner. Even if we cannot find any objection to the individual entries, the total often seems impossible. The fact is that while we have been buying on time in a happy-go-lucky way, we are tempted to buy much that our resources do not warrant. Best of all, such accounts save one's friends. Most of the disputes about accounts are because some one forgot rather than because of dishonesty.

In the cities and larger towns, a duplicate sale slip is now given with goods. The simplest way to keep accounts with stores that give such slips is to keep these slips. Some large stores keep the original slips for their own accounts, and thus reduce the expense for bookkeeping. Systems of this kind are fast replacing the old elaborate bookkeeping methods.

264. Methods of bookkeeping. — Accounts for which slips are not made out may be jotted down in a memorandum book, if there are not too many of them. If many such accounts are kept, it is too hard to find the account with any one man. It is then more convenient to post them in a book in which each person or firm has a page. The debit or charge items, what we pay, are put on the left-hand page. The credit items, or what we receive, are put on the right-hand page.

The page may be ruled so that there is a left and a right hand side on the same page. This is not so good as using the left-hand page for debits and the right-hand page for credits, because there is not room enough to write full explanations.

Enter on the debit or left-hand page, cash paid by you, goods sold by you, work done by you, or any item of value for which you are not paid.

Enter on the right-hand or credit side of the account, cash paid to you, goods delivered to you, work done for you, or any item of value for which you must pay.

The following is an account that a farmer kept with James Peterson, his hired-man: —

James Peterson

Commenced work Nov. 1, 1912, at $25 per month and board

Nov.	11	Cash	$5		Dec.	1	1 month's work in November	$25		
Nov.	29	Cash	15				Dec. 18 and 20 did not work			
Jan.	2	Cash	28	08						
Jan.	15	Paid bill at store	3	45	Jan.	1	24/26 month		23	08

ANNUAL INVENTORY

265. Objects of an inventory. — Of the different kinds of records for studying the details of one's business, no account gives more information for the work involved than does the annual inventory. Until the last year or two, little attention has been given to this by institute speakers or farm papers. This is the chief reason why so few farmers take an annual inventory. The number who keep an inventory is rapidly increasing, and should soon come to include the majority of farmers.

Such an inventory shows how much has been made or lost during the year. It does not show on what enterprise the gain or loss occurred. The hay and grain crops may have returned a profit. The cows that ate it may have failed to pay. The horses may have stood in the barn so much as to result in a loss on them, or the family may have been living beyond its means. Whether the year as a whole has been profitable or otherwise, the final result is nearly always made up of some gains and some losses.

When a man has money, he nearly always feels that "times are good." Many times a farmer spends freely because he has money, when an inventory would show him that he ought to economize. The money may have come because things on hand last year have been sold. The inventory may show a loss.

Just as frequently, men are discouraged because there is no money, when an inventory would show that young stock, feed, or other items had increased so much that one ought to be very happy and optimistic. Cash on hand is no indication as to whether the farm has paid or not.

An inventory will also help one in estimating the profits from different enterprises. It may show an undue depreciation on horses or machinery. No one can take an inventory every year without learning much more than he formerly knew about his business.

266. How and when to take an inventory. — The usual time for taking an inventory in any business is when the stock of material on hand is lowest. On most farms, this is in late winter or early spring. It should be taken early enough so as not to interfere with spring work. The first of February, March, or April is the best date in most parts of the United States, but much depends on the kind of farming followed. On a poultry farm, October 1 or November 1 would be the logical time. The fundamental principle is to take the inventory when there is the least feed and unsold produce on hand.

The inventory on almost any farm can be taken in half a day. The first time such an inventory is taken, it will require some extra time to rearrange the items in convenient order. In taking an inventory, one should go through each building carefully and list all the equipment, stock, feed, etc.

Bins of grain may be measured and the number of cubic feet multiplied by 8 and divided by 10 to get the bushels. For ear corn, multiply the cubic feet by 4 and divide by 10. Hay in well-settled stacks usually weighs about a ton for every 500 cubic feet. Clover and alfalfa usually weigh less than grasses. Small mows or stacks usually require more than this amount for a ton.

For convenience in keeping the inventory in later years, it is best to copy the items in a book. For the equipment, it is convenient to rule a number of columns so that the same page may be used several years without having to rewrite the items.

The following is the inventory kept by a tenant farmer in Nebraska. He took his inventory on January first: —

	1910	1911	1912	1913
Horses 5 head	$690			
5 head		$640		
5 head			$600	
Cows 3 head	110			
3 head		130		
2 head			95	
Hogs	200	16	16	
Hens 65 head	40			
65 head		40		
72 head			50	
Roosters	6	7	8	
Hay and straw	20	45	60	
Corn	40	42	65	
	$1106	$920	$894	

Amount brought forward		$1106	$920	$894
Oats		60	50	
Winter wheat growing	72 acres	312		
	54 acres		216	
	100 acres			400
Seed corn		5	8	13
Seed potatoes		30	25	20
Equipment				
Lumber wagon		40	35	32
Hay raek and wagon		32	30	25
Old wagon		7	5	3
Spring wagon		30	25	22
Top buggy		18	15	14
Binder — 7 ft.		140	100	90
Plow, 2 gang 14 in.		40	35	32
Sulky plow, 16 in.		20	18	16
Walking plow		4	3	3
3 cultivators		35	32	30
Mower		5	4	—
Hay rake		17	15	13
Mower		—	—	40
Disc		22	20	20
Drill, old		16	12	—
Drill		—	—	77
Harrow and cart		18	17	16
Stalk cutter, 1 row		17	15	13
Corn planter		35	34	31
Fanning mill		6	5	5
One-horse harrow		3	3	3
3 sets harness		40	37	35
Single harness		18	15	12
Forks and spades		4	4	4
Scoops		2	2	1
Sled		—	4	—
Scales		6	5	5
Blacksmith and carpenter tools		36	35	34
Blacksmith shop		—	18	17
Hog troughs and crates		7	6	5
Breeding crate		—	3	3
Hog waterers		3	2	2
Feed box		5	4	4
Chicken house		25	8	12
Lumber		20	10	8
Wire		40	20	8
Household goods		95	100	100
Groceries		25	20	25
Cash		36	55	15
Miscellaneous		40	35	30
		$2420	$2025	$2132

This tenant lost about $300 in 1910 and made half of it back in 1911. This is not very encouraging, but the years were dry so that crops were poor. The farmer had four children in school. With a little help from the children, he came within $100 of making his living expenses. While this is not as good as one would like, it is not so bad for two years of rather poor crops. The 100 acres of growing wheat was a good prospect for 1912, but this was again a dry year. The farmer is doing the right thing for his conditions, that is, raising as many acres of wheat, corn, and oats as possible. If he can keep even until there is a year with good rainfall, he will make money.

RECEIPTS AND EXPENSES

267. Object of keeping receipts and expenses. — Many farmers keep a list of receipts and expenses. Such accounts are of considerable help in studying the farm business. From these, one may see how much the cows, corn, and other enterprises have brought in during the year, and by making estimates of costs one may often be guided in making changes in the business. In fact, many farmers are able to figure up from memory and give a very good opinion as to which enterprises pay.

The writer thinks that nearly every boy and girl should be taught to keep a list of receipts and expenses. Nothing will so soon lead to habits of thrift. Foolish expenses when written down are not so soon forgotten. It is a good thing to run over one's expenses occasionally to see whether the money could have been spent in a way that would bring more lasting pleasure or profit.

MISCELLANEOUS ACCOUNTS

268. Other Kinds of Accounts. — There is a great variety of miscellaneous accounts, some of which are useful on one farm, some on another. Weather records with dates of beginning and ending important farm operations, animal records, milk records, egg records are among the ones more frequently desired. Various animal record forms are given on pages 221 to 223. There are many other kinds of farm records that are desirable under certain conditions. It is often desirable to make a sketch of the fields showing the location and area of crops each year. If tile drains are laid, an accurate map of their location should be kept. Such a map is necessary in making repairs or in laying new drains. Fruit growers need to keep records of the yields of different varieties, in order to learn which varieties to plant.

COST ACCOUNTS WITH ONE OR MORE CROPS OR KINDS OF ANIMALS

269. Object of cost accounts. — If one does not desire to keep a full set of cost accounts, he may keep accounts with the important enterprises on the farm, each one independently. The chief objections to this method are that it does not give a complete study of the business and that it is likely to be wrong, because without a full set of accounts one is not likely to know what horse labor, machinery labor, or even man labor really cost. Usually all these are underestimated. If one knows what these cost, an account with cows, corn, potatoes, or other important enterprise may be of very great value. In any event, such an account will be more accurate than the usual guesses.

270. Items with which crops must be charged and credited.—A crop must be charged and credited with the following items:—

Charges	Credits
Inventory of work, seed, etc. previously given.	All produce sold.
Manure from previous crops.	All produce saved for seed.
Manure for this crop.	All produce fed on the farm.
Fertilizers or lime, charge all or part to this crop.	Bedding, etc., used on the farm.
Seed	Manure charged to this crop, but probably left in the soil.
Use of land.	Inventory at the end of the year.
Use of buildings for storage of crops.	
Use of machinery.	
All man labor.	
All horse labor.	
All other costs caused by the crop.	
Interest on costs until money is returned.	

271. Items with which stock must be charged and credited. — Stock accounts should be charged and credited as follows:—

Charges	Credits
Inventory of stock, feed, etc., at beginning of year.	Sales of stock.
Purchased stock.	Sales of products.
Feed and bedding bought or raised.	All products used on farm for other stock.
Pasture.	All products used by the family or hired-men and not paid for.
Use of buildings.	Manure.
Use of machinery.	Inventory at end of year.
All man labor.	
All horse labor.	
All other costs caused by the stock	
Interest on investment.	

For methods of estimating values of manure, buildings, use of machinery, etc., see pp. 481 to 487.

272. An account with potatoes. — The following is an account with 14 acres of potatoes grown in 1911. The work report was kept like that on page 442.

POTATOES — 1911 — 14 ACRES. (Left-hand page.)

May	20	Manure — 30 T @ $1.50	45	00
May	23	6 oz. corrosive sublimate		60
June	1	4 oz. corrosive sublimate		30
June	12	6 lb. Paris green	1	32
July	3	Chas. Peck — seed potatoes 160 bu. @ 45¢	72	00
July	13	75 lb. arsenate of lead	6	75
July	21	50 lb. arsenate of lead	4	50
Aug.	17	35 lb. arsenate of lead	3	15
Mar.	31	Use of land 14 A. @ $5.00	70	00
		828.5 hr. man labor @ .20	165	70
		903 hr. horse labor @ .15	135	45
		903 hr. machinery @ .05	45	15
			549	92
		Gain	282	90
			832	82

POTATOES — 1911 — 14 ACRES. (Right-hand page.)

Oct.	23	226 bu. potatoes	136	00
Oct.	26	510 bu. potatoes	316	20
Nov.	3	241 bu. potatoes	261	02
Mar.	31	Seed saved, 90 bu. @ $1.00	90	00
Mar.	31	Saved for house use, 16 bu. @ 60¢	9	60
Mar.	31	Estimated value of manure left in soil	20	00
			832	82
		Cost of production	529	92
		Cost per A.	37	79
		Cost per bu.		49
		Gain per A.	20	21
		Gain per man hr.		34
		Man time to raise an acre, 58 hours (a very low rate)		
		Man time to raise a bushel, 45 minutes		
		Horse time to raise an acre, 63 hours		
		Horse time to raise a bushel, 49 minutes		

CHAPTER 17

COMPLETE SET OF COST ACCOUNTS

If instead of keeping accounts with one crop or animal as illustrated with potatoes, one keeps an account with each enterprise on the farm, he will have a complete set of cost accounts. There are some elaborate systems of double entry accounts that have been devised, usually by persons who have never actually done any real keeping of cost accounts on farms. It is very rarely that any such system is advisable on a farm. One must ever remember that cost accounting is an entirely different thing from ordinary bookkeeping. All that is necessary to have a complete set of cost accounts is to have an account, just like the potato account, with each enterprise on the farm.

There are many advantages of such a set of accounts. Instead of accounting for only part of the labor, the entire labor of men, horses, and equipment is accounted for and charged to some account. Instead of guessing at what these are worth, we find what an hour of horse or man labor really costs.

With such a set of accounts, there are always two entries, except for cash transactions. If one has an account with both the hay field and horses, he will charge the horses with hay at the same time that he credits the hay field with what the horses ate. If the hay was bought for cash, no entry is necessary except the charge to horses. If one desires, he may keep the cash account also. He will then have his accounts by the double entry method, but this nearly doubles the work and adds nothing to the value of the accounts. (See page 479.)

273. Essential facts for cost accounts. — In order to know what it costs to raise potatoes, or keep a herd of cows, one must keep track of all receipts and expenses, all labor of man and horse, and all transfers of feed or other materials on the farm from one account to another. Oats raised on the farm and fed to horses must be credited to the oat crop and charged to horses. Produce used in the house must also be recorded or estimated. If these three kinds of facts — cash, transfer charges, and labor — are recorded, one has all the necessary data for a set of cost accounts, except the inventory, use of land, buildings, etc., that need not be recorded until the end of the year.

274. Methods of cost accounting. — Naturally, there are many ways of recording such data. The best way on any particular farm is the way that requires the least work and yet gives the farmer all the facts that he desires. One of the shortest possible ways of keeping accounts that will give all the information that is likely to be wanted is illustrated by the following set of accounts kept by a New York farmer in 1911. This method has been used on a considerable number of farms with good success. Later we will consider the merits of this and other methods.

A COMPLETE SET OF COST ACCOUNTS AS KEPT BY A FARMER

275. Methods used and accounts. — On this farm accounts were kept with three alfalfa fields, buckwheat, corn grown on shares by a neighbor, cattle, equipment, farm, timothy hay, hens, horses, improvements, interest, labor, notes and accounts payable, notes and accounts receivable, oats 1911, oats 1912, orchard, pasture, wheat 1911, wheat 1912, wood lot, and personal expenses. The farm contains about 200 acres, about 80 of which was in pasture, woods, roads, waste land, etc.

Two books were used, one for labor and one for ledger accounts. Each evening, the time spent on each crop

1912	Wheat—1913 Crop – 25 a.	Man Hrs.	Man Min.	Horse Hrs.	Horse Min.
Aug. 19	Plowed	9		27	
" 20	"	9		27	
" 21	"	9		27	
" 22	"	9		27	
" 23	"	5	45	17	50
" 24	"	8	45	26	15
" 26	"	9		27	
" 27	"	9		27	
" 28	"	9		27	
" 29	"	9		27	
" "	Disked	10		30	
" 30	"	5		15	

FIG. 109. — A convenient form of work report.

or animal was entered in the work report under the name of that crop or animal, as shown in Figure 109. Strips of gummed tape were fastened to the pages, so that the proper place could be quickly found.

The chores for the year were kept in the front of the work report book on 12 pages like the following: —

JANUARY, 1911	HORSES		COWS		HENS				WEATHER
	Hrs.	Min.	Hrs.	Min.	Hrs.	Min.			
1		45	2	15		30			
2	1		2			30			
3		45	2	30		40			

Keeping track of the work in this way on a farm where two or three persons do all the work requires one to five minutes per day.

There is not room here to give all the work reports, but all the ledger accounts are given in full, except that in many places a large number of entries of a like character are added together to save space in printing.

The account with each of the crops and animals is just as the farmer kept it. The personal account is not as he kept it, but is included to show the method of keeping such an account. The year 1911 was a year of poor crops and high prices for feed.

The results of this set of accounts are discussed in detail not because of the results, but to show methods of keeping accounts. The method is as well adapted to a cotton farm or an orange plantation, or any other kind of farming.

INTERPRETATION OF RESULTS

276. Cautions in interpreting results. — Since the object of cost accounting is to help in studying one's business, it is evident that the interpretation of results is the most important part of the work. By studying the accounts, one may see ways of reducing the cost or increasing the returns. It is just as necessary to study the accounts that pay as to study those that do not pay.

If an account comes out even, it means that the enterprise has paid interest on the money invested and paid all costs and furnished employment for men, horses, and machinery at the rates charged for these. Such an enterprise may be continued, but like all other enterprises, one must be looking for ways to make it pay better or for something to replace it that will pay better. (*Continued on page 472.*)

1. Alfalfa A. $7\frac{3}{4}$ Acres — 1911

Jan.	1	Inventory		309	
Dec.	31	208 hours man labor @ $21\frac{1}{2}$¢	14	44	72
		191 hours horse labor @ 13¢	11	24	83
		191 hours equipment labor @ $3\frac{9}{10}$¢	7	7	45
		Interest on $386 @ 5% 6 months	13	9	65
		Use of land	8	23	
				418	65
		Gain		187	35
				606	

2. Alfalfa B. 3 Acres New Seeding on Summer Fallow — 1911

Mar.	13	120 pounds seed, $25.50, bag, 25¢, freight, 40¢ ($\frac{2}{5}$ charged to Alfalfa C)		15	69
Dec.	31	Manure	6, 10, 11	30	
		212 man hours @ $21\frac{1}{2}$¢	14	45	58
		412 horse hours @ 13¢	11	53	56
		412 equipment hours @ $3\frac{9}{10}$¢	7	16	06
		Use of land	8	9	
		Interest on $160.89 @ 5% 6 months	13	4	02
				173	91

3. Alfalfa C. 2 Acres Seeded in Oats — 1911

Mar.	13	48 lb. seed	10	46
		4 hr. man .86, horse .52, equipm't .16 : labor	1	54
			12	00

1. Alfalfa A. $7\frac{3}{4}$ Acres — 1911

Oct. 1	20 tons hay	6	400	
Dec. 31	Inventory		206	
	The inventory represents a part of the original cost of starting the crop. The field was limed, manured, and summer-fallowed. It is expected to last four years. One-fourth of the cost is charged each year. Figures before the dollars' column refer to the number of the other account that is concerned; 14 refers to the labor account. Interest is charged because all the costs were incurred and money spent some time before the crop was used for sale or feed.			
			606	

2. Alfalfa B. 3 Acres New Seeding on Summer Fallow — 1911

Dec. 31	Inventoried at cost	173	91
	The very large amount of time spent on this alfalfa was due to plowing in hot weather and to picking stone.		
		173	91

3. Alfalfa C. 2 Acres Seeded in Oats — 1911

Dec. 31	Inventoried at cost	12	00
		12	00

4. Buckwheat, $3\frac{1}{2}$ Acres — 1911

May	15	4 bu. seed		4	
Oct.	30	Coal for threshing			80
		Threshing 67 bu. @ 4¢		2	68
Dec.	31	110 man hours @ $21\frac{1}{2}$¢	14	23	65
		130 horse hours @ 13¢	11	16	90
		130 equipment hours @ $3\frac{9}{10}$¢	7	5	07
				53	10
		Gain		3	20
				56	30

5. Corn — 3 Acres on Land rented to Mr. Hamilton

Dec.	31	Use of land	8	9	
		24 man hr. husking and hauling @ $21\frac{1}{2}$¢	14	5	16
		20 horse hours @ 13¢	11	2	60
		20 equipment hours @ $3\frac{9}{10}$¢	7		78
				17	54
		Gain		19	66
				37	20

6. Cattle — 1911

Jan.	1	Inventory: Grade cows, Nos. 1, \$70; 2, \$65; 4, \$60 Grade yearlings, Nos. 8, \$30; 9, \$30; 10, \$20; 11, \$15; 17, \$35 Pure-bred cows, 3, \$150; 18, \$150 Pure-bred yearlings, 5, \$100; 6, \$50; 7, \$50 Pure-bred yearling bull, \$50 8 tons alfalfa, \$144 6 tons hay, \$63 2 tons straw, \$10 $2\frac{1}{3}$ tons mixed feed, \$70	1162	
Feb.	28	900 lb. corn meal, \$11.25; 100 lb. bran, \$1.40; 100 lb. oil meal, \$2.00; 200 lb. gluten, \$3.00; 250 lb. ajax, \$4.13	21	78

(*Carried forward*)

4. Buckwheat, $3\frac{1}{2}$ Acres — 1911

Oct.	30	67 bushels to hens	10	48	30
	30	Straw to hens	10	8	
		Buckwheat was grown on land that was being cleared. The work of clearing is included. The buckwheat was an incidental crop.			
				56	30

5. Corn — 3 Acres on Land rented to Mr. Hamilton

Nov.	1	$1\frac{1}{2}$ tons stalks to cows	6	10	
	10	32 bu. corn to hens @ 85¢	10	27	20
				37	20

6. Cattle — 1911

		The total milk for the year was disposed of as follows, details are here omitted to save space in printing.			
		Milk sold		402	72
		2603 qt. used in house @ $3\frac{1}{2}$¢	25	91	11
		Butter and cream used in house	25	31	37
		1990 qt. skim milk to hens	10	13	93
		360 qt. to hired-man	14	12	60
Feb.	4	Calf		2	
April	10	Calf		16	50
	25	Received for taking tuberculous cow to station (labor was charged to cows)		1	75
June	14	Hide — No. 17 struck by lightning, 46 lb. @ $7\frac{1}{2}$¢		3	45
Aug.	24	Received for condemned tuberculous cow No. 18, \$100.00 ; Board of cow, \$3.25		103	25
Dec.	1	Transferred 400 lb. corn meal to hens	10	5	60

(*Carried forward*)

6. CATTLE — 1911 (*Continued*)

Mar.	10	Notary fee tuberculin test			25
	15	Corn stalks of Mr. Waters		1	88
	21	Transferred from horses to cows: 100 lb. oil meal, \$2.00; 100 lb. middlings, \$1.50; 200 lb. bran, \$2.80; 3 bu. oats, \$1.50	11	7	80
April	6	1000 lb. corn meal, \$12.00; 200 lb. gluten, \$2.80; 200 lb. bran, \$2.90; 100 lb. oil meal, \$2.25; 250 lb. ajax, \$4.13		24	08
	16	Membership breeders' association		1	
	24	Ad. — Calf for sale			25
May	5	Bull ring			10
	6	Heifer calf, No. 12, \$8.40; telephone 10¢		8	50
		Notary fee tuberculin test			25
	10	Heifer calf, No. 13		6	
July	10	Fire insurance		3	
Aug.	1	Heifer calf, No. 14, \$5.00; telephone, 10¢		5	10
Sept.	13	6 tons oat straw, oat field	17	36	
		3 tons wheat straw, wheat field	21	15	
	18	Bull ring			20
		400 lb. corn meal, \$6.20; 200 lb. bran, \$3.00; 200 lb. middlings \$3.20; 250 lb. ajax, \$4.00		16	40
Oct.	1	20 tons alfalfa	1	400	
	3	Pure-bred heifer, No. 16; telephone, 10¢		50	10
	7	Veterinary fee to date		7	
	23	Pasture	20	68	
	24	Two loads corn stalks, Mr. Miner		10	
Nov.	1	$1\frac{1}{2}$ tons corn stalks	5	10	
	24	7800 lb. corn meal, \$126.40; 6875 lb. ajax, \$113.42; 6000 lb. wheat feed, \$90.48; 400 lb. bran, \$6.00; 400 lb. oil meal, \$9.00		345	30
		Ad. — Calf for sale			25
		Billheads, 10¢; vaseline, 10¢; Breeders' journal, 25¢			45
	25	13 tons hay from hayfield	9	195	
Dec.	31	Use of barn for cattle	8	60	
		1249 man hours @ $21\frac{1}{2}$¢	14	268	54
		147 horse hours @ 13¢	11	19	11
		147 equipment hours @ $3\frac{9}{10}$¢	7	5	73
		Interest on average inventory, \$1514.50 @ 5%	13	75	73
				2824	80

6. Cattle — 1911 (*Continued*)

Dec. 1	100 lb. corn meal taken by hired-man on a/c	14	1	60
31	Manure for the year	2, 9, 19, 24	70	
	Inventory : Grade cows, 1, \$70 ; 2, \$65 ; 4, \$55 ; 8, \$50 ; 9, \$50 Grade heifers, 10, \$35 ; 11, \$30 ; 12, \$25 ; 13, \$15 ; 14, \$20 ; 15, \$20 4 veal calves, \$45 Pure-bred cows, 3, \$150 ; 5, \$125 Pure-bred heifers, 6, \$125 ; 7, \$125 ; 16, \$60 Pure-bred bull, \$50		1115	
	3 tons straw, \$16 ; 14 tons alfalfa, \$280 ; 11 tons mixed hay, \$165 ; 1 ton stalks, \$8 ; 17,800 lb. mixed feed, \$283		752	
			2622	88
	Loss		201	92
			2824	80

The total value manure of cattle, hens, and horses is credited to the animals and charged to alfalfa, hay, and orchard.

The loss on cows was due to the number of young stock kept, and unusually high price of feed. Grade heifers do not pay for raising on such expensive feed.

7. Equipment — 1911

Jan.	1	Inventory — summary		723	80
		Total oil, gasoline, repairs, and new equipment for year, here summarized to save space		396	27
		Use of buildings	8	15	
		161 man hours @ $21\frac{1}{2}$¢	14	34	62
		33 horse hours @ 13¢	11	4	29
		Interest on average inventory $850.77 @ 5%	13	42	54
				1216	52
		Gain		1	07
		The cost of equipment for the year was $238.79, of which $12.48 was charged to the labor and horse accounts. The remaining charge is divided among the different enterprises in proportion to the number of horse hours of work. Aside from the work for labor and horses and equipment there were 5831 hours of work costing $226.31, or $3\frac{9}{10}$¢ per hour. For principles involved see page 486.			
				1217	59

7. Equipment — 1911

Dec. 31	279 hours use of equipment by labor @ 4¢ (estimated)	14	11	16
	33 hours use for horses	11	1	32
	Inventory		977	73
	Use of equipment			
	191 hours alfalfa A @ $3\frac{9}{10}$¢	1	7	45
	412 hours alfalfa B	2	16	06
	4 hours alfalfa C	3		16
	130 buckwheat	4	5	07
	20 corn	5		78
	147 cattle	6	5	73
	1108 hay	8	43	21
	111 hens	10	4	33
	848 improvements, barn	12	33	07
	537 improvements, clearing	12	20	94
	411 oats — 1911	17	16	03
	421 oats — 1912	18	16	42
	326 orchard	19	12	71
	41 pasture	20	1	60
	45 wheat — 1911	21	1	75
	640 wheat — 1912	22	24	96
	166 wood lot	23	6	47
	54 garden	24	2	10
	219 personal	25	8	54
			1217	59

8. Farm — 1911

Jan.	1	Inventory		16650	
Feb.	1	Taxes		70	84
	9	Bought 11¼ acres land, cash $443.76			
		Mortgage to Farmer's Bank, $400	15		
		Recording deed, $1.10		844	86
Mar.	13	School taxes		15	15
	15	Surveying boundary line		1	50
		"No hunting" signs		3	
Sept.	11	Insurance on buildings		5	60
Nov.	29	Insurance on buildings		10	86
Dec.	31	Cost of new barn	12	1897	77
		Clearing land, from the improvement account	12	235	66
		Interest on average inventory, $18,125, @ 5%	13	906	25
				20641	49
		Gain		76	51
				20718	00

9. Hay, Timothy, 67.4 Acres — 1911

Jan.	1	Inventory: Grass seed on hand and manure applied since hay was cut		83	
Mar.	13	130 lb. timothy, $16.32; 90 lb. alsike clover, $15.75; 90 lb. red clover, $15.60; bags, 75¢; freight, $1.04		49	46
	14	2 tons nitrate soda, $96; 2½ tons acid phosphate, $30; freight, $17		143	
June	14	1 ton salt		2	
July	1	Insurance		9	
Sept.	18	4 bu. timothy seed		32	
Oct.	8	Meals for hay pressers		13	25
Dec.	31	Manure for year	6, 10, 11	95	
		Use of buildings	8	150	
		Use of land: 50 acres @ $3; 17.4 acres @ $2	8	185	
		1094 man hours @ $21\frac{1}{2}$¢	14	235	21
		1108 horse hours @ 13¢	11	144	04
		1108 equipment hours @ $3\frac{9}{10}$¢	7	43	21
		Interest	13	20	98
				1205	15
		Gain		615	40
				1820	55

8. Farm — 1911

July 31	House rent		18		
Dec. 31	Use of buildings — equipment	7	15		
	Use of buildings — cows	6	60		
	Use of buildings — hay	9	150		
	Use of buildings — hens	10	30		
	Use of buildings — horses	11	25		
	Use of houses — labor	14	165		
	Use of house — personal	25	150		
	Use of land — alfalfa A	1	23		
	Use of land — alfalfa B	2	9		
	Use of land — corn	5	9		
	Use of land — hay	9	185		
	Use of land — oats	17	69		
	Use of land — orchard	19	30		
	Use of land — pasture	20	90		
	Use of land — wheat	21	33		
	Use of land — wood lot	23	52		
	Use of land — garden	24	5		
	Inventory		19600		
			20718		

9. Hay, Timothy, 67.4 Acres — 1911

Oct. 1	605 lb. hay			5	44
Nov. 25	46361 lb. @ $20 per ton			463	61
	3000 lb. used by hired-man's horse		14	27	
	13 tons mixed hay to cows @ $15		6	195	
	12½ tons mixed hay to horses		11	225	
Dec. 31	Inventory 43½ tons	$826.50			
	Seed on hand	18.00			
	Manure applied since cutting	60.00		904	50
	Interest is charged on the cost other than land and buildings for 6 months @ 5% (land and buildings have paid interest under farm account)				
				1820	55

10. Hens — 1911

Jan.	1	116 pullets, $116.00; 96 yearling hens, $72.00; 8 roosters, $8.00; colony houses, $20.80; leg bands, $1.00; corbolineum, $3.00; 42½ bu. wheat, $42.50; ½ ton mixed feed, $15.00; oyster shell, $2.00; 27 bu. corn, $15.50		295	80
Feb.	8	Paper for brooder house		3	
	28	100 lb. grit			65
		1990 qt. skim milk for year, summarized to save space	6	13	93
Apr.	1	Repairs brooder house		2	20
	6	100 lb. corn meal		1	20
	13	50 gal. gasoline		6	
	18	Fire insurance permit to put incubator in cellar		3	
	24	Advertising eggs			30
May	1	1813 lb. wheat		29	53
	2	Incubator, 390 egg size		34	20
		3 universal hovers		20	50
		100 lb. grit			75
June	6	Kerosene brooders and incubators		2	50
		13 lb. chick food			32
	7	600 lb. bran, $8.70; 300 lb. corn meal, $4.05; 300 lb. middlings, $4.65; 300 lb. cracked corn, $4.05; 100 lb. meat scrap, $3.25		24	70
	13	87 lb. rolled oats for chickens		3	48
		Kerosene for brooders		3	
	29	4122 lb. wheat, $68.70; 1901 lb. cracked corn, $25.66		94	36
July	10	Insurance on hens		1	50
Aug.	1	500 lb. corn meal, $7.75; 500 lb. middlings, $7.75; 400 lb. meat scrap, $12.00; 200 lb. bran, $3.00; 100 lb. oil meal, $2.25		32	75
Sept.	13	178 bu. wheat from wheat field @ 95¢	21	169	10
		2 tons wheat straw	21	10	
Oct.	30	67 bu. buckwheat	4	48	30
		Buckwheat straw	4	8	
	31	Cabbage from garden	24	2	
Nov.	1	300 lb. corn meal, $7.50; 200 lb. bran, $2.80; 600 lb. middlings, $9.90; 1000 lb. oyster shell, $6.00; 300 lb. grit,			

(Carried forward)

10. Hens — 1911

Dec. 31	The sales during the year are here summarized to save space:			
	1449½ doz. eggs		348	39
	150½ doz. eggs sold to incubate		53	09
	257½ doz. eggs used in house	25	62	41
	84 hens, 7 roosters		44	80
	315 cockerels		117	70
	4 hens, 1 rooster used in house	25	2	35
	34 cockrels used in house	25	10	05
	Manure	2, 9, 19, 24	20	
	Inventory:			
	404 pullets, $404.00; 116 hens, $87.00; 25 roosters, $25.00; 9 cull roosters, $4.50		520	50
	900 lb. oyster shell, $5.40; 300 lb. grit, $1.80; 300 lb. bone meal, $7.50; 300 lb. meat scraps, $9.00; 500 lb. middlings, $8.25; 300 lb. corn meal, $4.80; 150 lb. bran, $2.10; 4 tons corn, $126.75; 400 bu. wheat, $380.00; 50 bu. buckwheat, $36.00; straw, $5.00		586	60
	Incubator, $30.80; brooders, $19.50; brooder house, $20.00; colony house made of old boards, $10.00; feed hopper, $3.00		83	30
			1849	19

(*Carried forward*)

10. HENS — 1911 (*Continued*)

		$1.80; 500 lb. meat scrap, $13.75; freight on meat scrap, $1.15		42	90
Nov.	3	342 bu. wheat, $324.90; advertisement for wheat, $.25		325	15
		8000 lb. corn		126	75
	10	32 bu. corn from cornfield	5	27	20
Dec.	1	400 lb. corn meal from cows to hens	6	5	60
	29	10 egg cases		1	
	31	Use of buildings	8	30	
		606 man hours (268 hens and 338 chickens) @ $21\frac{1}{2}$¢	14	130	29
		111 horse hours (77 hens and 34 chickens) @ 13¢	11	14	43
		111 equipment hours @ $3\frac{9}{10}$¢	7	4	33
		Interest on average inventory $743.00 @ 5%	13	37	15
				1555	87
		Gain		293	32
				1849	19

10. Hens — 1911 (*Continued*)

	1849	19
	1849	19

Summary for Year

	Hens			Roosters			Eggs Laid
	No. First Month	Died	Sold or Eaten	No. First Month	Died	Sold or Eaten	
Jan.	212	1		8			1272
Feb.	211	1		8			1384
Mar.	210			8			2480
Apr.	210	2		8			3658
May	208	3		8			4164
June	205	2	26	8		8	2794
July	177		61				1341
Aug.	116						1316
Sept.	116						1278
Oct.	116						736
Nov.	522		2	37	1	2	773
Dec.	520			34			2786

1711 eggs were incubated.

11. Horses — 1911

Jan.	1	Inventory: Frank, \$100; Jennie, \$145; colt, \$40; $\frac{1}{4}$ ton mixed feed, \$8; 400 bu. oats, \$178; 9 tons hay, \$99		570	
	20	Della, bought of James Peterson, cash, \$100; note due Oct. 1, 6%, \$107.50	15	207	50
Feb.	9	Maud, bought of James Peterson, cash, \$55; note due Oct. 1, 6%, \$100	15	155	
July	10	Insurance		1	50
Sept.	13	668 bu. oats @ 50¢	17	334	
		6 tons oat straw @ \$6	17	36	
		3 tons wheat straw @ \$5	21	15	
Oct.	4	Minnie — Percheron colt		300	
	7	Veterinary to date		2	
	23	Pasture	20	12	
	24	Two loads hay, Mr. Mays		20	
Nov.	25	$12\frac{1}{2}$ tons hay	9	225	
Dec.	4	Membership Percheron society		10	
		Registration of mare		9	
		850 lb. bran		11	95
		100 lb. oil meal		2	25
		Ad. — colt for sale			35
	10	Stallion service		15	
		Other costs of the year are here summarized to save space.			
		Shoeing for the year		28	04
		Stabling for the year		1	35
		Halters for the year		3	80
		Medicine for the year			25
Dec.	31	Use of buildings	8	25	
		714 man hours @ $21\frac{1}{2}$¢	14	153	51
		33 equipment hours	7	1	32
		Interest on average inventory, \$947.70 @ 5%	13	47	39
				2187	21

11. Horses — 1911

Mar.	21	Transferred horses to cows: 100 lb. oil meal, \$2.00; 100 lb. middlings, \$1.50; 200 lb. bran, \$2.80, 3 bu. oats, \$1.50	5	7	80
Aug.	1	Received for horse labor		1	
Dec.	1	100 lb. bran taken by hired-man on a/c	14	1	40
	31	Manure for the year	2, 9, 19, 24	50	
		279 hr. horse labor for hired-men	14	34	88
		Inventory:			
		Frank, \$80; Jennie, \$140; Della, \$175; Maud, \$150; Minnie, \$335; colt, \$75		955	
		7 tons straw, \$40; 500 bu. oats, \$250; 600 lb. bran, \$8.40; 4 tons hay, \$72		370	40
		Work for the year:			
		191 hr. alfalfa A @ 13¢	1	24	83
		412 hr. alfalfa B	2	53	56
		4 hr. alfalfa C	3		52
		130 hr. buckwheat	4	16	90
		20 hr. corn	5	2	60
		147 hr. cattle	6	19	11
		33 hr. equipment	7	4	29
		1108 hr hay	9	144	04
		111 hr. hens	10	14	43
		848 hr. improvements, barn	12	110	24
		537 hr. improvements, clearing	12	69	81
		411 hr. oats — 1911	17	53	43
		421 hr. oats — 1912	18	54	73
		326 hr. orchard	19	42	38
		41 hr. pasture	20	5	33
		45 hr. wheat — 1911	21	5	85
		640 hr. wheat — 1912	22	83	20
		166 hr. wood lot	23	21	58
		54 hr. garden	24	7	02
		219 hr. personal	25	28	47
				2182	80
		Loss		4	41
				2187	21

12. IMPROVEMENTS — BUILDING A BARN AND CLEARING LAND

June	5	5000 ft. lumber wood lot	23	125	
		Total cash cost of lumber, hardware, cement, etc., summarized to save space		1201	61
		1990 man hours on barn @ $21\frac{1}{2}$¢	14	427	85
		848 horse hours on barn @ 13¢	11	110	24
		848 equipment hours on barn @ $3\frac{9}{17}$¢	7	33	07
		674 man hours clearing land	14	144	91
		537 horse hours clearing land	11	69	81
		537 equipment hours clearing land	7	20	94
				2133	43

13. INTEREST — 1911

Feb.	9	Drawing mortgage, $2; recording, $1.35	3	35
July	1	Farmers' bank, interest on mortgage	148	17
Sept.	1	Interest in advance on loan on life insurance policy	22	50
Oct.	24	Interest — James Peterson	8	70
Dec.	23	Farmers' bank, interest on mortgage	149	50
	27	Andrew Thomas	300	
			632	22
		Gain	536	22
			1168	44

12. Improvements — Building a Barn and Clearing Land

	Cost of barn	$1897.77		
	Cost of clearing	235.66	2133	43
	Carried to farm account at cost. This is a part of the farm account but was kept separate to get the cost of the barn and clearing.			
			2133	43

13. Interest — 1911

Dec. 31	Interest on farm enterprises			
	Alfalfa A	1	9	65
	Alfalfa B	2	4	02
	Cattle	6	75	73
	Equipment	7	42	54
	Hay	9	20	98
	Hens	10	37	15
	Horses	11	47	39
	Farm	8	906	25
	Oats	17	7	54
	Orchard	19	8	21
	Wheat — 1911	21	5	65
	Wheat — 1912	22	3	33
			1168	44

14. Labor — 1911

Jan.	1	Work report books and ledger		1	75
Mar.	15	Wood used by hired-men	23	30	
Nov.	25	$1\frac{1}{2}$ tons hay used by hired-man's horse	9	27	
Dec.	1	100 lb. corn meal furnished to hired-man	6	1	60
		100 lb. wheat bran furnished to hired-man	11	1	40
		The other costs of labor are here summarized to save space:			
		360 qt. milk	6	12	60
		Board furnished by house	25	25	06
		Board paid		92	60
		Paid for labor		904	40
	31	Owner's work (estimated)	25	600	
		Use of buildings by men	8	165	
		279 hr. horse labor for men	11	34	88
		279 hr. equipment	7	11	16
				1907	45

15. Notes and Accounts Payable — 1911

Dec.	31	Inventory	12,057	50
			12,057	50

14. Labor — 1911

Aug.	1	Received for labor				75
Dec.	31	Labor on various farm enterprises:				
		208 hr. alfalfa A @ 21½¢	1		44	72
		212 hr. alfalfa B	2		45	58
		4 hr. alfalfa C	3			86
		110 hr. buckwheat	4		23	65
		24 hr. corn	5		5	16
		1249 hr. cattle	6		268	54
		161 hr. equipment	7		34	62
		1094 hr. hay	9		235	21
		606 hr. hens	10		130	29
		714 hr. horses	11		153	51
		1990 hr. improvements, barn	12		427	85
		674 hr. improvements, clearing	12		144	91
		270 hr. oats, 1911	17		58	05
		151 hr. oats, 1912	18		32	47
		583 hr. orchard	19		125	35
		23 hr. pasture	20		4	95
		99 hr. wheat, 1911	21		21	29
		278 hr. wheat, 1912	22		59	77
		146 hr. wood lot	23		31	39
		81 hr. garden	24		17	42
		158 hr. personal	25		33	97
					1900	31
		Loss			7	14
					1907	45

15. Notes and Accounts Payable — 1911

Jan.	1	Mortgage, Andrew Thomas, 5 yr. @ 5%		6,000	
		Mortgage, Farmers' bank, due 1915, @ 5½%		5,000	
	20	Note, James Peterson, due Oct. 1, @ 6%	11	107	50
Feb.	9	Note, James Peterson, due Oct. 1, @ 6%	11	100	
	9	Mortgage, Farmers' bank, 2 yr. @ 6%	8	400	
Sept.	1	Borrowed on life insurance policy		450	
				12,057	50

17. Oats, 23 Acres — 1911

Jan.	1	Inventory: 134 hr. man labor (126 plowing, 8 other work) 254 hr. horse and equipment labor (248 fall plowing, 6 other work) $84.08 66 bu. oats for seed $33		117	08
Mar.	13	2 bu. seed oats, $2; freight, 13¢; bag, 25¢		2	38
	14	Fertilizer		10	
July	1	Insurance		3	
Sept.	8	Twine and cutting		22	
	12	Coal for threshing			96
Oct.	8	Meals for threshers		2	
		Threshing 668 bu. @ $2\frac{1}{2}$¢		16	70
Dec.	31	Use of land	8	69	
		270 man hours @ $21\frac{1}{2}$¢	14	58	05
		411 horse hours @ 13¢	11	53	43
		411 equipment hours @ $3\frac{9}{10}$¢	7	16	03
		Interest on $301.63, 6 mo. @ 5%	13	7	54
				378	17
		Gain		27	83
				406	

18. Oats, 22 Acres — 1912

Dec.	31	151 man hours fall plowing @ $21\frac{1}{2}$¢	14	32	47
		421 horse hours @ 13¢	11	54	73
		421 equipment @ $3\frac{9}{10}$¢	7	16	42
				103	62

17. OATS, 23 ACRES — 1911

Sept. 13	668 bu. oats to horses @ 50¢	11	334	
	6 tons oat straw to cows	6	36	
	6 tons oat straw to horses	11	36	
			406	

18. OATS, 22 ACRES — 1912

Dec. 31	Inventoried at cost	103	62
		103	62

19. Orchard, 3 Acres — 1911

Jan.	1	Inventory: Spray materials on hand		7	
June	14	1 bu. buckwheat, \$1.00; 4 lb. rape, 40¢; $\frac{4}{5}$ lb. cowhorn turnips, 50¢, for cover crop		1	90
Nov.	25	241 apple barrels		93	10
Dec.	15	Freight on apples		36	05
	31	Manure	6, 10, 11	10	
		Use of land	8	30	
		583 man hours @ $21\frac{1}{2}$¢	14	125	35
		326 horse hours @ 13¢	11	42	38
		326 equipment hours @ $3\frac{9}{10}$¢	7	12	71
		Interest on \$328.49, 6 mo. @ 5%	13	8	21
				366	70

20. Pasture, 43 Acres — 1911

Dec.	31	Use of land	8	90	
		23 man hours @ $21\frac{1}{2}$¢	14	4	95
		41 horse hours @ 13¢	11	5	33
		41 equipment hours @ $3\frac{9}{10}$¢	7	1	60
				101	88

21. Wheat, 11 Acres — 1911

Jan.	1	Inventory — cost of starting crop		117	82
July	1	Insurance		3	
Sept.	8	Twine and cutting		10	
	12	Coal for threshing			48
Oct.	8	Meals for threshers		1	25
		Threshing 203 bushels @ 4¢		8	12
Dec.	31	Use of land	8	33	
		99 man hours @ $21\frac{1}{2}$¢	14	21	29
		45 horse hours @ 13¢	11	5	85
		45 equipment hours @ $3\frac{9}{10}$¢	7	1	75
		Interest on \$169.56, 8 months, 5%	13	5	65
				208	21
		Gain		38	89
				247	10

19. ORCHARD, 3 ACRES — 1911

Dec.	15	Fruit used in house: 5 bu. peaches, $7.00; 2 bu. pears, $2.00; 2 bu. cherries, $2.00; 42 bu. apples, $33.95	25	44	95
		Apples sold at various dates here summarized to save space		298	14
Dec.	31	Inventory apple barrels		12	
				355	09
		Loss		11	61
				366	70

20. PASTURE, 43 ACRES — 1911

Oct.	23	Received for pasturing stock		15	
		Pasture used by horses	11	12	
		Pasture used by cows	6	68	
				95	
		Loss		6	88
				101	88

21. WHEAT, 11 ACRES — 1911

Sept.	13	40 bu. seed wheat to 1912, wheat @ 95¢	22	38	
		163 bu. wheat to hens @ 95¢	10	154	85
		15 bu. estimated, not threshed, to hens	10	14	25
		2 tons straw to hens	10	10	
		3 tons straw to horses	11	15	
		3 tons straw to cows	6	15	
				247	10

22. Wheat, 22 Acres — 1912

1911				
Sept. 13	40 bu. seed wheat	21	38	
18	3000 lb. bone meal, \$51; 330 lb. nitrate soda, \$9.60		60	60
Dec. 31	278 man hours @ $21\frac{1}{2}$¢	14	59	77
	640 horse hours at 13¢	11	83	20
	640 equipment hours @ $3\frac{9}{10}$¢	7	24	96
	Interest on \$266.53, 3 months @ 5%	13	3	33
			269	86

23. Wood Lot, 26 Acres — 1911

April 7	1000 black locusts		6	75
June 5	Sawing 5000 ft. lumber		15	
Dec. 31	Use of land	8	52	
	146 man hours @ $21\frac{1}{2}$¢	14	31	39
	166 horse hours @ 13¢	11	21	58
	166 equipment hours @ $3\frac{9}{10}$¢	7	6	47
			133	19
	Gain		34	81
			168	

24. Garden, 1 Acre — 1911

April 1	Seeds			15
Dec. 31	Manure	6, 10, 11	5	
	Use of land	8	5	
	81 man hours @ $21\frac{1}{2}$¢	14	17	42
	54 horse hours @ 13¢	11	7	02
	54 equipment hours @ $3\frac{9}{10}$¢	7	2	10
			36	69
	Gain		40	31
			77	

22. WHEAT, 22 ACRES — 1912

1911 Dec. 31	Inventoried at cost		269	86
			269	86

23. WOOD LOT, 26 ACRES — 1911

Mar. 15	Wood sold	12	3	
	Wood for hired-men	14	30	
	Wood for house, personal	25	10	
June 5	5000 ft. lumber for barn		125	
			168	

24. GARDEN, 1 ACRE — 1911

Oct. 31	Cabbage to hens	10	2	
	Garden products for house, estimated	25	75	
			77	

25. Personal, — 1911

	This account is summarized to save space. The year's summaries were:			
	2603 qt. milk from cows	6	91	11
	Butter and cream from cows	6	31	37
	257½ doz. eggs from hens	10	62	41
	34 cockerels	10	10	05
	4 hens and 1 rooster	10	2	35
	Wood from wood lot	23	10	
	Fruit from orchard	19	44	95
	Garden products	24	75	
	Use of house	8	150	
	Life Insurance paid		102	18
	Cash living expenses		255	
	158 man hours @ 21½¢	14	33	97
	219 horse hours @ 13¢	11	28	47
	219 equipment hours @ $3\frac{9}{10}$¢	7	8	54
			905	40

Summary of Gains and Losses

Losses:			Gains:		
Cattle	201	92	Alfalfa A	187	35
Horses	4	41	Buckwheat	3	20
Labor	7	14	Corn	19	66
Orchard	11	61	Equipment	1	07
Pasture	6	88	Farm	76	51
	231	96	Hay	615	40
			Hens	293	32
			Interest	536	22
			Oats	27	83
			Wheat	38	89
			Wood lot	34	81
Net gain on farm	1642	61	Garden	40	31
	1874	57		1874	57

Net gain on farm	1642.61
Loss on personal	280.34
Net gain	1362.27

The gains and losses on horses, labor, and equipment have no significance, as there are balances due to the rate per hour being a fraction over or under the real cost. The farm balance is due to charging a little more as rent of buildings and land than these cost. The gain on interest should represent interest on the capital owned. It is a little low, as is seen, by comparing with the inventory.

25. PERSONAL, — 1911

Oct.	1	Board furnished to laborers		25	06
Dec.	31	Estimated value of owner's labor	14	600	
				625	06
		Loss		280	34
				905	40

SUMMARY OF INVENTORY

	1911		1912	
Resources:				
Cash	4,226	50	39	35
Alfalfa A	309		206	
Alfalfa B			173	91
Alfalfa C			12	
Cattle and feed	1,162		1,867	
Equipment	723	80	977	73
Farm	16,650		19,600	
Hay	83		904	50
Hens' feed, etc.	295	80	1,190	40
Horses and feed	570		1,325	40
Oats, 1911 crop	117	08		
Oats, 1912 crop			103	62
Orchard	7		12	
Wheat, 1911 crop	117	82		
Wheat, 1912 crop			269	86
	24,262		26,681	77
Liabilities	11,000		12,057	50
Present worth	13,262		14,624	27
Gain for year	1,362	27		

If an enterprise fails to pay, it does not mean that that crop or animal should be dropped. A study of the account may indicate how it may be made to pay. Sometimes the trouble is that the area or number of animals is too small. Instead of dropping the enterprise, it may be that it should be increased so as to reduce the cost of production and make it pay. An enterprise that regularly shows a loss may be continued if the loss is not too great and if nothing better can be found to do. The enterprise may be paying less than the labor cost, but if it pays other expenses and something for man and horse labor, it is better than doing nothing. However, it is not often that any enterprise should be continued that does not pay wages. In nearly all cases, it may be changed or something else substituted that will pay.

In interpreting results, one must consider whether the season and other conditions have been normal.

In short, cost accounts are used as a means of studying one's business. The cost of production and the profit or loss are only a small part of the results.

277. Results on Crops. — The table on the opposite page shows some of the main facts about each crop in this set of accounts.

The alfalfa has been the most profitable crop on the farm, both per acre and for the time spent on it. Alfalfa paid all expenses and had left 90 cents for each hour spent on it. Or since the value of labor has already been counted out, we may say that it paid all expenses except labor and had left $1.11 for each hour of labor.

The cost of starting the crop after a summer fallow is very high. The three acres in field B cost nearly $58 per acre for manure, seed, labor, use of land, etc. When seeded in oats in field C without manure, the cost was $5 per acre. This

	Alfalfa	Timothy Hay	Oats	Wheat	Orchard
Total acres	7.75	67.4	23	11	3
Total yield	20 tons	94 tons	668 bu.	218 bu.	247 bbl.
Yield per acre	2.6 tons	1.4 tons	29 bu.	20 bu.	82 bbl.
Total value of crop	\$400.00	\$1742.55	\$406.00	\$247.10	\$343.09
Value per acre	\$51.61	\$25.85	\$17.65	\$22.46	\$114.36
Total cost	\$212.65	\$1127.15	\$378.17	\$208.21	\$366.70
Cost per acre	\$27.44	\$16.72	\$16.44	\$18.93	\$122.23
Cost per ton, bu., or bbl.	\$10.63	\$12.00	\$.57[1]	\$.96[1]	\$1.48
Profit	\$187.35	\$615.40	\$27.83	\$38.89	loss
Profit per acre	\$24.17	\$9.13	\$1.21	\$3.54	——
Profit per man hour	\$.90	\$.56	\$.07	\$.16	——
No. man hours per acre	27.	16.	18.	22.	194.
No. horse hours per acre	25.	16.	29.	23.	109.
No. man hours to raise a ton, bu., or bbl.	10.	12.	0.6	1.1	2.4
No. horse hours to raise a ton, bu., or bbl.	10.	12.	1.	1.2	1.3

[1] Notice that the grain does not have to be worth the cost per bushel in order to come out even, because the straw has a considerable value. This value was not counted in figuring the cost per bushel. The hours of work on wheat and oats do not include the cutting, because this was hired done. The cost of starting wheat includes 141 man hours and 211 horse hours.

seeding succeeded fairly well. By this means, the farmer expects to save at least \$30 per acre in starting the crop.

Buckwheat was grown on a small field that was being cleared. It did very well indeed to pay for the work done on this field.

The corn was grown by a neighbor for half the crop. It paid for the work of hauling in and husking and \$9 per acre for the use of the land.

Timothy hay paid very well, both per acre and for the time spent on it. The crop was fertilized and would yield more in a good year, but the low yield was offset by a high price. About half the time spent on this crop was spent in harvesting it.

The oats and wheat both paid in spite of the poor year. The time spent on these was a little high, because they were grown in small fields of about five acres. The farmer has now remedied this trouble by combining fields. These crops were hired cut, so that the hours of labor do not include cutting.

The loss on the orchard was due to low prices received for the crop on account of overproduction of apples. The cost of $1.48 per barrel is an indication of what would be required to make them pay. It is interesting to notice that the time spent on one acre of orchard is equal to that spent on twelve acres of timothy or on seven acres of alfalfa.

278. Cattle. — The only serious loss was on cattle. This was the second year that they showed a loss on this farm, yet the farmer did not sell them because the account shows the trouble to be things that can be remedied. Part of it is due to high-priced feed, but more is due to other causes. One heifer died and $50 was lost on one pure-bred cow that was condemned for tuberculosis. Five cows were giving milk during the year. The labor on cattle was 1249 man hours. If we ignore the young stock, this was 250 hours per cow. This may be remedied, not by going out of the cow business, but by keeping more cows. It takes as long to go to the pasture for five cows as for 20. By keeping 10 to 15 cows, the man labor can be reduced to about 150–175 hours per cow per year. Four grade heifers were valued at $95 at the beginning of the year and at $165 at the end of the year. At the prices of feed, it probably cost $150 for feed for these for the year, whereas they increased in value only $70. Where feed is so high in price, it is better to buy grade cows or raise pure-breds. Instead of going out of the cow business, the farmer decided to keep more cows so as to reduce the labor cost per cow and to stop raising any grade heifers.

279. Hens. — The hens paid all expenses and left a profit of 42 cents per hour of man labor. They laid about 8 dozen eggs apiece. The eggs brought an average of about 25 cents per dozen. It took about $1\frac{1}{4}$ hours to take care of a hen for a year and took about 50 minutes of time on chickens for each pullet raised. This is doing very well indeed. The cockerels nearly paid the cost of raising chickens except the food. The accounts do not give the food cost, but this was about $1 in a previous year, so that the pullets cost about $1 each on this farm.

280. Horses. — The horses worked on an average of about 4 hours a day for the year, or 4.6 hours if we allow for the time before some of them were purchased. The cost per hour was 13 cents or $2.60 for a ten-hour day of a team. This is very reasonable when feed is so high, but both of these might be improved. Making no allowance for the colts, it took about 179 hours to take care of a horse a year. Calling the colt equal to half a horse, the cost of feed was at the rate of about $130 per horse. The total cost of horses was $766, or $192 per horse. It will be seen that a team of horses costs more than a man for the time it works. This cost is, of course, much lower when feed is worth less.

The colt increased in value from $40 to $75. This is probably not half enough to pay for its feed for a year. The colt increased rather than decreased the cost of the horse labor. There was also a loss of a $15 service fee and of the risk, feed, and time lost by a mare that gave birth to a dead colt. The farmer decided to raise no more colts except such as would be worth high prices when grown, because feed in this region is too expensive for anything but high-priced colts.

281. Equipment cost $239 for the year. This is a cost of $1.99 for each acre of crops harvested, or a cost of $3\frac{9}{10}$ cents for each hour of horse labor. Both of these are reasonable costs, probably much below the average for the state. The cost of equipment was 21 per cent of the value of equipment on hand at the beginning of the year or purchased during the year. This, again, is a moderate figure, but one should strive to reduce these costs. On some farms in Minnesota, the machinery costs are about half as much, but the costs of housing machinery and of oil do not seem to be included. (See page 357.)

The chief reason for the difference is the greater area of each kind of crops grown on the Minnesota farms so that the machinery is used more.

282. Other uses of accounts. — By keeping the work report, as shown on page 442, it is possible to find the time required for each operation and the cost of operation. Such information is of very frequent use in planning farm work. It is often desirable to know how long to allow for a certain kind of work. By comparing different years, one can see where he is improving in the use of labor. Often the cost of an operation is an aid in business transactions. For instance, this farmer had occasion to use the cost of baling hay in determining at what price to sell it unbaled. Twice he had occasion to use the cost of harvesting wheat in making purchases of growing wheat. The time at which different operations were done on previous years is often of interest and value These are but a few of the great variety of uses that are made of such records.

DETAILS OF THIS AND OTHER METHODS OF ACCOUNTING AND PRINCIPLES INVOLVED

283. Kinds of books or record sheets. — Loose leaf ledgers or card index methods of accounting are more or less used. In the great majority of cases, those who have tried both methods prefer books. Cards or loose leaves are too easily misplaced. The writer designed a loose leaf record system for farming, but after two years' use discarded it for the ordinary forms of books.

No special forms of any sort are needed for farm records. An ordinary account book, ruled with four columns at the right, is the best possible form of work report. Man hours and horse hours are written at the head of the columns. Such a book has room for man hours and minutes, and horse hours and minutes. In one part of the book a few extra lines are drawn on 12 pages to make a chore report. A book about 8 × 12 inches is good shape. It is large enough to allow plenty of room for writing in the kind of work. The columns are long for convenience in adding and for easier reference, as the year's work on most crops can be put on 1 to 4 pages. It is long enough so that a month's chores can be put on one page. (See page 442.)

A book of the same shape is the best for a ledger of accounts. The books usually called ledgers are not satisfactory, because there is not room to write full descriptions of transactions. The best form has a page about 8 inches wide and uses the left page for charges and the right page for credits rather than divide the page. No attention need be given to the name printed on the cover of the book. All that is needed is place for date, wide space for writing, and a column for dollars and one for cents. In some kinds of bookkeeping, little space is needed in the ledger, but for cost accounting one needs a wide book so that when he opens it to study an account, he will have a full description of all transactions without having to refer to any other place. The mere statement of total costs and total receipts has little value. One must study details before he can come to wise conclusions as to how to reorganize the business.

For the above reason, the many column ledgers, with the kind of expense at the head of the column, are not adapted to cost accounting. They do not allow room for full statements. For instance, feed purchased for cows should show in the cow account the pounds and the kind of feed, as well as the cost. The farmer refers to the amount and kind of feed as frequently as to the cost. All details must be included in the ledger to make the accounts most valuable.

284. Journals and day books. — The book known as a journal is little used in any business; it is wholly out of place on a farm. The farmer has work enough to do without writing down his transactions three or four times over. For the same reason, the day book is useless. The object of a day book is to have a book where transactions can be written down quickly without keeping another customer waiting. Business men who keep their own accounts, and who have time after each transaction to enter it in a ledger, once for all, rarely use a day book. The farmer has just as much time to enter items in the ledger at once as later. If he keeps both a day book and ledger, his accounting will soon end, because he will get so far behind with his posting that he will give it up. The original entry ledger, as illustrated in the set of accounts, is the sensible way of keeping accounts on an ordinary farm. The items are entered once for all. They never have to be rewritten.

285. Double or single entry. — If a complete set of accounts is kept, as illustrated on the preceding pages, it will be by the double entry method if a cash account is kept, as this is the only account lacking. On most farms, over three-fourths of the transactions are cash. By omitting the cash account, such items are written once instead of twice. If this account is omitted, the work is reduced by one-third. The cash account adds practically nothing to the value of the book. The time spent in keeping it is better employed if spent in a more careful study of the separate accounts, or it may be spent in raising some more crops. The argument for keeping the cash account is that the cash on hand may be checked with this account and that the total debits in all accounts can be checked with the total credits. These are very important considerations when one is doing ordinary bookkeeping, but are of no particular value in a set of cost accounts. Cost accounts cannot be exact. They are full of estimates. It is foolish to spend time with the refinements in methods of bookkeeping that are designed to check exact work to the last cent.

When the farmer and his wife spend money out of the same pocketbook for personal expenses and the farm, it is almost impossible to make the cash check exactly, as some items are almost certain to be omitted. It does not matter if some small errors do occur. In fact, it is attempts to find insignificant errors that often disgust persons with the whole question of accounting.

When a cash account is not kept, there is a means of checking the whole set of accounts at the end of the year.

The gain or loss as shown by the inventory should be the same as that shown by the sum of the gains or losses of the separate accounts. If one is doing a good farm business, an error of $25 or $50 or so in a year need not bother him, because it is most likely made up of small items that were omitted from the personal expenses. It is not likely that it would change his conclusions on any farm enterprise.

The writer kept farm accounts by double entry methods for three years, and for three years has used the method here recommended. The omission of the cash account and the freedom from attempts to make the accounts balance saves half the work and nearly all the worry. At the end of the year, the error is not serious enough to cause any wrong conclusions as to how to reorganize the business. He would not think of going back to double entry methods. This method is now being used by a considerable number of farmers with good results.

Some farmers go one step farther and omit all personal expenses. At the end of the year, the summary of gains and losses will then show a greater gain than actually occurred. The inventory will show the real gain. The difference is the personal expenses. The writer believes that personal expenses, as well as business expenses, should be studied, and so favors keeping such an account.

If one is managing a farm for another, he must, of course, keep a cash account and keep it accurately, in order to give an account of the money. The same is true if one is renting land and shares receipts and expenses with the landlord.

286. Index. — Tape fastened to the pages and marked with the name of the account makes the work of listing accounts very much less. A box of gummed tape that costs 10 cents will be enough to last for many years, or strips of cloth may be used. When the account extends over several pages, the index may be cut off and a new one put on at the new place.

287. Other forms of work reports. — There are three general forms of work reports. The report may be kept in the form of a diary that includes man and horse hours.

		Man Hours	Horse Hours
Nov., 1912			
1	Husked corn	9	18
	Plowed for oats	9	27
2	Hauled hay for cows	10	20
	Plowed for oats	9	27

This form of work report contains all the facts, but at the end of the month or year the work must be sorted out by crops and animals. It bears the same relation to the form given on page 442 as a day book does to a ledger. It has all the facts in order of days rather than in order of subjects. It is sometimes convenient to have a man keep his time in this form when some one else is to do the posting. A chore report is kept on a separate page like that on page 442.

Sometimes no chore report is kept. The chores are then estimated once a week or once a month. The daily report is usually preferable.

Another form much like this is to have a sheet for each day like the following. There are a few occasions when this is desirable. Such sheets are likely to be lost. They must be summarized or transferred the same as the diary form. A very few farms have conditions that make this a satisfactory form.

Daily Work Report.

Chores.

Sheep------hr.------min. Personal-----hr.------min.

Horses-----hr.------min. Cows--------hr.------min.

Hens-------hr.------min. Hogs--------hr.------min.

-----------hr.------min. ---------hr.------min.

Kind of Work	Man		Horse	
	Hrs.	Min.	Hrs.	Min.

Name------------------------Date----------------191-----

Another form of work report uses one sheet a month and gives the time spent on each enterprise, but does not give the kind of work.

Nov. 1912	Hay		Oats		Corn		Wheat		Cows		Horses	
	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse
1			9	27	9	18						
2			9	27					10	20		

There is only one objection to this form. It does not tell the kind of work. When one begins to study his business, he is not satisfied to know only the hours required on a crop. He wants the details, so that whenever he desires, he can find the rate of plowing, the rate of cultivating, etc. Frequently, this information is used in planning farm work, and in many other ways. Moreover, the work report is a valuable reference book for use in looking up dates on which certain things were done in previous years.

The form given on page **442** gives all the facts, and sorts them by enterprises, so that one may turn to the work report on oats and have all the year's work on that crop before him. In putting down the same facts listed above, one would turn to the list of work on oats and put down the time spent in plowing. He would then turn to the corn page and put down the time spent in husking. This has a further advantage over the diary form in that the name of the crop does not have to be written. On a farm where the work is done by two or three persons, the time spent in keeping such a work report requires one to five minutes a day. The form on page 442 is preferred by the majority of farmers.

The work report and ledger may be combined in one book. The left-hand page is then used for labor and cash costs as shown on page 484. The right-hand page is used for credits, the same as in the ordinary ledger. At the end of the year the total hours of man and horse labor are charged in the dollar and cents columns.

Another similar method is to use the left-hand page for work and put both costs and receipts on the right-hand page. This requires four columns on each page, the usual ruling in account books. The two right-hand columns of the right-hand page are used for receipts. The columns next left of these are used for costs.

1912	Oats—1912—38 Acres	Man		Horse		Costs	
		Hr.	Min.	Hr.	Min.		
Jan. 1	Seed oats on hand 95 bu.					$74	
Mar. 5	Farmed	6					
Mar. 6	Farmed	9	30				
April 5	Disked	9		36			
April 6	$2\frac{1}{2}$ tons fertilizer					68	30
April 6	Hauling fertilizer	5	15	10	30		
April 8	Disked	9	30	38			

288. Estimating values. — Values used in cost accounts should be such as could be realized if the product were sold in a normal way; that is, at normal sale prices, rather than at high prices or at forced sale prices. When feed raised on the farm is charged to animals, it should be charged at its sale value less the cost of hauling to market. Hay one mile from town is worth more than hay 10 miles from town. Manure should be credited to animals at what it is worth at the barn. The cost of hauling should be charged to the crop, as the distance to haul is one of the factors that determines the profit in growing a particular crop on a particular field. The stock is not to blame if this field is far away or near by.

289. Accounts with fields. — Sometimes it is desirable to keep the accounts by fields rather than by crops. The costs on very different soils or fields of different distances from the barn are very different. There may then be accounts with oats on field 1 and on field 2. This makes a little more work if there are more fields than crops. If one field is part in one crop and part in another, it is counted as two fields.

290. Farm account. — The farm account includes only part of the real estate value. Fall plowing done for oats, a growing winter wheat crop, or the cost of starting an alfalfa crop are charged to the respective crops and are so inventoried, yet these values are sold when the farm is sold. The distinction as to just what is real estate has no particular significance to the farmer, except when he wishes to sell a farm.

Costs of repairs, taxes, improvements, etc., are charged to the farm account. If the repairs and improvements have not more than maintained the value of the place, the account should about balance. The use of buildings for persons, stock, crops, and equipment, and the use of land by crops, are credited to the farm and charged to the various accounts. These charges should be just high enough to cover repairs, depreciation, insurance, taxes, interest on the money invested in the land, and other expenses of maintenance. If the improvements have increased the value of the place, the value of the farm is given a higher figure in the inventory at the end of the year. One should be careful about increasing the farm value, as improvements in one way may only offset depreciation in another.

Usually the enterprises that use buildings should pay interest on the money invested in buildings and 3 to 5 per cent for repairs, insurance, and other costs.

Crops should pay rent for land at a rate that will cover interest, taxes, and other land costs.

291. Manure and fertilizer. — Manure may be credited to the animals and charged to the crops that receive it. The labor of hauling is best charged to the crop. If the crop is an annual one, part of the value of manure and the labor of hauling it should be carried to the succeeding crop. The most convenient way of doing this is to inventory the estimated residual value, and at the end of the year credit this value to the crop and charge to the succeeding crop. What proportion of the manure should be carried along varies with the soil and many other conditions. With loam or clay soils, a fair distribution in a four-year rotation in which manure is used but once might be 40 per cent to the first crop, 30 per cent to the second, 20 per cent to the third, and 10 per cent to the fourth crop after applying manure.

Another way of handling the manure account is to charge it to the farm and then charge the crop a high enough rental for use of land to cover the cost of manure as well as regular rental. The crops nearest the manure in the rotation then pay the highest rental.

Still another way is to charge it to the field. The easiest method is to charge to the crop and at the end of the year credit the crop with part of the manure and carry to the next year's crop.

With perennial crops, the residual value may ordinarily be ignored, because if a constant amount is applied from year to year, the residue of one year's application is about equal to the residue of a previous year's that is used up.

If heavy applications of fertilizer are used, part of the cost may be credited to the crop at the end of the year and carried on to a succeeding year. If only light applications are made, they may be all charged to the year's crop.

292. Equipment. — The easiest way of finding the equipment cost is to keep one account with all machinery and equipment. This cost may then be apportioned among the different enterprises in proportion to the number of hours of horse labor. In the majority of cases, this has been found to charge each enterprise with its proper share of the cost. However, one must be careful in all special cases. For instance, one might have a lot of incubators and special poultry equipment, and yet horses may do little work for hens. In such a case, the special poultry equipment should be kept in the hen account as was done in this set of accounts. Hens also had to pay a small amount for the use of general farm equipment. One may have a large amount of equipment for a crop that he grows little of. This makes the real cost of equipment out of proportion to the area of the crop.

A little judgment in using the method will usually make it safe to charge equipment in this way. We must also remember that cost accounting does not expect to get absolutely accurate results. It does not pay to spend too much time trying to avoid small errors that will not affect one's conclusions.

293. Labor. — Man and horse labor are charged to each enterprise at the same rate of pay, unless special labor is hired at a special rate, as in harvest, when it may be charged directly to the crop. The time of yearly men costs less per month in the winter, but actually costs more per hour than in summer, because the days are so much shorter. It is not desirable to charge this labor at different rates, because we are trying to find which enterprises pay higher wages.

294. Horses. — On most farms, horses are kept primarily for work. The best way to handle this account is to find the total cost of horse labor and distribute this cost among the different farm enterprises in proportion to the time spent on them. If colts are raised, they are for the purpose of reducing the cost of horse labor. Only in very rare instances do we find farms where pure-bred or fancy colts pay the cost of horse work. In the rare cases where horses are kept primarily to raise colts to sell, the horse labor may be charged at a reasonable rate and horses credited with this work. The loss or gain on horses is then determined.

295. Hay seed. — If one is raising a fairly constant area of alfalfa, timothy, or other long-lived plant, he may keep a single account with the crop. The seed purchased for next year's crop can then be charged to this account, although it is really seed for future years. The crop should then pay for about so much seed each year. If one prefers, he may run an account with each year's seeding separately. In the set of accounts given, the alfalfa fields are kept separate, but only one timothy account is kept. With annual crops, it is better to open a separate account for each year's crop.

296. Double cropping. — When more than one crop is grown on the same field at the same time, as when potatoes are grown in a young orchard, the accounting becomes difficult. But if one is not prejudiced in favor of either crop, he can arrive at a fair estimate. If he is prejudiced, his results in this, or any other work on cost accounting, will be useless. For instance, some persons have credited the orchard with the value of the crop grown between the rows of trees, in order to learn what it costs to grow an orchard. In one case that has been quoted to considerable extent by pomologists, the bean crop grown in a young apple orchard more than paid for all costs of raising both crops. Hence the apple orchard showed a very nice profit when it had not borne an apple. By this erroneous method of figuring, the apple orchard cost nothing; but if all the land had been in beans, there would have been no spraying or pruning, the cultivation would have taken less time, and the bean crop would have been much larger. Instead of being an argument for going into the apple business, these results are an argument for going into the bean business. Beans paid so well that they were able to carry an apple orchard and yet pay. If one who figures in this way is asked what it costs to grow an apple orchard, he would have to say that it depends on the price of beans.

The fair way to estimate the cost of an orchard is to divide the work, land, and fertilizer between the two crops. The proportion of the area in the crop should be estimated. This is not necessarily all the land planted to the crop, because the trees may injure it. The proportion of the time and fertilizer that the crop required should be charged to the crop. The remaining charges should go to the orchard.

A more useful way of figuring, if one has a limited area, is to determine what he would make if all the land were in crops, and compare it with what he does make when part of the land is in apples. This may be unfair to the orchard, but it points to the proper line of action. The farmer desires that combination of crops which pays best. Merely because some crop pays is not sufficient reason for growing it, if there is something else that pays better.

297. Interest. — Interest paid out is put on one side of the account and interest received, or charged to different farm enterprises, is put on the other side. Any crop or enterprise that uses much money or labor should pay interest on this money until the product is sold or ready for feeding. One must pay for labor, and feed horses while he is planting wheat. This money is tied up for a number of months. The wheat crop must pay interest on this amount. If the accounts are handled, as in the set illustrated, interest is charged to the farm account on the inventory value. The wheat pays rent enough to cover this and other land costs. In the wheat account, interest is, therefore, charged on all other costs, except the cost of land and building rent. If an account does not have a very large investment, the interest charge may be omitted, as was done on several of the accounts.

It is a little less bother and may be as well to charge interest to crops on all costs. This makes them pay interest on the use of buildings and land or really makes them pay rent in the middle of the year. Animals that give returns daily, as cows or work animals, do not need to pay interest on costs, but should pay interest on the average inventory. They pay for labor and feed as they get it.

The balance of the interest account should be a fair rate of interest on the total amount of money that the farmer has invested in the business. The average of the present worth at the beginning and end of the year usually represents the average investment.

298. General expense. — Such headings as general expense must be used very cautiously on a farm. It is nearly always possible to scatter the charges to different accounts as they occur. A general expense account, if kept, should be kept very small.

299. Accounts of convenience. — It is very often desirable to keep a separate account of some item that is later to be charged to several places. If fertilizer is bought for several crops, it may be convenient to keep an account with fertilizers and charge it to the various crops. Or a general supply account may be carried that will include any such items. In the set of accounts given, an account was kept with improvements to see what the new barns cost. When done, the total was charged to the farm. If the charges had been taken direct to the farm account, it would have been considerable work to pick out the barn charges.

300. Personal accounts. — All personal and family expenses are charged to the personal account.

The value of the labor done by the farmer, and the value of farm work done by members of the family and not paid for, must be charged to the labor account and credited to the personal account.

Products used in the house should be charged to the personal account. Sometimes it is just as well to include some enterprises in this account. For instance, if one cow and a few hens are kept for personal use only, these may be included with the personal account. The garden or a few pigs for home use may be similarly included. The costs of these things are then charged to the personal account, and any products sold are credited to that account.

Or one may go to the other extreme and split the personal account into food, clothing, furniture, household expenses, and miscellaneous expenses. It is not necessary to open a separate account with any item that occurs only a few times in a year. For instance, if coal is bought only a few times in a year, the amount and cost can quickly be picked out from the household expenses. It is not necessary to have a separate account with fuel.

301. Order of closing the books. — Because men, horses, and machinery each work for the other, it would be difficult to find exactly what each cost. It is, therefore, best to estimate the value of some of the work in closing accounts. Perhaps the best way is to estimate the value of horse and equipment labor and charge the labor account with the time that these worked for the hired-men. Also charge horses with equipment at the estimated rate for the time that equipment worked for horses. The value of man and horse and equipment labor can then be determined and charged to other accounts.

In closing books at the end of the year, the following is a good order to follow: —

Enter any accounts payable or receivable that are not yet recorded.

Charge animals and credit crops with any hay, grain, straw, or pasture obtained from the farm.

Charge the personal account and credit crops and animals with farm products used by the family.

Charge labor with wood and farm products used by the hired-men and credit proper accounts; also charge with board furnished in the family and credit personal.

Credit personal account and charge labor with all unpaid labor done by the farmer and his family.

Credit animals with manure produced and charge to proper accounts.

Credit farm with use of buildings and charge personal account for use of house, labor account for houses used by hired-men, and animals and crops for use of barns.

Charge crops and animals for use of land and credit farm.

Charge the labor account and credit horses and equipment with the time that horses and equipment worked for hired-men at an estimated rate per hour.

Find the cost of man labor and distribute according to hours spent on each enterprise. Charge the enterprise and credit labor.

Charge horses with the time that equipment worked for horses at the estimated value.

Enter the horse inventory. Charge horses and credit interest with interest on the average of the inventories.

Distribute the cost of horse labor the same as was done with the labor account. In finding the cost of horse labor deduct the hours that horses worked for labor or for themselves.

Enter the equipment inventory, charge interest as in the horse account, and distribute the equipment cost in proportion to the number of hours that horses worked on each enterprise.

Distribute or transfer any accounts of convenience, as with supplies, fertilizer, etc.

Enter all remaining inventories.

Charge interest to remaining accounts where worth while.

Balance all accounts.

Make a list of losses and gains. Find the net loss or gain, and compare with the loss or gain as shown by the two inventories.
Study each account and the business as a whole, in order to see how to improve it.

302. Accounts on tenant farms. — Ordinarily the tenant is the only one who cares to keep cost accounts on a rented farm. A tenant charges each crop or kind of animal with what they cost him and credits them with what they return to him.

Occasionally there is a condition where the cost for both parties is desired. The most convenient way is then to have four columns on each page and put landlords' costs in one set of columns and tenants' in the other.

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CHAPTER 18

CHOICE OF A REGION

PROSPERITY OF THE COMMUNITY

There are areas where farmers have nearly always prospered. Some years have been better than others, but the farmers have rarely failed to live comfortably. Such regions as the Connecticut valley, the limestone soils of Pennsylvania and Kentucky, the north part of western New York (where again the soils are well supplied with lime), the black prairie soils of the corn-belt, the Red River valley of the North, and the river valleys of the Eastern States are some of the regions where success has been fair in bad times, and good in good times. In such regions, the farmers live in comfortable houses, have good schools, and send their sons and daughters to college. The valleys of the Rhine and of the Nile have always been the last to feel adversity. The chances of success are greater if one goes to a region where success is the common lot, than if he goes where success is rare.

On the other extreme, there are regions where many an able man struggles along a lifetime against impossible odds. Men are always pushing up into the hills and mountains and into the deserts and on to the barren lands, and fighting with forest and drought. Sometimes the efforts are successful. In many places, attempts are made to farm land that should be used for forests or pasture. The abandoned farms in some places in the Eastern and Southern States are an evidence of the exceeding difficulty of making a living on farms in the region. Men do not abandon their homes until they are forced to do so. With a change in conditions, such lands may again be of use, but a young man should give the problem very careful thought before he locates in a region where the native population is being starved out. There are large areas in the arid sections of the United States that have been settled three times, and three times abandoned. Much of this land will never be of any value except for grazing purposes. Its settlement was each time based on the mistaken idea that the climate had changed, or would change if the land were plowed In some cases, a type of farming is being followed that is not adapted to the economic conditions of the region. Some semi-arid regions support a prosperous community, others do not.

Many times the feeble efforts of the native population are sneered at by the newcomer or passer-by. The farmers are blamed for their poor condition. It is well to remember that the white population of America is all one stock. This is hard to believe when one sees the slow and shiftless walk in some sections. But to be convinced, one needs only to see the transformation that takes place when such persons move to regions where nature rewards the toiler. Occasionally, the type of farming may need adjustment, or lack of transportation facilities may be the cause, but usually when one finds an entire community of white farmers who are failing to live comfortably, there is something other than the people to blame. We should not too lightly condemn the experience of others.

In general, the most prosperous agriculture does not develop unless there is a considerable area of good land in a body. Much of the prosperity depends on having enough of the product to attract buyers, to get railroad facilities, and to develop a community spirit and community knowledge.

The Bureau of Forestry estimates that 51 per cent of the area of North America can be used for agricultural purposes; 26 per cent can be used as arid ranges. The remaining 23 per cent is mostly adapted to forestry purposes.[1] All the land in states like Illinois is included in the agricultural land. There are many small areas on farms that are adapted only to woods or pasture.

CLIMATE

303. Change of climate. — Perhaps no error has been the cause of greater losses in farming in arid regions than the erroneous idea that climate changes. Figure 110 shows the rainfall for North Platte, Nebraska. It will be seen that there are wet years and dry years. There is no relationship between the rainfall of one year and that of the year following. When a few wet years come, nearly every one decides that the climate has changed and that dry years will never come again. Those who have land to sell are very positive about it. When a series of abnormally dry years come, farmers decide that it will never rain again, and frequently sell their farms for much less than they are worth. Before buying and before selling, one should make a very careful study of the rainfall. After a few years of good rainfall, the land in semi-arid regions sells for much more than it is worth.

Seasons vary but climate does not change. — The superstition that plowing, cutting off the forests, or any other thing in man's power can affect climate is almost universal.

[1] U. S. Dept. Agr., Forest Service, Circular 159.

but it is absolutely baseless. Forests hold back the soil water so that the streams are regulated, but forests have no effect on rainfall. There is not space here to give the proofs, but the references are given at the end of this chapter.

304. Compensating cycles in weather. — Another error that affects not only the purchase of farms, but the planning of farm work, is the belief held by nearly every one that there are compensating cycles in weather. There is a slight relationship between the weather to-day and what is likely to come in the next few days, but no relationship for next month. Persons think that if we are having good weather, we must pay for it later; if it is too dry now, there will be an unusual amount of rain later. If the summer is hot, the winter will be cold. If this is a dry year, next year will be wet. These ideas make a very nice theory, but there is absolutely nothing in them. The kind of weather to expect is the average of the region, but one should be prepared for the variations of the region. A wet year is just as likely to be followed by another wet year as by a dry one. It is most likely to be followed by a normal year. Figure 111 is typical in this respect. Twenty-one times a wet or dry year has been followed by its opposite, and 23 times it has been repeated. For a period of 58 years in Nebraska, wet or dry years have been followed by the opposite 28 times, and have had the wet or dry year repeated 30 times. The same point holds for all climatic factors for any region. We do not "have to pay" for our good weather by having bad weather later, nor do we have any reason for expecting a reward in good weather because we have been having bad weather. We should always expect the normal weather of the region and season, and be prepared to meet the usual variations either way from the normal.

305. Rainfall. — On about two-fifths of the land in the United States, the rainfall is the limiting factor in crop production. Farming is dependent on irrigation or dry-farming methods. Very much of this area can never be profitably farmed. Considerable of the land that has

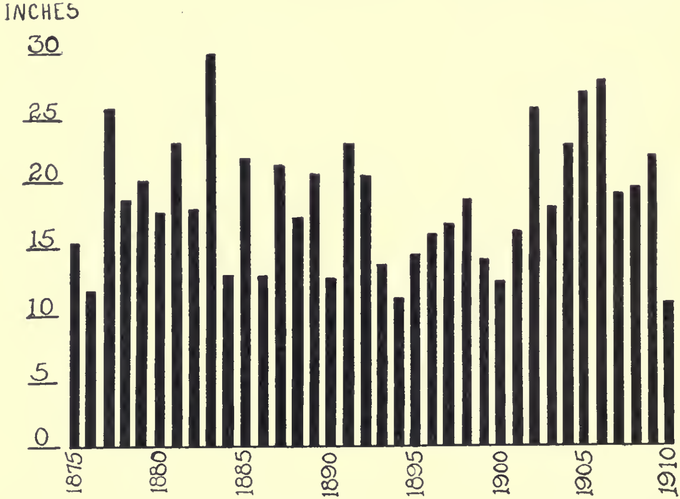

Fig. 110. — Rainfall at North Platte, Nebraska, for 36 years, from records of the United States Weather Bureau.

no value except as range land is sold to settlers, or is held as a speculation in the hope of selling it.

In nearly all parts of the United States, the loss from periods of drought is very serious, even though the total rainfall of the year may be large enough if it were properly distributed. One should make a careful study of the rainfall before he invests in farm land.

The rainfall of a single year, or of a few years, is not sufficient information. The variations in rainfall from year to year are very great.

Figure 110 shows the rainfall at North Platte, Nebraska, for 36 years. The years from 1887 to 1892 were years of fairly good crops. Settlers located in the region and paid good prices for land. For nine years, from 1893–1901, the rainfall was below normal every year, and crops usually failed. Many of the settlers lost all their property. From 1902 to 1909 were wet years. Crops were good and

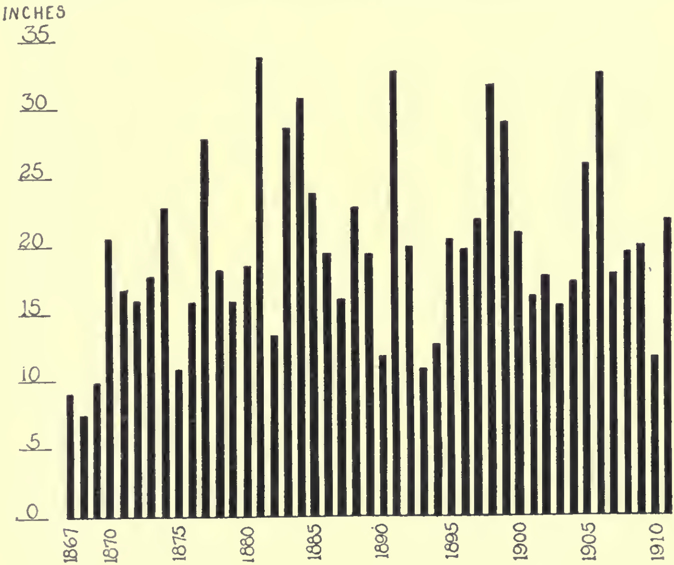

Fig. 111. — Rainfall at Dodge City, Kansas, for 45 years, from records of the United States Weather Bureau.

land rose in price much higher than conditions warranted. In 1910 to 1912, crops were either partial or total failures, so that farmers who did not have considerable money were in bad straits. Nearly every one who bought land in this region from about 1905 to 1909 paid much more than it was worth, because land was selling on the basis of a rainfall above normal. Those who bought land in the late nineties got it very cheap, because it was selling on a rainfall below normal.

Figure 111 shows the rainfall for Dodge City, Kansas, for 45 years. During this time, there were 9 years when the rainfall exceeded 25 inches. This is enough for good crops when properly distributed. In 9 more years, the rainfall was between 20 and 25 inches. In some of these years, fairly good crops were secured. In 27 years, the rainfall was less than 20 inches. With the very high evaporation, this amount of rain is usually not sufficient to produce a good crop. One who farms in this region should expect an average of about one small crop, one good crop, and two crop failures every four years. When two or three wet years come in succession, land values usually rise too high. When dry years come in succession, they are likely to drop too low. Farming under such uncertainties is a very trying business. One never knows when he may be called upon to live and pay his expenses for several years with no crops.

The distribution of the rainfall is almost as important as the amount of it. Figures 112, 113, and 114 show three general types of rainfall: the summer rainfall of the Great Plains, the winter and spring rainfall of the inter mountain district, and the winter rainfall of the Pacific Coast.

The frequency of torrential rains, the surface run-off, and the loss of water through evaporation should also be considered.

306. Evaporation is almost as important as rainfall. The evaporation from a free water surface at Williston, North Dakota, is 30 inches during the six months of April to September, while at Garden City, Kansas, it is 60

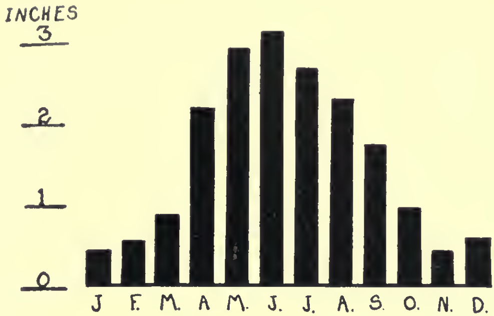

FIG. 112. — Average distribution of rainfall by months, North Platte, Nebraska.

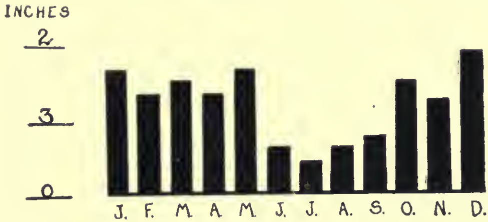

FIG. 113. — Average distribution of rainfall by months, Ogden, Utah.

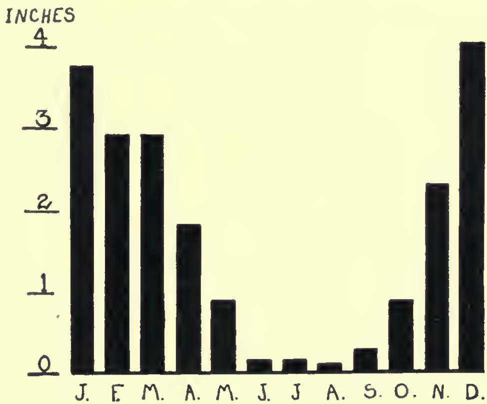

FIG. 114. — Average distribution of rainfall by months, Sacramento, California.

inches.[1] Holding moisture in the soil in this part of Kansas is a very different problem from conserving moisture in Dakota. Figure 115 shows the lines of equal rainfall and lines of equivalent rainfall for part of the Great

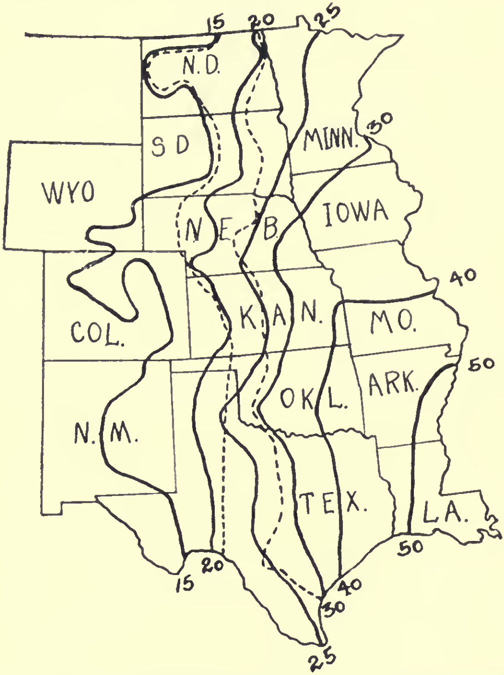

Fig. 115. — Lines of equal rainfall in black. Dotted lines pass through places having a rainfall equivalent to 15 and 20 inches, respectively, on the Canadian boundary.

Plains region. Fifteen inches of rainfall is more effective in North Dakota than 20 inches in Texas.

307. Winds. — The winds also affect profits. In semi-

[1] U. S. Dept. Agr., Bureau of Plant Industry, Bulletin 188, p. 18.

arid regions, the frequency of hot winds is of very great importance. Crops are frequently damaged by hot winds, when the moisture present might carry them along in normal weather.

308. Hail. — The frequency of damage by hail is also to be considered. Hail is much more frequent in some regions than in others. It is most frequent in some parts of the semi-arid regions.

309. Length of season. — The number of days between frosts and the frequency of injury from late spring or early fall frosts are very important climatic features. The danger of frost is often the controlling factor in fruit growing. The crops that can be grown depend not only on the length of season, but on the amount of sunshine and heat. A day in the corn-belt is a very different day from one in New England. Corn that matures in 100 days in Illinois usually requires over 120 days in New York.

Information as to the climate of different states may be obtained by writing to the United States Weather Bureau at Washington, or by writing to the State Experiment Station. A few states have published valuable bulletins on climate. Some of these are listed at the end of this chapter.

FERTILITY OF THE SOIL

310. Importance of fertility. — The natural fertility of the land is usually the most important single point to consider in buying a farm. The man who buys a good soil at a reasonable price can usually add other things. But if the soil is not naturally good, the other good points can never make it so. In fact, man rarely makes a really rich soil out of one that was naturally poor. Nature had untold ages to grow crops and allow them to fall back and decay to grow more crops. If with these ages of green-manuring a rich soil was not produced, it will never be made permanently rich. We may add manure and fertilizers and grow good crops, but if the soil is not naturally rich, it will fail as soon as we stop feeding it.

If the crops grown are valuable enough, it may pay to farm it in this way. Most of the vegetables for the eastern cities are grown on the sandy soils of the Atlantic Coast. These soils are often little more than a place on which to grow crops. But the crops are high-priced ones; the soils are warm and grow crops quickly. They are easily tilled. With truck crops, it pays better to add enormous quantities of manure and fertilizer on such soils than to use heavy soils that are naturally rich, but that require much more work and that do not grow vegetables of so good quality. The manure and fertilizer very frequently cost $20 to $30 per acre per year.

One very successful farmer in New Jersey uses a ton of fertilizer per acre and twenty tons of manure in growing cantaloupes. The fertilizer costs $30 and the manure $2.50 per ton, besides the hauling. Each year the farmer spends twice as much for fertilizer and manure as the land is worth.

Such soils cannot be used to a profit for growing grain, hay, or live-stock. If one is to raise general farm crops, it pays very rarely to select a farm with a poor soil. If too poor, such a farm is not worth taking as a gift, if one is required to live on it.

We advocate killing the cow that does not pay for her feed. Why should we farm a soil where the crop does not pay the cost of production? Some land is being farmed that cannot possibly be made to pay with present prices of products. Such land should be kept in woods or pasture until some future time when it may pay for farming.

However, the present condition of the soil may be misleading. A naturally good soil may be a little out of condition and may sometimes be easily brought up at small expense. On the other hand, land that is not naturally good is sometimes growing big crops, because of the treatment given.

Because men judge too much by superficial appearances, it often happens that land that is good but out of condition sells for less than it is worth, while poorer land that has been better cared for sells for more than it is worth. In order to judge land, it is necessary to consider both the present appearances and the underlying causes.

311. Use of soil maps. — If a soil map of the region, prepared by the United States Department of Agriculture or by a State College, is available, it will give reliable information as to the soil type and its value. The particular farm in question may be better or poorer than the soil type would indicate, but the general character and adaptation of the soil is shown. These government reports must be read with care. They are likely to give the more cheerful prospects for the region, but if carefully read, the facts are usually reliable.

312. Value of chemical analysis. — If a chemical analysis has been made of the soil type, it should be considered. Such an analysis is of great value in showing fundamental deficiencies.

The soil may have a very large amount of some plant-food and still give better crops when more of this food is added in a fertilizer. For this reason, some persons have lost faith in chemical analysis of soils. But if a soil is very deficient in any element of plant-food, the deficiency should be known. Chemical analysis gives this information.

Table 79. — Mineral Matter in Some Typical Soils in the United States. Pounds in 2 Million of Soil. About 7 Inches of Soil[1]

		Phosphorus	Potassium	Calcium	Crop Yields
Very low production					
Maryland, St. Mary Co.	Leonardtown loam	160	18,500	1,000	Much of the soil is abandoned and is valued at $1 to $5 per acre
Maryland, Prince George Co.	Norfolk sand	520	10,000	1,860	Little success with corn, wheat, or grass
Low production					
Alabama, Montgomery Co.	Orangeburg sandy loam	520	47,000	1,400	Little corn planted, as yields are too low; cotton heavily fertilized yields well
Maryland, Worcester Co.	Norfolk loam	610	13,200	3,430	Wheat 15–30 bu. depending on amount of fertilizer used
Maryland, Hartford Co.	Chester mica loam	1,130	34,400	3,290	Not a strong soil
Illinois, Clay Co.	Marion silt loam	1,050	24,900	8,000	Corn 15 bu.
North Carolina, Statesville	Cecil clay	960	22,700	2,000	Corn 18 bu., wheat 12 bu.
Texas, Nacogdoches	Orangeburg fine sandy loam	960	7,000	1,860	Corn 20 bu., cotton ½ bale
Kansas, Parsons	Oswego silt loam	1,050	20,700	5,710	First soil in region to require fertilizer
Medium production					
Tennessee, Pikeville	Hagerstown loam	1,050	12,800	5,710	Corn 22 bu., wheat 10 bu.

Ohio, Wooster	Volusia silt loam	1,480	38,300	4,850	Wheat 20 bu.
Ohio, Toledo	Miami sand	2,360	33,300	13,860	Corn 20–45 bu., wheat 10–20 bu.
Kansas, Riley Co.	Wabash silt loam	1,140	49,500	16,860	Corn 40–45 bu.
High production					
Kentucky, Scott Co.	Hagerstown clay	3,490	71,700	44,900	Corn 25–40 bu., wheat 25–35 bu.
Louisiana, Acadia Parish	Crowley silt loam	1,220	15,400	2,720	In rice continuously, no fertilizer, no decrease in yield
Missouri, Shelby Co.	Shelby silt loam	1,920	32,000	8,280	Corn 35–40 bu., hay 2–3 tons in a good season
California, Indio	Indio fine sandy loam	2,090	50,300	195,000	Will produce an abundance of any crops adapted to the climate, when not too alkaline
California, Fresno	Fresno fine sandy loam	1,830	68,200	50,100	Extremely productive where drainage is good
Alabama, Dallas Co.	Houston clay	5,150	16,800	400,300	Strong productive soil
Virginia, Albemarle	Porter's black loam	4,630	48,300	23,700	Can be worked year after year without apparent impairment of fertility
Connecticut, Conn. Valley	Podunk fine sandy loam	1,920	22,500	33,430	Good crops of corn, truck, tobacco
Minnesota, Marshall	Marshall loam	1,830	27,700	26,700	Excellent wheat soil

[1] Analyses by the Bureau of Soils, U. S. Dept. Agr.

C. G. Hopkins, Soil Fertility and Permanent Agriculture, pp. 136–152.

Statements on crop yields have been taken from publications by the Bureau of Soils.

TABLE 79. — MINERAL MATTER IN SOME TYPICAL SOILS IN THE UNITED STATES. POUNDS IN 2 MILLION OF SOIL. ABOUT 7 INCHES OF SOIL.[1] — *Continued*

		PHOSPHORUS	POTASSIUM	CALCIUM	CROP YIELDS
Wisconsin, Janesville	Miami silt loam	2,100	32,700	13,000	Corn 45–50 bu.
Wisconsin, Janesville	Marshall silt loam	2,450	41,000	12,300	Corn 50–60 bu.
Ohio, Toledo	Wabash loam	1,570	45,500	26,600	Corn 75 bu., wheat 20–35 bu.
Illinois, McLean Co.	Marshall black clay loam	2,970	38,500	46,200	Cropped almost continuously in corn for 50 years, yields still excellent
New Jersey, Salem	Collington sandy loam, lower subsoil	27,600	18,200	18,300	Millions of tons have been sold in fertilizers

[1] Analysis by the Bureau of Soils, U. S. Dept. Agr.
C. G. Hopkins, Soil Fertility and Permanent Agriculture, pp. 136–152.
Statements on crop yields have been taken from publications by the Bureau of Soils.

Most of the soils in America that are rich in lime and phosphorus are productive. Many soils, particularly in the humid regions, lack both of these. The highly prosperous farming regions in the United States are all on soils that are rich in lime and phosphorus, or that have not yet begun to feel a serious shortage of these elements. If the deficiency is not too serious, the land may be profitably farmed. But if the deficiency is very serious, the cost of fertilizer may be as much as the rent of rich land. Furthermore, if the deficiency is very serious in the subsoil, it cannot be readily corrected for deep-rooted plants. One may lime the surface, but cannot get lime to the subsoil except by the process of letting it leach down. The writer has never seen any permanently profitable alfalfa on a soil that was seriously short of lime or phosphorus in the subsoil. Usually on such a soil, a heavy application of lime will start the crop, but it will not do well when its roots get into the subsoil. Of course it can be made to grow, but making it pay is a different matter.

Table 79 gives the amount of phosphorus, potassium, and calcium in two million pounds of soil for some typical American soils, as reported by the Bureau of Soils of the United States Department of Agriculture. The writer has arranged these in four classes according to the crop yields reported.

The first two soils in the table are practically worthless, as is indicated by the low yields and abandoned land. Of course, one can raise " bumper crops " on these soils if he uses enough fertilizer, but this is no credit to the soils. They merely furnish the place for crops to grow. They do not deserve the name of soil. The farmers have learned that it does not pay to farm such land. The few who persist in staying because houses are there, usually live as poorly as do persons in the slums of cities. The popular assumption seems to be that these soils were once rich. They never were rich. The farmers on them never were very prosperous, except when they prospered by having a very large acreage run by slaves. The returns per worker never were good. One needs but to travel over these scrub pine lands, and then go to some of the limestone regions of Pennsylvania and Maryland, to realize the importance of locating on a fertile soil.

One of the best of the soils that the writer has classed as of low productivity is the Orangeburg fine sandy loam. It is reported to yield about 20 bushels of corn. It is one of the most important cotton soils of the South, not because it is so rich, but because there is so much of it. It requires heavy fertilizing to secure good yields.

The Marion silt loam of southern Illinois is a typical redtop soil. The Bureau of Soils reports say that corn averages only about 15 bushels, but that the farmers find this to pay as well as any crop. How rich a farmer will get growing this crop of corn is realized when we know that it usually takes 25 to 50 man hours and 50 horse hours to grow an acre of corn. Of course, good crops can be grown if lime and phosphorus are used and something is plowed under for humus. If one has to live on such a soil, he should by all means use these. But when one is choosing a farm, it is not often wise to select a soil where the fertilizer and labor of enrichment cost so much.

The Volusia silt loam at Wooster, Ohio, is much better than most of this soil type. At the Ohio Experiment Station, in the region where the sample was taken, the ten-year average yields without fertilizer were 31 bushels of corn, 30 of oats, 9 of wheat, and $\frac{4}{5}$ of a ton of hay. Much of the soil of this type on the hills of New York and Pennsylvania will not grow wheat or clover without much expense for lime and fertilizer. It has reached the red-top stage. It never was a good soil and never will be. It grows fairly good crops of oats, buckwheat, and potatoes. Of course, big yields have been grown on it and can be grown, but about the only really prosperous period in farming it was when the farmers got most of their money from cutting off the crop of white pine and chestnut. Today many of the farmers on the poorer phases of this soil are not well fed. By having very large areas, it is possible to make a good living. Much of the land is then kept in woods and large pastures. Only the best is tilled.

The Hagerstown loam is, in general, a rich limestone soil. This particular region does not seem to be typical of this soil, either in analysis or yields. This is the name given to the rich limestone soils that extend from southeastern Pennsylvania through Maryland and Virginia, eastern Tennessee, and northern Alabama and in the bluegrass region of Kentucky. This soil should be in the class of the naturally productive soils, but the sample and crops in the table are not typical.

Most of the farming regions that have the soil types classed as highly productive are prosperous farming regions. The Marshall silt loam is the predominating soil of the cornbelt. The Bureau of Soils estimates that there are sixty million acres of this soil.

An examination of the analyses in the table shows that the soils of low productivity contain much less plant-food than the soils of high productivity. The differences are particularly striking in the amount of phosphorus and lime present.

313. Plants as indicators of fertility. — The kind and character of the trees, weeds, and crops help in telling the fertility of the soil.

When considering plants, the entire list observed should be considered rather than the presence or absence of some one plant. It is often said that sheep sorrel indicates an acid soil, but sorrel will grow around a pile of limestone. It is a hardy plant and will grow under adverse conditions. The presence of sorrel and other plants of low lime requirement, and the absence of clover, alfalfa, and other lime-requiring plants, rather than the presence or absence of some one plant, is the point to consider.

It is sometimes said that redtop indicates a wet soil, yet it is the chief hay plant on some dry hillsides. The fact is that redtop is a hardy plant and will live under many adverse conditions, one of which is too much water; another is dry soil; another is lack of lime or an acid soil.

The following plants, in general, indicate good soils. Any one of them may be found on poor soils, but the general presence of these plants indicates good soils: —

Alfalfa, clover, Kentucky blue-grass, corn, wheat, walnut, ash, basswood, crab apple, quack grass, Canada thistle.

The general presence of the following plants and absence of the above list suggests poorer soils or poorly managed soils: —

Redtop, Canada blue-grass, rye, buckwheat, oats, potatoes, chestnut, beech, pine, hemlock, spruce, daisy, wild carrot, five finger, paint brush, sorrel, golden rod.

Any one of the last list will grow on a good soil, but most of them can be grown on soils that will not grow the plants of the first list. Golden rod grows luxuriantly on the richest soils, but grows on the poorest soils. If there is a general prevalence of the crops of the last list, and absence of those in the first list, the soil is fairly certain to be a poor one.

314. Use of Census figures. — By studying the Census figures of kinds of crops grown, yields, and other Census figures, one may obtain a good idea of the condition of agriculture in any of the older states. Studies such as those in Table 54 will also help.

315. Comparative advantages of new and old regions. — There is considerable rich land in the Eastern States that can be bought at $75 to $100 per acre. Very frequently, the improvements on a 150-acre farm are worth over half the price of the land. Which will pay better, to buy such land or go to Canada and buy open land at a few dollars per acre? In making the comparison, the improved land should be counted at what it really costs above the value of improvements. Not only are the farms improved, but the roads and school houses are built. These community improvements often represent a value of $10 per acre. It is evident that if one has the necessary capital, it is likely to pay better to buy the improved land.

The new countries have always attracted those with little money. One may locate on new land and go without many of the farm and community improvements. It is also easier to economize in a new country. One can go to church on a spring seat in a lumber wagon very comfortably, if all the neighbors come in the same way. It is very hard to economize so closely in an old country where most of the neighbors are well-to-do.

316. Land prices vary from time to time and are often entirely out of proportion to their values. Very frequently, land in one county will rise in price several years before any change takes place in an adjoining county that is equally good. The great rise in land values in the Central West began in Illinois and Iowa and spread gradually. Farms with which the writer is familiar in Illinois reached \$150, when certain farms in Nebraska were worth \$40. At the present time, the Nebraska land has reached \$125, and these particular Illinois farms are worth about \$250.

Land rose to a very high price in the Middle West before eastern and southern farms began to rise in price. Now farms in both of these regions are rising fairly rapidly, and the prices in the Middle West are about stationary. The waves of rising and falling values pass from region to region. One who knows the agricultural values of the different regions will consider the relation of prices to value before locating.

Figure 116 shows the relative changes in land values in Iowa, Illinois, and New York. The values in Iowa and Illinois have advanced in much the same way. In 1890, the Iowa land offered a better investment than the Illinois land. If \$1000 had been invested in average land in each state, the value in 1910 would have been \$3416 in Iowa and \$2616 in Illinois. But if \$1000 had been invested in New York land in 1890, it would have been worth only \$1220 in 1910.

There is no question but that the price of New York land rose too high at the time of the Civil War. For a generation, this land dropped in value while the western land rose in price. After such a period of depression, it takes some time for confidence to be restored so that land again rises in price. There is little doubt but that New York land was relatively too high in 1870, and there seems to be little doubt but that it was relatively too low in 1910. The real land values in these different states have a fairly constant relationship, but the prices may jump up in one region and then in another. Land values do not rise uniformly.

Sometimes values become inflated. When land rises very rapidly, it is fairly certain to rise too high. Buyers come to expect their profit from the increase in value

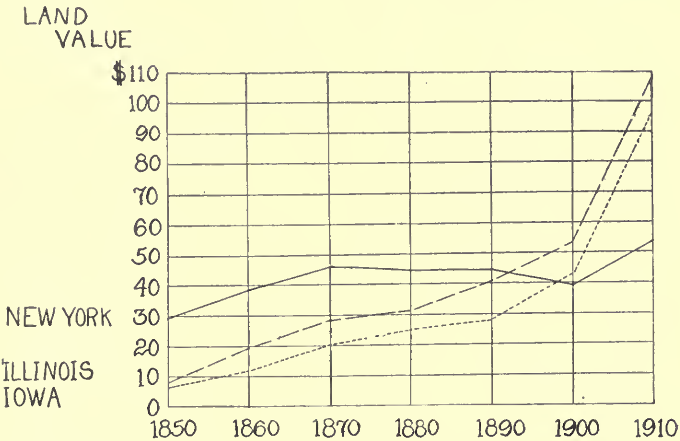

FIG. 116. — Comparative land values in Iowa, Illinois, and New York.

rather than the income, but this cannot continue indefinitely. There are some regions where land is paying only 3 per cent interest, when safe mortgages pay 5 per cent. The owners hope for a rise in value to cover the remaining interest. So long as there is another man ready to buy at the higher price, this works out all right, but there comes a last buyer. By this process, it sometimes happens that land rises to much more than its real value before the drop comes.

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CHAPTER 19

CHOOSING AND BUYING A FARM

THE choice of a region and the choice of a farm are much the same problem, but there are many points that have more to do with the individual farm and community than with the section of the country.

317. Importance of securing a good farm. — The most important decision that the farmer is called upon to make is the choice of a farm. In regions where the soil is most nearly uniform, the problem is not so serious, but even then there are great differences in farms. In regions of variable soils, it very often happens that a farm on which it is difficult to make a living joins a good farm. When strangers are buying land, these differences are very frequently used to deceive purchasers. Northern farmers going South and western farmers moving East are often misled into buying poor farms that sound cheap rather than buying good land. Sometimes land that has very little agricultural value has a trading value, just as an old horse that is worthless for work has a trading value.

318. Size of farm. — Chapters 7 and 8 have discussed the question of size of farm. If a farm is too large or too small, the chances of buying or selling to secure the proper area should be considered. If one wishes to combine two or more farms, and the fact is known, it is not always easy to buy at reasonable prices.

319. Area in crops. — Much more important than the total area is the area of land that is ready for raising crops or that can easily be made ready for crops. Rough pasture land and brush land may be of little value. Standing timber may be very valuable, but stump land and brush land are of low value. *The area in crops and natural yielding power of the soil are the most important factors in determining profits.* If one is merely looking for a place to raise animals on purchased feed, he had better locate in a city, where animal products sell for higher prices. If his area in crops is too small, or the yield per acre too low, he lacks the basis for profitable farming. It should be remembered that on a well-managed, diversified farm, raising such general farm crops as cotton, corn, small grain, potatoes and hay, there should ordinarily be 20 to 30 acres of crops per horse. A five-horse farm should have 100 to 150 acres of crops.

Many farms that appear cheap are really high-priced for the tillable land. A 100-acre farm that is only half tillable and that sells for $5000 may really cost $90 per acre for the tillable land.

320. The farm layout. — The shape and size of the fields and the nearness of the fields to the farmstead are important points. If the arrangement is not a good one, the cost of a rearrangement and the probable loss of time and profits while making the changes must be considered. A full discussion of this subject is given in Chapter 12.

321. The lay of the land. — The topography or lay of the land is becoming increasingly important as the use of machinery increases. A steep side hill could be farmed at very little disadvantage in the days of the scythe, grain cradle, and potato hook, but may not allow the use of the self-binder, hay loader, manure spreader and potato digger. Every new machine that is invented

FIG. 117. — A region where topography controls profits. The valley land is good if one can get a large enough area of it. The side hills have little value except for woods.

makes the struggle more difficult for the man who cannot use the machine. If he must compete with it by hand labor, he must lower his standard of living or change his type of farming.

Some men are wasting their lives on land that ought to be kept in permanent pasture or woods, merely because the land is cleared and there is a house on it.

Sometimes such land can be combined with better farming land so as to make a good farm. The rougher area can then be used for pasture and the better parts for tillage. (See Figure 91.)

Topography also affects erosion. This problem is of greatest importance in regions of heavy rainfall, and is particularly serious in regions with a long season. Erosion is one of the most serious problems in the South. If contour farming has to be resorted to, the irregular fields still further increase the expense.

If the land washes too much, fall plowing cannot be done. This reduces the crop area that a man can raise, and hence reduces the income.

Because of erosion and leaching, side hill soils are likely to be exhausted very soon. Valleys are kept rich at the expense of the hills. Many of the wars of Europe have been fought for possession of parts of the rich valley of the Rhine. Nations do not often fight for the ownership of infertile land.

Sometimes the topography affects production in other ways. In one township in Wayne County, New York, the four-year average yield of apples was 43 bushels more per acre on easterly than on westerly slopes.[1] The difference seems to be entirely due to the prevalence of strong west winds that blow off the apples.

[1] New York, Cornell Bulletin 226, p. 326.

An elevation above the surrounding country is sometimes desirable for avoidance of frost. In the peach sections of northern New Jersey, the valleys are best for grain crops, but are not good for peaches, because the late spring frosts are so likely to kill the buds. The trees in the valleys bloom a little earlier. Frosts sometimes occur in the valleys when the higher land is exempt. Fungous diseases are also worse in the valleys than on the higher land that has good air drainage.

In regions where there are great differences in elevation, the climate of the hill lands is very different from that of the low lands. The soils are usually very different. Persons who have grown up in a plains region like the corn-belt are easily misled when they go to a hilly country. It is hard to understand that in the same neighborhood, differences in elevation may make a difference of two weeks in the time of planting crops. There are many places in the Northeastern States where the level valley land sells for $100 per acre while level land on the hill tops a few miles away sells for $10.

If there is any danger from drought, side hills are much more affected than level land. Not only does much of the water run off, but the evaporation is usually more, particularly from the south and west slopes. In a region of fairly good rainfall, the hillsides are often really semi-arid.

322. Fertility of the soil. — On pages 503 to 513, there is a discussion of this very important point. The natural fertility of the land is more important than the present condition. By studying the crops and weeds on the farm, as discussed on pages 511 to 513, one may gain a fair idea of its fertility. The crops on adjoining farms should also be examined. A chemical analysis of the soil of a particular farm is not often available, but published reports may give an idea of the soil in general. Many times a good farm looks bad because of neglect. It is often possible to secure such a farm at a bargain. One must distinguish between a neglected farm and a poor farm.

323. Physical properties of the soil. — Ease of tillage is an important factor in the cost of production. In general, the loamy and sandy soils are easiest to till. Such soils can be worked soon after a rain and can be worked earlier in the spring. This makes it possible to do much more work in the year.

Ease of working and fertility are antagonistic. In general, the sandy soils are easiest to work, but least fertile. The clays usually contain more plant-food, but are hard to work. For types of farming that require a very large amount of labor, the ease of tillage offsets the cost of manure and fertilizers, so that sandy soils are preferred. For types that require little labor, ease of working is gladly sacrificed for greater fertility. A soil that is ideal for timothy or wheat or pasture is far from ideal for truck growing.

For most types of farming, the loamy soils are best. They are fairly easy to work and are usually fertile. Such soils are adapted to the widest variety of crops, and allow for diversified farming.

324. Drainage. — Natural drainage is best if it is not at too great a sacrifice in character of soil. Soils that are coarse enough to provide good drainage are often too coarse to hold fertility. Some of the loamy soils are good in both respects. Natural drainage lasts and requires no bill for repairs.

If artificial drainage is necessary, the present condition of drains and the amount and cost of new drains should be carefully estimated.

325. Water for irrigation. — In irrigated regions, land has little or no value without water. The amount and character of the water supply is then of first importance. The danger of accumulation of alkali, the danger of a shortage of water, and the cost of water and up-keep of ditches must all be considered. Also the legal status of the water right, and whether there is danger of the more extensive use of prior rights, so as to lessen the water supply in the future.

326. Condition. — If stumps, stones, serious weeds, or other obstacles are present, the cost of removing these should be considered.

327. Water supply. — Water is very expensive on farms. When labor is counted, it is much more expensive than in cities.

Occasionally, a farm has spring water piped to the buildings so that there is practically no expense for water. Unfortunately, the conditions that make this possible sometimes result in poor farm land. If there is an abundant supply of good water that can be pumped by a windmill, the supply is fairly satisfactory. Many farms do not have water enough, or the water is of poor quality, or the wells are too deep to be pumped cheaply.

328. Improvements. — The site of the farmstead, its location with respect to the fields, the number and kind of buildings, fences, and orchards will, of course, be carefully inspected. Chief attention should be given to the roofs and foundations and frames of buildings, and least attention to paint. The arrangement or possible rearrangement for convenience in work is of importance.

But one should be careful not to buy a farm merely for its buildings. Many western men who are buying eastern farms are buying buildings. The farms look cheap, because the buildings are worth more than the price asked. But there is no profit from buildings. In very many cases, the farms never did pay. The early settler made his little income by lumbering, and used a generous amount of lumber for buildings. The lumber is gone, the farms have such poor soils that they do not pay for working. Of course, this does not apply to the thousands of eastern farms that have rich soils, but good soils are not given away with a present thrown in.

329. Climate. — The climate of the region should be studied as indicated in the preceding chapter. Often there is a great difference in climate in a few miles. One must be on the lookout for such differences.

330. Healthfulness is, of course, of great importance. The general prevalence of malaria or other diseases should be considered. Sometimes one buys a farm expecting the conditions to improve, but one should be very careful about locating in a region where the people are not generally healthy.

331. Roads and markets. — How serious a handicap distance to market is, depends on the type of farming and the roads. If roads are good, the handicap is not so serious with some kinds of farming. If these types of farming are, for other reasons, not adapted to the region, then distance to market is a very serious matter.

Local markets are of much importance not only in selling but in buying. Their importance is less for grain and live-stock than for perishable products.

Much more important than the local markets are the railroad facilities for reaching important cities. A farm located on a trunk line of railroad is worth more than a similar farm on a branch line. The more rapid shipment and travel, as well as the better advertising that the region receives, are of great importance.

332. Neighbors. — The character of the neighbors is just as important from the standpoint of profits as from the standpoint of the home. One's success is very largely controlled by the community. Except in a few cases, such as when products are grown for selling in the home market, the type of farming should be the same as that of the community. (See page 98.)

The character of the labor supply is also of great importance. If the farm boys of the neighborhood are planning to be farmers, they furnish the best farm labor.

333. Taxes. — The tax rate has little significance when different regions are compared; because farms in one region may be assessed at nearly full value and in other regions at less than half value. The amount of taxes paid, and the cash value of the farm should be used to see what the tax rate really is.

334. Community improvements. — Telephones, trolleys, churches, and schools all represent investment by the community. If these are not developed, they must be gone without or must be paid for by the farms in the future. Every community improvement adds to the value of farm land.

335. Prospective development. — The probable development of the region must be considered. The possibility of new railroads, trolleys, and improved wagon roads should be taken into account.

The possibility of a rise in land values from these or other causes is a very important consideration. A very large part of the profit in farming in many regions comes from increases in land values. Land in America is a

SCORE CARD FOR FARMS

	Names of Farms		
SIZE			
1. Adapted to kind of farming			
FIELDS			
2. Shape and size			
3. Nearness to farmstead . .			
TOPOGRAPHY			
4. As affecting ease of cultivation			
5. As affecting production			
6. As affecting erosion and loss of fertility			
7. As affecting air drainage .			
FERTILITY			
8. Natural			
9. Condition			
PHYSICAL PROPERTIES OF THE SOIL			
10. As affecting economy of cultivation . . . . }			
11. As affecting number of days of labor . . . . }			
12. As affecting loss of soil fertility			
13. As affecting kinds of possible crops			
DRAINAGE			
14. Natural . . . . }			
15. Artificial . . . . }			
CONDITION			
16. Freedom from stumps, stones, weeds, waste land, etc.			
CLIMATE			
17. As affecting animal and crop production			
18. As affecting number of days of labor			

Score Card for Farms — *Continued*

Healthfulness			
19. As an economic factor			
Location			
20. Distance to market . . .			
21. Roadways			
22. Local markets			
23. Shipping facilities . . .			
24. Neighbors as an economic factor			
25. Labor supply of neighborhood			
26. R. F. D., telephone, trolleys, etc.			
27. Churches, school, grange, etc., as economic factors .			
Taxes			
28. Per cent on cash value . .			
Water supply			
29. Running water, wells . .			
Improvements			
30. Site of farmstead			
31. House as adapted to needs of farm			
32. Other buildings			
33. Fences; kind, condition, arrangement			
34. Timber, orchards, vineyards, etc.			
Investment			
35. Probability of an increase in value			
Acreage	Acres	Acres	Acres
36. Total acres			
37. Acres tillable			
38. Acres pasture not tillable .			
39. Acres woods			
40. Acres roads, waste, etc. .			
Estimated total value of	$	$	$
41. Tillable area			
42. Pasture			
43. Woods			
44. Barns			
45. Houses			
Total			
Price asked			

business investment the same as railroads or bonds. Its probable future value, as well as its earning power, should be considered. In addition, land has a home value. If one is to make his living from the farm, he should not let the home value overshadow the business value that must sustain the home. Neither should he ignore the home value. Both are important.

336. Map of the farm. — Before a farm is purchased, one should make a map of it showing the field lines and fence lines. This may be sketched fairly rapidly. One can then see how the farm looks on paper. Many a good looking farm loses its good looks when a map is made, showing the location of ditches, streams, fences, etc. Each field should be marked with its crop and area; this gives a picture of the amount of waste land and poor land.

337. Score card for farms. — When examining farms, it is well to use a score card like the above. Each farm may be marked on each of the points, using the words excellent, very good, good, fair, poor, or very poor. Or the corresponding abbreviations, E., VG., G., F., P., or VP. may be used.

The areas of different kinds of land and estimated values are filled in with figures. The estimated value of the tillable land, buildings, etc., will be of much help if carefully made. One should be careful not to assign too high a value to land that will not grow crops. Buildings should be estimated in accordance with their value for the use intended rather than for their cost.

The chief purposes of a score card are to make the examination systematic and prevent one from forgetting any points.

338. Effect of amount of money available. — If one has plenty of money, or can secure it at reasonable interest rates, it usually pays best to buy a fairly large farm that is in first-class condition in every way. One that has rich soil well cared for, good fences and good buildings. It is nearly always cheaper to buy improvements already made than it is to make them. Buildings, fences, drains, and other improvements usually do not add their cost to the selling value of the farm. The superficial things, such as paint and cleaning up of rubbish, usually add much more than their cost to the selling value.

If one is short of money, it is evident that something must be sacrificed. He cannot then buy the best farm, even if he does know that it is the best bargain. In such a case, it sometimes pays to buy with a view to selling in a few years and buying a better place. If this is done, the purchase should have the probable selling value as one of its important considerations.

Many times a good profit can be made by buying a farm that is really good but that is a little neglected, improving it and selling.

But if one is buying for a permanent home, what should he sacrifice first in order to make the most of his limited capital? Should it be area, richness of soil, buildings, or some other point? In such a case, the most important consideration is what can be made of the place in a lifetime. There are some points that are permanent, unchangeable conditions; others may be remedied as time and money become available. Under such conditions, the unchangeable points should be considered first. If one has a sufficient area of tillable land that is level and naturally fertile, other things may be added later, as money and time are available. Drains may be added, fences built, buildings put up, and trees planted. But if one invests his small capital in good buildings and fences, with too little or too poor land, he is indeed handicapped.

339. Cato's advice on buying a farm. — Few if any of these ideas on choosing a farm are new. It is interesting to see how well they agree with some of the writers of two thousand years ago. Some of Cato's writings as translated by " A Virginia Farmer " in " Cato's Farm Management " are interesting.

" When you have decided to purchase a farm, be careful not to buy rashly; do not spare your visits and be not content with a single tour of inspection. The more you go, the more will the place please you, if it be worth your attention. Give heed to the appearance of the neighborhood, — a flourishing country should show its prosperity. ' When you go in, look about, so that, when needs be, you can find your way out.'

" Take care that you choose a good climate, not subject to destructive storms, and a soil that is naturally strong. If possible, your farm should be at the foot of a mountain, looking to the west, in a healthy situation, where labor and cattle can be had, well watered, near a good-sized town, and either on the sea or a navigable river, or else on a good and much frequented road. Choose a place which has not often changed ownership, one which is sold unwillingly, that has buildings in good repair.

" Beware that you do not rashly contemn the experience of others. It is better to buy from a man who has farmed successfully and built well.

" When you inspect the farm, look to see how many wine presses and storage vats there are; where there are none of these, you can judge what the harvest is. On the other hand, it is not the number of farming implements, but what is done with them, that counts. Where you find few tools, it is not an expensive farm to operate. Know that with a farm, as with a man, however productive it may be, if it has the spending habit, not much will be left over."

A somewhat different point of view was expressed by Xenophon.

"For those who are able to attend to their affairs, however, and who will apply themselves to agriculture earnestly, my father both practiced himself and taught me a most successful method of making profits, for he would never allow me to buy ground already cultivated, but exhorted me to purchase such as from want of care or want of means in those who had possessed it, was left untilled and unplanted. He used to say that well cultivated land cost a great sum of money and admitted of no improvement, and he considered that land which is unsusceptible of improvement did not give the same pleasure to the owner as other land, but he thought that whatever a person had or bought up that was continually growing better afforded him the highest gratification."

Both points of view are good. If one is sure that he is buying a "diamond in the rough" he may well buy a neglected farm. He must, however, be sure that it is really naturally good.

340. Buying a farm. — After one has decided on the farm to buy, he should examine the abstract. Usually the seller furnishes an abstract brought down to date. If he does not do so, the buyer should have one made, as he cannot afford to purchase a place without knowing that the title is good.

Frequently, a contract for sale is made before the parties are ready to make the transfer. This contract should be very explicit on all doubtful points. Growing crops belong to the buyer, unless otherwise arranged, but in order to avoid misunderstandings, all such things should be in the contract. Fence posts and fences that have been used, go with the farm, but posts, lumber, wood, and fence wire that have never been used, also all harvested crops, are personal property and do not go with the farm. But it is much better to go over all possible points of difference in advance, so as to avoid misunderstandings.

Frequently, the farm equipment and stock can be bought with the farm at a price that will pay.

It is often wise to see how much a bank will loan on the place. If by borrowing at a bank, money enough is available to make a cash offer, it is well to offer cash. In many cases, an offer of all cash will bring a considerable reduction in price.

The deed should ordinarily be drawn by a lawyer, but this does not mean that one should assume that it will be correct. Very many persons sign papers drawn up by lawyers without reading them carefully, assuming that everything is all right. Nothing should be assumed. All papers should be examined more carefully than if one had drawn them himself. The writer has had a number of contracts drawn for the purchase of farms, and in about one-third of the cases, the lawyer has made a mistake. Usually these have been found by careful reading; but in one case the lawyer's error made the writer pay the taxes. He was directed to draw a contract so that the seller paid all taxes for the year 1906, but instead drew it with some legal verbiage that called for payment of taxes assessed before January 1, 1907. It happened that year that the legal assessment was delayed a few days after January 1. Lawyers are just about as accurate as other persons; that is, very inaccurate. The object of having a lawyer is that he may help one to avoid mistakes. There will be mistakes enough after the lawyer and the interested parties have all done their best to avoid them. All deeds, mortgages, releases, and similar papers should be recorded at once with the county clerk or other official in charge of records.

341. Selection of farms for schools and colleges. — Farms for schools and colleges should be selected for their value in teaching. Such farms should, therefore, be typical of as large an area as possible. If several soil types and other conditions can be secured, so much the better. Since schools wish to teach many subjects, it is of great importance that there be soils adapted to as many kinds of crops as possible, grain, fruit and vegetables. Since many farmers will wish to come to the institution, the railroad facilities should be good. There should also be ample hotel accommodations. This usually means a fair sized town.

342. Farms for charitable and reformatory institutions. — All such institutions have an abundance of cheap labor and a large demand for vegetables, milk, and eggs. This calls for the most intensive type of farming. In many cases, it is hoped that the inmates may be trained in farming, so that they may become farm hands or, in some cases, farmers. For persons who, for some reason, have not been able to get along well in the world, it is of great importance that land be secured that will respond to care. If interest is to be aroused in farming, the soil must be such that there is a response to the efforts expended on it. From the business standpoint of economy in running such an institution, and from the standpoint of the greatest good to the inmates, good land should be selected.

The cost of even the best land is a very small item in running such an institution. The land selected should be good land, or land that can easily be made good. The best soil type is a loam or silt loam, as these types are adapted to vegetables and other hand labor crops. If a variety of soils can be secured, so much the better.

In the Eastern States it is sometimes possible to get such soils in valleys in connection with forest land. One or two thousand acres of forest and several hundred acres of farm land makes a good combination for such institutions. The forest furnishes winter work. Its products may be used for buildings and for making furniture to use and sell.

Many other points, such as railroads and water supply, must be considered.

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CHAPTER 20

SOME SUCCESSFUL FARMS

CHARACTERISTICS OF SUCCESSFUL FARMS AND HOW TO FIND THEM

No farm can be called successful that does not maintain its productivity, pay all farm expenses, interest on the capital, pay for work done by members of the family, and, in addition, leave the operator good pay for his year's work; that is, a good labor income.

Sometimes a person who desires to find a profitable farm starts out by looking for unusual types of farming. Sometimes the attempt is to find a farm that agrees with some theory of what a successful farm is thought to be. This has sometimes been a farm that keeps the greatest number of cows per acre, secures the largest crop yields, uses green manure, or some other point that agrees with the searcher's fancy.

By survey methods, when the capital, receipts, and expenses on each farm in a region are recorded, one finds the really successful farms. Usually they are farms that are much like those of the neighbors, but that are more efficient for some reason. Occasionally, the very profitable farm is entirely different from the other farms of the region.

Of the 49 farms in Table 22, pages 134 to 140, only 8 are very different from the farms of the neighbors.

A farm may be very successful for the amount of capital that the owner has, or successful for the area used, or successful for a farm operated by a woman, or successful under some other condition. But if we wish to see what the principles of successful farm organization and management are, we can best determine them by studying farms that are not so limited.

The most successful farmers usually pass through many years before they are able to secure the capital and other conditions that enable them to make large profits in a year. All the time they may be doing the best thing with their limitations, but only when they overcome the limitations do they make examples of the most efficient farm organization.

Some persons are inclined to say that it is all in the man. But the unusual man can only express himself by definite acts. By studying many farms, it is possible to see in just what way the successful farm or its management differs from the other farms of the region. Merely being an " unusual man " does not amount to anything, unless one does something definite. Successful farms differ from unsuccessful ones by perfectly tangible things. The farm may be large, so that labor and equipment are more efficiently used. It may be that there are three or four important products rather than one, and that these fit together so that they can be produced without much more labor than one or two products require. It may be that the crop yields, or the production of animals, are increased without proportionate increase in cost. Sometimes the results are due to a better soil, or some other natural factor. Sometimes a farmer may work harder, or be able to get his men to work harder, than the average, but either or both of these do not go very far unless some other factors, usually one or all of the above, are combined with the work. There is nothing mysterious about successful farms. In fact, most of them do not attract much attention from the passer-by. Nearly always the successful farm has some points where it could be improved by applying principles used on other farms.

Records are here given of five farms. One is a dairy and crop farm that is typical of hundreds of successful farms in the United States. One is a diversified crop farm that uses animals as scavengers, also typical of hundreds of successful farms. One is a diversified crop farm. One is a specialized farm run by a woman. One is a dairy and crop farm that is given to show a method of farm analysis, or study.

A SUCCESSFUL DAIRY AND CROP FARM

The farm is located about a mile from a railroad station about 250 miles from New York. Products are shipped to New York to be sold at wholesale prices, or are sold to local buyers who ship them. The farm contains 211

Capital Invested in the Farm Business

	April 1, 1907	April 1, 1908
Farm	$10,000	$10,000
Machinery and tools	900	900
4 horses	450	450
31 cows, pure-bred and grade Holstein, 9 heifers, 1 bull	3,175	——
31 cows, 7 heifers, 1 bull	——	3,085
30 ewes, grade Shropshire	240	——
25 ewes	——	200
75 hens	49	49
Feed, seed, and supplies	612	612
	$15,426	$15,296
Decrease of investment		130

acres, of which 129 acres were in crops in 1908, and about 80 acres in pasture. The soil in crops is classified by the Bureau of Soils as Volusia loam. The cropped land extends up a hill that rises 200 feet above the buildings. The pasture is on a lowland soil called Dunkirk clay loam.

Detailed List of Equipment April 1, 1911[1]

4 walking plows	$15	Grain binder	$75
Sulky plow	40	Potato digger	35
2 shovel plows, 1-horse	10	1 root cutter	8
Spring tooth harrow, 2-horse	35	2 fanning mills	30
Smoothing harrow, 1-horse	5	Buzz saw	23
Weeder	5	Scales	3
Grain drill	65	Aërator	5
Roller	20	Cans and pails	10
Wheelbarrow grass seeder	8	2 brooders	10
Hand corn planter	5	Carriages	165
Marker and coverer	8	Milk wagon	8
3 cultivators, 1-horse	12	Democrat	6
1 riding cultivator, 2-horse	40	2 heavy wagons	40
Hand potato sprayer	5	2 cutters	22
Mower	20	Manure sleds	12
Tedder	20	Light bobs	10
Hay rake	20	Heavy bobs	20
2 hay racks	16	Harness	100
3 hay cars, forks, etc.	35	Crates, barrels, etc.	8
		Small tools	20

[1] The values of equipment are, of course, far below cost, as many of the tools have been used many years.

Crops

10 acres corn for silo.
15 acres potatoes, 3300 bushels, 3168 bushels sold for $1797.
2 acres cabbage, 20 tons, sold for $118.
2 acres buckwheat, 30 bushels sold for $20.
22 acres oats, 1265 bushels, 545 bushels sold for $366, part sold as seed oats.
9 acres wheat, 350 bushels sold for $357.
67 acres timothy and clover, about 100 tons, sold $110 worth.
2 acres old apple trees, sold $12.

Corn, potatoes, and cabbage are planted on sod. All are followed by oats. Part of the oat land is seeded with grass, and part is followed by wheat in which grass is seeded. Hay is left two to three years.

RECEIPTS

Potatoes	$1797
Cabbage $118, buckwheat $20	138
Oats $366, wheat $357	723
Hay $110, apples $12	122
Milk	3841
6 cows, 27 calves, 1 bull	716
45 lambs, 5 ewes $264, wool $63	327
Eggs	69
	$7733

EXPENSES

Labor paid	$1286
Machinery	90
Buildings and fences	153
Grain feed	1193
Seeds	90
Fertilizer	78
Bull	75
Other expenses	319
Decrease of investment in cattle	90
Decrease of investment in sheep	40
	$3414

SUMMARY

Average capital	$15,361
Receipts	7,733
Expenses	3,414
Income from capital and operator's labor	4,319
Interest on capital at 5%	768
Labor income	3,551

The reason that this farm is more successful than those of the neighbors is primarily due to the combination of good size, diversity, and good production. Some of the cows are pure-bred, so that the receipts from sale of calves help out. This was the best year ever experienced on the farm. In the preceding year, the labor income was $2750. In that year, five horses were kept, and crops were not quite so good. In 1911, the farm was under different management. The income from capital and labor was then $517 less than in 1907. Less efficient management also resulted in less milk. Seven horses were kept when four could do the work. That the farm could do so well even with these conditions shows that the system is good. The farm had also increased in value due to rise in land values, so that the capital was much larger. The income was sufficient to pay 5 per cent on the capital and leave $1620 for labor income.

In 1908, the owner did the work on this farm with the help of 2 hired-men by the year, and one man for 8 months, and some day help. The total work amounted to a little over 4 men. The area of crops grown per man was about 30 acres. It usually requires 3 men on such a farm when no crops are sold. There were 32 acres of crops per horse. The amount of work done is very good when we consider the high production per cow and the good crop yields.

From the public standpoint such farms are also desirable. Each horse and man on this farm is contributing over twice as much as the average farm of the region to the world's food supply.

The cows averaged nearly 9000 pounds of milk, about double the state average. The receipts per sheep were also very high, because so many twin lambs were raised and sold. The receipts per ewe from lambs and wool amounted to $9.57.

There is an animal unit[1] for each 3 acres of crops, so that the land can be manured with about 10 tons of ma-

[1] See page 209 for definition of animal unit.

nure per acre every three years, or with 20 tons every six years.

The owner of this farm rented it for many years. He then bought it, but at first had an $8000 mortgage on the place. This was paid off, the daughters were sent to college (there were no sons), and the owner is now in comfortable circumstances.

This farm is typical of the most successful dairy farms in all parts of the country. It combines cash crops with dairying. In New York, the most common cash crops on different successful dairy farms are timothy hay, potatoes, cabbage, apples. (See pages 122 to 131.) Usually the farms that combine two of these crops make more than the farms that grow only one cash crop.[1] In the corn-belt, the common cash crop that combines well with dairying is corn. Sometimes the corn is marketed through the hog. In other regions, barley, oats, grass seed, wheat, etc., are combined with dairying to make the most profitable type of farming. The most profitable type of farming on dairy farms in the cotton-belt is to raise corn and hay for feed and cotton to sell.

A SUCCESSFUL GENERAL FARM

This farm is 6 miles from a small village, 1½ miles from a railroad, and about 50 miles from Buffalo. It contains 330 acres, nearly all of which is tillable; 228 acres were in crops other than pasture in 1911. The soils are classified by the Bureau of Soils as Dunkirk fine sandy loam and Dunkirk gravelly loam.

[1] New York, Cornell Bulletin 295, pages 506 to 509 and pages 511 to 528.

Capital Invested in the Farm Business

	April 1, 1910	April 1, 1911
Farm	$30,000	$30,000
Machinery and tools	807	854
17 horses, 2 colts	2670	——
15 horses, 3 colts	——	2,560
4 cows, 1 bull, 23 steers	1024	——
4 cows, 26 steers	——	1,096
4 brood sows, 18 other hogs	224	——
4 brood sows, 15 other hogs, 5 pigs	——	215
50 hens	38	38
Supplies and cash in use	1,115	1,255
	$35,878	$36,018
Increased investment	140	

Detailed List of Equipment April 1, 1912

Manure spreader	$80	Grain binder	$40
4 walking plows	20	Corn binder	15
2 shovel plows	5	Bean harvester	15
2 spring tooth harrows	15	Potato digger	40
2 spike tooth harrows	15	Feed cooker	10
2 grain drills	30	Fanning mill	5
Roller	10	Scales	5
Grass seeder	5	Wagon scales	30
Potato planter	20	Cans and pails	5
5 hand corn planters	5	4 carriages	120
5 walking cultivators	10	3 wagons	45
2 riding cultivators	30	2 cutters	20
Potato sprayer	12	2 pairs bobs	20
2 mowers	40	Harness	75
Hay rake	12	Crates, barrels, etc.	25
4 hay racks	20	Small tools	25
3 hay cars, forks, rope, etc.	30		$854

Crops Grown in 1911

6 acres corn, 300 bushels.
15 acres potatoes, 1100 bushels sold for $744.
30 acres beans, 330 bushels, 286 sold for $629.
17 acres oats, 590 bushels.
80 acres wheat, 1600 bushels, 1400 bushels sold for $1400.
65 acres timothy and clover, 65 tons, 60 tons sold for $1320.
15 acres alfalfa, 33 tons.

Corn, potatoes, and beans are grown on sod. The beans are usually followed by wheat. Corn and potatoes are followed by oats or barley, and these by wheat. Grass is always seeded with wheat and is usually left down one year.

Receipts

Potatoes, 1100 bushels	$744
Beans, 286 bushels	629
Wheat, 1400 bushels	1400
Timothy, 60 tons	1320
Straw, 5 tons	50
23 steers	990
3 horses	355
150 lambs	667
29 hogs and pigs	216
Eggs $2, breeding fees $8, team labor $30	40
Increase of investment	140
	$6551

Expenses

Labor paid $310, value of board furnished $152, value of unpaid labor of son $312	$774
Machinery $167, and repairs $65	232
Fences $40, feed grinding $10.	50
Horseshoeing $60, breeding fees $8	68
Seeds	148
Fertilizer	109
Paris green $10, twine $25, threshing $100, fuel $10	145
Insurance $40, taxes $152	192
Steers $672, horse $91, lambs $415	1178
	$2896

Summary

Average capital	$35,948
Receipts	6,551
Expenses	2,896
Income from capital and operator's labor	3,655
Interest on capital at 5%	1,797
Labor income	1,858

The success of this farm is primarily due to the combination of good soil, large area of crops grown, and such a diversity of crops that they can be grown with a small labor cost. This was a very dry year, the poorest year in seven that the farmer has worked this place. In spite of this fact, he made a labor income of $1858. In 1908, he made a labor income of $3536 with the same general system of farming.

The owner did the work with the help of one man for seven months, and his son for seven months, with some day help. In the winter, he does the chores alone. The area of crops grown per man was 91 acres. In 1908, when crops were better, more work was required in harvesting. The area of crops per man was then 76 acres.

He now has at least 5 more horses than are needed, but the cost of horses is kept very low, as they run loose around the straw stacks and get grain and care only when they work.

A carload of lambs were bought in September and sold January 1. These were used to clean up the fields and stubble.

The steers are not fattened much. They are used to work up the roughage on the farm and are sold to local butchers. This is very different from finishing steers for the market with grain feed. In the region where this farm is located, it is rarely possible to fatten steers on grain at a profit, because one cannot compete with the meat produced in the regions where grain is very much cheaper. These steers were far from fat, as indicated by the price received for them.

The farm stock used up the wheat, oats, and bean straw, and corn stalks, probably amounting to 100 tons in all. They also had 38 tons of hay, 300 bushels of corn, and about 540 bushels of oats. It is at once evident that the animals received little grain. In 1908, when crops were good, the farmer fed almost three times as much grain per animal.

The animals kept provide enough manure to cover the land in crops with 10 tons per acre every five years.

The farmer went to district school, then worked as a hired-man seven years until he was 23 years old. He and his brother then rented 80 acres for one year, paying cash rent. The next two years, he rented a 70-acre farm alone, paying cash rent. Next he rented 110 acres for cash rent for five years. Then he rented 200 acres on shares for two years. When he was 33 years old, he rented 330 acres on shares and worked the place for six years. He then bought 90 acres and farmed it for eleven years. He then bought his present farm of 330 acres, which he has now owned seven years. He now has this farm all paid for and has built a good new house. This is like the history of many successful farmers. It takes a long time to get the capital necessary to farm well, but when this is secured and combined with the years of experience, more money is made in a few years than was made in all the previous years.

The system of farming on this farm is typical of that followed on many farms as far west as Central Kansas, Nebraska, and the Dakotas. The cash crops vary in different regions. In one region, they are corn and oats, in another corn and wheat, in another spring wheat, oats, and barley. In any event, large areas of these crops are grown. Stock are used to work up the waste products and some of the grain. If grain is cheap, the animals may be fattened; if not, they are carried through on roughage and sold without finishing, or may be fattened on grass; or in a region where grain is usually cheap, they may be carried over on roughage in the hope of having cheaper grain to fatten on the following year. Most of the profit is expected to come from crops. The stock work down the roughage and produce manure. They require little labor and are not expected to much more than pay for their feed in most years. This method of farming appears very rough to those who keep fine stock and to those who finish their meat animals for the top price. But the farmers who have a large area of cash crops, and who follow such methods, usually make money and have good crop yields.

A similar system where the cash crops are cotton and grain is described in Farmers' Bulletin 364. A farm that is somewhat similar is described in Farmers' Bulletin 432. The cash crops are grain and apples.

A SUCCESSFUL CROP FARM

This farm is located one and one-half miles from a railroad station about 325 miles from New York. It contains

Capital Invested in the Farm Business

	Tenant		Landlord	
	April 1		April 1	
	1910	1911	1910	1911
Farm			$14,550	$15,450
Machinery and tools	$780	$856	——	110
6 horses, 2 colts	1200	——	——	——
7 horses, 2 colts	——	1300	——	——
4 cows	300	——	——	——
3 cows	——	225	——	——
2 cows, 2 calves	——	——	——	120
Hogs	29	20	29	20
50 hens	38	38	——	——
Supplies and cash in use	475	475	325	325
	$2822	$2914	$14,904	$16,025
Increase of investment	92		1121	

128 acres. In 1911, there were 105 acres in crops. The products are sold at wholesale to local buyers who ship east or west, according to the demand. The farm is share rented. The results for tenant and landlord are both given.

Detailed List of Equipment April 1, 1911

2 walking plows	$12	1 tedder	$15
1 shovel plow	4	1 rake	10
2 spring tooth harrows	15	2 hay racks	10
1 spike tooth harrow	7	Hay forks, cars, etc.	25
1 weeder	17	1 grain binder	70
1 drill	60	1 bean harvester	15
1 roller	18	1 potato digger	30
1 grass seeder	5	1 fanning mill	5
1 cabbage setter	18	1 scales	5
2 hand corn planters	1	2 light wagons	60
3 walking cultivators	12	2 heavy wagons	60
2 riding cultivators	45	1 cutter	15
1 potato sprayer	20	1 pair bobs	15
1 orchard sprayer	220	Harness	75
1 potato hiller	2	Crates, barrels, etc.	20
1 mower	30	Small tools	50
			$966

Crops

7 acres corn, 350 bushels.
9 acres potatoes, 1400 bushels, 1124 bushels sold for $804.
15 acres beans, 215 bushels, 204 bushels sold for $438.
5 acres cabbage, 46 tons sold for $1104.
9 acres oats, 300 bushels.
2 acres barley, 45 bushels.
29 acres wheat, 634 bushels sold for $538.
22 acres timothy and clover, 30 tons, 2 tons sold for $20.
7 acres apples, about 1000 barrels sold on trees for $1076.

Potatoes, cabbage, corn, and beans are usually grown on sod. Beans are usually followed by wheat. The other tilled crops are followed by oats, and oats by wheat. Grass seed is included with the wheat. The hay is left one or two years.

RECEIPTS

	TENANT	LANDLORD
Potatoes	$402	$402
Beans	219	219
Cabbage	552	552
Wheat	269	269
Hay	10	10
Apples	538	538
Veal calves and 1 cow	460	——
Hogs and pigs	83	83
Poultry $25, eggs $100	125	——
Outside labor	100	——
Increase of investment	92	1121
	$2850	$3194

EXPENSES

	TENANT	LANDLORD
Labor $375, board of labor $220	$595	$25
Machinery and repairs	204	125
Buildings, fences, drains	450	650
Feed $26 and feed grinding $24	25	25
Horseshoeing	50	——
Breeding fees	15	2
Veterinary	10	——
Seeds	27	27
Fertilizer $200, spray materials $30	115	115
Twine and threshing	17	17
Machine work hired	3	——
Barrels, bags, crates	9	
Fuel and oil for farm work	6	2
Insurance	5	20
25 calves	75	——
2 cows	——	80
Taxes	——	100
	$1606	$1188

Summary

	Tenant	Landlord
Average capital	$2868	$15,465
Receipts	2850	3,194
Expenses	1606	1,188
Income from capital and labor	1244	2,006
Interest on capital at 5%	143	——
Labor income	1101	——
Landlord's per cent on investment	——	13%

Both the landlord and tenant on this farm are doing well. In order to compare the results with farms operated by owners, we can figure what the labor income would have been if the tenant had owned and operated the farm. The labor income would then have been $2334. In 1908, a different tenant worked the farm, but followed the same system of farming. The labor income was then $2392.

The success of this farm is primarily due to the combination of good soil, good crops, and diversified farming that allows efficient use of horses and labor. The year was a dry year, but the crops on this farm were good for the season. Prices, particularly of cabbage, were high enough to more than make up for the short crop.

The farm has unusually good buildings and is well kept up in every way. While it is primarily a crop farm, yet the system of farming provides an animal unit for each 7 or 8 acres of crops. This makes it possible to manure all the farm with about 10 tons per acre every 7 or 8 years. In order to have a cabbage storage house, the tenant paid half the cost of building one.

The few cows are used to produce veal calves. These are bought from dairymen and are allowed to suck cows for about a month. In this way, 25 calves were bought and sold during the year.

The work on the farm is done by the tenant and one hired-man, and a little help from the landlord who helped spray and prune the orchard. Over 50 acres of crops were raised per man, in addition to the other work done. This is very good, particularly when we consider that there were 21 acres of such intensive crops as potatoes, cabbage, and apples, and that the work was so well done. The horses raised 21 acres of crops per horse.

The tenant on this farm went to high school 2 years, farmed with his father 2 years. He then had about $500, borrowed as much more for horses and equipment, rented 75 acres of his father on shares for 2 years. Next he rented a farm of 135 acres for 3 years. He then rented this farm for a period of five years. The record here given is the first year on this lease. He is now 28 years old and is well started in farming.

This system of farming is typical of the apple farms of the East. Such farms are usually diversified farms with 5 to 15 acres of apples on a 100-acre farm. In 1900, in Orleans County, N.Y., 76 per cent of the apple trees were in orchards having less than 600 trees, or less than 15 acres. In 1910, there was no county in any of the Eastern states that did not harvest at least 9 acres of other crops for each acre of apples harvested. As the country grows older, the newer regions in parts of the West that have tended to specialize on apples will doubtless become more diversified. The year's work is then better distributed. The risks of failure of crop, poor prices, and pests are also less. The Eastern apple grower expects to live and pay the farm expenses from his farm, and hopes to have his apple crop as extra profit. This man sold apples without picking them. A more usual practice is for the farmer to pick and barrel the apples.

A SUCCESSFUL POULTRY FARM MANAGED BY A WOMAN[1]

The farm contained 12 acres in the edge of a village about 350 miles from New York. Eggs were shipped to a wholesale dealer in New York.

CAPITAL INVESTED IN THE FARM BUSINESS

	Nov. 1, 1910	Nov. 1, 1911
Farm	$6000	$6000
Machinery and tools	400	400
1300 White Leghorn hens, 40 cockerels	1920	——
1950 hens, 40 cockerels	——	2520
1 cow	50	50
1 horse	200	200
Feed and supplies	825	825
	$9395	$9995
Increase of inventory	600	

CROPS

The crops grown were 3.5 acres of corn, 0.4 acre mangels, 1.3 acres alfalfa, 0.5 acre rape, 1 acre young cherry orchard not yet bearing.

RECEIPTS

10,007 doz. eggs at wholesale	$3002
8346 eggs for hatching at $7 per 100	584
584 hens, 35 roosters	478
210 pullets	311
963 cockerels	209
Butter $42, calf $11	53
Corn stalks $15, alfalfa hay $104	119
Increase of investment	600
	$5356

[1] The record of this farm was secured by E. W. Benjamin of the Department of Poultry Husbandry, Cornell University.

EXPENSES

Labor paid $625, value of unpaid labor of daughter $292	$917
Machinery and repairs	85
Buildings and repairs	48
Grain feed	1509
Straw	65
Seeds	3
Fertilizer $5, spray materials $1.20	6
Fuel and oil $5, kerosene $9.60, gasoline $40	55
Carbolineum $2, egg cases $38	40
Horseshoeing	8
Insurance $4.50, taxes $45	50
	$2786

SUMMARY

Average capital	$9695
Receipts	5356
Expenses	2786
Income from capital and unpaid labor	2570
Interest on capital at 5 %	485
Labor income	2085

The success of this farm is due to the unusually high production of eggs per hen, and to the unusual success in raising chickens. The price received for eggs was about 3 cents a dozen above the usual wholesale price paid in New York. This increased the profit by $300.

In addition to the work of the woman manager and her daughter, one man was hired by the year and one man for 6 months. This is a large amount of labor for this number of hens, but the high egg production and success with chickens seem to justify the extra labor.

The other successful farms here recorded are the more usual examples of success, in that their success is due to a size of farm and types of farming and farm organization that use labor very effectively and yet secure good production, but this farm succeeds because its production is so good as to offset the high labor cost.

One of the daughters took a winter course in poultry husbandry in a college of agriculture, then started the farm in 1907. The mother and another daughter who is a college graduate now run the place. There were 300 pullets the first winter. The stock and plant has been increased each year up to its present size. To reach a labor income of $2000 in four years is very unusual success.

Diversified farms on which poultry is one of the enterprises are a more common type of successful poultry farm. See No. 9, page 135, and the records on pages 444 to 473.

RECORD OF A YEAR'S BUSINESS ON A FARM

In order to show the method of calculating labor income the following farm record is given on a record blank. The figures and words in italics are the facts that were obtained from the farm or that were calculated.

Record for the year beginning *April 1*, 19*11*, and ending *April 1*, 19*12*.

Operator's name............................Age............

Post Office.................County.................State, *N.Y.*

Distance and direction of the farm from station *2½ miles S. E.*

Name of station..................

How many years has the present operator had charge of the farm ? *20*.

What was the total area of the farm, including owned land, rented land, and land worked on shares ? *155* acres.

How many of the above acres were owned by the operator? *155*.

How many acres were cash rented? *0*. How many acres were share rented? *0*.

Of the total area how many acres were in woods? *0*.

How many acres of the woodland were pastured? *0*. How many acres in other permanent pasture? *15*.

How many acres in pasture not permanent? *8*.

Average Capital Invested in the Farm Business[1]

	April 1, 1911	April 1, 1912
Farm	*$15,500*	*$15,500*
Machinery and tools	*1,201*	*1,176*
Live-stock (from page 558)	*2,435*	*2,645*
Feed, supplies, etc	*930*	*1,105*
Cash kept in use	*200*	*200*
Total	*$20,266*	*$20,626*
Average		*20,446*
Increase		*360*

[1] In giving values of farm, machinery, live-stock, etc., give the value at which it probably could be sold. The value of the farm at the end of the year should be the same as at the beginning unless definite improvements that add to its value have been made. Rise in value of real estate is not counted, as the object is to study the system of farming, not real estate speculation. Machinery includes wagons, harness, small tools, and other equipment. Feed and supplies includes grain, hay, and other feed on hand at the beginning of the year but not including products held for sale.

Crops for the Year 1911

Crop	Crops Grown			Crops Sold		
	Area	Yield per Acre	Total Crop	Amount Sold	Price	Total Value Sold
Corn for grain...	*6*	*50 bu.*	*300 bu.*	....	.....	.....
Corn for silage..	*6*	*12.5 tons*	*75 tons*	....	.....	.....
Potatoes.........	*4*	*158 bu.*	*630 bu.*	*475*	*.60*	*$285*
Field beans.....	*22*	*19 bu.*	*420 bu.*	....	.....	.....
Roots (kind) *beets*	*1*	....	*1000 bu.*	....	.....	.....
Oats............	*15*	*37 bu.*	*550 bu.*	....	.....	.....
Barley..........	.....	....	....	....	.....	.....
Wheat..........	*25*	*28 bu.*	*700 bu.*	*590 bu.*	*.95*	*561*
Straw...........	X	X	X	....	.....	.....
Hay, clover and timothy	*18*	*1.5 tons*	*27 tons*	*1.4 tons*	.....	*27*
Alfalfa, *new seeding*	*6*	*0*	....	....	.....	.....
Seeds (give the kinds)	.....	....	....	....	.....	.....
....	.....	....	....	....	.....	.....
Apples, bearing	*1*	*8 bbl.*	*8 bbl.*	*4 bbl.*	.....	*3*
Apples, not bearing...........	.....	X	X	....	.....	.....
(Give any other Fruit).........	.....	....	....	....	.....	.....
peaches........	*1*	*0*	*0*	....	.....	....
Truck, etc. (give the kinds).....	.....	....	....	....	.....	.....
....	.....	....	....	....	.....	.....
(Give any other crop)	.....	....	....	....	.....	.....
Sweet corn canning factory ...	*5*	....	....	*18 tons*	*$7.*	*124*

If any of the above crops were grown in orchard or with other crops or otherwise double cropped, explain....................

....

If any of the year's crops are not yet sold, give the crop and amount and value of that which will be sold. *Beans, 400 bu., worth $1000; Hay, 1 ton, $20.*

Total sold or held for sale.......................*$2020*

AMOUNT AND VALUE OF ANIMAL PRODUCTS SOLD DURING THE YEAR

(Include the value of products exchanged for groceries, etc. Do not include products used in the house.)

PRODUCT		AMOUNT SOLD	PRICE	TOTAL VALUE SOLD
Butter made on the farm	lb.	....	....	....
Cream sold to a creamery to be made into butter..............	lb. fat	....	....	....
Milk sold to a creamery to be made into butter	lb.	....	....	*$ 135*
Milk sold at wholesale to a retailer or shipping station...........	qt	*63,875*	*4¢*	*2555*
Milk and cream retailed by the farmer	qt.	....	....	....
Milk sold to a condensery.......	lb.	....	....	....
Milk sold to a cheese factory....	lb.	....	....	....
Cheese made on the farm.......	lb.	....	....	....
Buttermilk......................	gal.	....	....	....
Wool	lb.	....	....	....
Eggs...........................	doz.	*200*	*25¢*	*50*
Breeding fees		.. X ..	.. X ..	....
Hides..........................		.. X ..	.. X ..	*6*
Honey	lb.	....	....	....
Total		....	....	*$ 2746*

MISCELLANEOUS RECEIPTS

Received for labor or team work done off the farm or for use of machinery	*$ 72*
What was the kind of work? *farm work*	....
Received for cash rent for......acres in this farm....	....
Received for rent of buildings on the farm...........	....
Received for sirup or sugar	....
Received for lumber, posts, wood, etc.	....
Any other receipts................................	....

ANIMALS

Kind	Number and Value on Hand at Beginning of the Year			Number and Value on Hand at End of the Year			Number and Value Sold During the Year			Number and Value Purchased During the Year			No. Died During the Year
	Number	Value per Head	Total Value	Number	Value per Head	Total Value	Number	Value per Head	Total Value	Number	Value per Head	Total Value	
Cows	22	50	1100	25	50	1250				4	42	166	1
Heifers													
Calves							25	2.50	63				
Bulls	1	40	40	1	65	65							
Steers													
Oxen													
Horses	7	171	1200	7	171	1200				1	200	200	1
Colts													
Mules													
Bucks													
Ewes													
Lambs													
Brood sows	1	20	20	1	20	20							
Other hogs	4	7	28	9	7	63	2	18	35				
Pigs							10	3	30				
Hens	50	.75	38	50	.75	38							
Turkeys	3	3	9	3	3	9	15	3	45				
Ducks													
Geese													
Bees													
Total	X	X	2435	X	X	2645	X	X	173	X	X	366	

Cash Farm Expenses for the Year

Amount paid for labor exclusive of household help	*$610*
New machinery	*95*
Repairs of machinery	*25*
New buildings	....
Repairs of buildings	....
Fences	*24*
Drains	....
Hay	....
Silage	....
Stalks	....
Straw	....
Shavings	....
Grains and concentrated feed	*280*
Feed grinding	*12*
Silo filling	*20*
Corn shredding	....
Milk cans, etc.	....
Milk expressage	*240*
Ice	*5*
Horseshoeing	*25*
Breeding fees	*1*
Veterinary	*12*
Milk and cow testing, acid, etc.	....
Seeds	*55*
Plants	....
Trees	....
Fertilizer	*100*
Manure	....
Spray materials	....
Twine	*15*
Threshing	*30*
Pressing	....
Machine work hired	....
Barrels	....
Bags	....
Crates	....
Lumber sawing	....
Fuel and oil for farm work	*9*
Expressage, commissions, etc.	....
Insurance on buildings and contents	*25*
Taxes, including school tax	*92*
Cash rent paid for.........acres	....
Other farm expenses	....
Total	*$1675*

Other Expense Items not Cash

Value of board furnished to farm help and not paid for in cash, *$161.*

Value of farm work done by members of the family and not paid for. Do not include the value of the farmer's time nor the value of housework, but include such work as butter making, chores, etc. At usual farm wages, what would it have cost to hire this labor? *$100.*

General Questions

Value of operator's house, *$4500.* Other houses, *$0.* Barns and other out-buildings, *$3000.*

If the number of cows was not constant through the year, what would the average number be? *$23\frac{1}{2}$.*

If any pure-bred stock is kept, give the breed and number of each kind. *None.*

How many men are kept by the year? *1.* Give number of other men hired by the month and number of months each worked. *1 man, 8 months. Son worked about 2 months in summer.*

Give the approximate number of days of day-help hired for haying, harvesting, silo filling, potato digging, etc., *0.*

Was the present farmer ever a hired-man or tenant? *Both.* How long as each? *4 yr. hired-man, 8 yr. tenant.*

Give particulars of how he got started.

Amount of mortgage on the farm, *$1700.*

Number of persons in the family exclusive of hired help, *7.*

Summary

Average capital (p. 554)		*$20,446*
Receipts:		
Crops[1] (p. 555)	*$2020*	
Animals (p. 557)	*173*	
Animal products (p. 556)	*2746*	
Miscellaneous (p. 556)	*72*	
Increase of capital[2] (p. 554)	*360*	
Total receipts		*$5371*

[1] Include value of crops that will be sold.

[2] When the total value of farm and equipment increases during the year, the increase is counted as a receipt; and when it decreases during the year, the decrease is counted as an expense.

Expenses:		
Animals purchased (p. 557)	*$366*	
Cash farm expenses (p. 558)	*1675*	
Other expenses not cash (p. 559)	*261*	
Decrease of capital[1]		
Total expenses		*$2302*
Income from capital and operators' labor		*$3069*
Interest on capital at 5%		*$1022*
Labor income		*$2047*

[1] See note 2 on page 559.

FACTORS

By comparing different farms in the same region, one may see how they differ and if enough farms are compared, may learn how the most successful farms differ from the less successful ones. Any one can fill out a blank like the preceding for his farm. If accounts are not kept, the receipts and expenses may be given as nearly as possible. The errors will not be so serious as to interfere with comparing the efficiency of the farm with other farms. The following factors aid in making such a comparison of farms. The region for which factors are given is a very prosperous region.

The success of this farm is primarily due to the good crop yields, the diversity of the business, the fairly large acreage of crops, good production per cow, and efficient use of man labor.

The farmer went to district school until he was 18 years old, hired out by the month until he was 22, then rented his father's farm of 145 acres on shares for 8 years. He then bought this farm and has been on it 14 years. He has a neat, well-kept farm with good buildings, has put steam heat, acetylene light, bath room, and running water in the house, and has the farm nearly paid for.

Factors

	Average for this Farm	Average of the Region
Size of business.		
Capital	$20,446	$12,037
Value of labor directed	$871	$433
Acres farmed	155	149
Acres in crops	110	93
Animal units	33	23
Number of cows [1]	23½	9
Diversity of business.		
Number of products bringing $500 receipts	3	—
Per cent of receipts from crops	42	58
Production.[2]		
Crop index	122 %	100 %
Receipts per cow from milk and its products	$114	$57
Receipts per cattle unit	$113	$52
Efficiency in use of capital.[3]		
Per cent of area in crops	71	62
Per cent of capital in house	22	14
Per cent of capital in barns	15	13
Value of barns per animal unit	$91	$70
Efficiency in use of labor.[4]		
Average number of men	2.8	2.2
Crop acres per man	39	42
Animal units per man	12	10
Productive work units of man labor (page 350)	755	479
Productive work units per man	270	218
Number of horses	7	5.6
Crop acres per horse	16	17
Productive work units of horse labor	465	337
Productive work units per horse	66	60
Value of machinery per acre of crops	$10.81	$6.11
Fertility.		
Crop acres per animal unit [5]	3.3	4.0
Cost of fertilizer per acre of crops	91 ¢	55 ¢

[1] If a farm has other important animals, they must be considered.

[2] The results on a farm may be due to high or low crop yields or production per animal. The crop index is a comparison with the average

of the region as 100 per cent. The crop yields on this farm were 22 per cent above the average. If there are no other figures, the crops may be compared with the state average. The receipts per cow from milk give an idea of the production per cow. The receipts per cattle unit are the receipts and increase inventory from dairy products and cattle divided by the number of cattle units. One grown animal, or 2 young stock, are called a cattle unit. The receipts per cow are sometimes good when the receipts per cattle unit are poor, because the young stock kept does not increase in value or sell for enough to pay. Receipts per hen, per sheep, or for other animals must be considered if they are important on the farm.

The approximate amount of feed used on the farm may be obtained by adding feed purchased to crops raised and not sold.

[3] Sometimes a farm has so little land in crops as to fail to pay. Sometimes the capital is too largely invested in buildings. This farm has a rather high investment in buildings for its size, but not high enough to be serious.

[4] The crop acres and animal units combined show that the men are well employed. The same point is shown by the productive work units per man. The crop acres per horse are low. One or two horses could probably be dispensed with unless they are desired for pleasure.

[5] The crop acres per animal unit give a basis for comparing the amounts of manure available on different farms. With the system followed on this farm there is about 3 tons of manure per year for each acre of crops. This is much above the average.

SUMMARY OF THE MOST IMPORTANT FACTORS AFFECTING PROFITS

THE most common ways by which the individual farmer makes more than the average are: (1) by working harder, (2) by choosing a region and farm that pays better than the average, (3) by having a better organized and managed business, (4) by forecasting the future, and buying land or other property or raising crops or animals to meet future shortages. The man who sees far enough ahead to raise colts for the time when colts will bring high prices is doing a good public service as well as making a good profit for himself.

Survey work and studies of successful farms indicate that the most important factors in the organization and management of the farm are: (1) size of business (particularly the area in crops), (2) diversity of the business, and (3) production (crop yields and production per animal).

Very few farms rank well in all these points. Some farms are large enough, some are diversified, some have good crop yields, some have good production for cows or other animals. Most farmers have a hobby that is overdone while other things are neglected. It requires good judgment to keep the farm development properly balanced.

If a farmer gets crop yields and production per animal a little better than the average and has a good-sized farm and diversified business, he is almost certain to have a profitable farm.

Ordinarily there should be three or four important products sold. That is, three or four specialties, no one of which is neglected on account of the others. A careful farmer may hope for crop yields a fifth better than the average and production per animal a half better than the average. With these conditions and a good-sized farm he may hope for a labor income of three to five times the average after he gets his business established.

Good crop yields may be the result of having a better farm than the average, using more fertilizer, or farming better in other respects. Of these the better farm is usually the cheapest way of increasing crops. But with a better soil it pays to farm better in every respect. The larger farm may be secured by ownership or rental according to one's capital.

Other minor points often prevent the profits from rising as high as they might go if the entire business were well balanced. Occasionally too much is invested in buildings or machinery or too many horses or men are kept, or any one of a hundred other factors may be wrong. These mistakes are not so often made by experienced farmers but are nearly always made by persons who go from city to country.

Of course the highest profits are made when size, diversity, and good production are combined with a well-balanced business in every other respect. But if the first four points are good a mistake in having an extra horse or man will still leave a profitable farm, although not as profitable as it might have been.

No matter how profitable a farm may be a farmer will not prosper if the family expenses are out of proportion to the income. Very often the farmer who runs the most successful farm fails to accumulate money as rapidly as a less successful farmer who saves all he gets. Failure to accumulate money may be due to poor farming, too expensive living, sickness, or other misfortune. Failures from all these causes are usually confused. In fact the personal factor so confuses some persons that they attribute all success to the man. The success of a farm is primarily dependent on the factors enumerated above. But success of an individual is primarily dependent on the relation of his income to his family expense. The highest financial success comes when a well-balanced, successful farm is combined with economy in living.

References

Many of the farms that have been written up in various magazines and bulletins are really not making much above interest on the capital invested.

A number of profitable farms, also farms that are doing well with small capital, are given in Bulletin 295, pages 510 to 536 of the Cornell University Agricultural Experiment Station, Ithaca, New York.

A number of successful farms are given in Laboratory Exercises in Farm Management, by Warren and Livermore, pages 50 to 62.

A very successful farm of a city man who went to farming is described in U. S. Dept. Agr., Farmers' Bulletin 432. In 1909, the income due to the labor of the father and a son on this farm seems to have been about $3500.

A very successful tenant farm in New Jersey is described in Farmers' Bulletin 472.

A successful cotton farm that appears to have given a labor income of $2000 to $3000 is described in U. S. Dept. Agr., Farmers' Bulletin 364.

A successful alfalfa and potato farm in Ohio is described in Circular 107 of the Ohio Agricultural Experiment Station, Wooster, Ohio. The man who rented this farm paid cash rent of about 6 per cent, and made a labor income of over $3000.

So far as the writer can determine, these are the only bulletins that describe farms on which the labor income is as high as $2000.

A farm that is interesting because of the fair profit on a small area is described on pages 7 to 16 of Farmers' Bulletin 325. This man made a labor income of over $1000 on 40 acres of land in Nebraska. With large farms and the usual types of farming, much more than this is often made in the region, but this farm is making a very large income for its size.

A very successful system of tenant farming in Maryland is described in Farmers' Bulletin 437.

TABLES OF PRICES OF FARM PRODUCTS

Table 80.—Average Farm Value per Head, United States, Jan. 1[1]

	Horses	Mules	Milch Cows	Other Cattle	Swine	Sheep
1867	$59.05	$66.94	$28.74	$15.79	$4.03	$2.50
1868	54.27	56.04	26.56	15.06	3.29	1.82
1869	62.57	79.23	29.15	18.73	4.65	1.64
1870	67.43	90.42	32.70	18.87	5.80	1.96
Average	60.83	73.16	29.29	17.11	4.44	1.98
1871	71.14	91.98	33.89	20.78	5.61	2.14
1872	67.41	87.14	29.45	18.12	4.01	2.61
1873	66.39	85.15	26.72	18.06	3.67	2.71
1874	65.15	81.35	25.63	17.55	3.98	2.43
1875	61.10	71.89	25.74	16.91	4.80	2.55
Average	66.24	83.50	28.29	18.28	4.41	2.49
1876	57.29	66.46	25.61	17.00	6.00	2.37
1877	55.83	64.07	25.47	15.99	5.66	2.13
1878	56.63	62.03	25.74	16.72	4.85	2.21
1879	52.36	56.00	21.71	15.38	3.18	2.07
1880	54.75	61.26	23.27	16.10	4.28	2.21
Average	55.37	61.96	24.36	16.24	4.79	2.20
1881	58.44	69.79	23.95	17.33	4.70	2.39
1882	58.53	71.35	25.89	19.89	5.97	2.37
1883	70.59	79.49	30.21	21.81	6.75	2.53
1884	74.64	84.22	31.37	23.52	5.57	2.37
1885	73.70	82.38	29.70	23.25	5.02	2.14
Average	67.18	77.45	28.22	21.16	5.60	2.36
1886	71.27	79.60	27.40	21.17	4.26	1.91
1887	72.15	78.91	26.08	19.79	4.48	2.01
1888	71.82	79.78	24.65	17.79	4.98	2.05
1889	71.89	79.49	23.94	17.05	5.79	2.13
1890	68.84	78.25	22.14	15.21	4.72	2.27
Average	71.19	79.21	24.84	18.20	4.85	2.07
1891	67.00	77.83	21.62	14.76	4.15	2.50
1892	65.01	75.55	21.40	15.16	4.60	2.58
1893	61.22	70.68	21.75	15.24	6.41	2.66
1894	47.83	62.17	21.77	14.66	5.98	1.98
1895	36.29	47.55	21.97	14.06	4.97	1.58
Average	55.47	66.77	21.70	14.78	5.22	2.26

[1] U. S. Dept. Agr., Yearbook, 1911.

TABLE 80. — AVERAGE FARM VALUE PER HEAD, UNITED STATES, JAN. 1. — *Continued.*

	Horses	Mules	Milch Cows	Other Cattle	Swine	Sheep
1896	$33.07	$45.29	$22.55	$15.86	$4.35	$1.70
1897	31.51	41.66	23.16	16.65	4.10	1.82
1898	34.26	43.88	27.45	20.92	4.39	2.46
1899	37.40	44.96	29.66	22.79	4.40	2.75
1900	44.61	53.55	31.60	24.97	5.00	2.93
Average . .	36.17	45.87	26.88	20.24	4.45	2.33
1901	52.86	63.97	30.00	19.93	6.20	2.98
1902	58.61	67.61	29.23	18.76	7.03	2.65
1903	62.25	72.49	30.21	18.45	7.78	2.63
1904	67.93	78.88	29.21	16.32	6.15	2.59
1905	70.37	87.18	27.44	15.15	5.99	2.82
Average . .	62.40	74.03	29.22	17.72	6.63	2.73
1906	80.72	98.31	29.44	15.85	6.18	3.54
1907	93.51	112.16	31.00	17.10	7.62	3.84
1908	93.41	107.76	30.67	16.89	6.05	3.88
1909	95.64	107.84	32.36	17.49	6.55	3.43
1910	108.19	119.84	35.79	19.41	9.14	4.08
Average . .	94.29	109.18	31.85	17.35	7.11	3.75
1911	111.46	125.62	39.97	20.54	9.37	3.91
1912	105.94	120.51	39.39	21.20	8.00	3.46

Table 81. — Average Farm Prices for the United States, Dec. 1[1]

	Cotton per Lb.	Corn per Bu.	Barley per Bu.	Buckwheat per Bu.	Oats per Bu.	Rye per Bu.	Wheat per Bu.	Hay per Ton	Potatoes per Bu.	Tobacco per Lb.
1866		47.4¢	70.2¢	67.6¢	35.1¢	82.2¢	152.7¢	$10.14	47.3¢	9.6¢
1867		57.0	70.1	78.7	44.5	100.4	145.2	10.21	65.9	9.4
1868		46.8	109.0	78.0	41.7	94.9	108.5	10.08	59.3	9.3
1869	16.5¢	59.8	70.8	71.9	38.0	77.0	76.5	10.18	42.9	9.3
1870	12.1	49.4	79.1	70.5	39.0	73.2	94.4	12.47	65.0	9.6
Average		52.1	79.8	73.3	39.7	85.5	115.5	10.62	56.1	9.4
1871	17.9	43.4	75.8	74.5	36.2	71.1	114.5	14.30	53.9	8.8
1872	16.5	35.3	68.6	73.5	29.9	67.6	111.4	12.94	53.5	9.2
1873	14.1	44.2	86.7	75.0	34.6	70.3	106.9	12.53	65.2	7.6
1874	13.0	58.4	86.0	72.9	47.1	77.4	86.3	11.94	61.5	11.8
1875	11.1	36.7	74.1	62.0	32.0	67.1	89.5	10.78	34.4	6.9
Average	14.5	43.6	78.2	71.6	36.0	70.7	101.7	12.50	53.7	8.9
1876	9.9	34.0	63.0	66.6	32.4	61.4	97.0	8.97	61.9	6.8
1877	10.5	34.8	62.5	66.9	28.4	57.6	105.7	8.37	43.7	—
1878	8.2	31.7	57.9	52.6	24.6	52.5	77.6	7.20	58.7	5.6
1879	10.2	37.5	58.9	59.8	33.1	65.6	110.8	9.32	43.6	5.8
1880	9.8	39.6	66.6	59.4	36.0	75.6	95.1	11.65	48.3	8.2
Average	9.7	35.5	61.9	61.1	30.9	62.5	97.2	9.10	51.2	6.6
1881	10.0	63.6	82.3	86.5	46.4	93.3	119.2	11.82	91.0	9.6
1882	9.9	48.5	62.9	73.0	37.5	61.5	88.4	9.73	55.7	8.4

1883	9.0	42.4	58.7	82.2	32.7	58.1	91.1	8.19	42.2	9.0
1884	9.2	35.7	48.7	58.9	27.7	51.9	64.5	8.17	39.6	8.2
1885	8.5	32.8	56.3	55.9	28.5	57.9	77.1	8.71	44.7	7.7
Average	9.3	44.6	61.8	71.3	34.6	64.5	88.1	9.32	54.6	8.6
1886	8.1	36.6	53.6	54.5	29.8	53.8	68.7	8.46	46.7	7.4
1887	8.5	44.4	51.9	56.5	30.4	54.5	68.1	9.97	68.2	10.6
1888	8.5	34.1	59.0	63.3	27.8	58.8	92.6	8.76	40.2	7.7
1889	8.3	28.3	41.6	50.5	22.9	42.3	69.8	7.04	35.4	6.6
1890	8.6	50.6	62.7	57.4	42.4	62.9	83.8	7.87	75.8	8.3
Average	8.4	38.8	53.8	56.4	30.7	54.5	76.6	8.42	53.3	8.1
1891	7.3	40.6	52.4	57.0	31.5	77.4	83.9	8.12	35.8	8.5
1892	8.4	39.4	47.5	51.8	31.7	54.2	62.4	8.20	66.1	9.4
1893	7.0	36.5	41.1	58.3	29.4	51.3	53.8	8.68	59.4	8.1
1894	4.6	45.7	44.2	55.6	32.4	50.1	49.1	8.54	53.6	6.8
1895	7.6	25.3	33.7	45.2	19.9	44.0	50.9	8.35	26.6	7.2
Average	7.0	37.5	43.8	53.6	29.0	55.4	60.0	8.38	48.3	8.0
1896	6.6	21.5	32.3	39.2	18.7	40.9	72.6	6.55	28.6	6.0
1897	6.6	26.3	37.7	42.1	21.2	44.7	80.8	6.62	54.7	—
1898	5.7	28.7	41.3	45.0	25.5	46.3	58.2	6.00	41.4	—
1899	7.2	30.3	40.3	55.7	24.9	51.0	58.4	7.27	39.0	6.6
1900	—	35.7	40.9	55.8	25.8	51.2	61.9	8.89	43.1	6.6
Average	6.5	28.5	38.5	47.6	23.2	46.8	66.4	7.07	41.4	6.4

[1] U. S. Dept. Agr., Yearbook, cotton, 1910 and 1911; tobacco,1908, 1910, 1911; all others, Yearbook 1911.

TABLE 81. — AVERAGE FARM PRICES FOR THE UNITED STATES ON DEC. 1.[1] — *Continued*

	Cotton per Lb.	Corn per Bu.	Barley per Bu.	Buck-wheat per Bu.	Oats per Bu.	Rye per Bu.	Wheat per Bu.	Hay per Ton	Potatoes per Bu.	Tobacco per Lb.
1901	—	60.5¢	45.2¢	56.3¢	39.9¢	55.7¢	62.4¢	$10.01	76.7¢	7.1¢
1902	8.3¢	40.3	45.9	59.6	30.7	50.8	63.0	9.06	47.1	7.0
1903	12.2	42.5	45.6	60.7	34.1	54.5	69.5	9.07	61.4	6.8
1904	8.7	44.1	42.0	62.2	31.3	68.8	92.4	8.72	45.3	8.1
1905	11.0	41.2	40.5	58.7	29.1	61.1	74.8	8.52	61.7	8.5
Average	10.1	45.7	43.9	59.5	33.0	58.2	72.4	9.08	58.4	7.5
1906	10.1	39.9	41.5	59.6	31.7	58.9	66.7	10.37	51.1	10.0
1907	10.4	51.6	66.6	69.8	44.3	73.1	87.4	11.68	61.8	10.9
1908	8.7	60.6	55.4	75.6	47.2	73.6	92.8	8.98	70.6	10.3
1909	13.9	59.6	55.2	69.9	40.5	73.9	99.0	10.62	54.9	10.1
1910	14.2	48.0	57.8	66.1	34.4	71.5	88.3	12.26	55.7	9.3
Average	11.5	51.9	55.3	68.2	39.6	70.2	86.8	10.78	58.8	10.1
1911	8.8	61.8	86.9	72.6	45.0	83.2	87.4	14.64	79.9	9.4
1912	11.9	48.7	50.5	66.1	31.9	66.3	76.0	11.79	50.5	10.8

[1] U. S. Dept. Agr., Yearbook, cotton, 1910 and 1911; tobacco, 1908, 1910, 1911; all others, Yearbook 1911 and Crop Reporter, Dec., 1912.

TABLE 82. — AVERAGE WHOLESALE PRICES IN CITIES

	Corn No. 2, Chicago [1]	Oats No. 2, Chicago [2]	Wheat No. 2, Chicago [3]	Beeves, Good to Choice, Live Weight [4]	Hogs, Fair to Good Packing, Live Weight, Cincinnati [5]	Sheep, Good to Choice, Live Weight [6]	Butter [7]	Eggs [8]
1866	57.5¢	39.5¢	137¢	6.9¢	10.2¢	5.6¢	44.4¢	28.4¢
1867	63.0	54.6	133	7.1	6.5	5.1	32.6	27.4
1868	48.0	46.2	84	6.8	8.0	4.7	43.3	32.1
1869	61.5	42.4	70	5.4	9.2	3.9	41.4	31.3
1870	50.0	39.4	95	5.8	8.6	4.1	34.6	31.3
Average	56.0	44.4	104	6.4	8.5	4.7	39.3	30.1
1871	37.5	31.9	109	4.9	5.4	3.5	32.3	25.0
1872	27.5	24.6	103	4.5	4.4	4.9	29.4	26.3
1873	44.5	37.3	101	4.1	4.5	4.8	30.0	28.0
1874	70.0	53.1	81	4.1	6.0	4.8	33.0	28.0
1875	43.5	30.0	87	4.6	7.5	4.9	30.3	25.8
Average	44.6	35.4	96	4.4	5.6	4.6	31.0	26.6
1876	41.5	33.1	111	3.9	6.8	4.8	30.9	22.9
1877	45.0	25.6	106	4.4	5.5	4.5	27.1	21.1
1878	31.0	20.0	83	4.0	4.0	3.9	27.1	16.9
1879	41.1	34.8	128	4.0	3.6	4.0	22.4	18.0
1880	38.8	31.3	102	3.9	4.5	4.7	29.3	16.9
Average	39.5	29.0	106	4.0	4.9	4.4	27.4	19.2
1881	61.0	45.1	127	4.6	5.6	4.9	28.6	22.2
1882	55.1	38.1	93	5.3	7.3	5.0	33.6	22.9

TABLE 82. — AVERAGE WHOLESALE PRICES IN CITIES. — *Continued*

	Corn No. 2, Chicago[1]	Oats No. 2, Chicago[2]	Wheat No. 2, Chicago[3]	Beeves, Good to Choice, Live Weight[4]	Hogs Fair to Good Packing, Live Weight, Cincinnati[5]	Sheep, Good to Choice, Live Weight[6]	Butter[7]	Eggs[8]
1883	58.7¢	32.8¢	97¢	5.1¢	6.1¢	4.7¢	28.5¢	23.4¢
1884	37.4	23.9	73	5.1	5.6	4.8	28.0	22.9
1885	39.4	28.0	86	4.4	4.2	4.1	23.8	19.3
Average . . .	50.3	33.6	95	4.9	5.8	4.7	28.5	22.1
1886	36.9	26.5	77	4.2	4.2	4.6	27.3	19.3
1887	49.1	29.8	77	4.0	5.0	4.5	24.6	21.0
1888	34.6	25.9	101	4.1	5.7	4.7	25.1	20.8
1889	32.1	20.5	79	3.6	4.7	4.8	23.9	18.7
1890	50.4	41.9	90	3.9	4.0	4.8	21.8	19.0
Average . . .	40.6	28.9	85	4.0	4.7	4.7	24.5	19.8
1891	49.2	32.4	91	5.1	4.4	4.7	24.1	20.9
1892	41.4	28.4	71	4.5	—	—	22.6	19.1
1893	35.4	28.3	62	4.8	—	—	25.6	21.1
1894	46.1	29.1	58	4.5	—	—	21.1	16.5
1895	25.9	17.1	59	4.9	—	—	18.8	16.7
Average . . .	39.6	27.1	68	4.8	—	—	22.4	18.9
1896	23.1	17.6	84	4.3	4.3	2.9	17.1	15.7
1897	26.2	22.4	101	4.8	3.7	3.0	17.8	14.0
1898	35.6	26.9	66	4.9	3.8	4.0	18.8	15.5
1899	30.8	22.6	67	5.4	4.2	4.3	22.2	23.8
1900	37.9	22.3	72	5.4	5.2	4.8	23.8	20.5

Average . . .	30.7	22.4	78	5.0	4.2	3.8	19.9	17.9
1901	65.0	45.1	76	5.6	6.2	4.1	21.8	22.0
1902	50.5	30.6	75	6.6	6.9	5.0	26.0	26.3
1903	42.4	36.1	82	5.1	6.0	4.9	24.3	30.0
1904	46.2	30.1	119	5.2	5.3	4.7	22.8	31.5
1905	46.1	31.1	86	5.2	5.5	5.5	26.5	28.3
Average . . .	50.0	34.6	88	5.5	6.0	4.8	24.3	27.6
1906	43.0	34.4	74	5.4	6.1	5.7	26.1	29.8
1907	59.5	48.7	107	5.8	5.8	5.6	29.3	33.0
1908	59.5	49.4	109	6.0	5.8	5.5	27.6	35.0
1909	64.3	42.5	113	6.5	7.3	5.5	31.0	37.0
1910	47.8	31.8	107	7.0	9.0	6.3	27.8	29.0
Average . . .	54.8	41.4	102	6.1	6.8	5.7	28.4	32.8

[1] U. S. Dept. Agr., Yearbook, 1910, page 501, average of high and low cash price for Dec.

[2] *Ibid.*, page 526. [3] *Ibid.*, page 512.

[4] Prices to 1891 are averages for Jan., April, July, Oct., for Cincinnati, from Senate Reports, second session, 52d Congress, 1892–1893. Wholesale Prices, Wages and Transportation, Part II, page 24. Averages for 1891 and later are Monday of each week, in Chicago, Bulletin of Bureau of Labor, No. 99, March, 1912, page 605.

[5] Prices to 1891 are averages for Jan., April, July, Oct., from Senate Report given above, page 27. Averages for 1896 and later are averages of high and low for all months from Yearbook, U. S. Dept. Agr.

[6] Prices to 1891 are prices for Jan., April, July, Oct., for Cincinnati, from Senate Report given above, page 31. Averages for 1896 and later are averages of high and low for all months for St. Louis, from Yearbook.

[7] Prices to 1899 are averages of high and low for Jan., April, July, Oct., for Boston, from Monthly Summary of Commerce and Finance, in the United States, May, 1900, page 3153. Prices for 1899 and later are for New York, from the Yearbook, 1909, page 574, and Crop Reporter, Jan., 1912.

[8] Prices to 1898 are averages of high and low for Jan., April, July, Oct., for Boston, from Monthly Summary of Commerce and Finance of the United States, May, 1900, page 3155. Prices for 1899 and later are for New York, from the Yearbook 1909, page 588, and Crop Reporter, Jan., 1912.

TABLE 83. — TEN-YEAR AVERAGE FARM PRICES, ON DEC. 1, 1902–1911

	CORN	WHEAT	OATS	BARLEY	RYE	BUCK-WHEAT	POTATOES	HAY
	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	per ton
North Atlantic States								
Maine	75	103	50	75	—	63	56	$11.85
New Hampshire	72	—	52	77	—	71	67	14.85
Vermont	70	101	50	68	79	65	57	11.68
Massachusetts	73	—	51	—	86	75	79	17.84
Rhode Island	82	—	51	—	—	—	84	18.74
Connecticut	73	—	49	—	81	80	81	16.99
New York	68	94	45	66	73	65	61	12.80
New Jersey	61	94	45	—	72	69	75	16.42
Pennsylvania	61	91	43	60	70	64	65	14.20
South Atlantic States								
Delaware	52	90	44	—	73	63	65	15.41
Maryland	55	90	43	57	71	66	62	14.62
Virginia	62	95	47	62	76	67	66	14.43
West Virginia	66	97	48	—	79	73	69	14.10
North Carolina	71	106	56	—	93	72	77	14.40
South Carolina	79	120	65	—	129	—	107	14.36
Georgia	76	115	62	—	122	—	104	15.67
Florida	76	—	66	—	—	—	120	16.64
North C. E. Miss. R.								
Ohio	49	90	38	58	69	71	60	11.22
Indiana	44	88	35	57	65	70	61	10.59
Illinois	43	85	35	55	66	80	66	9.47
Michigan	54	88	38	59	66	61	45	10.76
Wisconsin	51	84	36	58	65	68	45	9.94

North C. W. Miss. R.								
Minnesota . . .	43	82	33	49	59	65	46	6.87
Iowa	40	78	31	48	58	77	53	7.23
Missouri	45	83	36	59	68	83	65	8.51
North Dakota . .	50	78	33	45	56	—	51	5.23
South Dakota . .	41	78	32	46	55	—	52	5.18
Nebraska . . .	39	73	31	40	54	78	57	5.82
Kansas	44	77	36	44	62	84	77	6.15
South Central								
Kentucky	53	91	44	65	79	—	68	12.56
Tennessee	55	94	45	70	84	77	70	13.08
Alabama	70	107	59	—	118	—	97	12.92
Mississippi . . .	67	99	57	—	—	—	93	11.40
Louisiana . . .	64	—	53	—	—	—	89	11.85
Texas	60	94	49	78	94	—	99	9.63
Oklahoma	46	79	39	49	71	—	92	6.17
Arkansas	59	90	48	—	90	—	83	10.45
Western								
Montana	75	77	43	60	69	—	61	9.20
Wyoming	67	84	47	68	69	—	73	8.03
Colorado	61	79	48	61	64	—	59	9.01
New Mexico . .	79	94	60	76	—	—	91	11.32
Arizona	97	111	70	84	—	—	—	12.58
Utah	75	78	48	59	66	—	54	7.60
Nevada	—	98	64	76	—	—	77	9.27
Idaho	68	72	45	56	65	—	53	7.36
Washington . . .	69	74	45	55	78	—	54	12.14
Oregon	71	77	45	58	87	—	60	9.64
California	81	91	58	66	83	—	75	11.35

TABLE 83. — TEN-YEAR AVERAGE FARM PRICES. LIVE-STOCK ON JAN. 1, 1902–1911. BUTTER, EGGS, AND CHICKENS, MONTHLY AVERAGES, 1910–1911.

	HORSES	MULES	MILCH COWS	OTHER CATTLE	SHEEP	SWINE	BUTTER	EGGS	CHICKENS
							¢ per lb.	¢ per doz.	¢ per lb.
North Atlantic States									
Maine	$98.75	——	$31.87	$16.94	$3.49	$9.98	29	27	14.4
New Hampshire	92.60	——	34.51	18.31	3.48	10.33	29	29	14.4
Vermont	83.50	——	30.26	14.65	3.74	9.03	29	27	13.3
Massachusetts	110.38	——	40.53	17.11	4.40	10.73	33	34	16.8
Rhode Island	112.53	——	42.22	18.63	4.11	11.20	32	34	17.6
Connecticut	108.13	——	38.73	19.34	4.68	11.65	33	33	16.3
New York	105.82	$112.11	36.15	17.59	4.51	9.64	29	27	14.4
New Jersey	113.12	125.65	43.14	20.76	4.71	11.05	32	29	17.0
Pennsylvania	105.58	115.04	35.50	18.40	4.23	9.11	29	25	13.2
South Atlantic States									
Delaware	91.08	111.71	34.56	19.40	4.16	8.43	26	24	13.7
Maryland	88.57	112.31	31.86	19.26	4.22	7.65	26	22	14.3
Virginia	86.90	107.86	27.11	18.32	3.52	5.57	24	21	13.8
West Virginia	88.22	94.13	30.97	20.97	3.71	6.37	24	21	12.1
North Carolina	97.91	115.30	23.54	11.29	2.32	5.58	23	19	11.5
South Carolina	105.78	128.40	26.36	11.26	2.23	5.93	25	21	11.1
Georgia	104.75	128.20	24.94	10.34	1.98	5.62	24	21	12.8
Florida	89.17	129.25	26.67	9.99	2.02	3.60	30	24	13.5
North C. E. Miss. R.									
Ohio	102.59	100.31	36.03	21.83	3.97	7.78	24	22	11.4
Indiana	97.75	101.23	34.09	21.95	4.40	7.39	22	20	10.4
Illinois	98.19	102.82	36.27	23.72	4.56	8.17	24	20	10.7
Michigan	100.82	93.95	34.83	16.99	4.01	8.20	24	21	10.9
Wisconsin	98.23	90.01	32.29	14.86	3.74	8.73	27	21	11.0

North C. W. Miss. R.									
Minnesota	90.40	90.31	29.11	12.79	3.46	8.66	26	20	9.4
Iowa	91.11	96.23	31.89	22.21	4.44	8.61	25	19	8.8
Missouri	81.03	93.04	29.05	20.37	3.72	6.13	21	18	10.3
North Dakota	87.50	99.93	30.12	18.68	3.40	8.69	23	21	9.6
South Dakota	76.00	84.50	28.65	19.32	3.40	8.52	23	19	8.9
Nebraska	78.28	90.98	29.79	19.62	3.51	8.07	21	18	8.3
Kansas	79.32	89.77	29.80	21.07	3.72	7.56	22	18	8.8
South Central									
Kentucky	84.27	96.06	28.22	18.06	3.45	5.35	20	18	10.4
Tennessee	87.44	99.40	24.03	12.29	2.81	5.30	19	18	10.0
Alabama	79.84	93.10	20.89	8.24	1.89	4.87	21	18	11.5
Mississippi	71.07	98.29	22.07	8.65	1.82	4.79	22	19	11.6
Louisiana	62.14	104.11	24.71	10.38	1.85	4.84	26	19	13.1
Texas	52.85	77.09	24.88	12.87	2.42	5.36	22	17	9.3
Oklahoma	64.57	85.34	26.24	17.25	3.05	6.45	22	18	9.1
Arkansas	65.09	88.67	19.58	8.32	1.98	4.04	22	18	9.9
Western									
Montana	54.08	70.33	39.12	22.66	3.23	9.33	33	33	14.8
Wyoming	49.65	76.33	38.57	23.32	3.27	8.61	30	29	15.1
Colorado	59.85	79.53	35.38	20.11	3.08	8.00	29	26	13.4
New Mexico	33.91	58.00	35.58	16.63	2.59	7.00	32	27	13.1
Arizona	39.74	72.40	39.69	17.55	3.03	7.59	36	34	17.3
Utah	56.16	55.88	32.64	18.12	3.20	8.14	29	24	12.7
Nevada	60.57	68.45	39.97	20.23	3.24	8.30	36	38	17.7
Idaho	63.15	79.21	34.71	18.88	3.24	7.50	32	29	12.6
Washington	81.76	88.75	37.34	18.96	3.34	8.29	33	31	14.3
Oregon	74.11	79.67	34.05	17.67	3.01	6.66	32	29	13.2
California	82.44	96.26	38.37	20.49	3.07	7.10	30	29	14.4

TABLE 84. — TEN-YEAR AVERAGE WHOLESALE PRICES IN CITIES BY MONTHS, 1902–1911[1]

	Corn No. 2 St. Louis	Corn No. 2 Chicago	Corn No. 2 Mixed New York[2]	Oats Contract Chicago[3]	Oats No. 2 Mixed New York	Rye No. 2 Chicago	Wheat No. 1 Northern Spring Chicago[4]	Wheat No. 2, Red Winter New York
	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.
January	50.6	50.8	59.6	38.8	43.8	69	97	101
February	50.9	51.7	60.0	40.2	45.2	71	98	102
March	51.8	52.5	59.2	40.0	45.8	71	95	101
April	54.2	54.1	59.7	40.2	49.6	72	95	100
May	57.4	57.6	62.7	42.1	45.5	74	97	104
June	58.5	59.2	63.5	42.5	47.3	73	98	104
July	60.1	60.5	64.0	42.2	48.2	70	101	99
August	59.1	59.9	64.4	37.1	44.6	68	100	96
September	58.6	59.4	64.0	37.8	41.3	71	98	97
October	56.3	57.1	62.2	37.3	42.5	72	95	100
November	53.5	55.4	60.5	37.1	42.9	72	94	99
December	51.2	52.9	57.9	38.2	43.9	71	95	101
Average	55.2	55.9	61.5	39.4	45.1	71	97	100

[1] Average of high and low, from Yearbook, U. S. Dept. Agr. [2] Eight-year average.
[3] No. 2 grade for 1902–1906. [4] Eight-year average, 1907 and 1908 omitted.

TABLE 84. — TEN-YEAR AVERAGE WHOLESALE PRICES IN CITIES BY MONTHS, 1902–1911. — *Continued*

	Potatoes Milwaukee	Barley No. 3 Chicago	Potatoes Burbank Chicago	Flax No. 1 Northwestern Milwaukee	Timothy Hay, No. 1			
					St. Louis	Chicago	Cincinnati	New York
	¢ per bu.	¢ per bu.	¢ per bu.	¢ per bu.	per ton	per ton	per ton	per ton
January	51.6	61.5	55.1	151	$14.56	$13.40	$15.20	$18.93
February	52.4	61.2	56.5	153	14.28	13.23	14.90	18.85
March	53.2	62.5	57.0	153	14.51	13.27	15.21	19.10
April	58.8	62.7	60.6	155	14.99	13.88	15.81	19.33
May	60.5	63.0	63.9	153	15.70	14.35	16.48	20.22
June	63.9	62.2	71.4	150	16.08	14.45	16.31	20.43
July	62.1	61.2	—	146	15.65	14.60	16.30	20.25
August	61.7	60.2	—	147	14.88	14.83	15.38	20.65
September	57.2	62.8	—	148	14.45	13.80	14.64	18.70
October	49.0	62.7	51.7	144	14.65	13.83	15.48	18.83
November	48.8	63.1	51.9	144	14.89	14.25	15.34	19.38
December	49.3	65.6	52.9	147	15.58	14.40	16.01	19.23
Average	55.7	62.4	57.9	147	15.02	14.02	15.59	19.49

TABLE 84. — TEN-YEAR AVERAGE WHOLESALE PRICES IN CITIES BY MONTHS, 1902–1911. — *Continued*

	Cotton Middling Upland		Head Rice Cleaned Houston	Rice Honduras Cleaned New Orleans	Rice Domestic Good New York	Hops Choice State New York	Beans Pea Chicago	Beans Pea Boston
	New Orleans	New York						
	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.	per bu.	per bu.
January	11.1	11.3	4.5	3.6	4.7	25.0	$1.74	$2.08
February	11.2	11.5	4.5	3.7	4.7	24.9	1.76	2.09
March	11.2	11.5	4.5	3.6	4.7	23.8	1.76	2.04
April	11.3	11.6	4.4	3.6	4.7	22.0	1.68	2.01
May	11.6	12.0	4.5	3.6	4.8	21.4	1.80	2.10
June	11.9	12.1	4.6	3.7	4.8	21.4	1.88	2.14
July	11.9	12.1	4.7	4.0	4.9	21.5	1.85	2.15
August	11.5	12.0	4.9	4.0	4.9	22.2	1.85	2.15
September	10.9	11.4	4.7	3.7	4.8	23.6	1.88	2.15
October	10.6	10.9	4.7	3.7	4.7	28.9	1.90	2.21
November	10.8	11.1	4.6	3.5	4.6	29.3	1.91	2.20
December	11.0	11.4	4.5	3.6	4.6	28.9	1.89	2.15
Average	11.3	11.6	4.6	3.7	4.7	24.4	1.83	2.12

TABLE 84. — TEN-YEAR AVERAGE WHOLESALE PRICES IN CITIES BY MONTHS, 1902–1911. — *Continued*

	Beans Small White Lima San Francisco [2]	Timothy Seed Poor to Choice Chicago [2]	Clover Seed Poor to Prime Chicago	Cattle Good to Choice Native Steers St. Louis	Cattle Inferior to Prime Chicago	Hogs Mixed Packers St. Louis	Hogs Chicago	Hogs Fair to Good Packing Cincinnati
	per bu.	per bu.	per bu.	per 100 lb.	per 100 lb.	per 100 lb.	per 100 lb.	per 100 lb.
January	$2.17	$4.09	$6.95	$6.05	$4.66	$6.14	$5.85	$6.21
February	2.21	4.28	7.02	6.01	4.62	6.33	6.09	6.42
March	2.22	4.21	6.99	6.25	4.73	6.63	6.37	6.80
April	2.18	4.02	6.55	6.45	4.81	6.65	6.44	6.78
May	2.22	4.14	6.28	6.39	4.83	6.49	6.20	6.51
June	2.29	4.12	6.34	6.66	4.81	6.54	6.33	6.55
July	2.29	4.31	6.59	6.77	4.83	6.79	6.55	6.81
August	2.36	4.48	7.04	6.80	4.93	6.79	6.50	6.86
September	2.17	4.77	7.14	6.90	4.95	6.93	6.61	6.93
October	2.20	4.64	7.15	6.93	4.94	6.58	6.22	6.57
November	2.23	4.64	7.04	6.60	4.90	6.06	5.71	5.98
December	2.22	4.68	7.23	6.75	5.52	5.91	5.66	5.99
Average	2.23	4.36	6.86	6.55	4.88	6.49	6.21	6.53

[1] Nine-year average — 1906 prices omitted.
[2] Prime for 1902–1904.

TABLE 84. — TEN-YEAR AVERAGE WHOLESALE PRICES IN CITIES BY MONTHS, 1902-1911. — *Continued*

	SHEEP GOOD TO CHOICE NATIVE ST. LOUIS	SHEEP INFERIOR TO CHOICE CHICAGO	WOOL OHIO XX WASHED BOSTON	WOOL OHIO FINE UNWASHED BOSTON	BUTTER CREAMERY EXTRA CHICAGO	BUTTER CREAMERY EXTRA NEW YORK	CHEESE FULL CREAM ST. LOUIS[1]	CHEESE SEPT. COLORED NEW YORK[1]
	per 100 lb.	per 100 lb.	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.	¢ per lb.
January	$5.20	$4.19	33.5	24.3	25.4	28.4	10.9	13.4
February	5.49	4.40	33.3	24.1	26.0	28.9	11.2	13.8
March	5.85	4.95	33.2	23.7	26.2	28.4	11.4	14.3
April	6.11	5.02	32.6	22.9	25.0	26.9	10.8	14.2
May	5.77	4.80	32.1	22.7	21.3	24.1	10.7	12.3
June	5.25	4.44	32.4	23.0	20.9	22.7	9.8	10.5
July	4.66	4.09	32.6	23.5	20.9	22.8	10.2	10.9
August	4.50	3.84	32.9	23.9	21.1	23.3	10.4	11.4
September	4.53	3.81	33.0	24.1	22.4	24.7	10.6	12.3
October	4.62	3.70	33.2	24.2	23.8	26.0	10.9	12.8
November	4.67	3.71	33.3	24.2	25.2	27.7	11.2	13.4
December	4.75	3.96	33.7	24.5	26.6	29.9	11.3	13.7
Average	5.12	4.24	33.0	23.8	23.7	26.2	10.8	12.8

[1] 1902-1909.

TABLE 84. — AVERAGE WHOLESALE PRICES IN CITIES BY MONTHS. — *Concluded*

	Eggs Fresh Chicago 1902–1911	Eggs Best Fresh New York 1902–1911	Average Price of Horses at Omaha, 1902–1907					
			Carriage Teams 2 Horses	Drafts	Drivers	General Purpose	Southern	Western
	¢ per doz.	¢ per doz.						
January	26.2	32.5	$329	$167	$140	$90	$66	$30
February	23.9	28.3	333	171	140	97	65	30
March	18.5	22.4	338	178	144	101	63	30
April	16.6	19.4	365	194	162	100	60	30
May	16.3	19.6	485	220	226	99	58	32
June	15.6	20.5	473	191	222	99	54	45
July	16.2	22.5	350	171	165	91	53	51
August	17.3	24.0	347	165	160	87	50	62
September	19.2	26.9	342	161	157	89	52	67
October	21.6	31.3	356	168	163	90	58	57
November	24.9	35.4	350	175	174	93	58	41
December	26.7	37.5	333	177	172	92	68	36
Average	20.3	26.7	367	178	169	94	59	43

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