What Is Farming?

Prepared by Specialists in the
United States Department of Agriculture
Under the Editorial Supervision of
Gustav E. Larson

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Issued November 1944

This publication is not available for sale by the Superintendent of Documents

Acknowledgments

We thank the following, who have made this book possible. For outlining and planning the book: Harold A. Vogel, Gustav E. Larson, A. B. Genung, of the Department of Agriculture, and Walter Magnes Teller. For acting as consultant, Gove Hambidge of the U. S. Department of Agriculture. For many helpful suggestions, A. B. Genung. For writing the various chapters: Earl H. Bell, Catherine C. Carmody, Arthur P. Chew, O. H. Cockrel, Nancy Crenshaw, Joe Davis, A. B. Genung, Edward H. Graham, Gove Hambidge, Elco L. Greenshields, Florence B. Kandiner, Charles E. Kellogg, Harald C. Larsen, Gustav E. Larson, Alvin T. M. Lee, Marcelle C. Masters, Orlin J. Scoville, John B. Shepard, H. L. Shrader, A. M. Sowder, Carl C. Taylor, Marshall A. Thompson, F. L. Thomsen, Wm. R. Van Dersal, Hugh Wooten, K. F. Warner, and Howard Zahniser, all of the Department of Agriculture; David H. Eddy of the Federal Housing Administration, and Walter Magnes Teller. The Fish and Wildlife Service of the Department of the Interior prepared the sections on Rabbits, Pigeons, Game Farms, and Fur Farming. For selecting the pictures, Katharine A. Smith of the Department of Agriculture. For editorial review, Roy E. Miller, Esther M. Colvin, Charles M. Arthur. For indexing, Mary A. Bradley and the Indexing Section.

We acknowledge occasional use of material from *The Farm Primer* by Walter Magnes Teller, published by David McKay Company, and *The American Land* by Wm. R. Van Dersal, published by Oxford University Press.

Foreword

This book was prepared by men and women in the Department of Agriculture for men in the armed forces who are seeking to understand farming.

American farmers have always been as handy with the rifle as with the plow. And they have been quick to seize the rifle and leave the plow when their American land was threatened. But never before have soldiers and sailors had the opportunity to study farming while in the service.

There is a great deal about farming that can be learned from study wherever you are. This book, or any other, cannot be a substitute for farm experience, but it can help you to see the job as a whole and find your way around with less of the error of trial.

What Is Farming is for men with or without farm background. It lays before you the whole picture of American farming, big farms and little farms—the growing of potatoes, oranges, cotton, corn, cattle, hogs, or whatever—from Maine to California and the Great Lakes to the Gulf.

Needless to say, there is much more to be learned after you have read this book. It is only the beginning. The book will have served its purpose if, after careful study of it, you can say to yourself, farming is, or is not, for me.

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U. S. Department of Agriculture.

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Farming is a family enterprise. (U.S.D.A.)

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WHAT THIS CHAPTER IS ABOUT

This chapter discusses some of the personal qualities you need and some of the conditions which you should meet if you want to be successful in farming. Each of them is important and the absence of any one might mean failure in your farm venture. The requirements are not discussed in an order of importance; all of them are important and worthy of careful consideration.

YOU HAVE TO LIKE FARMING TO BE SUCCESSFUL

An important requirement for success in farming is a true liking for farm life—a real preference for it above all other occupations. If you can mow hay in the heat of summer and not mind it or can even get some fun out of it, if you have worked with poultry and enjoy it, or if you have been around cows and really like giving a cow the treatment she requires, then farming may be the thing for you. On the other hand, this liking for the farm does not necessarily come from farm rearing, farm experience, or contacts with farm communities. City folks who have never raised a garden may like the country, and farm folks may long for the city. But you can't tell whether your desire for agriculture is a permanent one just by your present personal thoughts in the matter. Maybe a few days on the manure pile or a few cold mornings spent in getting your cows fed and milked would change your mind quite suddenly. After all, about the only thing that can prove that the farm is the place for you is experience of actual farm work, farm problems, and farm living.

YOU NEED SOME SPECIAL ABILITIES

A prospective buyer needs to have some idea of the special abilities he has that will stand him in good stead in running a farm. One of the first questions a prospective farmer should ask himself is: How am I to know, and in what ways can I judge whether or not I will be skillful in handling farm machinery, or in repairing buildings, driving a tractor, handling tools, or helping the sow at farrowing?

If you have already worked on a farm and know what your abilities are you won't need to worry about these questions. But if you haven't had any farm experience you had better ask yourself: Am I a good hand at fixing the car, the house, the plumbing, electric lights? Do I know how and do I like to handle tools? Do I like to do odd jobs and manual work? Do I mind getting up early? Can I practice regularity? Can I plan the efficient use of my time, or do I need a boss to tell me what to do next? For one thing, if you can drive a car, you can drive a tractor. If you can fix a car you will know how to keep a tractor going. If you can find and fix leaks in your house roof in town you can do it on your barns in the country. Then too, what about your family? They need farm aptitudes too. You will need help from them and if they can't do or don't like to do the things required of a farm family, you had better think twice.

But don't overestimate the training and experience required. Farming is complicated, but all modern business is complicated. Like other occupations farming can be learned, and the man who has tested his liking for it need not worry about being able to learn it. With some skill and intelligence, a lot of interest and drive, and patience, he will soon learn enough to get along provided he doesn't make big mistakes at the outset—such as locating on poor soil, paying too much for land, laying out his capital badly, and trying too many things uncommon to local experience. Also, the farm must be big enough to furnish employment for himself and his family. A farmer's wife and the rest of the family, too, will need to help in caring for the chickens, milking the cows, caring for the family

Figure 1. A farmer must be able to make at least minor repairs on his machinery. (U. S. D. A.)

garden, and in many other duties, in addition to preparing the meals and caring for the house. Some of the best advice a fellow can keep in mind is to follow the patterns of successful farmers around him.

MONEY OR CREDIT IS NECESSARY TOO

The requirements for success in farming include money or credit. Usually the farmer himself must furnish a considerable part of the money, although some may be borrowed. Generally it takes several thousand dollars to start even a small farm, and this can be entirely wasted if it is not invested properly. Soil that can produce crops good in quantity and quality, and livestock that will produce good yields of milk and meat, and the necessary machines and buildings in the right proportions are necessary parts of any good farm. Work stock (horses or mules), cattle, and poultry shouldn't cost too much for the buildings they occupy, or for the feed they eat.

The proper distribution of capital among the items of land, equipment, livestock, supplies, and cash for operating expenses will vary with the price of land and the type of farming. On truck, fruit, grain, and cotton farms as much as 90 percent may be represented by the real estate; whereas in a general or diversified farming business the real estate proportion may be from 70 to 80 percent. It is important to have enough capital for livestock, machinery, and other equipment, and for carrying on the business. Beginners usually need more cash in hand than well-established farmers, since getting the business started takes more than to just keep it going. It would be fine if prospective farmers with the necessary aptitude and training could dispense with capital, but they can't.

No one can say exactly how much capital the beginner will need. It will vary with his training, knowledge, and special skills. A man can sometimes start without a dollar of his own, as a farm manager, a farm renter, or an installment purchaser on a contract that requires no down payment. For example, the Bankhead-Jones Farm Tenant Act provides for the granting of loans to tenants for purchasing farms without requiring down payments, and provides credit besides for the improvement of the farms. It is necessary, however, to have some farm goods. In 6 years under this program, the repayments have exceeded the maturities. This experience has shown that the savings accumulated by prospective borrowers are not necessarily the most important consideration in starting farm enterprises. Chiefly, such borrowers must be good moral risks. There are rare instances when trained farm operators can get started without capital of their own through arrangements with landlords and reliable credit institutions. But it is safer, especially for beginners, to have some funds on hand to cover their mistakes, and to tide them over while learning.

THE FARM MUST BE THE RIGHT SIZE AND IN THE RIGHT PLACE

It takes more than just being a good man to be successful in farming. Not only must soil and climate be favorable, markets be good and easy to get to, and community facilities such as stores, schools, and churches sufficient, but the farm must be large enough to employ the family full time and yield a satisfactory living. To be of sufficient size, a farm must have enough good land to grow the crops or raise the livestock necessary to provide the farm family with enough income to maintain a fair standard of living. If the farm is too small, no matter how much work you put in, you will not make a satisfactory living. Remember too, a large farm isn't worth anything if the soil is so poor that you can't grow much on it. A small farm of the same type with good soil would be more likely to give you more income for the hours of work you put in. In other words, it is the number of productive acres that counts, not the total number of acres on the farm.

YOUR SOIL MUST BE ABLE TO GROW CROPS

You can't be successful on a farm unless it can produce good crop yields without too high costs. Be sure to find out what good yields are for a given crop in a given location, and what the farm in which you are interested has produced for the past 10 years. You can get information on crop yields by talking to neighboring farmers and the county agricultural agent. It is good to know, also, whether crops of fairly good yield were obtained by very expensive methods, such as applying a large quantity of fertilizer (which costs from \$30 to \$50 a ton), and by a large amount of work, or were they grown with normal use of fertilizer and crop rotation, and good management.

On the other hand, it should be kept in mind that low yields may have been caused by poor farming rather than poor soil, in which case the condition can be overcome by applying wisely the knowledge you can acquire if you really study farming. It is well to be cautious, however, in assuming that you will be a better farmer than the fellow ahead of you who failed. Throughout the United States abandoned farms are numerous, and persons unfamiliar with the conditions often buy them because they seem cheap. Where the experienced have failed, the inexperienced should be very careful. Before buying such a farm, find out why the previous operator failed, and make sure you can overcome the obstacles that caused his failure.

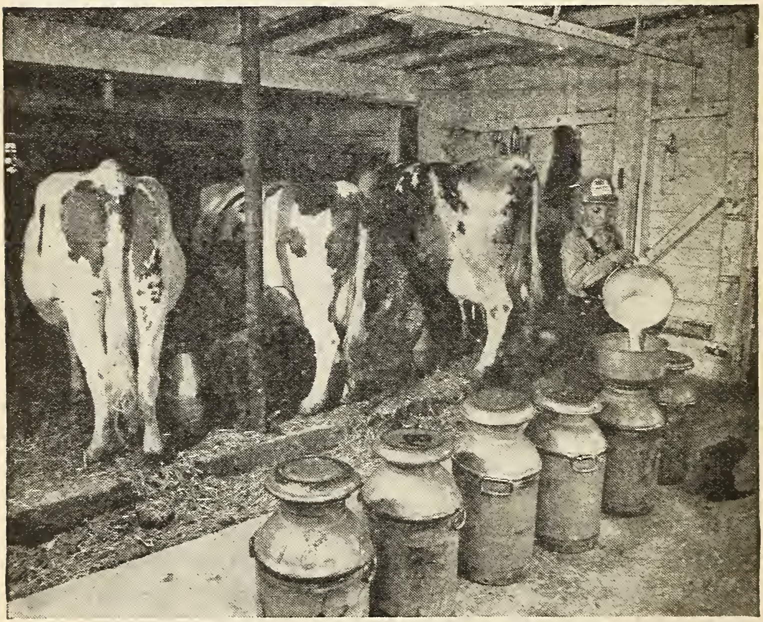


Figure 2. The family needs farm aptitudes too. Their help will be needed often. (U.S.D.A.)

THE RIGHT AMOUNT AND KINDS OF MACHINERY HELP TOO

A wise selection of machinery also contributes to success in farming. On a small farm it is easy to get too much machinery. On a small farm also it often costs less to rent machinery from a neighbor or to hire someone to do the plowing, harrowing, or harvesting than to purchase machinery. It is, of course, equally important on a large farm to have sufficient machinery to avoid unnecessary hand labor and to enable one to perform the various farm operations at the right time.

In the first few years you may try to rent some of your machinery. Another good practice is to arrange to buy some machinery with a neighbor. Such an item as a grain drill, which is used a few days a year, might be bought by two, or three, or more farmers. And that saves money.

AN AGRICULTURAL EDUCATION CAN PROMOTE SUCCESS

It pays to get as much agricultural education as possible. A study once was made of the average labor incomes—that is, the amounts made by farmers in return for their labor, exclusive of interest on investment—obtained by operators on various farms in relation to their education. This study covered the records of 11,000 New York farms from 1907 to 1936, and showed that the men who had attended an agricultural college were operating larger businesses and obtaining higher production of crops and animals than men without such training. The average labor income of men with only grade school education was $213; of high school graduates $528; of business college students $498; of non-agricultural college men $353; and of agricultural school or college men $1,057. Possibly the agricultural college men had other advantages too, such as capital and other assets, in starting to farm. But education in modern ways of farming undoubtedly was important in accounting for these income differences. Some farmers with only a grade school education were making large incomes, but less commonly than the men with an agricultural education.

GENERAL ECONOMIC CONDITIONS INFLUENCE YOUR SUCCESS

New ventures in farming take place constantly, in good times as well as bad, in old as well as in newly settled areas. Some of them prosper, while others fail. Naturally, however, the proportion of successes is high only when the conditions for agriculture as a whole are favorable. It is only the exceptional beginner who can succeed when the demand for agricultural products is declining, and when many experienced established operators are going behind. In fact, under such conditions numerous attempts that otherwise might succeed will surely fail. The beginning farmer therefore, must study the whole economic and social framework for his venture, as well as the local conditions. He needs to have the tide with him. The sooner the farm is paid for and a surplus is in the bank, the sooner he can feel reasonably secure against losses from weather and low prices.

Sometimes the conditions that follow great wars are not favorable for new agricultural enterprise. In the change-over from war to peace there may be unemployment, along with a tendency for agricultural markets and prices to decline. It does not follow that conditions after the present war will repeat those that have followed previous wars; in fact the country seems determined they will not.

The new farmer should look over the prospects. He needs to study one question very carefully indeed. Will the country need more or less agricultural production after the war than it does now, not only as a whole but in the particular lines in which he expects to take part? Even if he decides it will need less, he may still be right to go ahead with his plan, because some enterprises prosper even under discouraging general conditions. He may have good reason to feel that his will be one of this type, but he should figure out whether or not he will be able to stand the grind.

SOCIAL AND CULTURAL VALUES ARE IMPORTANT IN MEASURING SUCCESS

It has been mentioned that success in farming cannot be measured in financial gains alone. The successful farmer is one who leads a satisfactory cultural and social life, who has time and facilities for recreation, who is able to give his children a good education, and perhaps provide adequate sanitary and electrical facilities for his home and farm. But these advantages have their money cost, which will figure to some extent in the initial investment. For example, a farm on a good hard road with electric service available will be more desirable than a farm with equally good land in a poorer location. It will also cost more. Prospective farmers should consider the desirability of a farm as a place to live as well as to make a living. A very important feature in this respect is nearness to schools, churches, and community centers.

It is important that settlement in the neighborhood is not too sparse and scattered; otherwise, the costs of schools, roads, churches, and other community facilities may be too high. Naturally, the farm that has plenty of good farming land around it, with community facilities to match, will cost more than a place without these advantages, but the difference may be well worth while. Sometimes the new farmer has to take a farm where the community advantages are scanty. In that event he should reckon fully with the handicaps, economic as well as social. In any case, he should not pay more than the farm is worth as a business venture, unless the making of a living on it is a minor consideration.

FARM EXPERIENCE WILL PREPARE YOU FOR SUCCESS

If you decide you will have all the advantages here presented or at least most of them, there is still something that you should do before deciding to take up farming as a life work. Get some farm experience on the kind of farm you want to rent or own. It isn't necessary that this testing period be long. In 1 year or even 6 months of the right kind of actual farm work, the beginner can

Figure 3. Work on the farm is never done. When the crops are in fences must be repaired and other odd jobs done to keep everything shipshape. (U. S. D. A.)

learn how to do common farm jobs and find out what kind of farmer he would make.

Men who are short on experience and yet think they want to farm should regard this probationary training as a sensible way to find out if they have "what it takes." This precaution will protect them from wasting their savings if they change their mind about farming. The training period will also enable them to use their money wisely if they decide to give farming a try. This is a good place to tell you to remember that the first step in farming—selecting and then renting or buying a farm—is dangerous if undertaken with no experience at all.

CHECK-UP NO. I

If you have read this chapter carefully you should have an idea of what some of the more important requirements for success in farming are. Circle the response that best completes each of the following statements:

1. To be successful in farming it usually is best to—

   a. Devote all your time to a specialty crop.

   b. Raise as many different crops as possible.

   c. Farm like the successful farmers around you.

2. One of the best ways to determine whether or not you will like farming is to—

   a. Read some farm books.

   b. Go around and look at some farms.

   c. Work on the kind of farm you plan to operate.

3. Education in an agricultural college—

   a. Will be of little value to one who has had some farm experience.

   b. Is liable to result in a better income for those who have it.

   c. Is always necessary for success.

4. In deciding on the size of farm you want it is most important to consider—

   a. How much machinery you will need.

   b. The amount of labor available and the kind of farming you are going to do.

   c. How much livestock you are going to raise.

5. You should be able to get good crop yields from your farm if you are going to be successful. The best source of information on the productive capacity of a farm is—

   a. Neighboring farmers and county agent.

   b. The man who owned the farm.

   c. The Department of Agriculture in Washington, D. C.

6. A good way for the beginner to reduce the cost of equipment is—

a. To rent some of the expensive pieces from neighbors.

b. To buy machinery on time payments.

c. To do without.

7. Chances that the beginner will succeed in farming are better when the general trend of prices of farm products and of farms are—

a. Starting up.

b. Starting down.

c. At an all time high.

Now check your answers with those in the key to the answers at the back of the book. In that key you will find not only the correct answer, but also the number of the page which gives the information needed to answer the question. In case your answer and that of the key do not agree, reread the page in question. Do not just accept the key answer, but find out the facts.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Henry Dean, who used to be a coal miner, has decided to be a farmer because he feels more certain of making a living on the farm. He doesn't like farm work, but he doesn't like coal mining either. What are Henry's chances for success?

2. If a man has little capital with which to begin farming, what qualities should he possess to have a reasonably good chance at success?

3. Under what conditions might a beginner buy land which has been yielding poorly and still hope for success?

4. What are the chief social advantages in living on a farm over living in a city?

Chapter II

The Farm as a Place to Live

STUDY GUIDE

Practically all that you will learn from this course, will be got through reading. One way to improve that reading is to read with a purpose. Reading to answer a question is an example of reading with a purpose. When you are reading to find information needed for answering a question, you are constantly asking: Does this apply to the question? Is this related to the problem? Having such things in mind improves your reading. You know from the chapter heading that this chapter is about the farm as a place to live. Are there questions about that topic which you would like to have answered? Think of some questions to use to guide your reading. Do that now.

Here are some questions that another reader thought of. See if they give you any ideas. (1) Do many people have the notion that the farm is a grand place to live? (2) Does war make people want to return to the land? (3) Is the ability to work alone essential to make life on the farm successful? (4) Does a low income go with living on the farm? (5) Is the farm really a better place to raise children or is that just a saying? (6) Are farmers more neighborly than city people? (7) Is electricity, and all that goes with it, possible on the farm? (8) Is the cost of living on the farm truly lower than that in the city, or is that saying just the result of a false way of figuring?

Did you notice that some of the questions this man asked are not the same as the ones you asked? Don't let that bother you. Two men can use different questions to guide their reading.

Now use the questions to guide your reading.

Plutarch, the famous Roman historian, tells this story. Over 2,000 years ago, a certain nation sent emissaries with a large sum of gold to gain the favor of a prominent Roman citizen. They sought out the powerful Roman and found him on his little farm.

Though he had been three times accorded a public triumph and though he owned many slaves, they found him in the chimney corner of his cottage, busy dressing turnips for the evening meal. After they had made their offers, the great man said to them, "The Roman who owns a farm like this wants nothing you can give. What need have I or any man, who can produce and enjoy such a supper as this, of gold?" He sent them away and went on dressing turnips.

Stories of the attachment of men of all ranks and conditions to the soil, which is the mother of us all, go back as far as written history. Throughout the age-old struggle of mankind to make a living, perhaps no dream has been more appealing than that of a home on the land—a snug, secure place where one could be reasonably sure of enough to eat, of shelter, of warmth, of those elemental necessities of life that the average man thinks of first for himself and his family.

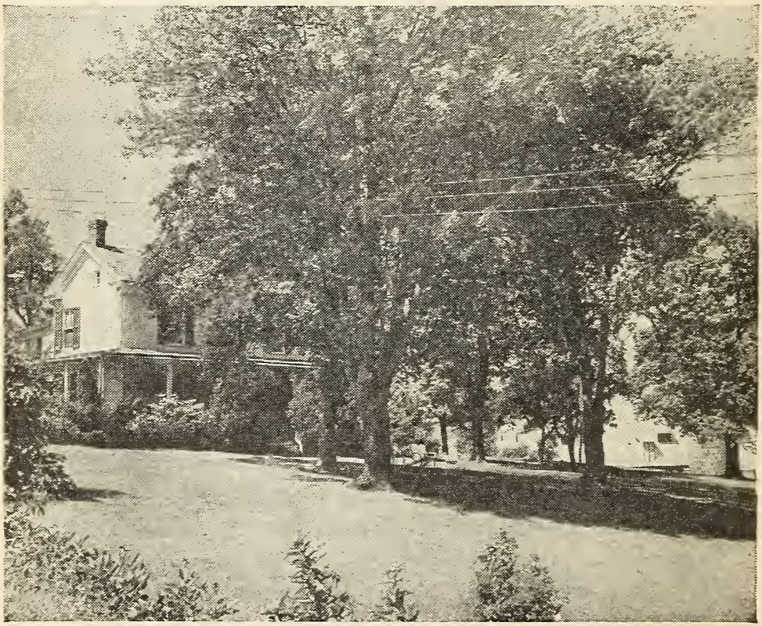


Figure 4. The farm is a home enterprise. It combines business with home in an intimate way. (U. S. D. A.)

Every great war has tended to turn the thoughts of many men toward farming. It seems that the economic disruption and general turmoil of such periods tend to stimulate again that old hope of finding peace and security on the land.

We can look back upon several generations within our own country who have cherished just such a dream—and who have seen it fulfilled. Nor is there any reason to doubt that it is just as attainable now as ever, provided the hope be seasoned with sound common sense and some real understanding of present-day conditions. Certainly no country on earth offers to its young men who want to acquire farm homes a better opportunity than does the United States.

The desire to own a farm may be just as strong on the part of a city-bred man as with one born in the country. But it is especially important for the person who knows nothing of farming to get some practical information about it before he takes any steps in that direction. Farm life and work are quite different from town life and work. Understanding that fact thoroughly beforehand may save some serious disappointments, losses, and heartaches. The city man can become just as good a farmer as one who has grown up on a farm, but he has more to learn.

One fact peculiar to the farm is that it is a home enterprise; it combines business with home in an intimate manner scarcely true of any other vocation. The average farm, of the type discussed in this book, is literally a place where a family makes its living. Its use and worth as a home thus becomes one of the first and most important things to consider.

YOUR TEMPERAMENT SHOULD FIT THE LIFE

The person who is considering farming as a life work should consider his likes and dislikes with respect to farm life. There is a certain temperament which is fond of natural surroundings—fields, trees, streams, animals, growing things, the outdoors—and who can get along well without constant contact with many other people. There is another kind of temperament which is happiest among crowds and bright lights, the activity of city streets, and who prefer the easy reach of shops, stores, urban social life, and conveniences, and a job in a factory, office, or store with regular hours and pay. The man who wants to quit work when the whistle blows and who, after supper, likes to stroll around to the cigar store or perhaps play a friendly game somewhere, is not likely to be happy working alone all day in the fields, doing chores around a barn, or spending his evenings, year in and year out, cooped up in the isolation of a farm home. The question of likes and dislikes, therefore, is more important than it sounds; it should be well weighed beforehand.

YOUR WIFE SHOULD LIKE FARMING TOO

Moreover, it is just as important that the likes and dislikes of the prospective farmer's wife or his wife-to-be be taken into consideration. The woman's part in the making of a successful farm is of vital importance. Many farm jobs are brought right into the house and handled there. Eggs are often cleaned for market in the house; in many cases butter is made there; more than likely the hired man, if there is one, will be boarded in the household. Meat is cured, fruit and vegetables canned, and numerous other jobs are done in the farm kitchen. Will the wife welcome this kind of activity within her domain? Is she the sort who will be glad to cooperate in furthering these little side industries of the farm business; will she, if necessary, cheerfully take on such jobs as milking, making butter, raising chickens, and working in the garden?

The farm will turn out to be a good place to live only if the man and the woman find some pleasure in this kind of life.

Now if you and your wife or your wife-to-be have the liking, what else is to be said for and against farm life?

ADVANTAGES OF FARM LIFE

One thing about farm life which appeals to many is the fact that the farmer is his own boss. This does not mean that one operating a farm is not subject to all the general conditions and limitations imposed by our broader economic life. Debt, taxes, labor problems, transportation problems, low income, and a hundred and one other circumstances hedge him about and impose their restraints. But the fact remains that when the farmer goes out to work in the morning he picks his own task, works at it in his own way, and changes or stops work at his own will, and not according to the orders of a foreman. Even though there is hard work to be done and the hours are long at some seasons of the year, he does not have to punch a time clock, please some petty boss, or endure the jealousies, bickerings, or wirepulling of the shop or office. He is not going to be fired because of his age or at somebody's whim. There is this certain independence about farming which for many centuries has tended to make the farmer a forthright, upstanding, and often strongly individualistic figure.

If one who is fond of farm life were asked to mention some of its advantages, possibly he or she would stress the wholesomeness of the country home. Out in the rural countryside there is space; there is clean, fresh air; there is closeness to nature—the sunshine, flowers, trees, and streams. The round of daily living, work, and pleasures go on under conditions which promote good health, mental as well as physical. The farm is a good place to bring up children. It supplies one of the greatest of childhood needs—some useful work to do. There are no city gangs to worry a parent, no shady pool halls or juke joints, and few of those breeding spots of mischief which are frequent in cities.

Social contacts in the country are limited it is true; but frequently there is a spirit of neighborliness, a bond of friendship within the community which contributes to a very durable social system. One does not live on a farm for years and not get to know his neighbors—a common experience in city apartments. Out in the country you are likely to know your neighbors. The families up and down the road are friends of yours and usually can be counted on in both good times and bad. However, this is not true of all communities and where congenial company is lacking a newcomer may be unhappy.

There are many physical advantages about the farm home nowa-

Figure 5. Many farm families raise practically all their own food. (U.S.D.A.)

days which did not exist years ago. It used to be that the farmer and his family lived very isolated lives, cut off from most of the contacts which we now think of as essential. But that is no longer true. With good roads and automobiles one can now get to town or to the doctor, the children can go to school, and the family can go shopping, attend church, or find entertainment almost as easily as can the city dweller. There is the miracle of electricity, which today has reached no small proportion of the farm homes of the United States. This alone makes a great difference in the comfort and convenience of farm life; electric lights and the common household electrical equipment can be enjoyed on thousands of farms now just the same as in town. The radio, modern mail service, and the telephone, all play their part in breaking down that old wall of isolation that used to surround the farm home.

Questioned further about the advantages of farm life, its devotee will likely mention the fact that it provides a living for the farm family. This is an important consideration, especially where one has a large family. The farm does or can furnish a very substantial part of the family living. The housewife who lives in a city knows only too well that she must open her purse for every smallest item of food and every gadget needed by her family. But on the farm, if things are managed wisely, the outlay of money for the daily living can be cut to a comparatively small figure. Many farm families raise practically all of their own meat—pork, beef, lamb, chickens, and even rabbits, pigeons, and the like. A flock of hens will supply eggs as well as meat. Milk, butter, fruit, potatoes, vegetables, together with the wild berries, and nuts, which may be had for the gathering, round out a diet such as would cost a great deal of money in the city. The farm garden alone, if it is of good size and well cared for, is the source of an amazing amount of food for the whole year.

It is a heart-warming experience to go around a farm home in winter time and see the store of good things to eat. There may be shelf upon shelf of canned meats, vegetables, and fruit; bins of potatoes, sweetpotatoes, onions, turnips, beets, carrots, apples, pears; cabbage and celery packed in earth; bags of dried corn, beans, and peas; the pork barrel, and hanging overhead those smooth brown hams, shoulders, and sides of bacon; cans of sirup and honey; kegs of cider, vinegar, and perhaps wine; crocks of butter, and cans of lard; a basket of eggs; even earthen pots sprouting their clumps of green parsley and mint. Not all farm homes have all of these things, but most have some of them—not to mention the quick-freezing units in some homes or the community freezer lockers nearby.

There is the matter of wood for fuel too. In the farm woodlot is stored, ready for the taking, a fuel supply which will provide for the kitchen stove and fireplace and, if one is ambitious, will run a furnace or living room stove. Many farmers burn coal or even oil nowadays, but in many sections of the country there is plenty of wood on the farms. It is a comfortable feeling to know that one has fuel within reach, no matter what conditions may exist with respect to transportation or to labor difficulties; and a good woodpile, cut in the slack winter season, can reduce the year's fuel bill.

There is even something to be said about the economy of clothing on the farm. Of course, the day of homespun has gone by; nevertheless it is still true that the item of clothing is much smaller in the budget of the farm family than in that of the average city family. This is true partly because the work is different and partly because the conventions which set more exacting standards of dress among urban streets, crowds, and schools do not apply in the country. Father, mother, and the children all require less money for clothing and shoes on the farm than in the city, on the average.

Surveys made in all parts of the United States show that the farm furnishes its family with from two-thirds to three-quarters of the total living costs included under the headings of food, fuel, and shelter.

Figure 6. The farm woodlot supplies fuel for the kitchen stove and fireplace, furnace and living room stove. (U. S. D. A.)

The possibilities of a small farm as a home for workers otherwise employed are so great that this subject deserves special attention and will be dwelt upon at greater length later in this book. Ordinarily this presupposes a place located fairly near a town, preferably on a paved road, with electricity, and all the advantages and conveniences possible. Thousands of families have acquired such small farms where they can keep a cow or two, chickens, pigs, raise a big garden, perhaps have their own wood, and otherwise enjoy the advantages of living in the country while the breadwinner works in a nearby factory or town. It is not unlikely that in the years following World War II there will be some decentralization of industry which will include plans for farms or semirural homes for factory workers.

DISADVANTAGES OF FARM LIFE

It must not be supposed, however, that farm life is without its disadvantages. We have mentioned the element of isolation, a feature which still exists, in degree, and which alone causes many men and women to turn thumbs down on it.

Many of the accepted conveniences of modern life, things which come as a matter of course in urban homes, require considerable effort to obtain on the farm. Municipal water, sewage, gas, and electric systems do not exist on the farms. When you buy or rent a farm home you don't automatically get a central heating system, a bathroom (or even water piped into the house), electricity, or perhaps even a tight roof or a concrete floor in the cellar. Most of the houses on American farms were built years ago; the modern conveniences have had to be added since—or still remain to be added. These things must be considered as individual problems, each by itself, and cannot be simply assumed as already assured features of the farm home, as is true of the city house.

An electric power line may pass close by the farm you are interested in, yet it may require quite a lot of effort and expense to get electric current actually brought into your buildings. There may be a good well or spring close to the house, but the job of piping that water into the house, plus all the cost of electric motor,

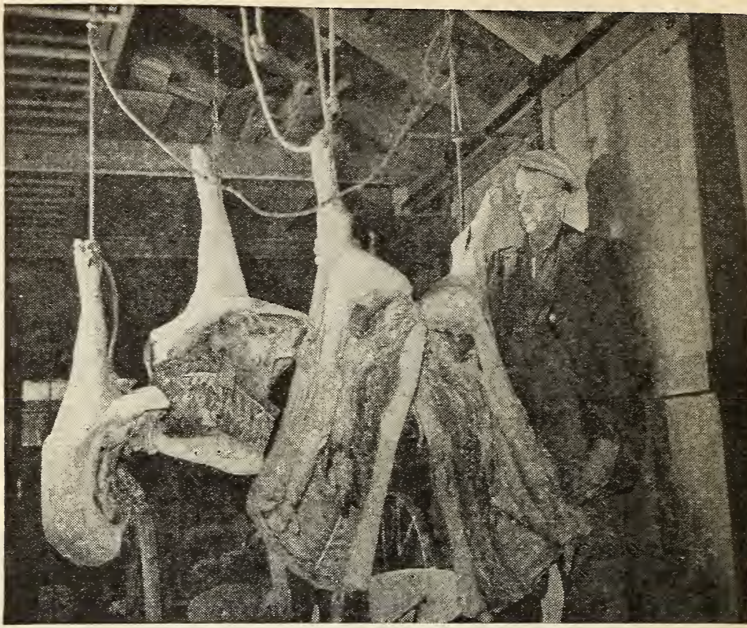


Figure 7. The farm provides much of the family's living. Many farm families raise most of their own meat. (U. S. D. A.)

pump, pressure tank, and sewage disposal system may still be awaiting you.

It has been the fashion sometimes to make much of farm life as the simple life. Nothing could be further from the fact in respect to its material aspects. The establishment and maintenance of a modern home out in the open country is a complex job compared to the same job in town. The farm dweller must, in the last analysis, be almost completely self-reliant.

If the water has frozen upon a zero morning, he has to remedy the situation single-handed; there's no handy janitor or plumber to call. If a shingle blows off the roof, he has to climb up and fix it. If the automobile develops a flat tire, a horse has colic in the night, a window gets broken, a marauder raids the hen house, the cellar drain plugs up, or an overheated stovepipe sets the kitchen ceiling afire, the man of the farm must rise to the occasion—at once and adequately. This is not the simple life, in that sense; it is a life of complexity, requiring great resourcefulness both of hand and mind. The "simple life," by comparison, is to be found in a city apartment; there things are done for you—all you have to do is pay the rent!

Figure 8. Most farms have storerooms well stocked with fruit, vegetables, and canned foods for winter use. (U. S. D. A.)

There are other disadvantages about farm life which will loom up in varying proportions to different people. Some will miss the schools, churches, libraries, art galleries, or other cultural centers of the city. If there are one or more old persons in the family they may fear the lack of easy access to a doctor or hospital. Those who like to travel or take vacation trips may rue the confining routine which is inseparable from almost any pursuit of animal or poultry husbandry.

It is not necessary, for present purposes, to catalog all of the virtues and drawbacks of farm life. The purpose is merely to point out that both of these exist, and that the wise thing is to look at them with open eyes before you take any step or tie up money that may later lead to regret.

THERE ARE MANY SUCCESSFUL AND MANY UNSUCCESSFUL FARMERS

There are more than six million farms and farmers in the United States. Many farm families have found the farm a good place to live; but many haven't. Many have been unsuccessful. In fact in 1941 about 47 percent of all rural farm families had money incomes of less than $650 a year. The average total income of this group, which includes the value of the food raised and the rental value of their buildings and other noncash benefits, was about $1,150. These income figures are for a family of four. Everyone knows that four people can't live well on an income of that size. It is important, therefore, that a young man interested in going into farming think carefully about the hazards involved. He might do well to talk to unsuccessful low-income farmers as well as to successful ones. From those who have failed he may learn a good deal and be much wiser for having talked to them.

CHECK-UP NO. 2

By doing the exercises in this check-up, you can find out how well you have learned the material in this chapter. In each of the following questions underline the correct answer. There may be more than one correct response.

1. Which of these phrases is probably more descriptive of farming than many other jobs?
   a. Requires hard work.
   b. Offers more free time.
   c. Combines business with home.

2. Why can farming be a real character builder for children?
   a. Because of the fresh air.
   b. Because it offers useful work to do.
   c. Because there are so many places to play.

3. If you run a family-size farm, what portion of food, fuel and shelter costs can you expect from the farm?
   a. About two-thirds to three-quarters.
   b. All.
   c. About one-fifth.

4. In matters of convenience, how does present day farming compare with living in the city?
   a. As many conveniences as the city.
   b. Fewer conveniences than the city.
   c. Practically no conveniences at all.

5. In 1941 what percentage of our six million farmers had a total income (money, food, etc.) of less than $1,200?
   a. Nearly 50 percent.
   b. About 20 percent.
   c. About 75 percent.

6. Why did the old Roman referred to in this chapter refuse the offer of money?
   a. It meant giving up his Roman citizenship.
   b. He had already had all the triumphs he desired.
   c. It meant leaving the farm.

7. The farm as a place to live has appealed to men of all ages because of:
   a. Man's innate desire to be alone.
   b. Man's desire to supply his own necessities.
   c. Man's desire to be in the sunshine and open air.

8. Facilities for entertainment, shopping, and education for the farm dweller compare how with those of the city dweller?
   a. The farm dweller is far behind.
   b. The farm dweller is nearly up with the city dweller.
   c. The two groups are about equal.

9. The farm is generally considered a more economical place to live than the city. For which of these items is that not usually true?
   a. Clothing.
   b. Fuel.
   c. Electricity.
   d. Canned foods.

10. Which of these people is more than likely to be living the simple life?
   a. The small farmer.
   b. The small rancher.
   c. The large rancher.
   d. The apartment dweller.

Compare your answers with the answer key in the back of the book. In case your answer and that in the book do not agree, go back and reread that section of the book in which the essential information is given. The number in parentheses following each question gives the page where the information is found.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Since conditions today are so different from what they were in Roman times, why did the author include the story of the old Roman farmer?

2. In deciding whether or not your temperament is suited to the farm, you should ask yourself a number of questions. One of these

questions is, "Do I long for daily contacts with other people?" What are some other (5 to 10) questions of this type that should be asked?

3. A young man planning his future knows that his wife does not like the work that most farm women are called upon to do. The young man made his plans so as not to include any outside help from his wife. In what ways are the young man's plans weak?

4. Food grown on the farm is one reason why farm living is more economical. Since labor is required to produce this food, is it not true that the farmer just works more than the city worker and does not live more economically? In answering the question, give as many reasons as you can to support your point of view.

Chapter III

The Farm as a Business

STUDY GUIDE

Before reading this chapter, you will find it worth while to consider what ideas you may already have about the "business of farming." Below are seven general questions about farming as a business that almost everyone asks. Keep them in mind as you read this chapter.

1. How safe is farming from an income standpoint?
2. Do some types of farms produce better income than others?
3. How much have machines affected the hours of work on the farm?
4. How does the average farmer's income compare with that of the city worker who is getting about $1,500 a year?
5. How does the income based on per man hours from farms in various parts of the United States compare?
6. About how much a year does a cash grain farmer in the corn belt make?
7. Do I need much money to get started?

FARMING HAS CHANGED

Making money from the farm is paramount. That statement reminds us that the concept of farming has changed within recent years.

In the days of our great-grandfathers and for centuries before, the central idea in farming was to raise a living for the family entirely on one's own land. The successful farmer was the man who did just that—who produced crops and meat enough for a year's food; wool, cotton, or other fibers for clothing; grain and roughage (hay and fodder) for the livestock; fuel for the fireplaces. Whatever surplus could be grown was bartered for such necessities as the farm did not provide, but these were few. The farmer's problem, year in and year out, was one of production. He neither saw nor needed much cash.

Times have changed. That old, self-sufficient scheme of things has given place to the modern commercial economy, with its infinite division of labor and its endless exchange of goods and services, all carried on through the medium of money. The farmer's job, formerly one of applying skill and muscle to grow enough to live on, has become one of organizing his capital, labor, and land into an efficient business that shows money profit.

In the days of cheap land and the barter system, what we think of as modern business principles played little part in the year's operations. But today, with substantial capital invested, with higher wages to pay, with heavy fixed charges—taxes, interest, insurance—and innumerable expenses and costs of production to be met in cash, a farmer must have a money income sufficient to make ends meet. His problem now is one of business management.

FARMING IS NOT A MECHANICAL INDUSTRY

One fact remains, however, and it makes the business of farming somewhat different from almost every other. Farming is still a biological rather than a mechanical industry. It still centers in live plants and animals; its processes are still those of growth and reproduction. This fact has important effects. For one thing, it makes the farm business one of slow turn-over. This has a bearing upon efficient management; a mistake made in a factory process can be corrected perhaps within a day or a week, but a mistake made in crops or livestock often cannot be corrected until the next year. It affects the hours of labor. Cows must be milked early in the morning and again in the evening. A sow just having pigs, or a brooder house full of baby chicks, or a field of ripe strawberries, or of hay in the windrow may demand a 20-hour day; while at other times the work may be slack. These peculiarities raise their own problems of management.

When you compare farming to other occupations, the question of how much money can be made is of considerable interest. It is,

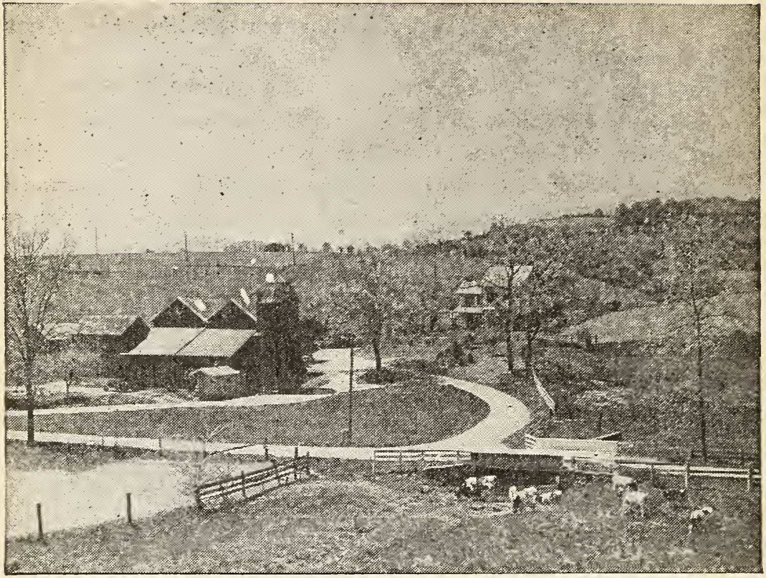


Figure 9. A diversified farm in the East that has proved successful as a business venture. (U. S. D. A.)

in some respects, rather difficult to make a clean-cut estimate of the farmer's income that is comparable with an urban wage or salary, because so large a part of the former is received in kind rather than in cash. Also confusion may arise in attempting to measure what part of income should be credited to the use of capital and what part to the farmer's labor.

On large plantations and ranches where capital is the important element, probably the best way is to express the financial return as a percentage on the investment. But on the average family type farm, the labor of the owner and his family is the more important element; here it is probably better to make an allowance for interest on the capital and then express the remaining income as a return for the owner's labor. Such a figure is often called the "labor income" or by some equivalent term. It means the amount of money a farmer has left for his year's work after paying all expenses and interest on his capital invested.

SOME INCOMES FROM AVERAGE FARMS OF VARIOUS TYPES

What can an average American farmer hope to make in ordinary times? Many surveys and studies have been made bearing on this question. The United States Department of Agriculture has reported the yearly averages taken from thousands of farmers' account books. Some of the farm incomes these books show are given below. "Farm income" is the amount derived by deducting farm expenses from farm receipts; in other words, it is the amount of money the farmer has at the end of the year to show for both his labor and capital. In computing farm income for any particular year, however, it should be borne in mind that the family has had its living from the farm, which may be a considerable item. The years shown are fairly typical of good, bad, and medium.

Figure 10. An Eastern farming venture that failed. (U. S. D. A.)

Several hundred cotton, peanut, livestock farms in Alabama; 1928 to 1939; yearly farm income of $132 to $1,191; some lost money.

Twenty-two truck farms in Florida; years 1934–1935; size 221 acres (151 acres in crops); farm income of $720 (poor year).

Thirty-seven farms in Illinois, selling hogs, cattle, and crops; year 1939; average size 225 acres; average total capital $21,864; average farm incomes of $1,871.

One hundred forty-two general farms in Iowa selling chiefly cattle, hogs, and crops; year 1939; average capital $37,380; average farm incomes of $3,254.

One hundred eighty-four wheat farms in Kansas; year 1936; average size 894 acres; average capital $22,093; farm incomes of $437 (poor year).

Seventy-nine wheat and livestock farms in Kansas; year 1939; average size 359 acres; average farm income $1,384.

Thirty-two tobacco, cattle, and hog farms in Kentucky; year 1937; average size 136 acres; farm income $933.

Twenty-seven wheat, corn, and cattle farms in Nebraska; year 1939; average size 1,161 acres (451 acres in crops); capital $29,133; farm income $2,327.

One hundred farms in New York selling chiefly grade A milk, cattle, and cabbage; year 1936 average size 198 acres; capital $19,301; farms income $2,014.

One hundred seven tobacco and cotton farms in North Carolina; year 1937; average size 131 acres (44 acres in crops); capital $5,194; farm income $753 (good year).

One hundred eleven cotton farms in Texas; year 1939; average size 112 acres; capital $6,962; farm income $782.

One hundred six cattle, sheep, and goat ranches in Texas; years 1925–1928; average size 7,680 acres; average capital $135,672; farm income $12,708.

Forty-nine dairy farms in Wisconsin; year 1936; average capital $23,300; farm income $2,584.

Seven hundred forty farms of all types in Iowa; year 1939; average size 175 acres (119 acres in crops); average capital $20,577; farm income $1,490; labor income $461.

These figures are representative of farm incomes mostly in reasonably good years. Over a long period of years farm accounts show many instances of loss and some of much higher incomes than here indicated.[1]

When the farmer's income is compared to that of many city workers and small business men, it seems lower—and through some periods it does run considerably lower—but over a lifetime there is less difference than might appear. City wages and salaries are deceptive because of the higher costs of living. The farmer, moreover, has his savings invested in what ordinarily is one of the safest forms of property; and over the last four or five generations the gain in value of farm property, in some of our main agricultural regions, has added a substantial amount to the assets of farm people. How-

[1] United States Bureau of Agricultural Economics, "Summaries from Farm-Business Analysis Studies in the United States, 1907–39," by H. W. Hawthorne. Processed report issued December 1941.

ever, it would be wrong to infer that farming, on the average, offers large money income. On the whole, it does not, although few vocations can assure a more dependable or a better living.

SOME EXAMPLES OF SUCCESSFUL FARMS

The Department of Agriculture has made studies of records kept by groups of farmers in various regions, covering investment in the farm, amount of time spent on farm work, and return on investment. From these records can be drawn the broad outlines of a typical successful farm in a particular area. They give one a general idea of what to expect in certain types of farming.

Of course, each farm has its individual characteristics. But in the accompanying descriptions of farms, the variations are left out, and the main features are combined to make a composite general picture of a farm that is a typical example for its area. Each example is described as though it were one specific farm.

Experience has shown that these typical farms are about the right size and involve about the amount of work a farm family can handle comfortably. On most of the farms a family with growing children can do the regular work, although extra labor may be brought in at times like haying or harvesting. Some of the farms are large but the land is worth less per acre and so the total investment is no greater than for some of the smaller farms.

The figures in the typical examples are 1935–1939 figures. They do not reflect high war costs and prices nor the low returns of the drought-depression period before 1935. Conditions now are too uncertain to know whether these prices, costs, and incomes may be expected after the war.

The typical farmer represented on these farms is an able-bodied man who has passed the beginner stage and has come to know farming in the locality. The income figures include the value of crops and livestock used in the home, usually amounting to between $300 and $500.

A Wheat Farm in the Winter Wheat Region. This farm of 605 acres is larger than several other types, and the investment in machinery is high. Land and buildings are worth $14,000 and machinery and livestock another $2,200. When machine methods are used as on this farm, however, wheat requires less time per acre than most other crops. Over 450 acres are cropped and the work takes an estimated 3,100 man-hours a year. About four-fifths of the work is done by the operator. There are 2 work animals, 3 milk cows, 15 other cattle, 5 hogs, and 93 chickens. These give the family work and added income in off seasons. The total net income (income after expenses of running the farm) equals $2,225.

Cash-grain Farm in the Corn Belt. This farm, and in fact most cash-grain farms, can be found on the most productive land in the Corn Belt. It is larger than other Corn Belt farms, 212 acres. The investment in land and buildings is $22,300, and in machinery and livestock $2,700. The operator does about two-thirds of the work on this farm, the total work hours amounting to 4,200. As on the winter wheat farm, some livestock are kept: 2 work animals, 4 milk cows, 10 other cattle, 25 hogs, and 113 chickens. The income is about the same, $2,225. A large proportion of the crops raised on the 168 acres of cropped land are sold. Although this farm is profitable and not as confining for the family as many other types, there are some disadvantages to being so dependent on a cash market.

Mature Orange Grove in Southern California. Investment in an orange grove is a costly business. This 20-acre grove, which is about 20 years old, is worth approximately $43,000, including the land, buildings, machinery, and work stock. Although one man keeps up the grove by working 1,500 hours a year, harvesting and work to protect the grove from frosts require 5,000 more hours of labor, usually labor hired on a contract basis. This farm yields about 240 packed boxes of oranges to an acre every year. No other crop is grown on the land, no livestock is kept, and the owner does not live on the property. The net income from the grove totals $1,525.

Two-mule Cotton Farm in Georgia. This farm, typical of many in the Southeast, is small, 82 acres. Investment is also small: $1,600 in land and buildings, $500 more in machinery and livestock, which includes two work animals. The cash income from the 47 acres of cropped land, $525 net, likewise is not large although it is sometimes supplemented by work outside of the farm. Because there is almost

Figure 11. Harvesting wheat on a one-crop farm in the Southwest. (U. S. D. A.)

no other local market, only enough other crops and livestock are produced to fill the family needs: 2 milk cows, 4 hogs, and 34 chickens. A mild climate and low family living expenses partly compensate for the low income; the garden and livestock provide much of the living for the family, and there is timber for fuel and other uses.

Figure 12. Preparing the land for cotton on a one-crop farm in the South. (U. S. D. A.)

Hog and Beef Raising in the Corn Belt. Beef cattle take less labor than dairy cattle and so more stock can be kept, although of course they need more feed. The 35 cattle and 42 hogs on this farm eat farm-grown roughage, and pasture on land that is not suited for crops. One hundred twenty-seven acres of the 191 acres on the farm are cropped, including the acreage producing grain and forage for the livestock. Besides the cattle and hogs, the farm has 4 work animals, 4 milk cows, and 111 chickens. Altogether it takes about 5,000 hours to get all of the farm work done, which means the operator can accomplish about 60 percent of it. His net income is about $1,700. The land and buildings are worth $15,000, machinery and livestock another $3,800.

Dairy-Hog Farm in Minnesota. The number of dairy cows and hogs on this 160-acre farm in southern Minnesota is limited to the number the operator can handle with only a small amount of help. This farmer keeps 12 milk cows, 13 other cattle, and 9 hogs, besides his 5 work animals and 120 chickens. If more labor were available, livestock production could expand. The land and buildings investment equals $14,500, and machinery and livestock another $4,300. Total working hours are 4,500, and total net income $1,650. One hundred nine acres of the farm are cropped.

Dairy Farm in Central New York. Only 53 acres of this 140 acre farm is in cropland; the rest is pasture and woods. The operator buys most of the grain and other concentrated feed to support his 16 milk cows, 7 other cattle, 2 work animals, and 103 chickens. Three hogs are produced mainly for home use and local slaughter. The growing children in the family help with the chores before and after school hours, contributing time to the 4,800 hours of work required per year. The investment in the farm amounts to $4,900 in land and buildings, $3,200 in machinery and livestock. Milk is produced for city consumption, yielding the bulk of the net income of $1,475.

Beef Cattle Ranch in South Dakota. This is a 90-cow ranch in central South Dakota on which feed is grown to carry livestock over the winter. The farmer with his wife and children handle the 3,600 hours of work on the ranch. He has few opportunities for work away from the home place, but on the farm he crops 200 acres of the 2,140 and, in addition to 107 cattle, keeps 5 milk cows, 7 work animals, 4 hogs, and 100 chickens. Investment amounts to $14,600 in land and buildings, $7,200 in machinery and livestock. Although occasionally drought in the area reduces the family's income, ordinarily about $1,250 can be expected if no outside labor is hired. Income would be larger if the crop year were not so short.

Cattle Ranch in Arizona. The National Forest and other public lands are the grazing lands for the 394 cattle belonging to this ranch. Actually the size of this farm is only the 200 acres used for headquarters. The two grown men in the family do the 4,400 hours of work, with some extra help at round-up and branding times. If there were not two grown men, a year-round cowhand would have to be hired to take care of a ranch of this size. Ten work animals are the only livestock besides the cattle. The investment is more than $27,000—most of it in livestock and improvements. Although expenses are high, the expected income is higher than on most other farms described here, about $3,050. Each worker earns about 68 cents an hour for 2,200 hours of work a year.

Poultry Farm in Southern New England. This farm has many advantages. It can be operated on very little land, it is close to a large market, and it gets high prices for good-quality products. Beyond the space for buildings, all that is needed is enough grass range for the young stock to start on clean ground every other year, about 10 acres in this case. The quality of the soil is not important except that it should be well drained. No crops are grown except in the garden. The family could have kept a few head of livestock, but it did not.

The total investment is $6,500 for land and buildings, $2,500 for machinery and livestock. This covers the cost of 1,500 layers which produce approximately 12 dozen eggs apiece. Replacements are raised from baby chicks. Occasionally help from the family and hired workers enables the operator to handle the 3,500 hours of work. The income after expenses are paid is about $1,500.

A FARM BUSINESS MUST BE CAREFULLY ORGANIZED

Modern farming requires capital but undue emphasis should not be placed upon the capitalist nature of the farm business. The farm employs capital and its owner is under the necessity of directing the use of that capital according to certain standards of efficiency. In the case of the average family farm, the emphasis belongs rather upon the labor involved than upon the capital. The farmer is essentially a worker who owns his tools of production. His great and ever-present problem is to organize the business in such a way as to make the most profitable use of his own time, his family help, hired help, horses, tractors, and equipment. Men and horses should be busy at productive work throughout the year if the business is to show a profit.

Some men who lack sufficient capital to buy the kind of farm they want solve the problem by becoming tenants for a few years. It is possible, in most regions, to rent almost any kind of farm either for cash or on shares. The tenant supplies all the labor and quite commonly the work stock (horses or mules) and some or most of the machinery. In a dairy region the cows may be furnished by the landlord or by both parties. In the Cotton Belt there are many small tenant farmers working on shares, the landlord often supplying nearly everything except the labor. Tenancy arrangements differ in different sections of the country, but in the better agricultural regions they are generally worked out to the mutual advantage of both parties. Throughout the Central States, tenant farming is prevalent and offers a steppingstone for the young man who hopes later to establish himself as an independent owner.

THE ESSENTIALS OF AN EFFICIENT FARM BUSINESS

Now what are some of the prime considerations that enter into an efficient farm business? In every section of the country and in every line of farming some men achieve greater success than others. Why is this? How does one farmer organize his business in such a way as to make more money, one year with another, than the average of his neighbors?

In asking such questions as these we are, of course, trying to get to the core of the farm-management problem; and in making any reasonable answer we must begin by saying that there isn't any magic secret or formula that tells the whole story. Many things enter into the conduct of a profitable farm; these differ under different conditions. However, there are certain basic principles that underlie success in farming, as is the case in any other business, and at least some knowledge of these principles will be useful to the man who is considering it.

In the first place the successful farmer usually is found swimming with the tide—not against it. He is following the type of farming that is common to his region. Whether he settles in the Corn Belt, the dairy section, a famous fruit-growing valley, an irrigation project, the Cotton Belt, or elsewhere, he is almost always found running the same general kind of business as the rest of the neighborhood.

In the second place, he is generally found in a good location—meaning that he is on good soil and that his farm is favorably situated as to roads, distance to market or shipping point, etc. This is important. You can build or improve buildings, fences, and the like; but the quality of the soil and the location are matters that nothing much can be done about after you have bought your farm.

Such general matters as these—type of farming, good soil, favorable location—are, in a sense, preliminaries; but they are the kind of fundamental things which, if ignored, doom all further plans to failure or indifferent success.

Three or four principles underlie the success of the vast majority of profitable farms. First, the business must be large enough. This does not mean simply bigness alone. There is a certain size that fits the amount of labor available, the kinds of crops, the equipment, the stock that can be handled, and so on. Size of business is relative; a thousand acres in parts of the Great Plains may not be enough to support a family; 25 acres devoted to fruit or vegetables may be a big business in a western irrigated valley or in certain muck lands of the East. Fifty beef cattle may be a small business; 50 dairy cows a large one. But whatever the type of farming, the principle to be kept in mind is that there is a certain size of business below which one is not likely to join the ranks of the better income farmers. There are ways of enlarging one's business with limited capital, such as by renting additional land.

The next principle to be kept in mind is that of productiveness of crops and of livestock. The successful farm shows yields usually above average per acre and per animal. In a neighborhood where the average yield of potatoes is 150 bushels per acre, for instance, the profitable farms will be turning out probably 200 to 250; where the cows average 6,000 pounds of milk a year, the moneymaker's herd will be producing 8,000 pounds per cow or higher. Good yields are the result of good soil, good stock, and skillful management—in other words, the reflecting of business judgment both in selecting the farm and in operating it. Year in and year out, superior productiveness plays a telling part in the financial outcome.

The question of specialization versus diversification must also be considered by the prospective farmer. Some farmers believe in putting all their eggs in one basket—and occasionally do well at it. This, however, increases the risk and in most cases cuts the income down at certain times of the year. The single-crop cotton farmer in Alabama, the wheat raiser in Kansas, and the potato grower in Maine can testify to the higher hazards and the long months without income of one-crop farming. Having more than one important product tends, in most parts of the country, to reduce the risks of crop failures or low prices, provides for crop rotation, keeps men and equipment busy, and helps to bring in money throughout the year. The majority of profitable farms are found with more than one string to the bow.

Finally, must be mentioned agai nthat principle which is so important and often so little understood: The necessity for organizing the business in such a way as to keep the labor and equipment busy. The idle tractor or horse in the barn may be far more expensive than the first cost of either. The idle man or the man making a lot of motions at unproductive work spells loss. This applies to the owner as well as to hired help. When all is said and done, profits on the family-type farm come from labor that is continuously and efficiently employed.

WHAT IS FARM PLANNING?

What are some of the ways by which successful farmers get the most out of their labor? First, by having the farm large enough. Fields must be long enough that modern machinery can be used to advantage and so that time may not be wasted in making turns. Farm buildings, water supply, and the like must be arranged so that chores can be done easily. There is a skill in applying just the economical amount of labor to a crop—either too little or too much means waste. There is usually an economy in handling larger than average units: Hauling large loads, using wide harrows, having enough power for the job. Doing work at exactly the right time saves labor—one cultivation at the right time will kill more weeds than three cultivations later on. Planning jobs ahead will insure use of rainy days and work for horses between the crop operations. Livestock enterprises like dairying or poultry can provide winter work. There are many ways of stepping up the efficiency of one's labor. This is one of the important matters that challenge a farmer's ingenuity and underlie a profitable farm business.

Of course all planning of farm enterprises presupposes certain things such as maintaining the fertility of the soil. Maintenance of soil fertility is the greatest problem in agriculture. No farmer is successful unless he leaves his land in better condition and more productive than he found it. But the system that makes a cash profit year in and year out will, in all probability, also keep up crop yields and even improve them.

These basic principles which are widely practiced on the successful farms of the United States, are merely mentioned here. More extended discussion of them belongs in the book on farm management. The purpose here is simply to point out that this modern job of organizing a farm business involves knowledge and observance of certain things. In other words, the game has its rules. The men who make the most money are the ones who know the rules and follow them.

HOW MUCH CASH DOES IT TAKE TO GET STARTED?

Young men frequently ask, "How much capital is necessary to buy a farm?"

There is no simple answer to this question. The reply must vary for different circumstances and regions. It is possible, however, to note some of the major items involved. In the first place, there is the purchase price of the farm. This may be $3,000, $5,000, $10,000, or more. The amount of cash that one will be called upon to pay down at the time of purchase varies greatly. In parts of the country good farms can be bought by paying down about one-fourth of the price and paying the balance under a long-term mortgage. Then there is the matter of draft power—horses, mules, or tractors— the first two including harness also. Next come tools and equipment. In most parts of the country these will include as a minimum, the necessary tools for plowing and fitting the land, planting and seeding, cultivation, haying, and harvest. Certain other equipment is needed, including small tools and fencing. In any system of farming which involves livestock—and that probably includes a majority of the general farms of the United States—money must be available for stocking the farm. This amount will depend upon the type of livestock one starts with, whether it be a breeding herd, young stock to fatten and sell or for the production of milk, eggs, wool, or some other product. Finally, there is the item of working capital. It takes money right from the beginning to hire help, buy seed and feed, make repairs, and meet the many unforeseen needs that are bound to come up.

SHALL I GO INTO DEBT?

The question of assuming a heavy debt is one that needs a lot of careful thought. It must be kept in mind that interest, taxes, and insurance are expenses which will have to be met every year, at a fixed time and in cash. Many a farmer has assumed such debts and failed to allow sufficient margin for emergencies such as a poor crop year, or losses among his livestock, or low prices, or illness. The burden of these fixed charges that one must meet regularly can become overwhelming unless all plans have been laid with wisdom and with sufficient allowance for unforeseen difficulties. This whole question of financing the purchase of a farm will be discussed at greater length in another chapter.

WHEN YOU BUY CAN MEAN SUCCESS OR FAILURE

Finally there is one matter which should not be ignored when one is considering a long-time venture into the business of farming. That is the trend of what economists call the general price level. Commodity prices, including land values, wages, and current values of all kinds, are subject to certain long-time movements up or down which have most important consequences to farmers and other workers and business men. Some of the greatest disturbances of the general price level have occurred during the inflationary periods incident to great wars and the subsequent deflationary periods following such wars. This was the case during and after the Civil War and again during and after World War I. In each case, the general price level rose to unusual heights during the war and abruptly fell to very low levels following the war.

Many thousands of enterprising young men who bought farms during the years 1916 to 1920, for example, found themselves unable to meet their obligations when the prices of their products as well as the value of their farms were cut almost in half after 1920. There was a prolonged agricultural depression during the 1920's which was accompanied by a fall in the general price level—itself a result of forces wholly outside the control of individual farmers. This matter of the general price level is one to which the prospective farmer may well give some study, even though he may not be certain at any given time just what the trend is likely to be. To buy a farm at a time when all prices and land values are on a highly inflated level is to risk failure if prices come down again.

CHECK-UP NO. 3

Choose from *a, b,* or *c* the answer that seems of greatest significance.

1. There are four principles which underlie the success of most farms. Three of them are: size of farm, productiveness, and diversification. The fourth principle is—

a. Having schools close by.

b. Having many recreational opportunities.

c. Keeping labor and equipment busy.

2. Many of the young men who bought farms from 1916 to 1920 failed because—

a. Most of the farms were on the poorer land.

b. They didn't have enough capital.

c. Value of farm products and of farms declined to about half their value after 1920.

3. To be a successful farmer over a period of years it is essential that a farmer, among other things—

a. Maintain the fertility of his soil.

b. Paint his buildings every 5 years.

c. Adopt all available labor-saving devices.

4. In diversified farming—

a. No financial hazards involved.

b. More financial hazards involved.

c. Fewer financial hazards involved.

5. The number of hours worked per day in farming—

a. Remain about the same throughout the year.

b. Vary with the kind of farming done.

c. Are long every day in the year.

Now check your answers with those in the back of the book. If any answer is incorrect, go back and study the chapter.

CORRESPONDENCE OR CLASS ASSIGNMENTS

1. What are the major factors which prevent farming from becoming a mechanical industry?

2. Why is it wrong to conclude that a city worker's income is higher than that of a farmer even when the total income of city workers is $250 more per year?

3. Is it reasonable to conclude that cattle ranching in Arizona is the best *kind* of farming? Tell *why* or *why not* this is a sensible conclusion.

4. A number of things can be said about the successful farmer. Make a list of at least five of these things.

Part 2

The Base of all Agriculture

Chapter IV

Climate and Topography

WHAT THIS CHAPTER IS ABOUT

Climate and topography have a lot to do with the kind of farming in which you engage. In this chapter some of the effects of various climates and topography on farming are given.

MANY FACTORS HAVE SHAPED AMERICAN AGRICULTURE

Several conditions must be met before a man can make money on a farm. The land must not be too hilly or stony; there must be enough rainfall; the growing season must be long enough to mature the crop; and the soil must be of the right structure and fertility to produce it at not too great a cost. Each of these factors has had a part in shaping the agriculture of the United States, although the effect has not been at all uniform. In certain areas topography (lay-of-the-land) has been the limiting factor; in others, soil; and in still others, moisture and temperature.

OUR CROPLAND

About 45 percent of the almost 2 billion acres that compose the total area of the United States, or about 880 million acres, cannot be used to grow crops. This land is either too rough, rocky, or mountainous to be plowed, too dry to produce crops without irrigation, or too cold. We do not always realize this. We usually think of our farm land in terms of our total production and in terms of the high fertility of many regions. Of the 880 million acres of land that cannot be cropped at all, a great part is in the west, and consists either of dry deserts or of the steep rocky slopes of the Cascade, Sierra Nevada, and Rocky Mountains. Attempts to crop another 360 million acres of land also, have not been successful, because they have too little moisture, shallow or stony soil, steep slopes, or poor drainage. So we find that about 65 percent of the total land area of the United States is not well suited to crop farming.

Many broad areas with fertile soils do not have enough rainfall to produce grain crops each year. These soils are adapted to grazing and dry farming. There are many small patches scattered through more fertile areas, particularly in the eastern States, that are too hilly or too wet to be cultivated. Many of these soils are covered with grasses, or have been cleared and sown to grass that can be grazed by cattle and sheep, and so converted into animal products. The soils of the Great Plains are used largely for grain, under dry farming, and for grazing. Some of these soils are under irrigation. About one-fourth of all the beef cattle and two-thirds of all the sheep produced in the United States are raised in this area. Over the rest of the country, there are millions of small areas of soil that contribute an additional large amount of food for livestock each year.

TOPOGRAPHY INFLUENCES TYPE OF FARMING

The general smoothness of the land surface and the degree of slope play an important part in determining the kind of farming followed. An uneven or broken surface usually means that much of the soil is hard to till, and livestock must play an important part in the farming system. If the soil is steep it is not practical to use machinery, and it is difficult to plant, care for, and harvest the crops. It is much easier to use machinery and labor on smooth, level land. Because of this, if other things are equal, it is cheaper to produce crops on level lands than on more rugged land. Furthermore, erosion is more apt to be serious on hilly land if cultivated crops are grown. Rolling, erosive soils should never be bare of vegetation for any long period of time.

North America is shaped almost like a triangle, and is dominated by three topographic features. Stretching along the Pacific Coast from Bering Strait to Panama is the great Rocky Mountain System, with its high ranges and associated highlands and plateaus. The northeastern section of North America is mainly the Laurentian Upland, a vast rolling area, with many local irregularities of surface (bare rock areas, lakes, swamps, bogs, etc.), but without any prominent mountainous regions. Extending southward from the Laurentian Upland in eastern United States is the Appalachian Chain. Lying between the Rockies and the uplands of the North and the East are the rolling interior plains, which at the south merge into the coastal plains. Look at the relief (contrasting outline) map of the United States. How many of these features can you pick out?

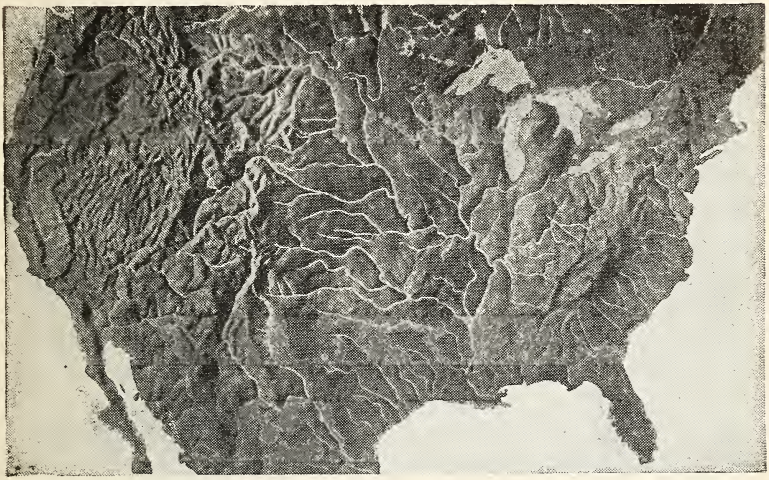


Figure 13. Relief Map of United States. (U. S. D. A.)

CLIMATE INFLUENCES TYPE OF FARMING TOO

The climate of any farm is influenced by its position in relation to the equator and the poles, in relation to great bodies of water and land masses, and in relation to ocean currents and mountains. Areas near the sea, with prevailing winds from the sea, like western Europe, usually have relatively mild or even climates.

Lands in the interior of continents, or located where prevailing winds come from great land masses, like central United States and the Soviet Union, have sharply irregular or continental climates. Winds blowing west from the warm Gulf Stream of the Atlantic Ocean over the land cause Europe's climate to be milder and more nearly uniform than that of northern United States. (London is about the same distance from the North Pole as Winnipeg, and Rome has the same latitude as New York City.)

As winds rise to cross high mountains they drop rain and after they are over and drop to lower levels they are dry. Thus it is moist on the west side of the Cascades in Washington, and dry on the east side.

Locally, a small body of water tends to reduce summer heat and winter cold. Tender fruits are grown much farther north along the shores of Lake Michigan than a few miles inland from the lake.

Even within a farm the last frosts are later and the first frosts earlier in the lowlands than in the adjacent highlands. Cold air is heavier than warm and settles in the low spots. For this reason farmers in temperate regions plant their orchards and gardens where there is good air drainage.

Most farmers now understand that individual crops or groups of crops are adapted to definite soil types and climatic conditions. Such questions were not always carefully considered, and countless unwise beginnings in farming were made, as when the farming methods of the humid east were brought into the Great Plains.

The fact that a region has been devoted over a long period to the production of wheat, cotton, or dairy cattle, is proof that the climate, topography, and soil in this region are well or fairly well adapted to the raising of these crops and of livestock. Of course, economic conditions have something to do with the agriculture of a region. Around large cities, for example, the good markets for vegetables and milk favor their production even though the soils are not ideally suited.

One may speak of the weather today, or of last month, or of some past year; but not of the climate of a day, a month, or a year. The climate of a place is understood only after we have studied its continuous weather records for many years. The succession of types of weather through the seasons gives to a place, an area, or a region,

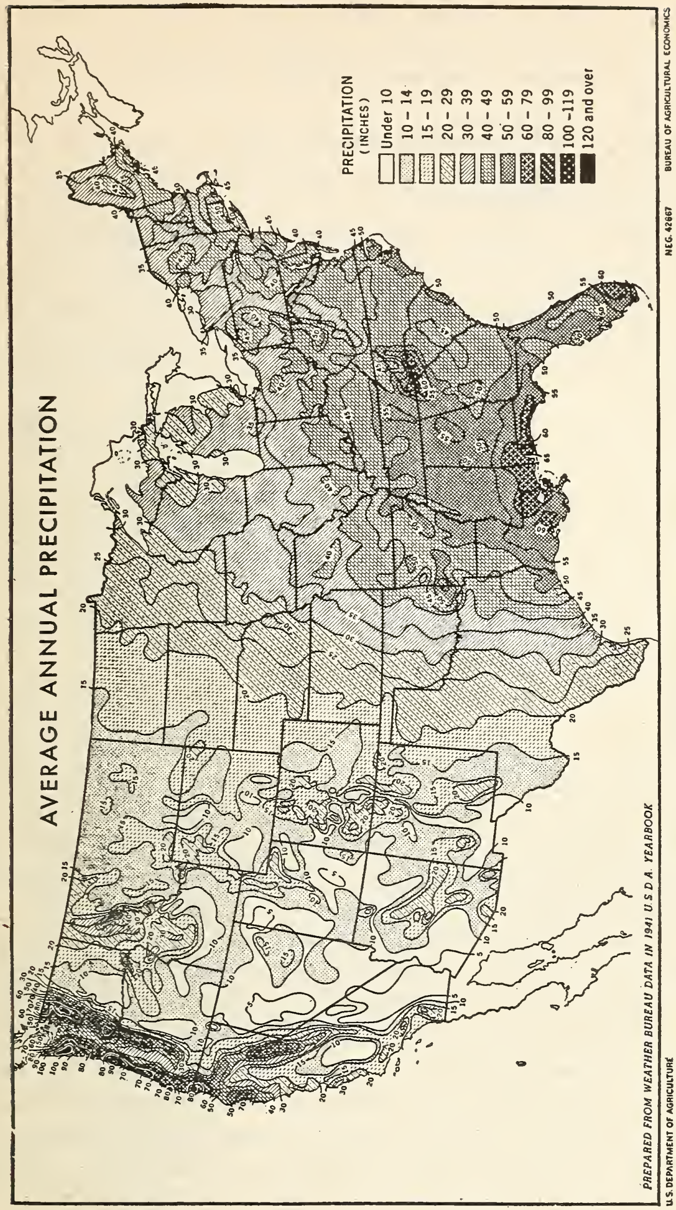


Figure 14. Average annual precipitation. (U. S. D. A.)

its climate; and the seasonal aspects of weather and of climate are of much importance in agriculture. Climate is not only rainfall, but also wind, sunshine, cloudiness, humidity, temperature, and their variations.

To some extent, rainfall governs the choice of crops to be grown. Insufficient rainfall may prevent crop production. Wheat, for example, is grown with 15 inches of rainfall in western North Dakota, but in much of Kansas, where there is more evaporation, it is grown in areas having 20 inches or more. The distribution of the rainfall seasonally is as important as the total amount. For example, in western Washington, areas having an annual rainfall of 30 to 50 inches, but with a dry season in midsummer, are not adapted to certain crops.

Long-continued gentle rains moisten the soil much more effectively than torrential downpours. Gentle rains soak into the soil, but torrential rains make puddles on the surface; the water doesn't soak in because it is falling at a rate faster than it can penetrate the soil. The run-off may cause serious erosion on sloping fields. Gentle rains are usually characteristic of humid regions, but much of the scanty rainfall occurring in semiarid and arid climates comes in torrential downpours.

Where there is not enough rainfall, it is necessary to supply water artificially if crops are to be grown. Irrigation is the process of bringing water to the land from dams, rivers, or wells. In nearly level places where there is more rainfall than can soak into the ground readily, soils are often soaked for a substantial part of the growing season, and must be drained before they can be cultivated successfully. Drainage is employed to improve cultivated lands or to reclaim swamps.

Temperature is the measure of the hotness or coldness of an object, and is, therefore, an effect of heat energy. Practically all the heat energy on the earth's surface comes from the sun. Through the ages, the various forms of life, both plant and animal, have become adjusted to many temperatures, but there are limits for all groups of plants and animals. It is impossible to go beyond these limits without resulting in injury or death to the plants or animals involved. But through scientific breeding and selection new varieties of plants and breeds of animals have been developed for different

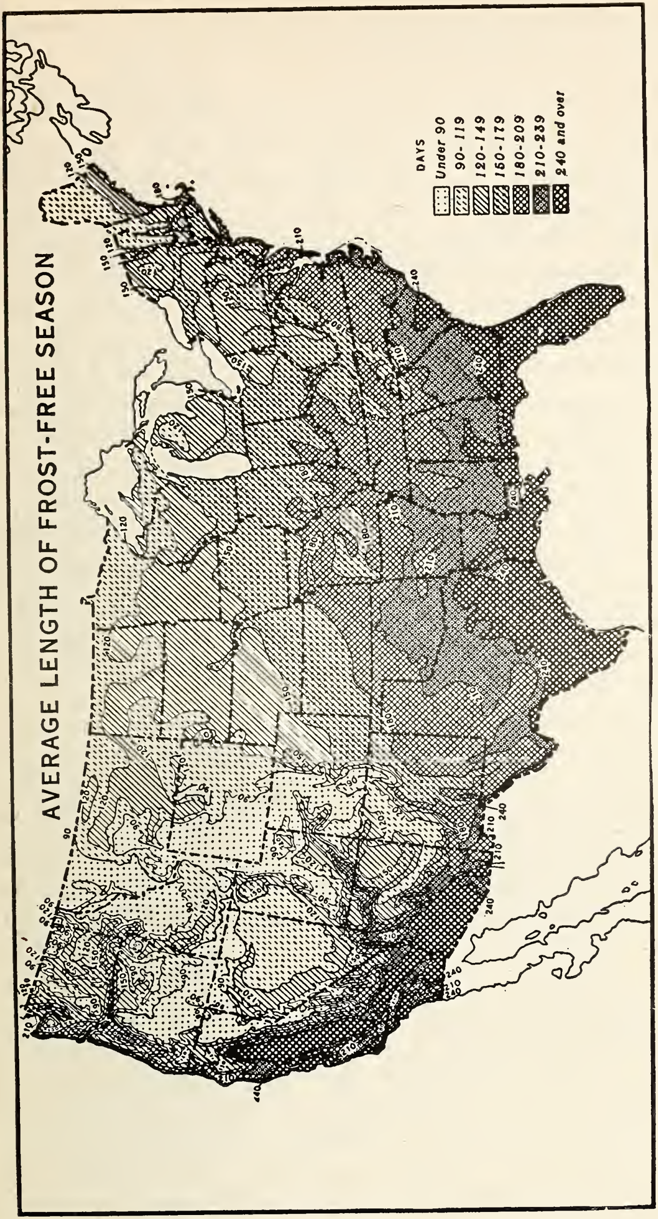


Figure 15. Average length of frost-free season. (U. S. D. A)

climatic areas; for example, new pasture grasses for southern United States and corn for North Dakota.

Temperature is important in determining which crops are grown in particular areas. In cold regions some plants are in danger of frost injury. In winter-garden sections, frosts may kill outright fields of tender crops, such as beans, lettuce, and tomatoes. Subtropical fruit districts may have winter frosts that ruin green or ripening fruit on the trees. In selecting a farm or planning its cropping system the number of frost-free days—the number of days between the last killing frost in spring and the first one in autumn—is of great importance.

In many areas of the United States, late-spring frosts constitute a hazard to plant production. Young plants of corn, flax, potatoes, cotton, tender garden vegetables, and even seedlings of such comparatively hardy crops as wheat and alfalfa may be damaged or killed. Plants such as tomatoes, which are normally transplanted into the fields, are usually started in the warm temperatures of the South or under glass in order to prevent any injury by frost. Fruits and many nuts suffer frost damage to opening buds, flowers, or young fruit and sometimes a whole crop is lost. The farmer must learn the effects of frost upon the various crops and the local differences in frostiness within his farm.

Too much heat also has bad effects. Fruits grown where summer temperatures are high ripen too early, the fruit does not have good flavor or color, and it spoils quickly. High temperatures sometimes cause tissue injuries which kill local areas on leaves, as in the case of lettuce. High temperatures also scald such fruits as strawberries and gooseberries, discolor and cause bad formation of flowers, as with early blooming chrysanthemums and dahlias. Through plant breeding "heat-resistant" varieties of many plants have been developed.

Some crops can be grown in many climates, but others do well only under specific climatic conditions. Cotton, for example, is grown in tropical and warm-temperate zones. The greater part of the commercial crop is grown in the warmer part of the temperate zones. Corn can be grown in more kinds of climate than cotton—in fact, it is grown in all the States—but is still a warm-weather plant and requires warmth both day and night for best growth. Wheat

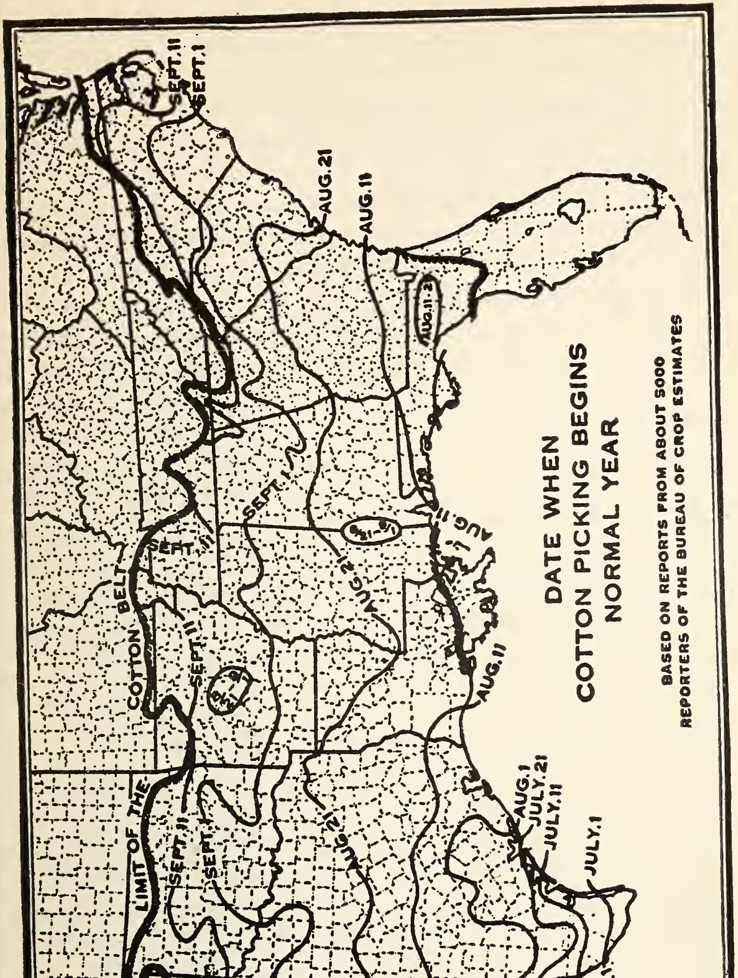


Figure 16. Date when cotton planting begins, normal year. (U. S. D. A.)

has a wide range of adaptation, but it does best where the rainfall is moderate and comes largely in the winter and spring, with little at harvest-time. Oats grow best in cool weather. The potato plant prefers a cool and uniform climate of moderate and well-distributed rainfall. Hay is grown in practically all parts of the country because many kinds of plants are made into hay.

Light has effects as fundamental as those of temperature and moisture. After the plant emerges from the seed, it usually becomes sensitive to light. Light is essential for the process of food manufacture within the plant. Sufficient food is stored in such seeds as beans and corn to last the seedlings grown in darkness approximately 2 weeks, but after that they can no longer live in darkness.

It is now known that length of daylight also affects the production of leaves, flowers, fruits, and seeds. Some plants flower only in the short days of fall. Others flower only under a long period of light. Still others are not sensitive to the relative lengths of day and night. This discovery has helped plant breeders to supply plants especially adapted to the day length of certain regions. The very long days of the North stimulate some plants, like peas and barley, to grow very rapidly. Thus crops of "long-day" plants can be grown during the short summers of the far North.

CLIMATE INFLUENCES GEOGRAPHIC DISTRIBUTION OF LIVESTOCK

Livestock is not in general so directly influenced by climate as plants. But indirectly, through limitation of pasture and feed crops, and through influences on diseases and insect pests, climate has a pronounced effect upon the geographic distribution of livestock. The lack of a satisfactory pasture grass in the South has been a factor in restricting the spread of livestock in that general territory; sheep are susceptible to disease and do not thrive in low, wet lands; goats are unable to withstand very hot or very cold weather. In tropical areas only breeds of cattle resistant to the many insects and diseases of the region can thrive. Both sheep and goats like high, dry altitudes, and climate has no doubt been one reason for their popularity in the mountain States.

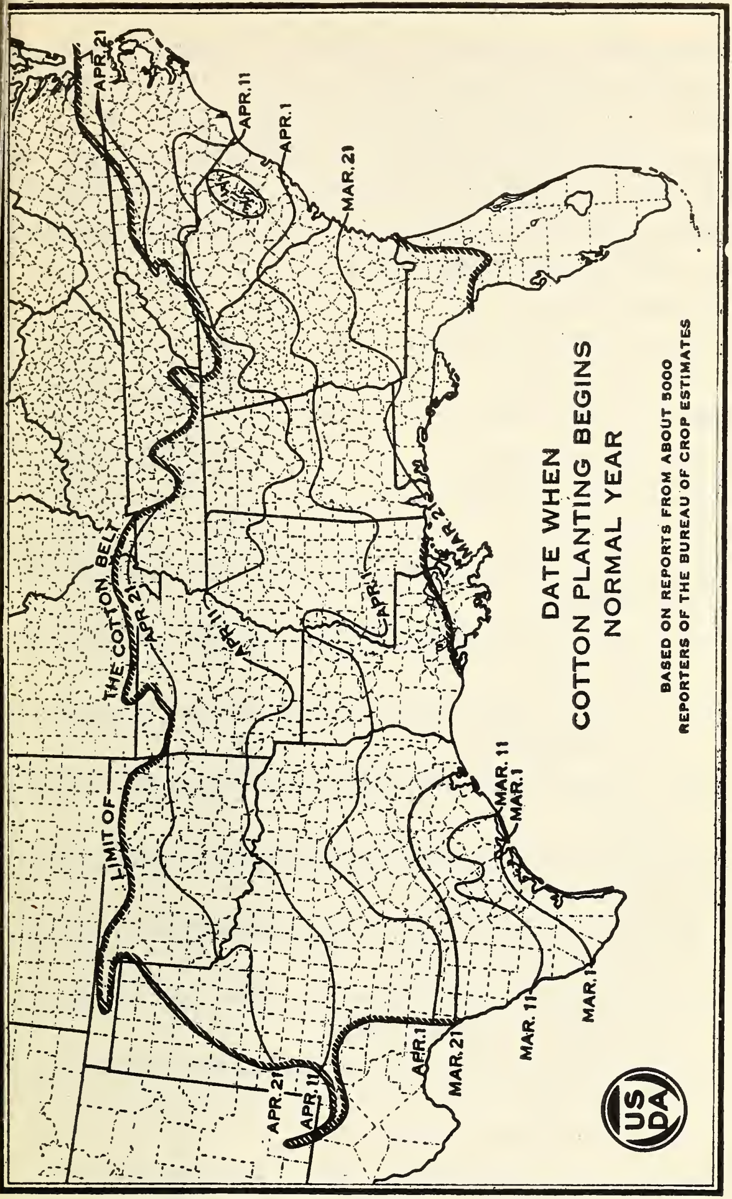


Figure 17. Date when cotton picking begins in normal year. (U. S. D. A.)

CHECK-UP NO. 4

In this chapter the influence of climate and topography on farming have been discussed briefly. Find out how well you have read the material of this chapter by answering the following questions.

1. About what part of the land of the United States is suited for crop farming? *a.* one-fourth. *b.* one-third. *c.* one-half. *d.* two-thirds.

2. Lands in the interior of continents or located where prevailing winds come from great land masses have:

   a. Regular climates.

   b. Sharply irregular climates.

   c. Very hot climates.

3. Cold air usually settles in:

   a. Low spots on a farm.

   b. High spots on a farm.

   c. On level ground.

4. What is wrong with a statement such as this, "New Orleans has a wet climate"?

   a. There isn't really enough rain at New Orleans to refer to the region as wet.

   b. The statement does not mention temperature, sunshine, or wind conditions.

   c. Any statement about the climate of one single place is misleading.

5. The length of daylight affects the production of leaves, flowers, fruits, and seeds. This fact has:

   a. Prevented plant breeders from developing plants suitable to varying lengths of daylight.

   b. Has encouraged plant breeders to develop plants adapted to day length of various regions.

   c. Resulted in shortage of some plants like peas and barley in the far north.

   d. Plants do not grow at night.

Compare your answers with those in the back of the book.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. To describe the climate of a region, what facts do you need to know?

2. How can the handicap of a climate that is not good for farm crops be overcome. Cite some specific examples.

3. In what section of the country is topography a major factor in preventing the use of land for cultivated crops?

Chapter V

Soil and Water

STUDY GUIDE

You probably already know a great many of the facts that are given in this chapter. If you know the facts, your reading need not be so careful. Find out what you know by answering the following questions:

1. When the earth was young was there any soil? (a) Yes. (b) No. (c) Don't know.
2. Does young soil contain much humus? (a) Yes. (b) No. (c) Don't know.
3. Are differences in the color of soil sometimes caused by climate? (a) Yes. (b) No. (c) Don't know.
4. Are young soils deeper than old soils? (a) Yes. (b) No. (c) Don't know.
5. Does red color in soil indicate an abundance of organic matter? (a) Yes. (b) No. (c) Don't know.
6. Is soil with granular structure considered good for production of crops? (a) Yes. (b) No. (c) Don't know.
7. Do coniferous trees return much organic matter to the soil? (a) Yes. (b) No. (c) Don't know.
8. Are there places where washing away of the top soil is desirable? (a) Yes. (b) No. (c) Don't know.
9. Would the best soil of the Dakotas contain more organic material than the best soil of Virginia? (a) Yes. (b) No. (c) Don't know.
10. Is there a soil map for every county in the U. S.? (a) Yes. (b) No. (c) Don't know.
11. Are the great grain-producing soils of the world in the interior of continents? (a) Yes. (b) No. (c) Don't know.
12. Are chernozem soils well adapted to intensive farming? (a) Yes. (b) No. (c) Don't know.
13. Are there large regions of Laterite soil in the U. S.? (a) Yes. (b) No. (c) Don't know.

14. Carbon is one of 14 elements plants need. Does the farmer have to be concerned about providing growing crops with an adequate supply of carbon? (a) Yes. (b) No. (c) Don't know.

15. Is structure of soil as important to the farmer as fertility? (a) Yes. (b) No. (c) Don't know.

16. Does conservation plowing retain more water for the soil? (a) Yes; (b) No; (c) Don't know.

17. Did Thomas Jefferson believe there was any value in contour plowing? (a) Yes. (b) No. (c) Don't know.

18. Can soil which before first plowing was infertile be made fertile? (a) Yes. (b) No. (c) Don't know.

19. For the good of the soil is deep plowing advantageous in all soils? (a) Yes. (b) No. (c) Don't know.

Now read the chapter.

THE ORIGIN OF SOILS

When this earth was young there was no such thing as soil. The surface of the earth was either rock or water. Heat and cold, air, water, and ice acted on rocks, breaking them down into smaller and smaller particles, and slowly, with the coming of plants and animals, soils began to form. A young soil is little more than loose pieces of mineral material. As plants grow in it, die and decay, organic matter is added; tiny, microscopic organisms (micro-organisms) increase; and finally a deep, fully developed soil is produced. From the natural soils man literally makes the soils he cultivates—the arable soils. Man may improve them—make them better for crops—or allow them to become poorer.

Today, as since the beginning of cultivation, in this Nation as in every other, soil and agriculture lie at the foundation of our society. Yet thousands of generations in various parts of the world have tilled the soils without knowing their real make-up. You have probably wondered how the roots of plants were able to get nourishment from what seemed like dead material. You've wondered why some soils are better than others, and why crops grow better on one side of the road than the other. If you are going to be a farmer, it is well to understand these things.

THE FACTORS OF SOIL FORMATION

Climate—including heat and cold, rain and snow, and their distribution—and vegetation—trees, grasses, or shrubs—acting upon the underlying rock material, produce soils. The action varies locally with differences in slope or relief, in the kinds of rocks, and with the length of time the rock material has been acted upon. Thus each natural soil is the product of five factors or forces: (1) climate; (2) vegetation; (3) parent rock; (4) relief; (5) age. They act together, and the influence of any one depends upon the others.

The regional differences in soils—between the black soils of eastern North Dakota and the light-colored soils of Maine, for example—are due to big differences in climate and vegetation. These soils were developed from essentially the same kind of rock materials. The local differences in soils—between one field and another on the same farm—are directly related to differences in rocks, relief, and age; in this case it is the climate and vegetation that are essentially the same. Some local soils are on steep hillsides, others lie on wet flats; some are developed on sandy, gravelly, or stony materials, others from clay deposits; and some are on recently formed stream bottoms, while others lie on very old land forms. If people haven't noticed the similarities underlying the different soils in their own communities, they may not realize the great importance of climate and vegetation in soil formation.

THE SOIL TYPE

Areas of soil developed under about the same climate, native vegetation, relief, parent rock, and age, are of the same type. The effects of these five factors are seen in what is called the *soil profile,* or sequence of layers from the surface down into the parent rock. Young soils may be only a few inches deep, but usually the soil profile is 2 to 5 feet in thickness.

The soil material in the layers, which are usually called soil horizons, may vary a great deal within the same soil profile, as well as between different soil types. The following characteristics are especially important:

Color. The various colors indicate soil properties. For example, soils rich in organic matter are usually black. Red color indicates abundant iron. White soils have been leached—that is, the minerals have been washed downward—or else contain some whitish salt.

Figure 18. Soil maps already made for more than one-half the counties in the United States show the soil types and give additional information about the soils and their uses in the area mapped. The county agricultural agents are glad to show farmers soil maps of the lands they already own or are considering buying. (U. S. D. A.)

Texture. This refers to the relative size of the individual particles or grains of soil. Clay is the very finest and most active part. Actually soils have mixtures of grains of varying size. These mixtures are called clay, clay loam, silt loam, loam, sandy loam, loamy sand, and sand, from the finest to the coarsest. If gravel and stones are abundant the mixtures are called gravelly loam, or stony sandy loam, and so on. Very generally speaking, soils rich in clay are likely to be sticky when wet and hard when dry, very sandy soils are droughty (fail to hold water for plant growth), and loam soils are intermediate. But this depends also upon soil structure; and likewise the condition in any one layer depends on what the other layers are like. A soil type with a sandy surface layer and a clay loam lower layer may be nearly ideal for crops.

Structure. The way the individual soil grains are grouped together in plates, blocks, or granules is called structure. Massive soils, where the particles cling together in large irregular masses, like puddled clay, and singlegrain soils where each particle is by itself, like dune sand, are said to be structureless. For most crops, productive soils have a granular structure either naturally or as developed by proper tillage, manuring, and crop rotations. Excessive tillage, especially when the soil is wet, destroys the granules; while vigorously growing grasses and legume hays promote granular structure. Most soils need to be devoted to grasses, at least a part of the time, to maintain good granular structure and productivity. Sometimes the granular surface soil is washed away under careless management, exposing a lower massive layer. This is generally the greatest harm that erosion does.

Chemical Composition. The content of plant nutrients in the soil depends upon the original rock, the amount of leaching, the normal erosion, and how much material the plants have returned to the surface. Grasses feed heavily throughout the soil profile and return nutrients and organic matter to it. Hardwood trees return somewhat less and coniferous trees least of all. In humid regions the soil may be highly leached by rain water percolating downward, so much so that chemicals which would make the soil neutral or alkaline are washed out. In this case the soil is acid, at least in the surface, even though the rocks beneath are rich in alkaline nutrients—limestone, for example. In semiarid regions the soil has more plant nutrients and is not acid, except, perhaps, in the very surface layer. In desert regions the soils in the low places may have excess salts in certain layers. Crops will not grow on these soils unless they are drained and irrigated to wash out the salts. Despite the leaching in humid regions, if there is a little soil erosion year by year, the leached surface material will gradually be washed away and the plant roots will continually extend into fresh materials from the decomposing rocks beneath.

Organic Matter. The surface layers are usually richest in organic matter, but they vary a great deal. Soils developed under grasses in the subhumid regions, like the eastern Dakotas, eastern Nebraska, and Iowa, have deep surface soils, dark-brown or nearly black with organic matter, while in the humid forested regions organic-rich surface layers are much thinner. A few soils are developed naturally from organic matter—peat that has accumulated from plants remains in poorly drained areas. Raw peat soils are nearly valueless for crops; but where the peat has been decomposed we find excellent muck soils.

Soil Type. Thus the several layers of soil often vary a great deal from one another in character and in thickness. It is in the soil profile that we can read the previous history of the soil type and predict its future response to management. On the basis of their profiles and the slopes of their surfaces, soil types are defined. These are given place names from some town, river, or other feature, like Miami, Barnes, Hagerstown, or Mohave soil types. Such names refer to a whole group of soil characteristics just as the terms used to designate particular kinds of rock, varieties of plants, or breeds of livestock refer to a whole group of characteristics. In addition to this place name, words that indicate the texture of the surface soil are added to give the complete name of the soil type. Thus over 5,000 names like Miami silt loam, Barnes loam, Gila fine sandy loam, Norfolk sand, and Fargo clay loam, are used in the United States to refer to specific local soil types.

The results of scientific investigations of soil productivity and of soil and crop management practices, as well as of the experience of farmers, are reported by soil types—the same soil types that appear on the soil maps already made for more than one-half the counties in the United States. Where available, the prospective farmer should study carefully the detailed soil map and the accompanying text of the area of interest to him. Most detailed maps include the county as the unit. Additional information about the soils and their uses is being made available continually by the U. S.

Department of Agriculture and the State agricultural experiment stations.

GREAT SOIL GROUPS

Although the local soil types are of immediate concern to the use of individual fields and farms, these may be grouped into great soil groups, or continental soil types as they are sometimes called, having characteristics that dominate the soils and agriculture over large areas of the world. The names of these are used internationally and come from several languages.

Thus the deep black soils of the subhumid grasslands, found in a wide belt extending north from eastern Kansas into Canada, on the steppes of the Soviet Union in the Ukraine, and far to the east, and in similar regions, are called Chernozem, which literally means black soil. These black soils are the great grain-producing soils of the world. Farms are large and are devoted to only a few crops. The soils are rich in plant nutrients but the unstable climate makes yields uncertain. Most Chernozems lie in the interior of continents, far from the sea. They were largely undeveloped for agricultural use prior to the coming of the railroad. Because of the unstable climate, the large proportion of cash crops and relatively few subsistence crops, the distance from large markets so that the farmers have to depend upon railroads, and the need for long-time financing, people living on the Chernozems are forced to cooperate with one another a great deal.

In striking contrast the Podzols (ashlike soils) of cool, humid, forested regions are light colored, leached, and acid. Such soils are suited to farms that are small and diversified, with a high proportion of crops for home use. Although the soils are not naturally fertile, they respond to careful management. The Podzols are found in the northern part of the United States from Minnesota to Maine, and in northern Europe.

Just south of the Podzols in the United States and Europe are soils much like them called Gray-Brown Podzolic soils, developed in the cool temperate, humid forested regions. Although only moderately fertile, they are adapted to an unusually wide range of crops, fruits, and livestock. Farms are relatively small since the soil needs careful management. It is mostly upon these soils in western Europe and in eastern United States that Western civilization—our civilization—developed until the middle of the 19th century. The conditions created by these soils are the most familiar to us because until recently the great majority of our agricultural writers—in fact, the majority of all English and American writers—grew up on such soils.

The red leached soils of the humid tropics are called Laterites (from the Latin word for bricks because some kinds can be used directly for bricks). These soils are rich in clay but relatively porous. They are adapted to crops high in carbohydrates—starches and sugars—like sugarcane, coconuts, rubber, bananas, and pineapples. Usually they must be fertilized heavily or else be returned to forest growth for several years after a few years of cropping. The small farmer on the Laterite soils is really more a gardener than a farmer. Much of the commercial agriculture in this soil region comes from large plantations much like agricultural factories.

Between these last two groups are the Red and Yellow Podzolic soils, like those of southeastern United States, developed under forest in warm temperate, humid climates. Although strongly leached and relatively infertile naturally, they are responsive to management and can be made productive by the skillful farmer. Because of pressing economic conditions, too high a proportion of cultivated crops, especially cotton and corn, and too little grass in the rotations, many soils in this region have become depleted in fertility and eroded. With the wider adoption of good farming practices, developed through research, farming in this region is improving now.

These are examples. Altogether there are some 20 of the great soil groups in the world—perhaps more—that dominate the general possibility for farming and for community development. Not only do these soil regions offer individual possibilities and set certain limits to farm crops and livestock; they influence the size of farms, the type of buildings, the kind of social life, and through these things, even the ideas of the people.

WHAT MAKES A SOIL PRODUCTIVE

A productive soil is one that gives a large crop in relation to the work and materials needed to produce it. Basically, the productivity of a soil depends upon two sets of factors (1) fertility, and (2) the physical condition of the soil. Fertility depends on the amount of available plant nutrients, or of compounds poisonous (toxic) to plants, in the soil, and the balance among them. The physical condition of the soil depends on its depth, structure, slope, drainage, and freedom from stones.

SOIL FERTILITY

Good soils for crops are either naturally fertile or have been made so by the farmer.

Plant Nutrients and Fertilizer. Plants need 14 elements for growth: carbon, oxygen, hydrogen, nitrogen, phosphorus, potash, calcium, magnesium, iron, sulfur, copper, boron, zinc, and manganese. Carbon they get from the air, and oxygen and hydrogen from the air and water, and the others from the soil. Not only must the soil have adequate amounts of these elements, but also they must be in forms usable by the plants, and in proper balance. Too much nitrogen, for example, in relation to the other nutrients, can be as harmful as too little nitrogen.

Generally speaking, nitrogen, phosphorus, and potash are most likely to be lacking in ordinary soils—more especially, those developed in humid regions under native forests. The fertilizers commonly used by farmers contain one to all three of these elements in available forms, that is, forms that plants can use. But any one of the elements taken from the soil may be lacking in some soil types and the farmer will need to add it for good crop production or for good quality of crops. Sometimes crops will make a fairly good growth, and they may even look all right, where the soil is deficient in one or more elements. But such crops may lack substances important in food, like phosphorus, calcium, copper, and so on. Frequently sickness in cattle or sheep, and even sometimes among humans, has been traced back to such deficiencies in the food and soil.

Figure 19. What fertilizers to apply to a field depends on the original soil type, the crops grown, and previous uses of the soil. (U. S. D. A.)

Through experiments, the experience of farmers, and chemical tests, successful farmers know what fertilizers to apply to make their soils fertile. This depends upon the original soil type, the crops grown, and the previous use of the soil.

Soil Acidity and Liming. Leached soils of humid regions are commonly acid—sour. On these lime is applied according to need, usually ground limestone, which furnishes calcium and corrects acidity. Some crops like potatoes and strawberries need a moderately acid soil, but most of the crops grow best on one that is nearly neutral, neither alkaline nor acid. Especially must lime be used on acid soils to grow the rich legume hays like alfalfa, clover, and sweetclover.

Micro-organisms Are Important. The soil is teeming with tiny microbes. They live on the organic matter—decompose it and make the materials in it available to plants again. Those that change the nitrogen into useful forms are especially important; others that live on the roots of the many legume crops, like clover, alfalfa, lespedeza, and kudzu, can take nitrogen out of the air and convert it into forms that plants can use. In this way the soil is kept supplied with nitrogen. Instead of using nitrogen fertilizer entirely, many farmers add manure to the soil and also grow the legume plants. These plants not only contribute nitrogen, but also make excellent hay and pasture and improve soil structure by making it more granular. Yet to have good growth of legumes we must be sure that the soil is well supplied with lime, phosphorus, and potassium.

Besides this matter of nitrogen the microbes decompose fresh organic matter to form humus—the dark granular material in soils so important in keeping the soil granular and maintaining its ability to hold water.

WHAT PHYSICAL CONDITIONS ARE ESSENTIAL TO PRODUCTIVITY?

In some ways the physical condition of the soil is more important than its fertility. This is partly true because it is easier to correct and control the fertility. If soils have good physical condition they can be made very productive through the use of lime and fertilizers and a proper sequence of crops. In fact it requires great skill for the farmer to improve and maintain the *structure of soil.*

Roots and Water. First of all, the soil must be such that water and roots can penetrate it readily. Roots need to go deeply into the soil for nutrients, and they need both air and water—neither too much nor too little. An ideal soil holds enough water between rains, or between irrigations, for crops and allows the excess to drain away. This means a granular structure, or one approaching it. Such a structure requires proper tillage (not when the soil is wet), the maintenance of organic matter, and the growing of deeprooted crops.

If the soil is too hilly, the rain water will run off and be lost unless the soil is kept open and the water slowed down by growing crops or by the special devices to be discussed later. On flat land and in low places so much water may collect that crops cannot grow unless the excess is drained away through tile or ditches, or both.

Figure 20. Many farmers add fertility to their soil by turning under legume plants. (U. S. D. A.)

The Use of Agricultural Machinery. At least some machinery is necessary in modern agriculture. Stony and hilly soils offer such handicaps that they must be used only for pasture—which doesn't require a great deal of tillage—or devoted to forest trees where tillage is unnecessary.

HOW CAN SOIL PRODUCTIVITY BE MAINTAINED?

The improvement of natural soils for crop production and the maintenance or conservation of the soil go together.

Crops Must Be Rotated. Of first importance is the maintenance of vigorous plant growth. The largest part of the washing or erosion of soils comes about after loss of fertility or structure when plant growth becomes weak. Then running water or dry winds can carry away the soil particles. If these processes of soil washing and soil blowing go on very long, even less fertile lower layers of soil will be exposed.

The first principle in building up and maintaining the soil is to grow crops—those adapted to the land and climate—in rotation, that is, a sequence of crops, such as corn one year, oats the next, and clover the next. Thus the soil is cultivated some years, when row crops are planted, to destroy weeds and to allow the incorporation of organic matter and lime and fertilizers where needed. Other years thickly growing crops that require little tillage are sown. Nearly all soils should be devoted to legume crops, like alfalfa or clover, at least a part of the time in order to maintain organic matter, nitrogen, and soil structure. Each soil type is adapted to certain crop rotations and requires certain treatments to keep the crops strong and healthy. These things the farmer must learn about the soil types on his farm.

Water Must Be Controlled. The right amount of water in a soil is of utmost importance. Although this condition is determined largely by the climate and soil type, the farmer can also do a great deal about it.

Run-off and Soil Erosion. Excess run-off of water not only deprives the plants of needed moisture, but also causes loss of the soil itself. The hazard from soil washing or erosion depends upon the

Figure 21. Up-and-down hill plowing of row crops forms ditches that cause excess run-off of water, which deprives the plants of needed moisture and also causes loss of the soil. (U. S. D. A.)

soil slope and the ease with which water can enter the soil. Where this hazard is important all the plowing and other tillage should be done on the contour—on winding lines that curve around the hills at equal elevation—rather than up-and-down hill. In this way the plow furrows act as dams instead of ditches.

As Thomas Jefferson wrote in a letter to Charles W. Peele many years ago:

We now plough horizontally, following the curvatures of the hills and hollows, on the dead level, however crooked the lines may be. Every furrow thus acts as a reservoir to receive and retain the waters, all of which go to the benefit of the growing plant, instead of running off into the streams . . . In point of beauty nothing can exceed that of the waving lines and rows winding along the face of the hills and valleys. The horses draw much easier on the dead level, and it is in fact a conversion of hilly grounds into a plain.

This advice is as good today as it was when Jefferson wrote it 140 years ago. Not only contour plowing, but also the arrangement

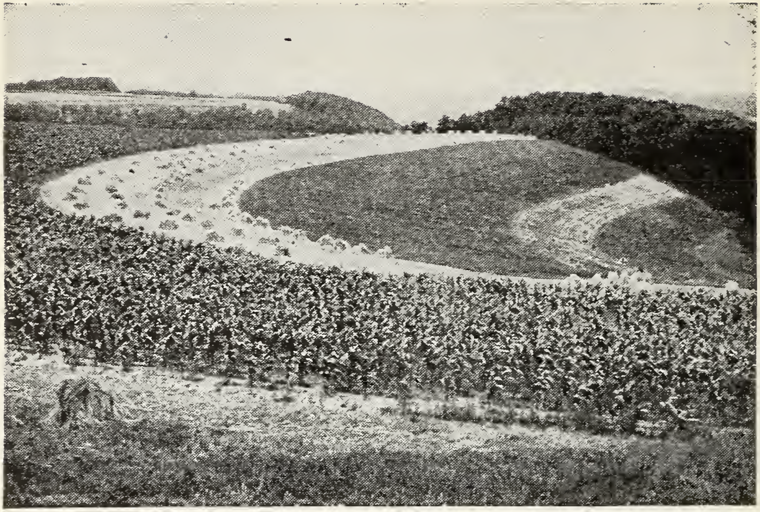


Figure 22. Contour strip cropping with corn, grain, and alfalfa prevents erosion of the soil. (U. S. D. A.)

of crops in ribbons or bands on the contour is another important practice. Instead of having an entire slope planted to corn, let us say, the farmer may have one band in corn or cotton, another sown to oats or wheat, and a third in grass or hay. These individual bands can be repeated throughout the length of the field. Even though some excess run-off and erosion might begin on the corn, it would be reduced or stopped when it came to the strip of grass.

Where run-off and erosion are likely to be serious, *and where the soil is deep and relatively porous*, terraces, or ridges with channels on the upper side are built along the slope at a very slight angle to the contour. As water flows down the hill it is stopped at these terraces or ridges and is carried away along the channel very slowly. In this way more of it will sink into the soil and that which does run off can do no harm. At the outlets the water must pass into grass-covered channels or ditches protected from wash. Terraces must be kept in constant repair. An unwatched terrace is a great erosion hazard because if the water breaks over the terrace a gully may begin and deepen rapidly as a result of the concentration of the running water at one spot. Many farmers keep their terraces permanently in grass. Terraces are especially valuable in the semi-arid regions where it is important to save every drop of water, even on the gentle slopes. Here they may be built on the contour rather than on an angle to it.

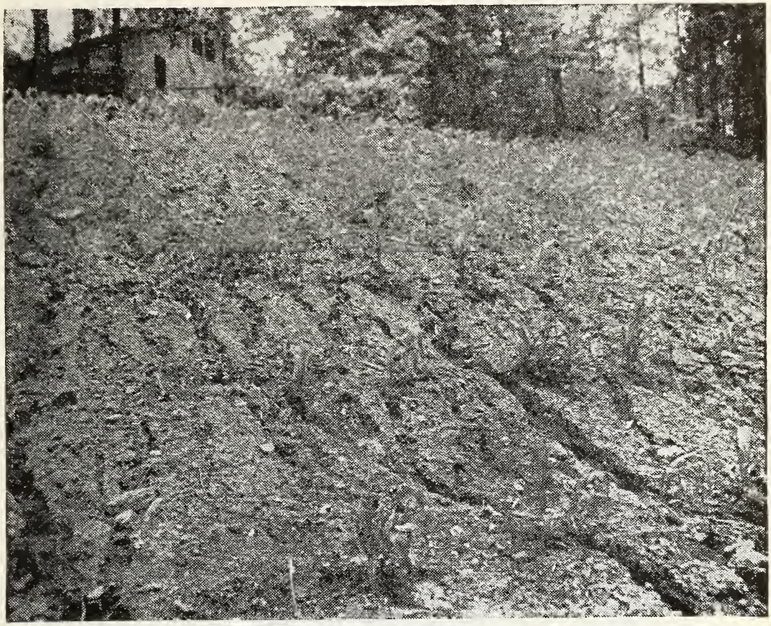


Figure 23. Erosion—the result of planting a hillside up and down to corn. (U. S. D. A.)

In southern Europe and in many older countries wall terraces of masonry have been constructed. These are rarely used in the United States because of their great cost and because of the difficulty of using farm machinery in the fields.

Where gullies have washed into the soil it may be necessary to build little dams of stone or brush. These gullies will need also to be planted to permanent vegetation to prevent them from spreading.

All these mechanical devices are supplementary to the main job of maintaining vigorous vegetation. In the grazing country the lands must be protected from overgrazing which may kill the grass and start soil washing or blowing.

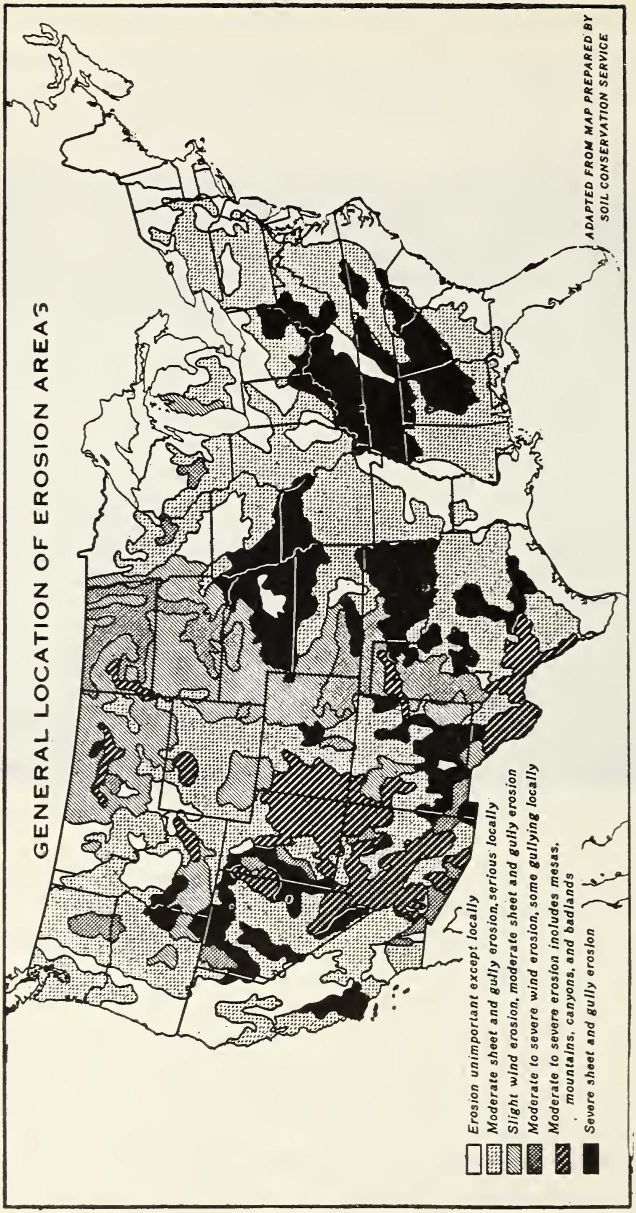


Figure 24. General location of erosion areas. (U. S. D. A.)

Drainage. Some soil types that are naturally too wet for crop growth are highly productive when drained. (Of course, many others are not and should never be drained.) This is an engineering job requiring the digging of ditches and the laying of tile so as to remove the excess water and carry it away into natural streams. Some of the most productive soil in the United States is tile-drained, like many great areas of dark-colored soils in Michigan, Ohio, Illinois, Wisconsin, and Iowa. On the other hand, hundreds of thousands of dollars have been wasted on draining poor soil.

Irrigation. Thousands of acres of good agricultural land in desert and semiarid regions depend upon irrigation. Great dams have been built on streams to store water and guide it through canals and finally through little ditches onto the soil. A large part of the irrigation in the United States is carried on through great engineering projects. In addition, some farmers irrigate all their land or part of it through water obtained from little storage reservoirs on their farms, or from wells. Irrigation for vegetables or other special crops is becoming increasingly practiced in the humid region, where a little extra water may save a valuable crop during a dry period.

Drainage and irrigation frequently go together. Unless the soil is well drained, harmful salts are likely to accumulate, especially in the dry regions. If the soils are not naturally well drained, artificial drainage must be provided to remove these salts else they will prevent crop growth.

Soils Must Be Protected from Damage by Wind. Especially during dry periods, some soils are subject to serious blowing. This is particularly true of loose sandy soils or those with a uniform crumblike structure. Under intensive vegetable production, trees are planted as windbreaks in the path of prevailing winds that protect both soil and crop. Windbreaks are also used to protect local areas in general farming regions. But in the large grain-growing sections of the Great Plains farmers must depend upon proper tillage methods to protect the soil. Such methods encourage the maintenance of coarse organic matter and small clods in the surface that protect the fine soil underneath from the wind. Instead of using the common turning plow, these farmers use disks and other special cultivators and weeders that leave the surface rough and trashy.

PERMANENT AGRICULTURE AND SOIL CONSERVATION

Soil is a great natural resource. Although other natural resources, like oil, coal, and iron, are exhaustible, forests and soils are renewable. The natural soil in any place has reached its present state through a long history. Each year plants are removing certain materials and adding fresh organic matter. On a great many soils, natural erosion is gradually taking away a tiny bit each year, and fresh rock fragments are being incorporated from beneath. On other soils dust or silt is being added to the top. Finally, as these processes go on, the soil comes into balance with its environment—the losses balance the gains. No one knows exactly how long it takes to produce a mature soil. We do know that good Chernozems have been developed in less than 500 years. So much depends upon the character of the rock and the other factors that few definite estimates can be made.

When man uses the soil for crops he upsets the natural balance, perhaps a little, or maybe a great deal. Some soils are highly productive for crops when first plowed, others are not. Many of the so-called "wornout soils of the East" never were productive, not even when first plowed. The smooth dark-colored soils of northern Iowa were more productive when first used than it is practicable for farmers to try to maintain. The natural productivity of the soil is not so important as is the productivity that can be maintained under farming conditions. Many of the soils in southeastern United States are naturally infertile, but because of the favorable climate and good soil structure they respond well to fertilization, liming, and a rotation with legumes. From these soils farmers have made good productive land.

Soil productivity must be thought of in terms of several years. If farmers grow wheat, or cotton, or beans, or corn year after year, thinking only of the immediate yield, the soil may be greatly impoverished after a relatively short time, or even ruined in extreme cases. But if he thinks in terms of many years, taking a longer view, he can work out a system of crop rotations and soil management that will maintain and often greatly increase productivity. Thus by resisting the temptation to get the very most money this year or next, the farmer can have more production from his soil over a 10-

or 20-year period, and keep the soil in a good state of productivity all the time.

What does conservation mean in reference to soils? It doesn't mean simply saving, or not using the soil; farmers live by production. It is not conservation as such but *secure production*, production now and production later on, that farmers seek.

Thus production from the soil is the result of both soil and husbandry, or management. When we say that a soil is productive for corn or for surgarcane it means that a relatively high yield of the crop can be obtained for the amount of work done and materials used. Soil productivity is really response to management, measured in terms of yield and quality. Some natural soil types do not respond to management enough to pay for the use of labor and materials. These soils should remain in the natural state, in which they may produce grass or trees of value.

Other types of soil respond somewhat differently. A few require only plowing and tillage whereas others need lime, fertilizer, manure, practices for erosion control, and so on. Some of our most productive soils—soils from which farmers get the most for their labor and expense—require very careful and complicated treatments. For example, there is a type of soil in Hawaii that would produce very little through simply tillage and seeding alone. But by using the proper varieties of sugarcane, with careful tillage, and with intensive fertilization and irrigation, the soil produces an average of better than 1,500 pounds of sugar per acre per month. This means nearly 180 tons of sugarcane per crop growing less than 2 years.

This is an extreme example. But many farmers in the United States are getting extra good returns by keeping the soil highly productive, and at the same time they are conserving it for the future.

Some people have difficulty in understanding why agriculture is so complicated. Every once in a while someone comes along with a startling emphasis on some one thing. He may want to solve all the problems of soil management by using deep tillage, or by throwing away the plow, or by controlling soil erosion, or by using some particular fertilizer, and so on. This means that he has seen something that was very important on one, or perhaps a good many soil types and then jumped to the conclusion that it was equally important everywhere. But there are thousands of soil types, each with its own characteristics and its own requirements for good production. There is no individual practice that is good everywhere. Deep plowing is good on some soils and disastrous on others. Certain soil types respond to heavy applications of fertilizer that would be positively harmful to others. There are thousands of practices used in farming that are important in certain places; none is all-important or universal. The individual farmer must study his own soil types and work out these practices in relation to the farm unit, considering his crops, livestock, markets, and skills.

Abundant soils of good quality exist in the United States. There has been significant impoverishment through declining fertility, careless management, and soil erosion. Most of this has been unnecessary, although many individual farmers couldn't prevent it, especially during periods of ruinous prices. Although our agriculture is improving, we have a long way to go. How far we go and how fast depends primarily on the responsibility and thoughtfulness of the individual farmer. He *can* handle his soils so that he will have the optimum production and at the same time leave them in good condition for the next farmer.

CHECK-UP NO. 5

Have you changed your mind about some of the questions asked in the beginning of this chapter? To find out, go back to those questions and check each of your answers. If you are not sure of an answer, reread the material.

Now compare your answers with those in the answer key. If any of your answers are incorrect, be sure to find the material which supports the correct answer.

CORRESPONDENCE OR CLASS ASSIGNMENTS

1. Two soils which originated from the same rock are markedly different in color. Explain.

2. The soils of the Great Plains of the United States contain much more humus than the soils of the Gulf Coast region. Since rainfall is much lighter in the Great Plains, how did this difference in amount of humus come about?

3. Podzol soils are almost ideal for the growing of vegetables while Chernozem soils are ideal for growing grain. What characteristics of each of these soils make it well suited for the purpose listed?

4. Jefferson gave three reasons for plowing on the contour. Tell what the reasons were and whether each still holds.

Chapter VI
The Living Plants

STUDY GUIDE

To help you in your study of this chapter think of three or four important questions about living plants which you think every man interested in farming should be able to answer.

The author of this chapter thought these questions were important: (1) How do plants get their food? (2) How do plants reproduce themselves? (3) What are the major principles of plant breeding? (4) What are the chief things that cause trouble to the man who tries to grow plants? (5) Are plant diseases a serious problem to the farmer?

Most of the things a farmer works at have to do with the care, handling, and use of plants. He spends considerable time preparing land to grow plants, sowing seeds, cultivating crops, cutting and gathering plant seeds, roots, and fruits, or feeding plants to animals which in turn change them into meat, milk, eggs, wool, hides, and many other things we use. Agriculture is concerned with supplying the world with food and clothing, and all agriculture has its basis in the growing of plants. Because these things are so, it is important to consider how plants live and the conditions necessary to their welfare.

HOW PLANTS GET THEIR FOOD

The most remarkable manufacturing process in all the world is carried on every day, everywhere, by green plants. The raw materials for the process are water and carbon dioxide, a gas obtained from the air. The process takes place for the most part in leaves that contain chlorophyll, a pigment that only plants can make, and which gives them their characteristic green color. The energy for the process comes from sunlight. The product of the process is a simple sugar known as glucose, which can be converted into starch, cellulose, and a whole series of other chemical materials that go to build the body of a plant, and later, to build the bodies of animals and men.

Animals cannot do the same thing, and despite our scientific progress and knowledge of chemistry and physics, neither can we. Perhaps one day men may learn how plants perform this feat; but until they do, all mankind and other creatures of the earth depend finally upon plants for their food.

The manufacturing process is known as photosynthesis—a long word, but a good one to know. It means to use light *(photo)* to build up *(synthesis)*. Photosynthesis can take place in any part of a plant that contains the green pigment, chlorophyll, although leaves are the most important parts concerned since they are held up to the sun to get as much light as possible. A byproduct of the process, incidentally, is oxygen. The process can be put in brief form like this: Water plus carbon dioxide, acted on by light in the presence of chlorophyll, gives sugar plus oxygen.

The other materials besides sugar that plants use for food come from the soil. Nitrogen is one of these; it is an essential and important constituent of protoplasm—the living material of which you and all other organisms are made. Plants also get potassium, phosphorus, calcium, sulfur, iron, and magnesium, as well as some lesser substances, from the soil. All of them play various vital roles in the formation of the many complex chemical materials that go to make up the plant body.

The only way plants can get these food elements is in solution, which means that they must be dissolved in the water plants take in through their roots. When farmers use fertilizers they are supplying such elements to the soil so that plants can use them and thereby grow. The fertilizers must contain the elements in a chemical form that will dissolve easily, or that will break down in the soil to make chemical compounds that can dissolve in water. We should notice also that when dead plant or animal bodies enter the soil they are decomposed by soil fungi and bacteria, and in the process the plant foods they contain are converted into soluble form.

From all this may be seen that water is of great importance to plants. Plants use it not only to manufacture sugar, but also to carry all of the chemical materials in a dissolved state from one part to another. Special water-conducting systems extend from roots through stems to all parts of the leaves, flowers, and seeds, through which the water can move. A shortage of water, therefore, becomes of critical importance to any plant.

HOW PLANTS REPRODUCE THEMSELVES

It is characteristic of most plants that a small portion of their body (especially if it includes a bud) when removed and placed under favorable conditions, will replace any missing parts and grow into a new and complete individual. Nurserymen make use of this character when they cut pieces of twigs or other parts and plant them to get new plants. Some plants produce structures especially designed to aid in reproducing. Onion and daffodil bulbs are good examples of this, as are potatoes, or the runners of strawberry plants.

Far more important and common than these vegetative ways of reproduction, however, is the sexual method of reproducing by seeds. A seed is essentially a small package, well wrapped, containing a young plant plus a supply of food for future growth. Seaweeds, mosses, ferns, and other plants lower in the evolutionary scale do not produce seeds but almost all the common plants most familiar to us do.

Seeds are produced following pollination; that is, pollen, which contains the male germ cells, must reach the ovary, which contains the female germ cell, or egg. In a great many seed plants the pollen and ovaries are found in the same flower, but there are many plants in which the pollen is found in one flower and the ovary is found in another. Corn is a plant like this. Corn tassels produce the pollen; the young ears of corn contain the eggs. A few plants have the sexes entirely separate; thus one plant produces only pollen-bearing flowers, another produces only ovary-bearing flowers. Evergreen hollies, familiar at Christmas time, are like this; only the ovary-bearing bushes produce berries.

The business of pollination is a matter of interest to farmers. The seeds, fruits, and berries of our important crop plants do not develop ordinarily unless pollination has taken place. Cross pollination, in which pollen from one plant reaches the ovaries of another plant, is very necessary with many plants; some fruits will not develop very well and some will not develop at all unless cross pollination occurs. There are two principal ways that pollen gets to ovaries—it is blown there by the wind or carried there by insects. All the grains (except buckwheat) are wind-pollinated. All our fruits and berries are insect-pollinated. Many orchardists arrange for beehives to be placed in their orchards just as the trees bloom. The bees carry the pollen from one flower to another, thus insuring the setting of fruit. Prolonged cold or wet weather at a time when pollination should take place may prevent the bees and other insects from operating—and there is no fruit that year.

PLANT BREEDING

With plants, as with all other living things, no two individuals are exactly alike. There is an inconceivable amount of variation among them, and man long ago began to take advantage of plant differences by saving the seeds of the plants he wanted or liked the most. Almost every farmer saves seed from the best wheat, from the best alfalfa, from the best type of any crop he grows. In such a selective manner it is possible, over many plant generations, to obtain a superior strain of plants.

But there are limits to selection. Some strains of wheat, let us say, may produce an abundance of grain but be susceptible to frost. Other strains may be able to grow in cold climates, but be unable to produce much grain. If the best qualities of both could be combined, a productive wheat that could grow in colder climates might be produced. Exactly such combinations have in fact been made, thereby making it possible to grow wheat far north of the usual wheat-growing areas.

To breed better types of wheat or of any other type of plant, pollen is taken from one strain that has the character we want, and placed on the ovaries of another strain that has other desirable characters. The union produces seeds that in turn produce hybrids, some of which may contain the desired combination of characters we want. By carefully selecting the best of the hybrids and reproducing them, eventually a pure line can be produced.

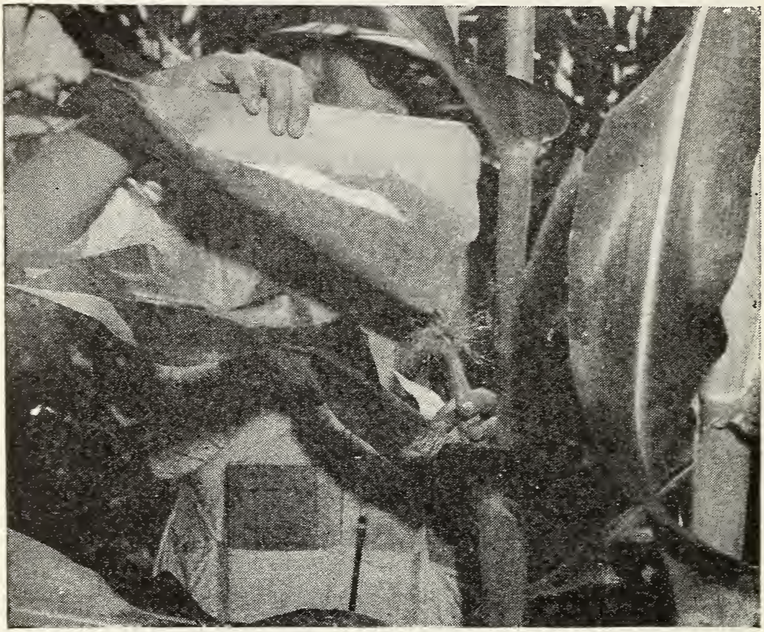


Figure 25. Hybrid corn has been developed as a result of research in genetics. It is an outstanding example of the influence of theoretical scientific research in revolutionizing the production practices of an agricultural crop. Although a new development, the corn hybrids already have established their superiority in productiveness and in resistance to wind, disease, and other unfavorable conditions.

Dr. M. T. Jenkins, agronomist of the U. S. Department of Agriculture, applies pollen from a selected parent corn plant to the silks of another corn plant selected as the other parent of a hybrid being developed in one of the Department's experimental plots. (U. S. D. A.)

Actually breeding plants is a complex and difficult business. It requires knowledge of the laws of inheritance, and demands the exercise of great skill in the operations involved in artificial pollination, in the selection of pure strains for crossing, and in the establishment of pure lines after crossing has been effected.

But despite the difficulties, crop breeders have made magnificent strides in the development of better crop plants. High-yielding types, resistant to diseases, able to stand erect despite heavy rains, easier to harvest, maturing early or late depending on our needs—types with such characters have been developed in wheat, corn, barley, and other important grains, as well as among many other crop plants. It is fair to say that there are few things plant breeders cannot accomplish, given the raw material to work with.

PLANT TROUBLES

Every farmer is troubled by three things that cause him difficulty in his work of growing plants. These three are plant diseases, insect pests, and weeds. All of them cut down the amount of food per acre that can be produced, and the farmer's concern is obviously justifiable, because in farming, as with anything else, it is the results that count.

Weeds. Weeds are plants that grow where they are not wanted. Some grow fast enough to crowd or overshadow crop plants. Some take so much nourishment from the soil that crop plants cannot get their fair share. Others harbor various kinds of insects or diseases that attack the crop plants we try to grow. Many of the weeds produce enormous quantities of seeds, and others produce underground stems or roots that can reproduce the weed even when broken into small pieces. Both these methods of reproduction are effective in enabling weeds to compete with crop plants.

We could discuss the many kinds of weeds that encroach on cultivated land, on pastures, hay meadows, rangeland, and the like, but to do so would require a big book. They cost agriculture millions of dollars each year both because they reduce crop yields and because they make necessary a greater amount of cultivation to get rid of them than the crop would otherwise need.

Methods used to combat weeds are many. When we sow crop seeds we check in advance to be sure the seeds are clean and free of weed seeds. Cultivation is done to kill young weeds and to prevent them from reaching maturity to produce still more weed seeds. In meadows the weeds may be mowed before they have a

Figure 26. A good crop of barley and oats dragged down by bindweed. (U. S. D. A.)

chance to fruit. With difficult types, especially those with persistent underground parts, we may have to resort to pulling and cutting them out by hand, or of letting the fields lie idle and cultivating them frequently. Chemicals, such as sodium chlorate and sulfates of ammonium, copper, or iron are used to destroy weeds, but while there has been some success with them, much remains to be learned.

Figure 27. Johnson grass in corn. Corn scarcely visible. (U. S. D. A.)

Insects. The struggle between man and insects began long ago and it continues intensively at the present time. So far as farming is concerned, almost everything insects do results from their efforts to get food. A great many kinds of insects may prefer only one kind of plant, but there are others that will feed on almost any plant; and inasmuch as farmers are kind enough, so to speak, to plant acres upon acres of the favorite foods of this or that sort of insect, it is small wonder that violent competition for the crop may result.

The chewing insects include several well-known species that are a particular menace to field crops. There is the Colorado potato beetle, native to America, that formerly lived on wild weeds, but that took to potatoes, which it now devours as its favorite food in every State. There is the armyworm that attacks all grass crops, especially corn, timothy, millet, bluegrass, and small grains. Then there are the various grasshoppers that have periodically overwhelmed farmers in parts of the Plains region; that in 1923, for instance, destroyed the plants in a Montana area larger than an average-sized State of the East. And there are many others of the chewing type.

The piercing-sucking insects include the aphids and the scale insects. These creatures live by piercing the leaves or stems of plants and sucking the juices.

The borers include a number that bore into orchard trees, for instance, or that work into nuts, seeds, or fruits. The cotton-boll weevil is one of these. It crossed the Rio Grande about 1892 from Mexico, and there, before it, lay about 19 million acres of its favorite food, cotton. In less than 30 years it spread into nearly every part of the Cotton Belt, and wherever it went the little weevil's activities caused losses equivalent to as much as half of all the cotton grown.

There are many other kinds of insects, and for each there is a poison or a cultural method, or in rare cases, a parasite that may help to keep them in check. Insect-eating birds perform no inconsiderable service in checking insects, which is why good farmers do what they can to encourage the songsters. The poisons include stomach poisons, such as the arsenics, which are sprayed on plants to kill chewing insects; the contact poisons, such as the nicotines and oils, which kill by contact and are used against the piercing-sucking insects; and the fumigants such as carbon bisulfide, which are applied as a gas to certain borers, and which only act within an inclosure of some sort.

Figure 28. Alfalfa plants bred to resist cold (left), survived exposure to extreme cold. Ordinary alfalfa plants (right), withered and died. (U. S. D. A.)

Good cultural methods also help considerably. Variations in the time of planting or harvesting, proper kinds of rotation of crops, cultivation at the right season, destruction of weeds that may harbor insect pests, and the like, are used with good effect in many instances. In a very limited way as yet, breeders are beginning to breed plants resistant to certain insects. But any farmer can tell you that one of the costs of farming that must be reckoned with is the cost of battling these pests.

Diseases. The last, but by no means the least of the enemies of crop plants—and therefore of farmers—are the numerous diseases that attack them. Many apparent diseases are caused by such things as too much water, poisonous materials in the soil or air, freezing, animal parasites, inadequate or unbalanced plant nutrients, and even by too much spraying; but for the most part the true plant diseases are those caused by a fungus, by bacteria, or by a virus.

We do not yet know the exact nature of a virus—which is some sort of infectious principle that carries a disease and that can increase itself. Insects may carry viruses, and they are carried in other ways. Viruses cause the so-called mosaic diseases, which usually cause a mottling of plant leaves; they also are at the root of peach yellows, beet curly-top, and a number of others. Control lies in removing and destroying infected plants or plant parts, in avoiding contamination, and in using resistant strains of plants.

Bacteria cause diseases variously known as wilts, rots, blights, tumors, and scabs. General sanitary practices, disinfection of seed, disinfection of seed beds, and use of resistant varieties help to control these diseases.

Figure 29. What is left of a stalk of corn after the grasshoppers have been chewing on it for a while. (U. S. D. A.)

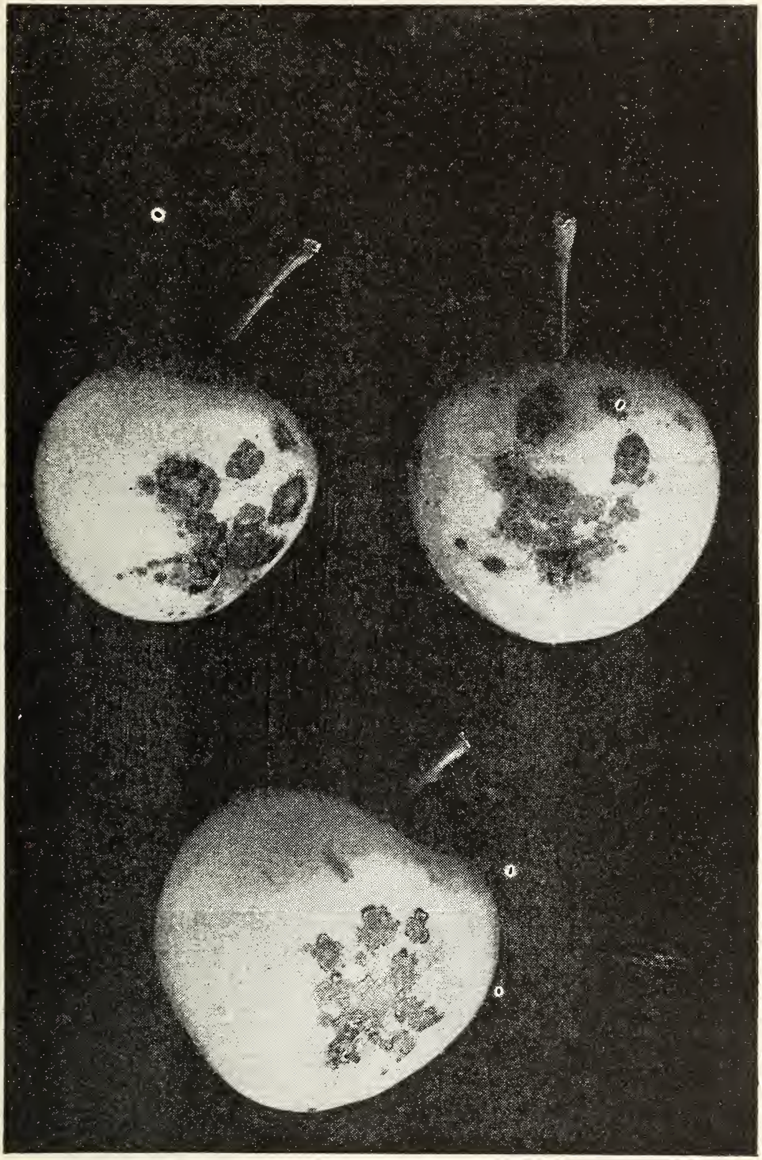


Figure 30. Scab spots on deformed apples in midseason. (U. S. D. A.)

Parasitic fungi (this word is the plural of fungus, and is pronounced funj-eye) cause a wide variety of plant diseases, such as mildews, smuts, rusts, black mold, black rots, soft rots, leaf spots, cankers, various types of blights, and many others. The fungus diseases are controlled by sprays such as lime-sulfur, copper sulfate and lime mixtures (known as bordeaux mixture), or dusts, such as powered sulfur, lead arsenate, or copper dusts. Many other methods are used, including eradication of plants that may carry one stage of the fungus, use of resistant varieties, seed disinfection, sanitary cultural methods, and the like.

No one knows exactly what plant diseases cost agriculture, but the annual toll is large; and, as with insects, a farmer must know how to combat diseases if he is to succeed in getting good crops. One measure of importance is choosing the best variety to plant. Many varieties resist diseases, and plant breeders are continually producing better varieties that stand up against diseases.

CHECK-UP NO. 6

Part I

By answering these questions, you can find out how well you read the chapter. Underscore the correct answer.

1. Is glucose a food manufactured by plants? (a) Yes. (b) No.
2. Are all fruits insect pollinated? (a) Yes. (b) No.
3. Does the pollen contain female germ cells? (a) Yes. (b) No.
4. Is chlorophyll always green? (a) Yes. (b) No.
5. Is a daffodil bulb the same as a seed? (a) Yes. (b) No.
6. Are seeds produced following pollination? (a) Yes. (b) No.
7. Is the offspring of the crossing of two strains of plants called a hybrid? (a) Yes. (b) No.
8. Is the breeding of plants an easy undertaking? (a) Yes. (b) No.
9. Are aphids classed as chewing insects? (a) Yes. (b) No.
10. Are nicotines stomach poisons? (a) Yes. (b) No.
11. Are some strains of plants more disease resistant than others? (a) Yes. (b) No.

Compare your answers with those in the answer key. If your answer is incorrect, go back to the page listed in the parenthesis in the key and reread the material.

Part II

The terms in Column A were all used in this chapter. Find out if you know the meaning of each term by matching it with the correct word or phrases in Column B. Write the number from A in the appropriate blank in B. The first one is marked correctly.

Column A	*Column B*
1. weed	__3__ A cross between two plants
2. Boll-weevil	_____ green matter of plants
3. hybrid	_____ boring insect
4. chlorophyll	_____ process of food manufacturing

5. photosynthesis	_____chewing insect
6. pollination	_____fertilization in plants
7. solution	_____sucking insect
8. nicotine	_____liquid with minerals dissolved in it
9. aphids	_____an undesirable plant
10. potato beetle	_____used to fight sucking insect

CORRESPONDENCE OR CLASS ASSIGNMENT

1. In addition to being used in the process of photosynthesis, water has another important use to plants. Describe this second use.

2. Describe briefly a procedure that might be used by a plant breeder who is trying to get oats that combine resistance to disease and high productivity.

3. Why is it necessary to know the feeding method (sucking, chewing, boring) of insects?

Chapter VII
The Plants That Support Us

STUDY GUIDE

As indicated in the chapter heading, the plants considered are the important ones. Since these plants make it possible for you to live, you already know what they are and probably know in a general way the main facts about the production of each of them. The information in the chapter will be of use chiefly to help you organize the knowledge you now have. It may also add to your store of knowledge. First, find out how accurate your information on the important plant crops is. You can do that by trying to answer the following questions:

1. Which of these groups of U. S. crops is the most important? (a) The fiber producing. (b) The grain producing. (c) The forage (hay) producing. (d) The vegetables.

2. Which group of crops requires the least amount of labor to produce? (a) Fiber producing. (b) Grain producing. (c) Forage producing. (d) Vegetables.

3. How many true cereal grains are there? (a) 4, (b) 5, (c) 6, (d) 7.

4. On farms producing the maximum amount of corn for the available labor, is there time to grow other crops? (a) Yes. (b) No. (c) Don't know.

5. About what percent of the corn planted in the Corn Belt is hybrid? (a) 20, (b) 40, (c) 60, (d) 90.

6. In what States of the U. S. is corn not grown? (a) Utah. (b) Maine. (c) Florida. (d) None.

7. Where is the most important winter wheat region? (a) Southern Great Plains. (b) Northern Great Plains. (c) Washington-Idaho. (d) Ohio-Indiana.

8. What is the chief use of wheat straw in the wheat belt? (a) Feed for livestock. (b) bedding for livestock. (c) Litter for poultry. (d) Mulch for the soil. (e) bonfires.

9. How many States in the U. S. produce substantial amounts of rice? (a) 4, (b) 9, (c) 14, (d) 22.

10. How does the amount of land in the U. S. devoted to oats compare with that devoted to corn? (a) The oat land is only about a tenth as large as that in corn. (b) The amount in oats is about a third that in corn. (c) The amount in oats is about two-thirds that in corn. (d) The two amounts are about equal.

11. In number of acres planted each year which of these ranks first? (a) Barley, (b) Rice, (c) Rye. (d) Grain Sorghums.

12. Which of the crops in question 11 ranks second? (a), (b), (c), (d).

13. Which of these grain crops is increasing most in importance in the U. S.? (a) Corn. (b) Wheat. (c) Grain Sorghums. (d) Oats.

14. What percent of the world's potatoes are grown in the U. S.? (a) Less than 10 (b) 15-20 (c) 60-70 (d) over 90

15. How does cotton rank among the crops in dollar value of sales made by the farmer? (a) First (b) Third (c) Fifth (d) Seventh.

16. About what percent of our cropland is devoted to tobacco? (a) Less than 1 (b) 3 (c) 7 (d) 11

17. About what part of the hay used in this country is made from grass? (a) one-eighth. (b) one-third. (c) one-half. (d) three-fourths.

Now read the chapter to see whether your information was correct.

THE WORLD'S GRAIN CROPS

All the great civilizations of the world have depended principally on grains or cereals such as wheat, or rice, or corn, as their most important source of plant food. Without the basic foodstuff supplied by these cereals, really great civilizations could not exist. The six true cereals—wheat, corn, rice, barley, oats, rye, and sorghum (which is classed as a pseudo-cereal)—ordinarily occupy more land in this country than all the rest of the crops we grow put together. Using long-time average figures, the big seven cereals are grown on about 60 percent of the land used for all of our crops, including hay. This is a lot of land, more than 200 million acres of it.

Cereals are easier to grow than many other crops, and for the amount of land they occupy and the small amount of labor needed to cultivate them, they yield a large amount of food. Their food value is high, and the grains are easy to store and handle because they are dry.

CORN IS OUR MOST IMPORTANT CEREAL

Our most important cereal is corn, which originated in the Western Hemisphere. The United States produces more of it than any other country in the world. In fact, we usually harvest slightly more than all the rest of the countries put together. In some years, including 1942 and 1943, the United States produced over 3 billion bushels, although the usual harvest amounts to about 2½ billion. And once—in 1917—we used 110 million acres for corn, although we usually devote about 95 million acres to the crop. This means that about one-fourth of our total cropland is planted to corn. What this all adds up to is that corn occupies more land in the United States—and is more valuable—than any other crop we grow.

The most important corn-growing area is the famous Corn Belt of the Mississippi Valley in the United States. Iowa sits in the center of the belt, and parts of all the States surrounding it, plus Indiana and Ohio, make up the rest. It is here that corn yields more grain per acre than in most other parts of the country, although corn is grown in every State in the Union.

Raising and Harvesting Corn. Methods of raising corn have been changing rapidly in recent years, particularly in the main producing areas where the acreage of corn averages 30 to 50 acres per farm. The commonest method in the main Corn Belt is to plant the seed during May in well-tilled fields, using a "check row planter," a machine which plants several kernels in a "hill" and spaces the hills in checkerboard squares so that they are in rows about 3½ feet apart in each direction. Small weeds close to the corn are often killed without hurting the corn by stirring the surface with light-fingered "weeders," "rotary hoes," or harrows, and then the corn is cultivated by horse-drawn or tractor-drawn cultivators which kill the weeds between the rows by stirring the soil and kill the weeds close to the corn by covering them with dirt. By cultivating the rows alternately lengthwise and crosswise at about weekly intervals farmers are usually able to keep the fields practically clean of weeds. In the Corn Belt the hand hoeing and the one-horse cultivation, which still persist in some other areas, are now almost unknown except in gardens. Two-horse cultivation, cleaning both sides of a row, is the smallest cultivating unit used, two-row cultivators which cultivate 12 to 18 acres per day are in common use, and use of three- and four-row cultivators is increasing. When the corn is waist high, cultivation is stopped.

After reaching this height corn grows very rapidly, and with sufficient moisture and fertility it soon reaches a height of 8 to 14

Figure 31. Corn harvesting in the Corn Belt is mostly mechanized. A mechanical picker picks the ears from the stalks and tosses them into a trailer truck. From the truck, which is hauled to the cribs by horses, or tractors, the ears are elevated mechanically to a well-ventilated crib to dry. (U. S. D. A.)

feet, the shorter and earlier ripening kinds being planted in the northern areas where the growing season is shortest. After the plant has matured and the ears have dried sufficiently to be stored, they are picked from the stalks and put into well-ventilated cribs to dry. Mechanical pickers which pick the corn from the standing stalks, take off the husks, and put the corn into wagons are now used for most of this harvesting in the main corn-producing area, and their use is rapidly increasing in other areas. A two-row picker will pick an average of 12 acres in 1 day. Engine-driven elevators which have chain belts to lift the corn into the cribs are also extensively used, and power-driven shellers are usually used to shell the corn from the cobs after it is dry and before it is shipped any distance.

By using tractor-driven machinery for all operations it is not uncommon now for one man to raise 100 acres or more of corn, and in productive areas this may average 5,000 to 7,000 bushels with much higher production occasionally obtained on individual farms. Maximum corn production still leaves a farmer considerable time to grow oats, hay, and other crops that do not conflict with corn in labor requirements during rush periods so that in the best corn-producing areas the production of grain per worker is very high.

Outside the main Corn Belt various modifications of these methods are used. From about central Ohio eastward there is a demand for all the fodder that can be saved, and farmers commonly cut the corn with binders or by hand, and stand the bundles or stalks in wigwam-like shocks. This permits cutting the corn while some of the leaves are still green and saves the fodder in good condition for use as forage for cattle after the ears are picked out. In the main dairy areas a large part of the corn is chopped up green by mechanical cutters and blown into large cylindrical silos where it undergoes a fermentation like sauerkraut and is preserved as a succulent feed for the cows during the winter months. In parts of the South where it is difficult to keep insects from destroying stored grain a common practice is to cut off the tops of the stalks above the ears and save the tops and leaves for forage, leaving the ears on the stalks until needed or until cold weather. Special methods of production as well as adapted varieties of corn have also been developed for other parts of the country. Recently yields have been materially increased by general use of "hybrid corn" which has been scientifically developed to take advantage of the extra growth that is secured when certain dissimilar kinds are first cross-bred.

Figure 32. Outside the main Corn Belt farmers commonly cut the corn with binders or by hand and stand the bundles or stalks in wigwam-like shocks. (U. S. D. A.)

Hybrid corn is now planted on more than 90 percent of the corn acreage in the Corn Belt.

In all, nearly three-fourths of the farmers in the United States raise corn in some form. It is planted on nearly a fourth of our total crop acreage, produces half of our total grain supply, and is the principal grain fed to our livestock. It is an important crop practically everywhere east of a line drawn from central Texas to southeastern North Dakota. This area includes practically all of the country that has a summer rainfall of more than 10 inches and a summer temperature that averages above 67°.

Within this area there is a wide variation in the yield of corn per acre, for this depends largely on the fertility of the soil and on the rainfall. Cultural practices and the skill of the farmer are also important. In areas of high rainfall, where there is commonly a lack of plant food in the soil, commercial fertilizers are extensively used, and corn now receives more total tons of fertilizer than any other crop. On many eastern farms the land to be planted in corn is heavily manured. These practices give high yields on many individual farms, but in some of the southern States yields still average below 15 bushels per acre. The yield per acre in the country as a whole has been rising since the use of hybrid corn became general and is now expected to average over 30 bushels. In 1942 the United States yield reached 35.2 bushels or almost a ton of shelled corn per acre, and in Iowa it was 60 bushels per acre with many individual fields producing more than 100 bushels per acre.

What We Do With Our Corn. In one way or another we eat about 16 bushels of corn per person in the United States every year. This does not mean that we eat it directly; we may eat it in the form of pork or beef that was produced from corn-fed hogs or cattle. In the famous corn-hog agriculture of the Middle West the hog is the principal direct consumer of corn, using about 40 percent of the total crop. Actually, corn is a principal source of food in this country whether we use it directly or indirectly. Corn may reach the table "on the cob" or as cornbread, hominy, corn meal mush, popcorn, or corn whiskey. It may be poured on corn cakes in the form of corn syrup, sprinkled on fruit as sugar, or put on salad as the oil base in the mayonnaise. The crust on bread may have been brushed with corn dextrin to give it its soft brown color, and ice cream, candy, and even chewing gum manufactured in part from corn products may conclude many an American dinner.

If you like figures—we produce over a billion pounds of cornstarch annually, nearly half a billion pounds of corn sugar, almost a billion pounds of corn sirup, and something on the order of 60 billion pounds of corn oil, oil cake, and corn meal. We use the sugar in sparkling ales and in dyeing processes. The gum on the back of postage stamps comes from corn. Many manufactured jellies and preserves are based on corn sirup. Pith from the corn stalks is made into explosives or used in packing, and husks from ears of corn are used in cheap mattresses. A fine grade of charcoal comes from corn cobs as do the corn cob pipes. A coarse paper is made from cornstalks, and corn oil is used in certain soaps and paints. Corn oil may also be used to make rubber substitutes and alcohol from corn to produce synthetic rubber. Cornstarch is a common product on grocery store shelves.

WHERE WHEAT IS GROWN

A good part of the wheat grown in the United States comes from the northern Plains, the central-southern Plains, and the Pacific Northwest. We grow wheat, of course, in nearly every State in the Union, but these are the areas of concentrated production. In the northern Plains spring wheat, which is sown in the spring, is grown, for there the climate is too severe for young wheat seedlings to get through the winter alive but the summers are relatively cool and favorable. In the southern Great Plains, winter wheat is grown. It is sown in the fall, gets a good start before frost, and makes its main growth in the spring before the hot and often dry weather of the summer months. In the great wheat-growing areas of the Northwest, including the famous Palouse region of eastern Washington and Idaho, both spring and winter wheat are grown, fall planting being generally preferred when fall rains are adequate. Besides these places where wheat is the main crop, we grow many millions of acres of wheat in other States including the Corn Belt, the limestone valley area, and central California. All told, in the United States we grow on the order of 750 million or more bushels of wheat and set aside about 50 million acres of land to do the job.

Hard red spring wheat is used principally for bread, durum wheat for macaroni, and hard red winter wheat and soft red winter wheat for flour and feed. Durum wheat is declining in importance. White wheat occurs chiefly in the West Coast States including Idaho, and in Michigan and New York.

How Wheat Is Grown. Where wheat is an important crop the seed wheat is carefully cleaned, treated with chemicals to destroy any fungus, and "drilled" or sown by machines in well prepared

Figure 33. In the great wheat-producing areas of the United States, combines are the rule in harvesting the crop. These machines cut off the heads, thresh out the grain, and put it into sacks or storage bins, all in one operation. (U. S. D. A.)

land. When the young plants appear they look like so many grass plants—which is exactly what they are. If the wheat was sown in the fall, it looks like nothing more than young grass all through the winter. As the season advances it grows higher until eventually the spikes or "heads" of wheat begin to appear and reach their full height. Gradually, the heads turn lighter green, then become tinged with yellow, and fiinally when the food elements developed in the plant have been stored in the grain the whole plant turns golden brown and wheat harvest time has come.

How Wheat Is Harvested. Where the fields are large and the rainfall low, combines are now the rule. These machines cut off the heads, thresh out the grain, and put it into sacks or a storage bin on the machine all at one operation. The development of small combines (machines which harvest and thresh grain while moving over the field) that can be operated by an ordinary tractor have been rapidly extending this method of harvesting into areas where only a small amount of wheat is grown, but large machines harvesting 25 or more acres per day are the rule in the main wheat areas. Headers which cut off the heads and put them into a wagon to be stacked and afterwards threshed are still used in some sections.

Binders which cut the standing grain a few inches from the ground and tie it into bundles still cut a fourth of the wheat, and are still the standard method of harvesting where saving the straw is important or where frequent rains make it difficult to get the wheat dry enough for combining before it begins to fall down. When a binder is used the wheat can be cut before it is "dead ripe," but the bundles must be picked up and stood on end in small "shocks" to dry and then pitched on a wagon and hauled to a thresher, which beats out the grain, puts it into a wagon or sack, and blows the straw to a straw stack. This method gets the straw off the land so that it does not interfere with the grass and clover that is seeded in the wheat and subsequently harvested as a hay crop. It also stacks the straw where it can be conveniently used for feed or for bedding livestock.

Choice between these various methods of harvesting depends in part on the quantity of small grain raised. In the Wheat Belt, where immense quantities of straw are produced, it has practically no value except as a mulch for the soil. On the other hand, in parts of the Northeast so little grain is grown that the straw is often worth half as much as the grain.

Methods of growing wheat prior to harvest also vary considerably between areas. Where the rainfall is too low for other crops,

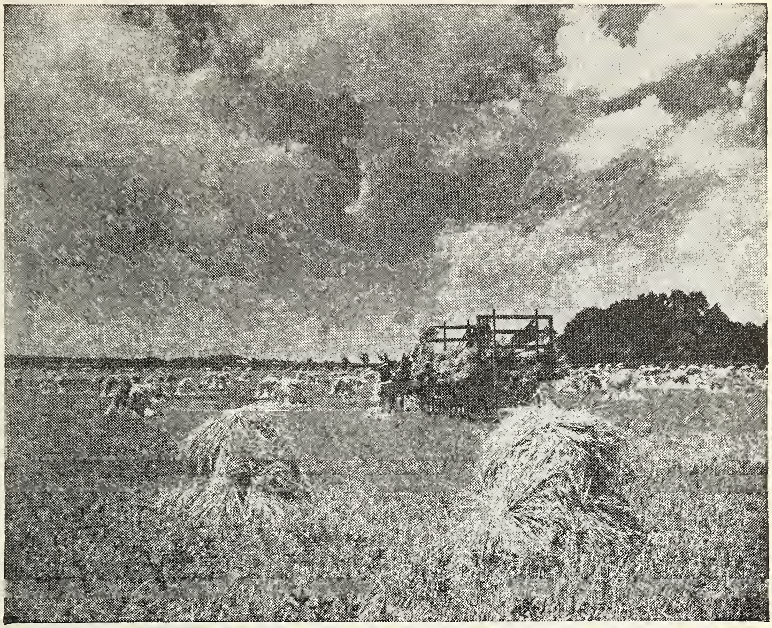


Figure 34. Binders, which cut the standing grain a few inches from the ground and tie it into bundles, are still the standard method of harvesting wheat where saving the straw is important or where frequent rains make it difficult to get the wheat dry enough for combining before it begins to fall down. (U. S. D. A.)

much wheat is grown on the same land year after year. Here the yield per acre depends primarily on the rainfall, although periods of hot weather and losses from a fungus disease called "rust" also reduce the yield especially in warm rainy seasons. In some areas of deep soil and low rainfall farmers sow only half of their wheat land each year and cultivate the rest all summer to keep down the weeds and hold the moisture and plant food. They thus accumulate most of a year's rainfall in each field before seeding. East of the Mississippi River winter wheat seldom suffers seriously from drought, but it often suffers from too much rain or from the diseases and the shortage of plant food that tend to accompany an excessive rainfall. In much of this area fertilizer must be used to obtain profitable yields.

Wheat Uses. About one-fifth of our food in this country comes from wheat. Bread, of course, is the staff of life and is the most familiar of all wheat products. It is made mostly from hard wheat. Cakes, pies, pastry, crackers, biscuits, rolls and the like are made from soft wheats. Then there is a great array of breakfast foods—shredded wheat, puffed wheat, bran, wheat mush—and macaroni, spaghetti, and noodles. All of these come from wheat. Wheat is also used to make beer, as well as other beverages and industrial alcohol. Starch from certain varieties is used for textile sizing. Wheat straw goes into mattresses, straw carpets, string, baskets, and hats. And besides all these uses, wheat reaches us in the form of meat from animals—such as chickens, pigs, and beef cattle—that are fed on it.

RICE

Rice is preeminently a cereal of the hot semitropical countries, and as such does not figure largely in grain production in the United States. Our commercial crop comes from Louisiana, Texas, Arkansas, and California. Before the expansion to meet war conditions we usually grew about 50 million bushels each year on about a million acres of land. In comparison with other parts of the world, however, this is a small business since the whole world grows about 7 billion bushels on nearly 200 million acres. In the United States the hand methods followed in the cheap labor countries of Asia are not used.

The crop must be flooded during much of the growing period, but commercial production is now limited to areas where preparation of the land and the harvesting can be done by machinery while the land is dry. Usually the seed is sown in tilled fields in April and May either by drills or broadcasting machines, but in California some is dropped in the water from airplanes. As the plants grow the soil is gradually submerged under 4 to 8 inches of water. When harvest time comes the water is drawn off and the rice is harvested about the same as wheat. Rice yields much more per acre than other small grains and it is all used for food for human beings. Like oats and barley, it has a hull that adheres to the seed and must be removed by machinery before the grain is eaten.

OATS

Oats are far more important as food in other countries—Scotland, for instance—than in the United States. Less than 4 percent of our oat crop is made into rolled oats or oatmeal. We use the rest principally for livestock feed. Nevertheless, we usually grow a little over a billion bushels each year on about 37 million acres of land, and ordinarily we lead the world in oat production.

Oats are grown to some extent in all States, but usually about 40 percent of the crop is produced in Illinois, Minnesota, and Iowa, and another 40 percent in the other North Central States. Oats are an important crop in the Corn Belt partly because they can be sown in the spring before corn planting time and harvested after the corn is too big to cultivate, and because they serve as a companion crop for legume and grass seedings and fit well into the rotation with corn. Oats may be harvested with a combine but much of the crop is still cut with a binder. In the South, much of the acreage is sown in the fall or winter months but the crop in the North is sown as early in the spring as the ground can be worked. In some States combines are used for harvesting, but a large part of the acreage is cut with binders. With these exceptions the crop is grown about like wheat.

BARLEY

Barley is grown in the United States in much the same areas as wheat, occupies about 14 million acres of land, and produces upwards of 300 million bushels of grain each year. It is best known as the chief source of the malt used for making beer, ale, porter, and stout. Malt is made by sprouting the barley seeds and drying them just after the shoots have started. The grain is also used to some extent as food and feed. In the field barley looks very much like wheat or rye, and it is drilled and harvested in the same way as these other grains.

RYE

Toughest and hardiest of all true cereals is rye, the grain that can grow on poorer soil and in drier country and can survive colder winters than any of the others. On good land it usually yields less than wheat. It also usually sells for a lower price. It is still a crop of lesser importance in the United States, but we grow nearly 40 million bushels each year on about 3¼ million acres. It is taller than winter wheat but is grown in the same way. About two-thirds of our crop we feed to livestock; the rest we use for rye bread, or to make whiskey and alcohol. In addition to the acreage grown for grain, usually about 2 million acres are sown to rye for pasture or for a winter cover crop.

GRAIN SORGHUMS ARE BECOMING MORE IMPORTANT

The sorghums that produce grain are grown on about 10 million acres in the United States, and from them we harvest approximately 100 million bushels. Most of the crop is planted in the hot, dry southern Plains and the Southwest. There the great fields of heavy-headed spikes of sorghum are a familiar sight and one likely to be seen more frequently since the use of sorghum has been spreading lately.

Sorghum differs from corn in that it is much less seriously damaged by spells of dry weather, and it is therefore grown chiefly in areas that are often too dry for corn to yield well. While still young the plants resemble corn a good deal, but there is no mistaking the big club-heads of grain as the seeds ripen. Up to harvest time the grain sorghums are handled much like corn. The seeds are planted in rows 3 or more feet apart; the young plants are cultivated to destroy weeds, and the mature plants are commonly harvested with combines such as are used for wheat or with binders such as those used for corn. Sometimes the heads are cut off by hand, and sometimes cattle are turned into the fields, but an increasing number of farmers are now preferring the low-growing kind that can be harvested with a combine, for this greatly reduces harvesting costs.

POTATOES

Although the ordinary white potato did not get into general use in the world until after 1700, it is the most important crop in all the world at the present time, measured by the bushels produced. This is a remarkable record to have been made in less than 300 years. The really big production is in Europe, where more than 90 percent of the world's potato crop is harvested. In the United States we grow upwards of 400 million bushels on a little over 3 million acres. At the present time potatoes are said to be grown in all but seven counties in the United States. The plants do best in sandy or loam soils, and they are primarily a crop of cool and moist climates. For this reason the heaviest production is in the northern States, in irrigated areas of the West, and along the Atlantic Coast from North Carolina to Long Island.

COTTON

Cotton is less extensively grown than a few years ago, but it is still the most important crop in the United States from the standpoint of the dollar value of sales by farmers and the value of exports, and probably in the hours of labor used. It ranks second only to corn in the total value of production. It is the principal source of income for about a million farmers.

Cotton is a crop of high labor requirements but one that often gives a high income per acre from poor land. Both yields and prices have been variable, and farmers who depend exclusively on cotton have had an unstable income. Since more than half of the crop has usually been exported, the returns of producers have been considerably affected by world conditions.

A few mechanical cotton pickers are now in use, but most of the cotton is still picked by hand. This is a slow and tedious job and accounts for a large portion of the labor requirement. The large amount of hand labor required makes it difficult for this country to hold its position in world markets. World prices high enough to give producers here a favorable return per hour of labor tend to encourage increased production in competing countries where labor is cheap. Costs of production in this country were also increased by the cotton boll weevil, a troublesome insect that spread over the Cotton Belt some years ago. Recently yields have been increased by variety improvement, heavier fertilization, weevil control, and better farming methods, and on many farms costs have been reduced by the substitution of tractors for mules in plowing and cultivating. Formerly all cotton was planted very thick and then "chopped" or hoed by hand to space the plants. Now some growers are reducing or eliminating hand hoeing by de-linting the seed to remove the fuzz, so that mechanical drills can plant the seed at accurately spaced intervals.

The picking of the crop, however, still requires a great deal of labor. With an average yield of 250 pounds (one-half bale) of cotton lint (fiber) per acre, the weight of cotton and seed, as picked, averages about 700 pounds. Picking this quantity using fam-

Figure 35. Most of the cotton grown in the United States is still picked by hand—a slow and tedious job. (U. S. D. A.)

ily labor of all ages represents about 5 days' work, and as the crop must be picked fairly soon after the bolls (pods) open the acreage of cotton that a family can grow is limited by the number of pickers available. This has tended to prevent producers from increasing their incomes by using power equipment for planting and cultivating and operating larger acreages except in California, Arizona, and limited areas elsewhere where workers can be brought in from other areas to help with the picking. For these reasons farms growing cotton have an average of only 15 acres per farm, and the bulk of the crop is produced on small farms and by families with limited resources and skills and who are willing to work for relatively low returns per hour of labor.

During the last 15 years the value per acre of the cotton crop (lint and seed) has ranged from $22 in 1932 to $62 in 1943. These however are average figures and variation on individual farms is very great. In 1943 per acre value on some farms was as much as $200, while on some poor farms the value was as low as $25.

After the cotton has been picked from the bolls, it is hauled to cotton gins where the lint is separated from the seeds by a series of revolving disks with sawlike teeth. The lint is pressed into bales weighing about 500 pounds. The seeds, which weigh nearly twice as much as the lint, are sold to oil mills where they are hulled and then put in presses to separate the oil from the cake. Cottonseed oil is an important food material and has a large number of other domestic and military uses. The "cake" is mostly ground to make cottonseed meal, a valuable high-protein feed for livestock, and also used to some extent for fertilizer. The bales of lint are shipped to cotton mills, where the lint is spun into thread, to be woven into cloth and other fabrics.

The fuzz that clings to the seeds—cotton linters—is taken off the seeds by reginning at the oil mill, and is used to make explosives and for stuffing mattresses and other uses. It may turn up in cushions, horse-collars, or upholstery; it is turned into felt or mixed with wool to make fleece-lined underwear; candlewicks, twine, rope, and carpets may contain cotton linters, and they are the basis for one type of very fine rayon and for certain kinds of paper.

TOBACCO

Nine people out of ten are likely to think of the South when tobacco-growing is mentioned, but while more tobacco is grown in the Southeast than elsewhere, a very great deal is grown in the North. Both Massachusetts and Connecticut grow tobacco; so do Missouri, Ohio, and Indiana; Minnesota grows some, and Wisconsin until recently grew more than Maryland.

For the last 50 years we have been growing more than a million acres of tobacco, and within the last 30 we have now and then raised tobacco on 2 million acres. North Carolina and Kentucky account for 60 percent of the crop; adding Tennessee, Virginia, South Carolina and Georgia, these six States produce about 85 percent of all our tobacco. We produce upwards of 180 billion cigarettes and 5 billion cigars, to say nothing of 200 million pounds of pipe tobacco, 37 million pounds of snuff, and some 60 million pounds of chewing tobacco. The value of the industry is obviously enormous.

About 6 million tobacco seeds weigh a pound. It takes only about a level teaspoonful of the fine and dust-like seed to sow a hundred square feet of tobacco seed bed where the young plants are started. After the seedlings are strong enough to take care of themselves they are transplanted in rows in the fields. Over and over again the plants are cultivated until they get so big that they are bruised by the cultivator. The tops of the plants may be later broken off to force the development of large leaves.

As soon as the leaves are ripe the tobacco is harvested, either by pulling off the individual leaves or by cutting the whole stalk. In either case the tobacco is hung on sticks and taken into curing barns. There the leaves or plants are hung on racks and cured. The curing process is slow and the leaves ferment slightly, turning yellow-brown to dark brown. With some tobacco the leaves are stacked after curing and allowed to ferment for an additional time to develop aroma and bouquet. Some tobaccos are air-dried in well-ventilated barns; some are dried over charcoal fires; and some are dried by hot air. The three ways of drying or curing result in air-cured, fire-cured, and flue-cured tobaccos respectively.

LIVESTOCK NEED A LOT TO EAT

Anyone who stops to think about it knows that an animal can get hungry, but few people realize what enormous quantities of land it takes to grow enough feed for the lusty appetites of all our domestic livestock. Besides 70 million head of cattle, there are 10 million horses and 4 million mules. We raise each year 700 million chickens and 20 million ducks and geese, to say nothing of 30 million turkeys; and somebody has to supply feed or pasture for 55 million sheep, as many hogs, and about 4 million goats. Every year enough feed to satisfy these animals has to be produced somewhere, and every year the farmers manage to do it. Well over a billion acres in the United States are used solely for livestock. Land in pasture, the land used for hay, and the vast range lands of the West make up this impressive total. There are, after all, only 1,905,000,000 acres of land altogether in this country, which means that more than half of our total land area is involved in hay, pasture, and range.

Hay. Although a great many people think of hay as dried grass of some kind, actually only about a third of all our hay is made from grass. Two-thirds are made from alfalfa, clover, lespedeza, soybeans, cowpeas and related plants, which are not grasses but legumes, belonging to the same group of plants as the peas and beans we use for food.

No matter what kinds of plants are used, the job of making hay is not for a beginner to tackle. It takes judgment and experience to decide just when the plants are ready to be cut—not too green, not too old and woody, but exactly right. And it takes experience to decide when the hay is properly cured, whether it is dry enough to store in stack or bale, or whether it should stay another day in the field. Sweet hay with good color and well cured is what you want because it has the highest nutritive value; and it is what you get if you know how and the weather permits.

Hay is to be seen almost anywhere in the country. On the 60 million acres of "tame" hay land and the 12 million acres of "wild" or prairie hay land we cut about 90 million tons a year. The heaviest production is in the Northeast, the Corn Belt, and in the irrigated valleys of the West, but a short drive in any direction from nearly any point in the country, outside of the extremely arid Southwest, is likely to reveal a hay meadow.

Aristocrat of all our tame hays is alfalfa, or as the Europeans call it, lucerne. Alfalfa means "best fodder" in Arabic, and in the United States this legume from southwestern Asia lives up to its name. We produce a greater tonnage of it than any other kind of hay, and it leads all the common kinds in the number of animals it will support per ton. We grow 14 million acres of it, and its acreage is slowly expanding.

Other legumes used for hay include red clover, alsike clover, and ladino clover, all known as true clovers. Besides these there are the sweet clovers with yellow or white flowers, bur-clovers that are more closely related to alfalfa, and lespedeza, which is grown principally in a broad land stretching from eastern Kansas and Oklahoma to the Atlantic Coast. Legumes are superior feed for livestock largely because they have a high-protein content in addition to vitamins and such mineral salts as calcium and phosphorous.

A mixture of timothy and clover was originally the most popular hay combination and is still used, but in recent years mixtures such as bromegrass-alfalfa, timothy-ladino, orchard grass-lespedeza, to mention a few, are being extensively grown.

Other plants used for hay include soybeans, cowpeas, peanut vines, and vetch. Among the grasses are timothy, bromes, fescues, rye grass, bluegrass, and reed canary grass. In the South we use Bermuda grass and Johnson grass for hay as well as pastures, although both these species are noxious weeds in cultivated fields. Various other species of plants hold promise of becoming more important for hay production. Among them are crotalaria or rattlebox, velvet-beans, sericea lespedeza, and kudzu, the latter a gigantic vine from East Asia that is performing miracles on the worn soils of the South. From these examples it may be seen that many kinds of grasses as well as legumes are required to meet the varied climatic and soil conditions in the different parts of the country.

Pasture. Our best pastures are to be found principally in the States north of the Cotton Belt in the East, and in the coastal regions of the westernmost States. The pastures of the South are

Figure 36. A load of ladino clover, alfalfa, and orchard grass cut August 1 in a pasture that was grazed closely in May and June is drawn up to the barns on an Eastern farm. (U. S. D. A.)

largely unimproved although they are getting better every year. The pastures of the arid west are called range land.

How many acres of good pasture land are needed to carry one or two animals? In general, the best pasture land will support about two animals to an acre for the summer season. Such pastures are located in humid areas where mixtures of rapid-growing grasses and legumes or timothy-ladino clover or brome grass-alfalfa supply the most abundant pasturage in the country.

If the same land were planted to permanent grass each acre would support only one-half to one animal unit for every two acres. In a semidesert area one animal unit may require 75 to 100 acres, but the average dryland range usually supports one animal unit on 10 to 20 acres.

Animals can be pastured anywhere from about 100 to 225 days out of a year, depending of course upon the condition and location of the pasture.

Figure 37. Hay baled with a pick-up hay baler in a western field. (U. S. D. A.)

Many farmers are taking greater interest in conserving and caring for their pastures. It is now recognized as sound practice in the humid regions to prevent plants from getting over 4 to 6 inches in height, and to stock pastures when a growth of 3 inches has been made and when the ground is sufficiently dry. Also encouraged is removal of stock to allow a 3-inch growth before winter sets in and dividing of pasture for grazing in sequence. Mowing, fertilizing, and rolling pastures are also necessary to keep them in good condition.

Range. In the western half of the United States is to be found the enormous area of arid pasture that is known as the western range. Altogether it amounts to 728 million acres, which is nearly 40 percent of the total land surface of the United States.

This great mass of land begins just about the middle of the United States. If you were to draw a line from Canada to Mexico that would cut the Dakotas in two, cut off the panhandle of Oklahoma, and end at the southern point of Texas, you would have indicated fairly well the eastern edge of the range country. Within the territory west of that line about three-quarters of the land is livestock range. This does not mean, of course, that three out of every four acres will be in range. There are very large areas in the West that are not range at all, just as there are enormous areas that are nothing but range.

If you live in the East, you should by all means rid yourself of the idea that "range" means a level, grassy plain extending as far as the eye can see, because it doesn't. About half the range is true grassland, fairly level, and with few or no trees or shrubs in sight, but the other half has some kind of woody vegetation on it. A great deal of the range is rocky and mountainous and its vegetation varies all the way from the magnificent firs and spruces of the high mountains to sagebrush and the desert scrub of the Southwest. At favorable seasons the range is green, but in most sections there are times during the year when the aspect of the country is gray and brown, and quite unlike the lush green pastures of the more humid East. Livestock use the shrubs and trees as well as the grass for food. Some shrubs are good food for cattle, others are very low in food value and animals rarely touch them unless they are very hungry. Grass, of course, is to be preferred; really good grass is much better feed than the general run of woody plants or browse, as it is called.

About half the great western range is in private ownership. The rest is Federal or State land that may be leased to operators. Not much more than 95 million out of the 728 million acres making up the western range is in reasonably satisfactory condition; the rest is overgrazed in greater or lesser degree. Ranching requires a knowledge of feeds, feeding, range plants, and the carrying capacities of different kinds of rangeland. The range deteriorates when more animals are put on it than it can support, hence ranchers must use considerable skill in managing livestock so that the animals are in balance with available forage. Stock must also be well-distributed so that they do not collect in one place and overgraze the range locally. Proper fencing, development of well-placed watering-holes, and good distribution of salt, besides riding herd on the animals, helps get the stock well spread on available range.

CHECK-UP NO. 7

Part I

Go back and retake the test at the beginning of the chapter. When you have done that, check your answers with those at the back of the book. For any question on which your answer and that of the book are not in agreement, read the information again. The numbers given after each question tell you where to find the information.

Part II

If you have read this chapter carefully, you should know something of the more important crop plants that support us. Can you answer these questions? Only one answer to each question is correct. Underline the correct answer.

1. Which of the following crops occupies the most land in the United States:
   a. Barley.
   b. Wheat.
   c. Corn.
   d. Potatoes.
2. Which of the following crops is far more important as food in other countries than in the United States?
   a. Wheat.
   b. Corn.
   c. Rye.
   d. Oats.
3. In which of the following groups of States is the most tobacco grown?
   a. North Carolina and Kentucky.
   b. Tennessee and Georgia.
   c. Virginia and South Carolina.
   d. Minnesota and Wisconsin.
4. Which of the following vegetation found on range land is the best feed for animals?
   a. Shrubs.
   b. Trees.
   c. Grass.
   d. Browse.
5. Which of the following groups of plants are cereals?
   a. Fruits.

b. Vegetables.

c. Fiber plants.

d. Grains.

6. Which of the following crops do best with cool, moist climates?

a. Corn.

b. Rice.

c. Potatoes.

d. Barley.

7. What part of all our hay is made from grass?

a. About two-thirds.

b. About one-third.

c. About one-half.

d. About one-fourth.

8. Which of the following crops has the highest labor requirements?

a. Cotton.

b. Corn.

c. Hay.

d. Wheat.

9. Which of the following crops can be grown on poor soil and with cold winters?

a. Rye.

b. Barley.

c. Rice.

d. Corn.

10. Which of the following crops is fed to animals, converted into sugar for table use, or made into a fine grade of charcoal?

a. Wheat.

b. Corn.

c. Rye.

d. Oats.

11. What part of the total land area of the United States is involved in hay, pasture, and range?

a. Less than one-half.

b. More than one-half.

c. Less than one-third.

d. More than two-thirds.

Now check your answer by means of the key.

Part 3

Kinds of Farming

Chapter VIII

Major Types of Farming in the United States

WHAT THIS CHAPTER IS ABOUT

This chapter describes the more important types of farming in the United States. It gives an idea of what the main types of farms are like in each of the six agricultural regions by describing typical or average farms in these regions.

WHAT DETERMINES TYPE OF FARMING?

It must be kept in mind that the United States is a big country, with a wide diversity of climate, soil, and agricultural enterprises. Those who desire to engage in farming, therefore, have an almost unlimited choice with respect to the type of farming they will follow. People unfamiliar with farming sometimes make the mistake of thinking that farmers in a given region are doing the wrong thing; such people do not fully appreciate the basic role of soil, climate, markets, land values, and many other factors in determining types of farming. Corn, for instance, requires a warm, moist growing season, a soil very rich in organic matter, and, where it is grown extensively, land that is flat and adapted to machine tillage. Hogs can best be raised near the corn, which is their great feed grain. Cotton must have a long, warm growing season. Potatoes do best in a cool climate and on a somewhat acid soil. On the other hand, alfalfa, which is one of the most important livestock feeds, requires an alkaline soil. Fluid milk, being both bulky and perishable, is produced near the centers of consumption, whereas wool can be more economically produced in the range country where pasture is cheap.

The point to remember is that the type of farming that one finds in a given region has, in most cases, developed there for sound reasons. If one wishes to follow a certain kind of farming, the best thing is to settle where that particular type of enterprise is common. The error of thinking that all the farmers in a region are doing the wrong thing sometimes costs the would-be missionary very dearly. Usually the prevailing type of farming has been developed after generations of trial and error, and is very likely to be the best for the region.

THERE ARE SIX MAJOR AGRICULTURAL AREAS

Speaking in a very general way, the United States may be divided into six broad regions, in each of which a certain kind of farming is sufficiently outstanding to be fairly typical. It must be understood that in each one of these regions there are a great many different combinations of farm enterprise, and that there is much overlapping and diversity with respect to all of the kinds of farming hereafter mentioned and many others not mentioned. These few are cited as typical examples. The six representative regions may be denoted roughly as follows:

1. The Northeast (dairy and general farming).
2. Cotton and Tobacco Region.
3. The Corn Belt.
4. The Wheat Belt.
5. The Range Country.
6. The Pacific Coast Region.

The Northeast (*Dairy Region*). Considerable milk is produced throughout the entire eastern half of the United States, but the main dairy region extends from Minnesota and Iowa eastward through New England. There are also locally important milk-producing sections in California and elsewhere. The greatest concentration of dairying is in Wisconsin and the adjacent areas of Minnesota, Iowa, and northern Illinois, and in New York, New England, and eastern Pennsylvania. About one-fourth of all the milk pro-

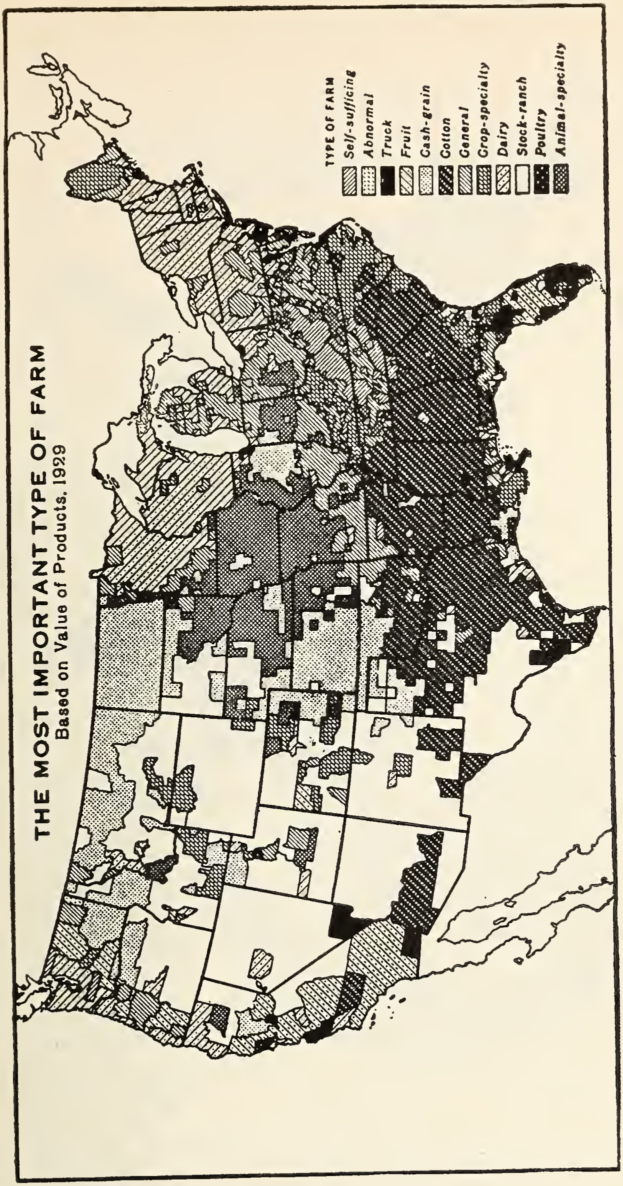


Figure 38. (U. S. D. A.)

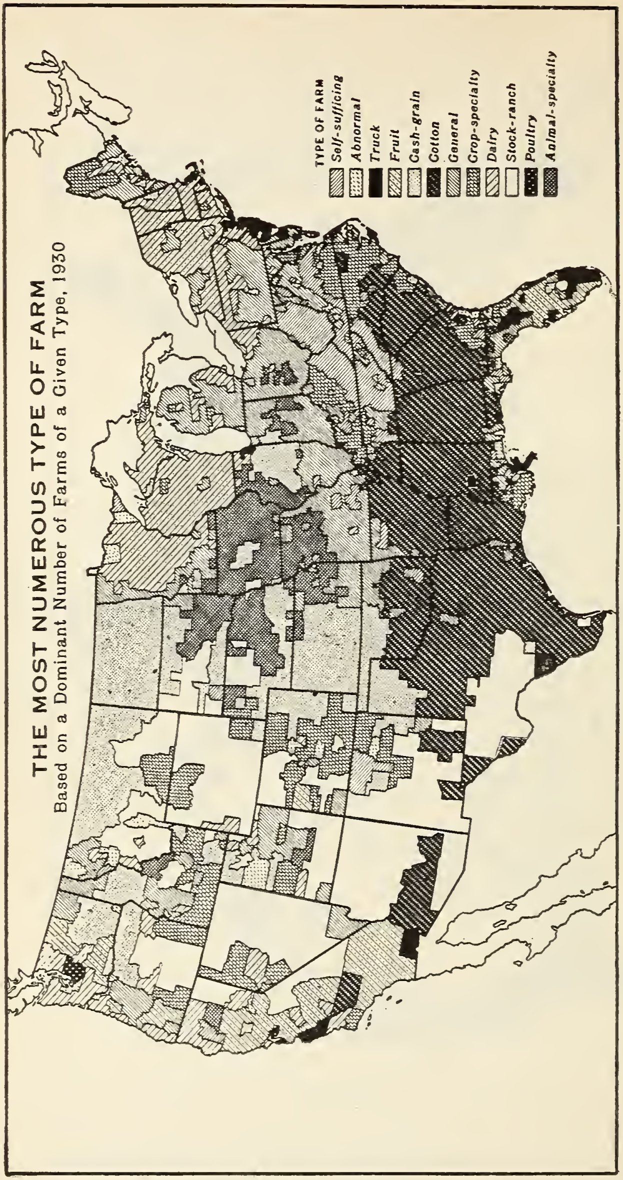


Figure 39. (U. S. D. A.)

duced in the United States comes from three States, Wisconsin, Minnesota, and New York.

In general, it may be said that the eastern part of the Dairy Belt, fairly close to the big eastern cities, produces fluid milk, while the Wisconsin and Minnesota region leads in the production of butter and cheese.

Over this broad region it is fairly common to find a farm business consisting of a herd of dairy cows as the main enterprise, with hay and corn silage for roughage; corn, oats, and possibly wheat for feed grains; and very likely some supplementary cash crops such as potatoes, fruit, soybeans, beans, cabbage, or other readily salable crops. And of course such a place will probably also have a flock of chickens, a few pigs for home pork, and so on.

A fairly typical dairy and diversified farm in this region may be 150 to 200 acres in size. It will have a total capital investment of from $10,000 to $25,000, perhaps $5,000 to $10,000 of this being in real estate; a herd of perhaps 20 to 40 milk cows, besides heifers and young stock; and perhaps 75 to 100 acres or more of land under the plow. The rest of the land will be in pasture, woodlot, and farmstead. It is quite common for such a farm to be run by the operator with at least one hired man if he does not have a son big enough to handle a team of horses and machinery. The milking of cows is a very exacting job; it must be done every day, no matter what happens or whether the owner is sick or well. More than 10 to 15 cows usually require an additional man to help milk. On many dairy farms the women help with the milking.

The year's work on the dairy and general farm largely revolves about the herd. The cows have to be milked twice a day and other work must be arranged accordingly. In the winter much of the farmer's time is spent in milking, feeding stock, doing chores, repairing buildings and machinery, and hauling out manure. In the spring the preparation and planting of crops begins and outdoor work takes up much of the time from then on through harvest; as soon as grass is good the cows are turned out to pasture so that the stable work is lessened through the summer. It is usually considered essential to grow corn for silage, good crops of clover or alfalfa hay for winter feed, and in addition corn, oats or barley, wheat, and frequently soybeans or other available feed crops which will add to the winter ration. A fairly common crop rotation consists of corn, followed by oats, followed by winter wheat, followed by 2 or more years of grass. Eastern dairymen commonly buy large quantities of high-protein feeds. Feed and labor often make up the two largest items of expense on these eastern farms, while the principal sources of income are from milk or cream, surplus stock sold, and cash crops.

Figure 40. The year's work on the dairy and general farm, characteristic of the rural Northeast, largely revolves around the herd. (U. S. D. A.)

Cotton and Tobacco Farming. The arc from Texas eastward to the Atlantic has been called the Cotton Belt because for generations the chief money crop of the region has been cotton. Although this is still true, the great bulk of cotton production has gradually shifted westward in recent years. Of course, in certain sections various other cash crops are important, such as peanuts, tobacco, sweetpotatoes, fruits, and vegetables. Small grains and corn are grown widely as feed crops and there is a developing meat and dairy industry in the South. Livestock enterprises however are less important in that region than in some other parts of the country. One of the problems of farm management in the South is to grow adequate forage crops, suited to the climate and soils, to support cattle.

Cotton Belt farms of family size are, as a rule, somewhat smaller than those in the North and West, and the capital investment is generally lower. A considerable part of southern agriculture is operated under a tenant system whereby a fairly large plantation may be owned by a landlord, who rents out smaller units to tenants, usually on a share-crop basis.

Cotton used to be mostly a hand-worked crop, but machine agriculture has developed extensively in recent years, in the western portion of the Cotton Belt particularly, so that large areas of cotton are now cultivated with machinery.

In a cotton area like the Delta region of Mississippi, farms are commonly valued at from $75 to $100 an acre. Those operated by owners are about 100 to 150 acres in size; those by tenants frequently 20 to 30 acres, depending on the size of the family or whether they operate a one- or two-horse farm. But in most parts of the South land values are somewhat lower, often averaging $25 to $50 an acre in typical cotton sections. A typical owner may operate a farm of about 100 acres, of which 25 to 40 acres may be in crops and the remainder in woods. A third to three-fourths of the cropland usually is in cotton. In addition to the income from cotton and cottonseed, the income from such a farm may come in small part from the sale of some milk or cream, poultry products, forest products, and other cash crops.

Outstanding among cash crops in this region is tobacco; in fact, there are many areas in the southeastern States where farmers consider tobacco even more important than cotton. A very large portion of the tobacco produced in the United States, including the bright tobaccos used for cigarettes, is grown in the Cotton Belt, mainly in areas specially suited to tobacco in Georgia, Virginia, and the Carolinas. Kentucky, a leading tobacco State, is known for its large production of Burley.

Figure 41. Cotton plantation, with rows of young cotton plants and tenant houses, in the cotton belt. (U. S. D. A.)

Tobacco is a crop which requires considerable experience and the willing hands of just about every member of the farm family. Often they must work day and night to cultivate properly, barn, cure, grade, and market the crop. But families who grow their own food and feed, raising tobacco as a money crop, as a good many now do, are apt to find their hard work well rewarded. The returns usually run from $100 to $400 per acre, the amount varying a great deal in different sections, according to both the quality and the quantity that the land and the farmer can produce, and according to the price received. A farmer should know that certain fields are better suited to tobacco; that this plant is allergic to certain fertilizer ingredients; that some soils are infected with deadly wilt, and that only an old hand at the game can fire a barn at the proper temperature in order to cure the tobacco just right.

Then, there are certain things to know about different types of tobacco. It is one thing to grow flue-cured tobacco in Georgia, the Carolinas, and Virginia; another to grow Burley in Kentucky; and quite another, also, to handle fire-cured tobacco in Tennessee, or air-cured tobacco in some other section of the country.

Tobacco generally is grown along with other crops. Because of the large amount of labor required and because the leaves must be cured when ready, a farmer ordinarily plants a smaller acreage than of cotton or grain crops. A one-horse farmer living in a certain section of the Cotton Belt suited to tobacco usually will have 3 to 5 acres in tobacco and 7 to 10 acres in cotton, plus his food and feed crops; a two-horse farmer may have double these acreages; or, if his family is small, he may find it necessary to hold his tobacco to 5 acres—the usual capacity of a curing barn. On many small farms in the hills and mountains the farmer frequently plants less than an acre. In tobacco sections outside the Cotton Belt, tobacco is planted to supplement livestock or other cash crops. In recent years, satisfactory prices have been maintained by self-imposed crop control, and often the value of the farm depends to a very large extent upon whether the farm has an established tobacco acreage allotted to it.

Most tobaccos in the southern States are grown with little hired labor on family-sized farms, usually ranging in value from $1,000 to $10,000. Here and there, largely in the Coastal Plains, may be found big farm operators or plantation owners who grow tobacco on a large scale. Usually such operators employ an experienced overseer, and the crop is produced with hired labor or by share tenants. The money invested in one of these larger farms, fully equipped with houses, barns, mules, wagons, plows and other tools for 15 or 20 families, may easily run to $75,000 or $100,000. On these large farms families often work together in harvesting and curing, the Jones putting in a barn of tobacco today, the Browns tomorrow.

Other important cash crops in the Cotton Belt include peanuts, soybeans, Irish and sweet potatoes, fruits and vegetables. In nearly every section of the cotton South, some one or all of these crops can be grown as supplementary cash income. And in certain areas one or more of them are grown predominantly.

Corn Belt. The vast area of the upper Mississippi Valley is one of the most fertile regions in the world. It may be fairly called the heart of agricultural America. Here are found the great stretches of level black corn land, the warm summer days, and abundant rainfall which combine to make it the Corn Belt.

The practice followed on the majority of farms in the Corn Belt is to raise hogs or beef cattle, corn and small grains, and frequently, in addition, potatoes, corn, soybeans, or other cash crops. On successful Corn Belt farms about half the income quite commonly comes from hogs or cattle and the other half from crops sold.

The investment per farm in this region runs rather high, commonly \$10,000 to \$30,000 and among the more successful farms frequently \$50,000 to \$100,000. The average value of real estate alone per owner-operated farm in Iowa, as shown by the 1940 census, was \$9,492. A fairly common size of farm is about 160 acres. Although both larger and smaller units are found, this size employs efficiently the labor of the farmer and about one hired man, or the equivalent in family labor and perhaps a little extra hired or family help through the summer.

In western Illinois or eastern Iowa, for example, the typical farm may consist of around 200 acres, perhaps 125 acres in crops, the value of real estate being anywhere from \$20,000 to \$50,000. Such a farm will frequently have 12 to 25 brood sows, and in many cases will have a herd of beef cattle or the owner will buy and feed a number of steers each season. Fifty to eighty acres of corn will be grown on this farm, perhaps half that acreage of oats, and substantial amounts of barley, wheat, soybeans, alfalfa, clover hay, and other feed crops. Some farmers sell considerable corn as cash grain while others carry large numbers of hogs or cattle and buy corn to feed, in addition to what they raise.

In general, this type of farming furnishes a well-diversified source of income, and is, one year with another, probably as successful as any in the country. The land is level, the soil is good, the farm buildings are above average, and agriculture is the dominant concern of the region as a whole.

It should be emphasized that Corn Belt farming requires a skilled knowledge of cattle and hog management. In addition to crop growing, one must know how to raise and feed these meat animals efficiently in order to succeed in the typical operations of this region.

Wheat Belt. The Wheat Belt includes roughly the belt of country extending from the central Dakotas southward through Nebraska, Kansas, Oklahoma, and into Texas. In this region there is an overlapping of the Corn Belt type of farming on the east and the grazing type on the west, but within a broad belt north and south wheat is the predominating crop. In the Dakotas and eastern Montana the wheat is mostly spring wheat, that is, planted in the spring and harvested the following fall. From Nebraska southward, however, the wheat grown is mostly winter wheat; it is sown in the fall and harvested the following summer.

Figure 42. The backbone of farming in the Corn Belt is a combination of hogs, or beef cattle, plus corn and small grains. This type of farming calls for a skilled knowledge of livestock management. (U. S. D. A.)

The typical wheat farm is relatively large, frequently 500 to 1,000 acres or more in size, and often practically the entire acreage is in wheat and summer fallow. This is primarily an extensive type of farming, lending itself to large-scale machinery. To operate such a farm in modern times one must have command of sufficient capital not only to buy or rent land, but to equip it with tractor, truck, and large tillage and harvesting machinery. The investment in a fair-sized wheat farm including equipment will often amount to from $10,000 to $25,000, varying of course in different sections.

Wheat farming is less exacting and confining than, say, animal husbandry, for instance. It keeps a man extremely busy through planting and harvesting seasons and requires extra labor at harvest time, but many wheat farmers are free to engage in side-lines through the winter. In some sections a certain amount of cattle and lamb feeding is combined with wheat growing, in order to round out the year's operations. Alfalfa, corn, oats, and other feed crops frequently are grown on wheat farms. In the North considerable flax is grown as an alternative to spring wheat.

Returns from wheat farming, like those from other one-crop systems, depend in considerable degree upon the price of wheat. The business accounts from these farms commonly show wheat (or in the North occasionally flax) as the principal source of income, with livestock and its products a secondary source. Among the largest operating expense items are gas and oil, hired labor, machinery, and livestock purchases. In years of good crops and prices the successful Wheat Belt farmer does well. In years when grasshoppers, drought, low prices, or other calamities overtake the wheat crop, farmers in this region sometimes have to contend with decidedly lean conditions.

Range Country. The range country of the West includes the vast mountain and high plains territory from Montana southward through New Mexico, Arizona, and West Texas. It is primarily a region of extensive cattle or sheep ranches, although it includes also many irrigated valleys as in Utah, Idaho, Colorado, and the South, which grow considerable quantities of vegetables, sugar beets, and grain. While there are thus two distinctive types of agriculture in this Rocky Mountain territory, the large cattle or sheep ranches are here regarded as typical.

These ranch enterprises usually involve a fairly heavy investment of capital, both in real estate and in herds or flocks. Many suc-

Figure 43. The typical wheat farm in the Wheat Belt is relatively large, often with practically the entire acreage in wheat and summer fallow. It is primarily an extensive kind of farming, lending itself to large-scale machinery. (U. S. D. A.)

cessful cattle ranches average 3,000 to 5,000 acres in size, and in addition each must have access to several thousand acres of grazing territory to take care of its herd of 400 to 800 cattle. Animals on a sheep ranch with perhaps two bands of sheep (1,000 or so to the band) are grazed in charge of herders, on the vast, unfenced national forest or on other public or private range. The cattle or sheep range far into the foothill and high-grazing country in the summer and in winter are brought into more sheltered valley areas where winter forage may be supplemented by grain and hay grown on the ranches or by cottonseed cake or other purchased feed. In addition to its beef, mutton, and wool, which are shipped directly to the markets, the range country also makes a considerable business of furnishing young animals—calves, short yearlings, and lambs

—to Corn Belt feeders who then put them in feed lots for a season and fatten them for market.

Figure 44. Livestock ranching in the range country is the most thoroughly extensive type of animal husbandry. (U. S. D. A.)

Livestock ranching in this territory is the most extensive type of animal husbandry just as the big wheat ranch is the most extensive crop enterprise. It requires capital and a full knowledge of the raising, management, and marketing of herds and flocks. It is subject to the hazards that go with a comparatively nondiversified business.

Pacific Coast. This is a 2,000-mile-long stretch of country that includes almost every kind of agriculture from dry-land wheat farming in the north to the irrigated orchards and vineyards or intensive poultry farms of California. The region is distinctive in climate, markets, and farm enterprises, and may be cited particularly for certain specialized and intensive types of farming. The choice of kind of farming here is a very wide one.

Figure 45. The 2,000-mile stretch of country along the Pacific Coast includes almost every kind of agriculture from dry-land wheat farming to orchards and vineyards. (U. S. D. A.)

In California one of the typical lines of farming is that in the irrigated valleys, which in some areas includes citrus or deciduous fruit and in others a characteristic rotation of vegetables. The average irrigated farm is a relatively small unit, but the land values are high per acre. Irrigation farming is a stable, dependable kind of farming as far as production is concerned, crop yields being more sure than in most humid regions. Among the main hazards are prices and markets. A fruit farm, of successful proportions may be 20 to 50 acres in size, although all sizes are common, down to very small units. This type of farming is very flexible but is invariably intensive in its scheme of operation.

There have been many failures in irrigation farming ventures. Many new colonies, established with great promise, have failed to yield the permanent homes and incomes expected. On the other hand, farmers in the irrigated sections who have acquired the necessary skill, experience, and capital are perhaps as favorably established and live under fully as pleasant conditions as those in any agricultural region. But there are special problems in irrigation farming, which are discussed in a later chapter.

A great asset on the coast is the generally mild and pleasant climate. This, together with the varied opportunities for farming both under irrigation and without it in the humid regions of the north Pacific area, have long made the region especially attractive to many people. It is wise to look upon agriculture in this region, however, as no different from that in other parts of the country, in that some capital, skill, and experience are necessary in building a successful farm business in any area.

CHECK-UP NO. 8

By answering the following questions, you can get an idea about how well you have mastered the material of this chapter.

1. What has been the major factor in determining the type of farming done in a particular region? (a) The likes and dislikes of the people living in the region. (b) The recommendation of the U. S. Department of Agriculture. (c) The results of years of trial and error.

2. In classifying the Northeastern section of the U. S. as a farm region, what term would you use? (a) A vegetable and small grain region. (b) A cattle fattening region. (c) A dairy and general farming region. (d) A wheat region.

3. About how many acres would be typical of the size of Northeastern dairy farm? (a) 165 acres. (b) 250 acres. (c) 300 acres.

4. About how many cows does the average Northeastern dairy farmer alone (no hired help) take care of? (a) 5, (b) 7, (c) 12, (d) 20.

5. In what phase of cotton farming has machinery been most extensively applied? (a) Cultivating the crop. (b) Picking the crop. (c) Curing the crop.

6. About how many acres are there in a typical cotton farm operated by a tenant? (a) 25, (b) 75, (c) 125, (d) 200.

7. Which of these farm crops require the most labor per acre? (a) Corn. (b) Tobacco. (c) Cotton. (d) Hay.

8. In addition to the limitation set by the available labor, what other item usually determines the amount of tobacco grown on a farm? (a) The amount of land. (b) The number of tobacco plants. (c) The weather at planting time. (d) The size of the drying barn.

9. In which of the farm regions is the peanut an important farm crop? (a) The Corn Belt. (b) The Cotton Belt. (c) The Northeast. (d) The Pacific Coast.

10. What would be a good guess on the amount of money invested in the best of Corn Belt farms? (a) $10,000, (b) $20,000, (c) $60,000, (d) $500,000.

11. What is a major characteristic of farming on the Pacific Coast region? (a) The large number of crops grown on each farm. (b) The great emphasis on specialization on each farm. (c) The emphasis on cattle and sheep production. (d) The extensive dry land farming.

Check your answers by comparing them with those in the book. Be sure to look up the material on any question for which you did not have the right answer.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. In each of the six major farm regions important crops besides the main crop are produced. What are two or three such crops for each region?

2. What are the major items which make investment on Corn Belt units so large?

3. Farming in the Pacific Coast region is very different from farming in the five other great regions. What are these differences?

Chapter IX
Part-time Farming

STUDY GUIDE

In Chapter 2 the suggestion was made that you would probably do a better job of studying if you read with a purpose. One way to insure that you have a purpose is to ask yourself questions concerning the topic or subject about which you are reading. What are some questions about "Part-time Farming" to which you would like to have an answer? Write five or six here.

1. ____________________

2. ____________________

3. ____________________

4. ____________________

5. ____________________

6. ____________________

The following are questions that one student wrote. Are any of them the same as yours?

1. Do many people actually do part-time farming?

2. How much will a large garden cut down food expenses per year?

3. What is next in importance to the garden on the list of things that part-time farmers engage in?

4. How much land is needed to provide the major feed for one cow?

5. Is it wise to raise livestock when the available time and space limit the number markedly?

6. Is it better to raise or buy feed for animals kept on the part-time farm?

7. What are good jobs to have if you wish to do part-time farming?

8. What are the main disadvantages of part-time farming?

Use some of these questions, or some of those you made, to guide your reading.

You may want to farm and at the same time follow another occupation. In 1939 there were over 800,000 farmers in the United States who worked more than 100 days each at nonfarm employment. Many thousands more lived on small farms and supplemented their farm income by other employment. Some of these derived most of their income from nonfarm work. Their farm income was only supplementary. The income of others came largely from the farm. Between these extremes are all degrees of adjustment to meet the needs and desires of the individual. These people are all part-time farmers.

Part-time farming is a way of life in which the family lives on a small farm but derives its income from two sources, one of which is farming. One should not expect, however, to make all his living on a farm too small to give him either full employment or adequate income.

HOW MUCH INCOME CAN BE MADE FROM PART-TIME FARMING?

One advantage of part-time farming is that you can plan the extent of your farm work to fit your special needs and wishes. If you have a good job and want to live on a farm because of the advantages farm life offers your family and because you like to do a little farm work, you will limit your farming activities to fit those conditions and your farm income will be very small. If on the other hand your nonfarm employment is seasonal or occupies only part of each day, you may plan to spend a large part of your time in farm work. In this case, your farm income may be rather large.

The amount of labor you and your family are willing to devote to farm work is the primary factor in determining the amount of farm income you can expect. This factor also governs the amount of land you should get, the things you should raise, and the amount and kind of equipment you need. The amount of your farm income may be only a couple of hundred dollars a year and that not in cash, but its equivalent in the savings on your grocery bill. Or your farm income may be anywhere above that to well over $1,000 per year.

HOW MUCH WORK MUST BE DONE ON A PART-TIME FARM?

If you expect your farm to provide only enough vegetables and fruits and perhaps eggs and milk to meet your own family needs, the labor required is small. Most families have enough spare time during the mornings, evenings, and week ends to care for a garden large enough to meet most of their needs for fruits and vegetables, and still have a little time left for other recreation. Your wife's time will be more fully occupied if she processes and preserves the food. If you do not preserve food for the winter season there is little need of having a large garden for your own use.

If a large garden is properly cared for and the surplus produce preserved, it will supplement your income to the equivalent of from $100 to $300 a year, depending upon the size of your family. The labor which you put into your garden probably will return you less per hour than you receive for your regular work. If you try to include in the cost of your produce the value of your labor at the regular rates you receive from your employer you will probably find that your produce is costing you more than if you bought it at the neighborhood grocery store. If you enjoy working in a garden so much that it is at least partly recreational, value the superior quality of freshness which cannot be obtained at the market, and take pride in producing a large share of your own food, you will find garden work very profitable.

If you want more income from your farm you must devote more time to farm work. If, however, you have full-time employment the year round, you cannot expect to profitably expand your farm operations much beyond production for family use, and you cannot increase your farm income much above the savings represented by the production of food for your family's consumption unless you have a large family of working age who are willing to give up practically all recreation, or hire help. On part-time farms the advisability of hiring labor depends quite largely upon what you have to pay for hired help in comparison with what you can make in your own nonfarm job. Generally, part-time farmers hire very little labor.

WHAT SHOULD BE RAISED FOR HOME USE ON A PART-TIME FARM?

The first crops for you to consider are vegetables and small fruits for your own use. One-half to three-fourths of an acre of good land will be sufficient to supply nearly all the vegetables and small fruits, both summer and winter, for a family of five. A few hand tools, a sprayer, and perhaps a wheelbarrow and a wheel hoe are the only tools required for a garden of this size. The annual cash cost of such a garden would be from $30 to $50, which includes the cost of having the plot plowed, seeds, fertilizer, and insecticides.

You may wish to have some fruit trees. A few are sufficient for family use. These will also provide some shade in the back yard. If you want first-class fruit it will be necessary to spray the trees, which requires suitable equipment unless you are in a locality where you can hire it done by professionals.

Many part-time farmers confine their farming to this extent, but you may want to produce your own eggs, milk, and perhaps even your own meat. Even if employed full time you may have enough time to care for some chickens or rabbits, and possibly a hog, and a milk cow or a goat or two in addition to your garden *if you really want to.* You must remember though that any kind of livestock requires regular care every day of the year. Livestock cannot be neglected. Your garden will permit better adjustment of your time. If you want to do something else today you may put off garden work until tomorrow and you probably will not lose a great deal by the delay. But livestock care requires that you follow a regular schedule. Departure from such a schedule may cause a sharp decline in production or actual loss of the animals. If you are unwilling or cannot be at home at regular times every day you had better give up the idea of keeping animals.

About a dozen hens properly cared for will provide from 85 to 100 dozen eggs a year—enough to meet the needs of a family of 5. They will require a little land, and an adequate poultry house can be constructed from materials costing from $50 to $75. In addition to table scraps, hens will require in a year about 85 pounds of grain per bird at a cost of about $2.50.

Some part-time farmers keep hogs and butcher them. Generally, these are the larger places that also raise a few hogs for sale. They are not very well suited to small places, and many communities prohibit the keeping of hogs in thickly settled areas. In any case, pigs should be kept some distance from any residence. Two or three hogs will supply most of the meat and cooking fats for a family of five, and most families would not want this much pork. If you buy a couple of weanling spring pigs they will be large enough to butcher in the late fall or early winter. They will cost around $5 to $7 each. A small pen and rude shelter is all the equipment needed. Table scraps can be fed to hogs, and in addition from 600 to 1,000 pounds of grain per pig costing from $7 to $15 will be enough to carry the pigs from the weanling to slaughter stage. If you have from a fourth to half acre of good pasture the feed costs would be reduced by as much as 10 or 20 percent. The advisability of feeding out a pig will depend upon the price of pork compared with the price of grain. Also, considerable work and skill is required in slaughtering, dressing, and curing the meat, unless you can hire these done.

One milk cow will cost from $75 to $150. With good care she should provide you with about 2,300 quarts of milk yearly. During about 4 months of the year this would provide enough cream to supply the family of five with butter as well as milk, and during all but 1 or 2 of the remaining months with plenty of milk.

Keeping a cow will require a pasture of 1 to 2 acres in addition to about 2½ tons of hay ($25 to $40) and 1,000 to 2,000 pounds of grain which will cost from $15 to $35. You will need adequate shelter for the cow, particularly if you live in the north. The materials for the shelter will cost from $50 to $150.

HOW CAN CASH BE OBTAINED FROM A PART-TIME FARM?

Thus far our discussion of part-time farming has centered around small operators producing primarily for family consumption. If you wish to further supplement your income with cash you may expand in one or two general ways. You may grow one or more crops for sale either on the fresh market or for commercial processing. Here again the amount of time you can give to farm work is the determining factor, but it is also essential that suitable land is available at reasonable cost. The first step in deciding what to produce commercially is to determine not only the amount of family labor you have available, but also the proportion of this labor you wish to devote to farm work and the way in which it is distributed throughout the year.

As an aid in estimating your labor supply, list the months of the year and opposite each month estimate the amount of time your family will be able to devote to farm work. How many hours will you, your wife, and children want to be occupied with farm work each month? If you have a regular vacation period you may want to include that as extra time available for farm work. Don't include all of your family's free time—only that which they are willing to use for farm work. This will give you a picture of the time available for farm work. Your next task is to select the crops you may want to raise and that will fit the time you have available.

HOW TO DECIDE WHAT CROPS TO RAISE FOR SALE

Crops adapted to your locality. First, you must learn what crops are adapted to your locality and to the particular soils on your farm. Unless you are quite familiar with these crops you should consult some farm expert, an experienced local farmer, the county agricultural agent, vocational agriculture teacher, or the agricultural college of the State in which you live. This is especially important if you plan to raise crops ordinarily not grown commercially in the area. Many crops that are sufficiently adapted to justify raising them for family consumption do not do well enough for commercial production.

Crops for which there is a market or marketing facilities. It is not enough to be able to produce a crop—you will have to sell it to some one, so be sure there is a nearby market or marketing facilities. You have three possible outlets—local fresh markets, packers and distributors, and processing plants. The first type of market pays the highest prices, but more of your time will be required in marketing and your losses from spoilage may be higher. The packers and distributors pay less but provide a fairly steady and reliable market, and if you sell to them the time required to sell your produce will be reduced. Sometimes they buy the crop in the field and harvest it for you. The processing plant pays least but when you sell to them you are sure of a market, and many of them contract for your total crop at planting time, provide technical guidance, and make loans to cover seed and labor costs. How good these market outlets are depends upon the locality and the kind of produce. Fresh markets in towns and the smaller cities can be easily oversupplied. Packers and processing plants are not available in all localities and frequently handle only 1 or 2 crops.

Crops that require care at the time you can work with them. Your final choice among the crops adapted to your locality and for which there are markets or marketing facilities will be based on the comparison between their labor requirements and your labor resources.

If growing and marketing conditions permit, it is generally advisable to raise a smaller amount of several crops rather than to grow only one. A variety of crops will utilize your labor better as the peak labor requirements for cultivation and harvesting of different crops usually come at different times. If one crop fails you may still have income from the others. However, consider the matter very carefully before adding any crop which will require special machinery or buildings not needed for the other crops.

The production of vegetables, fruits, and berries for the market is particularly well adapted to part-time farming. The yields and

Figure 46. Many part-time farmers living near large cities get good returns from their vegetable gardens. (U. S. D. A.)

returns per acre are high and the labor requirements when raised on small units are adaptable to family labor. The large fruits, however, have some disadvantages for the part-time farmer. Production is quite hazardous and complete crop failure is common. Cash costs of care are higher. Unless you are in an area where much of the work can be hired on the custom basis, the cost of the required spraying and other machinery is prohibitive for the part-time farmer.

WHAT MACHINERY AND POWER IS NEEDED?

Equipment and power required will depend, of course, on what is raised, the number of acres that you have, and the possibility of having some operations done for you on a contract basis. Production for home use is about as much as you can expect to do with hand tools and even then you will probably want to hire the land plowed. For a larger acreage of crops you will need some kind of power for plowing, harrowing, disking, and cultivating. If you have 5 or 10 acres you may want to buy a small 2-wheel garden tractor. These can be bought, new, from about $100 up to $500. Because of their light weight they are not entirely satisfactory for plowing and, especially on the heavier soils, it may still be necessary for you to hire the plowing done. A horse could be purchased for less money, but would require so much feed that it would not be economical to own one on such a small acreage. It will require 4 or 5 acres of cropland to produce the feed needed for a horse. If you are to keep a horse you should have at least 15 or 20 acres of good cropland.

In considering the other machinery needed, you should remember that in addition to plows, harrows, wagons, etc., that are used on all crops, there are groups of crops that are handled with a certain line of machinery; thus, most of the row crops can be planted and cultivated with one planter and cultivator, the hay crops require a mower, a rake and perhaps a stacker, and the grain crops require a drill and a binder or combine. If you are equipped to handle one of these groups of crops you can add other crops in the same group without buying much more machinery, but if you undertake the production of some crop from a different group you may have to have considerably more equipment.

The difficulty of providing power and machinery at low cost is one of the disadvantages of small farms. With each machine, as the number of acres handled goes down the per acre cost of using the machinery goes up.

As a part-time farmer you must be very careful to avoid investing too much in farm machinery. Find out if you can hire some of the work done that requires expensive and specialized machinery, such as spray rigs, combines, or binders. Since most of your equipment will be used only a few days each year, you do not need to have the most up-to-date models and you can keep your investment down by purchasing good second-hand machinery.

WHAT LIVESTOCK CAN BE RAISED?

Livestock care is highly skilled work requiring considerable knowledge and proficiency. All livestock requires considerable in the way of buildings and equipment and the risks are greater than with the production of crops. If you get a disease in your flock of chickens or in your other livestock you may lose your entire investment, amounting to several hundred dollars.

Chickens and rabbits lend themselves quite well to part-time farming. With chickens, for example, one may secure good returns from a small amount of space. The cost of the flock, buildings, and equipment is not high in relation to the returns, the birds respond well to good care and there are facilities almost everywhere for marketing eggs as well as live or dressed chickens. The returns you can expect from chickens will vary with the cost of feed, the care you give them and the price you receive. If egg prices are unfavorable you can eat or sell some of the hens and rebuild the enterprise when conditions are more favorable.

Milk cows, hogs, and sheep are not so well adapted to commercial production on very small part-time farms, but may offer attractive possibilities on larger farms. All require a fairly large amount of capital, and milk cows and sheep require considerable acreage. Milk cows need elaborate buildings and equipment for themselves and for handling the milk. Their feed must include roughage, which is usually uneconomical to buy and requires a large amount of land. Cheap land suitable for pasture is necessary for low-cost production. If you want to raise these animals you should plan to devote a considerable part of your time to farming.

Milking goats are well adapted to part-time farming. They do not require as much space as milk cows and can be fed more cheaply. They are a good source of milk for the family. And the kids provide meat. It is difficult to find a satisfactory market for goat's milk.

SHALL FEED FOR LIVESTOCK BE BOUGHT OR RAISED?

Part-time farmers generally find it more profitable to buy a large part of their grain feed, especially those on small units and on high-priced land near cities. Raising feed takes a good deal of land and is adapted to mechanized farming. Generally speaking, you will be better off if you raise more chickens or other livestock than if you spend your time raising feed for a smaller flock. This is of course only a general principle. You will have to make your decision in the light of all the factors in your own case, particularly the amount and quality of land available to you and the price at which you can buy feed.

HOW MUCH LAND IS NEEDED FOR A PART-TIME FARM?

The land required will depend on the extent of your farming operations and the fertility of the soil. If you plan to raise only fruits and vegetables for your own use, then ½ acre to 1 acre of good land should be adequate. A small flock of chickens can also be kept on a plot that size if you do not plan to raise the feed for them. The accompanying table will serve as a guide in helping you to determine the land needed to produce feed for livestock.

Approximate acreage of good land required to produce feed for livestock

Number and type of animals	Pasture	Hay and Grain	Total
	Acres	*Acres*	*Acres*
25 hens and 40 young chickens	....	1½	1½
1 cow	2	3	5
3 pigs (for 6 months)	1	1½	2½
1 horse	1	4	5

WHAT KIND OF EMPLOYMENT GOES WELL WITH PART-TIME FARMING?

If you want to use your spare time that way you will have enough time to raise a garden and enough chickens to supply nearly all of your family needs for vegetables, fruits, eggs, and fryers with almost any kind of employment except heavy manual labor which leaves you physically exhausted at the end of the day. With some help from your family you might also be able to care for a cow. But if you want to produce on a larger scale and get a cash income from your farm, you will need some type of employment that will either give you considerable spare time every day, or that has seasonal slack periods which occur at a time when your farm requires your attention.

Rural mail carriers, for example, frequently have considerable extra time to work on a farm. Driving a school bus or milk route are other examples of employment which may leave the worker with fairly long hours for farming.

There are many types of industry which give only seasonal employment. Some of these have their slack seasons during the time when you can profitably work on your farm. Coal mining, for example, normally has its peak season during the winter, with considerable time in the summer free for farm work. Forestry also provides work in the winter as do trapping and some types of fishing. Some of the agricultural processing plants provide seasonal work and leave the person employed in them enough time for profitable part-time farming. For example, you may raise fruits or vegetables for either the fresh market or canning factories during the spring and summer, and then work in a beet sugar plant during the fall and early winter.

Part-time farming offers a good opportunity for you if you have a small pension or annuity. If you are partially disabled you can plan your farm work at the level permitted by your health and ability. The outdoor farm work, moreover, may be beneficial to your health.

WHERE SHOULD A PART-TIME FARM BE LOCATED?

Near other employment opportunities. Many people have been disappointed in part-time farming because they located in communities where there were insufficient employment opportunities. Unless you plan to make almost all of your income from farming, you should locate in a community in which there is ample work opportunity that fits in with your farming program. This is a primary consideration.

Nearby markets. If you plan to produce for sale you should select a farm that is near good markets. If you plan to sell fresh vegetables or whole milk, for example, you should be close to a city or town.

Adequate transportation facilities. Transportation is of vital importance to the part-time farmer. Time spent in travel to and from other work and the market will be taken from the farm work and, of course, will cost money for travel. If your farm is too far from your other work the cost of transportation may be so high as to offset the earnings from the farm. You should be on an all-weather road.

WHAT SHOULD BE WATCHED FOR IN SELECTING A PART-TIME FARM?

Having found a suitable area for part-time farming as discussed above, great care should be exercised in selecting a farm. It will be your home as well as a source of income. But since it will not be your only source of income, you should take every precaution to see that operation of the farm will not interfere with your other work. Here are a few things to consider before selecting a part-time farm.

1. Size. Is it large enough to provide the amount of income you expect and not too large for your family and you to operate along with other work?

2. *Adaptation to your use.* Is the soil fertile and adapted to the produce you plan to raise? You should get expert advice on this

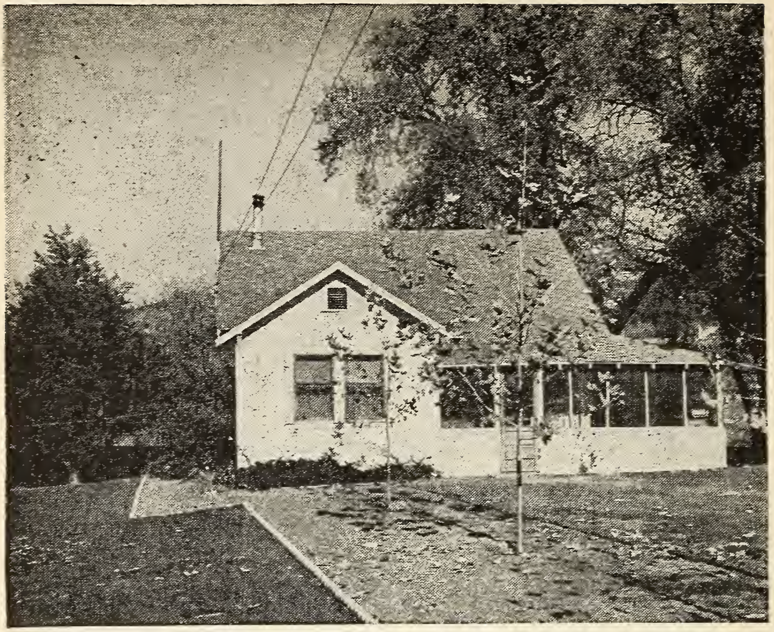


Figure 47. Use great care in selecting a farm. It will be your home as well as a source of income. (U. S. D. A.)

because many crops are exceedingly particular about their environment. The soil type, drainage, or even slope may be responsible for the difference between profitable production and mediocre crops. Frequently small areas unadapted to a certain crop may be immediately adjacent to areas well suited to the same crop. Land speculators have made fortunes selling unadapted lands to hopeful farmers. Your county agent or other local disinterested specialists can help you to make the right selection.

3. *Reasonably priced.* If buying, it is very important that you pay only what the farm is worth. Because its value will depend partly on what you can raise on it, and partly on its value as a place to live, you can expect it to cost more per acre than the going value of agricultural land of similar quality farther from town. First, decide what the place is worth to you as a home in

comparison with what it would cost you to live in town, but be sure to take into account differences between town and county tax, insurance and utility rates, and the added costs of travel to work. In many areas the schools in the country are not as good as in the city, some facilities like fire protection, gas, and sewage systems may not be available, and you must consider these things in placing a value on the country residence.

What you are willing to pay in addition to the value of the place as a home depends upon the earnings expected from the farm. One way of estimating the value would be to set up a plan for operating the farm, listing the kinds and quantities of the different things you could expect to produce in an average year both for home use and for sale, and estimate the value of these at normal prices. The total of this will be your gross income from farming. Subtract the total of your estimated annual farming expenditures, including an allowance for depreciation of buildings and equipment, and a charge for your labor and that of your family. (You may have difficulty in deciding what your time is worth, but charge something for it or you will pay too much for the farm and as a result, get nothing for your labor.) The difference that is left after subtracting all expenses, is net farm income. Capitalize this at about 5 percent and you will have the approximate value of the farm. Thus, if the net farm income is \$100, the farm value is approximately \$100 ÷ .05 or \$2000. In other words, if you invest \$2000 in such a farm you can expect a return of \$100 or about 5 percent on your money. Add the farm value, arrived at in this manner to the home value, to get the total value of the part-time farm.

If you are not well acquainted with the area or are not sufficiently experienced in farming to make a calculation of this sort, you had better rent a place for a year or two before buying.

4. Facilities. Are water and other facilities available? Your part-time farm probably will be outside the town. Water mains, sewers, gas lines, and perhaps even electric lines may not be right at your door. Getting these facilities may involve large and unexpected expenditures. It may be necessary for you to provide these facilities yourself and at great expense.

DO YOU REALLY WANT TO BE A PART-TIME FARMER?

The decision to become a part-time farmer is a serious one. Unless you have farmed before, it will require that you adopt a new way of living. If you make the wrong decision you will be unhappy, your work will be drudgery, your returns probably below expectation, for plants and animals thrive best under enthusiastic and watchful care. It will be costly for you to reverse your decision once you have acquired a farm. Before making it you should carefully weigh the advantages against the disadvantages.

THE DISADVANTAGES OF PART-TIME FARMING

1. It is confining. Farming, if livestock is raised, will require the presence of someone every day. Even without livestock one cannot be absent for long periods, especially during the growing season. Moreover, it requires a regular routine, depriving you of freedom to do as you wish on the spur of the moment. Your life must be organized to meet the requirements of your crops and livestock. The work will necessitate early rising and frequently late hours. Even a slight alteration of your work schedule may cut the production of your milk cow or chickens.

2. It requires hard physical labor. You will have to work long hours frequently under unpleasant conditions—hot sun and cold rain. Regardless of how well work is planned, adverse weather or unexpected setbacks will necessitate periods of extra exertion to catch up.

3. Your costs of production will be high. Land near cities is higher in price than land of equal agricultural value farther from town. You will not be able to take advantage of many labor-saving machines. Unless you are unusually skillful you will not obtain as high egg production per hen or as much milk per cow as can be obtained by a competent full-time farmer.

4. There may be disappointments. Production may fall far below your anticipations. The hazards of drought, hail, disease, and insects take their toll of your crops. Sickness or loss of some of your livestock may cut deeply into your capital as well as decrease your earnings.

5. *You cannot change jobs freely.* If you are running a part-time farm you will have many ties which hold you where you are. To leave may result in considerable loss of capital because it involves much more than loading your household goods on a moving van.

6. *Farming may be an additional burden if you lose your job.* Part-time farming actually may be an additional burden if you lose your job, especially if you own or are buying the place. The opportunities for selling part-time farms tend to rise and fall with opportunities for nonfarm employment in the same area. Producing enough to eat is not enough for security. You will need to meet your rent if you are a tenant. Unless your place is free of mortgage you must keep up interest and principal payments as well as taxes. If you are farming only to supplement your income your continuation of farming will probably depend largely on the income you make in your nonfarm employment.

THE ADVANTAGES OF PART-TIME FARMING

1. *Environment.* Living on a farm provides a wholesome and healthful environment in which to rear children. They have room to play and plenty of fresh air. They can be given chores adapted to their age and ability. The ownership or care of a calf, a pig, or some chickens develops a sense of responsibility for and an appreciation of work. Fresh vegetables, fruits, and dairy products in abundance and with a flavor unknown to those who get them from the market are the rewards of those living on a farm.

2. *Security.* Part-time farming will give you a measure of security if you lose your job *provided* you own the place free of debt and your farming operations furnish enough income to meet your fixed expenses and minimum living costs.

3. *Work for retirement years.* Part-time farming is especially desirable for the elderly or partially disabled or for those whose health requires some outside work or exercise. The income from the farm supplements their insurance, annuity, or social security

benefits, and the amount of the work can be adjusted to their physical abilities.

4. Profitable use of spare time. Part-time farming provides an opportunity to use profitably family labor which otherwise would not be utilized. It provides work opportunity for the entire family subject to the planning and under the supervision of the family itself.

5. Recreational values. The physical work on a farm is often considered recreational. It is a restful change and a physical conditioner for many white collar workers.

6. The pleasure of farm work and life. Many people like farm life and farm work. To have a little farm of their own is the expressed ambition of many city people.

QUESTIONS TO CONSIDER WITH YOUR FAMILY BEFORE DECIDING TO BE A PART-TIME FARMER

Part-time farming is not just a way to make a little money. It is a way of life and a cooperative venture for your entire family. You and your family had better consider these questions together:

1. Do we really want to live in the country?

2. How will part-time farming change our way of living, and are we willing to make the changes?

3. Do we want to accept the routine of farm life?

If you clearly understand the requirements of part-time farming and are willing to accept the advantages and disadvantages involved in this type of farming you probably will be happy and successful in it. If not, you had better give up the idea.

CHECK-UP NO. 9

Part I

Now go back and see if you can answer the questions listed at the beginning of this chapter.

Part II

If statement is true, circle letter T. If false, circle letter F.

1. T F The income I can get from farming is largely dependent on how much time I can devote to farming.

2. T F It takes very little work to produce vegetables for home use.

3. T F Any vegetables which I produce in my garden will be very costly if I figure my time as valuable.

4. T F A large garden will not pay me unless my wife cans and preserves the surplus for winter use.

5. T F If I raise livestock it will have to be cared for regularly every day.

6. T F If I produce vegetables for sale I should always hire most of the labor they will need.

7. T F There is plenty of opportunity everywhere to sell any surplus products I may produce.

8. T F It is usually better policy to raise several crops for sale rather than just one.

9. T F I shouldn't attempt part-time farming until I can buy a tractor and a full set of farm machinery.

10. T F Peaches, apples, and other orchard crops are perfect for part-time farmers to produce because picking is the only work required.

11. T F It is more costly to start raising livestock than garden produce.

12. T F Chickens are better adapted to part-time farming than milk cows.

13. T F It is generally best for a part-time farmer who produces products largely for family consumption to plan to raise most of the feed for the livestock because he can produce it for much less than he will have to pay for it.

14. T F A part-time farmer should get all the land he can because that is the primary factor determining how much money he will make.

15. T F Part-time farming goes best with employment that has a slack season during the spring and summer.

16. T F Your part-time farm should be located near a place where there are plenty of other employment opportunities.

17. T F If you have an automobile, distance from other work is of little consequence when selecting a part-time farm.

18. T F A few acres of land is all that is needed for security against the hazards of unemployment.

19. T F Part-time farming is confining.

20. T F Part-time farming requires the cooperation of all members of the family.

Turn to the back of the book to check your answers. You should not miss any. If you did, better check the chapter again.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Men who do part-time farming usually include recreational value when stating what they derive from their work. Is this a legitimate claim? Tell why or why not.

2. Garden products are usually considered the most important of part-time farm products. Why are they put above eggs, milk, and meat which are also frequently produced on part-time farms?

3. What are the major decisions that the part-time farmer has to make when he undertakes the production of meat, milk and eggs?

4. What are the chief disadvantages of part-time farming?

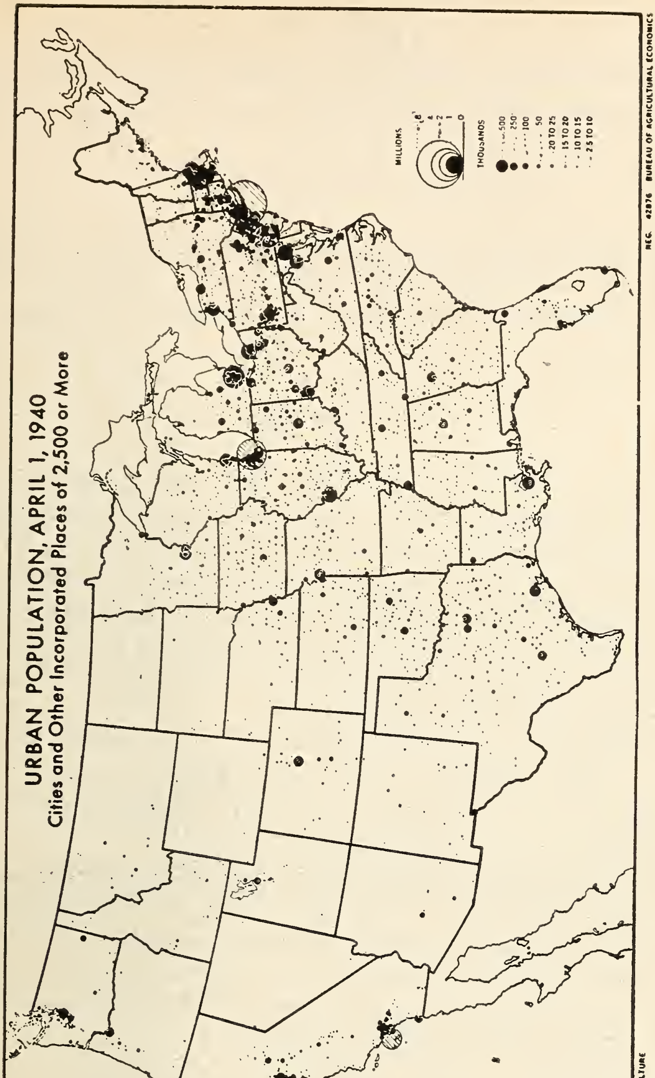

URBAN POPULATION, APRIL 1, 1940
Cities and Other Incorporated Places of 2,500 or More
MILLIONS
THOUSANDS
U.S. DEPARTMENT OF AGRICULTURE
NEG. 42876 BUREAU OF AGRICULTURAL ECONOMICS

Figure 48.

Chapter X

Truck and Market Gardening and the Vegetables Grown

WHAT THIS CHAPTER IS ABOUT

Farms that specialize in growing vegetables for market are called truck farms. This chapter tells where the more important truck regions are and some things about the vegetables that are grown.

STUDY GUIDE

Of course, you already know something about the topics discussed in this chapter. To find out what you do know and to guide your reading of the chapter, try to do the following exercises.

1. In some vegetables we eat the fruit, in others we eat the leaf, and in others we eat still different parts of the plant. After each vegetable listed below write the name of the part of the plant that we eat. Use "fr" for fruit, "fl" for flower, "s" for stalk, "l" for leaf, "r" for roots, and "b" for buds.

(a) Rhubarb (———) (b) Lettuce (———) (c) Sweet Potato (———) (d) Cucumber (———) (e) Broccoli (———) (f) Asparagus (———) (g) Peas (———) (h) Cauliflower (———) (i) Cabbage (———) (j) Tomatoes (———).

2. Some vegetables are grown primarily in home gardens, some are grown primarily in truck gardens, while some are grown in home, truck, and market gardens. After each vegetable below write an "H" if it is grown *primarily* in home gardens, write "T" if it is grown *extensively* in truck gardens, and "A" if it is grown *extensively* in home, truck, and market gardens.

(a) Asparagus —— (b) Radishes —— (c) Beets —— (d) Cauliflower —— (e) Kohlrabi —— (f) Muskmelons —— (g) Beans ——.

3. Some vegetables are grown extensively over a wide section of the United States. Others are grown in only limited areas, while

others are grown in a moderately large area. After each vegetable in the list below write E, L or M depending upon whether the vegetable is grown in extensive, limited, or moderate areas.

(a) Cabbage —— (b) Egg Plant —— (c) Onions —— (d) Muskmelons —— (e) Artichokes —— (f) Rhubarb ——

VEGETABLES ARE GROWN IN FIVE WAYS

Vegetable growing is carried on in the United States in five general ways. These are (1) in home gardens; (2) in market gardens; (3) canning-crop production; (4) vegetable forcing, involving the use of greenhouses or hotbeds; and (5) truck farming. Distinctions between these are not too clear-cut. Several types may be practiced on the same farm. Market gardens, near big cities, often include vegetable forcing; and growers may produce vegetables both for canning and for shipment as fresh products.

Truck crops are usually produced under large-scale methods for shipment to distant markets. Growers take advantage of the very best climatic and soil conditions to produce the crops, and ship the products to places where they can be sold. Truck gardeners must concern themselves with transportation facilities and problems of labor supply, and must be expert in growing special crops. In market gardening, on the other hand, the operator grows a greater variety of crops very close to the market, making the best of the soil and climate that exist near the city he has selected. The market gardener must be able to make a profit on high-priced land, and he usually has to be a good salesman because he has to sell his own products.

KNOWLEDGE OF INSECT AND DISEASE CONTROL IMPORTANT

Any grower must know the diseases and insect pests that attack vegetable crops. Wilts, yellows, and various other virus, bacterial, and fungus diseases may cause considerable losses unless checked.

Worms, beetles, and a variety of other vegetable-eating insects must be guarded against by suitable sprays and sanitary practices. To a large extent disease resistance is bred into superior varieties, but insect-pest control must figure into production costs.

THERE ARE FIVE IMPORTANT TRUCK-CROP AREAS

Truck crops are grown most commonly in five rather well-defined regions that are either close to large bodies of water or are in protected valleys. One of the regions is a broad belt along the Atlantic or Gulf Coasts from Massachusetts all the way around to Texas. Another is a broad irregular area around the Great Lakes, reaching from New York as far west as Minnesota. A third is the great Rio Grande Valley of Texas. A fourth is located in the intermountain valleys of the Rockies, particularly in Idaho, Utah, and Colorado, and the last is along the Pacific Coast and in some intermountain valleys in Arizona as well as the coastal States themselves.

It would be rather difficult to put your finger on the precise reason why these five areas have become important for producing vegetables while others have not. In fact, there are places outside these regions where big-scale gardens are doing very well. Climate is probably most important; certain kinds of soils are important too, although there is a wide variety of soils in the five regions; and certainly access to markets, good shipping facilities, and other factors play their part.

Fresh vegetables for northern markets are available the year round since they can be grown during the winter season in such southern areas as Florida and Texas. Gradually, as the season progresses, production moves northward so that there is no time during the year that city markets cannot have fresh vegetables. The produce was shipped entirely by rail formerly, but increasingly in recent years by truck.

How well vegetables stand shipping is a matter of considerable interest to growers. Special varieties have been bred for this purpose, combining good quality, appearance, disease resistance, and keeping quality. Breeders have also worked wonders in developing

Figure 49. Home vegetable gardens keep the farm family well supplied with fresh vegetables, with a surplus for sale. (U. S. D. A.)

new vegetables with desirable characters. Strains of wilt-resistant cabbage and those able to hold up well in storage have been bred. The famous Marglobe tomato is highly resistant to the serious tomato wilt disease, and it was developed in time to save the Florida tomato-shipping industry from ruin. Many other examples could be cited that show clearly the importance of the plant-breeder's work in furthering the vegetable-growing industry.

There is no particularly close kinship among the vegetables. The fact that they are all called vegetables does not mean that they have any botanical relationships. Some vegetables are really "fruits" botanically—peas and beans for instance, and tomatoes, and cucumbers. Some are flowers, such as cauliflower and broccoli. There are the root vegetables like carrots and sweetpotatoes; and the leaf vegetables, such as lettuce and endive. The edible parts of celery and rhubarb are leaf stalks, or petioles, while cabbage is an enlarged bud of closely folded leaves.

Figure 50. Market gardeners grow a variety of crops, very close to the market. (U. S. D. A.)

There has been a very considerable expansion in the vegetable-growing industry during the past few years due largely to wartime needs. In the preceding decade 1930–40 there was relatively little expansion, although the 10 years between 1920 and 1930 saw a marked increase in vegetable growing and production. It has been said that the processed food industry of the United States is the biggest industry we have, and vegetables, of course, make up a substantial part of it.

In 1942 over 174 million cases of vegetables worth approximately 3 dollars a case were canned, and over half a million people were employed in the processing job. This figure applies both to canned vegetables as such and to vegetable juices such as tomato juice. In addition, more than 152 million pounds of vegetables were frozen. It should be noted that special varieties may be required for processing.

The war period has seen a great increase in dehydration of vegetables. Well over a quarter of a billion pounds, dry weight, are likely to be handled in the 1943–44 period.

The principal vegetables dehydrated include carrots, cabbage, onions, beets, potatoes, and sweetpotatoes. Dehydrated onions and potatoes are considered very good products, but there is still reasonable question concerning the others. Dehydration increased during World War I, but fell off in popularity until the present war when the industry increased to its greatest size. There seems no doubt that the post-war period will see less processing by dehydration than during the war.

In addition to the processing industries dependent on vegetable growing, a sizeable industry devoted to the production of vegetable seeds and transplants is also to be considered. Between three hundred and four hundred thousand acres are devoted to the production of over a quarter billion pounds of seed. Greatest acreage is set aside for growing peas, beans, and tomatoes. Between 8,000 and 9,000 acres are used for growing young plants to be transplanted. This transplant industry has developed especially in Georgia, but also in Mississippi, Arkansas, Florida, and some other States. From one section in south Georgia in 1943, 1,200 carloads of young tomato plants were shipped out during the season.

THE VEGETABLES WE EAT

Artichoke. Botanically the globe artichoke is a big thistle, but it is by no means as tough as ordinary thistles usually are. It is grown commercially only in a narrow strip of land along the southern California coast, and it is probably the most exacting of all vegetable crops so far as climate is concerned. Eight or ten thousand acres of it are grown in California, and one occasionally sees the plants elsewhere, especially in the South. It is propagated by shoots or suckers from the large plants since it does not come true to seed.

Asparagus. Every year on some 125,000 acres the asparagus roots send up juicy succulent shoots. Before they have a chance to grow tall they are cut off. If the shoots develop in the light, they are green; if the soil is banked up around them and they develop in the dark, they are white. After the young shoots have been cut off regularly throughout the cutting season, the later shoots are let grow to become 4 or 5 feet tall, bushy, and somewhat woody to store up food in the roots for the next year's crop. The plants bloom with minute white flowers, and at the end of the season produce a crop of red berries of some value to birds. In this country we grow asparagus principally in the hot interior valleys, along the West Coast, in the upper Mississippi Valley, and along the central Atlantic Coast. Most of the white asparagus for canning is grown in California.

Beets. Table beets are grown in nearly every home garden, but the bunched beets in the vegetable market come principally from Texas, Louisiana, and New Jersey. The beets that are canned are grown principally in New York, Michigan, and Wisconsin. Altogether, in commercial areas, we grow about 20,000 acres of the ordinary type of red beets—almost a $2,000,000 crop.

Cabbage and Its Relatives.—It is probable that from the wild cabbage of the Mediterranean region came brussels sprouts, cauliflower, broccoli, kohlrabi, kale, collards, and of course, cabbage itself. As they approach harvest these plants resemble each other very little; yet there is a certain similarity in the seed and small seedlings, and also in flavor, regardless of sauces and manner of cooking, that betrays their common origin.

Kale and collards are probably the oldest types since they resemble their ancestor more than do other members of the cabbage group. They are much more leafy than their wild ancestor, but they are open in growth. Much less kale is grown in the United States than in other countries, and what we grow may be found chiefly along the middle Atlantic Coast, especially in the Norfolk region of Virginia. There it is sown in late summer or early fall, and cut, and shipped to market in winter or very early spring. Collards are grown almost entirely in the South, principally in small gardens.

Cabbage is another story, since some of it is grown on a commercial scale in all 48 States. Ordinarily about 180,000 acres are devoted to cabbage—commercial cabbage, that is—to say nothing of all the cabbages grown in city and farm gardens. Cabbage plants are really big buds, and they grow best in a cool climate. To take advantage of the coolness of climate that the plants require, cabbage is grown as a summer crop in the North, as a winter crop in the South, and as a spring or fall crop in the in-between States. New York, Florida, Texas, and Wisconsin usually lead in acreage.

Cauliflower—one of the few flowers we eat—has nowhere near the wide range that cabbage has. It takes considerable skill and exactly the right conditions to grow good cauliflower. Too intense sun, for instance, turns the heads brown, so that the leaves are tied together at the top to keep the mass of flowers white. Cauliflower is to be found growing in cool, mild, moist areas principally in California, Oregon, Colorado, and New York. A little is grown also in Arizona, the Northwest, Texas, New Jersey, and Utah. Altogether we grow nearly 30,000 acres of it each year—not much land perhaps, but some 10 million crates of heads just the same.

Broccoli comes in two kinds. One type, known as heading broccoli, looks like cauliflower and takes about the same special conditions to grow. This is the "cauliflower" Easterners get in the wintertime from the West Coast. The other type, known as sprouting broccoli, is what people usually mean when they ask for broccoli at the grocery store. Sprouting broccoli grows anywhere that cabbage can grow, and is also a vegetable we value for its flowers. In fact, we eat flowers, buds, leaves, and the top of the stem as well.

We grow much more of it than we used to, and although it was formerly grown in the same area as cauliflower, it is now being more widely grown.

Kohlrabi is grown mostly in home gardens in this country. It is similar to turnips except that this "turnip" develops above ground and has leaves on it.

Brussels sprouts are apparently the youngest of the cabbage group. They are thought to have been developed in Belgium and are possibly only a few hundred years old. Brussels sprout stems are much elongated and the little sprouts develop all along the stem like so many little cabbages. They are more tender and have a more delicate flavor than that of cabbage. Cool weather improves their eating qualities, and the plants are grown principally along the middle Atlantic Coast. Eastern Long Island produces a great deal. So does the Half Moon Bay region of California.

Carrots. Wild carrots grow along our roadsides in many parts of the United States, but they came originally from western Asia. We raise 45 thousand acres or more of cultivated carrots in the commercial centers in California, Arizona, and Texas, and most of our crop is grown under irrigation. New Jersey and New York and other States touching the Great Lakes produce large quantities.

When it rains too much carrots lose their carroty color. Where they are irrigated the water content of the soil can be regulated so that good color can be developed. The color comes from carotene, a red-orange pigment that can be extracted and used for coloring material. Carotene is the source of vitamin A.

Celery. Celery growing is one of the most highly specialized, expensive, and difficult of all vegetable enterprises. In the wild state celery prefers marshy, wet places, hence in cultivation it does best in peat or muck soils reclaimed from bogs and swamps. It is particular about temperature, and there must be plenty of moisture. If it gets too cold, then warm, the plants are likely to "bolt"—meaning they will go to seed—which is not what growers want unless they are raising seed.

For all that we grow some 40 thousand acres of celery in the big producing centers of thirteen States, in the North and in the South, including Florida and California. Some celery is also grown in almost every other State.

Celery is usually sown in beds, then transplanted to field rows. As the plants become good-sized some varieties are blanched; that is, the lower parts of the stems are covered up so they will turn white. The plants may be covered with boards, with paper, or with soil banked up around them. Sometimes the celery is picked green and blanched in dark cellars or with ethylene gas, which is also used to ripen oranges. There are also nongreen or "self-blanching" varieties that require no treatment. Blanching improves quality, but there are green celeries on the market that make their own bid for success.

Cucumbers. A native of Hindustan, cultivated for perhaps 4,000 years, cucumbers are grown in heaviest concentration in the East and in the Great Lakes States, although California and Texas also grow a great many. More than half the crop is used to make pickles, and the whole crop is grown on about 130 thousand acres of land. Cucumbers grow well in about the same regions as muskmelons, to which they are quite closely related.

Eggplant. The chances are small of seeing a field of eggplant in the United States except in Florida, Louisiana, Texas, Virginia, and New Jersey. Eggplant is a minor crop that rarely occupies much more than 4,000 acres all told in this country. The plant came originally from India, and people in the warmer parts of the world use it more extensively than we do in the United States.

Lettuce. Lettuce was served on the royal table of the Persian kings several centuries before the Christian Era, and it is certainly still in royal favor now as a salad plant. We grow quite a lot of it—on about 160,000 acres of land. The Western States grow about 85 percent of it and what they grow is principally one strain or another of Imperial or of the New York varieties. On the market it is erroneously called "Iceberg" lettuce. This is the lettuce the Europeans call Neapolitan cabbage; it is usually the lettuce you buy in the market with white, crisp, solid heads. In the East the principal variety used to be Big Boston, which has smooth, not crisp, leaves of the "butter" type. Recently, however, eastern growers have changed over to types like the Imperial strains because the public seemed to prefer them.

Muskmelon. All cantaloups are muskmelons, but not all muskmelons are cantaloups; in fact, the true cantaloup is a hard, warty looking melon that is practically unknown in this country. However, muskmelons, which we grow in quantity, have been called cantaloups so generally that even the experts are beginning to give up trying to keep the two separate.

We grow about 130,000 acres of muskmelons each year scattered over a good many States in the truck-crop regions. The most concentrated acreage is in the irrigated Southwest.

Onions. Several species of plants closely related to onions are cultivated in this country. Two are ornamental flowers; the rest include garlic, leek, shallot, chives, Welsh or Japanese onions, and the ordinary onion. We grow a few thousand acres of garlic in California, Texas, and Louisiana, a few leeks, chives in many herb gardens, and about 5 thousand acres of shallots in Louisiana; but ordinary onions we produce on about 120,000 acres yearly, besides planting them in nearly every home garden.

Peas and beans. We grow garden peas on about 400,000 acres of land in the commercial truck crop areas besides 260,000 acres of field peas which we use as split peas or to make pea meal. The plants favor cool seasons, and they are not grown in the South during the summer. They are, however, widely grown during the cool part of the year.

Garden and green beans (snap and lima) are quite sensitive to cold but we grow them in most of the States, and use more than 260,000 acres to do the job. In addition to this land we grow on the order of 3 million acres of dried beans, both the ordinary type and the flat, lima beans.

Peppers. This paragraph has nothing to do with the black or white pepper that we find in pepper shakers on the table, which is not grown in this country. It deals with garden peppers—the cayennes, chilis, paprikas, pimientos, tabascos, and sweet peppers native originally to the American tropics. Christopher Columbus is supposed to have taken peppers back to Europe from the West Indies, and this was the first time white people knew anything about them. The native Americans had all the types of peppers in current use today, however, even though we have since improved them, and had apparently been growing them for quite a long time, perhaps many centuries.

More than 35,000 acres of peppers of one kind or another are grown in the United States. Roughly, half the land is used to grow pimientos, and most of the commercial pepper-growing is carried on in the Atlantic and Gulf States and California. Over 90 percent of the pimientos are grown in Georgia. Tobacco and paprika peppers are grown chiefly in Louisiana, and chili peppers in the Southwest.

Radish. The radish is believed to have come originally from China and India, and it is known to have been cultivated by the ancient Greeks and Romans. It has a rather low food value but a spicy agreeable taste and is widely grown in home gardens, the market gardens near big cities, and on large truck farms. There are a num-

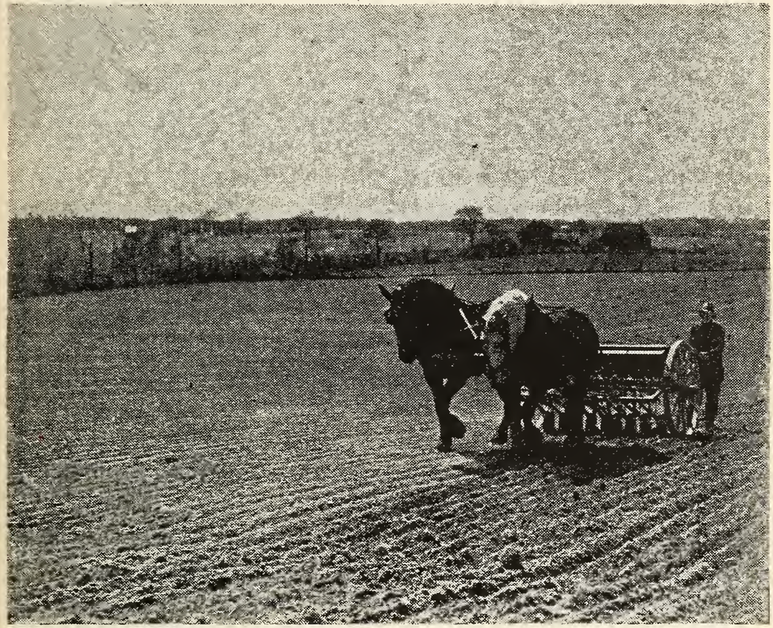


Figure 51. Peas for canning are a profitable crop in many parts of the country, including Maryland where this picture was taken. It shows how peas to be canned are planted. (U. S. D. A.)

ber of kinds. The early radishes are small, mild, and last only a short time. The winter radishes are large, pungent, and store well. In bloom, radishes have a purple flower and are rather attractive although coarse and weedy. Most of our radish seed is grown in Michigan and California.

Rhubarb. Rhubarb growing in this country is largely restricted to regions north of the Potomac and Ohio rivers and to the coastal regions of California. Only the stalks are used, the large leaves being poisonous.

Spinach. Spinach has been grown for some 2,000 years, but it has never been as important as it has become recently. It is now the principal source of greens. Its closest vegetable relative is the beet. We grow some 75,000 acres of spinach in the truck-crop regions of this country, with the leading production in Texas, California, Virginia, and Maryland. The plant came originally from southwestern Asia.

Sweetpotato. There are several hundred species of morning glory *(Ipomea)* but only one produces edible roots on a commercial scale, and that is the sweetpotato. This plant is entirely different from the yam, which we use only for cattle feed and of which we grow a very little in the deep South. In the vegetable markets the moist, soft, orange-yellow sweetpotatoes are often called yams, while the dry, mealy, light-yellow kinds are called sweetpotatoes, but both these tubers are the same.

The sweetpotato came from South America, although most of our varieties were introduced from the West Indies. In the United States we grow about 800,000 acres in the more southerly States, both east and west, and along the central Atlantic Coast. The plant is a vine that sprawls on the ground and that, in this country, seldom flowers and rarely produces seed under natural conditions.

Tomato. For a long time after the early Spanish explorers took tomatoes back to Europe people were afraid to eat them. The English grew them as an ornamental only, in the seventeenth century. In the eighteenth the Italians grew them on a field scale, but the nineteenth century was half over before Americans generally dared to eat tomatoes. "Love apples," as people called them, were thought to be poisonous.

Figure 52. Enough seedling tomatoes are grown in these hothouses to plant 2,500 acres. When they reach the right size the seedlings are transplanted to flats (right) in which they are moved to cold frames for conditioning to the outside air. Then they will be set out in the grower's fields. The entire crop is contracted for by a cannery. (U. S. D. A.)

But all that is past history now. We devote more than half a million acres of land to tomatoes in the United States. The plants are grown in every State, and in Florida, California, and Texas they are grown the year round. The plants are sensitive to frost, having originated in the American tropics, but they do well even where there is no more than a 4-month frost-free season. There is an astonishing variety of tomatoes; the fruits may be red, purple-red, orange-yellow, lemon-yellow, or cream color, large or small, and the plants may be dwarf or large. Usually the plants are transplanted from seedbeds to the field, although sometimes the seed is sown directly.

Turnip. Although turnips and rutabagas are sometimes confused they are distinctly different species. Rutabagas have a longer growing period and grow best in the northern part of the country, but turnips are grown in every State. Both plants came originally from temperate Europe, and as far as anyone knows have been cultivated for possibly 4,000 years. Rutabagas are sometimes called "swedes". Most varieties are larger than turnips, are more solid and keep better.

Watermelon. Watermelons are hot-weather plants native to Africa, grown in this country and in the Southeast and Southwest. The watermelon is a vine that is believed to have been cultivated for several thousand years. Each year in this country we produce between 65 and 80 million watermelons on some 270 thousand acres.

Figure 53. Disease resistance has been bred into many varieties of vegetables. Here W. S. Porte, vegetable breeder of the U. S. Department of Agriculture, holds the new Pan American tomato, a cross between the Marglobe tomato (left) and a wild small-fruited species from South America. The Pan American tomato is resistant to the diseases that have caused great losses to tomato growers. (U. S. D. A.)

CHECK-UP NO. 10

Part I.

Did you find that you had made errors when you did the exercises at the beginning of this chapter? Check your answers by comparing them with those in the back of the book.

Part II.

If you have read this chapter carefully, you now know something about vegetables that are grown for market. Each one of the following questions has only one correct answer. Put an "X" in front of each correct answer.

1. Where are beets grown principally for canning?
   a. Texas, Louisiana, and New Jersey.
   b. California, Washington, and Oregon.
   c. New York, Michigan, and Wisconsin.
2. In what type of climate does cabbage grow best?
   a. Cool climate.
   b. Warm climate.
   c. Dry climate.
3. Which of the following crops is very difficult, highly specialized, and expensive to grow?
   a. Carrots.
   b. Lettuce.
   c. Celery.
4. How are truck crops usually produced?
   a. Large scale.
   b. Small scale.
   c. On farms always less than one acre in size.
5. Where are market gardens usually located?
   a. Near shipping facilities.
   b. Close to a city.
   c. In Iowa.
6. Where are large quantities of fresh vegetables for Northern markets grown during the winter season?
   a. Mississippi and Tennessee.
   b. Kansas and Missouri.
   c. Florida and Texas.

7. Which of the following is a root vegetable?
   a. Lettuce.
   b. Carrot.
   c. Tomato.

8. Which of the following crops has the lowest food value?
   a. Peas.
   b. Radishes
   c. Beans.

9. Which of the following crops is usually transplanted from seed beds to the field?
   a. Tomato.
   b. Watermelon.
   c. Spinach.

10. Which of the following crops grow best in the northern part of the country?
   a. Muskmelons.
   b. Rutabagas.
   c. Cucumbers.

Check your answers with the key.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. The five important truck crop areas all have a few things in common. What are these common points?

2. Many of the great truck garden areas are far from markets. What natural advantages do these areas have that overcome such a handicap, and what developments in transportation and handling of vegetables have helped truckers?

3. What two vegetables have probably increased most in production in the last 50 years? Give the reasons for this rapid growth.

Chapter XI

Fruits That Grow on Bushes and Trees

WHAT THIS CHAPTER IS ABOUT

This chapter tells where our various fruits are grown and something about their relative importance and the skills involved in growing them.

OUR ORCHARDS

Orchards in the United States contain about a quarter of a billion fruit trees of all kinds, and although there are no exact figures available, these trees occupy about 5 million acres of land. There are no general rules about where orchards can or cannot be grown, although soils, elevation, climate, diseases, and a number of other factors have to be carefully considered in choosing the site for an orchard. There is a great belt of orchard land along our coasts and about the Great Lakes, also there are a great many orchard areas in the basin of the Mississippi River, in the foothills of the Appalachians, and in protected valleys of the Rocky Mountains.

The business of orcharding requires careful planning. Locations must be selected that are suited to growing fruit trees, and a prospective orchardist will always do well to consult the local county agent and other agricultural authorities before he buys. The choice of varieties to plant must be carefully made, and with an eye to the future, since the wrong variety of fruit has often been the reason for financial failure of an otherwise excellent orchard. Trees, bushes, and vines all require spraying to control diseases and insect pests, and the cost of this may be great enough to eat up all the profits unless the plants produce well. Harvesting, with its costs for labor, packaging, and equipment has to be counted on, and attention has to be paid to shipping facilities and markets.

Figure 54. Orchards must be planted in parts of the country that are suited to fruit growing. Hood River Valley orchards, here shown with Mount Hood in the distance, are profitable to their owners. (U. S. D. A.)

Orchards and vineyards must be fertilized, just as any other crop, either with commercial fertilizers, manures, or cover crops planted in them and plowed under. In some orchards, especially those on sloping land, proper measures must be taken to prevent soil from washing, such as mulching with straw, growing permanent grass or other covering crops, and even terracing. If the fruit is being grown in dry regions, the grower must learn how to irrigate without losing an undue amount either of water or of soil; in all cases where trees are involved, it must be remembered that orcharding is a long-term project requiring several years between planting and the beginning of fruit production.

Apples. No other fruit tree is so widely grown as the apple, nor is any other fruit so valuable a crop. Every year we produce from 125 to 150 or more million bushels of apples from the 71 million trees now growing in the United States. Most of them are grown in the East and the West, and almost none come from the Plains region. There are no satisfactory varieties for that part of the South within 150 miles of the Gulf, and no apples are grown in the tropical climates. In this country apples are grown within a belt bounded on the North by 30° below zero weather and on the South by winters without sufficient cold to break the dormancy of the buds.

Our apples have developed from the better seedlings that have been found growing wild, although originally apples came from the Caucasus region between the Black and Caspian Seas. The Romans knew perhaps 2 dozen kinds; the world today has about 6,500 varieties.

Figure 55. McIntosh apple trees on a hillside in Cayuga County, N. Y. (U. S. D. A.)

Most of our orchards are located around the Great Lakes, in southern New England, on the peninsulas of New Jersey, Delaware, and Maryland, in the valleys of the Mississippi River system, the

Ozarks, the high valleys of the Rockies, Northern California west of the Sierras, and such famous valleys as those of the Hood River.

Pears. The growing of pears depends to a considerable extent on how severely the trees are attacked by a serious bacterial disease known as fire blight. In the early days pears were tried in many places, but the fire blight, which leaves the trees looking as though they had been through a fire, eventually eliminated them from many parts of the country. In the East they can be grown along the southern and eastern shores of Lakes Michigan, Erie, and Ontario. There the cool summers and mild winters permit them to be grown on a large scale, largely without the blight.

On the West Coast pears were brought in by the Mission Fathers to California in early days and in certain districts have done well. Northward in the moderately warm dry valleys of Oregon and Washington, they also did well. Climatic conditions in these places are not so favorable to the fire blight organism, and with a little careful surgery trees can be kept free of infected branches. Nowadays most of our pears come from the three Pacific States, and most of these are the soft, mellow Bartletts.

For the rest of the country pear growing depends to a large extent upon hybrids between the ordinary pear and the Oriental, or sand pear. Thanks to their oriental parent the hybrids are fairly resistant to fire blight. The sand pears themselves are coarse-fleshed and gritty, and these characters have been passed on, to some extent, to the hybrids, which, so far, are inferior to the "buttery" Bartletts. Even so, the hybrids are pears, and from them it may be possible, plant breeders hope, to get types altogether resistant to fire blight and with first class fruit.

All told, our 14 million pear trees produce between 20 and 30 million bushels a year, worth nearly the same number of dollars.

Peaches. Peaches are grown in nearly every State, but the really extensive orchards are more frequent in the milder and warmer climates. In the South, in California, in certain areas near the Great Lakes, along the central Atlantic Coast, and in protected valleys in many States, peach orchards are fairly common.

The peaches occupy much land—as much as it takes for 70 million little trees. From the great orchards we harvest between 50 and

60 million bushels of fruit ordinarily, although once, in 1931, we produced 70 million. Because the peaches are perishable, a goodly portion of the fruit is dried or canned, but, even so, some years, when the crop ripens all at once over large areas, peaches may be thrown away by the carload.

Plums. What we lump under the one name of plums includes European plums, the damson plums that are delicious but less planted than the European plums, the American plums that have been developed from our own native species here in the United States, and the Japanese plums that were brought into California at the end of the last century.

The European plums do best in New England, around the Great Lakes, in the intermountain region, and along the Pacific Coast. They have never been able to make the grade in the enormous areas of the south-central and southwestern United States. Even so, they are the most important commercially of all our plums, and it is from the European plums of higher sugar content that we get prunes.

The damson plums will grow and thrive under much more rigorous conditions than the European plum. They are little trees; their fruits are small and tart—and delicious in preserves and jams. The big soft plums with red flesh that you buy in the market are the Japanese plums which are rapidly assuming importance. They have less trouble with plum diseases, although they bloom early and the flowers are often killed by frosts. In the South and in central United States the native American plums take the lead. Their fruits do not compare in size with the European plums, but they can stand climatic extremes far beyond those any other plum can put up with and they are delicious to eat. They are relatively free from native diseases and insect pests, in marked contrast to the species from overseas.

Cherries. Sweet and sour cherries are fairly well distributed over the country, but commercial cherry orchards are concentrated in the three Pacific States, in intermountain valleys in the Rockies, and about the borders of the Great Lakes. Sweet cherries are grown principally in the West. Sour cherries, mostly from the Great Lakes region, are the great reliance of the American public for cherry pies—and how vitally important this is requires no elaboration. All told, there are about 12 million cherry trees in American orchards; these produce some 300 million pounds of cherries every year.

In the South, the Southwest, and the northern Great Plains, cherries do not do particularly well, and few are to be seen in these regions. In the Plains region, however, the little Bessey cherry, native to that part of the United States, has been improved and is planted to some extent.

Apricots. We grow some 6 million apricot trees, nearly all of them in California, although a few orchards may be seen in Oregon, Washington, Utah, Arizona, and New York. If the apricots bloomed a little later (they flower a good week ahead of most peach trees) we could grow them in other parts of the country. These fruits appear on the eastern markets for only a short time as fresh fruit, the rest of the time they are marketed as dried or canned apricots which is the way most people know them.

SUBTROPICAL FRUITS

Subtropical conditions in this country are limited to the southernmost fringe. Southern California comes readily to mind, as does Florida; less well known perhaps are the southern portions of the States in between these two, namely Arizona, Texas, and Louisiana.

A rather surprising variety of subtropical fruits can be grown in favorable locations in this part of the United States. Avocados, figs, olives, dates, and citrus fruits such as oranges, lemons, limes, and grapefruits are grown in large enough quantities to be important. There are many others that may reach the fruit markets but in the aggregate, occupy relatively little land. Among these are bananas, guavas, mangoes, papayas, Oriental persimmons, pineapples, pomegranates, and lesser numbers of jujubes, loquats, sapodillas, sugar apples, cherimoyas, and a number of others. One of these days it is possible that any or all of these lesser fruits may become important.

Citrus fruits. The types of citrus fruits we grow in commercial quantities, that is that occupy an appreciable amount of land, are oranges, tangerines, grapefruits, lemons, and limes. We use the most land for our 41 million orange trees, less for 11 million grapefruit trees, and still less for the 6 million lemons and half a million limes. Most of these are grown in the citrus groves of Florida and California, but some are found in southern Louisiana, Mississippi, Georgia, Alabama, and Arizona, and in the Rio Grande Valley of Texas.

Citrus trees are easily frozen, which is why they are restricted to the warmer parts of the southern United States, and why growers usually use oil-burning heaters designed to warm up the groves on cold nights. The heaters are usually, but not always, able to keep the temperature above the danger point.

Figure 56. Florida's citrus fruit groves are profitable. (U. S. D. A.)

Dates. At the present time we have nearly a fifth of a million date palms in the very dry, desert areas in southern California and Arizona, with just a few in southern Texas, and we harvest some 12 million pounds of dates from them. The largest production in the

Figure 57. Fruit trees must be pruned—a job that calls for expert knowledge and experience. (U. S. D. A.)

world, of course, is still in Iraq on the site of ancient Mesopotamia, where there are perhaps 20 million date palms. Dates contain from 60 to 70 percent sugar and thus have a very high food value. Just off the tree they are soft and sweet, and as palatable as any fruit you ever ate. It is probable that in the deserts we will grow more dates as time goes on.

Figs. There are a number of kinds of figs, some of which produce fruits in an ordinary manner. But there are others that have a rather complex life history, such as the Smyrna fig, which cannot bear fruit unless a certain small wasp pollinates its flowers. In the United States we have now about 3 million fig trees of which nearly 2 million are in California. Texas is next, with about a third of a million, and the States of the deep South have most of the rest. We used to grow half again as many as we do now, but fig production has dropped off markedly in the past 10 years.

Olives. If you have ever tried to eat an olive right off the tree then you know why olives must be soaked in lye solution before you can eat them. The olives are shining purplish black when they are ripe, and they look good enough to eat, but the bitterness has to come out first, which is what the lye is for. It also softens them, and after the fruits have been pickled in brine, they make the finished product we are accustomed to eating.

Spain, Italy, and Greece are the principal sources of olives, but we have about a million and a quarter trees on some 25,000 acres of land in the Southwest. Most of these are in California, but there are a few thousand in Arizona.

Avocados. Avocados are fruits that are rapidly coming into favor, particularly for salads. We grow nearly a million avocado trees in California and Florida, and the chances are good that this number will increase since the American public has taken quite a liking to these Central American fruits.

NUT ORCHARDS

Six different kinds of nut trees are grown in the United States in quantities of commercial importance. Growing nut trees is decidedly on the increase in this country especially as nuts become staples rather than luxuries. Nut tree groves or orchards are most commonly seen in the South and along the Pacific Coast.

Almonds. The growing of almonds in California has developed during the past 50 or 60 years, and except for some kinds grown in Spain, the best almonds on the world's markets now come from that State. Almond flowers cannot stand late frosts, which is why we grow nearly all our almonds in California. We use about 80,000 acres for them and we have another 20,000 acres in young trees that are not yet bearing. This land supports about 5½ million trees. Our almond acreage is increasing, and so is our production; we used to import more than we raised, but now we raise more than we import.

Filberts. A million and a half filbert trees produce almost 5½ million pounds of nuts each year. The commercial production of these nuts is an important industry in the Willamette Valley of

Oregon and in nearby parts of Washington. The filberts are of European origin and they have never been able to stand the climate or the diseases by which they are attacked in the East.

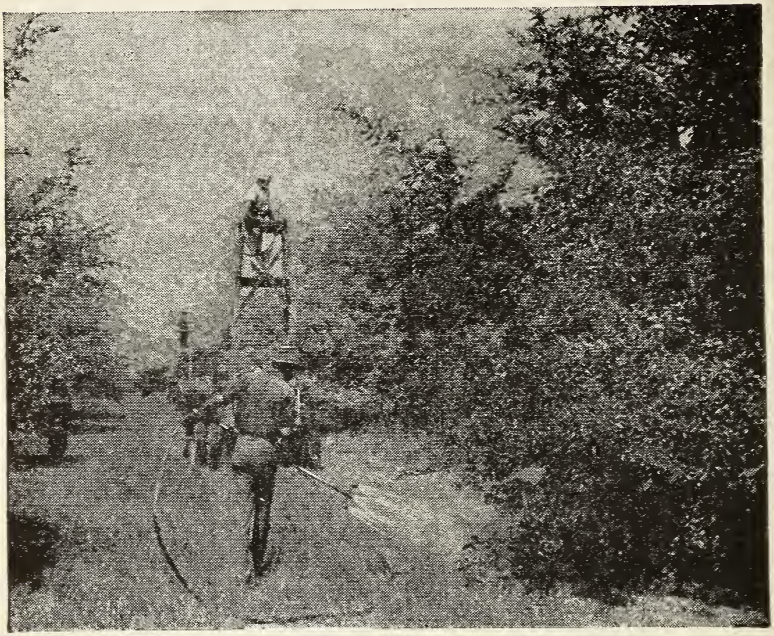


Figure 58. To protect fruits from disease and insect pests, trees, bushes, and vines must be sprayed. Unless yields are good, the cost of spraying may eat up profits. (U. S. D. A.)

Pecans. Pecan groves are planted in many parts of the South and the "papershell" is sold in quantity in the nut markets. From the improved varieties we now gather some 20 million pounds of pecans yearly, and from the wild and seedling trees, 40 to 60 million pounds. The nuts contain over 70 percent fat, a content higher than that of any other vegetable product. Diseases that are causing concern to growers have appeared when the nuts are planted in groves, but breeders hope to solve this problem, just as they have for other crop plants.

Tung. Tung tree nuts contain a valuable drying oil, much like linseed oil, but more resistant to water and able to dry more rapidly. Ten years ago there were a few hundred thousand tung trees being grown in the deep South; today there are some 13 million, with more being planted all the time.

We grow tung trees from South Carolina to Texas, with greatest numbers in Mississippi, both of bearing age and of nonbearing age. The trees grow very fast, often reaching a height of 6 or 8 feet the first season from seed, and they will grow in types of soil unfit for other kinds of agriculture. For all the great boom in tung oil, however, much remains to be done in getting better varieties. In the meantime this country is now harvesting over 2¼ million pounds of the poisonous but oil-bearing nuts and there is reason to believe that there will be greater expansion of this relatively new and promising industry.

Walnuts. While we grow black walnuts in reasonable quantity, there is more land in English walnuts—some 1,700,000 acres, nearly all of which is in California, Oregon, and Washington. In those western States this tree seems to do its best, but for all that, there are trees of bearing age in at least 43 States. Only in the very coldest areas does the tree fail; only in the milder States does it fruit abundantly; and only in the West are the nuts of the excellent flavor and quality that are expected when we buy them at the grocery.

BUSH FRUITS

Blackberries. Besides the American types of blackberries, we grow the Evergreen blackberry from England and the Himalaya blackberry from Europe. The Evergreen and the Himalaya have gone wild in Oregon and Washington, and both of them supply market material. But by far the most of our blackberries originated from the wild plants of America, and between 30,000 and 40,000 acres of land are now used for the crop which is grown to some extent in nearly every State in the Union, but extensively in relatively few States.

Some of the types are trailing and are supported on trellises or stakes or allowed to spread along the rows. Others are erect and able to support themselves, as do raspberries. The erect plants are usually called blackberries, and the trailing ones dewberries. It was from seedlings of a very rank-growing, trailing blackberry at Santa Cruz, California, that Judge Logan grew a red-fruited blackberry later named the Loganberry. The Youngberry is also a dewberry that originated from a cross between Luther Burbank's Phenomenal (which resembles a Loganberry) and a dewberry of the East. Very similar to it is the Boysenberry, also a dewberry, but of unknown parentage. Fruit of the Boysenberry, Youngberry, and Loganberry is especially well adapted to freezing, keeping its original flavor especially well.

Raspberries. Some 60,000 acres, mostly in the northern part of the United States, are used for raspberries. In the West, Oregon and Washington lead the field, and in the East, Minnesota, Michigan, New York, Ohio, and Pennsylvania. Universally the bushes are set in rows, often with wire trellises to keep them erect. Some of the new varieties bear berries of very large size, so that raspberry production is more promising than formerly. In these tasty fruits, as well as among other fruits and berries, new and better kinds are on the way in the many breeding centers of the country.

Currants and gooseberries. Years ago we grew far more currants and gooseberries than we do now. Botanists discovered that blister rust, a serious disease of white pine, depended on currants and gooseberries for its spread. Since white pine is a very valuable timber tree, the berry bushes were eradicated over large areas, and as a consequence, interest in these small fruits lagged. Some 3,000 acres are devoted to these bushes now, and the crop is worth a little under a half million dollars. New York, Ohio, and Illinois lead in land devoted to currants, and Oregon, Washington, and Michigan lead in gooseberries.

Grapes. Most of the land in vineyards is in California and about the Great Lakes, although grapes are grown in every State. About 300 million vines now produce about 4½ billion pounds of grapes. From certain kinds of California grapes, raisins are made by drying the fruits in the sun or by special drying processes. Fertilizers, stock feed, acetic acid, cream of tartar, and even tannin are also manufactured from grapes. In the East most grapes are trained on trellises, since the American varieties grown there do not ordinarily stand erect. In California many grapes of the European type that are successful there but not in the East stand very well by themselves and are pruned back each year to the stump.

The growing of wine grapes from Europe was tried in America by experts for nearly 200 years on a considerable scale; in the eastern United States they refused to grow. The vines froze or they were attacked by mildews, black rot, or phylloxera, a root-louse dreaded now by all grape growers. Finally, growers turned to using varieties selected from the native wild grapes of the East, and from these were eventually developed such types as the Catawbas, Concords, and Scuppernongs.

In California, however, the European grapes did well almost from the start, and the industry there is now based for the most part on European grapes. As it happened, the phylloxera eventually spread into California, where it had not formerly been found, and into France, Italy, and other countries as well. Wherever it went it spread disaster. The solution found was to graft the European types on American rootstocks that were resistant to the root-louse. Today the world's grapes are grown for the most part on the phylloxera-resistant roots furnished by the native wild grapes of America.

Grapes come in many colors—red, purple, black, brown, white or pale green—and a few varieties are seedless. From certain kinds of California, or European grapes, raisins are made by drying the fruits. Both eastern and western types are used in the production of grape juice or grape wine and for commercial and home-prepared grape jelly and jam. Breeders are hoping to develop grapes that combine the desirable features of both American and European grapes, but as yet phylloxera-resistant plants that will produce good fruit have not been created.

Figure 59. Costs for harvesting and packaging the fruit run up expenses on a fruit farm. (U. S. D. A.)

CHECK-UP NO. 11

Part I

Find out how well you have mastered the material of this chapter by taking the following tests. Check your answers with the key in the back of the book.

Select the one best answer to each of the following questions.

1. What is a descriptive term that can be applied to the orchard sites of the United States? (a) The soils are all moderately fertile. (b) Sites are usually protected from winds. (c) Orchards grow under many conditions.

2. After planting an orchard the trees can be expected to bear (a) The first year. (b) After several years. (c) More than 10 years.

3. For which section of the United States are there no satisfactory varieties of apples? (a) New England. (b) The Great Plains. (c) The Northwest. (d) The Gulf Coast.

4. How many varieties of apples are known today? (a) 12, (b) 50, (c) 500, (d) 6,500.

5. In what three states are most of our pears produced? (a) California, Oregon, and Washington. (b) Michigan, Indiana, and Illinois. (c) New York, Pennsylvania, and Ohio. (d) Georgia, Florida, and Alabama.

6. Pear trees are attacked by a disease known as (a) fire blight. (b) black rust. (c) blossom-end rot.

7. The European plums do best in (a) New England. (b) Louisiana. (c) New Mexico and Texas.

8. What keeps apricots from being grown in large sections of the United States. (a) Their inability to stand hot weather. (b) The long growing season required. (c) The fact that they bloom so early. (d) Their special soil requirements.

9. Which of the following fruits is not edible when fresh? (a) Dates. (b) Figs. (c) Grapefruit. (d) Olives.

10. Tung tree nuts (a) contain valuable drying oil. (b) Are valuable as a food. (c) Have little value.

Part II

Some of the following statements are true, some false. If true, circle the letter T. If false, circle the letter F.

1. T F Growers usually use oil-burning heaters to warm up citrus groves on cold nights.

2. T F Tung nuts contain a valuable drying oil, and are very delicious.

3. T F Orchards do not need fertilizer like other crops.

4. T F We get prunes of high sugar content from the European plums.

5. T F The pear tree is now grown principally in Washington, Oregon, and California.

6. T F Apples are grown in the tropics.

7. T F Grapes of the European type are not successfully grown in California.

8. T F Walnut trees seem to do best in the western states.

9. T F Olives are shining purplish black when they are ripe, and must be soaked in lye solution before you can eat them.

10. T F Sweet cherries are grown principally in the East.

11. T F Apricots bloom later than most peach trees.

12. T F A large part of the peach crop is dried or canned.

13. T F It takes several years from the time trees are planted until fruit is produced.

14. T F Acetic acid and cream of tartar are manufactured from grapes.

Check your answers with the key.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. The following statement, "The business of running an orchard requires careful planning" is taken from this chapter. Give several reasons for making such a statement.

2. What quality does the apple possess which has made it so popular?

3. Since subtropical fruits are not at the present time very important in the United States, why is space devoted to them in a brief book such as this one?

4. The grape industry of the world is built on a combination of European and American grapes. Explain.

Chapter XII
Modern Farm Animals

WHAT THIS CHAPTER IS ABOUT

Every farmer should know something about breeding and feeding livestock and the principles to be followed in selecting horses, cattle, hogs, sheep, or other animals. This chapter describes some of the fundamentals of these things.

MEAT HAS ALWAYS BEEN IMPORTANT TO MAN

Meat has always been one of man's chief wants. An ample meat supply "a-swinging in the shadow of my cabin" was really desired and sought long before our ancient ancestors had learned how to build a cabin. Man lived where there was game. He moved when the game moved. Meat was an essential.

What was true in the dim ages of man's beginnings was also true when this American continent was young. The buffalo or bison was important to many of our Indian tribes. Long strings of buffalo jerky drying in the smoky fires of a skin-covered wigwam were not the white man's invention. They were the result of man's universal, age-old want for meat.

You and I are not different from our forebears. Beefsteak in the frying pan has the same appeal today that beefsteak did when it was seared on a forked stick. If we had to follow the game trails to obtain our meat, we would. Happily, we don't. Our meat-loving ancestors have seen to that. Long ago they saw that game would not supply sufficient meat for the increasing numbers of men. As population increased it became necessary to find some other way to make available the necessary quantities of meat. So the livestock industry was born. This chapter can deal only with the high spots of its development and the opportunity that those achievements give us to carry on.

THE HORSE

The evolution of the horse as a beast of burden contains, in most respects, the problems and opportunities of the stockman who would fit his domestic livestock to his special needs. Skill, time and persistence are needed to produce a change but the wise selection of proper breeding stock, the ruthless elimination of unsuitable animals, and the fair testing of the capacities and quality of new offspring can make changes in a strain of livestock even during the life span of one man.

Some 3 million years ago the early, prehistoric horse was a "swamp fox," about 12 to 18 inches high with five spreading toes that held him up out of the muck as he darted through the thickets to escape his enemies.

As this native homeland rose from the water and became drier the grass and bushes thinned. They offered less secure hideouts for the early horse. Oftentimes there was no place to hide and, when attacked by meat-eating beasts, the little eohippus (ancestor of the modern horse) had to run away. Five toes were no longer necessary on this harder ground. Short legs that let him slip under roots and logs were of little value when there were few places in which to hide. In fact long legs were now an asset, for long legs made for speed. Those horses with the longest, fastest legs escaped and lived to reproduce. Those with big clumsy feet and short legs did not live to produce any young. They were caught and devoured.

Through succeeding generations this selection went on. "Natural selection" it is called because it follows nature's law of the "survival of the fittest." Those bigger horses that were alert and swift, with plenty of endurance, sped away to survive and rear the next generation.

The succeeding generations that these fleeter horses raised contained some animals that could run faster than any of their ancestors. That result was to be expected, for it follows another law of nature. Mating individuals with high value for speed or size or smartness or almost any characteristic will produce some young with still higher values. So the prehistoric horse, the little 5-toed

Figure 60. Cowboys need alert, fast, wiry ponies that can run and dodge. (U. S. D. A.)

swamp fox, now living on higher, firmer ground, forced to defend himself through speed alone, changed through the ages to the solid-hoofed, long-legged, stout-hearted "saddle pony."

When man appeared, caught the wild ponies, and put them into service more changes in the horse began. Some of these men wanted strong horses to carry a heavy load or to carry heavy arms and armor. They selected the biggest and strongest ponies from the herd, mated them, and produced still more rugged animals. Gradually there developed different "types" of horses. Some were still the alert, fast, wiry ponies that could run and dodge. When the horses took the place of cattle in pulling plows the big, strong, and slow types were found most suitable.

Today we have several types of horses, none of which resemble the swamp fox of antiquity. The big draft horse, thick, broad, strong-muscled, heavy-boned, often weighing over 2,000 pounds could never have survived the hardships of the early day. Under man's protection, however, he can live on to haul the heavy loads that man wants hauled.

The farm chunk, weighing 1,200 to 1,500 pounds, heavy-muscled like a drafter but with quicker action, is a compromise between the draft horse and the still lighter, faster animals that are used for riding, driving, and racing. Natural selection made the horse. Man-made selection fashioned various types to fit the various man-made jobs.

The evolution of the horse is typical of the evolution of all our domestic animals. Prehistoric beginnings of cattle, hogs, sheep, and poultry have finally come under man's control. Man's selection of the individual animals best suited to producing meat or milk or wool or eggs have produced definite types of animals best suited to those jobs.

BEGINNING OF ANIMAL HUSBANDRY

It was as late as 1760 before man first really understood that livestock breeding could be made a science. An English stockman, Robert Bakewell, set himself the task of studying the means by which he could breed easier feeding, smoother, meatier animals. He had considerable success and his neighbors and successors began to use his methods. So extensive was this copying that Bakewell has been called the Father of Animal Husbandry.

Following Bakewell it became popular to "inbreed" or "linebreed" animals. These terms mean that related animals were

Figure 61. Many farmers need at least one team of strong, heavy-muscled horses, like these well-matched grade Belgians. (U. S. D. A.)

mated. Thus a sire was bred back to his daughter and then to the granddaughter. Or sires were mated to their half sisters or cousins.

This close inbreeding or less close line-breeding caused many failures in which the offspring lacked vigor and fertility. Occasionally, however, concentration of family blood lines formed good qualities instead of poor ones. Such successful "nicking" produced outstanding animals. Not only were these animals superior in type and meatiness but they also had the capacity to reproduce their good qualities in their sons and daughters. "Their blood breeds on" as the stockman says.

A bull called Hubback was one of those outstanding sires. The foundation of the Shorthorn breed of cattle is traced to his sons and daughters. This was and is the goal of all constructive livestock breeders—to produce good animals that have the capacity to pass on their good quality to the succeeding generations. A big, smooth, meaty bull that begets a wide assortment of calves, many of which are small, rough, and thin-fleshed, is the sorrow and handicap of the stockman. Growing or finding a bull or cow most of whose calves possess the character desired is the goal to be achieved. Hubback was such a bull; so was the later Shorthorn Whitehall Sultan, and Anxiety 4th among the Herefords, and Black Woodlawn of the Aberdeen Angus breed.

BREEDS OF LIVESTOCK

Before and following Robert Bakewell there were in the British Isles a number of stockmen who were trying to improve the beef-producing quality of their cattle. In northeastern England farmers preferred the red and white color and were strong for size and wanted some milking quality too. Through the years they concentrated on the task and finally their cattle came to have a characteristic color and shape. Shorthorns their owners called them, and as Shorthorns their descendents are known today.

In a valley of central England other cattlemen selected a red body color with a white face. They wanted size and meatiness too but they were more interested in rustling ability than they were in milk. These white-faced cattle from Herefordshire became the Hereford breed.

In Scotland local cattlemen started with black cattle. They selected for short-legged, blocky, all black, hornless cattle and laid the foundation for the Aberdeen Angus breed.

The beginnings of these three breeds of beef cattle is a fair sample of the way that all types and breeds of domestic livestock have been started and improved. Nature produced a wide variety of animals, and man selected and concentrated the inheritance of the ones that suited him the best.

With dairy cattle, hogs, sheep, and poultry, it has been the same. And the process is still going on. Livestock breeders of today are taking the best animals the past has provided, testing them for performance, and mating together the best, in the hope of obtaining animals that will be more productive than any of their parents. It is a slow process, full of pitfalls and disappointments, but it is succeeding.

AMERICAN LIVESTOCK CAME FROM FOREIGN LANDS

When Columbus discovered America he found buffaloes and wild turkeys but no horses, cattle, hogs, sheep, or domestic poultry. Explorers coming later brought live animals with them as a source of food. Some of those animals escaped into the forests, some were abandoned, some were lost on the trails. The net result was that there developed in America herds of wild cattle, horses, and hogs. Here began an example of evolution in reverse. The hogs, bred to make the greatest possible amount of pork from liberal quantities of concentrated feed, found that their existence depended now on their ability to fight, to run, to range long distances for acorns and other forest foods. Like the prehistoric horse before them, those with the longest legs, the quickest, fiercest bite, and the most endurance survived to sire the wild boars which still range some of the mountain areas in Tennessee.

Wild cattle spread through sections of the South. Short feed in winter, heat in summer, and a continuous attack of insects and internal parasites struck down all but the hardiest of these beef or milk strains. Ability to survive was the measure of a cow and calf in the southern woods. Throughout the Coastal Plains of the Southeast there still exist large numbers of these cattle. We call them scrubs because they are inferior to our improved breeds.

The horses from the Spanish boats that landed on the coast spread west. Some came north from Mexico. The western range became their home. The Indian soon caught and learned to ride these horses, and picked the sure-footed ones. Thus the famous, useful, western mustang was on the make.

As the population of America increased and spread westward, meat production became a major need. Breeding stock was brought from Europe; the wild herds were domesticated or driven off. Crops were planted. The new strong plant called Indian corn was found to make excellent feed. The settlers soon built up large herds of well-fed horses, beef and dairy cattle, sheep, and hogs. Then as their forebears had done in Britain, they began definite efforts to select the best animals for breeding and thus improving the quality of their livestock. They made extensive and continuing importations of breeding stock from Europe, especially from the British Isles, and adapted their animals and production methods to the varying climatic and feed conditions in the different sections of our country. Today United States livestock and United States stockmen are in the forefront of the world's livestock industry and recognized as world leaders in this important phase of food production.

SCRUBS, PUREBREDS, AND GRADES

The livestock population of the United States today can be divided into three main groups—the unimproved stock or scrubs, the purebreds, and the grades. The scrubs are the cattle, horses, sheep, and hogs of miscellaneous or unknown breeding. Like Topsy, in Uncle Tom's Cabin, they have "just growed." Scrubs vary widely as to color, type, size, and productiveness. It is anybody's guess what kind of calves or colts or pigs or lambs scrubs will produce.

Purebreds, on the other hand, have a known, recorded ancestry. No animal is eligible for registration by a breed-record association unless its ancestors were accepted and recorded by the association. The chances are that the offspring of purebreds will resemble its parents in appearance and productiveness. That is the advantage of a purebred to a breeder; like begets like.

Grade animals are crosses between a scrub and a purebred. For example, suppose a dairyman owns scrub cows. He buys a purebred bull and mates it with those cows. All the resulting calves will be half purebred and half scrub. They will rarely be as good as the purebred sire but will almost certainly be better than their scrub mothers. They are called grades. Their owner is grading up his herd. When these first-cross heifers mature and are bred to another purebred bull of the same breed as their sire, their calves will be three-fourths purebred and one-fourth scrub. Those calves, in turn, should be better producers than their first-cross mothers. So grading up proceeds. These grade offsprings will never become eligible to registration in a purebred herd book. The original scrub blood of their great-grandmother disqualifies them. However, four or five crosses with a good purebred bull will give the latest crop of calves about the same appearance and productiveness as purebreds.

Grading up a herd of common females by breeding to a good purebred sire is a practical way to begin a profitable herd or flock of livestock. The original cost of the females is moderate and usually about the same as could be obtained for them by resale on the open market. As the beginning stockman works with these animals he learns how to handle stock and how to make the most from them. He learns also whether he likes livestock and whether he has the knack for feeding and caring for them. If he finds that he likes the business and can make money from it, he may buy a few purebred females and start growing into the purebred business.

Before a beginner invests his time and money in livestock he should remember that not all purebreds are good. Breeding purebreds is a continuous process of weeding out the animals that are not up to standard. That is the process by which the breeds have been developed and the method by which the breeders of today are trying to improve further their chosen breeds.

Buyers of purebred sires will find purebred animals that have papers, or certificates of registration, that are little, if any better than common stock. Fair-minded stockmen send these culls to the slaughterhouse, but it is sometimes hard to draw the line as to

Figure 62. A scrub cow of unknown parentage. (U. S. D. A.)

which should go and which should be saved. Judgment is needed and the beginner will do well to find and use the advice of an experienced stockman in whom he can have confidence. Obtaining such advice before buying your livestock is wise procedure.

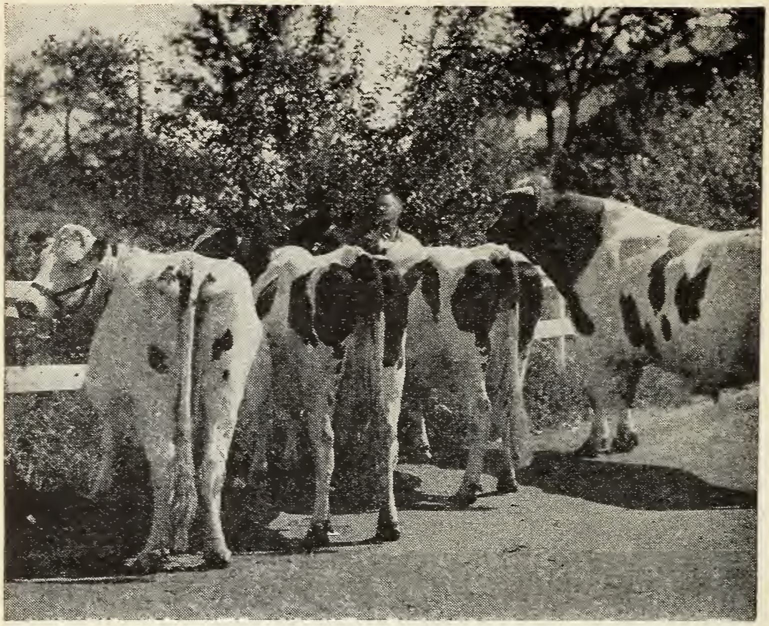


Figure 63. A good purebred Holstein bull—Carnation Matador Sultan—and three high-producing daughters: (left-right) Roto Matador Denver, with a record of 12,936 pounds of milk and 467 pounds of butterfat; Roto Matador Johanna Evangeline, with a record of 12,526 pounds of milk and 451 pounds of butterfat; and Roto Matador Roxie, with a record of 10,091 pounds of milk and 385 pounds of butterfat. (U. S. D. A.)

SELECTING LIVESTOCK FOR A FARM

Here is a farm of 120 acres of which 20 are in grass and 10 in timber. The other 90 can be plowed and will grow the regular crops of corn, wheat, oats, soybeans, and clover. Buildings are in fair shape with a good barn and some fencing. The farm is near a town of over 50,000 population. What kind of livestock should be put on it?

The farm is rather small. It must produce a variety of crops, including food for the family. It must provide profitable labor for the owner during the whole 12 months. The right answer to "what kind of livestock should be put on it?" is probably several kinds—horses, cattle, hogs, and poultry certainly, and possibly some sheep. Later perhaps the owner may want to specialize, but at the start he will find it safer to grow the things his family needs to eat and to sell what surplus is produced over and above the family needs.

Selecting Horses

Four horses or one team and one tractor, or perhaps one tractor alone, are enough to provide the power for this 90 acres. If two teams are used, farm chunks are suitable. One team should be of draft type, weighing about 1400 to 1500 pounds. Whether these horses are grades from the black or grey Percheron, or the massive sorrel or roan Belgian, or the smooth-moving, hairy-legged Clydesdale, or the more rugged, hairy-legged English Shire, is not important. No good animal ever had a bad color. The main thing is to get a strong-muscled, moderate-weight, sound team of good walkers that can move down the crop rows at a fair pace.

The second team can be a little lighter and faster for mowing and raking hay and similar jobs. They will have some draft blood too, with probably a touch of Morgan or even some of the heavier strains of the famous Standardbreds that race in harness.

If the stock are mares they can produce colts while they work. Feeding and breaking colts is another job for winter days and another source of income.

Selecting Cattle

Selecting cattle for this farm is a major decision. Beef cattle are probably not suitable. A breeding herd of market beef cattle belongs usually on a place where land is cheap and the animals can be handled with the least amount of labor. Milk cows would seem the best investment here. Milking is profitable employment. A monthly milk check is always welcome, and a nearby city offers a good outlet for either whole milk or cream. Milking is a 7-days-a-week job, but chores will be an important source of income on as small a place as this.

Grade cows will be best to start with. The Holsteins are black and white. They are heavy consumers of cheap forage, which helps to make them economical producers of milk. Their calves are large at birth and easily raised. They produce more milk per cow than any of the other breeds, though it is lowest in fat content.

Jerseys may range from almost black to a light fawn, solid or spotted with white. They are highly developed dairy animals, being spare in flesh and producing large quantities of butterfat in proportion to their size, which makes them economical producers of butterfat. In contrast to the high fat content, the quantity of their milk is the lowest of the dairy breeds.

Guernseys are fawn and white and similar to the Jerseys except that they produce a little more milk that is not quite so rich, though more yellow. Both were developed on the small Channel Islands near the coast of France.

Ayrshires are an aggressive, active breed, red and white, and characterized by high curving horns and square udders. They are good rustlers and regular breeders. They produce somewhat more milk per cow than either the Jerseys or Guernseys.

The Brown Swiss breed ranges from yellow to dark brown. The animals are rugged and not easily excited. The calves are very large at birth and are easily raised. The udders though usually not large are of good quality and produce well in proportion to their size. Brown Swiss rank next to the Holstein in quantity of milk produced though it contains less fat than that of the Jerseys, Guernseys, and Ayrshires.

A good cow of any breed is more profitable under any conditions than a poor cow of that or another breed. Selection within the breed must not be neglected. Personal preference, the availability of good grade cows and good purebred bulls, and the local market for milk or butterfat will be the basis for a final choice. Any one of the five breeds will fill the bill. The main task is to select 5 to 20 healthy, good-producing animals that you will like to handle.

Before leaving the matter of selecting a dairy herd, one other possibility should be considered. In addition to beef-type and dairy-type cattle there is a third called dual-purpose type. Not as thick and meaty as beef cattle nor as heavy milk producers as dairy

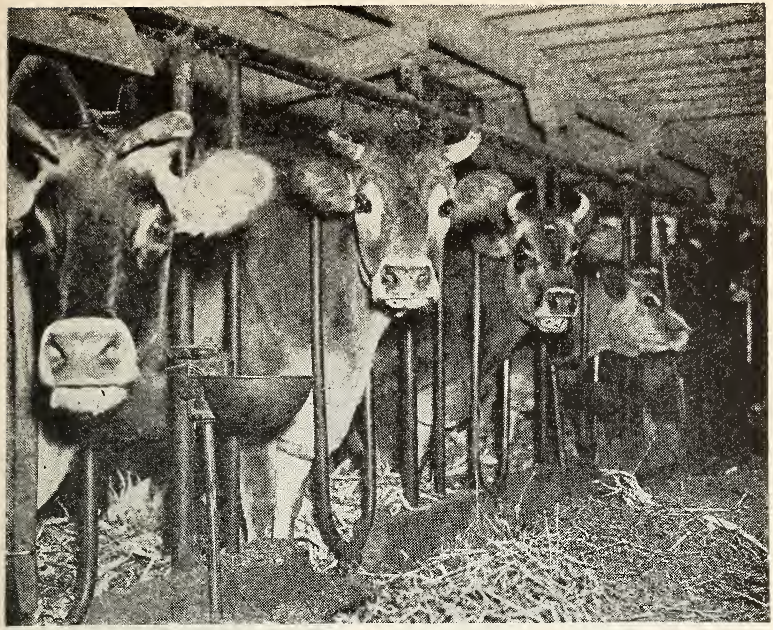


Figure 64. Good dairy cows, like these purebred Jerseys, receive a supplemental feeding of grain after coming in from the pasture, to insure maximum milk production. The modern dairy barn has running water that is piped to individual drinking cups for the cows. (U. S. D. A.)

cattle, these dual-purpose cattle are just what their name describes, good for two jobs, milk and beef. They give more milk than beef-bred cows, and their calves feed out for beef more satisfactorily than dairy calves. Those who prefer the dual-purpose Shorthorns, or Red Polls, describe them as well adapted to a diversified farm.

There is no best breed. Each person must select the one that suits him best. Good dairy-type cows of all breeds have been profitable investments for men who like them and who give them proper care.

Selecting Swine

There are several breeds of swine that are adapted to farms like this one of 120 acres. They are of two types.

Lard or Fat Type:

Poland Chinas—black with white nose, tail and feet
Spotted Poland Chinas—black with big white spots
Duroc-Jerseys—all red
Chester Whites—all white
Hampshires—black with a white belt around the fore ribs
Berkshires—black with six white points like the Poland China and a characteristic short turned-up nose and stand-up ears

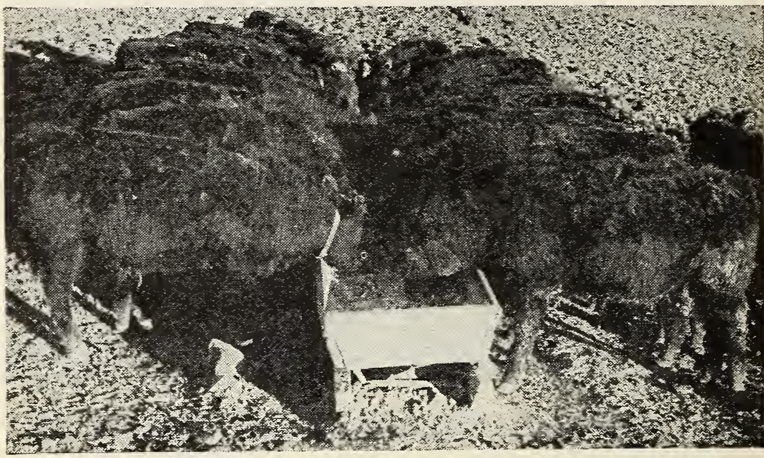


Figure 65. Prize-winning Aberdeen-Angus beef cattle are fed in a feed lot on an Eastern farm. (U. S. D. A.)

Bacon Type:

Tamworths—all red with longer legs and body than the Duroc-Jersey, and straight stand-up ears
Yorkshire—all white with longer legs and body than the Chester White, and straight stand-up ears

The lard type is more numerous in the United States, where the hog is used to convert corn and other grains into meat and lard. In Canada, where the whole, largely untrimmed side of pork is cured to make a Wiltshire Side, the leaner bacon type is chosen.

Any of the standard breeds of swine will be satisfactory. The main thing is to like them and obtain good-quality breeding stock. Type varies widely within most of the breeds and the buyer can find pigs ranging from the extreme blocky or chuffy type to those with legs and bodies that are even longer than many bacon-type hogs have.

The intermediate type, not too short nor yet too long, is the choice of many farmers. The sows are big enough to have good-sized litters of 7 to 12 pigs, yet small enough to fatten at a weight of 250 pounds or less, which is preferred normally by the butcher.

Two thrifty, strong-footed sows of intermediate type and their litters will salvage considerable waste feed around a farm, make 100 pounds' gain in weight for each 9 or 10 bushels of corn they eat, provide 2 to 4 pigs for the family's meat, and produce additional income when the rest of the pigs are sold. Two sows may not be enough if the owner finds that he does well with pigs.

Figure 66. A scrub sow—the "piney woods rooter"—and her scrawny litter of young razorbacks. (U. S. D. A.)

Sheep

Sheep furnish the best means of harvesting the grass and weeds that grow in the orchard, yard, rough land, and timber. Sheep

Figure 67. Corn-fed spotted Poland China sows and their plump litters on a Corn Belt farm. (U. S. D. A.)

will not do well on weeds alone. They need good feed like any other class of livestock. Yet sheep will consume considerable feed not used by cattle or hogs.

Sheep are nervous animals. They scare easily and are the prey of many dogs. Anyone who adds sheep to his farm livestock must be prepared to keep them under good fence and to have a dog-tight corral or shed in which to house them overnight.

A ewe, the female sheep, drops one or two lambs in the spring. Where the lambs come early, January to March, they can be sold 4 months later, at weaning time, often weighing 70 to 80 pounds. For this type of farm flock the Down breeds, or medium-wools, are used. Among these are the smaller, blockier Southdown, the larger, dark-faced Hampshire and Oxford, the heavier-wooled Shropshire and the horned Dorset. The Cheviot, a mountain breed, is exceptionally hardy. A ewe of these breeds will shear from 5 to 10 pounds of wool each spring, which makes another source of income.

The less meaty, heavier-shearing, fine-wool breeds, like the smaller Merino or the larger Rambouillet are the foundation stock for many of our range flocks in the West. They are better suited to the range than to the farm flock.

The long- or coarse-wool type of sheep are heavier than the fine- or medium-wools and are characterized by long, coarse locks of wool, as their name implies. Lincoln, Cotswold, and Leicester breeds of long-wooled sheep are often used to add size to the large western range flocks of fine-wools but are not numerous on small farms.

Farm flocks of 15 to 40 ewes are a valuable part of many general or diversified farms. Whether they belong on the farm that has been described here depends on the owner and his equipment. Normally sheep are something to be added to a farm after the owner has had some experience and has found that he likes sheep and has a place for them.

RANCHING

Riding a cow pony, throwing a rope, the smoke of camp fires, the lure of the open country call every boy who leans toward livestock. Most of us have wished, or still wish, that we could be ranchers. Those thrills are a real part of ranching, but mixed with them are drudgeries of dust, heat, drought, storm, snow, cold, feed shortages, long distances, and bills. Investments are huge in the range business. Labor is a problem. Feed supplies have to be planned for years ahead. Marketing and market prices are uncertain. Ranching is a technical profession even more than farming.

If one really yearns for a steer herd, or a cow herd, or a purebred herd, or a band of sheep out in the open places, he should first get a job with some outfit. He learns the feel of the saddle, the bite of the dust, the way of a cow with her calf. Then and only then is he ready to decide whether ranching offers him a future. And this applies to all the great range areas, the flatwoods of the South, the sandhills of Nebraska, the prairies of the Great Plains, and the mountains of the far West.

Figure 68. A small flock of sheep on an eastern farm. (U. S. D. A.)

SUMMARY

Livestock production is a major part of agriculture. Livestock and their products make up the greatest single source of human food and the greatest single source of agricultural income. Some 70 percent of the farm, range, and forest acreage in the United States is used to produce grain, hay, and pasture for livestock. Livestock utilize much rough feed that would otherwise have little value and, through the manure, return essential fertilizer to the soil.

The various types and breeds of cattle, horses, hogs, sheep and poultry are the result of man's effort to adapt to his needs the wild animals that he found. By selecting the best and culling out the poor ones, man has been able to change the appearance of livestock and improve its capacity to use feed efficiently, to work, to produce more and better meat, milk, wool, and in the case of poultry, eggs.

Breeders with special needs or preferences have worked for different types, characteristics, and colors. The result has been to create many distinct strains of livestock. These distinct strains are called breeds. Thus in cattle selected for beef production there are several breeds. The same is true for dairy cattle and for all the other kinds of livestock.

Each of these improved breeds has its advantages in contrast with the others, but almost all are well suited to use feed economically if the better animals in the breed are used.

Inferior quality in some of these purebreds is evidence that the job of improving the strain is not yet complete. Modern breeders are continuing the task of selecting the best animals for breeding stock and culling out the poorer ones. Much progress has been made but the job is not yet finished.

A wise selection of a type or breed for use on a farm must be based on the size, kind, and location of the farm, and on the personal preferences and plans of the owner.

Selection of an individual breeding animal from among the many of the chosen breed requires experienced judgment if the buyer is to obtain as good an animal as he needs. Cheap animals are often expensive in the long run.

Most successful livestock men have started in a small way, learning the business as they grew into it.

CHECK-UP NO. 12

Part I. In this chapter a number of special terms were used. Some of these terms are listed in Column I. In Column II are definitions or phrases related to the terms. Match each term with the proper definition or related phrase by putting the right number in the blank of Column II. The first one has been marked correctly.

Column I		Column II
1. Aberdeen Angus	4	a. A breed of light horses
2. Leicester	____	b. Beef cattle, black in color
3. Bakewell	____	c. Father of Animal Husbandry
4. Morgan	____	d. A famous Angus sire
5. Nicking	____	e. An animal whose ancestry is known
6. Shorthorn	____	f. A long wooled breed of sheep
7. Holstein	____	g. Breed of hogs, black with white feet
8. Standardbred	____	h. Offspring of a purebred and a scrub
9. Purebred	____	i. Harness race horse
10. Grade	____	j. Dairy cow noted especially for milk
11. Hampshire	____	k. Dairy cow noted especially for butterfat
12. Poland China	____	l. Name of both a breed of sheep and swine
13. Black Woodlawn	____	m. Associated with inbreeding
14. Duroc Jersey	____	n. Dual-purpose milk and beef cows
15. Hereford	____	o. Fine wooled sheep
16. Rambouillet	____	p. Beef cattle, red and white
17. Tamworth	____	q. Bacon type of hogs, red in color
18. Jersey	____	r. Lard type of hogs, red in color

Part II. Underscore the best answer to each of these questions.

1. Before man began to select animals for specific purposes, what was the major factor which influenced the development of such animals as the horse? (a) Ability to survive. (b) Having an attrac-

tive color. (c) The amount of food available. (d) Ability to produce large numbers of offspring.

2. What is "line breeding"? (a) Breeding animals having one outstanding characteristic, such as a special color. (b) Mating only purebreds. (c) Grading up scrubs by continued use of purebred sires. (d) Mating related animals.

3. What were the original Hereford breeders primarily interested in developing? (a) A combination of milk and meat production. (b) Rustling ability. (c) A pure red color. (d) Short legs.

4. What color are percheron horses. (a) Sorrel. (b) Roan. (c) Bay or brown. (d) Black or grey.

5. In addition to one type of Shorthorn what other breed is known as a dual-purpose breed? (a) Brown Swiss. (b) Red Poll. (c) Aberdeen Angus. (d) Guernsey.

6. What is the outstanding difference in appearance between the Chester White and Yorkshire hogs? (a) Type of ears. (b) Color. (c) Shape of nose. (d) Type of hair.

7. How many sows are recommended for the general farm of 125 acres? (a) 1. (b) 2. (c) 4. (d) 8.

8. If a farmer is interested in producing early lambs for the market which of these breeds would you recommend? (a) Rambouillet. (b) Lincoln. (c) Oxford. (d) Merino.
Check your answers with the Answer Key.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. The work of animal breeders is well illustrated by considering the Belgian, Morgan, and Standardbred horses. To show that you know the main features of this work, tell how each of these three types was developed.

2. Why did the more or less accidental introduction of cattle into America by the Spanish not influence the development of modern American beef cattle?

3. In selecting the breed for a herd of 10 dairy cows, a man selects Holsteins. What arguments might this man give for passing by Jerseys, Guernseys, Ayrshires, and Brown Swiss.

4. One man chooses Lincoln sheep, another chooses Southdowns, while still another chooses Rambouillets. What argument would each of these men advance for their choices?

Chapter XIII

Poultry

The highlights of the poultry industry are discussed in this chapter. Perhaps you already know most of these highlights. Find out by trying to answer the following questions.

1. What is the minimum size of poultry flocks classed as commercial flocks? (a) 400. (b) 800. (c) 1600. (d) 2000.

2. About what percent of the U. S. eggs are produced on commercial farms? (a) 10. (b) 20. (c) 30. (d) 45.

3. In general, breeds of chickens are classified into how many types? (a) 2. (b) 3. (c) 4. (d) 5.

4. What color are shells of eggs laid by Plymouth Rocks? (a) White. (b) Cream. (c) Brown. (d) Depends on the strain.

5. How old must a pullet be before she can be expected to start laying? (a) 90 days. (b) 110 days. (c) 130 days. (d) 180 days.

6. Baby chicks do not have to be fed until 60 to 70 hours after hatching. But in actual practice, what is usually done about feeding them. (a) They are fed as soon as they will start. (b) They are not fed for about 24 hours. (c) They are not fed for at least 36 hours. (d) They are not fed for the first 48 hours.

7. In addition to feed and water, what else should be supplied at all times to laying hens? (a) A worm medicine. (b) An insecticide such as tobacco dust. (c) Oyster shell. (d) A dust bath.

8. Other things being equal, which commercial poultry farmer is likely to make most from his chickens over a three-year period, the owner of white Leghorns or the owner of Rhode Island Reds? (a) The owner of White Leghorns. (b) The owner of Rhode Island Reds. (c) There will be no difference.

9. Why did turkey production shift first from New England to the Central States and then to the Southwest? (a) Because new markets were developed. (b) Because of blackhead. (c) Because

new strains that were better for these sections were developed. (d) Because the feed was more plentiful in these sections.

10. What is one rule that every turkey grower must observe if he is to avoid trouble? (a) Always breed from young stock. (b) Provide high roosts. (c) Feed only a tested commercial starter. (d) Keep chickens away from his turkeys.

11. Do ducks thrive as well in large as in small flocks? (a) Yes. (b) No.

As you read the chapter see how many of the eleven questions you answered correctly.

THERE ARE CHICKENS ON NEARLY EVERY FARM

Poultry raising is a recognized part of good farming just as fried chicken and scrambled eggs are a natural part of good farm-family living. We have become so used to seeing chickens on almost every farm that we are not surprised when the census shows that poultry are found on a larger percentage of farms than are any other class of livestock.

Poultry flocks are kept to furnish cash income and to supply the family table with meat and eggs. Eggs in the diet are associated with good living and better nutrition.

When poultry flocks are separated according to size they can be divided into three main classes: (1) Family flocks, (2) farm flocks, and (3) commercial flocks.

The family-size flock consists of 50 birds or less. They are kept primarily to supply eggs for the family table with an occasional bird for a Sunday or holiday dinner. About half of the flocks in the country are of 50 birds or less, but this includes many back-yard flocks of people who live in small towns or suburban areas.

The farm flock ranges from 50 to 400 birds and is kept both to supply the family with food and as a source of income from the sale of eggs and poultry meat. These are the side-line flocks that utilize feed grown on the farm and turn it into products that can be sold for cash. Such flocks produce about 64 percent of the eggs in the United States.

Figure 69. A Southern farm woman feeds her farm-size flock of Rhode Island Red and White Leghorn chickens on home-grown corn. (U. S. D. A.)

Commercial poultry flocks are those kept on farms that make a commercial business of producing eggs and chicken meat. The number of birds may range from 400 to 100,000. Such farms get the bulk of their income from the sale of poultry products such as table eggs, hatching eggs, baby chicks, and broilers. Although only 1 percent of the farms keeping poultry are classified as commercial poultry farms, they produce 19 percent of the Nation's egg supply. Some commercial poultry farms specialize in raising turkeys or ducks. These commercial farms are more like factories than our usual conception of farms. They usually purchase the bulk of their feed and count on the mass production of a large volume with a relatively small margin of profit. They are highly specialized.

CHOOSING A BREED

After one has decided on the size of flock with which he wants to start, he still has to determine what kind of chickens he will buy. The choice lies between the big-framed birds of the heavy type that are well known for their excellent meat carcass but produce only a few eggs; the general purpose breeds that are reasonably good at both meat and egg production; and the smaller, energetic, egg-type breeds that are well known for their egg-producing ability.

Breeds are subdivided into varieties based on color or pattern of the feathers and shape of comb. For example, purebred Leghorns may be White or Brown Leghorns, or they may be bred with a single or rose comb. Thus the name Single Comb White Leghorn describes both breed and variety.

Within a particular breed there are various families represented. The breed has been developed from different families each of which may have had particular characteristics such as high egg production, or rapid or slow feathering. The family or strains represented have much to do with the bird's performance.

In choosing a breed of poultry for your farm be sure you select a breed and variety that you like—because when you work with something you enjoy you will devote the extra care and attention and management that often makes the difference between success and failure.

Most commercial egg-farm operators select the White Leghorn, and farm-flock owners select one of the general purpose breeds described in the following paragraphs. The Leghorn does well in large flocks and being an active, vigorous breed seems to have the ability to keep itself physically fit under a wide range of feeding conditions. Leghorns are energetic chickens and good rustlers. Leghorns lay white eggs.

The Plymouth Rock is a popular breed among those keeping farm flocks. Both Barred Plymouth Rock and White Plymouth Rock are common varieties. They lay brown-shelled eggs. Although certain individual birds have been known to make high egg-production records, the breed as a rule does not have a reputation for as high production as the Leghorn. Plymouth Rocks make excellent broilers or heavy fowls when sold for meat. Skillful feeding is required to keep mature hens of this breed in the most desirable flesh for egg production, as they are inclined to get too fat for laying.

Figure 70. White Leghorns provide the breeding stock on this commercial poultry farm in the East. (U. S. D. A.)

Another breed in this general purpose class is the New Hampshire. This breed, which is gaining rapidly in popularity, originated on New England poultry farms. It has light-red feathers, lays a brown-shelled egg, and is noted for its rapid growth. It is quite active and vigorous for a large bird and is used frequently as foundation stock for broiler production.

The Rhode Island Red is one of the older, well-established breeds of poultry that has enjoyed popularity for a long time. When bred according to its prescribed type it has a rectangular-shaped body and deep-red feathers. It lays a brown egg. The White Wyandotte is another American breed that is well known and popular in certain sections.

RAISING REPLACEMENTS

The life span of a chicken is relatively short, although individual birds have been known to live 10 or 12 years. The first laying year (called the pullet year) is the most profitable from the standpoint of egg production. The average hen produces about 20 percent fewer eggs her second laying year. Thus the poultry raiser must plan to replace the older layers with pullets each year. Most pullets are hatched during the spring months, grown out during the summer, and start laying during the fall. It takes from 180 to 200 days from time of hatching until the pullet is mature and lays her first egg. With modern feeding and the use of mechanical incubators and brooders it is possible to hatch and grow chicks any month of the year. Nature has been carrying on the spring-summer-fall cycle for several thousand years and most poultry raisers find it practical to conform to that schedule.

Nature's method is for the hen to lay the number of eggs that she could cover with her breast. Then she sat on those eggs until they hatched, which requires 21 days for chickens. In some family-sized flocks this practice is still followed, but the use of mechanical incubators has increased enormously. These machines automatically control the temperature and humidity so that the baby chick pops out of the shell just the same as if hatched under the hen's body.

Since baby chicks can live on the egg yolk in their bodies for 48 to 72 hours, they need not be fed immediately after hatching. In actual practice we do feed them as soon as they will start to eat, which is only a few hours after hatching. The commercial hatchery industry is founded on the fact that baby chicks *can* do without feed, so chicks are packed in boxes and shipped long distances. Over 80 percent of the chickens raised in the United States are hatched in commercial incubators. The average farm-flock or comercial-flock owner obtains his baby chicks from a hatchery or hatches them at home, puts them under a brooder that furnishes the neces-

Figure 71. A fine flock of barred Plymouth Rocks. (U. S. D. A.)

sary heat, and supplies them with feed and water. Brooders are adjusted to keep about 95° F. temperature under a large top called the hover. This temperature is usually reduced about 5 degrees each succeeding week until the chicks are fully feathered.

In raising a replacement flock the usual practice is to sell the roosters for meat and keep the best of the pullets for layers. In commercial-broiler plants both the pullets and the roosters are sold for meat.

FEEDING CHICKS AND LAYERS

In the feeding of chicks we only imitate nature. In the wild state the chick lives on weed seeds, bugs, and worms, tender blades of grass, and tiny particles of minerals that it picks from the ground.

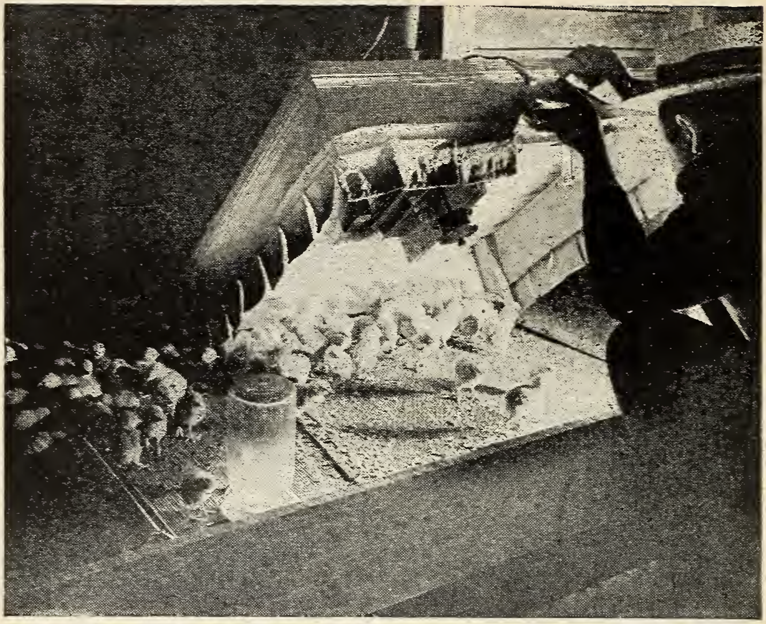


Figure 72. An electric unit and a home-made hover may be used for brooding chicks on the farm. The local electric co-op furnishes the electricity. (U. S. D. A.)

In our modern feeding practice we place a finely-ground mixture, called a commercial chick starter, in a small hopper so that the feed is readily available. We put into the formula of that mixture scientific knowledge of proteins, vitamins, and minerals. The young chick thrives under such treatment, and the simplified process has done much to popularize poultry raising. As the birds grow older they are usually given access to a grassy range, and grains such as corn, wheat, and oats are added to the mash diet. Care must be given to sanitation practices because filth gives rise to disease and only healthy chickens are profitable.

The feeding of laying stock depends on whether the birds are given the run of the place, as is often true with farm flocks, or kept confined to houses or yards—a common practice with back-yard and commercial flocks. When given free range they may pick up grain or green feed in season but they should also be supplied with a mixture of ground grains, protein, and minerals, called a laying mash. Commercial flocks are supplied both grain and mash on a fixed schedule. The birds adapt themselves readily to a regular routine, and for maximum production this should be maintained. Water and some form of shell-building material, such as oyster shell or limestone, should be available at all times.

The amount of feed a laying hen will consume per year ranges from 70 to 90 pounds for light breeds and from 80 to 100 pounds for the heavier-weight breeds. It also varies according to the number of eggs the bird lays. A hen that lays only 50 eggs a year will not be able to consume as much feed as one that lays 150 or 200 eggs. It takes about the same amount of feed to keep the 150- to 200-egg-a-year chicken alive, so the extra feed she consumes goes into egg production. That is why it pays to keep the bird on full feed all the time.

WHAT YOU CAN EXPECT TO GET OUT OF POULTRY RAISING

The income from poultry raising is derived from the sale of eggs and meat and sometimes certain byproducts, such as manure and feathers. With an average farm flock two-thirds of the cash income comes from eggs and one-third from live birds or dressed poultry meat. Records from demonstration farm flocks in the Corn Belt States show that no particular breed shows a decided advantage over a 10-year period. The farms keeping Leghorns have more cash from eggs and the farms keeping general purpose breeds derive a larger income from the sale of meat. It takes more feed to maintain a heavy bird, but the extra feed cost is balanced when birds are sold.

The average production for all birds in the United States was 113 eggs in 1943. The egg production reported for various demonstration flocks working under the direction of State extension service and county agricultural agents runs from 140 to 160 eggs per hen per year. Many flocks have averaged 200 eggs per bird. With this wide range in production you can see that certain poultry raisers have lost money and others have been able to show a profit. Much depends on the care and management of the individual flocks. The poultry income is scattered throughout the year and for that reason poultry production is favored by many farmers. The investment in equipment and livestock can be low per bird for small flocks, and family labor can be utilized. Large commercial flocks require substantial amounts of capital. Inventories of investment in land, houses, equipment, and livestock range from $3 to $8 per bird. On a commercial egg farm it is usually considered that in order to have a satisfactory living wage from poultry alone, one person should plan to care for at least 1,000 layers.

Poultry farming as a full-time job presents several different kinds of opportunities. For example, certain farms have specialized in the production of hatching eggs which sell at a premium over market eggs. Others have installed incubators and market their eggs as baby chicks. A few people have been successful in developing improved strains and sell high-quality breeding stock. This necessitates trapnesting the layers, which is a method of checking on the numbers of eggs each hen lays, and banding each chick so that individual pedigrees can be studied. Others have combined production of poultry products with merchandising methods such as roadside stands or retail routes to consumers. Many successful commercial poultrymen started out with a small-size flock and have grown to their present large-scale operations.

TURKEYS

Turkeys originated on the North American continent and their popularity in the United States dates back to the Pilgrims' first Thanksgiving dinner. Several domesticated breeds of turkeys have been developed from the wild stock. The Bronze, White Holland, Bourbon Red, and Black are well established breeds, and the Broad Breasted, a bronze-colored bird, has come into prominence in recent years.

The farm flock of turkeys has been the most important source of turkey meat for a long period of years. An average flock consisted of from 4 to 10 turkey hens and 1 tom or "gobbler." In such flocks natural incubation and brooding methods are usually practiced—

that is, a chicken or turkey hen hatches the eggs and broods the young poults. The number of turkeys marketed per breeder hen varies from 4 to 10. So many turkeys were started but never raised to maturity under this system that people talked about having "luck" in raising turkeys. Most turkeys die from a disease known as "blackhead." The ravages of this disease were severe enough to cause a shift in the areas that found turkey raising profitable. In colonial days the New England and other eastern farmers raised large numbers of turkeys. Later the center of turkey raising shifted to the midwestern States. When death losses became so large that turkey raising was no longer profitable the midwestern farmers quit. After this the bulk of our turkey crop came from the farms and ranches of the West and Southwest.

About this time a scientific discovery was made which revolutionized the turkey-raising industry. The life cycle of the dreaded blackhead was traced. A tiny pinworm commonly found in and apparently harmless to the chicken proved to be the intermediary host or carrier of the dreaded disease. Trouble from blackhead was largely eliminated by keeping chickens and turkeys separated and by keeping turkeys away from land where poultry manure had been spread.

The numbers of turkeys raised annually began to increase. Improved methods of incubation, brooding, feeding, and rearing were adopted. Then the modern commercial turkey flock came into existence. Certain turkey raisers now concentrate on the production of hatching eggs. Hatcheries handling only turkey eggs are in operation. Poults are brooded on farms and ranches in various sized lots from 100 to 10,000. One farmer raised 39,000 and herded them together in one band. Another located along a highway, put up a roadside stand, and sold the season's output at retail.

With turkeys more plentiful, turkey meat is served throughout the year and no longer just on festive holidays. Turkey meat is economical to produce, because a turkey gets about 25 percent of its feed from range or pasture. It produces a pound of gain for every 4½ to 5 pounds of grain consumed and it matures in 26 to 28 weeks.

The people of the United States are not heavy consumers of

DUCKS

ducks and geese. Our per capita consumption in pre-war days was much lower than that of certain European countries. The numbers of geese raised annually has been declining steadily. About half of the ducks in this country are raised as a side line on farms; the rest are produced on specialized duck farms. Such farms are usually located near a large city, most of them near New York.

Commercial duck farms keep the Pekin breed, a large white bird. Each farm is usually a self-contained unit—that is, it keeps a breeding pen to produce the hatching eggs, incubates the eggs, and grows the young ducklings to maturity as rapidly as possible. It usually takes from 9 to 13 weeks to produce what is called, on the market, a "green duck." The birds are picked at the farm and the carcasses and feathers sold.

It takes considerable capital and experience to operate a duck farm successfully because large-scale operations are carried on. A season's output runs from 50,000 to 150,000 birds. Ducks seem to do well in large flocks.

CHECK-UP NO. 13

Part I. Go back to the beginning of this chapter and answer again the 11 questions given there. Then, turn to the answer section and check your answers. Where your answer is not the same as the book, reread the page listed after the answer. Do not leave a question until you have found the information upon which the book answer is based.

Part II. Match the terms in Column I with the correct definitions or related phrases in Column II. The first one has been marked correctly.

1. Variety	__3__ a. Baby chick feed
2. Breed	_____ b. Fast featherings
3. Starter	_____ c. Young market type
4. Plymouth Rock	_____ d. A breed of ducks
5. Strain	_____ e. Dual-purpose breed
6. Bronze	_____ f. Single Comb White Leghorn
7. Pekin	_____ g. Disease of turkeys
8. Blackhead	_____ h. Leghorn
9. Green ducks	_____ i. A breed of turkeys

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Poultry flocks are separated into three main classes: (1) family flocks (2) farm flocks and (3) commercial flocks. What is the approximate size and major advantage of that size of each of these flocks?

2. In choosing a breed for a farm flock, a man had narrowed the choice to Barred Rocks and White Leghorns. List the chief characteristics of each of these breeds that will help him in making the final choice.

3. Turkeys and chickens cannot be successfully raised on the same range. Why not?

4. What makes turkeys economical producers of meat?

Chapter XIV
Farm Forestry

WHAT THIS CHAPTER IS ABOUT

Farm forestry is of importance to many farmers and can become more important to many other farmers. This chapter tells what farm forestry is, the origin of farm woodlands, what crops and products you can get from them, and the effect of trees on soil and moisture, and upon wildlife.

WHAT IS FARM FORESTRY

Farm forestry is growing, using, and marketing trees as a part of the general farm enterprise. It increases the farm income and makes the farm a better place to live.

Farm forestry includes the production of forest crops, such as wood in a variety of forms (lumber, poles, piling, pulpwood, fuel wood), Christmas trees, turpentine, rosin, nuts, maple sirup and sugar, etc.; it provides food and protection to wildlife; it involves soil and moisture conservation; it includes the establishment of windbreaks and shelterbelts for protection to soil, crops, livestock, and farm buildings.

THE ORIGIN OF FARM WOODLANDS

Except for the Plains States, forests originally covered almost all the United States. Across the northeastern part of the country were forests of spruce, fir, pine, hemlock, and cedar. The Lake States bore immense stands of virgin pine. The vast Atlantic and Gulf country of the South and Southeast was covered with great forests that were composed predominantly of the southern pines. Cypress and gum were abundant in the southern swamps and lowlands. Between these northern and southern coniferous (evergreen) forests (softwoods) were huge reservoirs of hardwoods (deciduous) such as birch, beech, and maple, as well as oak, hickory, ash, yellow poplar, gum, cherry, walnut, and chestnut. The Plains States did not have natural forests but in the West were found vast virgin forests of pines, firs, hemlock, cedar, spruce, and redwood. These differences in forests were caused largely by differences in soil, climate, and topography.

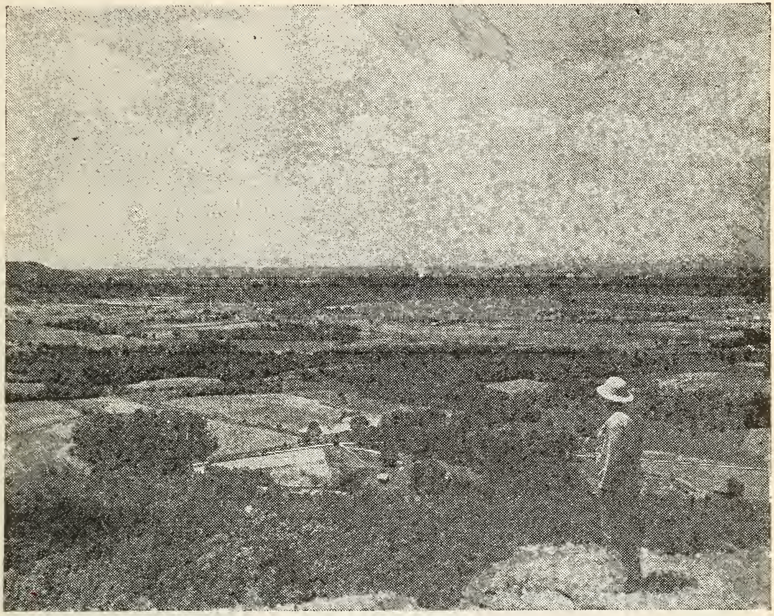


Figure 73. As the pioneers moved west, they cleared the forest lands to make way for food crops. Farm woodlands in the eastern and southern United States are the remnants of the early forests. (U. S. D. A.)

As the pioneers moved westward from the Atlantic Ocean, much land was cleared to make way for food crops. There was an abundance of forest growth, and timber appeared inexhaustible. Farm woodlands are the remnants of these early forests. The bulk of the western forested area was set aside as public forests because it was not suited to farm settlement. Thus we find most of the farm woodlands are located in eastern and southern United States. Now, after 300 years of settlement and development, the Nation is getting short of timber and many farmers are growing trees along with their other crops and finding it profitable. In general, nature provided the United States with an abundant resource and, while we are now using our timber twice as fast as it is growing, it is a renewable resource; it can be grown again whereas petroleum, for instance, cannot. Farmers have an important part to play in keeping up this resource.

The farm-owned remnants of the virgin forests, together with farm lands that were once cultivated but are now growing trees, vary in size from a fraction of an acre to hundreds of acres and total 140,000,000 acres. These 140,000,000 acres are owned by more than 3½ million farmers. In general, the less fertile soils of the farms are and should be devoted to tree crops. This type of land if

Figure 74. In the Plains States farmers plant trees not only to beautify their homesteads, but also to protect their buildings from wind. (U. S. D. A.)

planted to other agricultural crops would yield low returns anyway. Thus tree growing might be called a poor-land farm crop because trees can generally be made to grow on poor soils, steep slopes, eroding soils, rocky and wet land, and unused corners or waste parts. Farmers of the Plains States are planting trees on their farms not only to beautify their surroundings, but also for protection of soil, crops, livestock, and farm buildings, from wind and as a means of catching snow.

Good management of the farm woods will help develop them as productive units and promote successful farming. The farmer's trees are an added and profitable crop which will help supply materials that he can use about the farm. Merely to have trees growing on the land is not enough. The trees should be managed under sound principles like any other farm crop. Trained public foresters scattered throughout the United States help the farmers do this. The better the management, the greater the returns. In general, farm woodlands are rather accessible to markets and occupy better soils than most other forest lands. Thus, under good management, our farm woodlands should be our most productive forests. Generally work on and in the farm woodland can be done when other farm work is slack. Also, if markets for the crop are unsatisfactory, harvesting can be postponed until markets improve.

THE WOOD CROPS

Usually when we speak of forestry, we think of wood products, such as lumber, fuel wood, fence posts, and the like. Every day a farmer requires wood in one form or another.

One-third of all the forest products produced comes from our farms. Nearly all the firewood comes from farms. The farmers of course use it to heat their buildings, but also market a great deal of it in towns and cities.

More than one-third of all pulpwood used to make newsprint paper, cardboard for containers, and many other products is taken from farm woodlands. One of agriculture's most urgent needs at present is for lumber to make containers for packing and shipping vegetables, fruits, eggs, poultry, and meat. Every man in service has seen pulpwood or wooden boxes at the battle front which originated on American farm woodlands.

The best farm wood goes for sawlogs, veneer logs, piling, railroad ties, and poles, since wood suitable for these products has the highest cash value. One of the great developments in the war has been the use of veneer woods, in such airplanes as the British Mosquito bomber, which is almost an all-wood plane. Also, no satisfactory substitute has been found for black walnut for gunstocks, and most of the production of this wood comes from farm woodlands of about 20 States of the East and South. Treetops and limbs salvaged from the harvesting of logs, together with poor-quality trees and those thinned from overcrowded woods are used for fence posts, fuel wood, pulpwood, and charcoal. However, some farm woods are managed to produce pulpwood only.

In managing a farm woodland it is important that harvesting be so done as to maintain a good stand of timber. This will result in larger returns over a period of years of higher grade forest products than if harvesting is not properly done.

THE NONWOOD FARM-FOREST CROPS

As most of the 15 or 20 million Christmas trees used each year still come from natural forests and must be shipped great distances, the planting of Christmas trees on farms close to markets is rather profitable. Balsam and other firs are especially good because they are of good shape and retain their needles. Since Christmas trees can be grown in 5 to 10 years, they make an especially good cash crop for otherwise idle land.

Turpentine and rosin from pine trees of the South make up one of our most important forest crops. They are called "naval stores" because in the early days pitch made from the gum of these trees was used to calk wooden sailing vessels. Today the gum is the source of turpentine for the paint industry and of rosin for making soap and paper, and chemicals, drugs, plastics, and adhesives. Gum is obtained by tapping the trees or distilling the wood. Naval store pine trees finally go into lumber, pulpwood, poles, piling, and fuel wood.

Farmers of eastern United States produce almost all our maple sirup and maple sugar from their hard maple tree groves, or "sugar bushes." When the sap flows in the spring it is caught in buckets and boiled down in shallow evaporating pans to make sirup. About 30 gallons of sap make a gallon of sirup. Further boiling of the sirup makes maple sugar.

Nut crops from farm woodlands often add to the farm income. Black walnuts, hickory nuts, and pecans are the most common. Cascara bark is an example of a farm woodland product of the northwest which is used for drugs. And the tanning industry obtains tannin materials from hemlock and chestnut trees or from sumac found on farm woodlands. The harvesting of dogwood necessary for shuttles for the textile industry was a little-known but valuable contribution to the war program.

MANAGEMENT OF THE FARM WOODS IS NECESSARY

Good management of the farm woodlands is necessary to produce the most profitable tree crops. Some trees are weeds and if allowed to grow will handicap good crop trees. New tree crops may come up naturally or can be established by planting, but it is necessary that a good number of young trees be coming up in order to perpetuate the farm forest. As the trees grow, consideration is given to rate of growth, quality, and value of the different trees making up the forest, so that the most valuable trees can be favored for the final harvest.

It is also important that grazing of livestock be controlled and fire-control methods adopted to prevent damage to woodlands. These practices are especially important in managing hardwood stands. It is good practice to consult with a professional forester as to means of controlling grazing and fires.

WILDLIFE BENEFITS THE FARMER

Wildlife needs the protection, food, and breeding places found on areas planted to trees and shrubs, and will naturally tend to increase where cover is provided.

Game furnishes the farmer with an opportunity to hunt as well as provides some meat and fur. The possibilities of selling shooting rights to sportsmen for recreation are increasing all the time. Many farmers treasure large hollow trees which are the homes of squirrels and raccoons.

Further, some forms of wildlife are definitely helpful to agriculture. Birds using the trees for nesting and for protection eliminate many insects destructive to crops.

A variety of trees and shrubs is recommended for wildlife planting in order to furnish sufficient kinds of food or cover. Evergreens give protection in the wintertime. Selected shrubs furnish food in the form of berries and cover near the ground, where it is needed.

The greater the variety of food and cover, the greater the variety of wildlife which can be produced on the farm. The cost is small when balanced against the returns, especially when trees and shrubs planted for other farm purposes may also serve for wildlife.

Figure 75. Wildlife needs the protection, food, and breeding places afforded by the woods. (U. S. D. A.)

TREES CONSERVE SOIL AND MOISTURE

There are other products of the forest besides trees and wildlife. A tree-covered area is virtually a catch basin for falling rain and melting snow. Within the shelter of trees, snow melts more slowly than in the open. The water soaks into the soil as it gradually becomes available. The force of a beating rain is broken by the foliage and branches. Water drips to the ground and soaks into the carpet of dead leaves, decaying twigs and fragments of rotten wood that are slowly becoming a part of the soil. This carpet acts as a sponge and absorbs large quantities of water in a short time, then slowly feeds it into the deeper soil, which is full of porous channels produced by decayed tree roots, worm holes, and burrowing animals. As the water sinks lower into the sub-soil it finally reaches and maintains the level of the water-table which is so important in supplying wells and in some areas, springs.

The effectiveness of a wooded area as a catch basin is decreased and sometimes entirely destroyed through disturbance of the spongelike covering of the soil. This may occur through burning or the trampling of livestock. The exposed soil then becomes muddy in rains and caked in dry weather, whereas protected forest soil is covered with a mulch that keeps it moist and loose and permits water to penetrate.

On an open sloping area, as a field, where there is no plant cover and spongelike organic matter is absent, severe rains beat hard against the soil surface. Some water soaks in, but there is no sponge to take it up and hold it. The soil becomes muddied and puddled, and if there is more water than the soil can absorb, it runs off. It goes down the slope to a ditch or creek and carries fine soil with it. Thus the farm loses forever both valuable water and irreplaceable soil. When such erosion continues, gullies may result that sooner or later are difficult or impossible to cross with farm machinery.

Even when a field becomes so badly eroded that it is too infertile or cut up by gullies to grow other plants, it may be planted to trees. When the trees become established, their roots help to hold the soil particles and their branches and foliage again break the force of the raindrops. As the trees grow and increase in size, erosion decreases and finally stops. Water again percolates into the soil and supplies the watertable.

Frequently good management requires that a woodland be carefully maintained on erosive soils to avoid the problems accompanying erosion. Areas that have been unwisely cleared can be planted to trees while some fertility is still present instead of as a last resort. Where this is done, trees are easily established, their growth is more rapid, and the forestry part of the business will give greater financial gain than if planting is delayed.

WINDBREAKS ARE OF VALUE

In the Plains States the planting of trees and shrubs for windbreaks and shelterbelts is important to the building of permanent homes. They improve the appearance of a farm and help to make it a more pleasant place on which to live. A dense hedge around the lawn or on the windward side will help to make it possible for the farmer's wife to raise flowers and ornamentals successfully.

Well-placed plantings of trees and shrubs will also give protection to buildings and livestock from chilling winter winds, and to fruit and vegetable gardens from drying winds of summer. A good windbreak will keep snowbanks out of the yard in winter and will reduce the amount of dust that sometimes blows into the house during the spring and summer.

Strips of trees or field shelterbelts are effective in reducing evaporation of soil moisture and in preventing the soil from blowing away, and thus they contribute to increased crop yields. A windbreak will give protection for a distance of approximately 20 times the height of the trees to the leeward side of the windbreak and for a considerable distance on the windward side. In some areas where the soil is very light and is easily blown away, strips of trees are planted at frequent intervals at right angles to the prevailing summer winds as an aid in growing crops successfully.

The Arbor Day tradition was established in Nebraska in 1872 and it is said that on the first Arbor Day more than 3,000,000 trees and cuttings were planted in the State. There were more trees

Figure 76. Gum obtained by tapping the pine trees of the South is the source of turpentine and rosin. (U. S. D. A.)

planted in Nebraska between the years 1885 and 1890 than during any other period in the State's history. As many as 100 million trees were planted in a single season. Because of this great tree-planting activity of the early settlers, Nebraska became known as the "Tree Planter's State."

Farmers value windbreaks very highly. Their estimates of the monetary value will vary from a few dollars up to several thousand dollars per farm. The estimated average annual value of windbreaks by 300 Plains States farmers who were interviewed was over $300 per farm. Over half of this was claimed for the value of livestock protection. Other things for which money values were expressed were: Increased crop production, protection of buildings and equipment, production of fuel wood, saving of fuel, increased garden production, and posts and poles.

Trees do not occur naturally in most of the Plains States except in certain favorable areas such as along watercourses. Tree planting is a usual thing with farmers throughout the Plains area. In order to have the best success it is essential to select hardy and adapted species, do a good job of planting in well-prepared soil, and cultivate regularly for a few years to keep the planting free from the competition of weeds and grass until the trees are big enough to shade the ground.

CHECK-UP NO. 14

Answering these questions will give you an idea about how well you have mastered the material in this chapter.

1. How does the yearly rate of the use of our forests compare with the yearly growth? (a) The two are about equal. (b) The growth is about two-thirds that of the use. (c) The growth is about one-half that of use. (d) The growth is about one-third that of use.

2. In which section of our country is lumber a minor product of the farm wood lot? (a) The Great Plains. (b) The Great Lakes region. (c) The New England States. (d) The Northwest.

3. How does the farm woodland's chances for productivity compare with other forest land? (a) The farm woodland's chances are better. (b) The farm woodland's chances are poorer. (c) The chances of the two are about equal.

4. What part of our forest products are produced on farms? (a) $\frac{1}{10}$. (b) $\frac{1}{3}$. (c) $\frac{1}{2}$. (d) $\frac{3}{4}$.

5. Five of the products listed below are important products of American farm woodland; five are not. What are the five farm woodland products? (a) Nuts. (b) Leaves. (c) Cinnamon. (d) Naval Stores. (e) Pulp. (f) Sugar. (g) Faggots. (h) Fruits. (i) Fertilizer. (j) Fence Posts.

6. Woodlands preserve water by providing a better ground for water to soak in and by preventing rapid runoff. What are *two* other ways in which the woodlands preserve water? (a) By storing it in roots and trunks. (b) By breaking the force of raindrops so that they will not beat up the soil covering. (c) By evaporating a lot of the water. (d) By using a lot of the water. (e) By causing snows to melt more slowly.

7. In which section of the country are windbreaks most important? (a) The Great Lakes Region. (b) The Pacific Northwest. (c) The New England States. (d) The Great Plains.

8. In what state did Arbor Day originate? (a) Massachusetts. (b) Virginia. (c) Nebraska. (d) Washington.

Check your answers by comparing them with the key. Do not just accept the book answers, but find out why the book's answer rather than yours is correct.

Chapter XV
Unusual Kinds of Farming

WHAT THIS CHAPTER IS ABOUT

Farming, like any other business, has specialties and side lines. Nearly everyone is familiar with corn, wheat, fruits, vegetables, livestock, and other standard crops. They are what people think of when they talk about farming. And this is right. There are few farmers who can make a living unless they grow some of these standard crops that make up the bulk of what people eat. Still, there are many minor crops that are raised for special purposes, and some men make money out of producing them. This chapter is about these special crops.

Peppermint, cranberries, pigeons, rabbits, silver foxes, fishes. These are some of the subjects. All of these that are produced on all the farms of the United States put together do not come anywhere near being as valuable as the country's production of corn, for example. Not enough people use these products often enough or in large enough quantities to provide a good market for many growers. They do pay rather high prices for some of them, and this fact often misleads people who forget that it is not profitable to sell products at a high price unless they can be produced at lower cost.

UNUSUAL TYPES OF FARMING REQUIRE SPECIAL SKILLS

As a rule these special crops require special knowledge on the part of the person raising them. Most of the farms in the United States can produce corn, oats, and some of the other standard crops, and the farming methods used are familiar ones. But cranberries require cool, acid, sandy peat bogs, and growing cranberries is a special kind of farming that takes a lot of money. Raising hogs is a familiar enterprise and can usually be successful, without much special study.

Figure 77. The cranberry is a native North American plant. (U. S. D. A.)

Raising foxes, however, is something comparatively new, and a fox farmer has to have a great deal of special knowledge about foxes, their habits, their diseases, and their requirements. Even so, the fox farmer runs a risk, because foxes are really wild animals.

They have not yet been domesticated, and it is much more difficult to handle them in pens than it is to keep hogs. These examples illustrate what anyone is up against if he tries to make a living out of growing such special crops.

THE IMPORTANCE OF SPECIALTIES

Some of these specialties can, however, make good side lines. They are interesting, and if a person guards against making too heavy an investment they may also be profitable in a small way. It is possible that such a side line may develop into the big thing on the farm. Certainly the best thing to plan with most of these special crops is to try them out in a small way, get some first-hand experience, and then develop them only as fast as they prove to be profitable.

There are some other kinds of side lines that every farmer should think about, and this chapter discusses them too. These side lines have to do with the kind of things that the farm land would be producing even if the farmer were not there. Wild berries, persimmons, walnuts, timber, game, muskrats, and fishes are examples. Many farmers could add to their income if they merely took the time to reap the harvests of these products or sell them to someone else to harvest. Some farmers would even do well to develop such side lines. With only a little trouble they might, for example, produce more muskrats. What seems like wasteland may be handled so as to at least pay the taxes on the farm, and this is something worth thinking about. Every farmer should be alert to make the most out of what he has.

Side line activities are especially important where there are boys and girls on the farm. Raising rabbits is a good hobby. Trapping muskrats appeals to many boys. Gathering walnuts can be a lot of fun. It does no harm at all to think ahead about these things and prepare to make something out of the whole family's spare time. The farmer himself, however, has to be careful about planning things that take up too much of his own time. He is not likely to have enough of it anyway, and his time is his money. It is not a good idea to be like the man who sold his walnuts cheap because, he said, "they didn't cost me anything, I picked them myself."

These are some of the general ideas to have in mind in reading about special crops and side lines.

FLOWERS, HERBS, AND OIL PLANTS

Anyone who has had a vegetable or flower garden or has leafed through nursery catalogs knows that there must be places where gardenseed growing is a reasonably big business, for most garden flowers and vegetables are never permitted to go to seed. As a matter of fact, more than 500,000 acres of good, rich land are now devoted to the production of vegetable seeds in the United States. Half this acreage is usually given to peas. Beans of various kinds occupy second place, and substantial areas are given to the raising of tomatoes, watermelons, corn, radishes, and spinach for the seeds they produce.

The bulk of the seeds are raised in the Pacific Coast and other Western States, for a dry climate free from diseases is an advantage, and broad spaces where fields can be scattered to avoid cross pollination of the flowers are desirable. Cabbage, beet, spinach and other cool-crop seeds come in very large part from Washington and California, peas from Washington, Idaho, and the Northwest generally, lettuce and carrot seeds from Idaho and California. Vegetable seed growing is also undertaken in parts of New England and the Lake States. Before World War I the United States imported from Europe almost all of many vegetable seeds, for seed growing there is a practice of long standing. Today we are producing nearly 400 million pounds of vegetable seeds—enough for our own needs, those of our allies, and many neutral nations. Our production may drop off when European seeds are again available, but we will undoubtedly continue to produce for ourselves the bulk of the vegetable seeds we need, and probably some for other countries as well.

The growing of flower seeds is also a profitable type of farming, usually returning much more per acre than the raising of vegetable seeds. Only a few thousand acres, however, are regularly devoted to this purpose. Most of the flower-seed fields are in California, but there are some in Colorado, New York, Pennsylvania, and a few other States. Usually sweet pea seeds are produced in largest numbers, with marigolds, zinnias, petunias, and asters as other top-ranking kinds.

In some places outdoor raising of cut flowers and potted plants for market is a sizable business. Commercial nurseries producing ornamental trees, vines, and shrubs, shade trees, and other hardy plants occupy about 150,000 acres throughout the United States, and do a $50,000,000 business. There are also about 200 million square feet under glass, with the florist industry doing a total annual volume of business of about $400,000,000.

Various kinds of herbs are raised for seasonings and medicines, although we have as yet produced comparatively few in this country. For seasonings, Americans depend largely upon introduced spices—for example, ginger, cinnamon, cloves, pepper, and caraway. We are now beginning to raise sage commercially in several States and many home gardeners, of course, have long grown dill, basil, marjoram, and other herbs, as well as horseradish, parsley, and comparable plants for flavoring, pickling, and garnish. The growing of water cress in cool, limy waters is locally profitable, and recently we raised mustard to the extent of our normal demands, mostly in Montana and California. The acreage devoted to most such plants in the United States is small and scattered, although in the case of mustard, great fields of many acres are devoted to the crop.

Among medicinal herbs we find very few kinds grown in the United States on a commercial scale. Since the war we have started to raise some, like belladonna and digitalis, which are now produced in quantities equal to our previous imports that are no longer available. Many wild plants native to America are gathered locally and used medicinally, such as ginseng, goldenseal, boneset, sassafras, witch hazel, and cascara, the last a small tree of the Northwest which secretes in the bark a much-used laxative principle.

Among plants producing essential oils, peppermint takes a first and almost lone place in this country. Some 40,000 acres are devoted to its production, primarily in Indiana and Michigan. The oil of peppermint is used to flavor gum, candy, and pharmaceutical preparations, and we usually produce a million pounds or more each year. Among other types of oils we produce about 700 million pounds of linseed oil from the flax plant—source of linen fiber also—to the growth of which we devote some 3 million acres annually, chiefly west of the Mississippi. We get very useful oils from other plants, including cotton, peanuts, soybeans, tung tree, olives, and corn. We have not, however, gone into the commercial production of many special oil-bearing plants, like safflower, sesame, sunflower, and castor-bean, but some day we may.

The growing of vegetable seed is usually done on farms devoted largely to their production. In many instances, as with peas, special equipment for threshing or harvesting is required. Flower-seed growing is usually undertaken on a smaller scale and therefore involves less investment in land, labor, and equipment. In addition to the need for special seed-collecting devices, culture of vegetables and flowers for seed production requires much more than the usual kind of truck-farming experience. The growing of peppermint and other oil-producing plants, water cress, and herbs requires a special knowledge of the culture of the plants and a ready market.

CRANBERRIES, BLUEBERRIES, AND WILD FRUITS

The cranberry is a native plant, as typical of America as turkey, and as great a favorite on the Thanksgiving table. The cranberry plant is a slender but vigorous trailing vine grown commercially in cool, acid, sandy peat bogs. Its culture takes more care acre for acre than most other crops, for the bog may need quick flooding to prevent freezing, there must be good ditches for rapid draining to keep the water at a desirable level and weeding and spraying are necessary. New sand also has to be added every other year or so. We have grown cranberries commercially for a hundred years, and the crop, occupying a comparatively small but rather constant total area of nearly 30,000 acres, is valued at 6 or 7 million dollars annually. Massachusetts leads in production, with New Jersey, Wisconsin, Washington, and Oregon as other important cranberry States.

Blueberries are another native American crop, also adapted to acid soils. But since there are a great many different kinds of these bushy shrubs, we find them growing not only in northern bogs but also in high mountain areas and dry woodland burns in many parts of the country. The cultivated crop only occupies 3,000 or 4,000 acres and the value is scarcely a fifth that of the cranberry crop. Cultivated blueberries include several forms resulting from special plant breeding and selection, some of which have berries nearly an inch thick with good flavor. These bring a very high price in eastern markets. Blueberries and cranberries are good examples of the kinds of crops that can be grown profitably on land often referred to as "wasteland." They teach us to look to the real worth of such lands and the value of choosing special crops adapted to them, whether those crops be plant or animal.

It is not the cultivated, but rather the wild crop of blueberries, however, which is today of greatest value. In a good year, blueberries and their close relatives the huckleberries (the latter have a few large seeds instead of several small ones as blueberries have), picked from wild, unimproved stock, provide in the United States the astonishing return of $10,000,000. The wild low-bush blueberry of the northeastern States from Maine to Minnesota and south to West Virginia alone provides a return of nearly $5,000,000. In Maine the crop from 50,000 to 150,000 acres is harvested, much of the acreage now being given some care. Other kinds are highly valued in the East, South, and West. The florists pay to the States of the Pacific Northwest as much as $200,000 each year for the branches of thick, shiny, dark green leaves of the Pacific Coast evergreen blueberry useful for decorative floral effects. The same blueberry provides an annual food crop of berries valued as much as the leafy branches.

There is, in fact, a very substantial crop of wild fruits of various kinds, the value of which it is impossible exactly to determine. But we all know that most elderberry pie and jelly, service- or Juneberry pie, persimmon pudding, blackberry preserves, and gooseberry jam come from wild, hand-picked, home-processed fruits. In 1942 enough wild blackberries were picked in Missouri to provide $60,000 worth of canned jelly and preserves for Army use. In New England, Long Island, and New Jersey the fruits of the wild beach plum are used to make a delicious jam famous throughout the region and sold in glass in elite groceries at fancy prices.

Much of this wild-fruit production is accidental, coming from unimproved plants growing by chance in odd corners and out-of-the-way places or on land worn out and mismanaged. The idea of using all land, even small parcels of land, for the use to which it is best adapted, however, points the way to the utilization of many such areas for the intentional production of fruits from "wild" plants. For example, gullies, stream banks, and eroding areas are often planted to shrubby vegetation. Hundreds of millions of shrubs have been planted during the past decade by farmers and ranchers throughout the country as part of their erosion-control work. About a third of these are fruit-producing species, setting the stage for a high yield of wild fruits. Plums of several kinds, a number of cherries, many berries, grapes, hazelnuts, and filberts are among the shrubs put to such use. The growing popularity of hedges and woodland border plantings also assures additional sites for fruit-bearing shrubs. Plant specialists are now trying to develop special strains that will yield well when growing on poor or depleted soils of little value for more intensive use. In the future, good land use may thus include the management of certain parcels of land for specific crops of fruits and nut-bearing shrubs especially adapted to them.

RABBITS, PIGEONS, AND GAME FARMS

The present war has increased the demand for rabbit meat, and the production of domestic rabbits is an important part of the War Food Program. Rabbits are raised in every State in the Union. The small rabbitry has come into its own to supplement our domestic supply of meat. Fur is a byproduct of rabbit-meat production and the returns from the sale of pelts help pay the feed bill. Prior to the war the United States produced less than 2 percent of the rabbit fur it used. Imports usually amounted to $25,000,000 annually and came mostly from Australia and New Zealand, Belgium, France, and other foreign countries. The fur is used in making garments, gloves, felt, toys, and ornaments, and is prepared for garment use under more than 50 trade names.

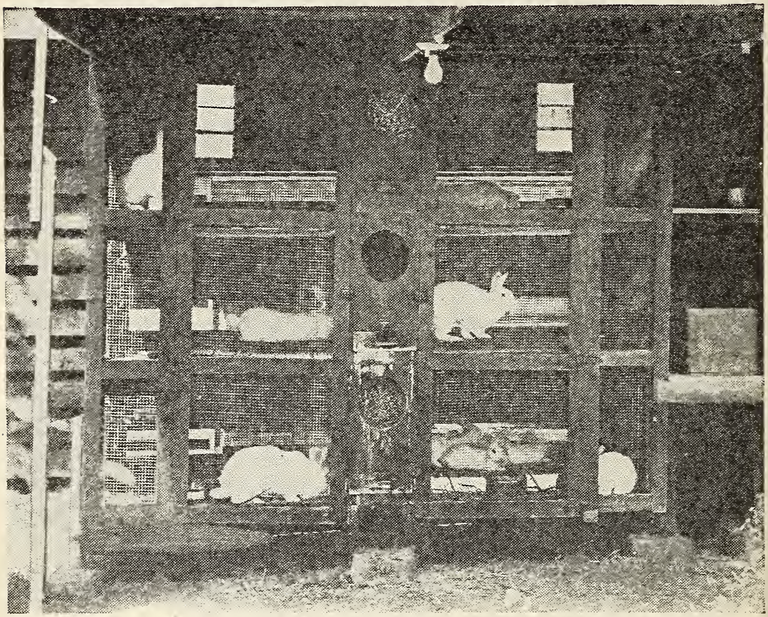


Figure 78. Rabbits are raised in every State in the Union. (Fish & Wildlife Service, United States Department of the Interior.)

The pelts of both rabbits and hares—two distinct groups of animals—are used in the fur trade. Hares are usually larger than rabbits and the hair more woolly, therefore, it is better adapted for making felt for hats than for fur garments. If American rabbit skins were available in large quantities, a fair price could be obtained. More recently, rabbits for wool have shown promise, the Angora rabbit within a year's time producing wool 5 to 8 inches long. The present trend is for the rabbit-raising industry to develop into large proportions in this country, for the meat, fur, and wool are all valuable products. Raising of rabbits is not a very difficult task, if one takes it seriously, nor does it involve a large initial investment. As a side line it offers an opportunity for persons otherwise employed. A ready market, of course, must be assured before one launches into the business on any sizable scale. The business is of such consequence that the Fish and Wildlife Service of the United States Department of the Interior maintains a Federal experiment station at Fontana, Calif,. devoted entirely to research on improving methods of breeding rabbits for fine fur and better meat, and for the study of other aspects of rabbit raising.

Domesticated centuries ago, pigeons were rather easily raised in captivity. In specially constructed and carefully regulated pigeon houses they are reared locally throughout the United States. The raising of squabs—young pigeons marketed just before they are ready to leave the nest—is not only a side issue on many farms and in city yards, but is a commercial enterprise in some places. Large squab-producing plants are developed in northeastern and southeastern States, and are found also on the Pacific Coast and near the larger midwestern cities. A squab, when marketed, is 25 to 28 days old and usually weighs 15 to 24 ounces. Little space is required to house them, and their flesh makes them a favorite substitute for game. Some of the breeds of pigeons most suitable for squab raising are the King, Carneau, Swiss, Mondaine, French Mondain, and Homer.

Modern methods of communication have not outlawed the value of homing or carrier pigeons. Our armed forces are making extensive use of these birds, which can fly 600 miles in a day, and have the uncanny capacity to return infallibly to the places from which they were taken. They are valuable where other means of sending messages are conspicuous or can be intercepted. Recently hawks along the English Channel cliffs had to be killed because they interfered with message-carrying homing pigeons.

There is in the United States a sizable business in the raising of various game birds for release in the wild. Figures expressing the extent of this activity are not easily obtained, but there are upwards of a thousand dealers in ring-necked pheasants, and as many who raise bobwhite and other kinds of native quail. There are also several hundred outfits producing partridge, grouse, and turkey. Successful pen rearing of these birds demands an intimate knowledge of their food, diseases, housing, and other requirements. They are much more difficult to raise than chickens. With the recent emphasis of game managers on habitat improvement there is a tendency to rely more on well-developed habitat than upon artificially raised birds as a game improvement measure, but there will doubtless be some profitable game farms for some years to come. Anyone thinking about starting a game farm needs to be pretty cautious, however.

Practically no mammals are pen-raised for stocking purposes, but there is a limited business in raising hatchery fish. In addition to private efforts along these lines, the Federal and State Governments raise large numbers of fish for stocking public waters, and engage in some rearing of game birds for release on Government lands.

FUR FARMING

Because the United States is the largest fur-consuming country in the world it is not surprising that ways have been developed to increase our supply of furs by raising in captivity the animals that produce them.

Our annual raw-fur catch is estimated to be from 60 to 70 million dollars. About one-sixth of this amount is produced by fur animals in captivity, the rest is trapped in the wild. Retail sales of fur apparel for the 12-month period in 1943 reached a record amount of $500,000,000.

Fur farming has become a well established business and is now a permanent part of our agricultural development. When World War II began, the world's production of silver-fox pelts was well over a million and mink pelts were not far behind. Norway, Canada, and the United States were leading the other countries in silver-fox production, with a yield of approximately 200,000 pelts annually.

A few introduced fur animals, Karakul sheep, chinchillas, and nutrias, are raised in limited numbers but such undertakings are considered experimental and not yet on a commercial basis.

During the last 30 years, great progress has been made in raising silver foxes and minks. Producers are offering the fur trade a greater variety of furs than ever before. The various color phases of silver foxes and minks are remarkable. Breeders have invested a great deal of time and money in developing these fur types. They have experienced numerous disappointments and set-backs, but have produced a sufficient number of pelts to demonstrate to the fur trade their confidence in fur farming.

Silver foxes and minks are raised in pens under controlled conditions throughout the two northern tiers of States and in high altitudes from the Atlantic to the Pacific coast. They are fashionable furs and bring good prices. About 60 percent of the silver foxes and minks produced in the United States are raised in Wisconsin, Minnesota, and Michigan. To some extent other fur animals are being raised in captivity, for example, marten, fisher, raccoon, opossum, and skunk. None of these are raised commercially, however. Martens and fishers seem to be shy breeders in captivity and do not produce young regularly. More money is invested in equipment, feed, and labor, than can be realized from the sale of pelts produced by raccoons, opossums, and skunks. The fur farmer needs a thorough knowledge of the animals he wishes to raise, like any other producer of livestock, and he must possess an understanding of their breeding, feeding, temperament, diseases, and physical requirements.

During the last 10 years there has been a very active scientific interest in the production of fur animals and much basic knowledge has been obtained in nutrition and reproduction of these animals. The Fish and Wildlife Service of the Department of the Interior maintains Fur Animal Experiment Stations at Saratoga Springs, N. Y., Cambridge, Md., and Petersburg, Alaska.

The production and conservation of fur animals in the wild has kept some of our finer ones from utter extinction and insured a continuing supply. Managing fur animals on State, Federal, and private lands has shown much progress. The possibilities of increased fur production in the United States through suitable modification of existing habitat and proper law enforcement are enormous. The valuable marten, fisher, otter, and to some extent the beaver, are confined to deep forests and wilderness areas. The muskrat, skunk, raccoon, opossum, mink, fox, and other fur animals may be produced on ordinary farm lands, but the bulk of the

Figure 79. Fur farming has become a well-established business in this country. (U. S. D. A.)

fur crop comes from the swamp and marsh areas bordering farm lands in the region of the Great Lakes, the large rivers, and the coastal marshes.

Some of the land-management measures known to increase wild fur animals are of interest. Simple protection of habitat from fire, grazing, and overtrapping benefits all of them. The muskrat, raccoon, opossum, and mink are also aided by the construction of simple, level ditches in marsh lands to provide better distribution of water and banks for burrows. Fur animals are particularly benefited by the development or maintenance of vegetation on the banks of streams and ditches often established as part of an erosion control program or a management program to increase wildlife. Protection of vegetation on rocky outcrops, gullies, box canyons, and other odd areas benefits the skunk, raccoon, and opossum, and these same animals may utilize hedges and field borders in crop fields. In woodlands, the preservation of den trees is one of the most important things that can be done to increase raccoon, for without den trees the raccoons will not persist.

Where natural conditions favor higher yields of farm crops these same conditions favor a higher production of fur animals in wood lots and swamp areas bordering the farm lands. In general, it might be said that States having a high percentage of agricultural land also produce large numbers of fur animals. Farmers, however, are primarily interested in crops that furnish food for human consumption and livestock. Fur as a crop from the land has not been given much consideration even though it gives a liberal winter income to many country folk.

Bringing back the beaver is an outstanding achievement in conservation. This fur animal whose extermination was our first big business has been put to work to save us from our own abuse of the land. Beavers can play an important role in soil and water conservation if they are introduced on mountain tributary streams that drain from large watersheds. The annual income from the beaver catch, while it constitutes only about $1/50$ of the value of the total Nation-wide fur catch, represents an appreciable addition to income from regular occupation. Other animals which produce valuable furs are the badger, bobcat, coyote, fox, weasel, and wolf. These and the ones previously mentioned constitute the animals that produce the annual fur crop of the United States.

FISH FARMING

Fish farming, as such, has been little practiced in America, although the culture of pond fish has been an important pursuit in Europe and the Orient for centuries. Recent programs of soil conservation and land use adjustment in the United States, however, have opened up the whole field of producing fish for food from farm ponds. Tens of thousands of ponds have been constructed during the past decade by farmers to provide a source of water for livestock, irrigating small gardens, spraying orchards, and other farm uses. They are frequently built as a land-conversion measure, transforming an eroded gully into a productive area. These ponds, if fenced or otherwise given a reasonable amount of protection, can provide not only water but also a place for a good crop of ducks, muskrats, or other useful wildlife. With even less attention than is required by an apiary or garden, those ponds which maintain a reasonably constant water level can be made to produce fish —a good fresh protein-rich supplement to the family larder.

Today thousands of farmers are managing their ponds for fish, and many are beginning to build small ponds for this purpose alone. The Alabama Agricultural Experiment Station has pointed the way in this special kind of farming, and one of their ideas is that fertilizing water can be just as productive as fertilizing land. Consequently, farmers apply ordinary commercial fertilizer to the pond by broadcasting it from the shore or a small boat. In the Southeastern States a good mixture is ordinary cotton fertilizer plus nitrate of soda, the latter to neutralize the normally acid waters of that region. In other regions variants of this mixture are applied, much as they are required by the ordinary crops of those regions. Organic fertilizers, such as manures, alfalfa and cottonseed meal, brans, and hay, may also be applied but there is as yet little experimental data supporting their use.

The fertilizer provides nutrient elements for microscopic plants, which serve as food for minute animals and aquatic insects. These, in turn, provide food for certain types of forage fish, like bream, and the forage fish serve as food for carnivorous fish, like bass. Experimental work has shown that the balanced pond should contain a ratio of forage to carnivorous fish of about 3 to 1 by weight. The forage fish most often used is the bluegill bream or sunfish, the carnivorous fish the large-mouth black bass, both palatable foods for man. In a fertilized pond these are stocked at the rate of 1500 bluegill to 100 bass fingerlings per surface acre of water. Fertilizer to support these fish is applied often enough, usually three or four times during the summer, to keep the water so greenish or brown with micro-organisms that the bottom of the pond is not visible through more than 18 inches of water. Small ponds are sufficient for fish farming, ponds from 1 to 3 surface acres being ideal.

Under such management, ponds can produce 200 to 300 or more pounds of fish per surface acre every year, at a cost ranging from 3 to 10 cents per pound. This is meat produced as economically as it can be produced from good pasture, with considerably less investment, for an average 2-acre pond can be constructed at a cost of about $200. In fish farming there is added the sport of harvesting the crop, for the fish must be caught regularly to keep the pond in balance. Fishing can start the first season after stocking, and ponds

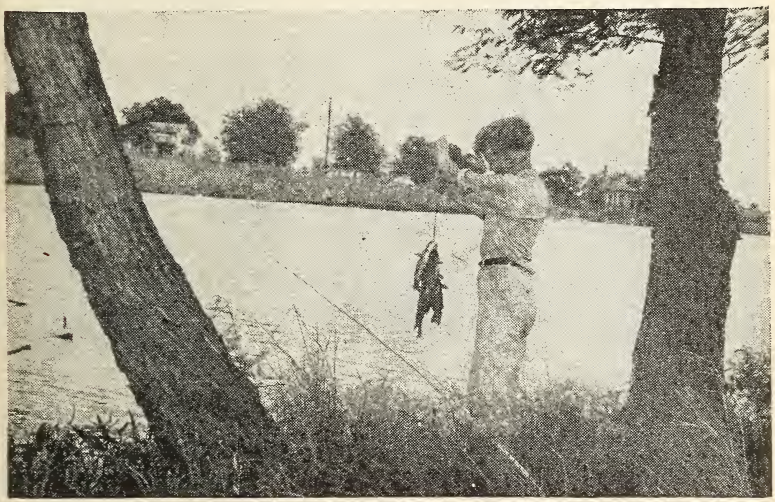


Figure 80. Recent programs of soil conservation and land use adjustment in the United States have opened up the field of producing fish for food from farm ponds. (U. S. D. A.)

a year old can be expected to yield pound-and-a-half bass and quarter-pound bream. Unfertilized ponds are also productive, but yields are usually less than half those of fertilized ponds.

A word should be added about a kind of fish farming not yet practiced by farmers in the United States, but of considerable importance in Europe. Ever since the Middle Ages, farmers of France have raised fish in flooded grain fields as part of a regular crop rotation. The farmers grow wheat or barley in a field for a year or two, then flood the field by diking the edges. The decomposition of the grain stubble plus any fertilizer remaining produce enough micro-organisms and insects to support fish, which in France is usually carp. After a couple of years under water the field is drained. The unutilized fish and remaining aquatic vegetation then serve as fertilizer for the grain once again planted in the field. The fields range from a few acres up to several hundred acres, the water seldom more than 4 feet deep. Here then is a unique rotation of land and water farming productive of both bread and meat, characteristic of the efficient use of land by the French.

BEE FARMING

In the United States every year honeybees produce 200 million pounds of honey and 4 million pounds of beeswax. California, Texas, Michigan, Ohio, and Wisconsin usually lead the list, but there is no State that does not contribute.

We hear less of beeswax than honey, but beeswax is so important we usually import as much as we produce. In peacetime it is valuable, in war times irreplaceable for making ammunition grease, models, machine patterns, pharmaceuticals, leather dressings, finishes, and polishes. Not the least of honeybee values is their usefulness in pollinating orchard trees, berries, buckwheat, vegetables, clovers and other legumes, and many other useful crops which would set far less fruit and seed without them. Records in Iowa show that the services of bees in pollinating apples alone has a value 14 times that of the honey crop obtained.

The keeping of bees is a very ancient pursuit; on the sarcophagus of an Egyptian king nearly 6,000 years ago an artist engraved a

Figure 81. In the United States every year honeybees produce 200 million pounds of honey and 4 million pounds of beeswax. Bees are useful also in pollinating orchard trees, berries, buckwheat, vegetables, and other crops. (U. S. D. A.)

hieroglyphic honeybee. In modern times beekeeping has become big business, which has been greatly aided by scientific research and practical improvements. The latter include techniques of queen rearing and methods of hive construction, including the development of the movable frame which permits the removal of honey without the destruction of the hive. The dome-shaped straw skep may be the traditional beehive and the recognized sign of industriousness, but it has no place in modern beekeeping.

Beekeeping depends not alone on having the right equipment, but upon an intimate knowledge of the insects themselves, their requirements and diseases, and general factors affecting their welfare. The honeybee is one of the most highly developed insects, with specialized castes and a social organization of great complexity and efficiency.

Among the factors affecting the productive management of bees is the availability of honey plants. Chief among these are alfalfa, white clover, sweetclover, and alsike clover, all widely distributed crop plants. In the Southwest mesquite is an important bee plant, in California sage, in the Southeast the tulip tree. Many others are locally valuable. When bees produce honey from the nectar of a particular plant, the honey can be identified. Thus we obtain clear, mild clover honey—the standard by which all others are measured—or dark, strong honey from the flowers of buckwheat. Often the honey is composed of a mixture of numerous nectars. We do not find much honey on the market now in the comb. The honey is usually freed, by whirling it in centrifugal extractors, from the waxy, six-sided cells in which the bees sealed it. Thus we eat "extracted" honey, releasing beeswax for other uses.

Bees need more than nectar from flowers. They also need pollen, which they store and convert into beebread. It provides protein food for young bees. Bees also require glue, called propolis, for calking cracks, smoothing up the hive, holding the honeycomb in place, and other building purposes. This is collected largely from the sticky leaf-buds of certain trees, especially poplars and aspens, although bees collect sticky exudates in crevices of bark and will use ordinary varnish if they can get it.

The modern apiary, or bee farm, consists of numerous hives of varying height, depending on the number of "supers" or upper stories that have been added to hold the honey crop gathered by the bees. Apiaries of 2,000 or more hives are not uncommon, and these are usually located 50 to 100 per bee yard with respect to favorable exposure and abundance of nectar and pollen plants. Properly equipped bee houses, where the apiarist works with many special tools of the trade, are an indispensable adjunct. Some apiarists transport colonies of bees to orchards when the trees are in bloom and "rent" their services for setting, or pollinating, the fruit.

There is an interesting relationship between modern soil conservation farming and beekeeping. To conserve soil much land ill-suited to crop production is converted to permanent pasture composed of grass-legume mixtures. Also, leguminous cover crops are used in orchards, crop rotations, and on cultivated lands during periods of non-cultivation. The plants employed offer the apiarist real bee pasturage, and in return pollination by the bees assures a good crop of seed useful in establishing further ground cover valuable in conservation farming.

The rearing of queens and package bees which find a ready market in the honey producing sections is a special phase of beekeeping. This industry is located largely in the Gulf Coast States, in parts of Texas, and in California. The bees and queens are shipped in combless packages by express, mail, or truck to honey producers.

Honey has brought an average wholesale price over a period of years of about 6 to 7 cents a pound. Depending on the locality, colonies produce from 60 to 120 pounds of honey each. Four hundred to 600 colonies make a full-time enterprise, but more colonies can be handled with extra help. While several thousand beekeepers have enough colonies to devote their entire time to beekeeping, hundreds of thousands keep less than 100 colonies.

CHECK-UP NO. 15

Check your understanding of the material in this chapter by answering the following questions.

1. Among these unusual farm crops which demands the most attention? (a) Muskrats. (b) Cranberries. (c) Blueberries. (d) Walnuts.

2. What is one of the main climatic requirements for the production of vegetable seeds? (a) A cool climate to insure vigor. (b) A moist climate to avoid stunted growth. (c) Mild winters followed by hot summers. (d) A dry climate free from disease.

3. What flower seed is grown in largest quantities? (a) Zinnias. (b) Marigolds. (c) Sweet peas. (d) Nasturtiums.

4. California, Pennsylvania and New York are three of the leading flower seed producing states. What is a fourth State? (a) Ohio. (b) Florida. (c) Louisiana. (d) Colorado.

5. Two of the following list of herbs and spices are grown successfully in the United States. What are the two? (a) Cloves. (b) Pepper. (c) Sage. (d) Ginger. (e) Dill.

6. What States lead in the production of peppermint oil? (a) Michigan and Indiana. (b) California and Arizona. (c) Georgia and Florida.

7. What State leads in the production of cranberries? (a) Florida. (b) Massachusetts. (c) Oregon. (d) Wisconsin.

8. Which of these ranks high in the list of side-line crops but is taken from uncultivated plants? (a) Loganberries. (b) Raspberries. (c) Blueberries. (d) Currants.

9. Which of the following side-line farm products is most likely to expand rapidly? (a) The production of rabbits. (b) The production of foxes. (c) The production of elderberries. (d) The production of cranberries.

10. In addition to the silver fox, what other fur-bearing animal has been raised commercially on farms? (a) Mink. (b) Skunk. (c) Raccoon. (d) Marten.

11. What one thing can the farmer do that will help most to preserve the wild raccoon? (a) Provide food in winter. (b) Leave den trees. (c) Stock streams with fish. (d) Trap the enemies of the raccoon.

12. How can the production of fish in a pond be increased? (a) By introducing more vigorous stock. (b) By supplying new stock each year. (c) By keeping the pond clean. (d) By supplying fertilizer to the pond.

13. How does fish farming in Europe sometimes differ from that in the United States? (a) They furnish one or two years in the crop rotation scheme. (b) The fish are kept in individual enclosures. (c) The fish are fattened in special pens. (d) Shell fish are sometimes grown.

14. What plant would be most likely to be a source of nectar for bees in Texas? (a) Clover. (b) Buckwheat. (c) Alsike. (d) Mesquite.

15. How many colonies of bees would furnish full-time employment for one man? (a) 80 to 120. (b) 120 to 200. (c) 200 to 400. (d) 400 to 600.

Check your answers by comparing them with those of the book.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Side-line or unusual farm crops are often considered as producers of so much extra income since practically the only cost is in the harvest. Other side-line enterprises, however, require capital and time for care. Under what conditions would each of the following fit into each of these classes? (a) Blackberry production. (b) Skunk production. (c) Fish production. (d) Mink production.

2. Bees are kept for several purposes. Discuss their role in the production of honey, clover seed, and plums, and soil conservation.

3. The production of fur-bearing animals in captivity has had so many obstacles that only silver fox and mink farms have been commercially successful. What are the main obstacles and how have fox and mink farmers overcome these obstacles?

4. Why is the production of game birds considered a hazardous undertaking?

5. The production of flower and vegetable seeds is confined to a relatively small section of the United States. Why?

HALF-COURSE CHECK-UP

To give you an idea of how well you have learned the material in the first 15 chapters, the following check-up is provided. Try to answer each item before you look back at the reading material. Show your answers by putting an "x" on the letter in front of statements which you think answer the question correctly.

1. Three factors which make living on the farm more economical than living in the city are in the list that follows. What are the three? (a) Transportation. (b) Medical care. (c) Clothing. (d) Electricity. (e) Fuel. (g) Water. (h) Food.

2. The city dweller who moves to the farm must give up some things. What are three of them? (a) Friendly neighbors. (b) Regular hours. (c) Daily contact with many people. (d) Individual enterprise. (e) Regular pay. (f) Urban social life. (g) Electricity.

3. Diversified farming is considered to involve less risk than farming which makes a specialty of one crop. What are two reasons for supporting the consideration? (a) Chances for total crop failure are less with diversified farmer. (b) Crop yields are better with diversified farming. (c) Prices are higher for the crops of a diversified farm. (d) The cost of equipment for diversified farming is less. (e) Labor requirements are more evenly distributed on a diversified farm.

4. What soils contain the most humus? (a) Soils which have been in forest for 100 years. (b) Soils which have been in grass for 100 years. (c) Soils which have been cultivated for 100 years. (d) Soils which have been treated with an adequate amount of commercial fertilizer.

5. About what part of the land in the United States is not suited to cultivated crops? (a) One-fourth. (b) One-third. (c) One-half. (d) Two-thirds.

6. What gives black soil its color? (a) The rock from which it was formed. (b) Black microscopic plants. (c) Humus. (d) The minerals in it.

7. Which of these plants is low in the evolutionary scale? (a) Ferns. (b) Blue-grass. (c) Corn. (d) Castor bean.

8. What grain is dependent on insects for reproduction? (a) Corn. (b) Wheat. (c) Oats. (d) Buckwheat.

9. What is a hybrid plant? (a) A sport. (b) One that will not reproduce. (c) The result of crossing two varieties. (d) A chlorophyll-producing plant.

10. Which of these is not a true cereal grain? (a) Rice. (b) Kaffir. (c) Corn. (d) Barley.

11. In which of these States are grain sorghums grown extensively? (a) Oklahoma. (b) Illinois. (c) North Dakota. (d) Oregon.

12. Mechanization is probably most successfully used in the production of which of these crops? (a) Corn. (b) Wheat. (c) Potatoes. (d) Alfalfa.

13. The size of tobacco farms is determined by what two factors? (a) The number of plants that can be produced in the seed beds. (b) The amount of fertile land available. (c) The size of the drying barns. (d) The amount of labor available. (e) The short planting season.

14. Which major farm crop requires the least labor per acre? (a) Corn. (b) Cotton. (c) Wheat.

15. How many hogs are needed to supply the cooking fat and enough pork for a family of five for one year? (a) 1. (b) 2. (c) 3. (d) 4.

16. Which of these is a legitimate argument to use in favor of part-time farming? (a) It has recreational value. (b) By keeping you busy you don't spend much money on amusements. (c) The returns on hours put in is at a high rate. (d) It is the only way to get fresh products.

17. Which of these crops requires cool weather? (a) Asparagus. (b) Beans. (c) Cabbage. (d) Melons.

18. What is the main thing that prevents the growth of apricots in the Northern and Northeastern parts of the United States? (a) the trees winter kill; (b) the summers are not hot enough; (c) fire blight kills the tree.

19. A person to earn a satisfactory living wage running a commercial poultry farm should care for at least (a) 100 layers. (b) 1,000 layers. (c) 10,000 layers.

20. If a farmer is to get any thing out of the trees on his farm he should (a) clear all trees and sell to lumber dealers. (b) manage his woodlot on sound principles. (c) never cut any trees until they are mature.

21. Which of these statements is true of flower seed production in this country? (a) It is concentrated in a few States. (b) It is scattered throughout about one-half the States. (c) It is scattered throughout all the States. (d) It is found in all States but in concentrated areas.

Check your answers with those in the back of the book. If your answer and that of the book do not agree, go back and check the material in the chapter to which the question refers.

UNITED STATES ARMED FORCES INSTITUTE
END-OF-COURSE TEST

If you have not already done so, you should write to the Armed Forces Institute, Madison 3, Wisconsin, asking for your End-of-Course Test. Remember that the test will be sent to your commanding officer and not to you. Allow a reasonable time to pass before you ask your commanding officer whether he has received the test.

If you think you are ready to take the End-of-Course Test, ask your commanding officer for permission to take the test. Be sure you have allowed plenty of time for the test to have reached your commanding officer.

Part IV

Buildings and Tools

Chapter XVI

Tools and the Man

Every man interested in farming should have an idea of what basic tools are needed on a farm and what the tools are used for. That information is given in this chapter. Even though you may already know farm tools and their uses, reading this chapter will give you a clearer idea about how important tools are to farming. Then, too, since not all tools are used on every farm, you may learn something that will be of value to you in purchasing the equipment needed in farming.

If you feel that you already know the material of this chapter, you should turn to the check-up and take that now. If you can't do all the exercises in the check-up it will pay you to study the chapter.

This is the machine age. And in man's oldest war, as well as his newest, machinery is essential. Tools are the machinery with which we explore and shape the earth.

The kinds and numbers of tools and the investment required are directly related to the size of the farm program. The acreage that will justify a tractor and its size and type will be taken up presently. Regardless of acreage and regardless of whether a tractor and tractor tools, or a horse and horse-drawn tools, are employed, certain hand tools have been and are basic to cultivation of the soil and a home on the land. These are the articles referred to in advertisements of farm sales as "small tools too numerous to mention" or "all the small tools found on a well-stocked farm."

BASIC HAND TOOLS FOR THE GARDEN

A small garden can be handled with as few as three tools, the cost of which will be returned several times over in produce the first year, and these are:

Figure 82. Hand tools for the garden. (U. S. D. A.)

A long-handled, round-end shovel to turn the soil.

A rake to make the seedbed—the handle to draw the furrow in which to place the seeds.

A hoe to cultivate and keep out weeds.

All tillage tools drawn or pushed by hand or power are variants of these. So meager a supply of garden tools is not recommended. On the contrary, efficiency and pleasure call for a goodly stock of tools.

The complete spading equipment should include not only the long-handled round-end shovel, but a short-handled round-end shovel, a short-handled square-end spade, a spading fork, and a general purpose shovel which can be used for many things including spreading ashes and snow removal.

The rakes should comprise a level-head rake with straight teeth, a bow-head with curved teeth, a wood rake, and a broom rake.

Hoes for the family and help should be plentiful. A garden hoe, a truck-garden hoe, weeding hoes, and cultivating hoes should be on hand. Try the various styles on the market to find the one best suited to your soil and back. Your garden can be plowed instead of spaded, harrowed rather than raked, and cultivated between the rows. But there is no substitute for hoeing your row—*in the row.*

WHEEL TOOLS FOR THE GARDEN

A garden as large as 150 x 100 feet justifies the use of a wheel hoe and attachments for cultivating and seeding. The plowing and harrowing of a garden this size should be done by a horse or tractor unless inexpensive labor is available.

A single low-wheel cultivator with scuffle hoes, reversible shovels, prong weeders, and plow, provides complete cultivating equipment. The plow attachment for the wheel hoe is of no practical value for plowing. It is good for making the furrow in which to plant large seeds, such as corn, beans, and peas.

A wheel-hoe outfit may also include a seeder. For rows 50 feet long or longer a seeder is a time saver, for it opens the furrow, drops the seed, and covers it in one operation. Wheel seeders may also be obtained independent of cultivating equipment.

The speed hoe, or rotary hoe, is a cultivating type that is pushed like a lawn mower. It is excellent for pulverizing and mulching in soils that are not stony.

Rotary pulverizers are light and easy to use. They are adapted to flower beds and are recommended for women's use.

ADVANTAGES OF THE WHEEL HOE

The wheel hoe is probably the most popular and widely used garden tool among commercial growers as well as home gardeners. It is a decided improvement over the wheelless hoe in ease and speed of operation and has advantages over horse or tractor. It is cheaper to buy and keep, of course. It also permits more intensive use of the garden by planting in narrower rows which results in increased yield per acre at no additional cost for plowing, harrowing, or cultivating. More rows per acre may mean less cultivating as the weeds are shaded out by the growing plants. Wheel hoes also permit cultivating close to the plant which reduces hand weeding to a minimum.

GARDEN TRACTORS

Many garden tractors are on the market. A garden tractor is a tractor on two wheels, sometimes on one, that is guided from behind by the operator, who is usually walking but may be riding in a sulky. This type of tractor represents a halfway measure toward power machinery that is not recommended except for market gardeners. Garden tractors are high in cost compared to standard farm tractors.

The wheel hoe has its place on every farm. If the farm justifies a tractor it should be big enough to handle all the work formerly done by a team and a large stationary engine.

HORSE OR TRACTOR?

The horse vs. tractor controversy is an interesting unresolved question which periodically reappears in farm journals and agricultural papers.

For the horse we may say that first cost is low, it reproduces its kind, it consumes fuel (feed) that is raised at home, it returns part of its keep in the form of manure, and horse-drawn tools are readily obtainable second-hand.

For the tractor we may say that it saves time and work, it does not eat when not working, requires less care, is not subject to the ills of horse-flesh, and can perform a greater number of services.

From the point of view of the young farmer, however, there is very little argument. A man who has driven a car, greased it, changed tires, tinkered with the carburetor, and cleaned the plugs and who has never hitched up a horse and followed the plow, is better equipped to operate a tractor than to work a horse. The farm beginner should utilize and extend the knowledge and skills he already controls without adding unnecessarily to the sum of what he must learn.

But for the man who likes a horse, or wants a horse and is ready to care for him, horse power, where acreage and buildings justify its keep, is useful. One or two horses cannot do all the work of a small tractor. On small acreage, however, one horse may be more economical than a tractor. If the acreage justifies a team, a tractor may be preferable.

HORSE-DRIVEN TOOLS

Tools for a single horse are reasonably light and manageable and are relatively inexpensive. They can often be bought second-hand for very little.

Necessary tillage tools are a one-horse plow, a one-horse disk or spring-tooth harrow, or both, a drag for pulverizing and leveling, and a one-horse cultivator.

Seeding tools that may be used with one horse are a one-horse corn planter and a seeder.

Necessary haying tools are a one-horse mower, a one-horse rake, and a one-horse farm truck with bed or flat.

Figure 83. Horse-drawn plow to turn the soil. (U. S. D. A.)

TRACTOR AND TRACTOR TOOLS

A tractor is simply that which draws or hauls. Without the accompanying tools a tractor can do no more farm work than horse or man. The tractor will pull whatever the horse pulls except that it cannot work in excessively rough or wet terrain. These conditions, however, are not encountered on good farm land during the farming season.

The tractor pulls from the draw bar, to which all wheel tools are attached just as they are attached to the horse's harness.

In addition to its ability to pull, the tractor provides belt power from a pulley and thus when standing still performs the work of a stationary engine on such jobs as pumping, grinding, and sawing wood.

A third form of power is provided by the tractor through the power take-off. This device permits mounting certain tools, such as the mower, directly on the tractor. While the tractor carries the tool along, the cutting or other mechanism is driven by the tractor engine through the power take-off. The pulley permits using power

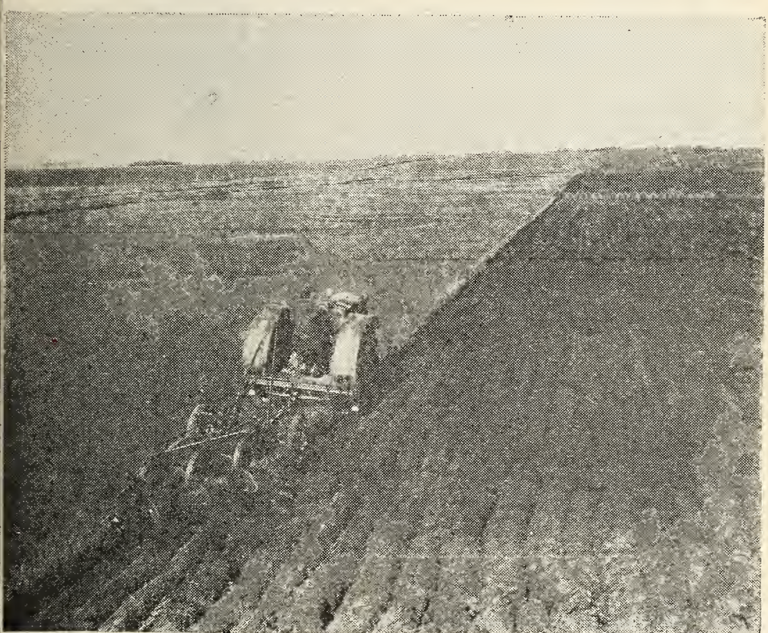


Figure 84. Tractor-drawn plow turns the soil. (U. S. D. A.)

from the tractor while it is standing; the power take-off allows power to be taken from the tractor while it is in motion. The pulley and power take-off, but especially the former, provide forms of power which the horse is not able to transmit.

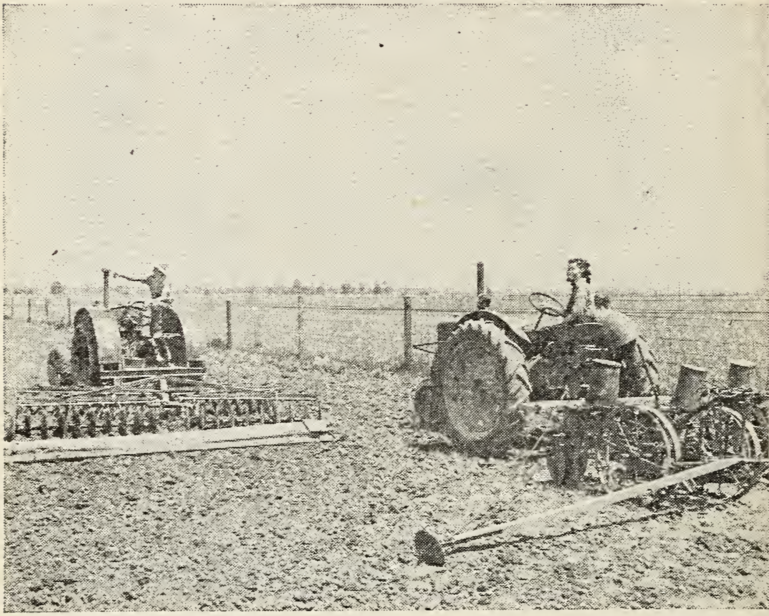


Figure 85. General-purpose tractors draw the disk harrow (left) that prepares the ground for seeding and the corn planter (right.) (U. S. D. A.)

Tractors are frequently rated as one-, two-, or three-plow tractors according to their ability to pull one, two, or three plows from the draw bar. The use of rubber tires has increased the usefulness, speed, efficiency, convenience, and comfort of tractor operation.

There are three kinds of farm tractors: the standard four-wheel tractor, the tracklaying tractor, sometimes called a crawler or caterpillar, and the general-purpose tractor, also known as the row-crop or cultivating tractor. The four-wheel type is designed much like an automobile. The front wheels steer and the rear wheels, which track with the front, are the drivers. The orchard tractor is a four-wheel tractor with special fenders, lowered steering wheel and seat, and other modifications.

Track-laying tractors are widely used in industrial and military work and were used in such jobs before they were brought into farming. Track layers give good traction on soft, wet, loose, or sandy soil, where wheel tractors cannot take hold. Also, track layers can turn on very short radius, their low center of gravity adapts them to rough or hilly land, and they do not pack the soil. Large diesel-powered track layers are extensively used for plowing, harrowing, and other field draft jobs on large acreage where five or more plows and harrows may be pulled in one gang. Smaller track layers have been designed for cultivating and row-crop work.

The general-purpose tractor is the newest and the most popular. It is of tricycle design and has greater clearance beneath the axle than other types. Steering is accomplished by one or two small wheels centered under the front end.

Acreage required. As few as five acres of cultivable, intensively farmed land may justify the purchase of a one-plow standard-make tractor on rubber tires.

Like man with his shovel, rake, and hoe, and the horse with plow, harrow, and cultivator, the tractor must have at least its basic tools. These should be purchased with the tractor. The tractor and tools together are known as a tractor outfit. A one-plow tractor outfit costs new, $750 to $1000.

The tractor plow may be of the wheel or mounted type. The former is mounted on wheels and hitched to the draw bar. It is easily hitched or unhitched. The mounted plow is not pulled from the drawbar but is mounted on the tractor so that tractor and plow are one unit. This is a useful type in small areas, as turns can be made in a smaller radius and plowing can be done closer to a fence or other boundary. Mounting and demounting this type of plow is something of a chore. Mounted plows cost less than wheel plows.

A disk, spring-tooth, spike-tooth, or Meeker harrow, or several harrows, of the size recommended by the tractor manufacturer are necessary. These are pulled from the drawbar.

A tractor cultivator is always mounted directly on the tractor. This tool, and all mounted tools, are not interchangeable among makes of tractors, as are drawbar tools.

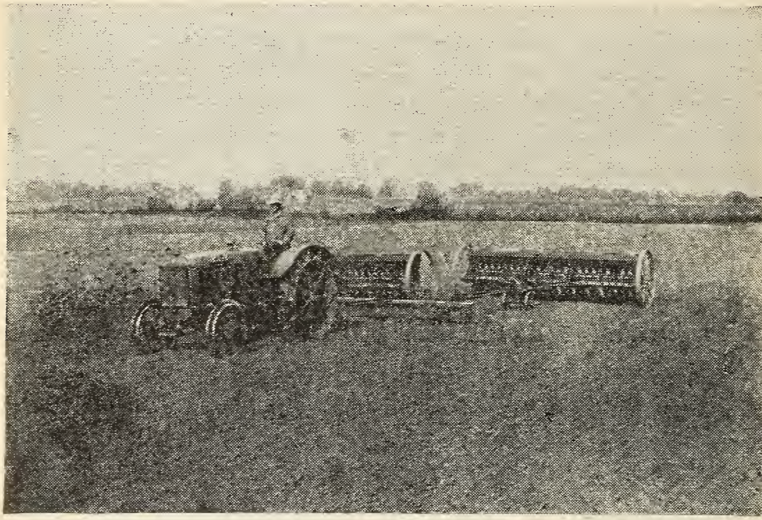


Figure 86. A standard 4-wheel tractor draws two grain drills in a tandem hitch. (U. S. D. A.)

All tractor tools are controlled from the seat of the tractor by the driver.

Every type of farming tool is made for tractor operation. The more tools you have the more use can be made of the tractor. It does not pay, however, to buy tools that are infrequently used. These can often be borrowed or rented if you have the power with which to operate them.

Selecting a tractor. A man who has decided to buy, for example, a one-plow tractor on rubber with single-row cultivator has already narrowed the question to what make should be bought. All the standard makes are good, but it is advisable to buy a make that is popular in your neighborhood. There is a reason for its popularity. Either it has been found especially well suited to the local conditions or the local dealer is regarded as a good man with whom

Figure 87. Tractor-drawn cultivator in a western potato field. (U. S. D. A.)

to do business. The ability and willingness of the dealer to service the tractor is important. Every tractor and tractor tool, despite excellent care, will require occasional service and repair. The first cost is not the last cost. Be sure that the cost of repairs and replacements is in line with original costs.

When a man buys farm implements for cash and has no trade-in it is customary to allow him a 5- to 10-percent discount.

Most tractors can be purchased with self-starter, lights, battery, and generator as extras. Unquestionably the starter increases the ease and safety of tractor operation. Despite the increased cost and upkeep attached to self-starting equipment, it is a worth-while expenditure especially if the women and young boys are planning to do some of the tractoring.

Home-made tractors. Home-made tractors are not recommended as a general thing. Where only one source of power is maintained it must be reliable. The average cut-down, sawed-off, flat-tired, boiling-over old-type car does not make either an efficient or economical power unit. The farmer has no time for tinkering when he should be farming. However, many young men in farming or who are going into farming are excellent mechanics and can make at low cost tractors that really work. There are available several plans for making good tractors out of old automobiles and trucks. If you have a shop or can get the use of one during the winter, you can work on such a project during the slack season and have the tractor ready for spring work. Good home-made tractors have been built for $150 to $200, but of course this is no job for a man who has not operated a tractor or who does not know what it can and should do.

Using the tractor efficiently. Normal tractor life is ten years, and the tractor should be amortized on that basis. All instructions for its care should be conscientiously followed. For maximum gas and oil economy it should be kept in perfect adjustment at all times.

Tools for use with the tractor should be of the correct size—neither too large nor too small—and correctly hitched. The method of hitching a tool has an important bearing on the power required to pull it. Tools should be greased and oiled.

Using the tractor safely. Do not use kerosene or fuel oil in a tractor designed to burn gasoline.

Do not put the tractor on jobs beyond its rated capacity.

Do not pull except from the drawbar.

Do not push with the front end.

Do not ride on the tractor except on the seat.

Do not stand while driving unless a platform for this purpose is incorporated in the tractor.

Do not drive at road speeds on fields or meadows.

Do not drive while looking behind.

Do not drive into a barn or shed where hay or straw is stored.

Do not fill gas tank while engine is running.

SOME COMMON FARM TOOLS USEFUL FOR THE FAMILY-TYPE FARM

The tillage tools are:

The plow. This is the most widely used tool for the first step in tillage. Plows differ in size. One horse will pull a 7- or 8-inch moldboard (a curved iron plate attached to a plowshare) at a depth of 3 or 4 inches, whereas a one-plow tractor will pull a 14- or 16-inch moldboard at whatever depth is practically desirable. Moldboards vary in type as well as size. A type adapted to local soil conditions should be used. The general-purpose moldboard works well in corn stubble, sod, or old ground and does a good job of turning under manure or trash, such as cornstalks, weeds, or stubble. It is the most commonly used type.

The standard tractor plow is of 14-inch size. The standard depth of plowing is considered one-half the size of the plow or, in this instance, 7 inches. Seven inches is a good depth for most crops. Most tractor plows are equipped with rolling colter and jointer which facilitates the complete coverage of trash.

The plowshare is removable from the moldboard for sharpening and replacement as it becomes worn down. To obtain the suction necessary to keep the plow in the ground, the share must be kept sharp.

The harrow. For the secondary operation of harrowing, the disk harrow is most useful for leveling, compacting, and destroying weeds in the plowed soil. A good job of preparing a seedbed for some crops can be done, under certain conditions, by disking without first plowing.

Penetration of the disk harrow is regulated by the angle at which the disks are set. The tractor disk with two gangs does a better job than the horse-drawn disk with one gang. Most one-plow tractors use a five-foot double disk harrow with disks 16 or 18 inches in diameter. Larger tractors pull larger gangs of disks.

Frequently ground can be prepared by disking without first plowing. In fact for some crops, such as wheat following oats, disking makes a better seedbed than plowing.

The spike-tooth harrow is useful for breaking clods, leveling the ground, and covering seeds.

The spring-tooth harrow is used for soils too stony for penetration by disks.

Rollers, cultipackers, cultimulchers, or drags, are tools used to break up clods left by harrows and to compact the soil for the purpose of eliminating undesirably large air spaces.

The cultivator. Weed destruction is the primary purpose of cultivation. The most common cultivator for use with horse or tractor power consists of gangs of shovels, sweeps, or teeth. Cultivating should never be deeper than is necessary to destroy weeds, as injury to crop roots may result. The cultivator is used chiefly to till crops grown in rows, such as corn, cotton, potatoes.

The seeding tools are:

The corn planter. This plants and fertilizes corn in one or two rows. It may be drawn by horse or tractor or mounted on the tractor. It does a better job of planting corn in rows or hills than is possible by hand.

The grain drill sows and fertilizes such crops as wheat, oats, barley, soybeans. It also has an attachment for seeding grass.

The wheelbarrow seeder and hand seeder are used for seeding grass. The former distributes the seed in straight lines. The latter broadcasts the seed.

These three types of seeding equipment are not purchased by all farmers. It is, however, desirable to rent or borrow them for performing those operations for which they are designed. The seeding on most farms, except in the garden, will require only a few days per year.

The haying tools are:

The mower. This tool is essential for haymaking. Its counterpart among hand tools is the scythe. Mowers may be horse- or tractor-drawn or tractor-mounted. The one-horse mower has a 3½ foot cut—the one-plow tractor has a 5- to 7-foot cut. Every farm that supports livestock or a tractor should have a mower whether or not hay is made.

Hay rakes. After mowing, the hay is raked for curing. The best curing is accomplished with a side-delivery rake which rakes the hay into long rolls (windrows), in which form it can be picked up by a hay loader or pick-up baler. The dump rake gathers the hay into heaps which are pitched by hand onto the wagon. The dump rake's chief use is on uneven ground and in small areas not easily reached by the side-delivery. It may be one-horse or tractor drawn. One horse cannot properly pull a side-delivery rake.

The hay loader. Where any considerable quantity of hay is made, a side-delivery rake and hay loader should be used. The hay loader is hitched behind the wagon. It picks up the hay from the windrow and loads it onto the wagon, thus eliminating pitching by hand, one of the most tedious tasks in unmechanized farming.

Pick-up baler. Instead of loading the hay onto a wagon and thence into the haymow, the hay may be baled from the windrow by a pick-up baler. The bales are then taken to the barn for storage. This work is frequently done by custom operators for 10 to 15 cents a bale. It is an excellent way of handling the hay crop.

Of haying tools the first to own is the mower, and then the rake.

Harvesting tools. The reaper and binder is the implement most widely used for harvesting small grains. It is also one of the most intricate farm machines. After a grain like wheat or oats is cut and shocked by the grain binder it must be threshed with a threshing machine.

All over the country the grain binder is being replaced by the combination harvester-thresher known as the combine. This tool, which is pulled from the tractor draw bar and which frequently derives its power through the power take-off of the tractor, cuts the grain and threshes it in one operation. The grain is caught in bags. The straw may then be raked and baled with a baler, or loaded with a hay loader, or left on the ground as fertilizer.

This is the most practical way of harvesting grain. Small combines have been developed for small farms and there are large ones for the bigger farms. The smallest cost around $700, but many farmers have this harvesting done on a custom basis—that is, a combine operator comes in and harvests the grain with his own outfit. The custom operator charges about $4.00 per acre.

Corn that is ensiled and stored in a silo is cut by hand or with a corn binder and put through an ensilage cutter and blower which delivers it into the silo. Corn harvested for grain is husked by hand or with a one- or two-row corn picker.

The manure spreader is one of the most valuable farm implements the livestock owner can have. It expedites the handling of all kinds of animal manures, at the same time benefiting the soil. Manure spreaders are designed for horse or tractor operation.

The lime spreader applies lime and fertilizer to the soil more evenly than can be done by hand. It is not necessary to own a lime spreader. The seller of the lime or fertilizer will sometimes spread it for you at little or no extra cost.

Sprayers. Every farmer requires one or more sprayers that may range from the hand-gun or garden-hose sprayer to a 4-gallon hand or 15-gallon wheelbarrow sprayer. The barrel and wheelbarrow pumps are necessary for small orchards and highly desirable for larger gardens. A duster for applying insecticides in powder form is also useful. Fruit and truck farmers use power sprayers and dusters.

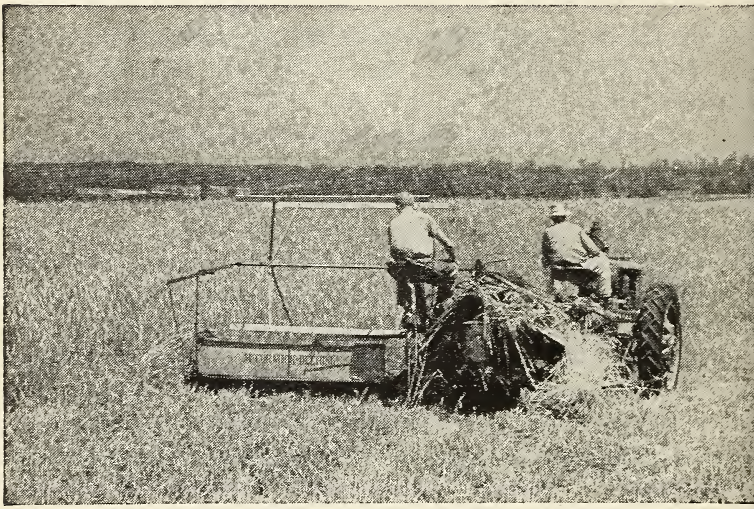


Figure 88. Tractor-drawn reapers are used to harvest small grains. (U. S. D. A.)

There are many other farm machines used for special jobs such as potato planting, tomato transplanting, or carrot topping. Electricity is used to run pumps, saws, hammer mills and many other pieces of equipment. And there are a lot of small machines for jobs like shelling corn, shearing sheep, grading eggs, or mixing feed. Modern American farming is becoming increasingly mechanized, and after the war we can expect new, better, and cheaper power tools for farmers.

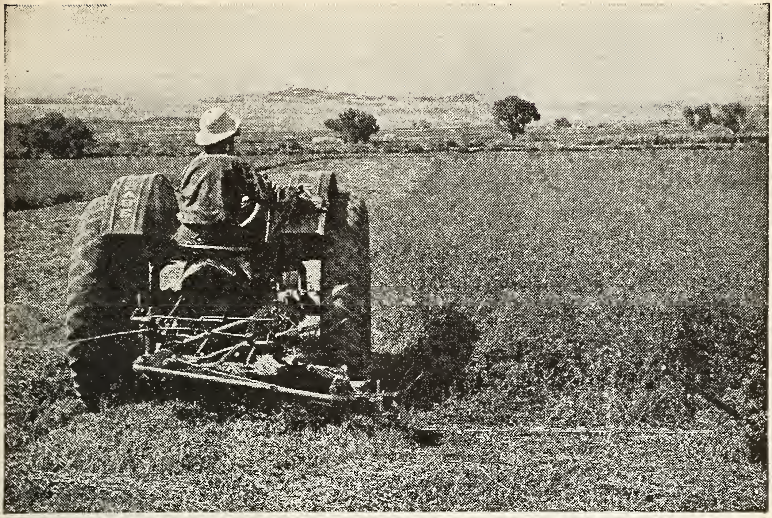


Figure 89. Tractor-drawn hay mower. (U. S. D. A.)

NEW VS. USED TOOLS

The small farmer may use his tools less efficiently than the commercial farmer simply because he uses them fewer days in the year. He should keep his overhead in equipment correspondingly lower. Do not buy all new tools. New tools burden you with unnecessary overhead. Modern tools in working order are all that are required. Some farm implements depreciate rapidly in price, others very slowly. Used tools are not always cheap.

Used tools may be purchased from reliable dealers, who get them as trade-ins on new machinery. Frequently they are reconditioned by the dealer. Their price is readily compared with the cost of new. Or used tools may be bought at public or private sales where farmers are selling out.

Buying at a public sale requires a knowledge of the value and condition of the tools offered plus a special kind of strength of character. You are bidding under pressure from the auctioneer and may easily pay more than the implement is worth. Inspect the machinery before the sale starts. Make up your mind what it is worth and what you will give for it. Stick to your figure.

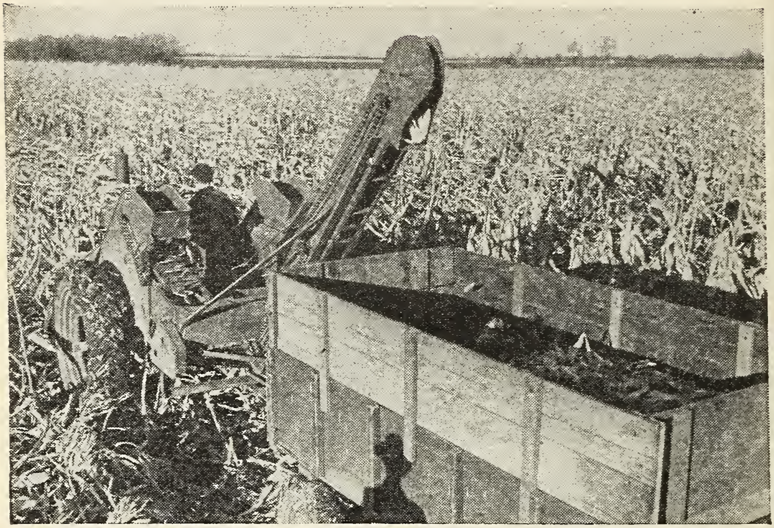


Figure 90. Mechanized corn harvester in the Corn Belt. (U. S. D. A.)

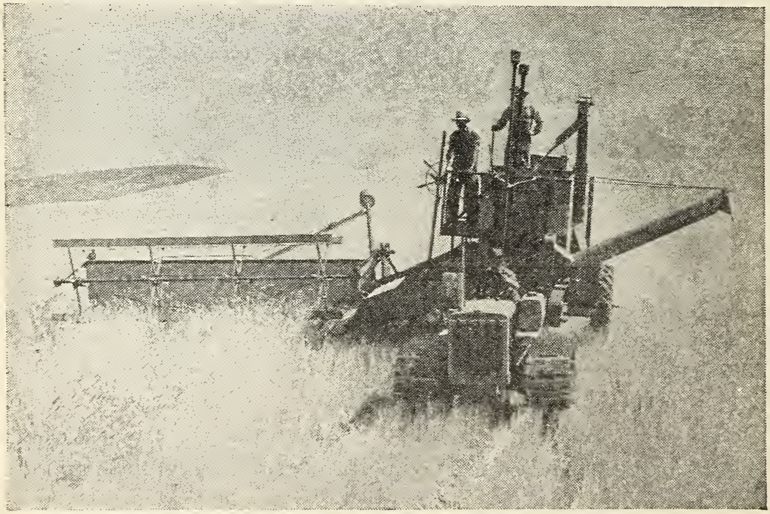


Figure 91. Grain combine in the Far West. (U. S. D. A.)

Regardless of whether you buy new or used tools—and you should have some of each—buy only good tools. Good tools do better work. A used spade in good condition which originally sold for $2.00 is far better than a new one at 79 cents ever will be.

CONVERTING HORSE-DRAWN TOOLS TO TRACTOR USE

New horse-drawn tools are never purchased for use with a tractor. Not only is the hitch different but more important is the difference in position of the driver and operator. The operator does not ride on the horse but on the tool drawn. The reverse is true for tractor tools.

Certain used horse-drawn tools can often be purchased so reasonably that it pays to buy and convert them to tractor use. For example, a horse-drawn disk harrow is readily operated by tractor by substituting a stub pole for the long pole used by a team. A roller, side-delivery rake, manure spreader, or wagon, is easily converted from horse to tractor. A mowing machine designed for horses may be hauled by the tractor, but in this case a second man may be required on the mower to operate it. Similarly with a dump rake and other horse-drawn tools where operation as well as driving is required. These slight inconveniences may pay, however, where the family can provide the extra manpower.

An excellent used horse-drawn mower can be bought for around $50. A new tractor mower (they are seldom found second-hand) costs around $100. This is a big saving if there are only a few acres of hay.

Used horse-drawn tools may be bought at the start, used a year or two with the tractor, and then traded in on tractor equipment. When tools are bought right no loss is involved.

Cooperative use of tools. It is obvious that many farms cannot afford to own all of the power tools of which they can make use only a few days in the year. At the same time power, rather than hand labor must be used. There are several economic solutions to this problem. The hiring of custom operators for such work as combining and baling has been mentioned. Another method, traditional in American agriculture, is neighbors working together.

Neighbors can advantageously pool their equipment as well as their manpower. Haymaking is one example. One man cannot make and load hay. At least two are required—preferably three. A neighbor will be glad to have your help at haying and will help you in return. Perhaps you will buy a hay loader together. Or if he owns a side-delivery rake you may buy the loader so that both tools can be used on both farms. Or he may provide all the tools in return for your help or a load of hay. Cooperative methods of working will solve many of the farmer's equipment problems.

The care and storage of tools. All farm machinery should be kept under a roof and preferably within four walls. During the winter, when much equipment is untouched for months, it should be kept oiled and greased. Rust is damaging to all tools and especially to cutting edges. Mower knives will not cut when rusted. A rusty plowshare and a rusty moldboard will not turn a clean furrow.

Oil and grease should be applied to every moving part. Stationary and wooden parts should be kept painted.

Used crank-case oil is as good a rust preventive as new oil and costs little or nothing.

Oil is cheaper than steel.

Gasoline engines and electric motors should be started every few weeks rather than allowed to stand untouched for months in unheated buildings.

Edge tools must be kept sharp to do good work.

No rule or set of rules will prevent injury to a careless or reckless operator. One rule that embodies many principles is this: Never oil or attempt to adjust a machine that is in motion.

OPERATION OF MACHINERY

There isn't much chance for farming in the Service, but you may get the opportunity to learn a great deal about the gasoline engine, which is the same in a jeep or truck as in a farm tractor. If you know how to operate a bulldozer you will know how to run a big diesel crawler-type tractor. And if you learn how to be handy around engines and machines and how to make repairs you will be giving yourself valuable training that will save you time and money in farming.

CONSTRUCTION TOOLS

A good collection of tools grows with good farming. The variety of construction tools will vary with the individual's interest and skill, but some ability in construction, which may range from digging a post hole to constructing a building, is required of every farmer. The special tools of various building trades are owned by those who ply the trade. By their tools you know them. The following are necessary for the repairs and simple jobs ever present on a farm:

- Extension ladder, 20-foot
- Stepladders
- Wheelbarrow
- Ax
- Sledgehammer and wedges
- Crowbar
- Ground chisel
- Wrecking bar
- Pickax
- Grubbing ax or hoe
- Post-hole digger (for soils not stony)
- Wire stretcher
- Pliers
- Wire cutter
- Mason's trowel
- Putty knife
- Pipe wrenches
- Monkey wrenches
- End and box wrenches
- Ropes
- Chains
- Circular saw and saw table, if much wood is on hand
- Crosscut saw
- All the carpenter tools you can use and afford
- Machinist's vise
- Small grindstone
- Pruning saw
- Scythe
- Brush hook
- Lawn mower
- A hose, where running water is available
- Pruning shears
- Trimming shears
- Gardening tools
- A manure fork
- A hay fork
- A grease gun
- An oilcan

A GUIDE TO TOOLS

Among the most valuable books ever written and compiled for farmers are the mail order house catalogs. Get one. Look at the pictures of farm tools, implements, machinery, and equipment. Read the stories. Learn the prices. You will discover why these volumes, revised semiannually, are some of the most widely read and best loved books in America.

Carpentry and plumbing are other skills you may learn while in the service and these abilities are of great value to every farmer. A knowledge of electricity and electrical equipment is another thing you should study while getting ready for farming. A modern farmer does not farm with bare hands. He must have tools and he must know how to use them.

CHECK-UP 16

Part I

The 20 tools listed below are used on farms. By trying to answer the questions, you can find out if you know the tools and their uses. In answering use only the numbers of the tools. The first one has been done for you.

1. Binder
2. Combine
3. Cultipacker
4. Cultivator
5. Drag
6. Drill
7. Harrow (disk)
8. Harrow (spike)
9. Harrow (spring tooth)
10. Hoe (hand)
11. Hoe(rotary)
12. Manure spreader
13. Mower
14. Planter
15. Plow
16. Rake (dump)
17. Rake (hand)
18. Rake (side delivery)
19. Roller
20. Thresher

1. The spade is considered one of the basic garden tools. What are the two others? 10, 17.

2. What 3 tools are most frequently used to break up clods in fields?..........................

3. The manure spreader is used to put fertilizer on the ground. What 2 other tools are used for that purpose?..........................

4. Which tool is probably the most common on farms? (Do not include garden tools)..........................

5. What tool was especially designed for use in stony soil?________

6. A farmer owning a binder would not be likely to own what tool?..................

7. The thresher is dependent upon the use of what other farm tool?..................

8. What tools would the hay farmer be most likely to own?..............

9. If the seed bed is to be prepared with only one tool which one would be used?..................

10. The man who has only two acres of hay would probably use what type of rake?..................

11. Which of the list of tools would a farmer be most likely to use in seeding grass?..

Part II

Each question has one correct answer. Underscore the correct answer from a, b, or c.

1. About how large a garden should you have before you can justify purchase of a wheel hoe?
   a. About 450′ x 400′.
   b. About 150′ x 100′.
   c. About 50′ x 75′.

2. How does the amount of work that two horses can do compare with that done by one small tractor?
   a. The horses can do more.
   b. The amounts of work that can be done are about equal.
   c. The tractor can do more.

3. Which of the following designs is that of the general purpose tractor?
   a. Four wheel design.
   b. Tri-cycle design.
   c. Two wheel design.
   d. Tracklaying design.

4. What size farm should you own before you can justify buying a one-plow standard make tractor?
   a. Forty acres.
   b. Twenty acres.
   c. Five acres.

5. At what depth can one horse pull a seven or eight-inch moldboard?
   a. Seven or eight inches.
   b. Three or four inches.
   c. Practically any depth.

6. What is the size of the standard tractor plow?
   a. Fourteen inch.
   b. Seven inch.
   c. Twenty inch.
7. For what are rollers, cultipackers, cultimulchers, or drags used?
   a. Spread manure.
   b. Break up clods.
   c. Fill silos.
8. What is the primary use of cultivators?
   a. Prepare seed beds.
   b. Destroy weeds.
   c. Break up clods.
9. The main use of the grain drill is to sow grain. What is another use?
   a. To use as a disk harrow.
   b. Cultivate grain crops.
   c. Put fertilizer on land.
10. What would you say about buying horse-drawn tools and converting them to tractor-drawn tools? Is it a wise policy?
   a. Sometimes.
   b. Never.
   c. No answer can be given.

Check your answers by comparing them with those in the back of the book. Be sure to reread the material if your answer and that of the book do not agree. Do not just accept a book answer.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. All tillage tools are said to be adaptations of the hoe, the spade, and the rake. Show that this statement applies to the disk harrow, the corn planter, and the side delivery rake.

2. The tractor-drawn plow prepares soil for gardening in a fraction of the time of hand spading. In view of that fact, how can the use of the spade rather than the tractor frequently be the most economical way of preparing soil?

3. What are some of the major factors to be considered in buying a second-hand tractor cultivator?

4. Some farmers prefer to use binders and threshers in harvesting grain while others prefer to use a combine. List the main reasons for this difference in preferences among farmers.

Chapter XVII
The Farm Home

WHAT THIS CHAPTER IS ABOUT

This chapter tells what a good farm home is, what some of the possibilities of fixing up an old farmhouse might be, and what a good farmhouse plan is, and it describes some post-war farmhouse standards to shoot at.

WHAT IS A GOOD FARM HOME?

Every farm family should have the kind of house that makes a home, which means something more than four walls and a roof. Requirements vary from place to place. Few families want and need exactly the same things. But from past experiences we have learned that all farmhouses should provide: a place to cook, eat, and sleep; a shelter from wind, rain, and cold; space for taking care of children, relaxation, storage, household tasks, and certain kinds of work peculiar to farm life. In an efficient, clean, comfortable house, providing for these fundamentals, the family can live more happily, do better work, and be better able to contribute to the community than without such a house.

A good farmhouse is different from a city house because it is an essential part of the farm business. The kitchen and porch are often turned into workshops where farm products are treated and prepared for market. Dairy products are handled in the farmhouse; some fresh vegetables and fruits are stored, others are canned and stored; meat is prepared for curing. Most of the family eats three meals a day at the house, and crews of men may occasionally need to be served, besides any farm help that must be fed and lodged. The family laundry and sewing are done at home.

Because it is part of the work area, a good farmhouse is planned around these routine chores of farm men and women. For instance, there is a convenient place for the women to take care of the cream

Figure 92. A good farmhouse is different from a city house in that it is an essential part of the farm business. Many farm products are treated and prepared for market in it. (U. S. D. A.)

separator and other milking utensils or one in which to store eggs and butter until the next trip to town. Men can come in from chores or field and get ready for meals without interfering with the kitchen work; they have a washroom and space to hang their work-clothes.

Part of the house also serves as the office of the farm enterprise. The farmer carries on his correspondence there, keeps his records, stores his papers, and conducts his business interviews. The farm telephone is a business telephone.

Not only are more kinds of work done in the farmhouse than in the city house, but also more social and leisure activities are carried on there. Especially during the winter months, farm families relax and create their own amusements in the house. Children have games and toys and a place to play with them. There should be a library of good books and magazines for the whole family; a good newspaper and a good farm paper or magazine help to make better farmers as well as better citizens. Many families want a piano and a desk and should have space for them. There should be room to entertain friends and neighbors.

The outside of the house and its surroundings are all part of the farm home. A pleasant exterior to the house is good for the family morale. Even a small amount of planting of bushes and trees goes a long way toward improving appearances. Shade trees, a lawn, and fenced yard space for children to play in are also important. A flower garden brightens both the inside and outside of the house and is worth the trouble it takes.

A vegetable garden is a necessity, and should if possible be conveniently near the house. A family of five needs a half acre or more for garden crops.

It is also important that the home be well-managed. Management involves many responsibilities: in knowing how to use time and energy; in planning a budget which provides, beyond necessities, for recreation, games, toys, education, transportation, life insurance, medical and personal expenses; in operating the household efficiently, feeding and clothing the family and keeping them healthy; in acting as advisor in education and in social activities; and in taking part in community activities. More than in almost any other business, the whole family works together on the job of earning a living with all members taking responsibility and cooperating.

WHAT ARE RURAL HOUSING CONDITIONS TODAY?

Studies of farm housing show that only a small proportion of farm families today live in houses that have most of the features desirable for family life. In fact, the figures of the Farm Housing Survey made in 1934, and of the more recent 1940 census data, show that the actual situation is different from what the farm home should be. Some of these farm houses will be the ones available for prospective farmers to buy or rent after the war. A few statistics show that a lot of planning and ingenuity will be needed to turn some of the houses into good farm homes.

The survey made in 1934 found that 83.6 percent of the houses in the United States had no running water; 27 per cent had no screens; and 42 per cent had broken and unserviceable ones. Only 9 percent had indoor toilets, while more than 13 percent did not even have outdoor ones. Census figures show that the value of all buildings including houses decreased nearly 20 percent between 1930 and 1940. The majority of rural houses are now in a poor state of repair, and there was a decided lag in the building and repairing of them even before the war, so that there is now a large shortage of the right kind of houses.

Although many of the suggestions, provisions, and requirements for homes mentioned in this chapter seem obvious, surveys show that in a large number of farm homes even the most obvious requirements are not filled.

WHAT ARE THE POSSIBILITIES OF IMPROVING, REPAIRING, BUILDING, AND REBUILDING?

Since most would-be farmers who will buy or rent a farm after the war will find a house, old or new, in a good or poor state of repair, with adequate or inadequate facilities, already on the land, the first task will be to decide whether to remodel the old house or build a new one.

Is the house sound enough to be worth spending time and money on it? The condition of the old house and the cost of putting it in good repair should be checked by a competent builder and compared with the advantages and costs of building a new one.

If remodeling is decided on, the job will be to make a convenient and comfortable home out of what is already there. The check by the builder will probably have uncovered ways of combining repairs with remodeling, to the advantage of both. Many farm families can undertake home improvements by themselves to correct crowded quarters, awkward arrangement of rooms, too many steps to go up and down, and out-of-date water supply, bad lighting, rough floors, or a run-down condition in any part of the house.

If the house is large enough, in a good enough state of repair, and has adequate light, heat, and sanitary facilities, other improvements can be made a step at a time, as income and farm work permit. But if it does not fill these conditions, a family, especially a growing family, should not live in it even temporarily. Often the work of improving or building can be done by members of the family, leaving cash and credit for conveniences that would be too expensive otherwise.

If a change of location seems desirable, it can occasionally be done by lifting the building on to skids or rollers and hauling it. But if the location is inconvenient to main roads and fields and the house cannot be moved, or if it is too run-down, expensive remodeling should not be considered. The installation of equipment that later can be moved to a new house might be advisable.

When remodeling is being planned, the location of all plumbing, heating, and lighting fixtures should be carefully studied, and even if they are not to be included at first, space should be provided so they may be installed later without radical changes in the plan or structure.

County agricultural and home demonstration agents supply farm families with information, advice, instruction, and demonstrations of planning, construction, and improvement of houses. Funds for modernization and repair, in addition to loans for the purchase of farm property or a new farm home, may be borrowed from the Federal land banks and from private lending agencies.

While modernizing may be more common than building in the acquisition of farms after the war, the possibilities of construction should not be overlooked. Building plans are available from the extension services of the State agricultural colleges, from district offices of the Farm Security Administration, the Superintendent of Documents, and from many private agencies. The State Agricultural Colleges can give advice and plans for types of housing appropriate for the State. Regional farm-building plan books have been prepared by the Department of Agriculture in cooperation with the agricultural colleges for the Northeastern States, the Southern States, and the Western States. They are respectively as follows: Miscellaneous Publications Nos. 278, 360, 319. They may be obtained from the Government Printing Office. It is impossible to estimate now what building costs will be after the war. They will vary with the region, with labor and material costs, with the volume and development of prefabrication, and so forth.

WHAT DOES A GOOD HOUSE PLAN INCLUDE?

There are certain standards to be considered both in buying or rebuilding or in checking the plans of a house. The proper site for the farmhouse depends on the climate—that is, whether it is more important for the living and working areas to be sheltered from storm and open to the winter sun, or placed to catch summer breezes. The location of other farm buildings, the farm driveway, and the public highway also need to be considered. When roads are not surfaced, the site should be beyond the dust line—100 to 150 feet from the road. The site should be well-drained.

In contrast to the city house, the back rather than the front part of the farmhouse is the most important. A great deal of the farm work is carried on in the kitchen and workroom, both in the rear, and much of the family life is actually lived in the kitchen. Therefore, the side and back service entrances of the farmhouse, not the front, should be conveniently located on the farm drive, since they are the most frequently used. A roof or small gable is useful to shelter entrances from bad weather.

In the northern part of the country, tight construction is important for warmth and to lower fuel costs; in the South, it keeps out summer heat; and in dry regions it is a protection against heat, wind, and dust. Foundations, walls, roofs, chimneys, doors and windows, screens, paint, interior walls and ceilings, floors, and stairs—all should be in a good state of repair. A well-built house is also one that is fire-resistant. Insulation and stoppage of air leaks both add to warmth in winter and coolness in summer.

The modern trend in design seems to be toward compactness. In extremely cold regions heating is expensive and it is an advantage to have both working and living areas under shelter and close together. In other regions, the high cost of modern conveniences often limits the family's expenditures to a smaller, less expensive house. However, the less compact house has its advantages in the South because it permits thorough ventilation.

For an average farm family, including both boys and girls, at least five or six rooms or the equivalent are desirable: Separate bedrooms for the boys, girls, and parents, and a combination providing living room, dining room, and kitchen separately or in two rooms. A house of fewer rooms may be satisfactory for a small family on a small farm. The original design of the house should allow for expansion as the size of the family and the farm income increase, and for contraction when children grow up and leave home. It should also provide for some way of cutting off part of the house when heating all of it is too expensive. Such basic plans are available through the Department of Agriculture, the State colleges of agriculture, and private agencies.

While it is an old custom for farm families to retire to town, leaving a married son or daughter on the farm, some retiring farmers may want to stay on the land. If the house is large and in good condition, it can be divided into two separate apartments. This helps to reduce the cost of living, the older people's experiences and assistance help to increase farm income, and their savings are more apt to be used to improve rural life than if they moved to town.

Since the kitchen, workroom, and storage space have a unique place in a farmhouse, it may be worth while to discuss each one in more detail.

Kitchen. To the majority of farm homemakers, except in the Southeast, the kitchen is a family room where meals are usually served, where children play and where neighbors are often received. The standards of upkeep and appearance are high.

In all except the very warmest sections of the country, many homemakers use a coal or wood range in the kitchen. This may be because they like it best or because it provides economical heat for the kitchen. Of course, if finances permit and facilities are available, an electric or gas stove has the advantage of being less trouble, cleaner, and not so hot in summer.

A kitchen sink, one of the most useful home conveniences, could be bought and installed before the war for from $12 to $25 com-

Figure 93. The kitchen on most farms, except in the Southeast, is a family room where usually meals are served. (U. S. D. A.)

plete with drain. Any person handy with tools can make built-in shelves and working surfaces in the kitchen.

Workroom. A utility room or porch adjoining the kitchen is popular as a combined laundry and workroom, for preparing farm produce, canning, cleaning poultry, preparing food in large quantities, and a variety of other activities. If the workroom is a porch there should be protection against stormy weather. If the house is in a cold region, artificial heat is necessary, perhaps from a small stove. There should be space for long tables, a special sink for washing milk utensils, provisions for washing clothes and facilities for water disposal, and perhaps a stove for rendering lard. There should be a closet in the workroom or nearby for cleaning equipment and supplies.

Storage. The care of perishable foods is one of the biggest problems in the farmhouse. For areas with low summer humidity there can be draft coolers in the kitchen cabinets. In other sections, spring-houses, cellars, and basements are used. In the South, especially in summer, a refrigerator is a necessity.

Storage facilities should be large enough for times when the family produces a great deal of what it uses. If there is no cellar or basement, an insulated and ventilated storage pantry is desirable, which will hold also potatoes, apples, cured meat, winter vegetables and canned foods. In warmer regions, many homemakers like outside storage better, even if it is not as convenient, because there is less dirt and odor. They prefer a cave or insulated building above ground. If food is preserved by freezing and dehydrating, storage room will be provided for dehydrated food and for a frozen-food locker. These two methods of food preservation are being used more and more because of their convenience and the way they conserve the nutritive qualities of food. Community food storage facilities are popular, especially where small farms are common. A clothes closet in each bedroom is essential. The Department of Agriculture and the extension services of the States also have good plans and specifications for storage facilities.

Adequate space in or attached to the house for fuel storage must be provided. In cold regions, the workroom, food-storage room, and fuel storage area are all more convenient if attached to the house. However, even in these regions, many homemakers would rather have them separated from the house because of dust, dirt, odors, or flies.

Cellar. In some areas, where the soil is very moist, the topography is unsuitable for basements or cellars. However, where it is possible to have either one, it is useful for storing fruits, vegetables, and canned goods; it is sometimes the best place for the laundry and the water system or lighting plant if there is a home plant; and it can be useful as a playroom and as a place for drying clothes in damp weather. In cold climates a dry cellar is the best place for the heating plant and fuel.

If protected from seepage, hillsides are particularly good places for cellars because little excavating is necessary, and doors and windows can light the cellar and make it an ideal workroom.

WHAT FACILITIES AND CONVENIENCES MAKE THE HOUSE A HOME?

Heating. The structure of the house is a mere shell until it has water, toilet facilities, heat, light, and other essentials. Throughout the northern part of the country in houses that have running water and bathrooms, a central heating system is a necessity to keep pipes from freezing. This system makes it possible to carry on routine activities in every room without putting on extra clothes. The heating system depends on the kind of fuel available and the costs of the alternative heating arrangements in the locality. It should allow for healthy, comfortable living. It should not require continuous buying of large amounts of fuel, since this does not fit in with the management and income of a large proportion of farm homes.

Electricity. Electric service in the farm home means a better standard of living, less drudgery, improved health, and greater contentment for the entire family. With it, problems of lighting, refrigeration, cooking, ironing, and heating water are made more simple and it is possible to have washing machine, vacuum cleaner, radio, and automatic water system.

The Rural Electrification Administration in the Department of Agriculture makes loans to cooperatives and other rural electric power systems for constructing and extending systems, and the systems in turn lend money to their farmer members for lighting fixtures and for wiring and plumbing installations. The REA also does research on improved farm and home electrical equipment and pressure water systems, and makes this information available to members of REA cooperatives. In addition to the REA, many private companies make electric power available to rural people. Cost of connection to a power line varies with the distance from the line and the policy of the power company or agency.

In 1940 individual farm lighting plants cost anywhere from \$300—\$800, depending on the capacity of the plant. The lower cost plants were inadequate for any more than a minimum use of electricity. Installation of an electric system or a farm connected to a power line costs much less. Materials and fixtures for a simple but adequate system can run as low as \$2.00 to \$3.00 per outlet.

A conservative estimate shows that a bill of $4.50 a month for lighting—an average of only 15 cents a day—is considered high. A new low-cost small-capacity electric service (consisting of a small transformer, an underground cable, a new type of circuit breaker, and a new device for lightning protection) enables a farmer with limited income to have electric lights and small appliances for a minimum of about one dollar a month. The average monthly bill for REA farm users before the war was about $2.50 in the South and between $3.50 and $4.00 in the North.

Electric lights are always used on electrified farms, and many other appliances, such as a refrigerator, iron, or washing machine are common. Many of the appliances consume little electric power, and the cost of operation is surprisingly low, especially for the amount of time saved and heavy work cut out.

The alternative methods of lighting by kerosene and gas are cheaper and can amount to as little as $6 to $12 in the annual family budget, varying with different regions.

Sanitation and water supply. A good farm has an available supply of good water at all times for household use, to supply the stock, water the garden, and perhaps for irrigation. It should be clean and pleasant to taste, and samples for testing should be sent to the State or local health departments to be sure that it is safe. It is convenient to have water piped to buildings under pressure.

If sanitary facilities are to be constructed in a new house or installed in an old one, they also should meet the requirements of the department of health. The cost of the facilities is influenced by how high the water table is, how great the local water supply is and how much it varies, and the protection required to prevent freezing of pipes. Farm homemakers want drains connected to a kitchen sink, a bathtub, a washbasin, and laundry tubs, even if they cannot have piped water, because the drains at least reduce the labor of carrying out dirty water. Piped cold water is valued more than piped hot water, because water can be heated on the cookstove.

It is desirable for both health and convenience to have a sewage system. It is possible to construct an independent disposal system—the most common form being a settling tank and soil absorption field. Tile and steel septic tanks may be had from a number of manufacturers. They are not difficult to install and once properly installed will take care of sewage for years, with a small amount of care. Septic-tank installations should conform to standards of the state or local public health authorities. Wells, springs, or cisterns should be carefully protected and covered, and water should be piped so that nothing can seep in and contaminate it. When running water and a septic tank are not available for sewage disposal, a sanitary-pit privy should meet the specifications of health authorities. Recommended designs can be obtained from State health departments and the United States Public Health Service.

In sections of the country where there are mosquitoes and flies, doors and windows should be screened. Openings through foundations and floors and around pipes and cracked walls should be closed against rats. Basement windows if open should be screened, ventilators and sewer openings grated, screen doors equipped with self-closing devices. Appropriate construction methods should be used to keep out termites.

POST-WAR HOUSING STANDARDS

As part of the Department of Agriculture's planning for the post-war period, a working group on housing and equipment has set up minimum adequate standards for farm dwelling and household equipment which it believes every farm dwelling that is part of an economic farm unit should meet. These standards, as they are listed below, are useful as a guide in building or remodeling. Regional differences should of course be taken into consideration.

The working group first assumed that the following conditions will be fulfilled: (1) The house will be on a farm capable of yielding a satisfactory standard of living including adequate housing; (2) the site will be well drained and suitably located in relation to the farm buildings; (3) there will be available a supply of good water at all times. Wells, springs, cisterns, septic tanks, chimneys, heating installations, and construction in general will comply with modern sanitary and safety standards.

Structure. Roof tight to water at all seasons; floors tight and finished to permit easy cleaning; outer walls tight and constructed

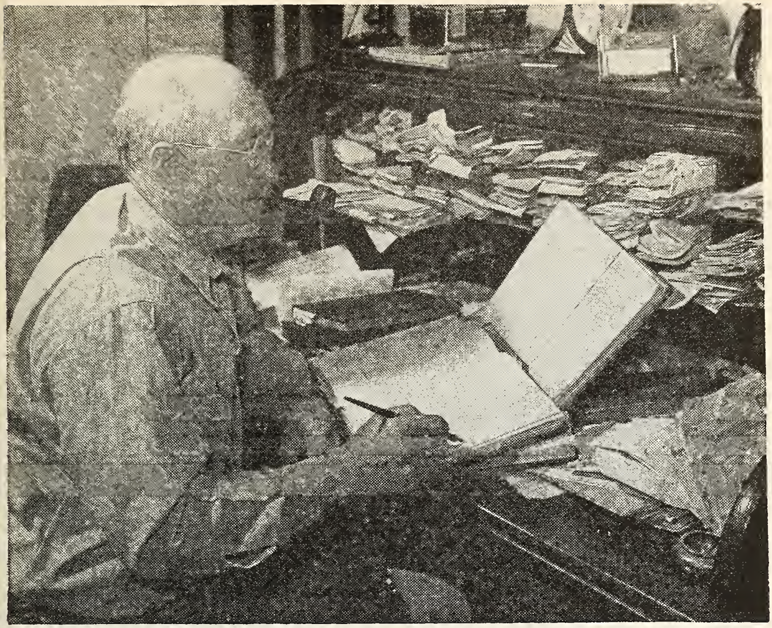


Figure 94. Part of the house serves as the office of the farm enterprise. The farmer carries on his correspondence there, keeps his records, stores his papers, and conducts his business interviews. (U. S. D. A.)

for comfortable year-round temperature, insulated if necessary; inner walls and ceilings: durable, easily cleaned or renewed, reflecting a high percentage of light, deadening noise; ceiling height not less than 7 feet 4 inches; windows glazed, and windows and doors screened except in areas where screens are not needed; continuous foundation or curtain walls between piers where first floor is raised above ground.

Space, arrangement, and storage. Living room: 160 square feet. If also used as a dining room, an additional 70 square feet.

Kitchen: 150 square feet, if fuel used is wood, coal, or kerosene; 100 square feet, if gas or electric stove. If used for dining room, an additional 95 square feet.

Kitchen equipment: sink of porcelain enamel on formed steel or cast iron, 24 by 18 by 6 inches; work surface at left of sink 30 by 24 inches; work surface at right of sink 48 by 24 inches; base cupboards enclosed by doors, and at least four drawers, 6 inches deep, below table tops; toe space beneath cupboards 3 inches high and 3 inches deep; at least three shelves above sink and work surfaces; and provision for sitting at sink.

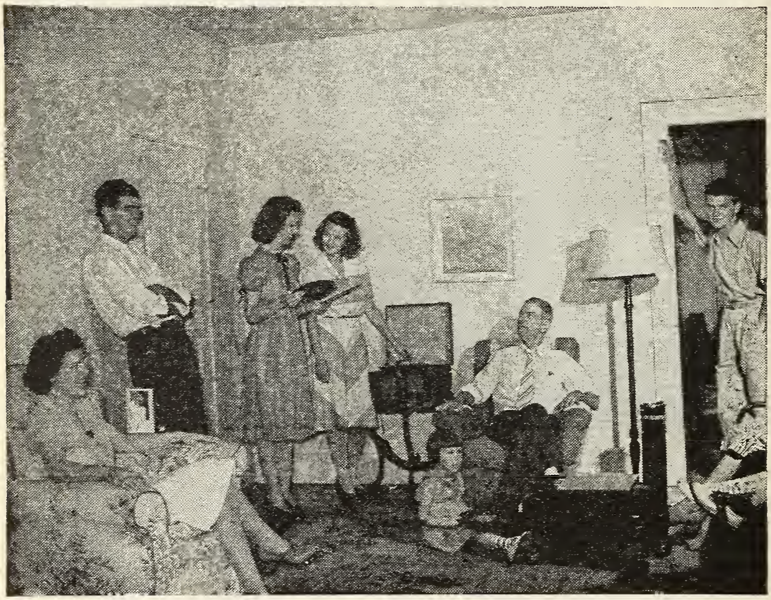


Figure 95. Farm families relax and create their own amusement in their house. (U. S. D. A.)

Workroom, or workporch protected against stormy weather.

Workroom equipment: sink, small stove, adequate provision for washing clothes and facilities for water disposal. Closet in or near workroom for cleaning equipment: 29 inches wide, 21 inches deep.

Bedrooms: at least three, each with a closet, 8 feet by 24 inches. Two bedrooms should be large enough for two double beds—145 square feet. Third should be large enough for twin beds—140 square feet.

Bathroom: 40 square feet. Indoor flush toilet, washbasin, shower or tub.

Porch: 80 square feet, in addition to work porch, desirable in most climates.

Additional storage space: closet, 3 feet by 24 inches, near entrance, for wraps and coats; linen and bedding closet, 3 feet by twenty-two inches, near bedrooms and bath; food storage, 48 square feet in or near house, ventilated and protected from freezing or excessive heat—if fruit and root vegetables are stored, 83 square foot closet for general storage desirable.

For privacy and convenience. Doors to all bedrooms, bath or toilet rooms, and closets; sole access to any room or bath not through a bedroom; doors in kitchen arranged so passage will not be directly through work area; outside doors and porches convenient to farm driveway and path to barn, and where possible on sheltered side of house; shelter over all outside doors.

Light and ventilation. Glazed window area for each room, (1) north, at least 15 percent of floor space; (2) south, at least 12½ percent of floor space; (3) southwest, at least 10 percent of floor space. Window area that can be opened, minimum of 5 percent floor area. Cross ventilation in living room, kitchen and bedrooms.

Electric wiring. Wiring according to electrical code of National Board of Fire Underwriters. Following lighting outlets: ceiling lights in kitchen, workrooms, porches, halls, stairways, over dining area, living room, basement and laundry; one lighting outlet in bathroom and each bedroom.

Heating. To provide healthful and comfortable living. No coal- or wood-burning range, stove, furnace, or stovepipe within 3 feet of unprotected woodwork, or wood-lath-and-plaster partitions.

Fuel storage. Adequate space in or near house.

Water supply. Hot and cold water must be supplied at kitchen sink, in workroom and bath.

Other minimum equipment. Kitchen range, refrigerator (8 cubic feet), washing machine (motor-driven).

CHECK-UP NO. 17

Select the best answer for each of the following questions.

1. What is one fundamental difference between farm houses and city houses? (a) The presence of flowers around city houses; (b) Farm houses are part of the farm business; (c) Farm houses are larger; (d) City houses have larger living rooms.

2. Which home, farm or city, is the scene of greater social activity? (a) The farm; (b) The city; (c) There is no difference.

3. About what percent of farm homes in 1934 had running water? (a) 15; (b) 40; (c) 60; (d) 85.

4. What is the first decision relative to a house that most new farm owners must make? (a) Whether to live in the house as it is or add to it; (b) Whether the old house is worth remodeling; (c) When to start the new house construction.

5. How far from a road should a house be placed in order to avoid most of the dust? (a) At least 50 feet; (b) At least 100 feet; (c) At least 500 feet.

6. What part of the farm home is the most important? (a) The back; (b) The front; (c) There is no difference.

7. In what section of the country is insulation of little value? (a) In protected forest areas; (b) In the Gulf Coast region; (c) In the dry Southwest; (d) None.

8. With regard to arrangement what is the trend in modern farm houses? (a) To spread them so as to get the work part of the house away from the living part; (b) To more compactness; (c) There is no identifiable trend.

9. In what section of the country is the farm kitchen of least importance? (a) New England; (b) North Central; (c) Southwest; (d) Southeast.

10. Which do farmers prefer for food storage? (a) a separate room or cellar; (b) a room or basement in the house; (c) their choice depends upon location of the building and lay of the land.

11. What amount should a small farmer allot for a monthly electric bill if only lights and small appliances are used: (a) $1.00; (b) $3.00-$4.00; (c) $7.50; (d) $10.00.

12. Is farm lighting by kerosene cheaper than by electricity? (a) Yes; (b) No; (c) No data are available.

Compare your answers to the above questions with those in the book. On those questions for which you and the book have different answers reread the pages listed after the answer.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Good farm homes differ from good city homes in several ways. Name and describe at least three such differences.

2. Convenience is one of the watchwords about the farm. Tell what special arrangements about good farm homes make for convenience.

3. What are the best sources of information on farm homes?

4. How much space should be allotted to bed room closets when planning a farm home?

Chapter XVIII
Farm Buildings

WHAT THIS CHAPTER IS ABOUT

You will want some idea as to what kinds of barns, outhouses, and storage buildings you may need on a farm. This chapter tells some of the essentials of good shelter for the most common types of farm buildings.

LOCATION OF BUILDINGS

Highways, the topography of the land, climatic and soil conditions, trees, water supply, and the type of farming to be undertaken all have their influence on the location of the farmstead and the arrangement of buildings. Variations among these factors make impossible the development of one standard plan, but there are a few underlying principles which apply in every case.

In laying out a farmstead plan, the route to be traveled in doing the chores should be borne in mind. The buildings should be so placed that in performing the routine work unnecessary walking is avoided. A farmer's time is valuable. Many factory managers have saved large sums of money yearly by merely eliminating a few steps in the daily routine of employees, or by cutting out unnecessary motions in performing a single piece of work. On the farm a great deal of time and unnecessary labor can be saved by carefully planning the various buildings and arranging them in proper relation each to the other.

If the average farmer were told that sometime during the year he would find it necessary to take a trip of 150 to 200 miles, and that he would have to walk all the way carrying feed or milk or harness, he would object strenuously and declare that he would not have the time; yet hundreds of farmers every year are walking that far over and above the distance that would be necessary in performing routine work were their buildings efficiently arranged.

While convenience and efficiency are major considerations, care must be taken that these factors are not overdone to such an extent that unnecessarily heavy losses result in case of fire. In some parts of the country where the winters are severe, particularly in New England, it has been the custom to connect the dwellings and barn with other outbuildings, directly or by short, covered passages. The reason for this arrangement is, of course, the protection from the weather which it affords, but it means a practical certainty of total loss of the largest buildings if fire breaks out.

The house and barn are the focal points of the layout and, as will be pointed out later, should be sufficiently separated to retard the spread of fire and to afford some privacy for the home and freedom from barnyard odors. The house should have pleasant surroundings and easy access to the highway. By constructing the barn on a north-south axis, all of the stock can have sunlight during a part of the day and, in many sections, the benefit of the prevailing breezes during the hot summer months. The secondary structures are grouped around these main buildings in accordance with the function of each in relation to one another. For example, the silo should be convenient to the barnyard for feeding of stock and not far from the cow stable; the manure shed should be not more than a short distance from the barn; likewise the corncribs and granary should be adjacent to the feeding areas. The milk house should be near the barn for convenience yet set off enough to insure sanitation, and the henhouse should bear the same relationship to the farm home if the poultry is to be cared for by the farmer's wife or daughters. In locating all buildings, possible future developments of the farm enterprise should be borne in mind and adequate space left for expansion.

THE ESSENTIALS OF GOOD SHELTER

Every good farmer knows the need for good barns and outhouses. To him good shelter means more than a warm house and a garage for his car. It means good places to protect his animals, to store feed, and to keep his tools. Many of our early settlers lived in cabins and let their livestock and equipment remain out in the

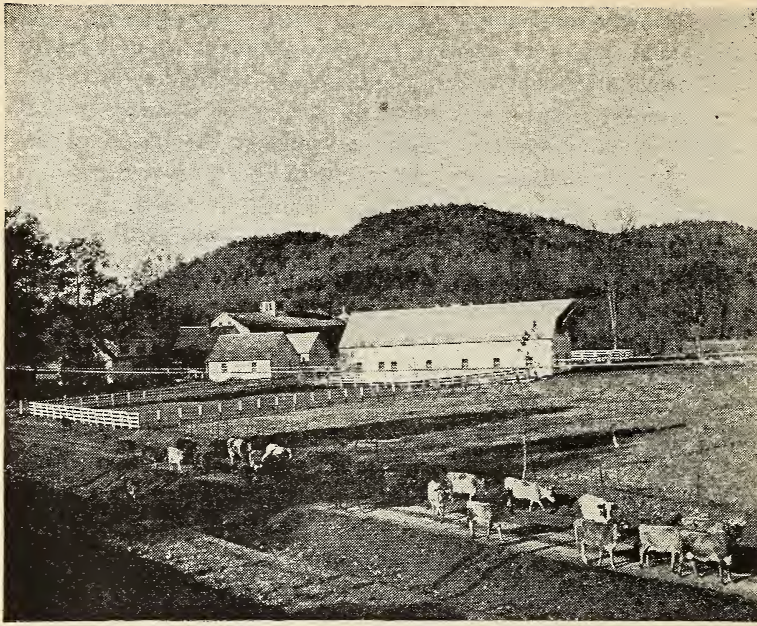


Figure 96. In some parts of the country where the winters are severe, particularly in New England, it has been the custom to connect the dwelling and barn with other outbuildings. (U. S. D. A.)

open without any protection. But farmers have learned that good housing for crops, stock, and equipment pays dividends. Barns and outhouses don't need to be fancy, but they should be up to certain standards. Unfortunately, many farms even today have ramshackle buildings that are completely unsatisfactory.

The kinds of outbuildings you will need will depend in part upon the climate. Naturally, where the winters are long and cold and snowstorms are frequent, warmer and better weatherproofed buildings are necessary. In the South, where the temperature seldom gets below freezing, the buildings don't need to be built as warm as in the Northern States.

Besides meeting the climatic conditions of the area in which you farm, farm structures must be related to the type of farming to be done. A dairy farm, for example, requires a large, warm, well-constructed barn, a good milk house, and a place for the storage of roughage and other feed, while the buildings on a tobacco farm are quite different in purpose and construction. Likewise, buildings should not be larger than the size needed to meet the demands of the farm they are intended for or the amount of the crops annually to be grown and stored. The buildings can grow as the farm grows, but too-elaborate buildings for the size and producing capacity of the farm eat up profits in construction and maintenance. It costs much money and effort to build and maintain buildings and considerable care should be taken in planning them.

Figure 97. Good buildings on a southern farm. (U. S. D. A.)

THE BARN

The barn, usually the largest and most expensive of the outbuildings, is a shelter for farm animals as well as for crops and machinery. On a dairy farm the barn is something special. All dairy farms require a barn large enough to house in single tie stalls or stanchions the number of cows that are to be maintained as milkers. For small herds it is common to have one row of tie stalls for the cows the full length of the barn and some box stalls for housing the herd bull, the cows at calving time, the young calves, and growing stock. Where large herds of 20 or more cows are maintained, it is common to run two rows of stanchions the full length of the barn, then provide additional buildings for housing bulls, cows at calving time, and growing stock.

In the northern areas it is necessary that barns be well constructed for warmth. All barns should be so built that they permit a good amount of sunshine to enter at all seasons of the year. Cement floors and mangers promote better sanitary conditions than wooden ones. As much water is required in the barn and as much manure is produced, it is desirable that water be pumped into the barn and that there be overhead carriers to carry out the manure. Also, dairy barns are usually built with loft space for the storage of hay and bedding. The dairy farmer must keep in mind the local regulations covering the production, handling, and disposal of milk. Marketing areas such as the New York milkshed area have strict milk regulations, and if a barn does not meet the standards, the milk cannot be disposed of commercially. Fundamental requirements of dairy barns can be obtained from the United States Department of Agriculture or the State agricultural colleges.

THE MILK HOUSE

The size and arrangement of the milk house will depend on size of herd, type of market, and type of milk business. The nature of milk requires that the milk house be separate from the stable. Milk absorbs odors readily and is easily contaminated by dirt from the stable. Contamination and the development of bad odors can cause considerable loss to the farmer. The milk, therefore, should be promptly carried after milking to a clean, well-ventilated place free from insects, dirt, and odors. A good milk house should have a concrete floor which can be washed frequently, plenty of win-

Figure 98. Good buildings on a middle western farm. (U. S. D. A.)

dows to let in sunlight, and proper drainage and ventilation to keep the air dry and clean. Milk houses should be supplied with plenty of cold, pure water for cooling the milk and rinsing the utensils. On large dairy farms there also must be adequate facilities for supplying hot water and steam.

THE HOG HOUSE

Hog raising is common to almost every region of the United States. To show a profit, though, hogs must be well housed. Proper quarters should be provided for them both at farrowing time and during bad weather. The same kind of housing for hogs is not needed in all parts of the country. In the North, of course, hog houses must be warmer and better weatherproofed than in the South, but even in the South in the winter season there are frequent cold rains during which hogs suffer if unprotected. The horse and foal, cow and calf, sheep and lamb, and even the chickens are better protected by nature with a good coat to shelter them from inclement weather, but the hogs have practically no covering to serve as protection.

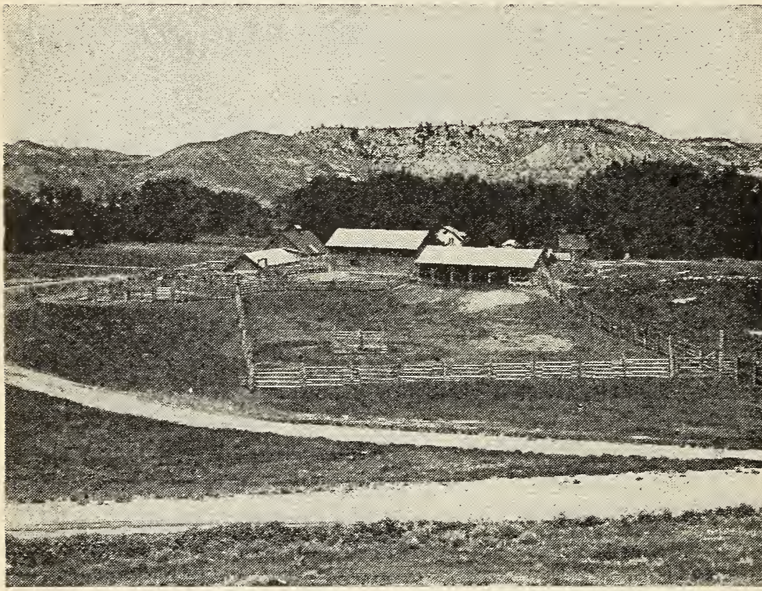


Figure 99. Ranch buildings in the North West (U. S. D. A.)

There is probably no building on the farm that gives so great net returns year after year for the money spent as a good hog house. Yet the hog house frequently is the most poorly constructed building on the farm. One of the chief defects of the average hog house is its poor ventilation. Hogs also require shade in the summer. If the houses are high and well ventilated with plenty of air space, the winter houses can be used in summer. Otherwise, they should be closed during the summer, for a hog will remain inside for the shade and die from overheating. The natural shade from trees is preferable to a house, but good artificial shade can be made by a framework covered with brush and supported by poles.

THE CHICKEN HOUSE

The first essential in housing chicks or laying hens is comfort, for unless chicks are comfortable they will not grow well and pullets and hens will not lay well. To be comfortable a house must be roomy, well supplied with fresh air and sunlight, and always dry.

The second essential is economy. A new house need not be expensive, but it should be durable; the more durable the house the less the cost of housing per year in a period of years.

The third essential is convenience. The house should be conveniently located and should be of such shape and size that work in it can be done with ease. Too often the mistake of building small houses with low roofs is made, so that it is drudgery to care for the chicks or the layers. Since labor is an important factor in the management of poultry, the arrangement of the house for convenience adds greatly to the chances of success.

The location should provide good drainage of water and circulation of air, so that the floor and yards will be dry. The house should not be in a low pocket or hollow in which cold air settles. Wherever possible a southern or southeastern exposure should be selected, although this is not so vital if there is good reason for facing the house in some other direction.

THE SILO

The barn serves as a storehouse for hay and other grain; the silo and corncrib store silage and corn. The corncrib is usually open to the air to prevent the corn from molding while the silo, which is often attached to the barn, is in effect a huge vat substantially built, into which green fodder is compressed and stored for later feeding. Silage is made by chopping up corn, clover, millet, sunflowers, and other forage plants. The chopped fodder is placed in airtight silos where it ferments. Fermenting improves taste and keeping qualities of the fodder.

In a little more than 50 years the silo has become one of the conspicuous buildings of the rural landscape in many parts of the country and in every State. It has been an important factor in solving the livestock feeding problem, particularly in milk and beef production. Silage is also widely used as a feed for sheep.

Not all farmers can use silos to advantage, but permanent, upright silos are practical where there is a herd of as many as 10 dairy cows or the equivalent in other livestock for which silage is a good feed. With a smaller number than this the investment in the silo and the machinery needed for filling it generally makes overhead costs too high per animal; also, it is not usually feasible to build a permanent silo small enough so that when few animals are fed enough silage will be removed each day to avoid spoilage.

Silos may be divided roughly into above-ground (tower or upright) and the below-ground (pit or trench) type, either of which may be built for temporary or permanent use. Brick, tile, and concrete silos, when well-built of good materials, are attractive, durable and fire and wind resistant. Brick and tile are commonly used in regions where clay products are readily available or may be shipped in at reasonable cost. Well-made concrete silos require little attention except for an occasional coat of paint. Of the many types of wood silos, the most common is built of milled staves, the life of which varies with the kind of wood and its treatment. A metal silo is relatively easy to construct, and is durable if it is rust-resistant and kept painted.

STORAGE

Every farmer needs some means of storing vegetables and fruits. He needs such storage space to keep his produce in good condition for his own use and to enable him to hold crops until market conditions justify their disposal. Storage facilities should provide the proper conditions for preserving the natural quality of the product by protecting it from moisture, and in the case of vegetables and fruits, from light and from extremes of heat and cold. The type of storage to be constructed where one is not already available will depend upon such factors as (1) the quantity of products to be stored; (2) the amount to be spent in building it; (3) the permanence desired; (4) the necessary protection from winter temperatures, and (5) the depth of the soil above the water table. The following paragraphs briefly describe in a general way only a few of the various types of storage. Information on kinds of storage to be used in particular areas and for particular crops may be obtained from the State agricultural colleges and the Department of Agriculture. It is important that information be obtained on how to store each type of fruit or vegetable as they require different types of storage.

The storage need not be expensive. A shallow trench or pit in the garden, for example, may be built at no cash outlay and with little labor. A modern basement or above-ground storage, on the other hand, may mean considerable expenditure. The cash cost of such a storage need not be high as the construction involves considerable labor which can be done by the owner. Although the simple types are not so satisfactory as those which are more elaborate, they serve very well.

Figure 100. Buildings on a grain farm in the Pacific North West. (U. S. D. A.)

Pit storage, for storing potatoes, carrots, beets, turnips, late cabbage, and certain other garden produce, is one of the simplest types. It consists of a leveled-off spot of ground or of a hole in the ground with dimensions varying according to the desired capacity. The site for the pit must be well-drained. To locate such a spot in areas where there are heavy winter rains requires special effort. If a suitable site is not available, a high place in the corner of the garden may be built in a few minutes with a shovel. Several small pits instead of a large one may be used so that all the vegetables of a single pit may be removed at once. When this plan is followed, some of each of the vegetables are placed in each pit. This practice is most desirable in extremely cold areas where opening and closing the pit may cause injury to the products.

Vegetables may also be stored above the ground on a level spot covered with 3 or 4 inches of straw. The vegetables (potatoes, carrots, beets) are piled on the straw and the pile is then covered with 3 inches of straw and with 2 inches of soil, leaving the soil off the top of the pile. Then an apple box or barrel is filled with straw and placed upside down over the top of the pile. The straw serves as a ventilator and also keeps out rain and prevents freezing. When the soil crusts over or when cold weather arrives, the apple box is removed and 2 inches of soil placed over the entire pile. Then a 4 inch layer of straw is added to the pile and finally 5 or 6 inches of soil to furnish winter protection.

A below-ground pit for root crops, potatoes, late cabbage, or celery, can be lined with 5 or 6 inches of clean straw or similar material. Dry squash or tomato vines may be used. The products are piled up in a pyramid and covered with 3 or 4 inches of straw. The covering is then completed in the same manner as is done in the above-ground pit. The products are removed from the pit by making an opening through the covering near one end. Usually a roof support is needed if a large supply of products is to be stored.

Side-hill storage is common in rolling areas where large quantities of products are stored. The pit should be deep enough to permit a 7-foot ceiling, with other dimensions varying according to the capacity needed. Because the pit is usually covered with soil, heavy supporting posts, sills, and joists are necessary. The walls may be made of plank, concrete, or stone. Twelve-inch tile extending through the roof and above the soil are often used as ventilators.

Apples, pears, root crops, potatoes, and other produce are sometimes stored in caves or cellars. These are dug completely in the ground to a depth of about 4 feet, leaving 4 feet of walk and a roof above ground to be covered with soil. A ventilator in the ceiling to avoid too much dampness is a desirable feature.

The following tables indicate the different methods of storage that should be used for different fruits and vegetables, the length of storage feasible, and the required temperature and humidity:

TABLE 1.—*Places recommended for home storage of vegetables and fruits*

Commodity	Place to store
Vegetables:	
Dry beans and peas	Attic or other cool, dry place.
Late cabbage	Pit, trench, or outdoor cellar.
Late celery	Pit or trench; roots in soil in storage cellar.
Endive	Roots in soil in storage cellar.
Onions	Any cool dry place, above freezing.
Parsnips	Where they grew, or in soil in storage cellar.
Various root crops	Pit or in soil in storage cellar.
Potatoes	Pit or storage cellar.
Pumpkins and squashes	Moderately dry, fairly cool cellar or basement.
Sweetpotatoes	Moderately dry, warm cellar or basement.
Fruits:	
Apples	Storage cellar, pit, or basement (see text).
Pears	Storage cellar (see text).
Grapes	Basement or storage cellar.
Plums	Do.

TABLE 2.—*Length of storage period and recommended temperature and humidity for home storage of vegetables and fruits*

Commodity	Length of storage period	Temperature	Humidity
Vegetables:			
Dry beans and peas	As long as desired	Cool	Dry.
Late cabbage	Through late fall and winter.	Cool; avoid severe freezing.	Moderately moist.
Cauliflower and broccoli	2 to 3 weeks	32° F	Do.
Late celery	Through late fall and winter.	Cool; avoid freezing	Moist.
Endive	2 to 3 months	Cool	Do.
Onions	Through fall and winter.	do	Dry.
Parsnips	do	Cold; freezing does not injure.	Moderately moist.
Various root-crops	do	Cool; avoid freezing	Do.
Potatoes	do	See text; avoid freezing.	Do.
Pumpkins and squashes	do	50° to 60° F	Moderately dry.
Sweetpotatoes	do	55° to 60° F	Do.
Fruits:			
Apples and pears	See text	Cool	Moderately moist.
Grapes	1 or 2 months	do	Do.
Plums	4 to 6 weeks	do	Do.

CONSTRUCTION AND REPAIR OF BUILDINGS

In general it is cheaper to buy a farm with buildings than to purchase acreage and construct new buildings. This is true even if the existing structures are not entirely suited to the new enterprise, for buildings, unlike land and climate, are flexible. Provided they are structurally sound they can often be remodeled relatively inexpensively and adapted to a variety of other uses. The foundation and the roof are of vital importance, for without a solid base and protection from rain and snow, no building can last long or serve the purpose for which it is intended. These points must be watched closely and repairs made promptly, with materials of good quality. Although these requirements may seem obvious, a farm housing survey made in 1934 revealed the rather startling fact that the roofs of about 40 percent of the houses visited needed to be repaired or replaced.

In new construction, conversion, and repair of farm buildings, there are broad opportunities for the use of native skills and materials. Lumber and stone, common in most sections of the country, usually can be obtained locally, if not from the farm itself. Repairs often can be made with materials salvaged from other buildings or purchased second-hand. Likewise, most farmers acquire a considerable degree of skill in the use of hand tools and can keep cash outlays for carpentry and masonry to a minimum by the use of their own labor, sometimes assisted by their neighbors. Even when a job calls for a more experienced hand, the farmer can act as assistant and thus learn while earning a helper's wages.

FIRE PROTECTION

Farm buildings provide protection for the farmer and his stock and equipment, but at the same time they also need protection against fire. Forethought in the construction, maintenance and use of buildings with a view to eliminate fire dangers, simple equipment for use in extinguishing fires, and a community fire-fighting organization form the farmer's triple line of defense against destruction by fire. Although the last of these measures unfortunately is not available in many communities, every farm operator can take the first two types of protective measures. Since the house and the barn are the most important buildings, they should be separated by at least 100 feet and, where possible, located so that the prevailing winds blow at a right angle to a line connecting the two. This not only gives security from exposure to running fires but also reduces the chances of ignition by flying sparks from the house chimney or by the sparks which are especially characteristic of barn fires. Likewise, the smaller and more hazardous buildings, such as the shop, garage, smokehouse, brooder house, and incubator room, should be placed as far from other structures as reasonable convenience will permit and, where possible, in such positions that the prevailing wind will carry sparks away from other buildings.

In the construction of buildings, a substantial roof of noncombustible or fire-resistant material, while costing more than one of wooden shingles or thin roll roofing, adds materially to safety from fire. Chimneys should be well-lined, inspected frequently for cracks, and kept free of soot. "Fire stopping" of walls, that is, the closing of all open spaces in hollow walls at the floor levels so that the fire will not pass quickly from one floor to another, prevents the rapid and dangerous spread of fire, and doors at the top and bottom of stairways serve the same purpose.

In most parts of the United States, lightning is one of the more frequent causes of fire in farm buildings. However, lightning rods or metal roofs which are properly grounded continuously discharge static electricity, thus making the buildings less likely to be hit by lightning. Modern methods and standards of protection from lightning are estimated to provide from 85 to 98 percent efficiency in preventing this type of fire.

CHECK-UP NO. 18

Select the one best answer for each of the following questions:

1. In what section of the United States are farm buildings likely to be grouped more closely on the farm? (a) North Central. (b) Irrigation districts. (c) New England. (d) Southern.

2. What is one of the main arguments against close grouping of farm buildings? (a) Animals do not have proper range. (b) Fire hazards are greater. (c) There is plenty of space on the farm so why crowd buildings. (d) Ventilation becomes difficult.

3. To give maximum sunlight to the animals occupying the building how should the building be placed? (a) On an east-west axis. (b) On a north-south axis. (c) On a northeast-southwest axis. (d) On a northwest-southeast axis.

4. Why should many hog houses be closed in summer? (a) Because hogs don't need shelter in summer. (b) Because the houses are likely to harbor diseases in warm weather. (c) Because hogs should be on a pasture in summer. (d) Because the houses may be difficult to ventilate.

5. Should the farmer who has only six cows invest money in the construction of a silo? (a) Yes. (b) No. (c) Depends upon how much pasture land he has.

6. Which of the following vegetables should not be stored in cool basements? (a) Squashes. (b) Apples. (c) Onions. (d) Parsnips.

7. For fire protection what is the minimum distance that should separate house and barn? (a) 100 feet. (b) 150 feet. (c) 200 feet. (d) 250 feet.

8. What major cause of farm fires can be almost eliminated by proper building construction? (a) Spontaneous combustion. (b) Careless use of matches. (c) Lightning.

Check your answers by comparing with the key in the back of the book. If your answer and the key do not agree, reread the page listed for that question.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. The proper location of farm buildings is a great factor in determining the efficiency with which a farmer works. Give an example of poor location and good location of the following buildings: House, barn, chicken house, silo and hog house. Use an illustration in connection with your answer.

2. Houses for hogs need some special attention. Why?

3. Silos are not recommended if only a few cows are fed. Tell why such a recommendation is sound.

4. The proper storage of vegetables confronts the farmer with a variety of problems. Cost, permanence, type and amount of vegetables to be stored, the kind of soil and the climate of the region all influence what he does. Tell how each of these factors can affect the farmer who has vegetables to store.

Part 5

Planning and Managing

Chapter XIX

Who Helps the Farmer?

WHAT THIS CHAPTER IS ABOUT

There are many public and private agencies that serve the farmer. This chapter tells about some of them and the services they give.

Before you read the chapter, decide whether each of the following statements is true or false, and mark each one accordingly.

T.F. 1. Federal and State agricultural agencies specialize in and spend all their time and money on research enterprises which will aid the farmer.

T.F. 2. Problems undertaken for study by Federal or State agencies are broken up into their several component parts for study, then re-assembled into a unified piece of usable advice.

T.F. 3. Conservation of resources requires the cooperation of many land users, Federal, State, and local, a program which is carried through by the Federal-State system of agricultural agencies.

T.F. 4. Forestry is a part of agriculture.

T.F. 5. Agricultural agencies of the Federal-State system consider educational tasks a very important part of their cooperative job, but leave the majority of this work to State and local departments.

T.F. 6. The 4-H Clubs are national organizations sponsored by the Office of Education, Federal Security Agency, and devoted to vocational agricultural studies.

T.F. 7. Many non-governmental agencies aid the farmer, both in furnishing him with technical information and other facilities, and in shaping public agricultural policy.

T.F. 8. Under modern conditions, the farmer works with other people less than formerly.

T.F. 9. More than one-third of our farms are now in established soil conservation districts, which also include much *nonfarm* land, and which comprise more than 500,000,000 acres.

If you do not know whether a statement is true or false, do not check it at all. As you read the chapter you will find the correct statements and ideas, and can mark them as you proceed in your studying.

THE DEPARTMENT OF AGRICULTURE AND STATE AGRICULTURAL COLLEGES SERVE THE FARMER

Outstanding among the farmer's helpers are the Federal and State agricultural research and service institutions. These agencies do many things for the farmer which he cannot do for himself. They engage extensively, for example, in agricultural research, which pays large returns to farmers and to the community. Agricultural research is not a job for the farmer individually, or even for groups of farmers. It seldom attracts private enterprise, partly because of the cost and uncertainty involved and partly because no one can monopolize the benefits. It is a task for public agencies—notably the United States Department of Agriculture and the State agricultural colleges and experiment stations.

But agricultural research is only one of the things which the Federal and State agencies do for the farmer and which otherwise might not be done. Equally important with the discovery of agricultural facts is making them known to farmers and others. Hence, the Federal and State agencies give out useful information on agriculture and related subjects. Also, they provide many services for farmers, at all points in their work, from soil care to marketing and farm financing.

Don't draw a line between the Federal and the State agencies; they form a single whole. When Congress decided, amid the stress of the Civil War, to create the Federal department, it provided almost simultaneously for the creation of the State land-grant colleges. The Federal and State agencies had their birth together and grew up together. This partnership continues, with Federal examination of federally financed State research, and with Federal and

Figure 101. Nearly every county in the United States has a county agent who advises farmers individually. (U. S. D. A.)

State work harmonized to avoid overlapping and duplication. Closer today than ever, the Federal department and the State agencies share their planning and their responsibilities.

Primarily, these agencies help the farmer in solving problems of production, farm organization, marketing, land tenure, and land use. This is a big order; so big, that you may think it covers the whole responsibility. Yet the Federal and State people have many other agricultural jobs. They develop new and wider uses for farm products and byproducts, study human nutrition and other aspects of family living, provide various services for consumers, make surveys of foreign agricultural conditions, assist farmers in cooperative crop adjustments, and do law-administration work like meat inspection and regulation of grain, cotton, and produce markets.

Biology, chemistry, physics, meteorology, geology, economics, and many other sciences enter into the research, and produce findings that must be blended and combined. After breaking problems into parts for study separately, the researchers must put the parts together again, as nearly as possible into unified pieces of advice which you can use. The Federal-State system follows this method throughout its efforts to help. It applies the process not only to research findings that you can apply individually in your day-to-day farm operations, but also to projects that bring you into cooperation with your neighbors and with farmers generally. Soil studies, for example, often point to the need for action jointly by land occupiers throughout whole watersheds. They take practical shape in watershed *programs,* which may draw on a dozen sciences.

FARMERS APPLY THE RESULTS OF AGRICULTURAL RESEARCH TO THEIR FARMS

Notice how the method works in a relatively simple case, in which you apply research findings individually on your own farm. Suppose you take up cotton growing and, among other things, must fight the boll weevil. Naturally, you seek the help of Federal and State research men; they have the know-how. But the specialists don't come to you separately, each with his own technique and nothing else. That wouldn't do you any good. You must have the results, not of just one or two inquiries, but of many; you must have them in the proper combination. It isn't your job, or that of any farmer, to decide for yourself how the findings should be put together, any more than it is your job to assemble your motorcar. So you apply to the agricultural clinic—to the Federal-State *team.*

Cotton growing under boll weevil conditions requires three principal methods of control: (1) The planting of early-maturing varieties; (2) close spacing and fertilization to enhance further their tendency to mature early; and (3) the use of insecticides. Applied singly, however, these methods may not work. Early-maturing varieties, if wrongly spaced or fertilized, may not develop properly; spacing and fertilizing must be applied to suitable varieties; poisoning with insecticides, by itself, especially when cotton is low in price, may be too costly. Even if only three specialists advised you,

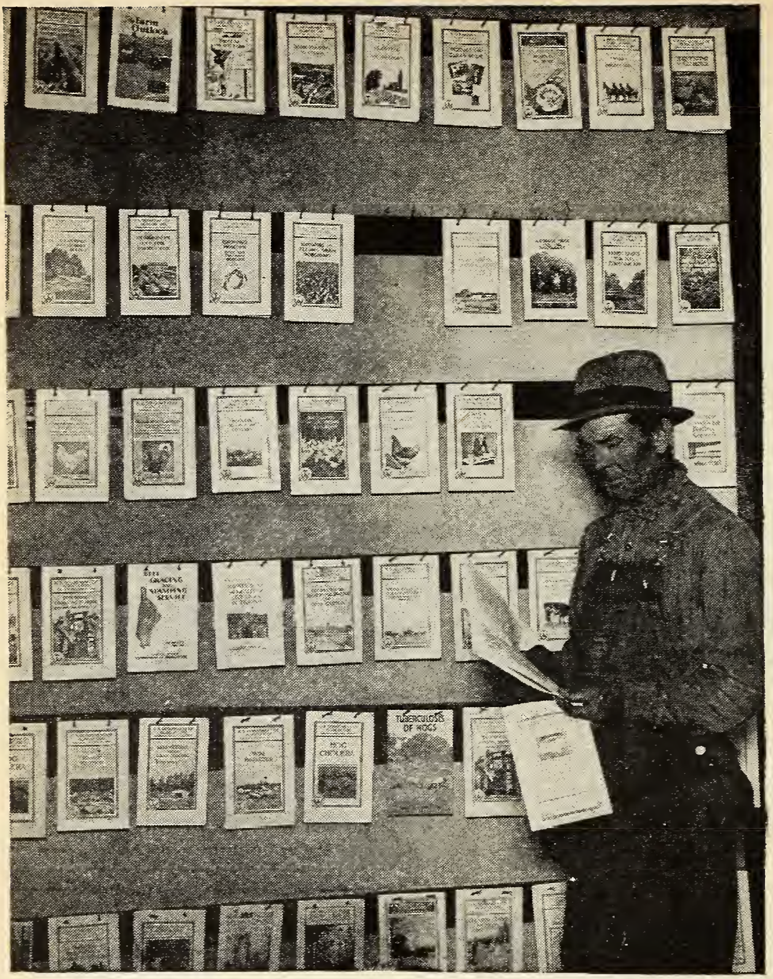


Figure 102. Results of extensive research on every phase of agriculture are brought to the farmer through Federal and State publications. (U. S. D. A.)

each the representative of one of these three methods, you might not know how to combine their recommendations. Hence, they come to you not individually but collectively, through channels provided specially. They come with *all* the facts you need in your fight against the boll weevil—not just some of them; and they give you the facts in a proper assortment, which you can immediately apply.

RESEARCH FINDINGS ARE AVAILABLE TO HELP ALL KINDS OF FARMERS

It is like that throughout agricultural knowledge. Grain growing, livestock raising, or dairying must blend hundreds of findings from scores of different sciences. Grain farmers must know the findings of plant breeders, soils men, entomologists, chemists, and economists. Livestock men need facts about the breeding, feeding, and care of animals; about range and pasture management; about the control of livestock pests and diseases; about markets for their cattle, hogs, sheep, and horses. Dairymen must study an even longer list. Besides knowledge that applies also to the other livestock industries, they must learn about dairy sanitation and the handling of dairy products. Milk isn't just milk. It has to be clean, cold, low in bacteria, free from objectionable flavors, and up to standard in butterfat. Acquiring the details one by one, from separate specialists, would be an endless task, and wouldn't make a pattern you could follow. So the agricultural agencies combine, condense, and shape the materials of information for you. But before we notice what comes next, namely, how you get the information, let us glance at the scope of it.

Helping you to grow better plants and animals, though the basic item, must have a counterpart in marketing help. Hence the Department and the State agencies keep watch on agricultural production at home and abroad and give you the facts, to help you decide what to grow. The "what" is as important as the "how." They provide you also with certain facilities whereby, in cooperation with your neighbors and with farmers generally, you may more surely produce crops in the right kinds, quantities, and proportions. Also, as an aid to more profitable marketing, they provide you with commodity grading and inspection and with market reporting services. These economic helps are indispensable. Without them, middlemen, speculators, or consumers would benefit from your skill in production, while you would lose.

Specialists and others in the Federal-State system help you in the conservation of resources, on which our agriculture and indeed our life depend. Waste of timber, grass, soil, and water causes poverty. Hence the agencies assist you to live well without overplowing your plowland, without overgrazing your grassland, and without overcutting your timberland, through programs that bring Federal men, State men, and farmers into cooperation. They assist you to combine the use with the conservation of the soil, in ways that would be impossible otherwise. Conservation is not exclusively a farm problem and requires more than individual initiative. It requires the cooperation of many land users, such as forest operators and public agencies, Federal, State, and local. Federal and State programs bring these interests together. More than one-third of our farms are now in established soil conservation districts, which also include much nonfarm land, and which comprise more than 500,000,000 acres.

THE AGRICULTURAL AGENCIES AND THE FARMER SHOULD WORK TOGETHER TO CONSERVE LAND

In some areas all the land, nonagricultural as well as agricultural, should be brought into conservation programs. This has become plain from the floods and duststorms of recent years. There is need for erosion control throughout whole land use regions; it does not suffice to check erosion on isolated tracts. Neglect on a few hill farms may ruin a valley lower down and cause much other damage as well. Wind erosion dissipates fertile soil in duststorms. Erosion by water carries the dust into streams, covers bottom lands, chokes dams and reservoirs, and damages roads, railways, irrigation works, power plants, and public water supplies. Through research, demonstrations, and practical control operations the Department's Soil Conservation Service, with the cooperation of other Government agencies, both Federal and State, and of farmers, makes detailed surveys, studies the erosion conditions of entire land use regions, and promotes the adoption of correct cropping, tillage, and engineering practices.

Figure 103. Federal and State agencies help the farmer in adopting soil conservation practices. (U. S. D. A.)

THE DEPARTMENT OF AGRICULTURE HELPS THE FARMER TO GET A FAIR PRICE

Also, the Federal agency supports the prices of your products, partly under laws we had between the wars and partly under wartime laws. Congress has provided, moreover, that for many farm commodities price support shall continue for at least two years after the fighting stops. In between the wars, when farm price support was young, one goal prevailed—more income for the farmers. The war years added another goal, which became more important than the first one; namely increased production, especially of crops needed urgently. Probably when the war is over we shall continue to have a two-fold use for price supports—first, as a prop for farm incomes; and secondly, as a means of helping to shape and guide farm production, so that it will come closer to human needs. Price supports may have *increased* importance for you then, as a means of helping you to shift to peace conditions.

As with other types of help to farmers which the agencies provide, the price supports depend greatly on how well you understand them. Hence the agencies tell you specifically what they do and what they can't do. Price supports make a better market for farmers everywhere. But they cannot provide the same price for every farmer, without regard to where he lives; nor can they ignore the different qualities of products, or dispense with grading, shipping, and processing facilities. So don't overestimate the importance of the price supports. Don't forget, moreover, that when the war is over it will be more difficult for the Government to support your prices. This very fact, however, will increase their value to you, though it may require you to back them up with cooperative crop adjustments.

THE AGRICULTURAL AGENCIES PROVIDE MANY OTHER FARM SERVICES

Forestry is part of agriculture, since trees as well as wheat, cotton, corn, and other crops come from the soil. Therefore Federal and State agencies promote the growth, management, and conservation of trees on both public and private land—in national and State forests, in privately owned timber lands, and in farm woodlots. They also study how to conserve forest products and find new uses for them. Scientists in the agencies help to prevent insect and other damage in warehouse and other storage places; they develop new or improved methods for handling, storing, and processing milk, meats, dairy products, and fruits and vegetables. Economists study farm cost and price conditions, land tenure, land settlement, farm debt, and farm taxation.

Various agencies provide farm credit for long-term mortgages, for intermediate and short-term use, and for rural rehabilitation. It is worth your while to study these credit facilities carefully. Perhaps you can get credit and begin farming on a moderate scale. In that case, why dispense with credit and struggle along on virtually a subsistence basis? Learn what types of farm credit are available. Also the Government lends funds, chiefly to farmers' cooperatives, for the construction of rural electric systems.

Observe the advantages you get from regulatory law administration. It protects your health and pocket, excludes plant pests, supervises livestock slaughtering, controls marketing in grain, cotton, and other products, fixes container sizes, certifies seed supplies, and does many other useful things. Study the national crop-adjustment system; eventually it may be in force again.

Some of this work helps you only indirectly; for example, discoveries in the utilization of farm products. Chemists have turned cottonseed, once a nuisance, into a source of wealth; the cotton grower gets a price for a byproduct that was formerly worth nothing. Other work in Federal and State agencies has only an indirect effect on agricultural operations; for example, studies of crops like tea, coffee, silk, and cocoa, which the United States does not produce. It is important to know about such crops; but the knowledge will affect our own agriculture only indirectly, possibly through its bearing on international trade. Most of the work done in the Federal and State agencies, however, depends for its value on how fully it reaches you and then on what you do with it.

Go back to the beginning of this chapter and read again statements 1, 2, 3, 5, and 9. Have you changed your mind about any of them?

AGRICULTURAL AGENCIES EDUCATE THE FARMER

Education in the broadest sense of that word brings most kinds of Federal and State help to you. Even service functions, like commodity grading or seed certification, need an educational support. Various agencies in the Federal Department of Agriculture have educational tasks, such as the Office of Information, the Extension Service, the Farm Security Administration, the Agricultural Adjustment Agency, and the Rural Electrification Administration. Among the facilities are publications, press and radio services, motion pictures and exhibits, farmer discussion groups, lectures, and correspondence. For example, the Department yearly issues approximately 25,000,000 copies of Farmer's Bulletins, Circulars, periodicals, publication lists, and other publications. The big education job, however, is on *State and local* levels.

Agricultural education is cooperative, just like agricultural research. The Federal Department of Agriculture and the State colleges of agriculture do their educational work together, with the Federal and the State Governments sharing most of the expense. County appropriations, and contributions by local organizations and individuals, meet a small part of it. Vocational high schools and other educational institutions, and also some private organizations and institutions, assist in bridging the gap between agricultural science and agricultural practice. But the mainstay is the Federal-State hook-up. Through the Extension Service, the Department of Agriculture, the State land grant institutions, and county officials reach farmers throughout the country.

It used to be said that farm practice in this country was decades behind farm science. Today the gap is not so wide. By and large, American agriculture is efficient. Our farms in 1943, with a population nearly 4 million under that of World War I period, produced 47 percent more food than in 1918, which was World War I's peak food-production year. American farmers are efficient because they strive to keep up with science, and because Federal and State agencies carry agricultural science to them.

Agents of the Federal-State Extension Service work with local groups and leaders at county, community, and neighborhood levels, and often come to you directly. Their task covers three main fields: In the first, they bring together Federal, State, and county facilities for helping you to solve your ordinary, personal, and day-to-day problems of production, marketing, homemaking, and country-life improvement. In the second, they assist you to act with other farmers in dealing with great national emergencies, through cooperative crop adjustments, orderly marketing, cooperative soil conservation, and other means. In the third, they help to shape and administer public programs, both directly and through consultation with your farmer committees. These services carry educational and advisory help to all farm groups at all farm-income levels, in every agricultural county in the United States, and also in our territories and possessions.

Originally the extension work dealt chiefly with farm production, but now it touches every phase of farming and farm living. Problems of production are as important now as they were formerly. Farmers must always study how to grow more per acre, how to get more meat and milk from the livestock for each pound of feed consumed, and how to take care of their land. Extension work covers all such matters as fully as it ever did; in fact more fully, because it has more information to give. But nowadays it goes much further. It helps you in locating seed supplies, in arranging for the storage of your crops when the need arises, in cooperating to the best advantage in production-adjustment programs, in debt adjustment and farm credit arrangements, in drought-relief measures, in rural relief and rehabilitation, and in numerous other ways. In many of these activities it gives you educational and service help together, on the principle that what you understand will do more for you than what you don't understand.

FARM BOYS' AND GIRLS' CLUBS ARE IMPORTANT

Important in the extension system is the work with 4-H Clubs of boys and girls. These clubs, whose name stands for work with health, heart, head, and hands, require members to complete certain farm or home activities under the supervision of the county agricultural agent. The projects involve all elements of farming and homemaking, and include community activities as well. Mem-bers learn to work together as well as individually; to take part discussions; to speak in public; to grasp community problems; ar to qualify themselves generally for citizenship. More than 1,500,0(4-H Club members took part in such farm and community activ ties last year; they helped to enlarge our food and fiber supply; store and preserve food; to relieve labor shortages on farms; control rural fire hazards; they assisted local committees in variou campaigns. Members became pioneers in their communities f better farming and better living. Another organization for youn farm people is the Future Farmers of America. This is a nation organization of boys, sponsored by the Office of Education, Feder Security Agency, and devoted to vocational agricultural studie One of its purposes is to promote such studies in high schools.

Figure 104. 4-H Club activities cover home making as well as farming projects. (U. S. D. A.)

THE COUNTY AGENT MAY BE YOUR MOST IMPORTANT ADVISER

Nearly every county in the United States has a county agricultural agent, who advises farmers individually, and draws on extension headquarters and on the State college staff for any necessary special help. Know your county agent; he is your first link with the Federal and State agricultural agencies. Perhaps he doesn't have all the facts you need; but if they exist, he can get them; he can put you in touch besides with the various service activities. Perhaps you want information about the agricultural conservation program. Perhaps your interest lies in some technical development, in economic reports, in university extension courses, in power machinery, in accessible seed supplies, in crop and plant diseases, in farm cooperatives, in farm wood lots, in credit facilities, or in farm labor conditions. In any case the county agent is your man. He doesn't rely exclusively on word-of-mouth teaching, but actually shows how things are done by farm demonstrations, in which he cooperates with local farmers. Home demonstration agents carry on the same kind of work in the field of food preparation and other tasks of the farm household.

Such functions as cooperative crop adjustment, cooperative soil conservation, flood control through land treatment, tenancy and rural rehabilitation programs, the purchase and development of lands that ought not to be in farms, the provision of small water facilities in semi-arid regions and many other Federal-State activities require educational work to explain the why and how. Studies in farm housing, in farm structures generally, in elevator and warehouse construction, in processing operations such as cotton ginning, in flour milling, and in meat packing must be made known to farmers through extension work. Farmers use education to learn more ways of using forest knowledge on their farms; for example, in the planting of shelterbelts and farmstead plantations that will fix soils, prevent dust storms, and restore soil productivity. They use it in order to get more benefit from crop statistics, from Government-sponsored marketing agreements, from facilities for rural electrification, and from Government credit institutions. They use it in order to do more things together, and more things in association with the Federal and State agencies. Briefly, education enables them to take advantage of Federal and State services.

OTHER ORGANIZATIONS HELP THE FARMER TOO

Many non-governmental organizations help the farmer, both in getting technical information and other facilities for him and in shaping public agricultural policy. Well-known examples are the American Farm Bureau Federation, the National Grange, and the Farmers' Educational and Cooperative Union of America. These organizations actively promote agricultural research through Federal and State agencies, and encourage education in scientific agriculture and home economics. Also, they present their views on National and State aspects of agriculture's problems to legislative bodies, and to farmers and the public generally. Members can advance their interests collectively, and participate in discussions to shape or alter organization policies.

Other farm organizations serve limited groups of farmers, such as those who belong to certain cooperative associations or who produce certain crops or livestock. Examples are the wool growers' associations, the cattlemen's associations, and the dairymen's associations. Some private businesses maintain contacts with farmers. Canners, for example, make contracts with growers for certain products. Sellers of farm equipment, fertilizer companies, livestock packers, and other concerns frequently carry out educational programs among farmers, related directly or indirectly to what the companies sell or buy. Cooperative marketing and purchasing associations serve farmers extensively, sometimes through widespread federations. Cooperative grain elevators frequently handle livestock feeds, salt, seed, and other supplies for farmers. Sometimes they even take on a line of farm machinery and repair parts.

THE FARMER WORKS WITH OTHER PEOPLE

Comparatively, the farmer is an independent fellow. More than most other people, he is his own boss. But his independence is less than it was formerly; under modern conditions he must work much with other farmers, often through facilities provided by public agencies. In the beginning, moreover, he may have to share some of his management decisions, such as his decisions with regard to what equipment he should buy, what crops he should grow, and what livestock he should keep. Perhaps his landlord, or the holder of the mortgage on his land, has a voice in such matters. Sometimes a public agency, such as the Farm Credit Administration or the Farm Security Administration, has some control over his use of borrowed funds. But the more he improves his technique, suits his crops to the demand, and manages his business efficiently, the less will his independence be abridged. Hence, with other things equal, the farmer who knows most about the help he can get, and who makes the most use of it, will get ahead fastest.

Check your previous decisions on questions 5, 6, 7, and 8 at the beginning of the chapter. Were you right in all of them?

CHECK-UP NO. 19

Below are several completion statements based on the chapter you have just read. Only one of the choices given will make a true statement. Underline the correct completion to each.

1. The Federal Department and the State colleges of agriculture do their educational work together with,

   a. County appropriations meeting most of the expense.

   b. Federal and State governments sharing most of the expense.

   c. Contributions by local organizations and individuals meeting most of the expense.

2. Extension Service sponsors:

   a. 4-H clubs.

   b. Future Farmers of America.

   c. Office of Education.

3. The following is the farmer's first link with Federal and State agricultural agencies:

   a. County agent.

   b. Extension headquarters.

   c. Members of a college staff.

4. Agriculture research is usually undertaken by:

   a. Groups of farmers.

   b. Private enterprise.

   c. Public agencies.

5. The U. S. Department of Agriculture and the State agencies:

   a. Share their planning and their responsibilities.

   b. Examine each other's financial situation.

   c. Never know what the other is doing.

6. The Department of Agriculture together with the State agencies:

   a. Supports the prices of farm products.

   b. Combines and condenses research findings and shapes a program pattern for the farmer.

   c. Sponsors Future Farmers of America.

7. The floods and dust storms of recent years have taught us that:

   a. All the land, nonagricultural as well as agricultural, should be brought into conservation programs.

b. Forestry is part of agriculture, since trees come from the soil as well as wheat, cotton, and other crops.

c. Economists study farm cost and price conditions, land tenure, and farm taxation.

8. The following is an example of an indirect service of the agricultural agencies:

a. Farm credit for long term mortgages.

b. Discoveries in the utilization of farm products.

c. The lending of funds for the construction of rural electric systems.

When you have finished these completion statements, check your answers with those given in the back of book. If yours do not agree, turn back to the chapter to see why you differ. Never accept an answer without checking back to be sure it is correct as given in the answer key.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Discuss this statement: "Some farmers think it best not to take advantage of provisions made by various agencies for farm credit, and continue to struggle along on virtually a subsistence basis." What considerations should influence such a decision on the part of a farmer?

2. Why is the county agent the farmer's first link with the Federal and State agricultural agencies?

3. How does educational work by agricultural agencies help farmers take advantage of Federal and State services?

Chapter XX

The Farmer Goes to Market

WHAT THIS CHAPTER IS ABOUT

This chapter tells some of the things that a successful farmer knows about marketing.

Put yourself in the farmer's place. What do you know about marketing now? How would you answer these questions?

1. General economic conditions affect the success of the farmer, but those conditions are market factors over which he has no control. Does this indicate that the farmer can do nothing about them?
(a) Yes (b) No (c) Don't know

2. Do marketing charges represent about the same percentage of retail prices at all times, whether those retail prices are high or low?
(a) Yes (b) No (c) Don't know

3. Do Federal and State agencies take any steps to prevent unfair practices in the determination of market grades?
(a) Yes (b) No (c) Don't know

4. Do farmers usually find it advantageous to market low quality products?
(a) Yes (b) No (c) Don't know

5. From market reports of supply and demand the farmer can estimate market trends, and by comparing markets he can decide when and where he should sell. Is there any other important factor he need take into consideration in planning where to sell?
(a) Yes (b) No (c) Don't know

6. Does the Federal Government actively advocate the growth and development of farm cooperatives?
(a) Yes (b) No (c) Don't know

These are only a few of the things a farmer needs to know before he goes to market. Perhaps you don't now know the answers to these questions or any of the other important points, but you can get these knowledges as you read the following pages. Try to pick them out as you go along.

THE FARMER PRODUCES TO SELL

Some of the most serious problems that the farmer will have to face in the years ahead are problems of marketing. The farmer has learned through bitter experience that no matter how efficient he is in production, he will not be successful unless he can sell his produce to advantage.

In pioneer days the farmer did not have to worry much about marketing. He was producing things chiefly for home use. Practically all the necessities of life, such as food and clothing, were produced right on the farm. Nearby towns took his surplus, partly in exchange for locally produced articles needed on the farm.

Today, however, the farmer is producing things mainly to sell. Generally only a small part of his output is for home use. He has become a part of a vast commercial system (see, for example, Fig. 105, which shows marketing channels for livestock). Today, production is only half of the business of farming. The other half consists of the farmer's relations with this complicated outside world which constitutes the market for his products and his source of many important goods and services formerly largely derived from the farm itself.

GENERAL CONDITIONS INFLUENCING PRICES RECEIVED BY FARMERS

There are many market factors, called general economic conditions, that affect the success of a farmer but over which he has no control. This does not mean, however, that the farmer is helpless to do anything about them. He must adapt himself and his farming operations to meet these conditions. It should be remembered, too, that these general factors or conditions are not always against the farmer. In many cases they may help him, if he takes proper advantage of them.

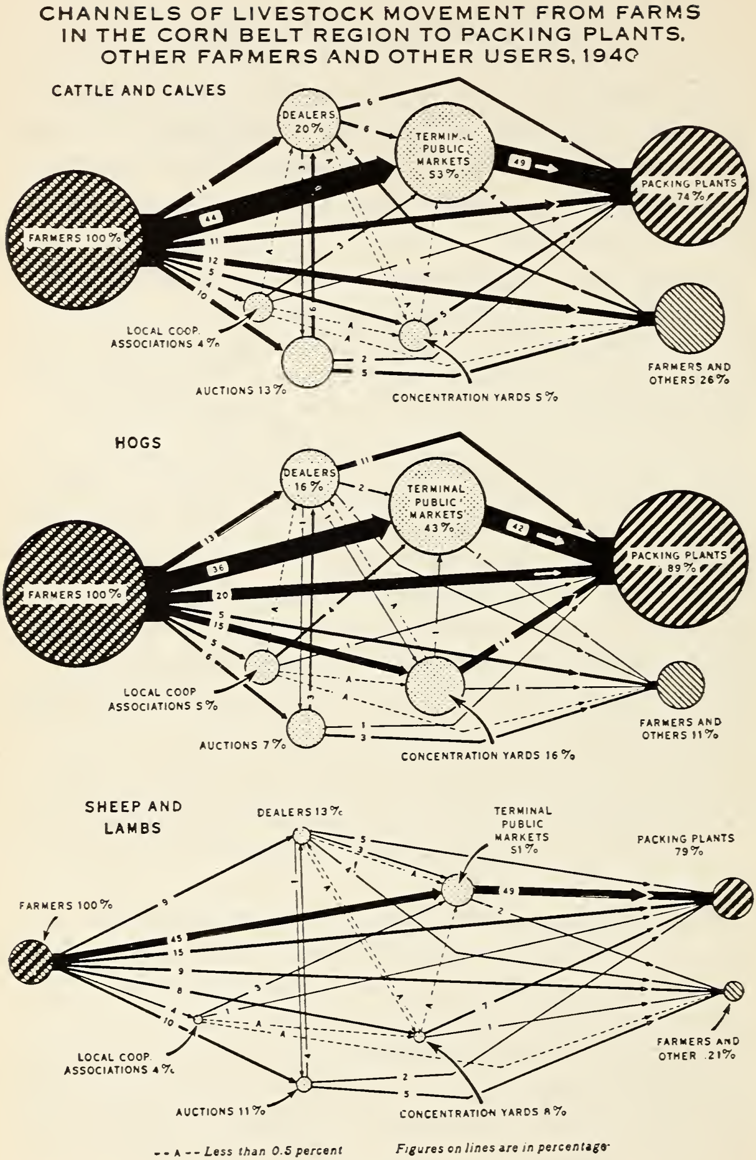

CHANNELS OF LIVESTOCK MOVEMENT FROM FARMS IN THE CORN BELT REGION TO PACKING PLANTS, OTHER FARMERS AND OTHER USERS, 1940
CATTLE AND CALVES
DEALERS 20%
TERMINAL PUBLIC MARKETS 53%
PACKING PLANTS 74%
FARMERS 100%
LOCAL COOP. ASSOCIATIONS 4%
AUCTIONS 13%
CONCENTRATION YARDS 5%
FARMERS AND OTHERS 26%
HOGS
DEALERS 16%
TERMINAL PUBLIC MARKETS 43%
PACKING PLANTS 89%
FARMERS 100%
LOCAL COOP ASSOCIATIONS 5%
AUCTIONS 7%
CONCENTRATION YARDS 16%
FARMERS AND OTHERS 11%
SHEEP AND LAMBS
DEALERS 13%
TERMINAL PUBLIC MARKETS 51%
PACKING PLANTS 79%
FARMERS 100%
LOCAL COOP. ASSOCIATIONS 4%
AUCTIONS 11%
CONCENTRATION YARDS 8%
FARMERS AND OTHER 21%
- - A - - Less than 0.5 percent
Figures on lines are in percentage

Figure 105.

THE GENERAL PRICE LEVEL CAN MEAN SUCCESS OR FAILURE

The general price level is an average of the prices of all individual products and services. The average of these prices moves up and down in response to certain economic conditions which have a similar, although not identical, effect upon the prices of individual commodities. When prices rise rapidly, as they did from 1916 to 1921, or when they fall rapidly, as from 1929 to 1932 (see Fig. 106), all classes of society are affected in one way or another.

When the price level declines farm products are usually among the first to fall. They are usually, also, the prices which experience the most severe drop. When the price level rises, farm prices are among the first to go up and are likely to advance more for a time, at least, than other prices (see Fig. 106).

The general price level is a very important consideration to a man thinking of going into or going out of farming. Suppose, for example, that a man established himself in farming in 1900. At that time the cost of land was relatively low, as was the cost of stocking the farm with equipment and livestock. What would now be considered a modest outlay of capital was required. Such a farmer, also, was destined to experience a long period of agricultural prosperity, because for the next several decades the prices of most of his produce would be rising faster than his costs (see Fig. 106). An unusually large part of the cost of production in agriculture is represented by general overhead or fixed costs, such as taxes, interest, and depreciation. These prices or costs tend to lag behind other prices. Thus the farmer beginning operations in 1900 was at an advantage because of his entry into the farming business at a time when land, equipment, livestock, and other items were relatively low in cost, resulting in relatively low fixed costs of operation.

If this farmer continued to farm for 20 years and sold out in 1920, he could hardly have avoided being successful, even though his methods were not efficient. By 1920 the value of his land would have increased, along with other prices. The value of his equipment also would have increased through the years, and in addition

WHOLESALE PRICES OF FARM AND NONAGRICULTURAL PRODUCTS, UNITED STATES, 1798-1943

INDEX NUMBERS (1910-14=100)

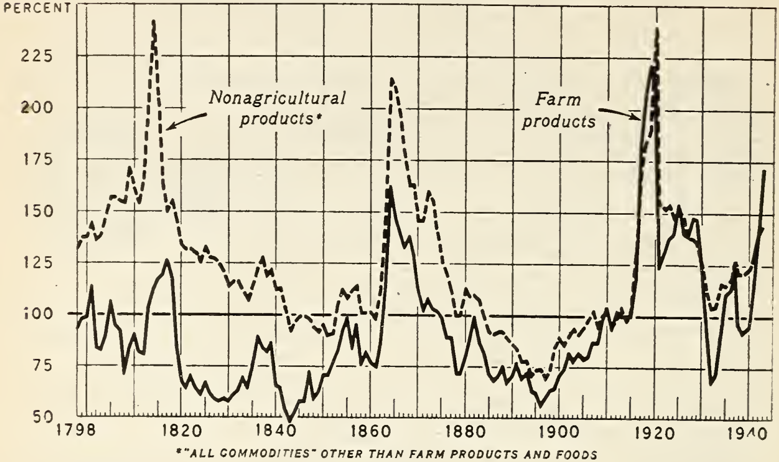


Figure 106.

PRICES RECEIVED AND PAID BY FARMERS, INDEX NUMBERS, UNITED STATES, 1910-44

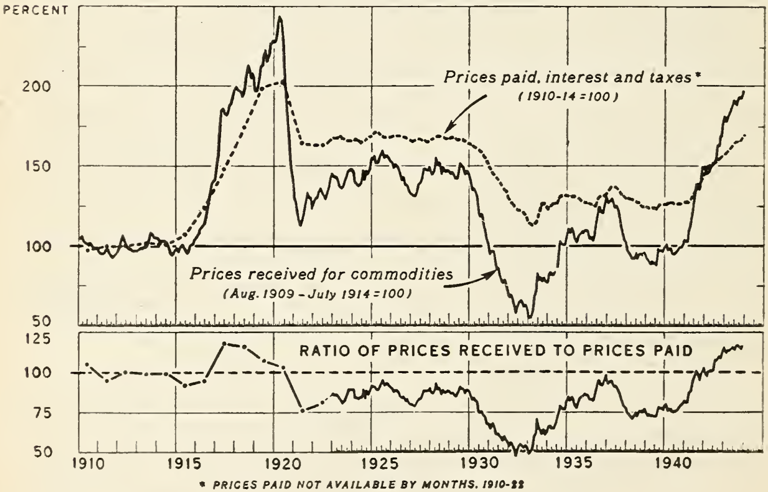


Figure 107.

he would have been operating almost continuously with prices rising ahead of his costs. These factors, largely beyond the control of the individual farmer, would have made success relatively easy.

In contrast, suppose that our farmer happened to start farming in 1919, right after World War I. At that time land values were high. Costs of equipment and livestock were also high. It required a much larger outlay of capital than in 1900, probably necessitating heavy borrowing and interest charges and generally making the farmer's fixed costs high. Immediately following his establishment in business he would have experienced a sharp decline in the prices which he received for his products, and these prices would continue low relative to his fixed costs for many years to come (see Fig. 107). Even if this young farmer were efficient as a producer, his life would be a constant struggle to raise enough produce to meet his high fixed costs. Under these circumstances, many thousands of farmers have given up the battle and lost everything. Even if this farmer were able to hang on, and retire 20 years later, he probably would experience a large capital loss, because farm real estate values were lower in 1939 than in 1919.

It is not hard to see from these illustrations that movements of the general price level play a very important part in the success or failure of the farm business. Farmers and prospective farmers should try to take advantage of these trends.

GENERAL DEMAND CONDITIONS INFLUENCE SUCCESS OR FAILURE TOO

These longer-time trends of the general price level are only one of the factors determining what price a farmer will get for his products when they are ready for market. Another important influence is what is generally referred to as demand conditions. This term covers general business activity, employment and consumer incomes.

Consumers tend to spend about the same proportion of their incomes for food, although this proportion changes slightly from time to time. If, therefore, the total money income of consumers rises, a large amount will be spent for food and clothing, and if

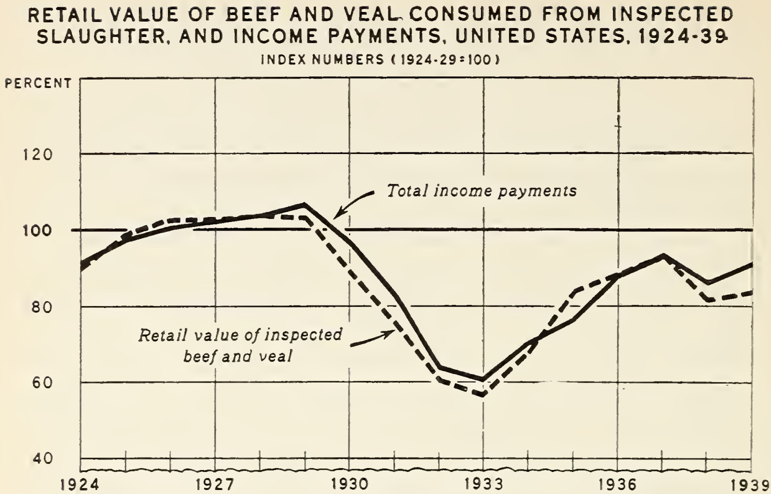


Figure 108.

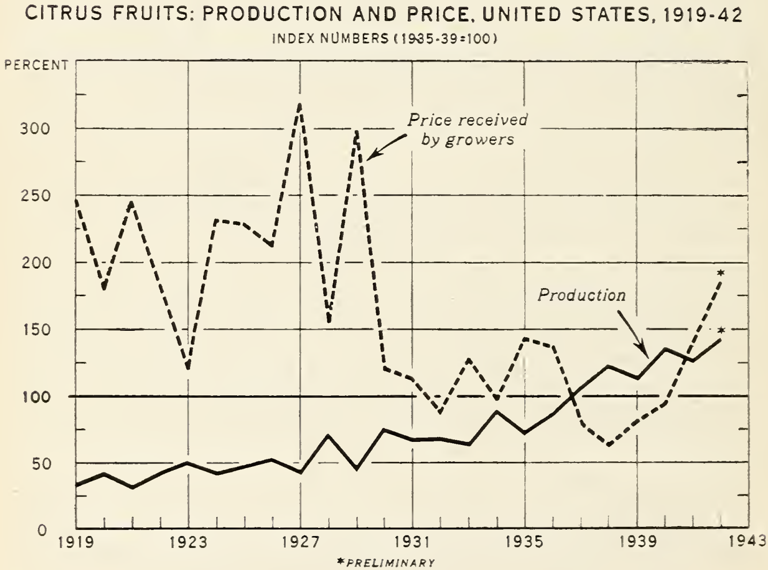


Figure 109.

income falls a smaller amount will be spent (this is shown in Fig. 108, which indicates the changes in amounts consumers paid for beef and veal as consumer incomes changed). With any given quantity marketed, this means higher or lower prices received by farmers as consumer incomes go up or down.

In order to market products at the most profitable time, therefore, and also in order to expand and contract his operations to take advantage of changing market demands, the farmer must give attention to prospective changes in the money purchasing power of the people who consume farm products.

AMOUNTS PRODUCED AND MARKETED BY OTHER FARMERS AFFECT EVERY FARMER

A farmer sells his products in competition with all other farmers. Though no single farmer can appreciably influence the market supply, all farmers taken as a whole determine this supply. Any farmer, to be successful, must be aware of what other farmers are doing. The amounts produced and marketed by other farmers have a direct effect on the prices received by any individual farmer, and hence upon what he should do on his own farm (see Fig. 109). He cannot change the over-all situation but he can and must adapt his operations to take advantage of it.

HOW TO TELL WHAT OTHER FARMERS ARE DOING

To determine what other farmers are producing and marketing, farmers have come to rely on what are called outlook reports prepared mostly by Government agencies. In addition to showing the present conditions as to what is being produced and sold, these reports also contain forecasts of what conditions will likely be in the future. They keep the individual farmer informed as to what other farmers are likely to produce and what the market situation is expected to be. They cover prospective demand as well as supply conditions.

This type of information, while relatively new in one sense of the word, is really just an application of an old idea. As far back as old-timers can remember farmers have been influenced, to some extent at least, by what other farmers were doing and what their plans were for future activities. In earlier years these observations were local in nature. For instance, a farmer might see that his neighbors were partially selling out their breeding stock of hogs. Hogs were cheap and unprofitable, and so, many producers were going out of business or reducing their hog operations. To the alert farmer this might mean an opportunity to make some money in hogs. He might reason that as a result of these actions the supply of hogs would be short in the near future. Since farmers now were anxious to sell, breeding stock could be picked up at a low price and so it might be an excellent opportunity to *go into* production. Or, the reverse situation might prevail. Most farmers might be going into production because of favorable prices, and thus an alert farmer might reason that it would be an excellent time to reduce production of that commodity.

It is much better, of course, to base one's observations on what farmers all over the country and even the world are doing, not just those in one locality, which might not be representative. Outlook reports are designed for this purpose. They help the farmer keep informed of past, present, and future conditions. These reports cover prospective demand as well as supply conditions. They are prepared by the United States Department of Agriculture, the various State colleges of agriculture, and by private concerns, and are made available to farmers in many ways, principally through the State agricultural extension services.

Of course, these outlooks are not perfect or entirely accurate and it is understood that a farmer cannot make radical changes in his farming system over night. Nevertheless, within a certain range he can adjust his operations to meet changing conditions and these outlook reports are the most accurate means of keeping posted. It is up to the individual farmer to interpret these reports and make adjustments which are suitable in view of his own particular situation.

MARKETING CHARGES AND COSTS AFFECT FARMER'S SUCCESS

The farmer receives only a portion of the amounts paid by consumers for food and clothing. On the average, for all products and for farmers in all parts of the country, this proportion is about one-half. But the proportion varies for different products marketed by different farmers at different times.

Figure 110 shows the percentage of the consumer's dollar paid for different commodities which went to the farmer in 1942. The large differences are accounted for mainly by the differing services which must be rendered in the marketing of these products, and differences in the costs of performing these services.

Labor costs represent the largest single element of marketing costs, and changes in marketing charges are related to changes in city wage rates. Since labor and other costs do not fluctuate as much as commodity prices, marketing charges are relatively constant compared with prices paid by consumers. Hence, when retail prices are high, marketing charges tend to represent a relatively small percentage of retail prices, and the percentage of the consumer's dollar going to farmers is high. When retail prices are low just the opposite relationship prevails.

The proportion of the price paid by consumers (retail price) received by any individual farmer, compared with the average, depends largely upon his distance from consuming markets, which affects transportation costs, the character of local market facilities available, and the quality of the product he produces.

Although marketing charges and costs are in considerable part beyond the control of the individual farmer, they are of major importance in affecting the results of his farming operations.

In the selection of a farm, attention should be given to its location and the effect of this upon marketing charges and costs. Such effects must be weighed against differences in land values with which they are associated. No farmer should attempt to raise products for which there is no satisfactory market outlet. It might not be profitable, for instance, to produce truck crops for the Louisville market in Grayson County, because the cost of marketing them would be so high that successful competition with Jefferson County would be impossible.

MARKETING CONDITIONS PARTLY UNDER THE CONTROL OF THE INDIVIDUAL FARMER

Many of the problems of marketing are individual problems. The individual can control some of these problems directly and he can have considerable influence on many others. In dealing with these marketing conditions over which the individual farmer has some control there are many opportunities to exercise individual initiative. Many farmers lack marketing ability and do not take advantage of these opportunities.

QUALITY CONTROL IS IMPORTANT TO FARMER

So far as quality of the products marketed can be controlled, the farmer has the greatest opportunity of all to influence the price received. Of course, many of the factors which make up quality are determined by natural processes such as soil conditions, and are largely beyond direct control of farmers. Nevertheless, through selection of parent stock, care in growing, and correct handling and marketing methods the quality of the product can be influenced by the farmer. In order to get the full advantage of quality production, however, the farmer must be able to obtain a higher price for good quality. This is not always an easy matter.

GRADING AND INSPECTION HELP THE FARMER GET A FAIR PRICE

In recent years emphasis has been placed upon accurate grading of farm produce. Detailed standards for various commodities have been devised by the Department of Agriculture and other agencies. Separation of qualities by grades makes it possible for each buyer

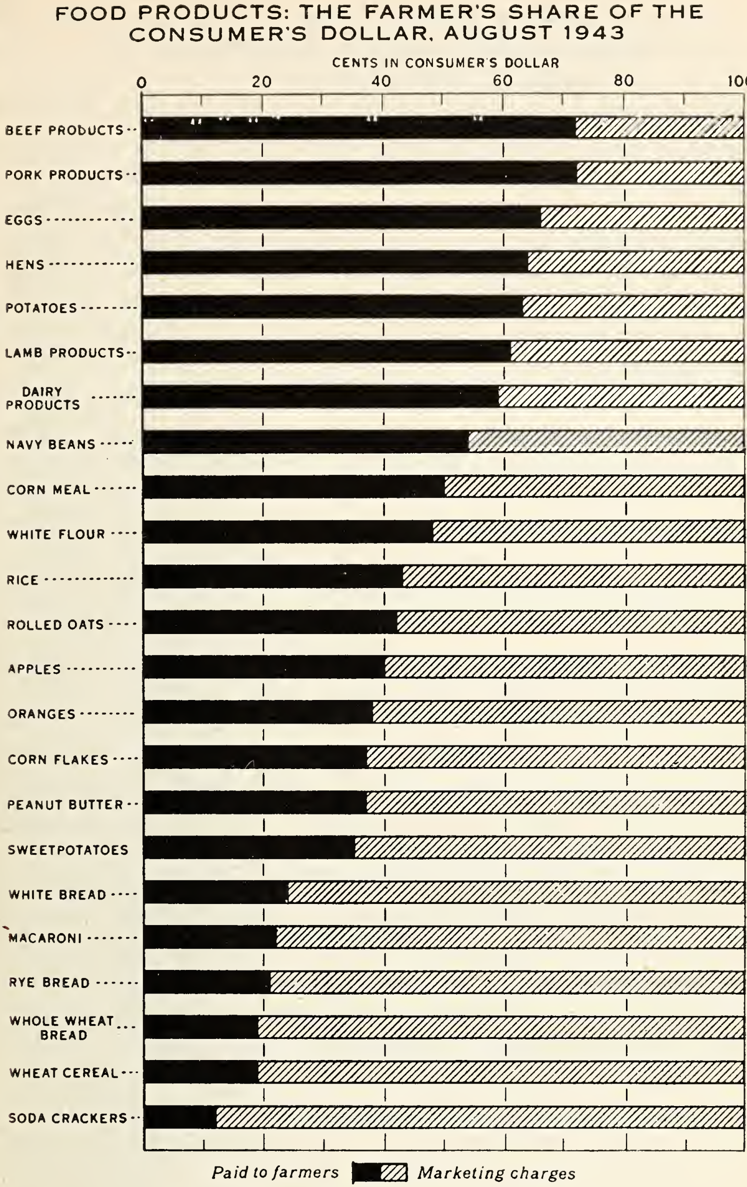

FOOD PRODUCTS: THE FARMER'S SHARE OF THE CONSUMER'S DOLLAR, AUGUST 1943
CENTS IN CONSUMER'S DOLLAR
0
20
40
60
80
100
BEEF PRODUCTS
PORK PRODUCTS
EGGS
HENS
POTATOES
LAMB PRODUCTS
DAIRY PRODUCTS
NAVY BEANS
CORN MEAL
WHITE FLOUR
RICE
ROLLED OATS
APPLES
ORANGES
CORN FLAKES
PEANUT BUTTER
SWEETPOTATOES
WHITE BREAD
MACARONI
RYE BREAD
WHOLE WHEAT BREAD
WHEAT CEREAL
SODA CRACKERS
Paid to farmers
Marketing charges

Figure 110.

to obtain just what he wants in the way of quality and assists the seller in locating the best market for the particular quality he has to offer. The grading of commodities improves trade because it enables the buyer to purchase and the seller to sell though they may be miles apart and the product subject to the personal inspection by neither. Through accurate grading, the buyers and sellers know what each is talking about. Accurate grading also makes possible widespread market news. Without uniform grades market quotations would be almost meaningless. Grading also helps the farmer to determine whether he is getting a fair price for the quality of product which he has for sale, and to adjust his production to market requirements.

The Federal and State grading and inspection services help to prevent unfair practices in the determination of market grades. Impartial experts assign the grades at markets, and these grades are based solely on the quality of product. Inspection for quality, and for factors such as disease, protect both the buyer and seller, as well as consumers who ultimately pay for all fraud and waste.

Through grading the farmer can put a higher quality product on the market and thus eliminate the expense of marketing low-quality or unmarketable products. He can put a more uniform product on the market which may command a higher price. Because of the uniformity of grades he may sell his product before it is shipped, thus insuring himself against certain marketing risks. And the impartial assignment of grades based on commodity characteristics helps to insure the farmer a fair price for the quality of product which he is marketing.

Whether a farmer markets high-quality product or a lower one should depend on whether the premium (extra payment) for quality is sufficient to compensate for the cost of placing the high quality product on the market. In most cases the farmer will find it to his advantage to market high-quality products and have them designated by grade to insure the premium for high quality.

Consumers, and hence middlemen who supply them, are nearly always willing to pay more for high-quality products. A farmer can sell ungraded eggs on the market. He can throw all kinds, qualities, and colors of eggs in one case and sell them, but the price he receives will be relatively low. On the other hand, he can grade his

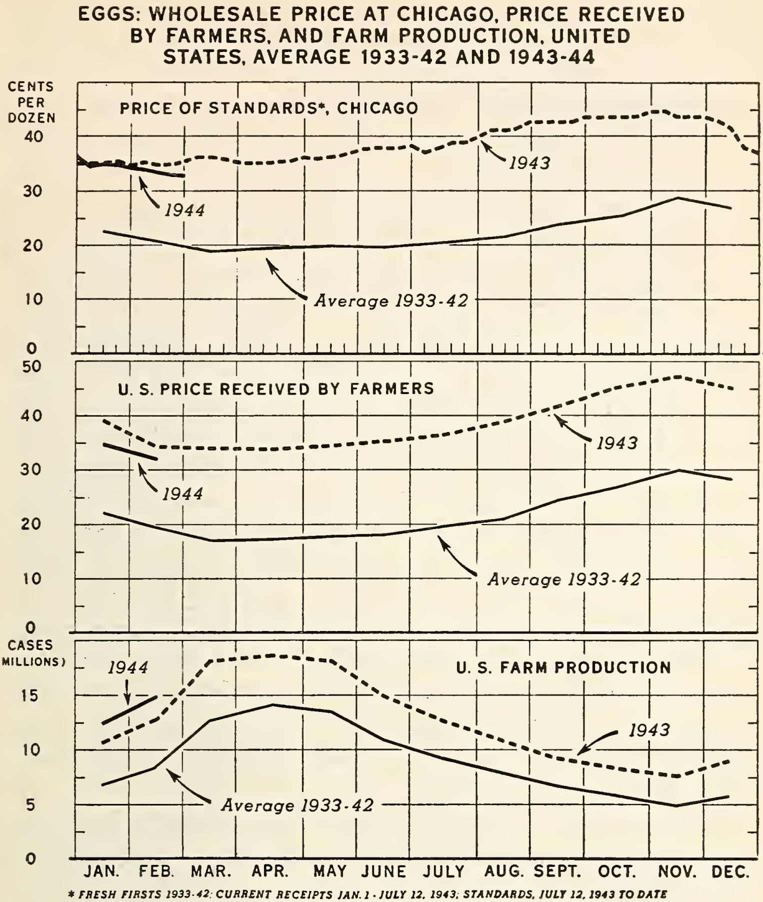


Figure 111.

eggs and sell a case of U. S. Specials or U. S. Extras and usually receive a substantially higher price for his product.

WHEN AND WHERE TO MARKET

Two of the most perplexing questions that any farmer has to answer are when to market and where to market. In determining the answers the farmer should make use of all the information possible. Many farmers give little or no thought to these questions. Yet here the farmer has choice and a chance to improve his income by making wise decisions. Market reports can be of much help. One of the most important considerations to be taken into account is seasonal variation in prices.

In determining when to market it should be remembered that for practically every commodity there is a time of year when prices are relatively high and other times when they are relatively low. Each commodity has its own typical seasonal variations in price, which are caused usually by seasonal changes in production or market supplies (see Fig. 111, which shows the seasonal variation in egg prices and production). A farmer sometimes can increase both his gross and his net income by studying these seasonal price patterns and marketing when prices are likely to be seasonally highest. Usually, however, it costs more to have products ready for market at such times—that is why supplies are scarcer and prices higher during such seasons. For crops which are harvested at one time of the year, there are costs involved in holding the commodity until the seasonal price peak is reached. The farmer must weigh the extra costs of production or holding against the higher prices received. In general, however, farmers can realize extra profits by studying seasonal price variations and adjusting production and marketing operations in order to take advantage of seasonally higher prices.

Where to market is a problem which involves relative prices and costs. For example, a farmer in western Kentucky might be able to sell his hogs for $12.00 in Louisville, $12.50 in Cincinnati and $12.65 in Chicago. If other things were equal, the farmer obviously would sell on the Chicago market. But he must consider the differences in costs of selling his animals on these markets. These differences include trucking or rail rates, terminal-market selling charges, and shrinkage in transit.

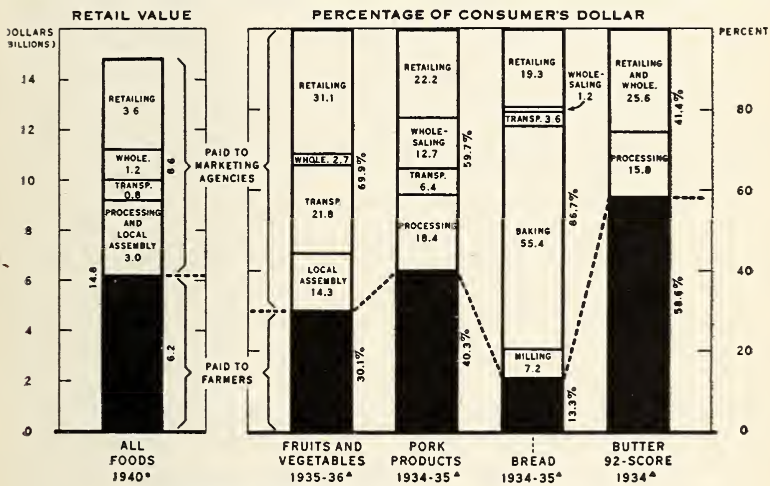
Thus, each farmer should examine all of his possible market outlets, compare prices and marketing costs, and determine the most profitable outlet regardless of where his neighbors are doing their marketing.

MARKET NEWS

In order to help the farmer determine when and where to market, the United States Department of Agriculture has inaugurated a market news service. In addition to this, various private agencies spend time and money in bringing market news to the farmer. By means of radio, newspapers, and mailed reports, market news is scattered far and wide. These services propose to keep the farmer up-to-date as to the demand, supply, and price situations at the various markets throughout the country.

The farmer can get on the free mailing list for various Federal Government market reports which give the current supply and demand situations for different grades of commodities as well as the prices at which they sold. From this information the farmer can estimate market trends and by comparing markets he can decide where and when he should sell. Of course, in determining where to sell he must be familiar with the costs of placing his products on the various markets.

BREAKDOWN OF FARM-TO-RETAIL PRICE SPREADS BY MARKETING FUNCTIONS



• "AGRICULTURAL SITUATION", APRIL 1941, P. 21

▲ "AGRICULTURAL INCOME INQUIRY" OF THE FEDERAL TRADE COMMISSION, 1937

Figure 112.

Market news services also help the farmer determine in advance about what price he should receive for his particular commodity. If he is close to a market he can get a report of the prices offered in time to market his products on the same day. The market news service also serves as a guide in private sales to a neighbor or local buyer.

THE FARMER MUST KNOW HOW TO BUY TOO

Not all of the market operations of the farmer are selling operations. Just as in the case of any other businessman, the farmer is also a buyer. Selling is only half of trade. It is almost as necessary that the farmer be an efficient buyer as it is that he be an effective seller.

Throughout the year the farmer must concern himself with buying equipment, machinery, breeding stock, seeds, fertilizers and many other items. To the Illinois farmer, for instance, who is producing fat steers and selling them on the market, the act of buying feeder steers is just as much a part of marketing and just as important to him as their later sale to a packer. It is as important that he buy right as it is that he sell right. The same knowledge, alertness, up-to-date information and accurate evaluation is necessary in a farmer's buying operations as are necessary in selling his product to advantage. He must be familiar with market conditions. He must know the supply, demand, and price situations at the time and have a knowledge of their probable trends.

GENERAL MARKETING PROBLEMS OF INTEREST TO FARMERS

Our marketing system has become so integrated, so complex and interdependent, that what affects any group or individual must necessarily have its effect on all others. There is hardly a marketing problem or marketing operation in which the individual farmer does not have an interest. In one way or another all of them affect him. Realizing this, farmers have given attention to the efficiency of the marketing system, and to the problem of how farmers can be assured of fair prices.

Ever since the commercialization of agriculture there have been protests that the farmer is adversely affected by monopoly and fraud on the part of transportation and marketing agencies. Many of these complaints were based on lack of complete or accurate information, but some were justified. In the early days of futures trading and speculation, for instance, a group of buyers might exert an unwholesome influence on prices of wheat or cotton. Also, in the case of isolated communities, local buyers were frequently able to take advantage of farmers by paying prices out of line with those in central markets. Before accurate grading came about, many farmers were swindled by misinformation as to the quality of their product. Commission merchants in distant markets did not always return to shippers what their products were worth. To many farmers, marketing charges and transportation rates seemed unduly high.

In recent years there has been improvement in these conditions, although they are far from perfect. Legislation has provided safeguards in the form of Government regulation. The extension of facilities which enable a farmer to choose a market has in most cases removed him from depending on the tender mercies of a single local buyer. Regulation of transportation charges has done much to prevent discrimination. And the farmer has gradually discovered that most of the unfavorable price conditions which he had attributed to scheming and dishonest business men were associated with changes in the general price level and demand conditions.

The greatest needs in improving the general adequacy and efficiency of the marketing system now, therefore, are twofold: (1) To avoid as far as possible the extreme fluctuations of prices which result from changes in the general price level and both domestic and foreign demand conditions; (2) to return to farmers a larger share of the consumer's dollar by making the marketing processes more efficient.

The first of these tasks falls most heavily upon the Government, which can do many things to influence economic conditions and prevent extreme price fluctuations. The second falls mostly upon private business, with the technical assistance and encouragement of Government and farm organizations. In this latter regard, farmers must realize that the lion's share of the consumer's dollar usually

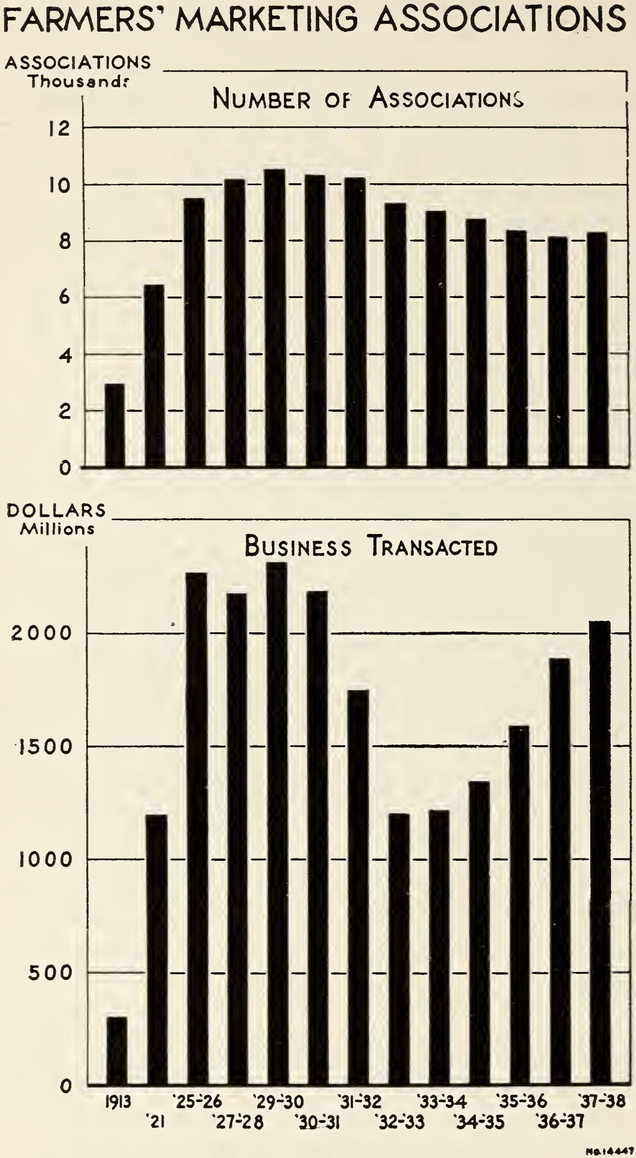

FARMERS' MARKETING ASSOCIATIONS
ASSOCIATIONS
Thousands
NUMBER OF ASSOCIATIONS
12
10
8
6
4
2
0
DOLLARS
Millions
BUSINESS TRANSACTED
2000
1500
1000
500
0
1913
'21
'25-'26
'27-'28
'29-'30
'30-'31
'31-'32
'32-'33
'33-'34
'34-'35
'35-'36
'36-'37
'37-'38
No.14447

Figure 113.

Figure 114. As a complement to the Nation-wide crop and livestock reporting system, the U. S. Department of Agriculture prepares and disseminates day-to-day reports on supply and demand conditions at important markets the country over. Obtained at terminal warehouses and shipping points and from producing sections, this information covers movement, market supplies, quality, and prices of more than 100 agricultural commodities. Basic information for the daily market reports is collected in numerous ways. One way is for the Federal market reporter to talk it over with dealers during trading hours. (U. S. D. A.)

goes to agencies, such as the retailer, which are nearest to the consumer (see fig. 112). Marketing improvement which merely extends from the farmer to the processor, therefore, is not likely to reduce marketing costs materially.

FARM COOPERATIVES

For many years farmers have been interested in cooperative marketing. It was generally believed that middlemen took unfair advantage of the farmer and also that the farmer needed certain services which the private middleman did not offer. To provide these services, and to gain the bargaining power which goes with collective action, farmers started organizing marketing and purchasing cooperatives.

The first cooperative cheese factory in the United States was organized in Oneida County, N. Y., in 1851. The first carload of livestock was shipped by a cooperative from Superior, Nebr., in 1883. Following many spectacular but largely abortive attempts, the cooperative movement got under way just before World War I, and since then farmer cooperatives have had a remarkable growth in number and volume of business (see fig. 113). This substantial and extensive development gives strong support to the contention that the agricultural cooperative movement is economically sound and socially desirable.

Figure 115. Reports of all kinds from many sources go together to make a daily market report. (U. S. D. A.)

The Federal Government and various State agencies have shown interest in farmer cooperatives and much has been written about their organization and operation. In order to stimulate their growth, the Government has exempted farm cooperatives from certain taxes and has also provided a medium (Bank for Cooperatives) through which cooperatives may be financed.

Farm cooperatives have a number of advantages. This does not mean, however, that they can be successful in all situations. Few cooperatives have succeeded unless a well-defined need for them existed. A cooperative marketing association can operate effectively only when the total volume of production is large enough to permit economical handling. Co-ops are most effective when large improvement in grading and standardization is possible, and when private marketing agencies have failed to provide efficient and modern processing facilities.

Now turn back to the questions at the beginning of the chapter. Have you changed your ideas in regard to any of them? After you have gone over each question once more check your answers with the answer key. If you disagree with any of them, be sure to re-check with the reading matter before accepting the key answer. It is always important to see why you made the mistake you did.

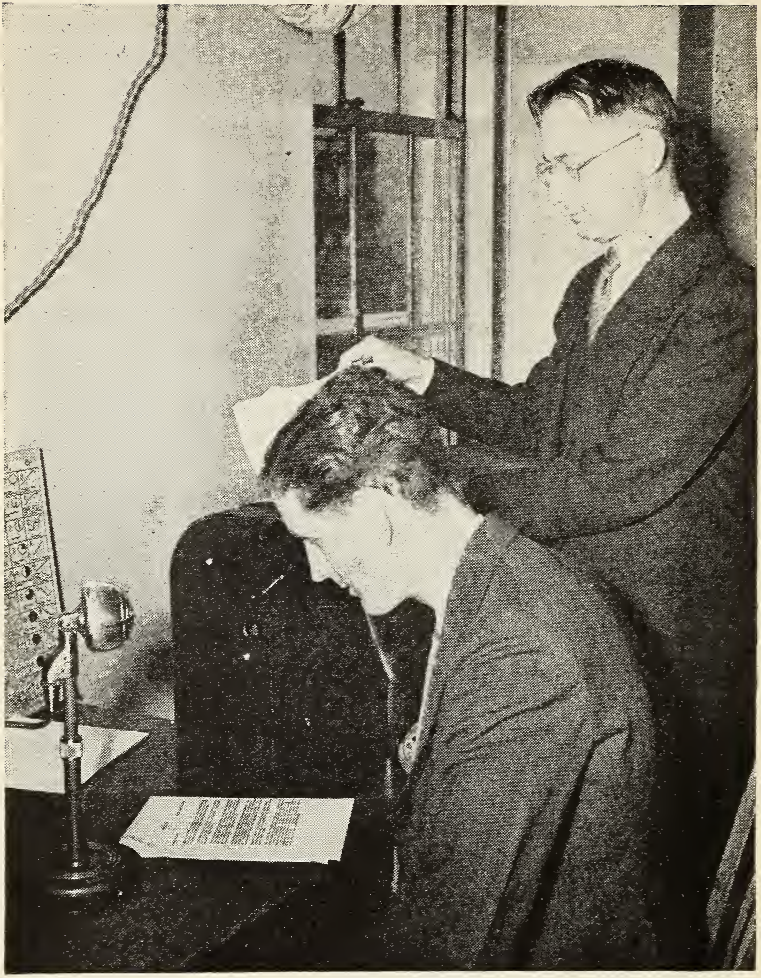


Figure 116. The Federal Market Reporter gets ready to go on the air over the local Weather Bureau microphone with his up-to-the-minute market report. (U. S. D. A.)

CHECK-UP 20

As a further check on your retention of the important points given in this chapter, take the following test. Place an x in front of the phrase which best completes each statement:

1. When the price level declines, farm products are
   a. The last to fall.
   b. Usually first to fall.
   c. Not affected.

2. When making plans what to grow a farmer must know what other farmers are planning to do because in this way he can determine—
   a. What things he is likely to get the best prices for.
   b. Where he will be able to get sufficient seed.
   c. How much labor he will have available.

3. A farmer can get information on what market conditions are likely to exist for particular farm products by—
   a. Reading outlook reports.
   b. Looking around and seeing what his neighbors are doing.
   c. Watching the grocery stores.

4. When selecting a farm it is—
   a. No longer necessary to consider marketing facilities.
   b. Only necessary to consider marketing facilities in dairy regions.
   c. Still necessary to consider how and where you will market the things you raise.

5. From the farmer's standpoint it is good for him to grade his eggs and other farm products because—
   a. It will mean less work all around.
   b. He will get a better price.
   c. It will make a good reputation for him.

6. A farmer through study of seasonal price patterns and marketing can determine—
   a. Whether he will be able to sell.
   b. When he should harvest his crops.
   c. When he can sell at the best price.

7. To help a farmer determine when and where to market he can get market news service from—
   a. State agricultural colleges only.

b. Department of Agriculture only.

c. Department of Agriculture, and private agencies.

8. If a farmer considers where to market—

a. He is wise because he may get more money in some markets.

b. He is wasting his time because all markets have a standard price.

c. He won't have time to do anything else.

9. In order to market products at the most profitable time and to arrange his activities to take advantage of changing market demands, the farmer must—

a. Sell only when seasonal price levels are highest.

b. Give attention to prospective changes in the purchasing power of the consumers.

c. Keep in touch with the local grocers.

10. A cooperative marketing association can operate effectively only when—

a. The farmers themselves do all the work.

b. There are good private marketing agencies to provide competition.

c. The total volume of production is large enough to permit economical handling.

Compare your answers with the key. Be sure to check any which are not in agreement with the information in the chapter.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. In what ways can the quality of a product be influenced by the farmer himself?

2. Discuss this statement: "The same knowledge, alertness, up-to-date information and accurate evaluation are necessary in a farmer's buying operations as are necessary in selling his product to advantage."

3. Why are marketing improvements which merely extend from the farmer to the processor not likely to reduce marketing costs materially? Explain fully.

4. In what ways can farm cooperatives be advantageous to farmers?

Chapter XXI
Keeping Records

WHAT THIS CHAPTER IS ABOUT

This chapter tells briefly why you keep records and outlines and the kind you should keep. If you want to keep more detailed records get in touch with your State agricultural college or the United States Department of Agriculture and ask for their bulletins on the subject.

THE REASONS FOR KEEPING RECORDS

Why do we keep business records and accounts on a farm? Of course the answer is just about the same as for any other business. There are two main reasons. First, so we can tell accurately whether we are making or losing money. Second, so we can keep track of specific phases of the business and thereby plug the leaks, shift to more profitable lines or methods, and generally improve our management of the place.

MAKE THE BOOKKEEPING SIMPLE

The first and best advice regarding a system of farm accounts is to make it simple. Many an elaborate system has been devised and many a man has become inspired to undertake complicated accounting methods for his farm business; then, when the rush of spring work comes along, all double-entry bookkeeping is pushed aside and forgotten.

The only records that are of value are those that are actually kept up throughout the year. It is true that now and then an individual who is genuinely fond of keeping books will undertake and carry on an elaborate set of farm-business accounts. But to most of us this job gets to be more or less of a chore. Experience shows that ninety-nine farmers out of a hundred fail to keep up a system of accounts for any length of time unless it is simple and can be posted with a minimum of labor.

The other extreme calls to mind the case of a certain farmer whose dairy barn burned down one night. Discussing his losses in the fire, he ruefully added: "Yes, and what's more, I've lost all my farm accounts for the last 10 years!"

It seemed that one of the stable doors had been built of clear, white pine and he had been accustomed to jot down on the back of the door such figures as he wished to keep.

"All my breeding and calf records and milk receipts were on that door. Now it looks as though I'd have to get myself an account book."

That is the sort of loss, moreover, which no insurance can make good.

"EXTERNAL" AND "INTERNAL" ACCOUNTS

There are two general types of accounts of value to a farmer. One shows what the farm is doing in relation to the outside world: That is, its overall receipts and expenses, and whether it shows a profit or loss. The other type concerns the internal operation of the business and is intended to show what each or any one enterprise is doing.

For instance, on a diversified Corn Belt farm, the first type of accounts tells you whether the farm as a whole made or lost money; the second tells whether your oat crop was more profitable than your wheat crop or hogs were more profitable than cattle, and so on. Every farmer certainly should keep some account of his business as a whole; then, if he wishes to go further, to study and improve his farm management, he probably will want to keep at least some account of particular enterprises.

Perhaps the very simplest farm business record of the first or general type would be a well-kept check book—assuming that you have a checking account in a bank. If one is careful to record in his check book the source from which each deposit came and for what purpose each check was drawn, at the end of a year he can gain a fairly good idea of his financial operations and outcome by studying back through the book. This is not an adequate system of farm bookkeeping but it is better than nothing

FIRST STEP IS TO TAKE AN INVENTORY

The first and most essential step in farm accounting is to take an inventory. This means making a list of all property, starting with real estate and going on through tools, livestock, feed, seed and crops on hand, and so forth, putting every item down on paper together with the best possible estimate of its current actual value.

Most farmers following business-like methods will be found taking an inventory every year. By comparing the inventory at the beginning and end of the year, a listing of this kind will give a good idea of the financial progress made during the year; it will serve as the basis of a credit statement if you want to get a loan from the bank; it will help in filing income tax reports; and will be invaluable for insurance collection in case of a fire. The best time to take an inventory is at the first of the year, or in the spring, or whenever the quantity of stored crops and feed on hand is at its lowest.

NEXT STEP—RECORD RECEIPTS AND EXPENSES

After having taken an inventory and having arrived at the amount of capital which you have invested, the next step in setting up some general accounts is to lay out your blank book with spaces for receipts and expenses. Those two items—receipts and expenses—are the simple essentials of the whole business. Maybe you will have receipts on one page and expenses on another; or receipts and expenses in adjacent columns on the same page; or receipts and expenses separated under headings such as cattle, hogs, fruit, hens, wheat, cotton. The main thing is to keep a record of income and outgo throughout the year. At the end of the year you can strike a balance, check with the results of your inventory, and determine just what the outcome of your business is.

That is all there is to the first mentioned type of farm accounts—an annual inventory and a running record of receipts and expenses. Any blank book or a few sheets of ruled paper will do. Or you can get from your State agricultural college a specially prepared farm account book which is handier than either of these others.

INTERNAL OR ENTERPRISE ACCOUNTS

The second general type of accounts is sometimes called "enterprise accounts" because these are kept on one or more enterprises within the farm business. This is internal bookkeeping, as distinguished from that other record of transactions with the outside world.

Suppose you want to know what it costs you to produce wheat and how profitable a crop it is. What you do is to set up a special account showing receipts and expenses on your wheat enterprise. You charge the crop, throughout the year, with all labor, seed, fertilizer, threshing, and other costs. In these single enterprise accounts some estimating may have to be done, as in case of the charge for man labor and horse or tractor labor. Of course you credit the wheat enterprise with the value of grain and straw produced. At the end of the year you can tell what your wheat cost you to produce, how much it paid you per hour for the labor expended on it and other costs.

If you are producing more than one cash crop or more than one kind of livestock product and want to get an accurate idea of which pays better, this can be done by keeping an individual enterprise account for each and comparing them at the end of the year.

Some farmers go so far as to keep an account of this kind for every enterprise on their farms. This is known as a complete set of cost accounts. There is an account for horses or tractors, one for man labor, one for each crop, and so on. Every night the day's operations are recorded in what amounts to double-entry fashion—for example, a crop is charged with so many hours of man labor, while the man-labor account is credited with the same number of hours of work on that crop.

Figure 117. Well-kept records will tell whether you are making or losing money. (U. S. D. A.)

In some States several hundred farmers keep this kind of cost accounts annually, with the help and supervision of the State agricultural college. Their carefully kept figures become the source of much statistical information regarding production costs and other data.

The great value of all such "internal" record keeping is that it gives you the best possible basis for studying your business. From such accounts many a farmer has been surprised to learn that what he had long regarded as the best paying crop or the most economical way of doing a certain job was in fact not so. Maybe he finds out that soybeans are paying him 75 cents an hour for the labor expended whereas his favorite wheat or white beans in the next field paid only half as well; or perhaps he discovers that an extra horse is costing $100 a year to keep and can be eliminated by planning the work a bit differently. And so on. If you talk to the most successful farmers in a given community you will be likely to find that they keep quite detailed figures on at least the important phases of their business.

OTHER SPECIAL RECORDS

In addition to these general business accounts mentioned, there are various special records which are useful—in fact, some of these are essential. The poultryman will want to keep a record of egg production day by day. The enterprising dairyman will weigh the milk from each cow at least once or twice a month and jot down the weights. For such records it is handy to have a card tacked up in henhouse or stable with a pencil hanging beside it. Many other special records of this sort will suggest themselves on different kinds of farms.

Once again, remember the advice to make them all simple and keep the blank and the pencil in a handy place—otherwise sooner or later the whole thing is certain to be neglected.

This keeping of proper business accounts and records is, in fact, one of the most important and helpful jobs that a farmer can undertake. If you don't try to overdo it at first, the chances are that you will gradually come to regard your account book as one of the most valuable things on the farm.

CHECK-UP NO. 21

Several completion statements are given below which highlight the most important things for you to remember about this section. Underscore the response that best completes each statement.

1. An external farm account shows—
   a. Only what you get from other people.
   b. Only what you sold to other people.
   c. The farm's overall receipts and expenditures.

2. An internal farm account shows—
   a. If you made more on your oat crop than on your wheat crop.
   b. Home expenditures only.
   c. Building expenditures only.

3. Farm inventories should be taken—
   a. Annually.
   b. Every two months.
   c. Every ten years.

4. A farmer who keeps a record of all his separate enterprises (chickens, livestock, corn, etc.) keeps what is known as—
   a. A set of complete cost accounts.
   b. An inventory.
   c. A budget.

5. If you plan to keep an account book, it is important that you—
   a. Keep complete record of all operations.
   b. Keep simple accounts of more important parts of business.
   c. Keep account of what you spend for gasoline.

6. The only records that are of any value are those—
   a. That are specific.
   b. That are kept up throughout the year.
   c. Those which show what your wife spends.

7. The best time to take an inventory is—
   a. Whenever the farmer has time.
   b. Whenever the quantity of stored crops and feed on hand is at its highest.
   c. Whenever the quantity of stored crops and feed on hand is at its lowest.

8. The main thing in keeping accounts is to keep a record of—
   a. Income and outgo through the year.
   b. The money taken in.
   c. The money spent.
9. The great value of "internal" record keeping is that it—
   a. Furnishes statistical information.
   b. Is more apt to be accurate than an external account.
   c. Furnishes the best possible basis for studying the business.

When you are sure you have answered these correctly, check your decisions with the answer key. Do you agree with those given in the key? If not, re-read the necessary parts of the chapter.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. What is the major argument for making all records very simple?

2. Why should an inventory include a list of all property, even tools and other small things, along with the best possible estimate of its current, actual value?

3. Explain this statement: "The keeping of proper business accounts and records is one of the most important and helpful jobs that a farmer can undertake."

Part 5

The Opportunities and Getting Started

Chapter XXII

Opportunities in American Agriculture

WHAT THIS CHAPTER IS ABOUT

What opportunities will there be in the future to make a living as a farmer, or as a worker or agricultural scientist in farm-supporting activities? The answer is, of course, that there will always be a lot of people needed to run our farms, to process the food, market it, and to carry on the research necessary to efficient farming and marketing. It is the purpose of this chapter to sketch out in a general way the nature of such opportunities. This includes consideration of the probable availability of the farms now developed—and the farms that can be developed from new lands. It includes also a brief introduction to the possibility of making a living in activities such as the important work carried on by the Department of Agriculture, State agricultural colleges, and other farm-supporting activities.

From the preceding chapters and from what you knew before you started studying this book, you know what some of the opportunities in agriculture are. You know that some old well-developed farms are available for new owners each year. You know too that new farms result from the draining of land, the clearing of timber from other land, and from the irrigation projects that are developed in dry regions. Before reading the chapter you may find it worthwhile to find out just what you do know about the material presented in this chapter. You can do that by trying to answer the following questions:

1. About how many well-developed farms in the U. S. can be expected to become available to new operators each year? (a) 10,000. (b) 50,000. (c) 250,000. (d) 500,000.

2. How would the extension of social security to farmers affect the number of farms available to new operators? (a) It would increase the number; (b) It would decrease the number; (c) It would not affect the number.

3. Getting a farm in the home community has the advantage of starting the beginner with a developed farm. What is another major advantage? (a) Goods do not have to be moved very far; (b) Seed is available; (c) A market for farm goods already exists; (d) Friends are near.

4. About what proportion of all farmers in the U. S. are part-time farmers? (a) 1/50; (b) 1/15; (c) 1/7; (d) 1/4.

5. Why does a part-time farmer need less capital for operation than a full time farmer: (a) Because the part-time farmer usually owns a smaller farm; (b) Because the part-time farmer can expect to get capital from outside employment; (c) Because the part-time farmers usually live near cities where money is more easily borrowed.

6. About how many new farms can be developed from the irrigation projects now authorized or under construction? (a) 135,000; (b) 250,000; (c) 700,000; (d) 1,000,000.

7. The man starting on a new irrigated farm has much work to do before he gets the farm in maximum production. In what year after starting work can he expect to make more than he spends? (a) 2nd; (b) 3rd; (c) 4th; (d) 5th.

8. If you were interested in getting a farm on land that is made available through drainage to which of these states would you go? (a) Wisconsin. (b) Maine. (c) Florida. (d) Mississippi.

9. Since the yearly income from new farms in the drained lands of Arkansas before the war was less than $500 a year, why did farmers go there? (a) There was very little work involved in cultivating the new land; (b) Only a few tools were needed; (c) The income on old developed farms was even lower.

10. How does the amount of cut-over land suitable for farms compare with that which might be made available through irrigation? (a) The amount from irrigation is greater; (b) The amount of cut-over land is greater; (c) The two amounts are about equal.

Now read the chapter. Be sure to check your answers when you find material which deals with any of the ten questions.

OPPORTUNITIES TO BECOME FULL-TIME FARMERS ON DEVELOPED FARMS

In the future, as before the war, the retirement of farmers from good developed farms will provide some opportunities for farmers' sons and to others who may seriously consider getting into farming. It is not possible to state in exact terms where, how many, and what kind of farms will become available to new operators in the years immediately after the war. If, however, the retirement rate from the developed farms continues at the annual average of the decade preceding the war there may be about 500,000 family-size farms of all types in existing farm areas that will become available to new operators in the first decade after the end of the present war. The number, of course, depends upon many unpredictable factors. The extension of Social Security benefits to farmers would increase the number of farms available. General economic conditions, the prices of land and of farm products will also influence the number of farms that will be obtainable at any one time.

Young men who are seriously considering farming as a profession might do well to inquire carefully into farming possibilities in their home communities before looking elsewhere. It is a real advantage to obtain a developed farm, provided the farm buildings and soil have been properly maintained and the price is a fair one. To establish oneself among friends is also usually an advantage.

The question of who will get these farms will depend upon the availability of credit at reasonable interest rates, a man's farming experience and skills, and to a large degree upon the initiative he may show in going after a farm and doing a good job of locating the possibilities. In order to obtain many of these good farms for rent or purchase it will in most cases be necessary to have considerable skill or experience—at least for those farms requiring the larger investments. The skilled man totally without capital may get an opportunity to rent such farms, even though he has not the money with which to buy; but an established farmer who owns a good farm will not risk its becoming run down or damaged in the hands of an unskilled person.

OPPORTUNITIES TO BECOME PART-TIME FARMERS

Of our 6,000,000 farmers in the United States about 816,000 are part-time farmers. As the term is used in this chapter, it includes those who spend anywhere from 100 days a year to the major part of their time in other occupations. The incomes of these part-time farmers will vary from a few dollars a year to several hundred—perhaps the major part of their income. A part-time farm may consist only of a garden, or it may include several acres of ground and a hundred or more chickens, a few hogs, and a couple of cows.

Many may be interested in getting just such a small farm or at least a small piece of land outside of town for a house. This type of farm or country home on an acre of ground can be obtained near almost any city in the United States. These part-time farms usually provide little cash income but often provide the operators with an opportunity to grow some food for their families—as well as furnish good healthy places to live.

It is possible in most areas of the country to become a part-time farmer by having from \$500 to \$1,000 to pay down on the house and the land. Such land may cost from \$50 to \$500 an acre. Many part-time farms can be purchased at a price ranging from \$3,000 to \$6,000. It is less important to have additional operating capital for this type of venture as such capital will be derived from outside employment.

OPPORTUNITIES ON IRRIGABLE, DRAINABLE, AND CUT-OVER LANDS

It is possible that after the war, farms of various sizes and types may be made available through the irrigation of arid western lands, the drainage of wet lands, and the reclamation of cut-over and damaged lands. It is also possible that some lands now used by the armed forces for training camps and other purposes may again be turned over to farming. These lands could be developed to replace farms now worn out and uneconomic to operate and to increase the production of food if that proves necessary.

Irrigable Lands. Available estimates indicate that about 6 to 8 million acres of land can be irrigated to provide new farms when the current irrigation projects under construction or authorized in the 17 Western States are completed. From these figures any land unsuited to farming within the boundaries of irrigation districts would have to be deducted. In all, it is estimated that about 125,000 to 150,000 new irrigated farms could be developed when the projects under way and authorized are completed. The development of the Columbia River Basin in Washington and the new development in the Great Central Valley of California will be important new irrigation farm areas. Several other irrigable areas are planned in the Western and Great Plains States where land is suitable and water available. Like the drainage of land, irrigation requires much development work, even after the large-scale engineering is completed. Ditches must be constructed for delivery of water to the farms and the land often must be cleared and leveled and otherwise improved. Buildings must be constructed, roads built, and other community facilities provided in the new areas. All this requires expense, labor, and time before crops can be produced and the farmers can make any money.

What about settlement on one of these new irrigation projects? What income can be expected from it and what does it take in capital? To settle on an 80-acre irrigation farm might require from $6,000 to $9,000 of capital over the first 6 years. This would be invested about as follows: $800-$1,500 for dwelling; $250-$500 for well and pump; $600-$1,500 for outbuildings; $800-$1,500 for land; $750-$1,500 for clearing, leveling, ditching, and fencing; and $1,800-$2,500 for operating credit.

What could be expected in income, both cash and noncash (food, fuel, rent, etc.), from a farm of this size? On the basis of experience in one area during 1934-1938, a farmer in settling on an 80-acre general farm is not likely to show an excess income of cash over expenditures until the fourth to sixth year. If the total expenditures are compared with total income over the 6 years, he will still have a cash deficit of more than $2,400. This should be more than offset, however, by the total value of farm family living (cash and non-cash) realized on this type of irrigation farm, which varied from about $700 for farms on which the operator had been on the farm for 1 year to about $1,300 where the farmer had been established for 5 years or over.

Drainage-Land Farms. The Mississippi Delta, which includes the poorly drained wooded lowlands of Louisiana, Mississippi, Arkansas, and Missouri, is the most important area in which drainable land can be developed for settlement. Many farmers on poor farms in the area surrounding the Delta have moved in during recent years. After the war it is expected that even more will be in search of new farm land in the Delta. According to estimates it is believed that at least 5,000,000 acres of undeveloped land suitable for agricultural production could be developed in this area. For those who have had some experience in pre-war farming in the lower South these lands may hold some good opportunities, provided the lands are properly developed first.

What about these new farms in the Delta? How big are they? What do they cost? The average size is about fifty acres. The prices paid by settlers for the unimproved land varied considerably, depending on the kind of salesman who sold the land. Prices paid for cut-over woodland without improvements ran from $2 an acre to nearly $50. The average price was about $20 an acre. Many purchases were made with down payments averaging about $4 an acre and time of payment of the remainder extending on an average to about 6 years. The usual interest rate was 6 percent a year.

The possibilities of success depend upon a number of things, including the density of timber to be cleared, the adequacy of the drainage, sound financing, good management, and, of course, hard work.

Much drainable land also exists in the eastern and Gulf Coastal Plain areas. The extent to which these lands will be developed for new farmers will depend largely upon the future industrialization of the South and the extent to which the people there as well as in other regions demand more of such foods as vegetables and fruits. One of the most important factors, however, is the demand for southern agricultural products for industrial purposes and world trade. In all, it is believed that about 15 to 17 million acres of land could be drained at reasonable cost and developed into farms.

But there is more than the cost of the land to be considered. On an average, new settlers in the Mississippi Delta about 7 or 8 years ago spent between $300 and $500 each for farm improvements in the first 3 years. This cash was expended about as follows: House $230, barn $35 to $50, pump $13 to $25, and fences $11 to $25. These low costs are due to the fact that small low-cost buildings were erected and the settlers made full use of available farm material and family labor. Especially heavy demands are made in the first years on the cash funds and family labor. Clearing and other improvements are expensive and time-consuming, and the need for crop income demands that as much land as possible be cleared, ditched, and plowed.

The typical family cotton farm of the one-mule type in the Delta area would have about 8 acres of cotton, 8 acres of corn, and 3 or 4 acres of other crops. The crops other than cotton and corn usually consist of 1 to 2 acres of soybeans or cowpeas, a small patch of sorghum, and a garden. The livestock consists of a mule, a cow, a sow, and about 35 chickens, and machinery of a turning plow, a middle buster (a plow that turns the soil both ways), a one-row corn planter, and two or three half-row cultivators.

What kind of income would you get from such a farm? Before the war net cash incomes ranged from about $400 to less than $100. However, in addition the families raised a part of their food —sometimes almost all of it. It is difficult to predict what any one person might expect. The income would depend on the price of cotton, the operator's ability and how hard he worked, and on many unpredictable things such as weather and insects.

Cut-over Lands. The lands that could be developed into farms in cut-over areas are in large part included in the estimates of drainable land already discussed. In fact, most of the land to be drained must be cleared before it can be used for farming. The Pacific Northwest, the North Central, and some of the Southern States all contain land that would be suitable for agricultural development after being cleared. A recent study indicated that about

10,000,000 acres of fairly well drained land was suitable for clearing and probably could be developed in the first 10 years after the war.

An average-sized family-type dairy farm of 80 acres in the western part of Washington on cut-over land would represent a total investment of about $8,000-$10,000 distributed as follows over a 6-year period: Land, dwelling, and other buildings $5,700; fences, water supply, etc., $400; machinery and equipment, $700; and livestock, $1,300. The farm would have 30 acres devoted to crops, 30 to cut-over pasture, 18 to wood lot, and 2 to farmstead and roads. It would also have 12 cows, 8 heifers, and calves, 100 hens, 5 hogs, and 2 horses. In 1938 from such a farm the family would have received about $900 in cash and over $400 worth of food, fuel, and rental values. The total expenses would be about $600, which does not include a charge for depreciation of buildings and equipment. This leaves a cash balance of about $600 a year for savings, family living, and future improvements on the average-size family dairy farm.

Military Lands. The training of an army of over 10 million men for this war has required the acquisition of land for training camps, airfields, munition plants, bombing ranges, proving grounds, and many other uses. Much of the land acquired by the Army and Navy was developed farm land. It was necessary to strip these lands of fences, buildings, and equipment in order to use them. In some cases the land has been damaged. About one-half of the 7 million acres acquired from private owners by the Army and Navy for training purposes can be developed into good farms providing the land is not needed for military training in the future. From these lands about 8,000 to 10,000 farms and ranches of various sizes could be redeveloped. In addition some of the land might be available for combination with adjacent farms.

OPPORTUNITIES TO WORK AS A FARM LABORER

Working as a farm laborer, on a farm requiring year-round work such as a dairy farm, is a good way to obtain useful experience before renting or buying a farm. Early in 1944 about 1,600,000 hired workers worked on farms. This number was slightly less than the previous 5-year average. During wartime, farm laborers receive monthly wages ranging from $40 to $100 a month with board. In normal years the wages might run from $20 to $50 a month including board. There are considerable variations in pay depending on the kind of farm, the location, the general farm situation, the available labor supply, etc. The great disadvantage of working as a farm laborer in some areas is the seasonal nature of the work and the necessity for moving about to obtain work.

For a young single man seriously considering going into farming, 6 months to a year spent in such work might be very useful.

OTHER OPPORTUNITIES IN THE AGRICULTURAL FIELD

There are many who may like agriculture or who have valuable experience in farming who may not want to farm but would like to get in some work of a related nature. For those who want to get or who may have sufficient education in an agricultural college, there are opportunities to enter many specialized fields of work in agricultural science. This is a huge and growing field. Probably a good way to open the subject is to tell you that many of these jobs are with such organizations as the United States Department of Agriculture, State agricultural colleges and departments of agriculture, food processing and marketing concerns, private research organizations, and educational institutions. These jobs have definite requirements of education, experience, and ability; in the case of the Federal Government, they also depend on passing a Civil Service examination. The jobs range all the way from laborer on a farm or typist or clerk in an office up to the most specialized professional work in such fields as physics, chemistry, economics, and many others.

In a highly developed country such as ours, everything about farming is the subject of special research and experiment. Broadly, the object of all this investigation is to determine how to do a better job in agriculture. For modern farming is no longer a simple business. It is as complex as modern industry. Today, for instance, the commercial production of cabbage or corn depends just as truly on

Figure 118. The small army of Federal and State employees who spend their lives working for the benefit of agriculture include plant breeders seeking new and better varieties of fruit and other crops. (U. S. D. A.)

scientific experiment as does the production of airplanes and automobiles. Whether he is aware of it or not, the modern farmer uses the results of this research in practically everything he does, from the preparation of the soil to the final marketing of his product. It is not too much to say that the comparatively high development and efficiency of agriculture in this country is due in no small part to the large amount of work that has been done in agricultural science and the readiness of farmers in the United States to make use of scientific findings.

So there is a small army of Federal and State employees and others who spend their lives working for the benefit of agriculture and the public in general. Some are themselves experienced farmers, doing much the same kind of work they would be doing on a farm, except that in this case it is on a publicly owned experimental farm. Others are office workers, laboratory assistants, or research workers in fields, forests, and laboratories.

It would be impossible, in a brief space, to give a detailed account of all the different kinds of work done in the service of agriculture,

Figure 119. Among the livestock people are veterinarians concerned with animal diseases and how to cure them. (U. S. D. A.)

but a broad picture of the professional work will at least indicate the range of possibilities.

There are specialists in all types of livestock and crop production—beef and dairy cattle, hogs, sheep, goats, poultry, grasses, grains, oil crops, fiber crops, tobacco, fruits, nut crops, vegetables, drug crops; not forgetting forests and even flowers and other ornamentals.

But this is only one way of showing how the work is divided. There is also the division by sciences. Some of the livestock people, for example, are geneticists and breeders; some are specialists in nutrition; some are concerned with animal diseases and parasites; some are physiologists; some are chemists. The same thing is true in the case of all the crops. There are plant breeders, plant physiologists, chemists, and so on, for each one. And in the case of both livestock and crops there are bacteriologists, who study microscopic organisms, and entomologists, whose concern is the control of insect pests. Basic to all of these is soil science, which studies the nature of the soil and finds the answers to such questions as what kind of handling the soil needs to give the best results, what crops should be grown where, what fertilizers should be used and how they should be applied. Engineering is another broad field, covering investigations in farm machinery and equipment, farm buildings, and such structures as those used in irrigation.

But science also deals with more than production on the farm. It studies what can and should be done with the products after they are produced—for instance, the handling of livestock feeds; the storing, transporting, and processing of foods by such means as curing, canning, freezing, drying; and the uses that may be made of agricultural products and byproducts for such things as plastics, rubber, paper, fiberboard, fuel, and even drugs, such as penicillin, that save life and relieve suffering, and even others. This industrial use of agricultural products and byproducts is coming to be a more and more important field of physical and chemical research.

This scientific work by no means tells the whole story, however. There are also many economists and statisticians working for public institutions in the field of agriculture. They too deal with a wide range of problems vital to the farmer—for example, farm management, credit and banking, marketing, transportation, taxation, ten-

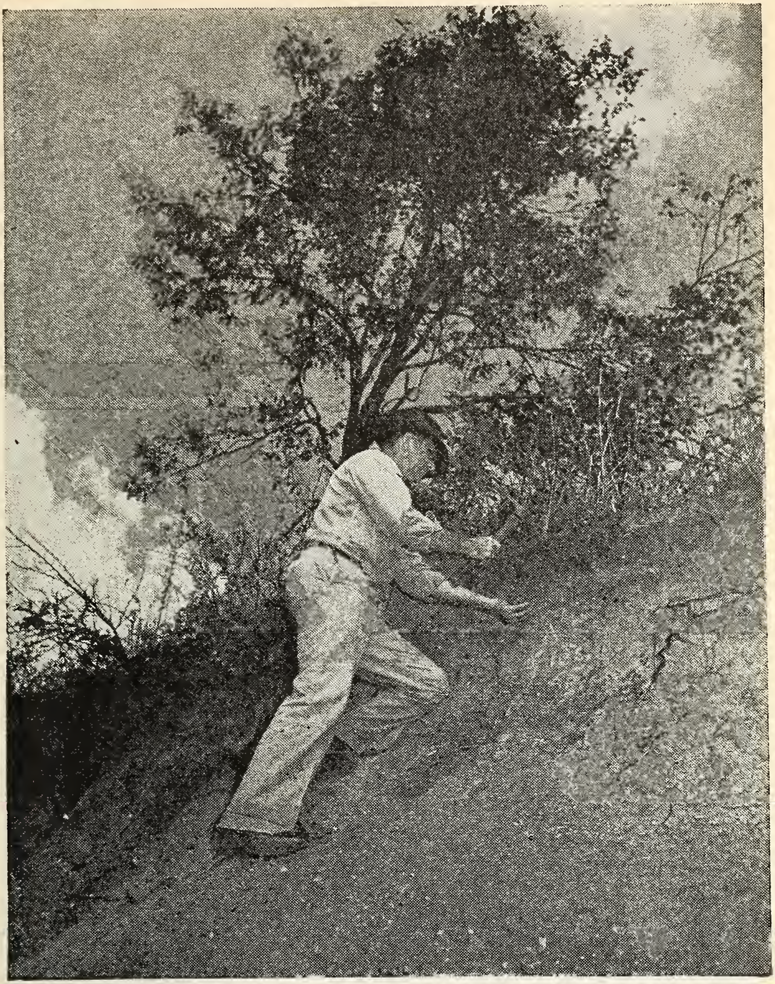


Figure 120. Soil surveyor at work. (U. S. D. A.)

ancy. Finally, there are people who specialize in law as it relates to the interests of agriculture, in adult education and extension work, and in writing up facts and research results in booklets and bulletins, newspaper releases, radio talks, etc., in such a way that they will become widely known and quickly put into practice.

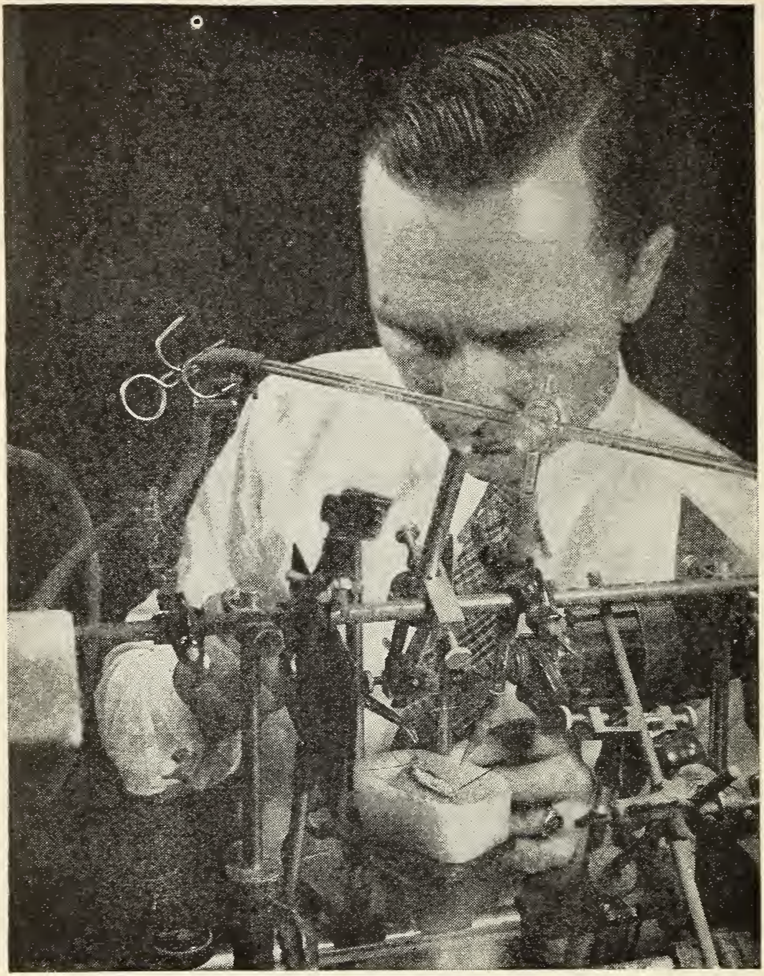


Figure 121. An entomologist studying new ways to control insect pests. (U. S. D. A.)

Thus the opportunities for worth-while work in the service of agriculture and the public are extremely varied and suited to people with many different kinds of interests and many different types of training. At the same time, the reader of this book should be cautioned it is not always easy to obtain jobs of this kind in the public service. In the first place, as has already been said, it is often necessary to pass a Civil Service examination, including qualifications of experience and education, to obtain such work. In the second place, the number of opportunities is dependent, like jobs in industry, on fluctuating conditions in our economy as a whole.

CHECK-UP NO. 22

Go back and see if you will now change the answers to any of the 10 questions you tried to answer before you read this chapter. Then, check your answers by comparing them with the answers in the back of this book. Reread the material on any item for which your answer and the book answer are not the same.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Old well-developed farms are always becoming available to new operators. The number of these farms that become available at any one time is influenced by a number of factors. What are four of these factors?

2. Farms for new operators are obtained chiefly from four sources: (a) Developed farms; (b) New irrigation projects; (c) Drainage of wet lands; (d) Cut-over lands. For each of these sources give two advantages and two disadvantages for the new operator who is making up his mind about how to get a farm.

3. Work in fields related to farming such as that of a farm experiment station worker is desired by many who have had farm experience. Tell why this work is attractive.

Chapter XXIII
Getting Started in Farming

WHAT THIS CHAPTER IS ABOUT

When you have made up your mind that you want to be a farmer, you are ready to consider how to get started. Are you going to buy, rent, or get a job as a farm laborer? You may think that the amount of money you will have will automatically decide that proposition for you. That, however, is not always the case. There are times when renting or working as a farm laborer is the best way to start, even for the man who has money. Why that is true is a question you may ask. Finding the answer to that and other questions about how to get started in farming are good guides for your study of this chapter. The following list of questions contains most of those which people ask when they are thinking about starting to farm: (1) Is getting started in farming any different from getting started in anything else? (2) Can you still get homestead land in the West? (3) What opportunities are there on irrigation projects; (4) What do you have to watch for when buying an improved farm? (5) Where can a renter get capital? (6) Can you rent a livestock farm? (7) Is starting as a share cropper ever considered a wise way to start farming?

THE WAYS OF GETTING STARTED

Getting started into farming is different from getting into any other occupation. For most occupations the beginner's only opportunity is to start as a hired worker. An individual seldom starts his career by owning a factory, for example. There are opportunities to conduct your own business, such as a retail store, restaurant, gasoline station, or the like, but compared with the jobs in industry and commerce these opportunities are few. In farming it is possible to start out by purchasing a farm. You begin by being your own boss. Most people who want to farm plan to buy. However, buying a farm is not the only way to get started and it may not be the best. There are several other methods. Choose the one that best fits your situation.

Pioneering on Free Land. Many who desire to enter farming wish to know of the availability of free land and of the possibility to homestead. There is practically no free land left. In 1934 the Taylor Grazing Act removed the major part of the public domain from private settlement. Land from the public domain cannot now be made available for homesteading unless it is classified as being more valuable and suitable for crops than for grazing. At present only 50 to 100 homestead opportunities are available each year. Information on the few homestead possibilities that develop can be obtained from the Department of the Interior, Washington 25, D. C.

Getting a Farm on a Public Land Development Project. Opportunities for new settlers are continually being made available through public irrigation and other land-development projects. The Bureau of Reclamation, which has developed most public large-scale irrigation projects, has selected purchasers of Government-held land within the boundaries of these projects by an examining board appointed by the Secretary of the Interior. The examining board considers the fitness of each applicant. The applicant generally must possess good health and have had at least 2 years of actual experience in farm work. He must have at least $2,000 in cash or the equivalent in livestock, farming equipment and other assets, and be free of liabilities.

Buying an Established Farm To Start. Farm ownership is the goal sought by most of those who farm. All farmers, however, cannot be owners from the time they commence farming. Most of the successful farm operators at the present time have come up either from the rank of farm-reared boys or of hired farm hands. This does not mean that there are not many who started out by buying a farm and were successful.

That there are hazards in buying a farm cannot be overemphasized even though one may have considerable capital. Following World War I and up until the end of the depression in the middle thirties, an estimated 2 millions of farm-owner operators lost their farms through mortgage foreclosure and related defaults. Many of these people bought when land prices were high. Later the prices of agricultural commodities fell sharply. Conditions after this war may repeat those following the last war. Guard against this possibility and buy only if you can get a farm at its normal value and only if you have sufficient funds to make a substantial down payment.

Getting Started by Renting a Farm. There are many forms of farm tenancy in the United States. Farm tenants have no ownership rights in the land they operate. They rent all the land they use from some one else and either pay cash, share the crops produced, share the livestock raised, share the livestock products sold, do work for the land owner in lieu of cash payments, or the rental consists of some combination of these items. The amount of livestock, machinery, equipment, farm implements and other contributions to the farm business furnished by the tenant is determined by the rental agreement. The share arrangements between tenant and landlord vary. Customary arrangements, kinds of farming, individual differences, and relative bargaining position of landlord and tenant determine the kind of contract.

Getting started as a farm tenant is different from buying a farm. Here, your chances to start are not so much dependent upon the amount of funds you have to invest but upon the reputation you have or the experience you can show as a good farm operator. To some extent, you may be deterred by not having sufficient operating capital. But operating capital can usually be obtained through chattel and production loans made by the Farm Credit Administration, the Farm Security Administration, and private lending agencies.

Getting a Job as Farm Manager. Men who are well trained and experienced as farm managers will have opportunities to obtain good incomes as managers of farms owned by city investors, lending agencies, and others who choose to operate their farms through hired managers. This system of operation is preferred over renting by some owners even though their land may be of family-sized units suitable for tenant operation. In addition, there are industrialized farming enterprises that are operated by managers. Most of the Nation's fruit and vegetables are produced on large-scale farms. During recent years there has been a tendency towards larger-scale farming. These large-scale units provide opportunities for the professionally trained farm manager.

During the last few years an increasing number of farms are being operated by men receiving a salary and a share of the proceeds from the farming business. In many cases, no salary is paid, but nevertheless the system differs from regular tenant operation. This method is sometimes used by retiring owner-operators who leave fully-equipped farms. Rather than sell their livestock and equipment and rent the farm, they prefer to turn over their farm fully equipped to an experienced farm manager. Instead of paying a fixed salary to these managers, they pay them a share of the net receipts, frequently one-third in the Corn Belt. This system of operation has increased in the Corn Belt and the North Central dairy region where fully-equipped farms represent a considerable investment.

Starting as a Sharecropper. A sharecropper is one who operates a farm or part of a plantation for a share of the crops produced. He owns no equipment, horses, nor tractor. He furnishes only his labor and in some cases shares part of the operating expenses. Many small farms are operated by sharecroppers, but the system is most prevalent in the South on cotton and tobacco plantations. The advantage of starting as a sharecropper is that it requires no capital. You can start this way and live on the farm the entire year and learn something about farming without investing any capital. The disadvantage is that the income is usually low.

Getting a Job as a Farm Laborer. A year-round farm laborer usually works for a monthly wage plus board and room. If he is a single man, he frequently lives in the home of the operator as one of the family. On large farms and ranches single men are usually quartered in bunkhouses. Many farms have a separate house which is generally occupied by a hired man and his family. For married men working as farm laborers and who have a separate house in which to live, the custom usually is that certain essentials are provided in addition to salary. They may receive a garden plot, milk from the farm dairy, and poultry and eggs. The kinds and amounts of such things received will vary, even with family-type farms in the same community. The amount so received is taken into consideration when arriving at the salary to be paid.

The usual farm laborer does not have an income that would be considered permanently satisfactory. The wages are low, and there is little chance to save. However, such work provides an opportunity to gain first-hand knowledge of what farming is like. You get experience that cannot be obtained in any other way, so as a prospective farmer you should not look down on a farm laborer's job as a method of getting started on the kind of farm you want to own. This may be wise both from the standpoint of gaining experience and in providing time to find just the right farm even though one has considerable savings that may be invested in the farm enterprise.

THE NUMBER AND KINDS OF WORKERS IN AGRICULTURE

The first step to take in determining how to start in farming, is to look into the opportunities that exist. You need to inquire of the opportunities for buying farms at a reasonable price. You should look into the possibilities of getting a job as manager of a big farm. Even the chances of getting a full-time job as a farm laborer, especially with a skilled farm operator, are not to be neglected.

Before making this decision, it might be well to know of the number of men engaged in farming. The 1940 Census of Agriculture and Rural Population show the following table.

TABLE 3.—*Types of farm laborers in the United States, 1940*

Status	Number	Percent of total
All groups	8,255,503	100.0
Farm operators	6.096,799	73.9
Full-owner operators	3,084,138	37.4
Part-owner operators	615,039	7.4
Managers	36,351	0.4
Full tenants	1,819,980	22.1
Croppers	541,291	6.6
Farm wage workers	2,158,704	26.1

A FEW THINGS THAT ARE IMPORTANT TO KNOW

After deciding the way in which you will enter farming it is important to watch for certain details in the arrangements you make to either buy, rent, or work. A few of these are:

Getting Title to a Farm. The mechanics of getting title to a farm are somewhat technical and usually are best handled by a competent abstractor or attorney-at-law. The steps which you will take in obtaining title will differ according to whether you pay cash for the entire purchase price, pay some cash and obtain the remainder through a mortgage or buy through a purchase contract. No matter how you buy, you will first be concerned as to whether the seller can and will deliver a clear title. This is determined by making an examination of the abstract of title. This will show all outstanding liens against the property such as rights-of-way, easements, judgments, mineral leases or any recorded instrument. Ordinarily the seller is expected to furnish an abstract of title which the purchaser may have examined by a lawyer. The examination of the abstract will show all claims or outstanding interests which must be settled by the seller before he can issue a clear title.

In the event the purchaser must give a mortgage for a portion of the purchase price of the farm, he will obtain a warranty deed, or similar legal instrument, in the same manner as if he were paying cash. The instruments used and the specific legal steps taken in placing a mortgage on the farm vary slightly from State to State. If you purchase a farm through a purchase contract, the title to the farm is not transferred until the completion of the contract. On these contracts, you are in a different legal position than when buying a farm and financing with a mortgage. The steps which the seller takes if you do not meet your purchase contract obligations are not the same as the steps which must be taken by the mortgagee in foreclosing on your mortgage. It is usually to the advantage of the buyer to obtain title and give a mortgage rather than use a purchase contract.

Improving Your Farm for Operation. When purchasing a farm, the beginning farmer should be careful not to overlook major farm improvements which must be undertaken before the farm can be put into full production. Many failures arise out of the fact that no allowance has been made for the necessity of getting the farm in condition for operation. It is usually difficult enough to pay for a farm when it is in full production. Do not make the mistake of trying to pay for a farm when adequate buildings, fencing, drainage ditches and the like prevent you from operating at a capacity that will pay out.

Negotiating for a Farm To Rent. When you have located a satisfactory farm to rent, the actual negotiation for the lease of the farm should not be passed over lightly. A large number of unsatisfactory farm landlord-tenant relationships arise from the failure of the parties to discuss completely the things upon which they should agree. If you have had no farming experience, it is advisable to have a qualified person assist you in drawing up your lease agreement. If you start as a farm renter through the aid of a Farm Security Administration loan, the county FSA supervisor will assist you.

Deciding Upon the Rental Payment Arrangement. Many methods of paying rent for farms are in use throughout the United States. The method used for any one farm usually has a bearing upon the type of farming carried out and the situation of the landlord and tenant. The method of renting which is used, if ill-adapted to the type of farming you choose to carry out, may mean failure. Some methods are appropriate for one type of farming and one type of area, while others are not. In the Great Plains wheat-growing region, for example, where drought causes crop failures occasionally, the cash lease has its disadvantages. In this relatively hazardous producing area, landlords and tenants should both share in the risk of production. In the humid areas on the other hand, particularly for landlords who live a long distance from their farms and who cannot assume the responsibility of marketing their share of the produce, the cash lease is the best arrangement. On farms that are devoted largely to the production of livestock and livestock products, the crop-share lease is unsuitable. With these livestock farms, either a cash lease or a stock-share lease could be used.

Many mistakes can be made when you rent. The following paragraphs describe four basic types of leases and call attention to what each involves.

Cash lease. The payment of a definite amount of cash agreed to at the beginning of the term of lease before the tenant knows what income he will receive from farming operations presents certain disadvantages to the tenants. He assumes all of the risk of production and price. Because he assumes all risks, he usually feels compelled to plant most of the crop land to cash crops in order to be assured sufficient income to pay the rent. He receives little help from the owner with management problems and therefore has the advantage of freedom in the managing of the farm. As a long-time proposition, the cash tenant pays less rent than under share renting arrangements. This is justified inasmuch as he carries all the risk of production.

Crop-share lease. The sharing of crops as payment of rent is adaptable to strictly cash-crop farming. In areas where general-type farming is undertaken, crop-share renting presents too much of a problem to landlords in the disposal of a variety of crops. Under crop-share renting the owner shares the risk of crop failures and declining prices. The tenant may be at a disadvantage because the landlord will not permit him to raise feed crops for livestock enterprises. The tenant may be further handicapped under this system because the owner does not maintain a good set of barns and other improvements suitable for livestock production. Under strictly crop-share leasing the owner obtains no benefit from the pasture and improvements and, therefore, is not inclined to spend any part of his returns for building repairs and upkeep.

Crop-share-cash lease. This system of leasing which provides for both the sharing of cash crops and the payment of a fixed cash amount is the most frequent method used throughout the Corn Belt. The chief advantage of this system is that the landlord receives the payment for pasture, feed, land and buildings. Because he receives these extra cash payments, he is interested in keeping the buildings in a state of good repair. Tenants who lease by this method usually have a better opportunity than under strictly crop-share leasing of undertaking a balanced type of crop and livestock farming.

Livestock-share lease. On all farms where the major portion of the income is from the sale of livestock and livestock products, the livestock-share lease is the ideal arrangement. This system of leasing usually involves the necessity of keeping farm accounts and may vary as to minor details. The most common method provides for the joint ownership of the basic livestock herd with a fifty-fifty sharing of all cash expenses and a fifty-fifty sharing of receipts. Landlords and tenants operating under livestock-share leases have a high degree of mutual interest in the operation of the farm which usually results in longer term leases and greater security for the tenant. Returns from the farm are increased as both parties contribute their capital, management, and interest to the farming enterprises, to the maintenance of the buildings and to the maintenance of soil fertility.

The Amount of Rent You Should Pay. The safest procedure in deciding upon the method of payment is to follow the customary practice in the community. This advice goes also for determining how much rent should be paid. If, for example, the rent per acre for an average farm is $3.50 and you are renting an average farm, then pay no more. If one-third of the cash grain crop is the customary share for the rental of a farm, do not pay two-fifths or one-half unless your farm is definitely above the average in productive capacity. Before you agree upon the kind of rent and the amount of rent, find out the rent paid for other farms. It will also be helpful to know the rent that has been paid during past years on the particular farm you are considering.

In the period following this war, caution is needed in making cash leases. Cash rents have been increasing during the war as farm incomes and prices have risen, and after the war, there will be a natural tendency for cash rents to decline at a slower rate than commodity prices. Cash rents agreed to at the beginning of the year may be in line with prices at that time, but by the end of the year when most crops are sold, prices may be lower. To guard against this possibility, it will be advisable in the immediate post-war period for those who make cash leases to put them on a sliding scale basis. The method for doing this has been worked out by several of the State agricultural experiment stations and has been tested through actual experience. Under this sort of an arrangement, the rental payment is adjusted at the end of the year in accordance with the average price of certain specified agricultural commodities. The following lease provision illustrates the sliding-scale arrangement:

The tenant shall pay a cash rent per acre proportional to the simple average of the monthly index numbers of the prices of the farm products........, ...,........,........, (use major products to be sold from farm) for the eleven months beginning with March 19.., and ending with January 19.., as computed and published by........................(most State agricultural experiment stations publish price indices suitable for this purpose) as follows:

If the simple average of the index numbers is:	The rental per acre shall be:
150	$7.50
140	7.00
130	6.50
120	6.00
110	5.50
100	5.00
90	4.50
80	4.00
70	3.50

The rental shall be paid in two installments, the first being due and payable October 1, 19.., in a fixed amount of $........ per acre, the second on February 15, 19... The amounts due and payable February 15th shall be the remainder of the full rental as computed according to the table above.

DECIDING UPON THE TERM OF LEASE

Short-term leases are characteristic of farm tenancy in the United States, and they are a bad feature. Long-term leases, automatically renewable leases, and longer periods of notice to terminate leases are ways of overcoming the disadvantages of annual leases.

Annual Leases. Most of those who start out as tenants will likely have to accept an annual lease. This first year will be a testing period for both the tenant and landlord. During the first year, the tenant will decide whether he likes the farm and whether he can work satisfactorily with the landlord. The landlord will decide whether he likes the way the tenant carries out his farming operations and the way he keeps things up on the farm. If everything goes well, the two parties will continue the lease for another year. On annual leases, the important point is that the parties meet together several months ahead of the end of the lease and decide whether they shall continue for another year.

Year-to-Year Leases. Year-to-year leases are common. This sort of lease may result from the intentions of the parties by specifying in the lease contract that the lease shall remain in force from year to year unless notice is given by one party to the other that he intends to terminate the lease. This arrangement is commonly referred to as the automatically renewable or continuing lease. Year-to-year leases also result when the two parties start out with a 1-year written lease, and then carry over without a specific agreement. Whenever a lease has been continued in this fashion, it can be terminated at the end of any succeeding year only through definite notice being given by one party to the other. The period of notice required varies according to State law. The recommended procedure is to specify in the lease that the term shall continue from year to year unless written notice is given at least 3 months prior to the end of any year and preferably 6 months prior to the end of any year.

Long-Term Leases. The best lease-term arrangement is the lease for a number of years. Leases of 3 to 5 years are entered into under good landlord-tenant relationships. Leases of 10 years' length are not uncommon. If you have an opportunity to enter into a 3- to 5-year lease on a good farm, but cannot definitely satisfy yourself that you should sign up for that long a period, the lease may provide for termination at the end of any one year. In this case, the length of notice required for termination should be at least 6 months. Under this arrangement, it is clear that the intentions of the landlord and tenant are to continue the lease in force for the specified number of years. However, if unforeseen circumstances arise, a method is provided for the termination of the lease.

DECIDING UPON THE METHOD OF MAINTAINING THE FARM

For successful tenancy, it is important that arrangements be agreed upon between the landlord and the tenant with respect to keeping buildings and fencing in repair, maintaining terraces and drainage ditches, and otherwise keeping the farm in good condition. Under normal circumstances, the landlord should put the farm in good condition at the beginning of the tenancy. The tenant is expected to maintain the farm during his tenancy with exception of normal wear and depreciation from causes beyond his control. If the farm needs specific repairs at the beginning of the tenancy, these should be specified in the lease contract. A landlord should agree to have such repairs made within a specified time.

For normal maintenance and repairs, it is customary that the landlord furnish the material, and that the tenant perform the labor. However, the making of new improvements which become a permanent part of the property is customarily the responsibility of the landlord. The tenant should make permanent improvements only with the authorization of the landlord, and under an agreement that the landlord will compensate him for the cost of such improvement including the value of his labor.

Minor improvements are frequently made by the tenant at his own expense and upon his own responsibility. Ordinarily the tenant will make only those minor improvements that will benefit him more than their cost during the term of the lease. The tenant should not make even minor improvements with the expectation of compensation from the landlord, or with the idea of removing them at the end of the tenancy unless he has a specific agreement with the landlord. Under State laws minor improvements may become legal fixtures which cannot be removed unless so specified in the lease contract.

DRAWING UP THE LEASE CONTRACT

Rental arrangements with private landlords are sometimes made verbally, but this is not a recommended procedure. In the interest of all concerned, lease agreements should be made in writing. The landlord and his wife, and the tenant and his wife should read and sign the lease contract. The tenant's family should know what rental obligations have to be met from the farm income, what the arrangements are for fixing a leaky roof, or for replacing a windowpane. If the landlord dies his wife will carry out the terms of the agreement if she has signed it.

Your farm lease should be drawn up as early as possible before the crop season begins. As to the main legal requirements, the lease should contain:

(1.) Date.
(2.) Names and signatures of the contracting parties.
(3.) A description of the farm leased.
(4.) The period of time for which the lease is to remain in force.
(5.) The amount and kind of rent to be paid and the time and place of paying it.

In addition, a good lease contract should contain:

(1.) General plan of farming.
(2.) Contributions to be made by each of the parties toward the operating expenses.
(3.) Procedure by which repairs are to be made.
(4.) Obligation and time limitation for the replacement of buildings by the landlord that are destroyed by fire, flood, storm, or other cause.
(5.) Responsibility for carrying out governmental soil conservation programs and the method of sharing the benefits from participation in such programs.
(6.) Procedure to be followed for the termination of the lease in the event of death of either of the parties.
(7.) Procedure for the settlement of differences of opinion.

In drawing up your lease contract, it is often helpful to obtain standard lease forms from the United States Department of Agriculture, or from one of the State agricultural experiment stations. The lease forms provided by any one of these agencies will serve as a check list of the essential items which should be considered in rental agreements.

CHECK-UP NO. 23

By answering the following questions you can find out how well you have mastered the material of this chapter. Check your answers by the key in the back of the book.

1. How is getting started in farming different from getting started in most occupations? (a) You can start at a younger age; (b) You can start at the top; (c) You don't need as much education.

2. From what government agency can you get information on the homesteads? (a) The Department of Agriculture; (b) The Department of Commerce; (c) The Department of the Interior; (d) The Forest Service.

3. Can men who have not had actual farm experience get farms on new irrigation projects? (a) Yes. (b) No.

4. What is one of the main hazards taken by the beginner who buys a farm? (a) The land may not be productive; (b) Interest rates may change; (c) The value of land may depreciate markedly; (d) The land may rapidly wear out.

5. To get a good farm as a tenant what is the chief asset you need? (a) The willingness to work; (b) Enough capital to pay for all the things you will need; (c) A friend who will rent his farm to you; (d) A good reputation as a farmer.

6. If you want a job managing a farm what qualification is most important? (a) A college education; (b) Experience on a farm; (c) A reputation for honesty; (d) Good financial judgment.

7. By being a share cropper you can get experience. What disadvantage is there? (a) The experience is not of the type of farming that most people do; (b) The land-owner dictates the crops to be grown; (c) The income is usually small.

8. Can the man who wishes to go into farming but who has not had farm experience make up for this lack by taking a general farm vocational training course? (a) Yes. (b) No.

9. About what per cent of the people who work on farms are wage workers? (a) 25. (b) 33. (c) 40. (d) 45.

10. In which of these states would the cash lease be bad? (a)

North Carolina. (b) Ohio. (c) Pennsylvania. (d) North Dakota.

11. For what type of farming would the crop share lease be undesirable? (a) Tobacco production; (b) Rice production; (c) Livestock production; (d) Flax production.

12. What share of the grain crops should be paid in rent? (a) 1/4; (b) 1/3; (c) 2/5; (d) Depends upon the section of the country you live in.

13. Should the tenant expect compensation for minor improvements he makes on the building of a rented farm? (a) Yes. (b) No.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. Getting started in farming is considered very different from getting started in the retail clothing, grocery or other business. What is the major difference between getting started in farming and in getting started in the other two occupations listed above?

2. Starting as a share cropper or as a farm hand usually pays the beginner very little and therefore these two ways of starting are not given serious consideration by most beginners. Before turning down these two ways of starting what advantage in each method should the beginner consider?

3. Figures show that on the average the man who pays cash rent, pays less rent than the man who rents under a share arrangement plan. In spite of this fact, beginners usually prefer to rent on a share basis. What is their reason for choosing the share rather than the cash basis?

4. In deciding how much rent you can afford to pay for land, what procedures should be followed?

5. What six important features should be included in a good lease contract?

Chapter XXIV
Selecting a Farm

WHAT THIS CHAPTER IS ABOUT

If you have carefully read this book and have decided that you want to be a farmer, you are ready to think of the selection of the farm you are going to run. This chapter tells some of the things to look for. It mentions again in less detail some of the important subjects that have been mentioned in previous chapters.

ESSENTIAL THINGS TO CONSIDER

The day you buy or rent a farm will be an important day in your life. If you select your farm carefully and buy or rent it at a price in line with its value and on terms you can meet you may be starting up the road to a satisfactory life and financial success. If you choose your farm unwisely or purchase it carelessly you may be starting down the road to years of fruitless toil and failure. Since a farm is both a home and a business, the particular one you select will influence the welfare of your family in every way.

When selecting a farm the principal questions to ask yourself are:

1. Where should my farm be located and what type of farming should I follow?
2. What size farm should I operate?
3. What must I look for when inspecting a farm?

Location and Type of Farm. "Where shall I locate," and "What type of farming shall I follow?" are the first problems you will encounter when you start to make your selection. Only you can tell whether you want to raise wheat in North Dakota or cotton in Alabama; whether you would be happier on a cattle or sheep ranch in Wyoming or on a dairy farm in New York State. Some farmers in each of the regions of the country have been successful and there are opportunities for additional farmers like them. There is no established rule to use as a guide in choosing the region for your home, but people generally are more satisfied with surroundings similar to those in which they were reared. The farm you will wish to operate may be near where you have always lived and of the type with which you have had experience.

After deciding on the region for your home and the type of farming you wish to follow, you must next choose the community in which to locate. As a rule, the community should be one in which the type of farming you like is well developed and generally practiced. Farming as practiced in an old agricultural community is usually the result of years of experience and the kind found by the farm people to be the most profitable. There are many exceptions to this rule. Farmers in some areas are known to be quite inefficient in the use of land, labor, and capital. Possibilities for unusual types of farming are also present in some localities, but for most people it is safest to follow the type that the majority of the successful and progressive local farmers have found profitable. Climatic records for the community will tell you what to expect in rainfall, length of growing season, severity of winters, and natural hazards such as destructive frosts, winds, hail, drought, and floods.

You should settle in a community populated by people with whom you will be satisfied to associate possibly for the rest of your life. Acceptable schools and churches should be nearby. You will want to be able to attend a church of your own denomination and you will also wish to send your children to schools that will give them satisfactory educational advantages. For you to be a successful farmer you and your family must be content and happy to live on the farm and in the community you select.

When choosing a site within the community, thought should be given to such features as improved roads, mail routes, power lines and telephone lines. Automobiles, trucks, and tractors are making improved roads a valuable asset to the average farm. Having the mail route a mile or more away will cost you many hours of lost time as compared with having the mail box at your door. Inexpensive electric power for lights and small motors has proved its worth on countless farms in the past few years. A telephone in the home can also save you hours of time and labor.

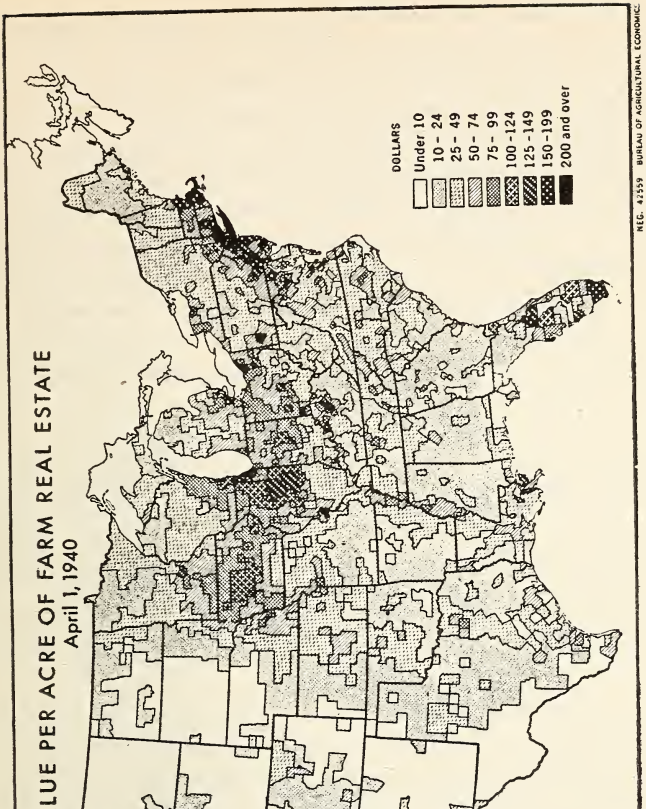

VALUE PER ACRE OF FARM REAL ESTATE
April 1, 1940
DOLLARS
Under 10
10 - 24
25 - 49
50 - 74
75 - 99
100 - 124
125 - 149
150 - 199
200 and over
UNITED STATES AVERAGE 31.71 DOLLARS
BASE FIGURES ARE FROM THE BUREAU OF THE CENSUS
NEG. 42559 BUREAU OF AGRICULTURAL ECONOMICS

Figure 122.

The community you select should have within it dependable market outlets for the products you expect to produce. These facilities may usually be found in well-developed communities for the basic products produced there. It is frequently difficult and expensive to establish markets for products not normally sold in the community. However, numerous opportunities still exist for the profitable production and sale of unusual products such as poultry and dairy products in communities where cash crops are now the principal items of production. Some crops that were unusual at one time are now well established in the farming system. For example, the soybean is now being produced commercially where it was a novelty a few years ago; and dairying is being expanded successfully in the cash-crop areas of the Southern States.

Size of the Farm. The ideal farm in the United States is a family-size unit that gives full-time employment to all members of the family with such hired help as may be needed during rush seasons. As a business, it is large enough to pay all farm operating expenses and in addition provide the family with an acceptable level of living. The size of this farm is determined by the family labor available; that is, the number in the family and the ability of each member.

You may want such a farm. You may achieve this by acquiring one fully developed or one that has the possibilities of being properly expanded. You may possibly acquire a farm covered with brush or timber, clear it off, and develop it into a substantial farm business.

Another method is to acquire a small tract and rent or purchase sufficient acreage nearby to make the size unit you desire. If you plan on having such a farm you should give consideration to the possibilities of adjusting the size of the business to fit any later possible change in the size of your family.

During the past three or four decades, the size farm which one family can handle has been getting larger because of the use of modern labor-saving devices and improved farm-management practices. Because of these changes some farms that were adequate operating units 30 or 40 years ago are now too small.

Mere acreage is not a dependable measure of the size of a farm business because the type of farming followed and the management practices employed both have a profound effect upon it. For example, a 50-acre vegetable or small-fruit farm on the east coast might be just as large a business, from the standpoint of both effective use of labor during the year and of annual net income, as a 5,000-acre ranch in Wyoming or Nevada. Improved farm management has changed many one-crop farms effectively using labor only a few weeks in the year into diversified farms providing year-round employment for the farm family and at the same time making effective use of the farm's resources. Similarly, irrigation has changed some range land into fruit and vegetable farms.

If you have reasonably high managerial ability and get along well with hired labor, you may want a farm that will employ more labor than that of your immediate family. Many farms require extra help at certain seasons, while others employ additional labor all year. If you are to depend on hired labor you should make sure that it will be available when you want it and at a reasonable price.

Some men are exceptionally good managers. They have the ability to control and direct a number of workmen and they know how to keep all phases of the farming enterprise in proper balance and adjustment. Many other men are more capable in the production phases of the farm but less capable as business managers and directors of farm labor. Such a man may be highly successful as an operator of a family-size farm but unsuccessful as an operator of a large commercialized farm.

The amount of capital you have available, in the form of either cash or credit, may also limit the size of your farm business. If you have sufficient available capital you will be able to purchase a well-developed farm outright. If your capital is limited you will have the problem of making efficient use of the capital and labor you do have. For many years the region of best opportunity for a farmer was in the cheap land area of the west. Practically all of this land has now been developed, but there are still opportunities for industrious and progressive farmers in the older farming areas of the country. It is most important, however, that you locate on a tract that will give you opportunities for advancement and not confine yourself to one so small or unproductive that all the proceeds will be insufficient to keep up the farm and provide for the family the kind of living you want them to have.

Bulletins published by the State agricultural experiment stations and the United States Department of Agriculture will give you helpful advice and detailed information on this subject.

WHAT TO LOOK FOR WHEN YOU INSPECT THE FARM

The financial success or failure of a lifetime of work may largely depend upon the business transaction of buying a farm. A productive farm, purchased at a reasonable price and on terms consistent with your ability to pay, will provide you with an adequate income and opportunity for continued financial advancement. When you purchase a farm, the chances are that you will remain on it for the rest of your life. In normal times it is not always possible to sell a farm without financial sacrifice. For this reason you should be certain that the farm selected is suitable to your needs and will continue to be satisfactory.

If you plan to rent, you need not be quite so careful in selecting the farm because most of your investment will be in livestock and equipment, all of which may be readily moved or sold. It will be important, however, to secure a leasing arrangement (as discussed in Chapter 23) which will make it possible for you to recover unexhausted improvements which you make on the farm.

When selecting a farm to operate, whether to buy or rent, you should base your selection on facts, not emotion and enthusiasm. Beautiful scenery, shrubs growing in the yard, fresh paint on the buildings, and attractive wallpaper in the house all add to the desirability of the farm, but they will not help you pay off a mortgage. Do not select a farm solely on the basis of a conducted tour. Take the tour, if possible, but return on your own and make your own investigations if you think you want the farm.

Topography and Soil. The productivity of the soil and the amount of cropland available will largely determine the amount of products that you will have to sell. Soil is the basic productive resource of the farm and, whether you buy or rent, it is by far the most important factor to consider. The topsoil of fertile land is unusually mellow and several inches in depth. It has a good coverage of vegetation, either domestic crops or native vegetation such as weeds, grass or timber. View with suspicion land with a shallow top soil or land that is cold and wet, for such soils are seldom productive. Poorly drained soils stay soggy so long in the spring that it is impossible to get crops planted at the proper time. These same soils become excessively dry and hard in summer. Such soils can often be detected by the presence of a compact and hard layer just below the topsoil.

Land that is in a humid climate and is very flat may be poorly drained, frequently requiring the use of tile or surface ditches to take off the excess water. On the other hand, steeply rolling soil erodes readily when in cultivation and usually requires extensive use of such conservation measures as terracing, strip cropping, contour farming, and soil-saving dams. For this reason steeply rolling soil is usually maintained in grass or timber and is used for crop production only occasionally.

It has been estimated that approximately 50,000,000 acres of former cropland have been ruined for immediate cultivation by erosion, another 50,000,000 acres have been damaged, and another 100,000,000 acres have lost half or more of the original topsoil. Gullies are easily detected, but sheet erosion, which may be just as serious, is not so obvious. If the land has a rolling topography and large areas on the slopes have a thin coverage of vegetation, you should make a careful inspection for soil erosion. If erosion has been severe and the fertility is depleted you should carefully investigate the probable cost in time and money to reestablish a reasonable degree of productivity and to adequately prevent further soil erosion.

Effective measures to conserve the soil are now generally accepted as part of the normal farming operations. If you are purchasing a farm, you should consider the cost of necessary conservation practices. If you are renting, the obligations of both you and your landlord in this connection should be clearly set out.

Lime. The lime content of the soil is considered to be the foundation of soil-improvement and crop-production programs in the humid regions of the Nation. It influences the physical condition of the soil, the availability of certain essential elements, the control of plant diseases, and the growth of soil organisms. It is frequently the limiting factor in the production of such high-type legume crops as red clover, sweetclover and alfalfa. The lime needs of the farm will have a significant influence on its value to you.

Weeds. The presence of noxious weeds is an important consideration in selecting a farm. Perennial noxious weeds have been known to reduce crop yields as much as 90 percent.

The county extension agent or the local representative of the Soil Conservation Service will give you specific information concerning the soils of the area, their capabilities and limitations, the crops that are adapted to them, the yields that may be expected with various types of management, and the noxious weeds that may be found on the farm. These persons can also give you the names of two or three successful farmers who live near the farm you are considering. These farmers can tell you how the farm has been managed in the past and how productive it has been.

Topography is an important factor to consider because it largely limits cropping and farm lay-out possibilities and at the same time affects production costs and drainage problems.

If the farm is badly cut up with ditches the fields will necessarily be small and irregular in shape. These are satisfactory for cultivation with small tools but large fields are necessary for the efficient operation of power machinery now in general use. Ditches and gullies are difficult, sometimes impossible, to cross with loaded vehicles. Bridges and crossings at running streams are expensive to build and maintain. Having pasture land a considerable distance from barns and water may cost you extra time in caring for stock, as compared with having the pasture more conveniently located.

Farm Improvements. Buildings on the farm should be adequate and appropriate to its needs. The needs of various types of farms vary widely. For example, a fruit farm requires one type of buildings, a poultry farm another. If your farm has insufficient buildings you may suffer financial loss due to exposure of livestock, feed, or machinery to the weather. On the other hand, if you own a farm that is over-improved you will find the cost of insurance, depreciation and repairs excessive. The major buildings of the farm, the house and barn, are obvious and usually well-established in the mind of either a buyer or a renter. Other buildings, however, are also frequently necessary for the efficient operation of the farm. The storage cellar, for example, is easily overlooked, yet has proved its worth in practically every section of the country.

When purchasing a farm, special consideration should be given to the type of construction and state of repair of the buildings. Structures that are cheaply constructed, have weak foundations, poor roofs, and inadequate braces will depreciate rapidly and be expensive to maintain. If you are renting a farm, you should make sure the buildings are sufficient for your needs and at least in keeping with the average of the community.

Fences are important on any farm where livestock is to be kept. If you buy a farm, fences are an essential capital improvement which should be considered as a part of the investment. If you rent a farm the lease should provide for the maintenance of fences as well as other improvements. It is desirable to have a lease which indicates the responsibilities of both the landlord and tenant in this connection.

If you contemplate purchasing a farm and constructing new improvements or making extensive alterations to existing ones, you should carefully investigate the costs and the effects these costs will have on the total cost of the farm. For example, if you purchase a 100-acre farm and add a building costing $1,000 you will add $10 per acre to the cost of the farm. During the past few years it has generally been considered cheaper to purchase a farm with buildings already on it than to build them after acquiring the land.

Special Considerations. Water, both for household use and livestock, should be ample, dependable, convenient and inexpensive. In some sections of the country, water is largely obtained from running springs or shallow wells. In others, water is scarce and difficult to obtain. Neighboring farmers will be able to give you accurate information concerning the supply on any farm you are considering.

Irrigation water for the production of crops is also essential in many sections. If you are to depend on an irrigation pump of your own or on water furnished by an irrigation district, you should have no doubt that water will be delivered as you want it, in quantities that you need, and at a reasonable cost. The special problems involved in selecting an irrigation, cut-over, or drained-land farm are discussed in the next chapter.

If the farm has an orchard, the number, condition, and variety of the trees should be noted. A healthy, productive orchard, even if only family-size, may add a substantial amount to the value of the farm. If there is some timber on the farm, the condition, stand and species should be studied. Timber and related products provide some farmers with a substantial income in addition to that derived from farming.

If you are purchasing a farm, all the elements that influence the sale value should be considered. You may wish to sell out sometime so the resale possibilities may be important. Some farms are "easy sellers," that is, they are salable at any time. They are usually neat, attractive, located in a substantial community, and of the size desired by a large number of buyers. Farms that are widely divergent from the average of the community in size, quality, character of improvements, or productivity of soil are frequently hard to sell.

Certain nonagricultural influences such as oil or gas development and speculation also affect land values in certain localities. However, they are special fields of operation and study, and are not considered in this chapter.

Overhead Costs. If you are purchasing a farm the fixed overhead costs should be examined carefully. After finding out what they are you should make sure that you will have enough money to pay them. General property taxes come due each year. Interest and amortization payments are usually payable annually. Insurance payments are assessed each year. Buildings and fences constantly depreciate and repairs must frequently be made. Tile drains stop up and must occasionally be cleaned out or replaced. If the farm is in a special-improvement district, such as a drainage or irrigation district, assessments for services rendered may be expected each year.

If you are to operate the farm either as an owner or as a tenant, there are other expenses such as costs of electricity, telephone, threshing, veterinary services, extermination of noxious weeds, etc. Overhead costs vary widely between different regions and between different farms within a region, but few farms are financially successful that have excessively high overhead costs. The State experiment station will have information available to help you make the estimations for the farm you consider.

The chart, Farm Appraisal Points, which follows, will give you a handy check list for some of the points to consider when making your own appraisal.

FARM APPRAISAL POINTS

Location of farm ....

Distance to shipping station..........; to trading center..........

Condition of roads..........; in winter..........; in spring..........

Distance to schools and churches..........; to nearest neighbor ....

Is telephone available?..........; R. F. D.?..........

Electric current for lighting..........; for power..........

Total area of farm..........; acres in crops.......... acres that can be used for crops..........; acres in pasture ....; acres in woods ....; acres in wasteland ....; in roads, buildings, lots, swamps, lakes, etc..........; acres in stump or brush land..........; carrying capacity for stocks..........; Kind of timber ....; ease in getting out timber or wood..........

Topography as regards economy of cultivation..........; irrigations..........; danger from erosion or sliding..........; flooding..........

Natural fertility as evidenced by kind of forest growth and native vegetation..........

Present condition of fertility as evidenced by growth of crops or weeds..........

Physical condition of the soil, (type, texture, depth, fertility, lime content), adaptability to legumes.......... adaptability to all kinds of crops..........

Natural drainage.........................; Artificial drainage.........................
Depth of soil.........................; Kind of surface soil.........................;
Kind of subsoil.........................; Water Supply: source
.........................; safety.........................; dependability
.........................; convenience ....;
quantity in dry summer months or during winter months.........................
.........................; cost of upkeep.........................; supply
in pastures.........................

Buildings as suited to kind of farming.........................;
adaptability to another type of farming.........................;
cost of upkeep.........................; arrangement for economy of
work.........................; desirability of dwelling as a home
.........................; condition of fences.........................;
kind as regards cost of upkeep.........................; farm highways
.........................; shape of fields.........................; size of fields
.........................; arrangement of fields.........................;
obstruction in fields.........................; nearness to farmstead
....

Kind of orchards.........................; condition.........................
.........................; amount of labor required.........................

Adequacy of trees for home use.........................

Climate: As to growing season.........................; storms.........................
severity of winters.........................; days available for farm work
.........................; healthfulness.........................

Neighborhood: Character of people.........................; available labor
supply.........................; churches.........................; schools
.........................; farm organizations.........................

Possibility of increase or decrease in value of land.........................

Possibility of selling farm.........................

Possibility of renting farm.........................

Desirability of farm as a strictly business investment.........................

Adaptability of farm to changing economic conditions necessitating change of type ....

Adaptability of farm for enlargement of business.........................

Adaptability of farm for diversification or improved organization of the business ....

Adaptability of the farm for high yields of crops and desirability for livestock production ....

Sureness of market for major crops grown..........; distance to markets..........

History of farm as regards management of land with respect to keeping up fertility..........

History of region as to development and speculation in lands as affecting present price..........

Number of other well-developed farms in immediate vicinity that are successful.......... How long have they been farmed?..........

What are some of the operators' difficulties?..........

How soon can this farm be made a going concern?..........

Are taxes on this farm reasonable?..........

Can the present owner transfer a sound title?..........

CHECK-UP NO. 24

From reading this chapter and from what you know, you should have a good idea of the important points to keep in mind when selecting a farm. To test your understanding arrange the points below in the order in which a person selecting a farm should make his decisions. Show the order by writing the number 1 before the first decision, the number 2 before the second, and so on—

_____ *a.* The size farm to buy.
_____ *b.* The condition of the soil on the farm.
_____ *c.* The community in which you want to live.
_____ *d.* The use of hired labor.
_____ *e.* The kind of farming you want to do.
_____ *f.* The availability of telephones.
_____ *g.* The modern improvements present.
_____ *h.* The state to live in.

Check your order with that of the book.

CORRESPONDENCE OR CLASS ASSIGNMENTS

1. A man has decided the type of farming he wants to do but bought a farm in a community where that type of farming is not done. Discuss his choice with regard to (a) chances of being the most successful farmer of the community; (b) availability of tools to be borrowed.

2. The number of acres is usually considered the only measure of the size of a farm. What are some conditions under which that measure would be very poor?

3. What things should be put under the heading of "overhead costs?"

Chapter XXV

Special Care Required in Selection of Irrigated, Drained Land, or Cut-Over Farms

WHAT THIS CHAPTER IS ABOUT

Some kinds of farming require special skills and involve special problems that even experienced farmers may not know how to deal with. This chapter tells what to look out for and what special requirements must be met if you decide to go into farming on irrigated, cut-over, or drained land farms.

To get an idea of how much you already know about the content of this chapter, you should try to answer some of the questions that most people ask about irrigated, drained, or cut-over land. Such questions may also serve as a guide for your study of the chapter.

Here are questions usually asked. Several possible answers are given for each question. Choose the one that you think is the best.

1. Which of the three areas requires little expenditure to get the land in condition to produce farm products? (a) Cut-over; (b) Drained; (c) Irrigated; (d) None.

2. Does the Government clear cut-over land of stumps, brush, and stones? (a) Yes; (b) No.

3. In general in which of the three areas is the least amount of the total work done in getting the land ready for crop production done by the individual farmer? (a) Irrigated; (b) Cut-over; (c) Drained; (d) They are about the same.

4. In what areas is the removal of stone not likely to be a problem? (a) Irrigated; (b) Cut-over; (c) Drained; (d) None of them.

5. In which area is marketing likely to be the most difficult problem? (a) Irrigated; (b) Cut-over; (c) Drained; (d) There will be no difference.

6. Is water logging of irrigated land a major problem to consider? (a) Yes; (b) No.

7. In which area is the initial cost of the land greatest? (a) Irri-

gated; (b) Cut-over; (c) Drained; (d) For quality received the three are about equal in cost.

8. Is it possible to lower the fertility of the soil on an irrigated farm by putting too much water on it? (a) Yes; (b) No.

Development and operation of farms in areas needing irrigation, drainage, or clearing require large expenditures in the way of land improvement before farm products can be produced. At the present time these are the principal lands remaining to be developed for agricultural use since the fertile prairie lands readily accessible and easy to prepare for farming have all been settled.

In cut-over forest areas time and hard labor are necessary to clear the land of stumps, trees, brush and stones. It would be possible for the Government to finance the clearing of large areas with large scale machinery, but this has seldom been done in the United States. Most of such land has been put on the market by timber interests and other private owners. In most instances they have been interested mainly in disposing of the land after the merchantable timber has been removed and have done only the development work necessary for selling the land. It has been up to the individual settler to clear the land and develop the farm into a going enterprise.

Development of land needing drainage or irrigation usually requires initial expenditures that are beyond the means of an individual. For this reason most of the irrigation projects developed in recent years have been sponsored by the Federal Government. Smaller projects have been organized and developed through corporate or cooperative types of organizations. Drainage projects in most instances are organized on a district basis and the costs of digging the ditches, building the levees and other improvements, and maintaining them are financed by all of the land owners within the district. The benefits from drainage and irrigation extend to so many people and the areas of land affected are so large that development and improvement work and maintenance as well must be carried out by the group as a whole. The type of organization set up to do the work must have the power to issue bonds to pay for the work to be done and levy charges on all of the land owners benefited.

IT IS A DIFFICULT JOB TO DEVELOP IRRIGATION OR DRAINAGE LAND FARMS

The individual who plans to settle in an irrigated or drained area usually must develop his own farm in addition to sharing the costs of community-wide improvement. An irrigated farm will require land leveling and clearing of trees, sagebrush, or stones. Irrigation ditches will have to be built. Buildings, fences, and other improvements must be constructed. Permanent crops such as alfalfa, pastures, or orchards must be established. A farm in a drainage area will require drainage ditches. Lands to be developed in drainage areas, like those in cut-over areas, require individual clearing of trees and brush and other farm improvements. Besides developing his own farm, the owner must share in the responsibility of making the community-wide features of the project a success. A farmer in a drainage area will be better able to keep his land free of floods and silt if the other farmers keep their ditches clean by holding back soil through conservation and keeping channels clear of brush and trees. Likewise, a farmer in an irrigation district will have sufficient water if other users above him do not use excessive amounts. In some instances farmers have priority rights to water supply. Priority rights to water mean that a farmer was there first and established a right to use a certain share of the total water available annually. This right cannot be taken away by farmers who move in later. Every farmer in irrigated or drainage areas must make his own needs fit in with those of the group. He cannot be an individualist to the same extent that farmers can who live in areas not requiring community types of projects for land management and crop production. The whole group has a collective interest in the management of water supply.

In all such areas, a prospective farmer must at the outset have sufficient capital at his disposal to pay the initial cost of the land and subsequent development costs as well as to support his family for the 2 to 6 years that it requires to bring the farm up to a point where the annual sales exceed the costs. If the individual depends largely upon borrowed capital he will require a type of loan that is increased annually until the farm is developed, with no repayments until after the farm produces in excess of operating and family living costs. It is difficult to obtain loans that meet this requirement. For this reason settlers in such areas usually find it necessary to accept a very low level of living for their families while their farms are being developed. Many families who start to develop new farms are not willing to accept these hardships and as a result abandon their farms before they are developed and sacrifice the time and money invested. Because this happens so often, it is commonly said that the efforts and sacrifices of two families must be expended before the third operator can make a success of a reclaimed farm from new land. Any individual going into a new area to develop a farm should be aware of the requirements and sacrifices involved. If he and his family do not believe they can take such hardships over the long pull, they should not be lured by free or cheap unimproved land.

These problems are more or less common to all types of areas requiring large outlays of capital or time and labor for development. However, there are many special problems that an operator encounters in irrigated, drainage, or cleared areas. Each of these will be discussed separately.

MOST IRRIGATED LAND IS IN THE WEST

In the semi-arid and arid portion of the western States rainfall is inadequate for crop production without irrigation. As a result the largest part of the western country is used for range on which livestock is grazed. Some of the mountain country does receive abundant rainfall and throughout other parts of the West much precipitation falls as snow in the winter months. The storage and utilization of this water make possible the intensive use of some of the land through irrigation. Water requirements for irrigation average about 27 inches per acre annually but vary from 12 to 80 inches, depending upon type of soil, location, and kind of crop. There is some overhead irrigation on truck farms in the East, primarily for the purpose of carrying the crops through short dry periods, but that is not what is meant here. This discussion refers to the Western States.

The irrigated areas of the West are scattered widely and include a total of 18,000,000 acres. The location and size of the areas depend upon the availability and amount of water, the cost of making water available, and the area of land suitable for irrigation. The first requirement is a water supply. It may be surface water taken from streams or lakes, or ground water obtained from underground. Neither surface water nor ground water is available in all locations. As surface water is available in greater abundance, and generally is less expensive, it is much more extensively used for irrigation. Most of the streams furnishing water for irrigation rise in the mountains and as a result have a fairly even flow throughout the crop-growing season. However, streams that rise in the Great Plains obtain most of their water from rains and melting snows in the spring. Consequently, their flow fluctuates widely throughout the year and reservoirs on them may become depleted of water during long periods of drought.

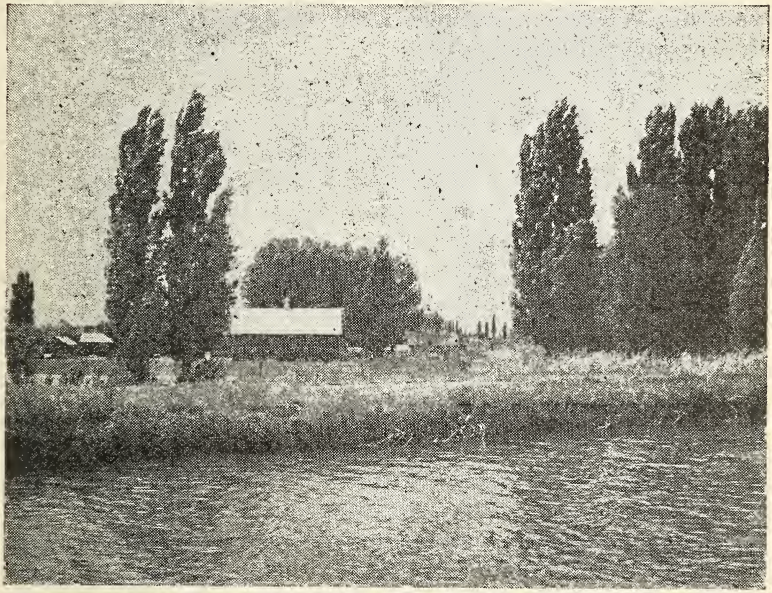


Figure 123. Typical farm on a western irrigation project. (U. S. D. A.)

TYPES OF FARMS IN IRRIGATED AREAS

The most common type of irrigated farming is rather diversified, with alfalfa a major crop, some good irrigated pasture, part of the acreage devoted to cash crops such as sugar beets, beans, or potatoes, and with enough dairy cows or other livestock to utilize the feed produced. But there are innumerable variations from this common type. In many of the higher mountain valleys, livestock farming is most common—dairy cattle, beef cattle, or sheep—because crop production is limited chiefly to hay and pasture. On the other hand, in many areas fruit and vegetable production are the main enterprises. In warmer areas cotton is a principal crop, and certain areas where the climate is suitable are devoted to such special crops as citrus fruits, olives, dates, avocados, or rice. Market outlets as well as soils and climate influence the type of farming in irrigated areas.

In many areas there are various combinations of these different types of farming, for even in a single irrigated area there may be considerable variation in soil conditions and lay of the land. Some of the land may be very fertile, gently sloping, and adapted to a wide variety of different crops. But usually there is also some land that can be used only for pastures or other perennial crops if severe soil erosion is to be avoided. Farms on such land usually are best adapted to feed production and livestock farming. In general, however, irrigated farming is an intensive type of farming. Intensive and high value crops must be grown because of the high cost of developing the water facilities. The high cost of water necessitates that large outlays per acre of land be made for labor and other expenditures. As a result, most irrigated farms are less than 100 acres in size. Most irrigated farms that are large enough to furnish a satisfactory living represent a capital investment of eight to ten thousand dollars or more.

The principal advantage of irrigated farming as compared with non-irrigated is that it is less dependent upon weather conditions. Because the farming is more intensive, farms in an irrigated area are smaller and the homes closer together. This makes it possible to live closer to towns with their schools, churches and roads, and

Figure 124. Development of land in an irrigated area calls for land leveling, and clearing of sagebrush or stones. (U. S. D. A.)

to have electricity and telephone. However, irrigation farming is not easy. There is much hard labor, water costs are high, and the farmer must be constantly on the job to pay for his farm and make a satisfactory living.

SOME THINGS YOU WILL HAVE TO KNOW ABOUT WATER

Most irrigated areas obtain water from rivers and creeks and by means of a diversion dam divert the water through a ditch to the land where it is to be used. The water is most often stored in upstream reservoirs and released as needed to maintain the flow of the stream. The ownership of such water facilities varies all the way from private, corporate, and cooperative to Governmental depending usually upon the size of the project. The irrigation features of the completed Grand Coulee Dam in the Columbia Basin, State of

Washington, is the largest project that will probably be completed after the war. In some areas irrigation water is obtained from underground supplies by pumping from wells on individual farms. When the area irrigated by pump method is not very extensive the individual farmer has no trouble in obtaining sufficient water. However, when large numbers of farmers in an area irrigate by pumping from underground supplies it soon becomes necessary through cooperative or Government effort to build storage reservoirs to replenish the underground water.

An individual who is going to develop an irrigated farm in a Government-sponsored project need not spend a great deal of time determining what his individual water rights are to be. The chances are that the proposed plan will provide sufficient water for the type of farming to be carried on in the area. However, in a new nongovernmental project or in an already established area of any type the prospective farmer had better spend some time finding out what his "water right" will be as well as the future costs for maintenance and payment of district indebtedness.

A "water right" is the legal right to a specific amount of water, under specific conditions. Laws relating to water are quite different in different States. In most areas the water supply is limited and an individual does not have the right to use water in unlimited quantities. The amount he is entitled to may depend upon the amount of land he controls or the number of shares of water stock he owns. Such control may give him a right to a specific proportion of the total supply, but the total amount he obtains will be influenced also by the total water supply available. If the entire area is served by a single irrigation project the water rights usually are uniform throughout the area. However, the water rights may vary considerably when the farms in an area are supplied with irrigation water by different means, such as a number of different diversion ditches, each supplying one or more farms or one or more small irrigation companies or districts. As an example, farms on the lower levels of the valley floor may obtain an unlimited water supply from a storage up the main river channel, whereas farms up on a higher level may have access only to the water from a small reservoir on a branch of the main river channel.

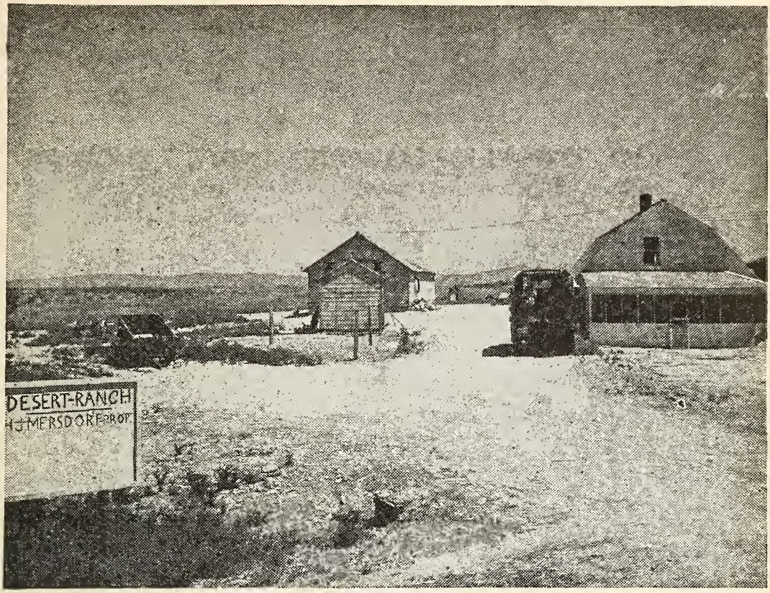


Figure 125. In the semi-arid and arid part of the United States rainfall is inadequate for crop production without irrigation. The owner of this ranch is waiting for irrigation water which will be supplied by a reclamation project administered by the U. S. Department of the Interior. (U. S. D. A.)

Persons contemplating irrigation farming should carefully investigate the adequacy of the water supply for the land in which they are interested. This involves not only the total amount of water that will be available, but whether or not it will be available when needed throughout the season. Where water is not stored, it is possible to divert it from the supplying river or stream when the water is high early in the season, but possibly not when it is low later on. In some projects where water is stored, the reservoir fails to fill in dry years, with a resulting water shortage. Where irrigation water is obtained by pumping from wells, the ground water level may recede because of too much pumping, in which case the water users face increasing costs for deepening their wells and pumping from greater depths.

SPECIAL KNOWLEDGE AND SKILL REQUIRED IN IRRIGATION FARMING

Success in irrigated farming requires special knowledge and skill in using and applying irrigation water and dealing with such problems as water logging and alkali. The operator must know how much water to apply and when and how to apply it.

Too large quantities of water cause leaching of plant food from the soil and may cause seepage and accumulation of alkali salts. In order to get rid of the alkali it may be necessary to construct a drainage system, or even to abandon the land for crop production if too much damage has resulted. Seepage from the canals as well as applying excess amounts of water often creates water-logged or swamp areas that require drainage.

Crops must be irrigated several times during the growing seasons and when they need moisture the correct amount of water should be distributed evenly over the cropland. Applying water at the

Figure 126. Most irrigated areas obtain water from rivers and creeks and by means of a diversion dam divert the water, through a ditch, to the land where it is to be used. (U. S. D. A.)

wrong time, unevenly, or in too small quantities reduces crop yields and lowers the farmer's income.

The combination of crops grown may depend upon the amount of water available and the frequency with which it is possible to obtain water. The farmer who obtains water once every 7 days will carry on different practices than one who can obtain water every 4 days. A farmer may grow some crops requiring water during every irrigation period and some requiring water every second or third irrigation period. By wise selection and planning the effective size of productive farm enterprises may be enlarged. Thus, the irrigation of crops requires not only knowledge of when and how to irrigate, but close attention to details and diligent work in the application of water.

SOME FARMS ARE IN ORGANIZED DRAINAGE DISTRICTS

Much level and low lying land in the humid part of the United States requires drainage before it can be used for agricultural production. In many instances an individual land owner constructs

Figure 127. Watering a field on a western irrigation project. (U. S. D. A.)

ditches that drain excess water into a nearby stream. As a rule, however, drainage, like irrigation, requires a district type of organization and the spreading of costs and benefits to all the land affected.

Farming in areas requiring drainage is sometimes specialized but in most instances is the same as that in surrounding areas not requiring drainage. Operators of these drainage district farms, however, have the added problem of knowing how to maintain the drainage system and, of course, have added costs in paying for their share of the community facilities, including maintenance, as well as a large investment in drainage facilities on their own farms. Much of the value of the land in such areas is represented by the cost of drainage systems. The importance of drainage is indicated by the fact that more than 10 percent of the improved acreage in all farms has been provided with ditches or tile drains.

THERE ARE ALSO DRAINAGE PROJECTS IN THE COASTAL LOWLANDS

Low wet areas near the Coast are sometimes drained by means of levees and pumping. The levees keep out excess water when the surface water level is high, and pumping removes excess surface water as well as lowering the subsurface water level. Such projects involve high risks because of the high cost and in some years the impossibility of removing excess water with resultant loss of crops. The importance of preventing excess water from standing even for short periods necessitates the installation of pumping capacity beyond normal needs. This often increases the cost of maintenance to a point where it is greater than can be carried by the production from the land. Pump and levee drainage will be successful only on land that is highly productive and suited to high-value crops. Several drainage projects of this type in the United States have been failures. The most successful are in California and Louisiana and they are located in protected positions on bays.

Large areas such as the Mississippi Delta and low flat lands inland from the Eastern Coast require a type of drainage which removes excess water from heavy rains in the spring and at other times and prevents water from standing on the surface. This type of drainage is often coupled with flood-control levees and river improvement. The creation of flood-control structures and the straightening of river channels give protection to much land formerly not suitable for agricultural use. Because of the installation of these structures it becomes profitable to complete the drainage of such lands, thereby making them available for agriculture.

DRAINAGE DISTRICTS ARE OFTEN TOO SMALL

A common mistake in the past has been the initial creation of drainage districts that affect only a portion of the drainable area. The original district builds an outlet channel large enough to carry the water away only from the land in the district. Later on other groups form adjacent districts and they in turn build small outlet channels parallel to the earlier ones. The cost of drainage, therefore, is much greater than if the original plan had been based on the eventual drainage of the entire area. Then too, many districts have not made adequate provision for the maintenance of the district ditches, financially or in providing men and equipment to do the work. Another problem is the disposal of the water from the district ditches. The ditches should do more than take the water of certain land and dispose of it on lands at lower levels. Such a practice often causes damage to other people's property and results in lawsuits and additional expense.

A prospective purchaser of a farm in an area with drainage district organization should find out not only about the adequacy of drainage facilities but also about the type of district organization and plans for future maintenance and financing. He should also find out about the financial condition of the district organization and the amount of original borrowings not yet paid off.

FARMING IN AREAS REQUIRING CLEARING

The upland areas requiring clearing are located in the Pacific Northwest, the northern portions of the Great Lake States, and

Figure 128. Much level and low-lying land in the humid parts of the United States requires drainage before it can be used for agricultural production. (U. S. D. A.)

numerous other smaller areas scattered throughout the Eastern United States. The areas requiring both clearing and drainage are the same as those cited in the preceding section.

As previously noted, the major areas requiring clearing have been cut over for timber before being offered for sale to prospective farmers, but many trees as well as stumps and brush remain. Timberland soils are much more variable than prairie soils and as a result the areas suitable for agricultural use are small and scattered. Airplane photographs of many such cut-over areas that are now developed for agricultural use show that only a portion of the land is used for crops. The remainder is in woods because of its rough topography, stoniness, or the poor quality of the soil. The resulting land use pattern consists of woods and patches of open land somewhat like the black and red squares on a checker board but, of course, not so regular. In developed cut-over areas such as in the Lake States the areas of improved and open land are small and the areas of brush and waste or forest land are large. The land suitable for agricultural use in undeveloped areas similarly occurs in small scattered areas.

FARMS ARE SMALL IN CUT-OVER AREAS

Farming in cut-over areas as a rule means small farms and scattered settlement. Thus it is more difficult and more expensive to have good public services such as roads, schools, electricity, telephones, and churches. The distances to church and school are great and the attendance is low.

Though an individual who acquires a farm in an established agricultural community in a cut-over area is likely to get a small farm,

Figure 129. In cut-over forest areas time and hard labor are necessary to clear the land of stumps, trees, brush, and stone. (U. S. D. A.)

he may have opportunities to enlarge it by clearing more of the unimproved land or acquiring additional suitable undeveloped land in the community. In the cut-over areas located in the North Central part of the United States the types of crops that may be grown are limited. The growing season is short and local markets cannot absorb large quantities of the perishable products such as potatoes and truck crops adapted to the cool climate. The soil, climate, and markets make dairy farming the most prevalent type. Where relatively large areas are suited to a specialized crop, it is possible to create a marketing system so that cash crops like potatoes or small fruits may be grown in quantity and at a profit.

CLEARING LAND TAKES TIME AND HARD WORK

The labor and expense of clearing land for a new farm vary widely depending on the type of timber growth, density of stand, and the type of land. In light soils less power will be required to remove the stumps than in heavy soils, also in light soils it will be easier to remove the stumps during the winter. Hardwood stumps rot sooner than pine stumps. To prepare land for crop production, the brush must be cut and removed, along with down logs, stones, and stumps after they have been pulled or blasted. Next the land must be leveled and plowed. Rather than complete all these operations before cropping a field, many settlers remove the brush and down logs and then pasture or even crop the land for several years to give the stumps and roots a chance to rot. This method is slow and means much work by hand and with a single horse. If a team or tractor is available the work will be done more quickly.

The slowness and difficulty of clearing land make it impossible for several years to have a farm enterprise large enough to begin payments on the land as well as support the family from the sale of farm products. The size of the livestock enterprise is limited by the amount of land cleared for pasture, hay, and crop production. The livestock kept the first few years, therefore, are primarily for home use.

CAREFUL STUDY NEEDED IN SELECTING LAND IN CUT-OVER AREAS

Selection of suitable land is the most important factor influencing success in developing a cut-over farm unit. Because of the variability of timberland soils and the difficulty of adequately appraising soil productivity as well as cost of clearing, a prospective farm operator should spend all the time needed in finding a suitable location and have the land examined by practical soils men and nearby farmers before purchasing. Not only should the land be of good quality, but the parcel selected should be large enough in area to permit final development of a good sized unit.

Prospective purchasers of land should never limit inspection to winter months when there is snow on the ground. The area should be inspected when it is possible to appraise the condition of vegetative growth and the workability of the land and its suitability for drainage. Nor should the prospective settler rely too heavily on statements of friends or relatives in a new area. They will be influenced by the desire to have neighbors and build up the community.

The length of time required to bring a cut-over farm into full production makes it desirable for the new settler to find part-time nonfarm employment during the development period. The wages so obtained can be used for family living, for improving the farm, and possibly also for making small payments on the land. By having such nonfarm work the new settler need not pay for both present living and the building up of future productive capacity from borrowed capital. It is possible for a limited number of people to obtain work at road building, logging, saw mill operations, and other miscellaneous jobs such as carpentry and operation of a school bus.

TILE DRAINAGE IS NECESSARY ON WET LAND

Farmers having wet land requiring tile drainage must know the relationship between soil type and drainage possibilities and problems. Some soils have so much fine material that the tile soon becomes clogged. Other soils are so tight that the area benefited by drainage extends only a few feet in each direction from the tile. Tile systems must be properly laid so as to obtain the necessary slope for quick drainage.

Much of the highly productive lands of Iowa, Illinois, Indiana and other States are flat and have small depression areas that may stay wet until some time in the summer if artificial means are not taken to get the water off. A number of deep open ditches would not be feasible because they would interfere with field operations; it would be difficult to drive mechanized equipment over the open ditches and even if this were done it would damage the ditches. For this reason and because of the ease with which the ground may be dug and the greater benefit to the soil, tile drains are laid which last in many instances longer than the lifetime of the farm operator. These tile drains are laid in a network of laterals finally emptying into the main community channel.

The cost of installing tile drainage depends upon the nature of the soil and the lay of the land. If the soil is porous the laterals may be several yards apart. If most of the land has adequate slope, only the flat areas and depression need to be tiled. In some instances the subsoil is so tight that tile drainage becomes impracticable because of the excessive cost when the laterals need to be spaced very closely. In such instances rather flat open ditches may be resorted to. However, good drainage is not possible by any method on very tight clayey soil, and the use of such land is limited to crops that tolerate cold wet land and excessive amounts of moisture. A further disadvantage of such soil is that it becomes dry in droughty periods and crops suffer because the movement of subsurface moisture to the surface is too slow.

MUCK LANDS MUST BE PROTECTED AGAINST EXCESS WATER

Many low fertile muck areas have been drained and developed for the intensive growing of vegetable crops. In these areas the chief problem is to lower the subsurface water level and to keep excess water from flooding the area during periods of heavy rainfall. Such land is usually divided into small fields with deep open ditches forming the boundaries. It is important that the main channel be large enough with sufficient slope to carry away excess water from upper parts of the watershed. Levees are sometimes built to hold back water that accumulates from heavy rains. Crops do not tolerate flooding and as a result a farmer may lose his year's work if water covers his crops for as long as two or three days. Farmers operating muck land usually live some distance away on higher land where they use an additional upland acreage.

CHECK-UP NO. 25

Part I. After reading the chapter did you change your mind about the answers to the questions at the beginning of the chapter? Read the questions again and then check your answer with those in the answer key. Be sure to reread the page or pages listed for any question for which you did not get the right answer.

Part II. The questions in this section are quite specific, but since you have just studied the chapter you should be able to answer most of them. Try each question, then look at the answers. Reread the material on every question for which you did not get the right answer.

1. Does a priority water right give the owner the right to all the water he needs? (a) Yes; (b) No; (c) No data on this were given in the chapter.

2. Should the loans to farmers on new irrigation, cut-over, or drainage projects be different from the usual farm loans? (a) Yes; (b) No, (c) No data on this were given in the chapter.

3. Is the yearly amount of water used in irrigation primarily dependent upon the kind of crops grown? (a) Yes; (b) No; (c) No data given.

4. Do most irrigated farms contain less than 100 acres? (a) Yes; (b) No; (c) No data given.

5. Are timberland soils more variable than prairie soils? (a) Yes; (b) No; (c) No data given.

6. Are new farms in cut-over lands usually more scattered than other newly developed regions? (a) Yes; (b) No; (c) No data given.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. The preparation of irrigated, cut-over and drained land for crops is in each case a difficult and expensive proposition. However, the amount of capital required to begin is probably greatest for irrigated farms, and least for cut-over land. What are the conditions

which put irrigated first, drained second and cut-over third in the matter of first expense?

2. The farmer on a new drainage project farm lives in conditions that are quite different from those found on the usual farm. Discuss this point relative to (a) The amount of land he farms; (b) The work he does the different seasons of the year; (c) The church he attends and (d) the home surroundings.

3. Before selecting cut-over land for a farm, a man should make investigations carefully. Tell how each of the following figure in this investigation: (a) Time of year; (b) The county agent; (c) Farmers in the region; (d) Friends and relatives in the area.

Chapter XXVI
Food and Life

This chapter tells you a few things about food for humans and animals.

WHY NUTRITION IS IMPORTANT TO FARMERS

Farmers' interest in nutrition. The farmer has a special and very vital interest in nutrition. He not only wants to feed his family well, but he wants to make a profit out of his business, which is producing food for the Nation. Farmers know the value of nutrition in caring for livestock. Animal nutrition throws much light on the nutrition of human beings, for most of the principles also apply to human beings. Every farmer knows that it costs more to feed an animal well than to let it starve along. This fact also applies to human beings. It is of interest to the farmer, because he is the one who produces the food for people. If millions more people could have good diets, the farmer would benefit as well as those who get the food. For purely selfish as well as humanitarian reasons, the farmer has a real interest in raising the standard of nutrition to the greatest possible degree.

Some poor diets in the United States. Many Americans still do not have enough food of the right kind. Many of these undernourished people may not appear to be seriously or severely affected. Rather, they may show the results of their inadequate diets by lack of energy, less resistance to disease, or shorter lives. If we are to correct or prevent such a condition we need to produce more food and to distribute it better. We can also accomplish a great deal through education, so that more people will know what a good diet is. It might also be worth while to enrich more of our foods, as is now done in the case of white bread and white wheat flour, or, still better, to use more foods in their natural forms.

Farmers' diets. Studies show that relatively more farm families have diets that can be rated as good than do nonfarm families. In all probability this is because a large amount of the food farm families eat is home-produced. Few farm families could afford adequate diets unless they produced some food at home. To get the most out of home production, the farm family should figure how much of each of the several kinds of foods is required to furnish a fully adequate diet. Then the family can decide how much and what to buy, raise, and store.

THE ESSENTIALS OF A GOOD DIET

It might be possible to devise a single menu that would supply all the food elements necessary to good nutrition. But it would be monotonous; people have individual likes and dislikes and habits of eating that must be taken into consideration; and there are hundreds of different foods. Hence the problem of better nutrition is difficult.

It is made easier if we learn to think in terms of food groups rather than individual foods, each group being an especially good source of some one or more nutrients. The following is a list of food groups which should be a part of everyone's diet. The quantities opposite each group are those suggested by the Bureau of Human Nutrition and Home Economics in a low-cost plan for one week for a man doing very active work, such as farming. The quantities apply to food as it is brought into the kitchen, before being prepared and cooked.

Milk (or its equivalent in cheese, evaporated milk, or dry milk)—6 quarts
Potatoes and sweetpotatoes—7 pounds
Dry beans and peas, and nuts—1 pound
Citrus fruit and tomatoes—1½ pounds
Green and yellow vegetables—1½ pounds
Other vegetables and fruit—2½ pounds
Eggs—4 (Many farmers eat more than 4 eggs weekly.)
Meat, poultry, fish—2 pounds
Flour, cereals (1½ pounds of bread equal to 1 pound of flour)—9 pounds
Fats and oils—1 pound and 10 ounces
Sugar, sirups, preserves—¾ pound.

These quantities would be modified for other persons according to age, sex, and the amount of physical work performed. The amounts listed above are for a low-cost plan. A somewhat higher priced moderate-cost plan would provide somewhat larger quantities of meat, eggs, fruits and vegetables. These foods contain more minerals and vitamins—and an extra margin should be supplied for good nutrition. A moderate-cost plan would also allow for more variety and flavor in meals.

ANIMAL NUTRITION

More than half of the average annual gross farm income in the United States comes from the sale of animals and animal products. It is obvious then that the efficient feeding of animals is of great importance to farmers.

How animals use feed. A certain part of the feed of all animals is used for the maintenance of bodily functions aside from any useful production. In addition, the various classes of animals use feed to take care of the functions for which they are kept, such as work or the production of meat, milk, eggs, or other products. Animals must receive sufficient feed to furnish the necessary quantity of proteins, carbohydrates, fats, minerals, and vitamins to meet the demands of this production.

Protein. Growing animals require an ample supply of protein. There are many kinds of proteins, but they may be broadly divided into those of plant origin and those of animal origin. Proteins of plant origin tend to be low or lacking in certain essential substances which are contained in animal proteins. In feeding hogs and chickens the proteins of animal origin may be used to supplement those from such feeds as corn, barley, and other grains, as these animals thrive best when they receive some proteins of animal origin. In feeding mature cattle, sheep, and horses, a safe plan to follow is to provide a liberal supply of legumes as hay or pasture with a supplement of concentrates. Those animals do not require feed of animal origin. In order to be sure that a diet has the proper kind of protein for animals that do not ruminate it is well to include a variety of feeds.

Minerals. An adequate supply of minerals in the diet is of greatest importance for young growing animals and for females carrying or suckling young, but minerals are necessary also for animals of all ages and conditions. Salt also should be accessible to most farm animals at all times no matter what other feeds they receive.

Diets will often be deficient in calcium if they are made up largely of straw, roots, and the cereal grains and their byproducts. Milk contains plenty of calcium and the legume hays exceed all other farm-grown feeds in content of this element. Diets that contain enough calcium usually contain phosphorus. Phosphorus may be added to the diet, together with calcium, in ground bone or one of the calcium phosphates. In certain parts of the country iodine should be added to the diet of animals to prevent a disease called goiter. Adequate amounts of other minerals besides calcium and phosphorus are of course also needed by animals.

Vitamins. The diets of well-fed farm animals usually contain adequate quantities of the vitamins. However, there may be deficiencies of one or more, especially during periods of drought or under other conditions of restricted feed supplies.

Water. Livestock should be provided with an adequate water supply. It is best, as far as possible, to have water readily available at all times, especially for animals on pasture.

Pasture. For adequate nutrition and economy, good pasture is the outstanding feed for most livestock throughout as much of the year as it is available or can be made available. It may serve as the only feed for some classes of cattle and for sheep, goats, horses that are not working, and dry cows. The use of a concentrate in addition to pasture and roughage is necessary for the maximum fattening of cattle and sheep, for cows producing large quantities of milk, horses that are working, growing and fattening hogs, sows with pigs, and poultry.

Forage crops and hay. Some crops may be preserved in the form of hay and fed in periods when pasturage is not available; or such crops may be cut green and fed or preserved as silage. Cultivated forage crops usually supply more feed per acre than does pasture.

Concentrates. As already noted, working and high-producing animals need concentrated feeds in addition to the roughage which they can consume. For this purpose grains and commercial byproducts may be used. With some classes of livestock, the cereal grains, such as corn, wheat, oats, or barley may be used as the sole concentrate. On the other hand, growing animals and high-producing animals, especially the nonruminants, will need more variety and better balance in the concentrate part of the ration. If the roughage available is poor in quality or low in protein the concentrate mixture should contain a high-protein concentrate, such as cottonseed meal or linseed meal, unless the animals are to be carried on a diet for maintenance only.

To supply the need for additional concentrates, commercial byproducts are available in large variety. These include byproducts of the milling, brewing, and distilling industries; of the oil-bearing seeds; of the dairy industry; and of the meat-packing industry, fisheries, and canneries.

Many of the feeds available on the farm are low in protein. For this reason the percentage of protein in commercial feeds is the most important measure of its value.

CHECK-UP NO. 26

Select the best answer to each of the following questions.

1. What is the farmer's main interest in raising the national standard of nutrition? (a) Its effect on the health of the farm family; (b) Its effect on the products he sells; (c) The lower cost of producing farm animals that will result.

2. Diets may be markedly enriched by one of the following: Which one? (a) Mass production of processed foods; (b) More careful examination of all processed foods; (c) Frequent examination of people by specialists followed by diet recommendations; (d) Use of food in natural forms.

3. Are the diets of farm families likely to be better than those of non-farm families? (a) Yes; (b) No; (c) No data given.

4. In the diet recommended by the Bureau of Human Nutrition and Home Economics what is the weekly amount of flour suggested for the farmer? (a) 2 lbs.; (b) 6 lbs.; (c) 9 lbs.; (d) 15 lbs.

5. What farm crop is rich in calcium? (a) Straw; (b) Prairie hay; (c) Root crop; (d) Legume hay.

6. The hog is one type of livestock which needs some animal products in its feed. What is another? (a) Sheep; (b) Cows; (c) Chickens; (d) Horses.

7. What food nutrient is usually deficient in most farm foods? (a) Protein; (b) Fats; (c) Vitamins; (d) Carbohydrates.

Check your answers by comparing them with those of the book.

CORRESPONDENCE OR CLASS ASSIGNMENT

1. It is generally assumed that diets can be improved through educating the public. What would be the educational information supplied to people relative to wheat flour, bread, and food in natural form?

2. Which of the foods recommended by the Bureau of Human Nutrition and Home Economics would not be produced on a farm in Pennsylvania?

3. What is the reason for dividing proteins into animal origin and plant origin?

FULL COURSE CHECK-UP

By taking the following test you can find out whether or not you are ready to take the end-of-course examination.

PART I

1. From the statements listed, select the four that are most closely related to a beginner's chances for success in farming.
   a. All the time devoted to a specialty crop.
   b. A desire to experiment.
   c. Experience on a farm.
   d. A willingness to fix things.
   e. A willingness to neglect details.
   f. General trend of farm prices.
   g. Knowledge of the best farm tools.
   h. An agricultural education.

2. Many men favor the farm as a place to live. Which of the five statements below are the reasons why people favor the farm?
   a. The electric rates in the country are much lower.
   b. People like to produce many of their basic foods.
   c. The income from farms based on a lifetime is higher than the life income from most occupations.
   d. The farm is well suited to bringing up children.
   e. Farmers are more neighborly.
   f. Heating costs on the farm are lower.
   g. Food costs on the farm are lower.
   h. Farm taxes are low in proportion to the income.

3. Why is heavy investment in farm land for beginners not recommended? (a) He may not like the community. (b) The value of the land may change. (c) Equipment is more desirable than land.

4. For the growing of what crop are Podzol soils particularly well suited? (a) Wheat. (b) Corn. (c) Cotton. (d) Potatoes.

5. What two grains are most likely to be grown on the same farm? (a) Corn and Oats. (b) Corn and Wheat. (c) Wheat and Oats. (d) Wheat and Rice.

6. Which of these is most likely to be the yearly income from an acre of tobacco? (a) \$20. (b) \$40. (c) \$75. (d) \$150.

7. Wheat farming is often combined with: (a) livestock; (b) corn and oats; (c) fruit and vegetable growing; (d) dry land farming.
8. In the good cotton areas like the Delta region of the Mississippi, farms are commonly valued at: (a) $75-100 an acre; (b) $250 an acre; (c) $350 an acre.
9. Which of the commercial vegetables is considered the most difficult to grow? (a) Cabbage. (b) Tomatoes. (c) Celery. (d) Peas.
10. A man interested in growing apples might be wise in locating in either of two of these states. Which are the two. (a) New York. (b) Florida. (c) Kansas. (d) Minnesota. (e) Arizona. (f) Oregon. (g) Georgia.
11. What characteristics make the Yorkshire hog popular in Canada? (a) Its hardiness. (b) Its ability to produce bacon. (c) Its ability to produce lard.
12. Which of these varieties is considered a good general purpose chicken? (a) Jersey Black Giant. (b) White Wyandotte. (c) Brown Leghorn.

PART II

The terms in this section of the check-up have all been used in the text. Select the word or words which are most closely related to each term.

1. Hybrid.
   a. An inbred animal.
   b. Corn.
   c. A disease of plants.
2. New Hampshire.
   a. Breed of hogs.
   b. Breed of sheep.
   c. Breed of chickens.
3. Aphids.
   a. Associated with plant production.
   b. Cross bred chickens.
   c. Class of trees.
4. Fire blight.
   a. Disease of White Pine.
   b. Disease of Bartlett pears.
   c. Crops seared by drought.

5. Dump rake.
   a. Used in hauling fertilizer.
   b. Used in spreading lime.
   c. Used in loading hay.
6. Bourbon Red.
   a. A breed of sheep.
   b. A breed of turkeys.
   c. A breed of cattle.
7. Combine.
   a. General purpose farm.
   b. Threshing of grain.
   c. Part-time farming.
8. Deciduous.
   a. Related to forestry.
   b. Related to squab raising.
   c. Related to sheep raising.
9. Chlorophyll.
   a. Related to food making.
   b. Related to pollination.
   c. Related to softwoods.

PART III

1. Is the amount of work to be done on a farm best indicated by the number of acres it contains? (a) Yes. (b) No.

2. Should personal preference for a breed of beef cattle be a major factor in determining the breed a man chooses? (a) Yes. (b) No.

3. In deciding whether you want to be a farmer, are personal likes and dislikes to be given more importance than the economic aspects of farm life? (a) Yes. (b) No.

4. Would the extension of social security to farmers increase the number of farms available to new farmers? (a) Yes. (b) No.

5. Is it wise for a beginning farmer to move into an area needing draining and begin the task of reclamation alone? (a) Yes. (b) No.

6. Are vegetable and flower seeds grown on a large scale in all parts of the country? (a) Yes; (b) No.

7. Does the beginning part-time farmer need as much capital

for the same sized livestock project as does the beginning full time farmer? (a) Yes. (b) No.

8. Did the Taylor Grazing Act eliminate all government land from the homestead list? (a) Yes. (b) No.

9. Is the cash lease a good one for a livestock farm? (a) Yes. (b) No.

10. Should the amount of grain rent paid vary with the amount an acre will produce? (a) Yes. (b) No.

11. Is the use of hired labor on farms considered good practice? (a) Yes. (b) No.

12. Are farms in reclaimed areas (irrigated, drained, cut-over) usually small? (a) Yes. (b) No.

13. Are animal proteins as good in cattle feed as plant proteins? (a) Yes. (b) No.

14. Will the sale of farmer's products increase if many people are properly educated with regard to nutrition? (a) Yes. (b) No.

Check your answers to questions in the final check-up. If you answered most of them correctly, you are probably ready for the End-of-Course examination. If you feel you need a review before taking the End-of-Course examination, go back and take each of the chapter check-ups again.

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☆ U. S. Government Printing Office: 1944—604087

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