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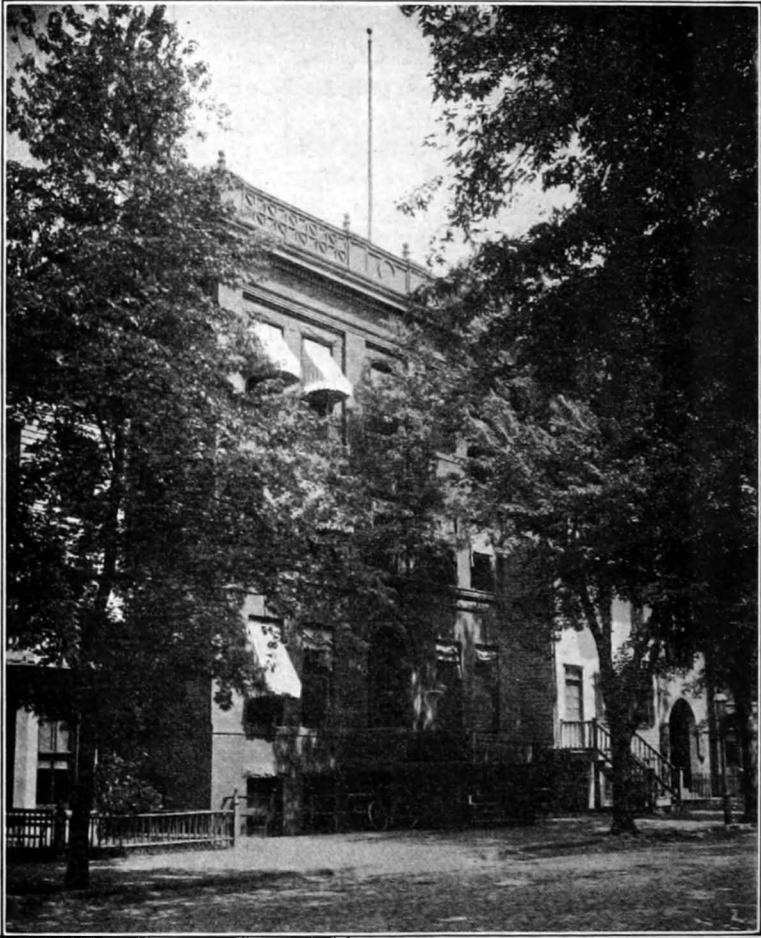
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Original headquarters of the Federal Office of Farm Management, United States
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Frontispiece

FARM MANAGEMENT

A TEXT-BOOK

FOR

STUDENT, INVESTIGATOR, AND INVESTOR

BY

R. L. ADAMS

PROFESSOR OF FARM MANAGEMENT, UNIVERSITY OF CALIFORNIA

FIRST EDITION

SIXTEENTH IMPRESSION

McGRAW-HILL BOOK COMPANY, Inc.

NEW YORK AND LONDON

121

X9(J): 8
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PRINTED IN THE UNITED STATES OF AMERICA

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THE MAPLE PRESS YORK PA

PREFACE

The business of farming is complex and almost infinitely diverse. At the outset both the observer of its conditions and the collector of its data face variations between the widest extremes not only of soil, water, climate, topography, and size of holdings, but also of individual opinions, experiences, practices, and ideals.

For instance, the man so situated that possible crops are apples, peaches, oranges, lemons, walnuts, or lima beans will reap different rewards from one who can raise only alfalfa or grain, or who is confined to buckwheat, rye, wild grasses, or pasture. Distance to and receptivity of the market are other influences, and affect in a marked way such things as vegetables, poultry products, berries, whole milk, and to a lesser extent, grains, beans, potatoes, pork, beef, and sheep. For the same crops there are variations in yield because of differences in soil type, climatic condition, age of planting, choice of variety, availableness of water, need of drainage, presence of alkali, market conditions, and farming method.

The necessity to provide a proper standard of living is the basis upon which all financial estimates must stand. It is the keynote to a discussion of the financial side of agriculture. Yet ideas differ widely as to what sum is needed to provide proper living for the average family. These differences may arise from (a) size of families, (b) age of members of the family, (c) standards of living demanded by different nationalities, (d) conditions of environment in which childhood was spent, (e) personal tastes as to what are proper social obligations, and (f) the degree of spending activity of various members of the family. Thus the comforts of one family will be the luxuries of a second and the necessities of a third.

Or again, the great variation in the characteristics of operators plays a most important part in determining the degree of success which will attend any farming enterprise. Compare, for example, the individual who admits he has been thirty-five years on a rented hay ranch, during a time when agriculture in its many changes has offered exceptional opportunities for advancement, with the man who, taking advantage of these opportunities, has amassed a modest fortune. Or, yet again, the man who is getting rich on a hundred acres of level, heavy-producing land, offers a striking contrast to the man losing money on a thousand acres of poor land.

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FARM MANAGEMENT

CHAPTER I

GENERAL CONSIDERATIONS OF FARM MANAGEMENT

Farming is business. It is as much business as importing goods, selling merchandise, building ships, running a railroad, and handling a mine. Jointly with industry in general, farming is subject to business principles and reacts to economic influences. The present day farmer should recognize that as such he is also essentially a business man, or else he must eventually succumb in competition with other business men.

Keeping step with the increasingly rapid but hit-or-miss application of business principles to farming by farmers themselves, men of inquiring mind have developed the science and art of Farm Management. In the former capacity it analyzes and classifies findings and principles; in the latter it endeavors to apply these systematically so as to insure more and more profitable agriculture. It follows that farm management is primarily concerned with the business side of farming—with the business principles involved.

Definition of Farm Management.—Management in farming falls naturally into two subdivisions—(a) as a subject, (b) as a method. Farm management—the subject—is the presentation of business and scientific findings in their application to farming, for the purpose of indicating the way to greatest continuous profit.

Farm management—the method—is the utilization of sound principles in the selection, organization, and conduct of an individual farm business for the purpose of obtaining the greatest possible profit.

The terms “farm organization” and “farm administration” are closely synonymous with farm management.

The Object of Farm Management.—The object of farm management has been stated in the definition, to obtain from the various enterprises of an individual farm business the greatest returns consistent with a broad, clear, and far-sighted policy. This object constitutes a test to be applied first, to the choice of farming as a business; second, to the selection of a specific farm business; third, to the selection of a farm and its proper equipping; fourth, to the detailed operation of a farm when established as a going enterprise.

Scope of Farm Management.—Put in a condensed form and with some seeming repetition from the statement above, the concern of farm management is with

(A) Getting started in farming:

1. Selecting farming as a business.
2. Selecting a specific farm business.
3. Selecting the farm.
4. Determining capital needs and obtaining credits.
5. Organizing the farm business.
6. Equipping the farm.

(B) Operating farm enterprises:

1. Directing crop and stock enterprises so as to obtain the greatest possible continuous net profits.
2. Handling farm labor.
3. Keeping account of operations and results.
4. Selling products.

Consideration of this table suggests the following generalization of the two-fold scope of farm management (compare the definition of farm management above):

(a) The recording, presenting, and discussing of all available farm management data as applicable to prevailing local conditions. These data will be (1) those generally possessed or recognized by competent students and practitioners of farm management; and (2) those that may be strictly local—perhaps not yet classified or published—while yet knowledge of them may be of supreme importance for the successful prosecution of a given crop or live stock enterprise. (b) The actual handling of a farm or ranch enterprise, *i.e.*, the carrying out of the duties and the assumption of the responsibilities of a farm manager.

A clean-cut distinction can thus be made between the practice of farm management and the presentation of information needed by the farm manager. All books on farm management are obliged to convey certain secondary facts contributory to the practice of farm management. For instance, a discussion of farm labor covers not only concrete ways of handling labor as a part of farm management, but also at least a brief look into prevailing hours, wages, and activities. A better understanding of planning or replanning a given farmstead will follow a review of prevailing building types for the same kind of business under the same kind of environment. It is perhaps not necessary to separate information and application at this stage of our knowledge of farm management, but as time goes on and the accumulation of data proceeds, a segregation of the two phases will prove desirable.

At this point, however, let us note with increased emphasis that farm management at bottom is interested in the individual farm as a unit. It attempts to apply widely gathered scientific findings as well as local knowledge to one particular farm or ranch at a time. It obtains these findings from many sources—agronomy, horticulture, animal husbandry, local farm practices, rural sociology, business experiences—which are

brought together, culled over, interpreted in terms of business, and, if utilizable, incorporated as part and parcel of the individual farm business.

Farm Management vs. Agricultural Economics.—The above conception of farm management distinguishes it rather sharply from the field occupied by agricultural (rural) economics, since agricultural economics deals with groups of farms, and from the resulting analysis, determines principles applicable not alone to the farm business, but to the national welfare and even to international contact. Farm management, as outlined here, is not as widespread in its scope, nor as far reaching, as agricultural economics. Within its sphere, farm management is concerned with the individual agriculturist, rather than with the general welfare of agriculture.

Illustration Contrasting Farm Management and Farm Economics.—Tenancy gives an excellent illustration of the viewpoints held by farm management men in contrast with those of the economists. From the individual's viewpoint tenancy may be a very desirable, and perhaps the only, way to obtain a start. Farm managers point out that the logical route for the beginner in agriculture who is to use his hands as well as his brain is through the successive stages of farm hand, tenant, owner. Tenancy provides opportunities for individuals who may not be in a position to buy. From the farm economics standpoint, the present feeling is one of grave concern over the increasing proportion of tenant-farmed lands in these United States.

Better marketing conditions through the coöperation of producers will undoubtedly result in advantage to the large body of farmers. But from the farm management viewpoint, a decision is to be made as to whether or not under given conditions, it is better to combine fellow farmers and pool interests, or to sell independently.

Farmers' Individual Interests do not Neglect Community Interests.—What is here said may sound as if the farm manager's viewpoint is purely individualistic and selfish. It is in his relation with his own enterprise. But this is far from saying that the farmer cannot or does not practice as generous an altruism and exemplify as humane a citizenship as any other man. Is it not correct that the truest democracy and the finest civilization are unvariably found to rest upon basic industries, the most important being agriculture, carried on by individual proprietors, who, when they coöperate, do so under no other compulsion than an inward willingness?

Financial Success Usual Farm Management Measure.—The farmer who applies business principles to his farming operations does so with the object of obtaining the greatest returns from expenditures of muscle, brains and capital, in competition with other farmers and other industries. This means that methods and recommendations are brought before the bar of finance. Financial success is the usual measure of farm management inquiry. Recognition of this fact is indicated by methods of report-

ing the outcome of agricultural experiments. Two or three illustrations will suffice.

In Comparing Experiments with Crops.—In comparing the result of a season's work with 11 differently handled field plots, Thorn and Holtz present the net returns per acre over cost of production. The summary shows:

TABLE 1.—FINANCIAL COMPARISON OF CROP EXPERIMENTS

No. of plot	How treated	Yield in bushels per acre	Gross returns per acre	Cost per acre	Net returns per acre
1	Corn and wheat alternating, fall plowed each year	Corn 30.0 Wheat 37.8	\$56.24	\$13.65	\$42.59
2	Peas and wheat alternating, fall plowed each year	Peas 32.0 Wheat 33.7	52.56	17.35	35.21
3	Wheat and summer fallow, fall plowed after wheat	Wheat 49.4	39.50	10.05	29.45
4	Wheat and summer fallow, spring plowing, April 3, packed	Wheat 49.0	39.20	10.55	28.65
5	Wheat and summer fallow, early spring plowing, April 3, not packed	Wheat 51.7	41.36	10.35	31.01
6	Wheat and volunteer, volunteer used for pasture, fall plowed after volunteer	Wheat 20.2	17.16	6.15	11.01
7	Wheat and summer fallow, late spring plowing, June 10, not packed	Wheat 38.5	31.00	8.80	22.20
8	Wheat and summer fallow, late spring plowing, June 10, not packed	Wheat 36.6	29.28	8.05	21.23
9	Wheat and summer fallow, early spring disked, April 3, late spring plowing, June 10, packed	Wheat 42.4	33.92	9.70	24.22
10	Wheat and summer fallow, fall disked, late spring plowing, June 10, packed	Wheat 37.3	29.84	9.20	20.64
11	Wheat and summer fallow, fall plowing, late spring disking, June 10	Wheat 49.7	39.76	9.45	30.31

¹ See chapter of references.

In Comparing Stock-Feeding Experiments.—The use of a financial statement in presenting results of stock-feeding experiments is of long standing. The following is illustrative:²

TABLE 2.—FINANCIAL COMPARISON OF STOCK-FEEDING EXPERIMENTS

Lot number	1	2	3	4	5
Number of steers.....	12	12	12	12	12
Average weight at beginning of experiment, pounds.....	780	774	760	742	757
Cost per steer at beginning of experiment at \$6.05 per 100 lb.....	\$47.19	\$46.83	\$45.98	\$44.89	\$45.79
Cost of feed consumed per steer during experiment.....	20.45	24.98	25.82	31.48	20.45
Freight charge per steer in marketing at 17½¢ per 100 lb.....	1.70	1.78	1.78	1.79	1.70
Cost of yardage per steer on market.....	0.25	0.25	0.25	0.25	0.25
Cost of hay per steer on market.....	0.11	0.11	0.11	0.11	0.11
Commission per steer in selling.....	0.50	0.50	0.50	0.50	0.50
Total cost per steer.....	\$70.20	\$74.45	\$74.44	\$79.02	\$68.80
Selling price per steer.....	71.44	76.35	77.88	79.36	69.98
Net profit per steer.....	1.24	1.90	3.44	.34	1.18
Prices per 100 lb. for which steers actually sold.....	\$ 7.35	\$ 7.50	\$ 7.65	\$ 7.75	\$ 7.20
Prices per 100 lb. necessary to have broken even (hogs not included)....	7.22	7.31	7.31	7.71	7.08
Increases in selling prices per 100 lb. above initial cost necessary to have broken even.....	1.17	1.26	1.26	1.66	1.03
Prices per 100 lb. necessary to have made a profit of \$10 per head (hogs not included).....	8.25	8.29	8.29	8.69	8.10
Increases in selling prices per 100 lb. above initial cost necessary to have made a profit of \$10 per head.....	2.20	2.24	2.24	2.64	2.05

In Comparing the Value of Spraying Experiments.—In computing the value of spraying experiments, records covering the years 1913, 1914, and 1915 were reported thus:³

TABLE 3.—FINANCIAL COMPARISON OF SPRAYING EXPERIMENTS

Plat 1—Total value of fruit.....	\$12.05
Value of fruit on check plat.....	2.28
Difference.....	9.77
Cost of spraying.....	0.29
Net gain from spraying.....	9.48
Plat 2—Total value of fruit.....	7.47
Value of fruit on check.....	0.10
Difference.....	7.37
Cost of spraying.....	0.25
Net gain from spraying.....	7.12
Plat 3—Total value of fruit.....	14.63
Value of fruit on check.....	0.40
Difference.....	14.23
Cost of spraying.....	0.26
Net gain from spraying.....	13.97
Plat 4—Total value of fruit.....	10.59
Value of fruit on check.....	0.21
Difference.....	10.38
Cost of spraying.....	0.24
Net gain from spraying.....	10.14
Plat 5—Total value of fruit.....	26.31
Value of fruit on check.....	5.66
Difference.....	20.65
Cost of spraying.....	0.25
Net gain from spraying.....	20.40
Plat 6—Total value of fruit.....	17.55
Value of fruit on check.....	2.14
Difference.....	15.41
Cost of spraying.....	0.26
Net gain from spraying.....	14.15

Use of Financial Test is General.—Use of the financial test can be found everywhere. It is involved in determining such questions as:

1. Does prolonged life of fence posts by dipping in asphaltum pay for the extra cost of material and labor?

2. Will a small pumping plant run 24 hours in connection with a reservoir, be ultimately cheaper than a large plant run for 12 hours—the period of actually applying water?

3. In warm, sunny climates, is the painting of farm buildings justifiable?

4. Is it cheaper to sell grain at harvest and rebuy in spring, or to store and meet the various direct and indirect charges (*e.g.*, storage charges and interest on money invested)?

5. Under poor drainage conditions, will tiling a limited area pay?

6. Under given conditions, will the buying and fattening of stock cattle pay?

7. Is a breeder justified in paying high prices for sires, as \$12,000 for a boar, \$109,000 for a dairy bull, \$25,000 for a beef bull?

Basic Knowledge of Agricultural Sciences and Practices Precedes Farm Management.—We have already perhaps made clear the complex character of our subject, even if we have done nothing else. But there is more to come to make this preliminary analysis complete: we must remind the reader that in delving into farm management he must equip himself with a panoply of fundamental knowledge. Empiricism grows less and less dependable. The manager must himself actually possess the existing body of knowledge about the feeding, breeding, and handling of stock; the requirements of soil preparation, seeding, cultivation, and harvest of crops; how to recognize soil types; alkali; irrigation; drainage; animal and plant diseases; handling of soils—plowing, cultivating, fertilizing, liming; control of weed, fungus, and insect pests; the elements of chemistry, botany, and genetics; the business principles involved in bookkeeping, banking, and selling. Only upon such a foundation can successful farm management be built. Just as in building a house one must know the relationship of the different parts, the strength necessary for each, the best choice of material, and the best type of construction for a given purpose, so in building up the farm, one must know the limits of each possible industry and how to proportion them to bring about a properly balanced and constructed scheme. Farm management is, then, the ability to test the adaptableness of the different agricultural elements within reach, and to carry out to success the scheme resulting from the selection and combination of these elements.

Examples Illustrating Function of Farm Management.—Let us now make these distinctions and relationships still plainer. Plant industry is responsible for information as to how to grow a crop. Animal industry is charged with the duty of pointing out how to handle stock and how to produce stock products. Similarly, farm mechanics is concerned with indicating how to select, purchase, and operate farm machinery; and plant pathology and entomology with how to control diseases and insects. Now it is the function of farm management, on the other hand, to decide when to use the contributions of these sciences and how much of them to use for meeting given conditions, with reasons for the decisions.

TO ILLUSTRATE.—Will this land grow barley better than alfalfa, or will there be rain enough in this district to grow alfalfa? This is a plant industry question. Even if this land does grow barley better than alfalfa, does it grow it enough better to promise greater net profit after taking into account market value of crop, possibility of its disposition, and final yield of the acreage? This is a farm management problem.

From the standpoint of physical welfare the problem, shall sows be bred once or twice a year is for animal husbandry to determine. But, are conditions such that more profit will result from one or from two litters per year is a question for farm management to decide.

If one is to buy 20 acres of land to set out to peaches, he must needs consider the demands of the peach as to soil, climate, water, planting, cultivation, pest control, pruning, fertilizing, harvesting, and marketing. This is basic information. Farm

management is concerned with the amount of capital required to buy the land and carry on the project, the amount of labor needed at different times of the year, a possible source of income until the trees are in bearing, the equipment required for working the land, the necessary buildings, the question of soil fertility and possibility of intercropping, the location and demands of a market for the product when grown, and the limiting distance of profitable haul.

Typical Farm Management Questions.—Other questions of a distinctly farm management nature are:

What can a man expect to make on 40 acres of alfalfa land yielding 6 tons per acre, given over to hogs, if he understands the business, discounts cholera, and practices intensive methods?

I am interested in fruits, and have \$12,000 to invest. Will you kindly answer the following?

(a) If I buy a bearing orchard, which offers the greatest profit—prunes, pears or peaches?

(b) How much can I afford to pay for typical producing land?

(c) How big an acreage can I buy, considering it in bearing, and leave enough to purchase the necessary work stock, meet running expenses, and keep my family for one year? (The latter item should amount to about \$900.)

Which offers the best returns as an investment—a stock ranch of 2,000 acres that will carry 200 head of beef cattle, or 200 acres that will raise good crops of beans, potatoes, and alfalfa? In the latter case I should put one-third of the acreage into each annually, selling all the product.

How many fat beeves can I turn off annually on a 1,000-acre ranch carrying one head to 20 acres, and what, on an average, will such land be worth?

Students of farm management find an extensive field to draw upon, and soon learn that there is naturally a good deal of overlapping. Many subjects must be considered, and there can be no sharp line of demarcation between what is strictly farm management and what strictly plant culture or animal husbandry.

Graphic Presentation of the Place of Farm Management.—The accompanying chart illustrates graphically the foregoing observations. Students will find it a helpful guide. The chart makes clear that at best the entire field is made up of interlocking subjects. In college curricula these are usually treated as more or less distinct, each in its own sphere. As already pointed out, in actual practice no such clear-cut differentiation is possible. Agronomic subjects dovetail into animal husbandry. Sheep, swine, cattle, and poultry are closely correlated with alfalfa, barley, wheat, corn, hay, and pasture crops. Horticultural practices draw upon plant pathology and entomology to a remarkable extent.

Chart Arrangement Arbitrary but Valuable.—Since each individual brings to bear a perspective based on the field he is attempting to cover, other investigators and teachers may find fault with this arbitrary arrangement. It is clear, however, that a brief explanation of this chart, carrying with it, as it does, the subject matter properly pertaining to farm management, goes far to provide the student with a mental picture

as a starting point in his attempt to classify the many subjects that support and dovetail into the field of farm management. Only a little study of the chart is needed to show the necessity of thorough training in the many subjects which form the foundation of farm management before actual study begins. Farm management, resting as it does on corner stones of training and experience, is, in college, a course for advanced students, not for elementary classes.

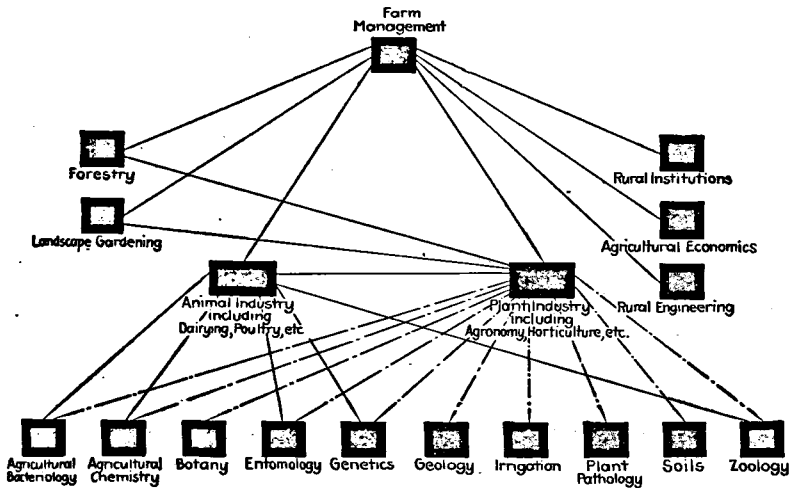


CHART 1.—Graphic presentation of the place of farm management.

The sizes of the squares in this chart do not necessarily indicate the relative importance of the subjects, other than to indicate their immediate and primary importance when gauged from the farm manager's point of view.

Use of Farm Management a Personal Matter.—The extent that farm management as exhibited in this work or in similar texts shall be applied to a given business is a personal matter. Knowledge of what farm management consists of and how business principles can be applied to farming operations should undoubtedly constitute a part of every farmer's equipment. Ignoring such principles, wholly or in part, is purely a personal privilege. Some men prefer to live in a pleasant home community and take less than the usual rate of interest on the investment; others prefer a business with relatively small possibilities in the way of returns if they can farm at something they like; others are willing to put up with the hardships of pioneering because they like frontier life or the subduing of difficult conditions; while still other men prefer to let someone else do the reclamation or pioneer work and to pay them for so doing.

Any farmer, either active or prospective, however, should know what he is doing, and if he is failing to get the most out of his business, he should know the reason why, and be ready to defend his methods—at least to himself.

The owners of many farms are disillusioned when farm management principles are applied. The presence of a minus income, the necessity of allowing for labor of all members of the family, the realization of the heavy investment, the knowledge that the operator is failing to get from the business all that he is rightly entitled to, are disconcerting and sometimes discouraging discoveries. In such cases if ignorance is bliss then it is folly to apply farm management tests. Nevertheless, every year greater numbers find the pleasure that lies in the subject, in the application of business principles to all farming operations. Its use is varied, extensive, and clean-cut. To test every proposed plan by balancing the saving or income against the cost becomes contagious. And in the doing, a better understanding is gained of agriculture.

Farm management does not enjoin a man from erecting any kind of buildings that meets his needs and desires, provided he understands what he is doing and is willing to accept the consequences of too great or too little investment, of freakish construction, or of temporary structures where permanent should prevail. It is personal privilege to farm one's land to grain and beans although fruit or live stock may be equally possible and actually more profitable. 'It is one's right to use horses even if tractors are cheaper, or the reverse; to sell independently when cooperation is possible; to rent rather than to own; to hire peon* labor; to store implements in the open; and to transgress many other business principles. But farm management, while recognizing personal privilege, is concerned that due attention be given to what from a business standpoint is justifiable and proper. What is finally done is the individual's concern; what should be done is the ground work of enlightenment and instruction (to the extent of available knowledge) upon which the whole subject of farm management rests.

Farm Management Constantly Changing.—Since farm management is concerned with the business side of farming a presentation of farm management must be general in scope and character. No business remains entirely stable or constant. All businesses fluctuate as changes occur in their zones of contact with other industries and influences. So farming needs change with labor shortage, good or poor markets, low prices, tight money, the demands for land, the influence of Japanese, Hindus, or other foreign races upon both the production of farm products and the social life of American communities. Sometimes one thing is of

**Peon* as used in this book is a western word, meaning low-grade labor, especially Mexican. It carries none of the implications of the word *peonage* as applied to certain alleged practices in some of our southern states.

outstanding importance; at other times an entirely different factor will be preeminent.

Use of Farm Management in Actual Farming.—Great variation is to be found throughout the United States in the extent that farm management is used in actual farming operations. The least use of farm management is found on the tiny farms recently cleared of brush or reclaimed from swamp, devoted to but one or two crops, using one animal as motive power, and equipped only with the minor farm implements. The equipment consists of an unpainted shack of one or two rooms, a small shed to house the horse or mule, a well, cistern, or spring, and a bit of cleared land roughly fenced.

The farm management of the typical negro farmer of the South, of the Indian of the West, of the Mexican of the Southwest, or of the little farmer of the dry areas or high altitudes, is simply the farm practice which he has acquired from long experience, and has traditionally followed.

The other extreme in the application of farm management is to be found in the large corporation holdings, farmed in units but coordinated into a gigantic enterprise, covering, in certain instances, hundreds of thousands of acres, and requiring the shrewdest application of farm management in its many business and technical aspects. An enterprise of this sort covers many combinations of agricultural enterprises—cattle, sheep, horses, hogs, dairying, alfalfa, corn, sorghum, barley, wheat, oats, rice, cotton, sugar beets, beans, deciduous and citrus fruits. In the more outstanding of these enterprises are to be found the best examples of farm management today. Their managers, often keen businessmen, developed by city training, have attempted to choose the most profitable combination of enterprises for the particular soil, climate, water, labor, and market conditions they have to face, to place able men in charge, to follow approved agronomic, horticultural, and live stock practices, to keep track of what is being done by carefully devised sets of records, and to watch all details of the business in an effort to eliminate leaks and waste and to increase profit.

Between these two extremes with respect to farm management there lies an endless array of farms and farm enterprises that use farm management principles in varying degrees.

Object of Studying Farm Management.—The principal purposes of studying farm management are to gain power to analyze the business; to devise suitable systems of cropping; to provide economical arrangement of fields; to adjust field crops to live stock; to utilize capital and labor to best advantage; to decide upon suitable plans for keeping simple records of the leading projects on the farm; and to carry forward the management of the farm and the work of farming in such a manner as to give the greatest profit per acre and per worker.

Fundamentals of Farm Management.—From an analysis of many farms and of specific farm enterprises certain fundamental factors have been evolved which in a large measure are directly responsible for the farmer's success. Some of the more significant of these are: proper size of farm business to promote efficient operation of labor, teams, and machinery; establishment of the principle that American agriculture is based on product per man rather than product per acre; importance of the diversified business which promotes better crop enterprises, insures against total loss of income through failure of major crops, makes for better utilization of farm labor and for general business stability; importance of having live stock that yield an adequate return for the crops fed, and of growing crops of sufficient yield to pay more than the fixed cost of production; importance of the utilization of capital in the farm business; utilization of equipment properly proportioned to the conduct of the given farm; and relation between landlord and tenant, including division of income.

Time Element in Studying Farm Management.—It is the great variety of scope and the opportunity to apply original plans to any given enterprise that make the study of farm management fascinating for the student of agriculture. But results in farm management are obtained only from study and thought. The student must take sufficient time for painstaking consideration, either prior to embarking upon an enterprise, or during the actual carrying out of the project. The gains from farm management are largely in direct proportion to the effort spent in its study and application. A farmer already overworked in trying to keep things going will not welcome a suggestion of still greater tax upon his time and energy. Later, when he can afford to spread out, he should find in farm management a worthy field.

Field Studies Should Supplement Printed Matter.—To acquire proficiency in the subject of farm management, study of printed matter should be supplemented, so far as possible, with visits to sections specially noted for well-developed practices in farm management. In general, the southern and many of the western states do not offer abundant examples of farm management in full operation, and better results in learning the general principles in return for the time spent can be obtained, for instance, in the middle western States such as Kansas, Nebraska, Iowa, the western states of California and Oregon, the north-eastern States of Michigan and New York, and in states and localities where agriculture is well developed, diversified in nature, and sufficiently profitable to permit the expanding of the business. On the other hand, a farm manager well grounded in the more approved and up-to-date methods will find such states as Louisiana, Mississippi, Alabama, Georgia, the Carolinas, Montana, Arizona, etc., of special interest because of the striking contrasts they have to offer.

Farm Management Terms

Familiarity with terms common to farm management aids in a better understanding of the subject. Terms in general use are:

Farm Enterprise.—A farm enterprise is any crop, type of live stock, manufacturing process, etc., which constitutes a part of the farm business.

Farm Practice is the handling of all the operations in connection with a given enterprise. If used in an agronomic or a zootechnic sense, the term refers to methods of crop production and handling of stock; if to Farm Management, it refers to the coordination and execution of the various details in carrying on the entire business.

A *farmstead* is that part of the farm set apart for the group of farm buildings together with yards or corrals, home orchard, garden, and minor home enterprises, as poultry or bees.

A *specialized farm* is one which normally derives at least 50 per cent of its receipts from one source.

Terms used in connection with capital.

Farm capital or farm investment is the average value taken at the beginning and ending of the farm year of all real estate, improvements, machinery, live stock, feed, supplies, cash, and other investments necessary to carry on a given farm business. It includes the value of the farmhouse but not the household furnishings. Money owed by the farmer is not subtracted.

Fixed capital is that invested in land, buildings, and relatively permanent fixtures.

Circulating or working capital is that invested in live stock, machinery, feeds, supplies, etc.

Inventory.—The inventory is a detailed list of farm properties with values assigned.

Terms used in connection with income.

Net income or *farm income* is the difference between gross income and farm expenses. Net income, therefore, includes both interest on capital and a sum for wages or salary of the operator.

Farm receipts or *gross income* is the amounts received from sales of farm products, increase in inventories of live stock, feed supplies, and receipts from outside labor, rent of buildings, etc.

Direct receipts are the cash or equivalent value received from sale of crops, live stock, live-stock products, for labor, and from miscellaneous sources.

Indirect receipts are the values from increased inventory, or appreciated values of any of the various forms of property.

Farmer's earnings are the sum of the labor income plus what the farm furnishes toward the living of the operator and all others living or boarding in the farm home.

Labor income or *operator's labor income* is the sum left after deducting from farm receipts the three items of farm expenses, interest at the going rate on the average farm investment, and unpaid family labor other than the operator's.

Minus farm income is the sum by which the operator failed to make farm expenses and interest on the invested capital.

Percentage return on investment is the rate of interest received on invested capital after deducting all expenses. In the case of the operator it is determined by deducting the estimated value of the operator's labor and dividing this result by the amount of capital invested. In the case of the landlord, taxes and other necessary expenses are deducted.

Terms used in connection with expenses.

Farm expenses are moneys paid out during a business year for the purpose of meeting current expenses other than investments which are necessary to carry on the farm

business. Expenses cover payment for labor, including board, feed, materials, supplies, taxes, insurance, repairs and parts, oil, gasoline, etc. Expenses should include the value of labor performed by the family plus depreciation of equipment plus decreases in inventories of live stock, feed, and supplies. Household or personal expenses are not included, as they do not constitute expenses of the business.

Terms used in connection with occupancy of land.

An *owner* is one who owns all of the land that he farms.

A *part owner* is one who owns only a part of the farm land that he operates.

A *tenant* is one who owns none of the farm land that he operates.

A *cropper* is a tenant laborer who furnishes the manual labor of growing a crop, but little or no capital.

A *landlord* is one who owns land farmed by another.

Share rent is a system of paying a portion of the crops or stock produced as rent for use of farm lands or equipment.

Cash rent is a system of paying a fixed cash rent for the use of farm lands or equipment.

Cash-share rent is a combination of cash rent and share rent paid for the use of farm land and equipment.

Terms used in connection with labor.

Family labor is the unpaid farm labor furnished by members of the family, other than the operator.

A *man work unit* is the average amount of work accomplished by one man in 10 hours. An acre of hay represents one man work unit because, on the average, approximately 10 hours of man labor are required to handle it. An acre of potatoes represents 10 man work units because, on the average, approximately 100 hours of man labor are required to handle it. One dairy cow from which the milk is wholesaled or made into butter represents 15 man work units because, on the average, approximately 150 hours of man labor are required to handle such cow and her product. It may be desirable to vary with the region the number of units assigned to this or that enterprise.

A *horse work unit* is the average amount of work accomplished by one horse in 10 hours.

A *productive work unit* or *labor unit* is the time of one man or one horse employed for a 10-hour day at productive work in the growing of a crop or the producing of stock or stock products.

Terms used in connection with crops.

Crop acre is one used for producing some farm crop other than wood or pasture. Two crops grown on the same ground means double as many crop acres as land cultivated.

A *tillable acre* is one suitable for some farm crop other than wood or pasture.

Diversity index is a measure of the degree of diversification as practiced on the individual farm.

Crop index is a measure of comparison of crop yields on a given farm with the average yields of a group of farms operating under similar conditions. The relationship is expressed in percentage.

Terms used in connection with live stock.

An *animal unit* is the approximate equivalent, from the standpoint of manure produced and feed required, of a mature cow or horse. It is customary to count as an animal unit 2 head of young cattle or colts, 4 calves, 5 mature hogs, 10 pigs or shoats, 7 sheep, 14 lambs, or 100 fowls. The term is used for purposes of comparing different classes of animals and to compute total amount of live stock on farms.

GENERAL CONSIDERATIONS

15

A *productive animal unit* is an animal unit which increases the revenue of the farm by its own growth, by producing young, or by some live-stock product as milk or eggs.

Illustrating use of terms.

On starting a farm enterprise the value of the investment in the business for land buildings, work stock, implements, seed, feed, cash, etc., is found to be:

Buildings, land, etc.	\$20,000 (Fixed capital)
Seed, feed, supplies, cash, etc.	6,000 (Working capital)
	\$26,000

At the end of the year the books show:

Buildings, land, etc.	\$19,800 (Fixed capital)
Seed, feed, supplies, cash, etc.	8,200 (Working capital)
	\$28,000

The average of the two inventories is:

\$27,000 (Farm capital)

The incomes are found to be:

From sale of products.	\$ 4,800 (Direct receipts)
From increase in number and value of young stock.	800 (Indirect receipts)
	\$ 5,600 (Gross income or farm receipts)

The expenses are found to be:

Labor, seed, feed, etc.	\$ 1,400 (Direct expenses)
Depreciation of equipment.	300 (Indirect expenses)
	\$ 1,700 (Farm expenses)

The difference between the gross receipts (\$5,600) and farm expenses (\$1,700) gives..... \$ 3,900 (Net income or farm income)

The operator figures that:

(a) The value of his labor is.	\$ 1,200
(b) The value of unpaid family other than his own is	400
(c) Interest at 5 per cent is.	1,350
(d) Value of house is \$400 and of home-used products \$450, a total of.	850

He will then find that:

	\$ 3,900 (Net income)
less	1,750 (Combined family labor and interest)
	\$ 2,150 (Labor income)
which, plus	850 (Value of house and home-used products)
plus	400 (Family labor)
plus	1,350 (Interest on investment)
	\$ 4,750 (Total family income)

gives a total available for the family of..... \$ 4,750 (Total family income)

Crop index is used to express the crop yields of a particular farm by comparing with the average crop yields of all the farms in the community.

FARM MANAGEMENT

Example.—A particular farm produces

1,000 bu. of corn on.....	20 acres
600 bu. of wheat on.....	20 acres
450 bu. of oats on.....	15 acres
60 tons of hay on.....	40 acres
	—
Total.....	95 acres

The average yields for these crops in the community are: corn, 60 bu.; wheat, 32 bu.; oats, 40 bu.; and hay, $1\frac{3}{4}$ tons per acre. Hence, on the average, the acres required to produce the above quantities of products are:

1,000 divided by 60	= 16.7 acres of corn
600 divided by 32	= 18.8 acres of wheat
450 divided by 40	= 11.3 acres of oats
60 divided by $1\frac{3}{4}$	= 34.3 acres of hay
	—
Total.....	81.1 acres

Ninety-five acres on this farm are required to produce what 81.1 acres produces on the average, or one acre output is but 85 per cent of the average, so 85 represents the crop index.

CHAPTER II

SELECTING FARMING AS AN OCCUPATION

The desirability of farming as compared with other occupations is largely a personal matter and must be determined by the circumstances, tastes, and aspirations of the individual concerned. Certain factors of general application, however, are touched upon below.

Stability of Farming.—From the standpoint of stability, safety, and profitableness there are considerable differences between farming and other lines of business. Farming is, perhaps, more stable and less susceptible to serious interruption from disturbances in the financial world than any other business. On the other hand, it is, perhaps, more affected by the natural elements than any other form of business.

Farming a Mode of Life.—E. Davenport says, "Farming is not only a business, but a mode of life. Sometimes the business is the prominent feature, so successful that life seems to run on as one long sweet song. Sometimes the business runs so low that life is a bitter struggle, it would often seem, against fate."

"The best of all on the land," Davenport goes on to say, "is the farmer and his family who own and operate a moderate-sized farm—just large enough to afford, by thrift and industry, all the comforts and many of the luxuries of life, but not large enough to be divided. Here are born and brought up typical Americans. May their tribe increase."

A recent editorial⁴ points out the lack of grounds for comparing "big farming" and "big business." "The big farmer is in no sense a captain of industry. He is a producer, to be sure, but he is tied to standard methods much the same as are his less ambitious neighbors. He can refine upon them. He can do much by way of better organization. Farming is not a business in which a small revolving fund may be made to do wonders, nor is it one in which a few great fortunes are made by a lucky turn of the wheel as it grinds out the lives of competitors by the thousands. Farming is largely the result of individual effort; in other words, food is a by-product of life upon the land; the great mass of farmers are just folks trying to get along and doing the best they can under all sorts of handicaps of health, financial, and family conditions."

Two Ways to Consider Farming.—Farming may be for the purpose of:

- (a) Providing a home.
- (b) Providing a business.

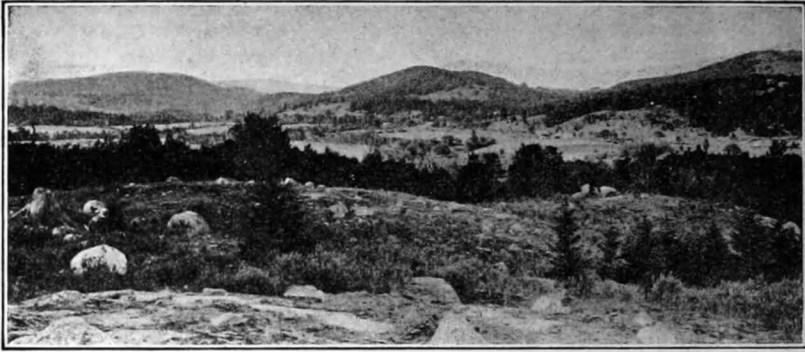


FIG. 1.—Near Potters Place, New Hampshire.

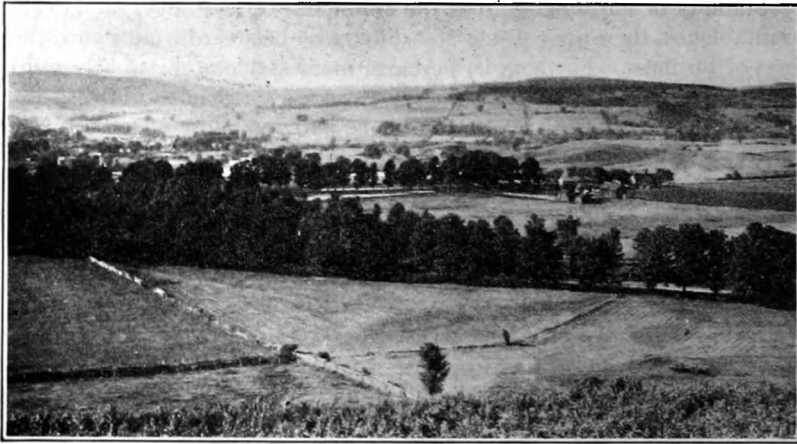


FIG. 2.—Near Greene, New York.

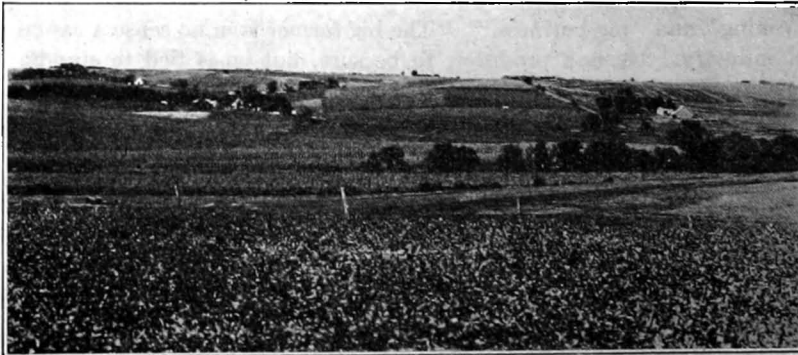


FIG. 3.—Country farm in southeastern Pottawattamie County, Iowa.

From rugged granite hills to rolling prairie soils, yet each has its attractions for the real farmer.



FIG. 1.—Near Potters Place, New Hampshire.



FIG. 2.—Near Greene, New York.

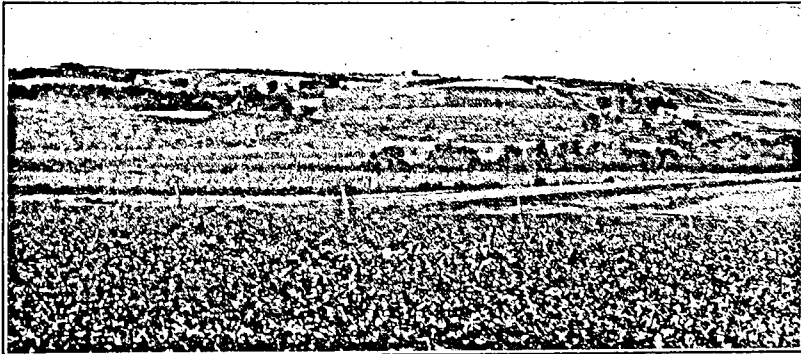


FIG. 3.—Country farm in southeastern Pottawattamie County, Iowa.

From rugged granite hills to rolling prairie soils, yet each has its attractions for the real farmer.

In the first instance, principles of farm management may be ignored, since the objects of the home are not susceptible to tests by business principles.

Under the second category, however, the principles of farm management fairly demand consideration.

The intermediate course is also open to the man who looks to the farm for a home, but must secure enough returns to keep a family, and possibly to make payments on a place purchased on the installment plan, and who will need to consider business principles in so far as they bear on his securing money enough to meet these obligations.

As a Home.—Without going very deeply into the question of the desirability of the country as a home, there are a few points to which attention may be drawn. Reasons for country living are briefly referred to below, without any attempt to list in order of importance.

1. A man working for himself may acquire greater independence than when working for another.
2. There are many opportunities for small investments.
3. Money properly invested in the country will furnish the investor a maximum of employment.
4. The work is varied and out of doors.
5. A good wife is a distinct asset on the farm. There is work which women and children can do with both profit and pleasure.
6. There is more chance for a mediocre man to succeed, because there are opportunities for employment, small investments, and small businesses.
7. Agriculture will apparently suffer more abuse through unintelligent operation than any other business and still return a living.
8. Country life brings about closer relationships between men, and results in more true friends.
9. A man's house is his home, and because of that, the farmer usually both makes a better citizen and raises better citizens.
10. The longer a man resides in the country, the more valuable he becomes, since the more experience a man has, the greater is his producing value. A man who has grown potatoes for ten years can grow them better than the man who has grown them but one year.

Farm Management Draws on Many Sources for Information.—A good farm manager is not slow to accept suggestions from any source. Thus the ideas of scientists, agricultural writers, business men, laborers, teamsters, mechanics, neighbors, are all accepted, digested, and if valuable, applied.

Value of Studying Local Practice.—Great benefit may be derived from observance of neighborhood farmers. In any community where agriculture has been established for some time, the prevailing tendency of the majority of farmers is to a correct working out of the best methods for the existing condition. By studying these methods it may be possible to offer simple suggestions for improvement, but on the whole, the fundamental principles will prove sound and reasonable.

No more liberal education can be found for one wishing to investigate a given phase of agriculture than to visit one hundred farmers in a given community and make a close investigation of their methods. Greatest good, of course, will result from the selection of farms where the operators have been established long enough to formulate and prove their policies. Thus one would gain less direct information from colonies on a new subdivision than from farmers in an old established section where it may be the farms have been in the family for several generations.

Scope of Detailed Information Needed.—A cursory study of the chart (Chart 1) presented in the chapter on "General Considerations of Farm Management," showing the dependence of farm management upon other subjects, will indicate a need for a practical working knowledge of (a) existing farm practices, and (b) scientific recommendations for improvement. Thoroughly to understand animal husbandry and plant industry with their subdivisions of horses, sheep, beef, swine, poultry, dairying, field crops, fruit (citrus, deciduous, etc.), berries, vegetables and seeds, requires information of the basic subjects on through a long list. So too, in order properly to understand and apply farm management factors, full knowledge is needed of agricultural economics, rural sociology, forestry, ordinary business principles of finance, and similar related subjects. Detailed information over a wide range is vital to the farm manager.

A farm manager should possess knowledge of local farming practices—prevailing types of agriculture, time and way of preparing seed-beds, amount of seed, time of planting, amount of cultivation, time of breeding stock, periods of feeding to fatten, etc. He should know the more common weeds, rodents, plant diseases, insect pests, and means of controlling them. He should be familiar with the selection, adjustment, and care of farm machines. He needs a knowledge of ordinary methods of farm construction—framing of buildings, selection of materials, use of concrete, galvanized iron, and other materials. The proper selection of size and type of buildings and their placement with relation to one another falls to the province of farm management, but bills of materials are a part of farm engineering, as are irrigation systems and drains. The farm manager should know the outstanding agricultural legislation applicable to his community, *e.g.*, fencing laws, trespass laws, right of way, taking waters from streams, diverting flood waters, responsibility for labor, payment of wages, housing, liability in case of accident, bonding laws, regulations covering the output of milk, veal, or other farm products, standard market packages, reporting infectious diseases, killing ground squirrels, coyotes, prairie dogs, getting rid of barberry, Russian thistle, and insect pests.

Local Practice the Result of Experience.—The better acquainted one becomes with the general principles underlying local farm manage-

ment plans, the more one realizes the necessity for a full acquaintance with local conditions, customs, and practices. In any old, well-developed community, present practices are, to a large extent, the result of experience and its attendant processes of elimination. Illustrations may be drawn from the open flat-roofed stock sheds of the southern states in contrast with the closed barns and steep-pitched roofs in snow countries; range methods in states of open winters in contrast with shed feeding in sections of heavy snow-fall. The planting season in the Pacific Coast states is at the time when the East is preparing to hibernate. In the East help boards with the farmer, in the West they stay in separate quarters; the former condition means a larger farm residence, the latter requires provision for additional housing. Practices which at first were condemned have later been justified, *e.g.*, potato sorting in certain sections; shipping apples in boxes instead of in barrels; saving of space through kind of shipping package, *e.g.*, peach basket of East compared with crate of West; and bulk handling of grain in Middle West compared with sacking it in California; methods of loading cows; of selling; of handling labor. The negro of the South requires different management from that of the Mexican and Spaniard of the Southwest, or the Japanese, Hindu, and Indian of the Northwest, and these again require other superintendence from that applied to the Norwegian, Dane, or Russian of the central states, or the Pole, Italian, and Greek of the Atlantic Coast.

Gaining Knowledge of Local Conditions.—Too much information cannot be had in a chosen locality concerning possible and probable yields, market demands for product, gross and net values at farm or ranch, percentage of probable crop failures, importance of maintaining soil productivity, availability of farm labor, degree of diversification normally practiced, extent of local cooperation among farmers, character of neighbors, local customs, provision for churches, schools, and libraries, etc. A short stay in the neighborhood for conducting quiet inquiry among farmers will sometimes suffice; a year's residence as tenant is a valuable guide; personal knowledge gained by working as a hand on the property or in close contact nearby will often serve; use of County Agents' information offers possibilities; inspection of buyers' books may reveal several facts; other ways will suggest themselves.

In reviewing worn-out lands where it is proposed to bring up production by use of fertilizers, green manure crops, live stock farming, or rotation methods, assurance that one has sufficient and accurate data is especially essential. Proper data of the time element are vital, as increased yields due to improved methods sometimes are not evident until several years. Ignorantly to count upon returns in a year or two which cannot possibly be obtained in less than four or five, is likely to result in disaster to the operator.

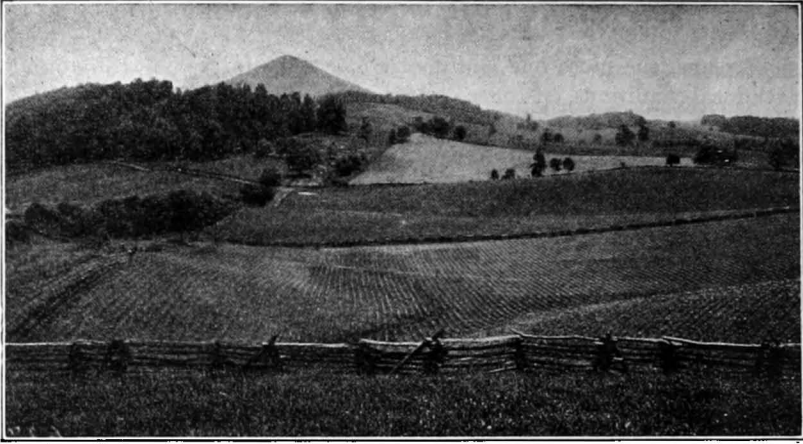


FIG. 4.—Near Witheville, Virginia.

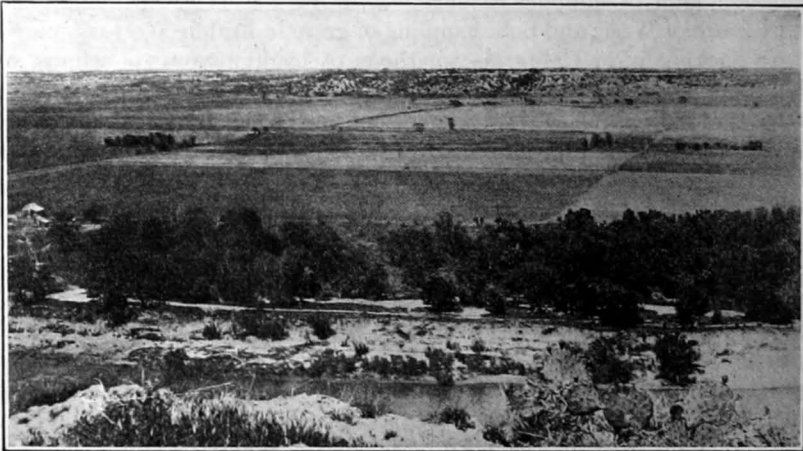


FIG. 5.—Brazos River Valley, Bosque County, Texas.

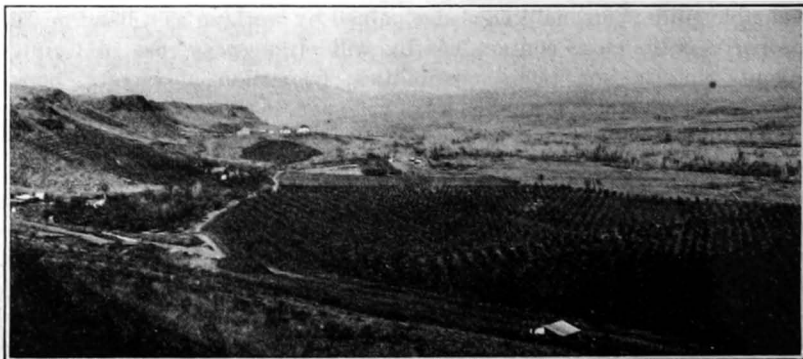


FIG. 6.—Lower Natches Valley, Washington.

The appeal of the open country is a first essential to fullest realization of what

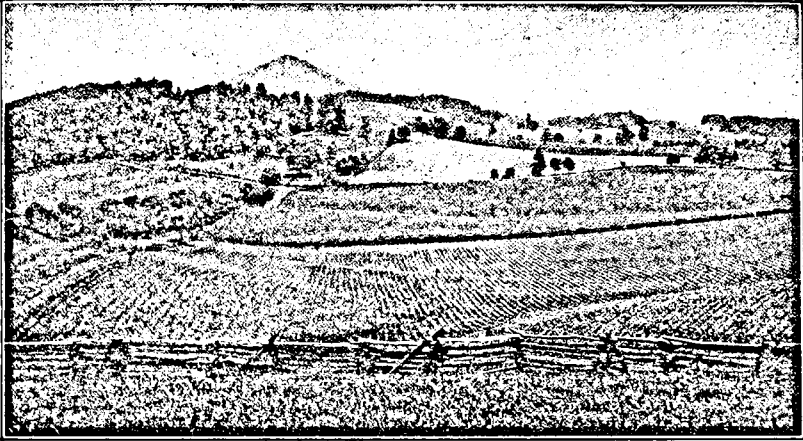


FIG. 4.—Near Witheville, Virginia.

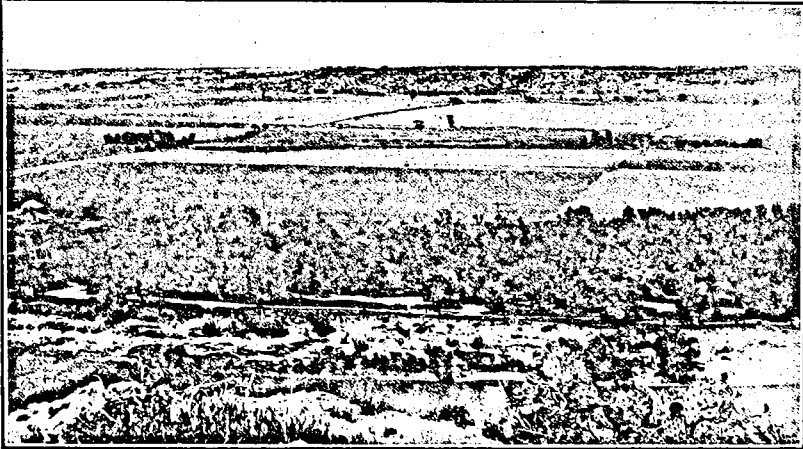


FIG. 5.—Brazos River Valley, Bosque County, Texas.

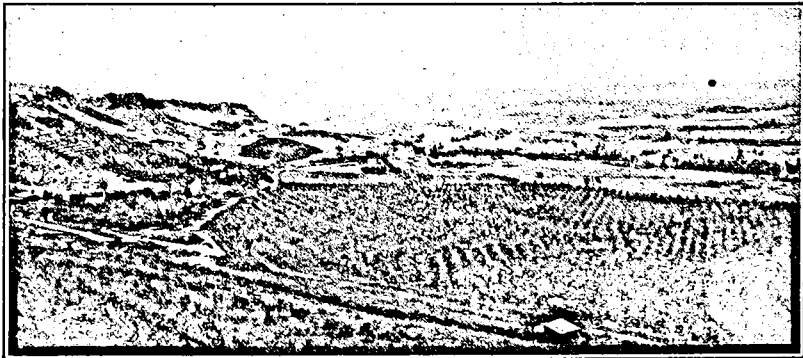


FIG. 6.—Lower Natches Valley, Washington.

The appeal of the open country is a first essential to fullest realization of what farming has to offer and yet the true farmer appreciates opportunities to do good work as well as the visual pleasure afforded by scenes such as these.

Personal Elements for Success.—In making a success of the farming business much stress must necessarily be placed upon the individual. There is no given rule to indicate the percentage to be attributed to the man himself. It is, however, large. For purposes of study it is safe to say that fully 50 per cent of success rests with the individual alone. The other 50 per cent covers the conditions of soil, climate, water, and market, as available for the chosen industry.

From the standpoint of the individual there are several elements which largely determine his success in agriculture. Among these are:

1. Knowledge.
2. Skill.
3. Energy.
4. Abiding enthusiasm.
5. Faith.
6. Courage.
7. Responsibility.
8. Experience.

If farming is considered as a manufacturing business, for farming is under a broad construction the manufacturing of food products, it is easy to see how necessary are the qualifications here enumerated. No one would think for a moment of success attending his efforts to make shoes or print books or construct engines without knowledge of the industry, and a keen desire to engage in the business.

Proof of the need for farm management *judgment* and *knowledge* is available for those who with a fair idea of farm management find occasion to try out their knowledge in new communities and in new enterprises. For instance, need of knowledge is illustrated by reviewing the "Farms for Sale" column in a region unfamiliar to the reader. The need for information is startling if one tries to select what is a workable proposition. Each locality requires knowledge of possible incomes; to what extent native feeds are of value; source, kind, and amount of farm labor for a given community; local practice in housing and boarding help; kinds and value of native trees and grasses; extent and character of weed, fungus, and insect pests; fertilizer practice, etc.

Skill.—An inquiry into the degree of skill required to do the work is a necessary part of the introspection demanded of the man who would be a good farmer. To knowledge and experience must be added skill. The skillful man is he who, having familiar knowledge, can execute with readiness and dexterity. The necessity for knowledge, wisdom, and skill in farm management cannot be overestimated. In every farm neighborhood there are examples of men (1) who are marked by ability, (2) others who are clearly unsuccessful as farmers who as markedly fail, and still others exhibiting all gradations between success and failure, depending far more on the differences in men than on differences in land or in materials or opportunities or other conditions.



FIG. 7.—Dairying in New York State.

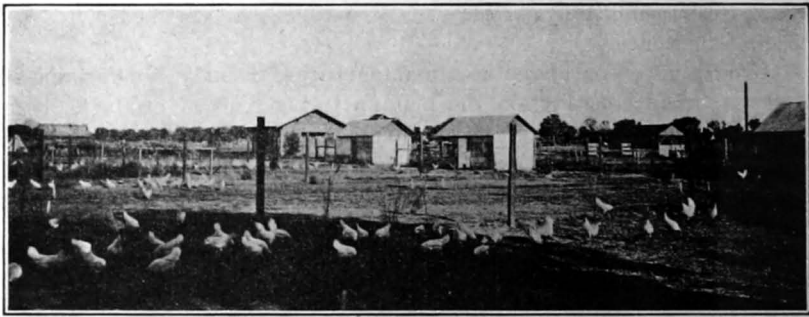


FIG. 8.—Poultry as a specialized business.

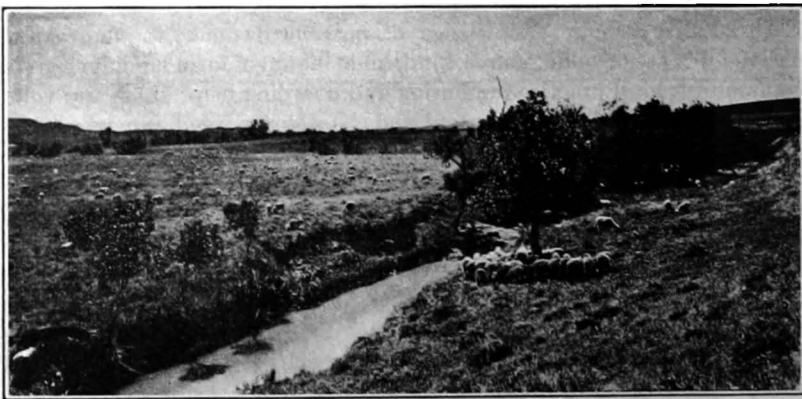


FIG. 9.—A Montana scene.

Various types of farming, for those who prefer to follow the stock business.

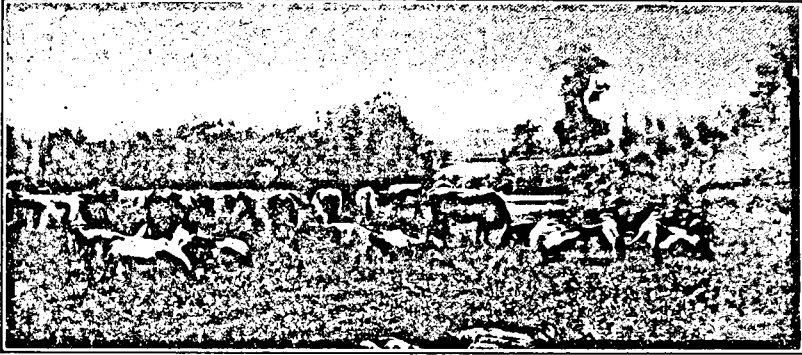


FIG. 7.—Dairying in New York State.



FIG. 8.—Poultry as a specialized business.



FIG. 9.—A Montana scene.

Various types of farming, for those who prefer to follow the stock business.

Energy.—The man who lacks energy or will to work will find farming intolerable. Complete success does not attend the lazy man in this particular business. He who does not work will not gather.

Enthusiasm, Faith, and Courage are necessary to complete attainment of success. Enthusiasm must be of the lasting kind founded upon courage and backed by a liking for and faith in the work. Otherwise, a man will not be able to weather the periods of low prices, the crop failures, the labor troubles, and the thousand and one things which the successful farmer is constantly meeting and combating.

Cuts have been interspersed through the pages of this text to serve as tests of personal reactions to farming. Greatest success in farming is attained only when the operator is so keenly alive to the "call of the land" that he thrills to the mental imprint of a photographic reminder. When one glances over these cuts, and does not feel a desire to smell the fresh earth, a wish to be out under the bright sun, and a tug at his heart-strings, he'd better give a little thought to how far his enthusiasm will carry him.

Experience, listed as last, is fully as important as knowledge, listed first.

No wise person lacking knowledge would think very seriously of investing his time and money in the active management of a cotton mill, printing office, hotel, wholesale hardware plant, or any similar line of business where competition is close. Experience is as necessary in farming. If the farm business is large, the experience will take the direction of building up a good organization and correlating the different business factors. If the business is small, so that the operator does a portion or all of the work, he will need experience as to how and when his work should be done—pruning, spraying, cultivating, plowing, milking, feeding, or whatever details the particular type of business he is interested in demands.

Minimizing Experience.—This subject of experience is worthy of much consideration, for of all attributes needed, the beginner in the farming business tries hardest to minimize or dodge the value of experience.

No amount of reading and studying alone will make a good farmer any more than one can become a good tennis player or baseball pitcher by reading up on the subject.

To the study must be added experience, for only by actually trying one's hand can the necessary knack of doing the work be attained. The degree of knack or skill which one must possess cannot be measured, but it is vastly important that one develop this attribute to the utmost.

Thus a city bred man seeing a double team go by will note that they wear "harness," but after he has harnessed and unharnessed a few times he instinctively notes the details—breaching, hames, breast straps, underdraws, throat latch, and the rest.

Experience Results in Saving Time.—Experience is necessary not only to show whether one actually likes the work or not, but, added to the proper course and amount of study, it will largely determine one's success. Experience results in *saving of time*. Thus the inexperienced man will take a half hour to harness a team which should be done in five minutes; he will consume an hour in doing what should really be ten minutes of milking; he will take two hours to do an hour's work around the hog pens, or in the harvest.

Experience Results in More Work.—Experience results in the *accomplishment of more work in a given space of time*. Repeated effort trains mind and muscles and results in the saving of many steps and the utilization of short cuts. An experienced man acquires a knack or skill in pitching hay, or hoeing crops, or irrigating fields, or making small repairs, or adjusting machinery, or sharpening tools, all of which reduces labor, time and cost.

Some of the things which come easily and naturally to the experienced farmer and look as if anyone could do them, will at the beginning prove the new man to be extremely awkward. Certain things will puzzle a beginner, as for instance the method of starting plowing in a square field, the handling of irrigation water in heavy clay soils, the driving of cranky mules, the way to set up a derrick and start a stack, the preparing of a grain field for the combined harvester, the packing of fruit.

Experience Indicates a Day's Work.—Experience provides the measure of what constitutes a day's work. When men must be hired, he who has had experience is able to judge as to what he may expect from his help, and furthermore, and more valuable, to distinguish those men who by their superior skill or knack can accomplish their work more easily, more quickly, and better.

Experience Teaches Labor Conditions.—Actual contact for a while with laborers results in a clearer understanding of their points of view and a better comprehension of their troubles. Thus a clearer understanding will result as to the merit of their complaints. Some keen thinkers are to be found among workingmen, and it is well to know something of the types represented by the agitator, the disturber, the man with anarchistic tendencies, and the general all-round trouble maker.

Experience acquaints one with *local conditions*.

Any lack of training in these details will seriously handicap the newcomer.

Getting Experience.—Several ways are open to gain experience, and the method must be determined by the individual.

Getting Experience as Operator.—A man with capital may go in for himself at once and pay for his experience with his own money. Under such conditions it is well to consider the advisability of putting aside a portion of one's capital for the future and confining these experimental

activities to the remainder. Then, if mistakes total more than was originally estimated, one will have some capital with which to continue with a clearer vision, or if the work fails to attract, the means will still be available for a return to the old work or a new start in other lines.

Getting Experience as Employee.—A man may work for a large corporation engaged in farming. If he is without influence, however, and goes in as a common hand, he will find in the majority of cases that his training is too narrow and one-sided. Thus, though he should know something of the policies directing the work, he will find that he seldom or never comes in contact with the men directing it, and his opportunities to profit by contact with these people is almost nil. Further, his work will consist of a routine set of duties solely pertaining to the department in which he works. He will learn to ride, brand, round up, cut out, and skin, if in the cattle department; he will learn how to mow, pitch, or rake if in hay camp; he will learn fence building in a fence crew; or some of the simpler duties in whatever camp or crew he is placed.

It is, of course, possible for the right man in the right position to get a good deal of information, especially from contact or conversation with old range riders, pioneer workers, and all-round men, but it cannot be gainsaid that the usual green man finds his quest for experience and information somewhat restricted in corporation employment. One must not forget that the capable men are clannish, each somewhat jealous of his power, and not especially apt to take up a greenhorn and a newcomer. The idea of possible future competition from the newcomer no doubt has its influence in part.

Getting Experience in a Partnership.—A man may take a partner who has what the first man lacks. Thus an inexperienced man may secure a thorough-going farmer as a partner to supply his lack of farming knowledge; or a hog raiser or dairymen may cooperate with a man who understands crops; or a local man with his knowledge of the soil, water, climate, markets, and methods of the community, may cooperate with one who has secured his knowledge of farming elsewhere.

The success of such a partnership necessitates at the outset a given ideal on the part of both partners—the same goal sought by each. The business must be big enough to warrant the constant employment of two men, which in turn indicates the necessity of sufficient working capital—more than would be required for a one-man business.

Getting Experience from Suburban Trial.—A plan worthy of consideration by the family that has never lived on a farm but desires to try agriculture, is to rent a small place for a year within commuting distance of the present position and try out the proposed life. This way will furnish the much needed instruction in the requirements and care of crops and stock, it may be the means of preventing an unwise decision,

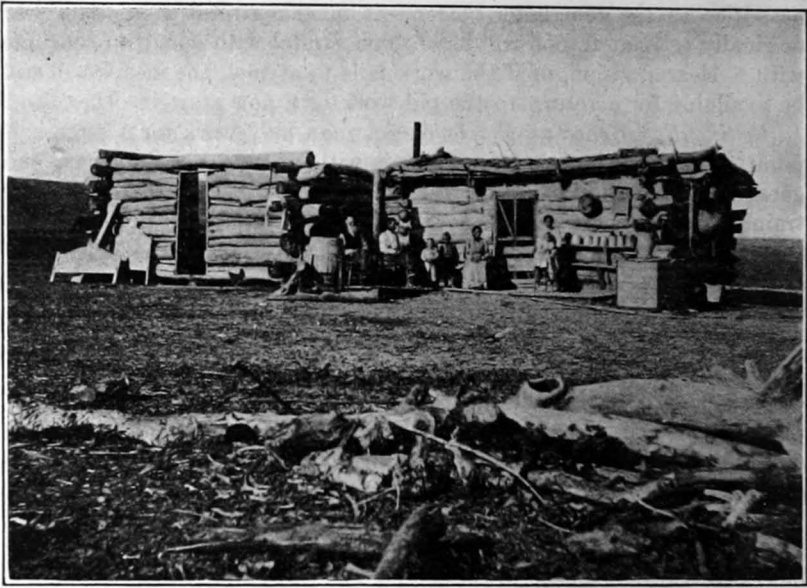


FIG. 10.—A lowly log cabin of the southwest.



FIG. 11.—A stately mansion of the south.

In choosing farming as a business the home aspect should not be overlooked.

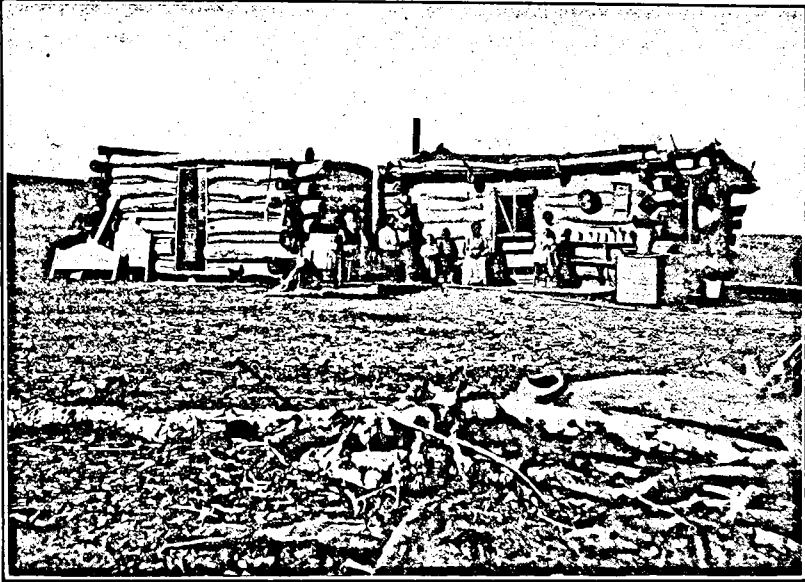


FIG. 10.—A lowly log cabin of the southwest.

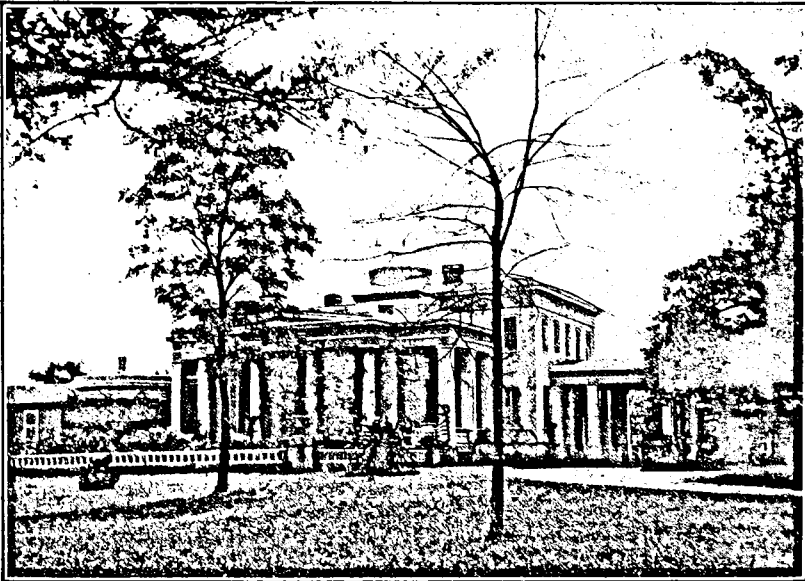


FIG. 11.—A stately mansion of the south.

In choosing farming as a business the home aspect should not be overlooked.

and it certainly will curtail mistakes which otherwise might prove too costly.

Many towns are near enough to the open country so that one can find a place which will permit a trial of any pet scheme. If one thinks he can make a living from a single acre, he should try it in some such way as this by determining what can be done during spare time without giving up his present employment. In the same way one can learn what is needed and what can be done with a small flock of hens, a few hogs, a couple of cows, a small truck and berry patch, or even a few fruit trees.

Incidentally such trial will result in a hardening of city muscles and a training of mind and body for a full day's work.

Suburban Trial Limitations.—Such experiments will indicate the limit of returns possible from such things as bees, rabbits, pigeons, mushrooms, and in many cases prevent what on a large scale might prove a disappointing venture through lack of knowledge concerning one's fitness for the work, amount of capital needed, requirements for the successful establishing of the business, receptivity of the market, size of the business one can handle, and costs of production.

An ordinary back yard will, with many industries, offer sufficient area for experimenting on a small scale, although one must remember that the results obtained with a small unit, *i.e.*, a dozen hens, two or three rabbits, 100 sq. ft. of truck, one hive of bees, or a single berry vine, cannot with safety be applied as a sure test of what will be forthcoming from a full-sized business. Thus one will get far different results from eggs sold to the neighbors with fowls getting a full ration of grain and table scraps than from the product of a commercial flock sold in the open market. And a few rabbits may be sold at good prices to a limited private trade where the product in the open market may command less than the cost of raising. One may easily make \$40 profit from a lot 50 by 100 ft. with vegetables raised during spare time, yet to handle two acres might take all one's time and at the same rate would return but \$675 for the year's work.

In short, the moral is that a small trial is desirable, but results obtained must be applied carefully in gauging the possibilities of the same industry on a scale taking all one's time.

The Best Way to Gain Experience.—The best way to gain experience is to secure employment on a small place given to the industry one wishes to enter, where one comes in frequent contact with the "boss"—preferably working beside him—and can imbibe daily a knowledge of policies and methods. The small place may employ only one or two men and thus an opportunity is offered for variety and a chance to see the working out of the scheme. Usually too, one can thus find better board and lodging, and is not thrown in quite so close contact with the foreign element as is the case in corporation employment.

Pay Secondary to Experience.—In getting experience, pay should be a secondary consideration, the main issue being the gaining of the greatest amount of training. One can sometimes afford to work for nothing, or at most for a few dollars a month, if he can find a successful man willing to take him in hand and give him a thorough training in the business. The wisdom of such a decision will show in future years.

Constructive Changes in Employment.—Further, it is well to move from place to place and try out the methods of different men, keeping one's eyes and ears open for the proper reception of all useful items. Such movement must, however, be designed to reach a given goal, be planned along constructive lines, and not an erratic, never approaching, rambling, shifting from one job to another. The latter is vagabondism, the former is preparation.

Understand that one need not and, in fact, cannot try one's hand at all things agriculturally. Thus a good superintendent may not be a prize "bronco buster" or "mule skinner." Neither does a foreman need to know all about the business end. One must, however, become fully acquainted by actually using hand or brain upon his duties and methods pertaining to the line of work one expects to take up.

Personal Introspection Desirable.—To the extent that a man possesses the essentials outlined above, just so far will he be able to succeed when considering only the influence of individual efforts. If a man be weak in one or two qualities, or lacking altogether in a single factor, he will not attain full perfection in his results.

Thus at the very start a little personal introspection is a most desirable thing. A man may test his knowledge by means of the paper plan, to be discussed later. He can determine his experience by a short review of his past history. If he is fair-minded, he can determine his energy by past successes in past fields of endeavor. His enthusiasm, however, may be a matter of some speculation. A little trial as a farm hand, or by leasing a place, or by a judicious purchase of a small place, will soon determine whether or not his inclination toward agriculture is strong enough to stand the real test.

This rather lengthy discussion of the personal attributes is not intended to discourage anyone, unless that one's faith is so weak that he should be discouraged, but rather to open the eyes to the true status of the business. The farming business is a good one. It offers opportunity for good profits. It recognizes long terms of capable service in a substantial way. It offers a variety of work, a healthful and an enjoyable life. One should, however, go into the work with a firm belief that one can succeed, backed by knowledge, experience, and capital, and with the courage to overcome such obstacles as may arise.

CHAPTER III

SELECTING THE FARM BUSINESS

The choice of a farm business will be determined largely by circumstances. In general, four factors will be involved in the selection of a business. These are (a) the locality and its possibilities in the way of producing and disposing of farm products, (b) the available capital, (c) the need of capital, for operating expense or family needs, or both, and (d) personal inclination and capacity of operator. If a choice is possible—*i.e.*, if (a), (b), (c) are none of them inhibitory—(d) will of course settle the question.

Locality Limitations. *Environment in Determining Type of Business.*—Of the environmental conditions limiting the business, soil and climatic conditions are of first importance, because of their relations to the kind and quantity of crops that can be grown. Rolling hills not susceptible of farming usually are given over to cattle and sheep. Lands which can be tilled are commonly utilized to better advantage for the production of farm crops. Corn must have warm nights. Wheat will grow in altitudes too high for either barley or oats. Sugar beets will resist alkali too strong for growing most crops. Alfalfa requires a deep, free, open soil. Apples are grown in calcareous soil. Oranges will thrive only under semi-tropical conditions. Pears do best where ample moisture is available. Because of the limits upon crops set by soil, moisture, and climate, the choice of an industry for a given property must first and foremost take into account what products, under the given conditions, can be grown.

Labor in Determining Type of Business.—Then follows as close a study of labor. Crops like sugar beets, cotton, hemp, and small fruits, are limited, even when growing conditions are good, by the available labor. Dairying to succeed relies upon competent steady milkers.

Markets in Determining Type of Business.—All conditions surrounding the growing and finishing of the possible products need careful investigation to determine the limitations or advantages surrounding production. And once production is assured, the matter of marketing must be determined. There are good reasons why commercial truck gardening is mostly confined to land lying close to centers of population, why fruit for canning is best grown near canneries, why sections remote from markets must raise products of high unit value to justify the long haul.

Capital Limitations.—The extent of available capital influences the choice of an industry. Insufficient capital is usually the rule, so that some temporary postponement or alteration of the final scheme may be



FIG. 12.—A family truck garden of a couple of acres growing vegetables for retail.

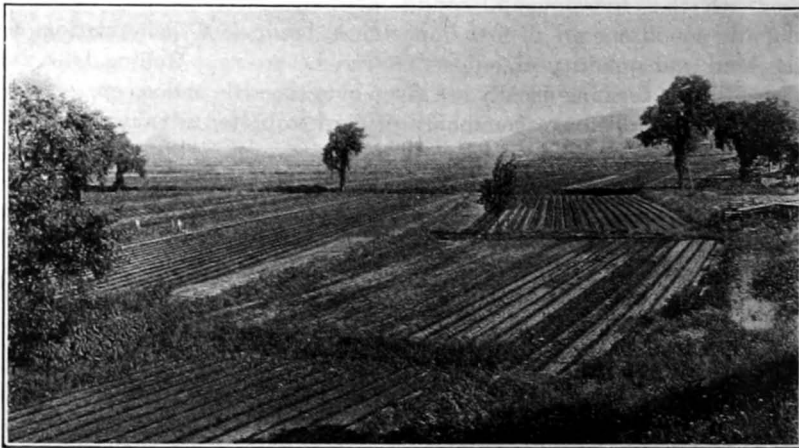


FIG. 13.—Extensive market garden section producing solely for wholesale trade.
(New York.)

Trucking or market gardening is a common type of intensive farming on limited acreages although it varies in magnitude from the local market garden of but an acre or two situated close to a direct market, to hundreds of acres utilizing much labor in the large-scale growing of vegetables for wholesale shipment. Requires nearness to a satisfactory market, hard work and attention to the details of plant requirements.

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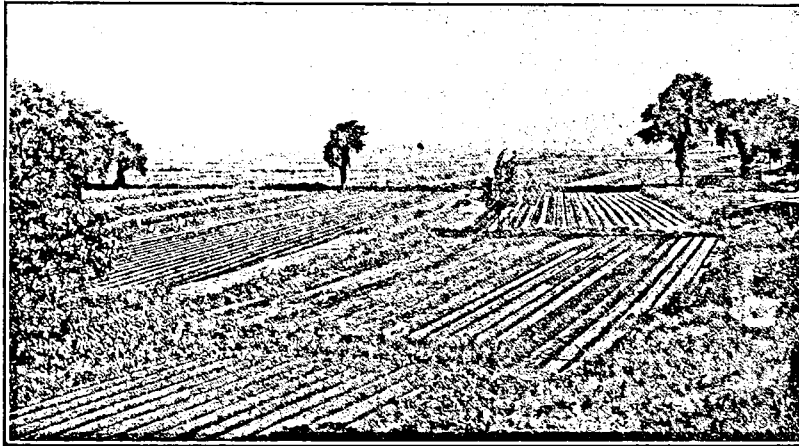


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Income Limitations.—Before the final analysis is completed as to what business to select, the factor of necessary or desired income must be considered. Is there a clear need for augmented income? Or does one possess the ability and willingness to get along with less than ordinary requirements? The answers to such questions often decide the choice of business.

Different businesses have variable earning capacities. The need to obtain operating capital or to meet unusual family requirements must be weighed before the final decision is made. The influence of the type of business upon income is illustrated in the varying returns from different products. For a certain section data are available⁵ for 1919 showing the usual yields, operating costs, and net income for different crops. Given a starting point of twenty acres capable of producing usual commercial yields, the difference in income is considerable:

TABLE 4.—SHOWING RETURNS IN ROUND NUMBERS OF SELECTED CALIFORNIA CROPS, 1919 DATA, FROM 20 ACRES

	Gross returns	Sum over operating costs
Citrus fruit		
Orange.....	\$6,900	\$2,300
Deciduous fruit		
Walnut.....	6,200	4,000
Prune.....	9,600	6,800
Peach.....	7,800	5,300
Pear.....	7,500	2,600
Field crops		
Rice.....	2,750	1,300
Sugar beets.....	2,700	1,500
Grain sorghum.....	720	280
Wheat.....	500	260
Truck crops		
Sweet potatoes.....	3,600	1,700
Tomatoes.....	4,600	1,250
Potatoes.....	2,200	680

Personal Inclination.—When more than one industry is possible, personal inclination will be the deciding factor. People generally have strong feelings either for or against some particular farm business, as, for instance, hog production, the details of fruit growing, raising poultry, riding range, growing field crops, running a dairy. The influence of personal inclination must be weighed solely by the individual. Dairying requires attention 365 days out of the year. Cows must be milked, housed, fed, and bred. Poultry is also a year-round job; details of brooding, (or of incubation), feeding, cleaning, collecting and weighing eggs,

must be followed day in and day out. The fruit industry requires a knowledge of tree growth to insure proper pruning, a watch for and treatment of many insect and fungus troubles, care in picking, marketing, and shipping, while the range has a fascination for the outdoor man who likes to ride. Some industries are not particularly confining; *e.g.*, many fruit and field crops. This greater freedom is often attractive.

Inventory of Personal Preferences.—Because personal preference is a prime factor in making the decision, the prospective farmer will find it not only interesting but extremely useful to draw up an inventory of the advantages and disadvantages of any proposed business. This is best made in the form of parallel columns, one for and one against the proposed choice.

For illustration sample inventories made up in this way are subjoined. One covers swine production; the other a combination of pears and table grapes—a specialized fruit farm.

EXAMPLE OF SPECIMEN INVENTORY OF SWINE PRODUCTION BASED ON PERSONAL REFERENCE

Advantages

1. Quick cash returns.
Within a year bred sows will provide an income.
2. Small capital required.
The business ranks with the less demanding of the agricultural enterprises as to capital needs both in developing and in carrying on.
3. Utilization of many feeds.
Often a source of use for grains not otherwise marketable or of skim milk, waste fruits, carcasses.
4. Market receptivity.
A staple product and ordinarily readily saleable as fat stock, breeders, or feeders: local buyers usually available.

Objections

1. Most economical gains require ample forage.
Constant maintaining of pasture may be difficult: winter feeding may offer obstacles.
2. Concentrates necessary for fattening.
If high priced concentrates must be purchased, care is needed to buy to advantage so that the margin of profit will be preserved.
3. Susceptibility of disease. Especially cholera, pneumonia, tuberculosis.
4. Cost of vaccinating. When cholera is present.
5. Irregular and sudden fluctuations.
Rather difficult to foretell market changes: these may at times reach extremes prohibitive of profit taking: local buyers sometimes a disadvantage.
6. Attendance.
The work calls for constant and faithful effort: may tend to become irksome.

EXAMPLE OF SPECIMEN INVENTORY OF PEAR AND TABLE GRAPE PRODUCTION BASED ON PERSONAL VALUES

Advantages

1. Profits are large.
Both direct sales and the premium on land values due to the presence of the orchard combine to make for substantial profits.
2. Steady market.
Pears and table grapes are accorded a stable and receptive market.
3. Variety of uses.
In some sections and with some varieties, grapes can be used for raisins or syrup: ditto pears can be dried, canned or sold fresh.
4. Work is not confining.
Since the requirements are largely seasonal periods of labor alternate with periods of rest.
5. Work is interesting. Because variable: operations change with the seasons.
6. Equipment needs are simple.
Implements and farm machinery are relatively small in number and low in costs.
7. Maintenance of productivity simplified.
Uses of cover and green manure crops, stable manures and commercial fertilizers are possible and the costs justified because of the high value of the output.

Objections

1. Long time to establish.
If a start is made with bare land, several years must elapse before returns from the crops are obtained.
2. Capital investment large.
Good fruit land usually commands a premium: if operator starts with bare land the length of time to establish requires heavy expenditures unless intercrops and companion crops and industries are unusually profitable.
3. Nuisance of pest control.
As leaf hopper, mildew, phylloxera, fire blight, slugs, codling moth, certain details of which must be handled under unpleasant working conditions.
4. Transportation sometimes difficult.
Fresh fruit is sometimes perishable and sometimes suffers losses: often specially constructed cars needed.
5. Packing requires care.
Market and shipping demands combine to limit type and to determine cost of package.
6. Storage necessary if holding of fresh fruit is required.
Refrigeration is costly and losses increase with delay in selling.
7. Heavy depreciation of certain equipment.
Trays, lugboxes, spray machines, etc., suffer a high rate of depreciation.

In the examples given above no extensive presentation is attempted. The items listed are sufficient to show the idea.

The Deciding Factor.—When a student finally completes such a list, it will be found that one item distinctly stands out as paramount in importance. The item is either an advantage or an objection. Other items dwindle into less significance. Upon this outcome will largely rest final decision as to whether the enterprise shall be accepted or rejected.

Studying the Personal Factor.—To find out the reason why the farmers in any group have chosen each his own particular business, is itself a liberal aid either in making your own selection or in determining the fundamentals which should govern you in later choosing a farm business.

What is it, for instance, in a man's personality that makes for a successful poultryman, stockman, grain grower, orchardman, truck gardener, cottonplanter, haygrower? How much is traceable to personality and how much is due to lack of capital? Would a man who goes into poultry because he has only enough capital for that business be as successful in stock, if he were able to command the vastly greater capital required for equal profits? Could a good grain grower or potatoman or hop producer be as successful in fruit growing if he had happened to select the latter instead of the former? Probably most men have sufficient elasticity in their makeup to permit a degree of success along several lines, although each will usually do best in some particular line.



FIG. 14.—Poultry and egg production.

A business adapted to small acreages and limited capital; susceptible of quick returns but necessitating a knowledge of poultry requirements, constant attention to detail, a satisfactory market, and reasonably priced feeds.

Different Farm Businesses Make Different Demands.—The demands of different businesses vary. For instance, running a stock ranch calls for different requirements from that of orcharding. The former is beset with problems of breeding, feeding, marketing, keeping up fences, insuring water, fighting occasional disease. The latter is a business of great detail, from time of preparing the land for planting, through the several years of selecting trees, planting, pruning, controlling pests by spraying, fumigating, cutting out, sometimes irrigating, sometimes smudging, until harvest commences, when the details of picking, sorting, packing, drying, curing, and processing are to be met; together with problems of maintenance of soil quality, cooperation, and standardization.

The two businesses call for different capacities.

The poultry business is a 365-day-a-year job of rearing, feeding, collecting eggs, marketing, and sanitation, a business of many details.

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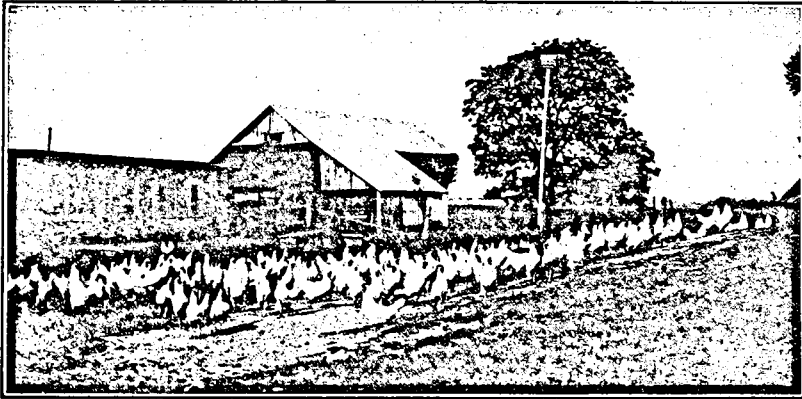


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On the other hand, the grain-growing business as usually carried on is divided into two well-defined periods of 2 or 3 months each, hard work and lots of it while it lasts, plowing, preparing seed bed, seeding, an occasional rolling or harrowing, then a long interval of growing by the crop and waiting by the rancher until the harvest starts with the binding, or heading, and followed by the threshing, or the whole thing at once with a "combined."

The financial side is reflected in small holdings of men capable of bigger things but handicapped by lack of capital; in occasional examples of relatives and legatees farming holdings beyond their capacity; in corporations financing large projects; in reclamation schemes of irrigation, drainage, protection from overflow, clearing of land; and finally in examples of farms handled by men actually possessing sufficient capital to meet the needs of their businesses.

All these four factors have their bearing, and one must be balanced against the others. Need for large income may require that personal preference take second place. Lack of capital may necessitate choice of a business of lesser income possibilities. A liking for animal husbandry means that personal desire must give way to the business best suited to existing conditions, if the locality is far and away better adapted to the production of field crops.

For the person who has the whole country to choose from, the same factors enter into the choice of a business, only more leeway exists. Personal preference, need of income, and available capital all have their influence. But in addition more elasticity in choice is possible.

When a Choice Is Possible.—If a choice of industries is possible, the selection will be simplified by a decision based upon either (a) a given locality, or (b) a given business.

A great many details must be considered in the selection of a farm, but in general, it is necessary first to settle upon either the industry or the location, when choice is possible.

When Type of Farming Determines Choice.—If one wishes to raise citrus fruits one must go where climatic and soil conditions are right for their growth. This means in the United States, Florida, or the warmer parts of California. Or he may desire to raise sugar beets, which grow best in the cool altitudes, along the Pacific Coast, or in the more northern tier of states, on rich, level lands. In the first case he must avoid the cooler climates for the sake of the crop he wishes to grow. In the second case, he may like the warmer climates, but will be forced to forego them if he is to give the sugar beets the benefit of the conditions best suited to them. Or if raising cattle or sheep is the desired object, the operator must go where land is cheap, thereby perhaps sacrificing a natural inclination to live near some city. Specialization on the production of flowers or small fruits will compel residing near a market, thus perhaps sacrificing natural tastes for back country conditions.

When Locality Determines Choice.—On the other hand, if one is not particular as to a crop but either desires or is obliged to select a certain climate or a certain locality, choice of industry must be based on the

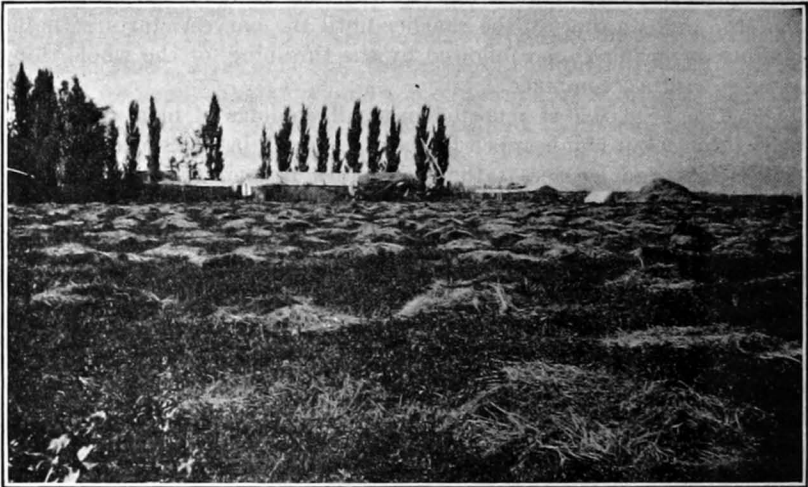


FIG. 15.—Hay harvest.

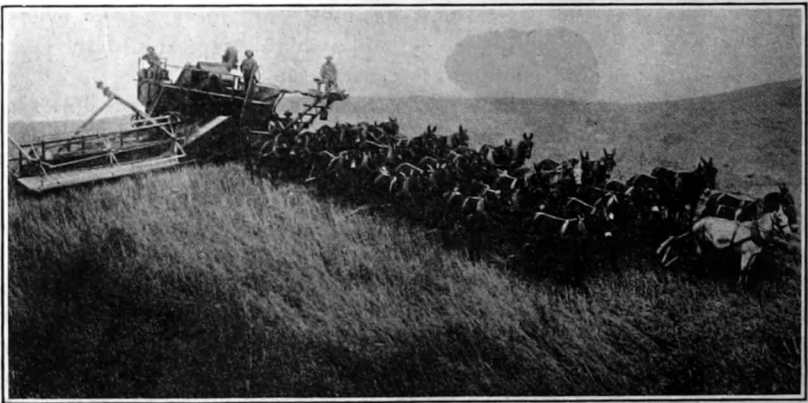


FIG. 16.—Barley harvest.

Field crops—a business of unusual safety because of its opportunity for diversification, the annual nature of the usual crops and the stability of the market: not exacting as to detail; acreage needs and capital requirements are intermediate. Knowledge of crop needs perhaps easiest to gain.

possibilities where one intends to settle. This may be poultry, or dairying or vegetables, or some other of the things most generally grown in the section, or it may be general farming, stock raising, or field crops.

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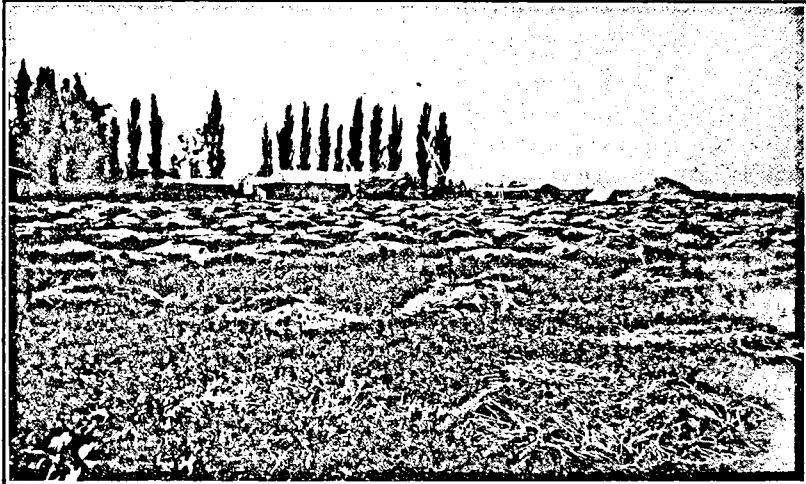


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There is, of course, the added possibility of finding the locality or climate where one desires to operate combined with conditions suitable for following a favorite industry.

Many Local Examples.—Farm management students anywhere in any state can find many examples of the influence of local conditions, personal demands, and financial limitations operating in making a final selection of the farm business. Personal desire and capacity are illustrated when one becomes fully acquainted with the farmers in a community and learns the reasons governing the final selection of their businesses.

Examples of Conditions Limiting the Industry. Citrus—The Highest Type of Agriculture.—In point of expert care, constant attention, and selling organization, citrus culture is perhaps the highest form of agriculture. A man to succeed with oranges or lemons must be a careful, conscientious grower, an all-round business man, a close student of detail, well informed concerning physiology, growth, need for plant foods, and expert in the control of pests.

The production of citrus is limited by three outstanding factors: (a) A temperature of not less than 30°F. at any time of the year, with special requirements as to humidity, wind, and high temperature, (b) sufficient water for the needs of the trees, which, being evergreen, require a constant supply in optimum amounts according to conditions of soil, temperature, and humidity, (c) good drainage, since a high water table, stagnant water, or rise of alkali is fatal to citrus culture. The cost of production is very high. Probably the highest investment per acre, in commercial agriculture, together with heaviest operating costs, is to be found in the citrus business, and only the best conditions will produce returns sufficient to warrant the financial demands of the crop.

Vegetable Gardening Requirements.—The selection of truck growing necessitates soils of high producing power, ample hand labor, a convenient and receptive market, and, usually, plans for maintaining the crop producing power of the land.

Beef Production Requirements.—Beef production is best conducted where ample feed and drinking water are available and disease is at a minimum.

Field Crops Requirements.—For most crops and stock the requirements on the side of soil, climate, handling, labor, markets, etc., limit the production to certain more or less defined areas. This statement holds especially true for such crops as sugar beets, hops, alfalfa, wheat, cotton, hemp, and, in less degree, since the production of crops determines stock industries, it holds for beef, sheep, dairying, hogs, poultry, and other stock businesses.

Volunteer Hay—The Lowest Type of Agriculture.—Cutting volunteer hay from wild growth is probably the lowest type of field farming. Range

production of cattle is a close second to prairie or volunteer hay production as an example of the low extreme of farming, while western grain production under methods of shallow plowing, broadcasting, and harvesting does not stand very high in the scale of exacting farming. Successful deciduous fruit and nut production on the other hand, is a close second to citrus in its demand for wise and expert handling. So, too, but to a somewhat lesser extent, are sugar beets, sugar cane, many truck crops and the commercial production of field seeds.

Agricultural Regions of the United States.—How it works out in actual practice is shown by the accompanying map, drawn for me in 1919, by members of the federal Office of Farm Management.⁶ There are, of course, minor areas and individual exceptions, but as an illustration of the general limitation of cropping belts, the sketch is pointedly interesting and valuable.

According to the country-wide studies of these investigators American agriculture has resolved itself into 11 fairly distinct types. These outstanding types have developed in their respective belts or zones as the results of climate, topography, soil, water conditions, circumstances of transportation and marketing, traditions and the tastes and personal inclinations of operators.

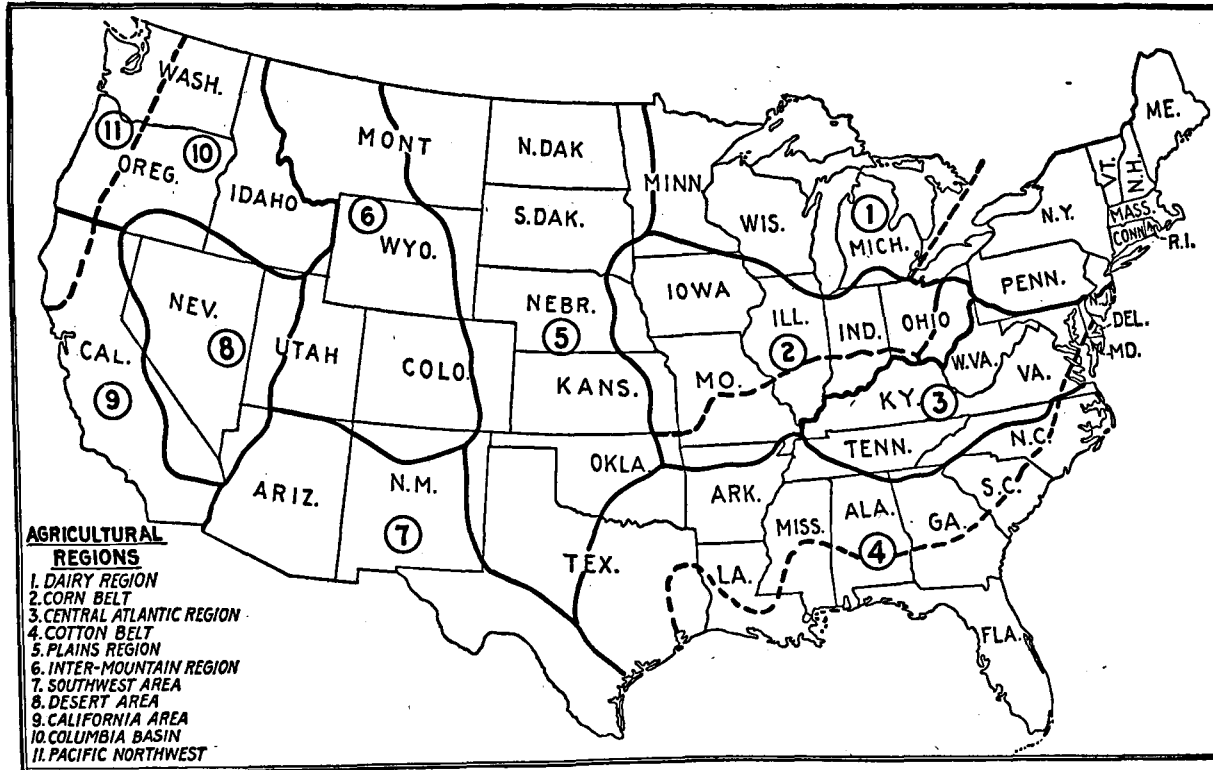
1. *Dairy Region.*—Dairying is the predominating type of agriculture in this region, although there are also many other enterprises, such as fruit, potatoes, sugar beets, and beans. The western part of this region differs from the eastern in that it includes cut-over districts.

2. *Corn Belt.*—The agriculture of this region centers around the production of corn. The feeding of live stock is an important feature. The section south and east of the dotted line is not so suitable for corn on account of less favorable soil conditions; hence the agriculture is more varied.

3. *Central Atlantic Region.*—The latitude, topography, and soil conditions combine to make this a distinct agricultural region. Three-fourths of the entire tobacco crop is grown in this region. Bluegrass pastures on the limestone soils, apple orchards in the Appalachian Mountains, and peanut and truck districts near the coast, are distinguishing features.

4. *Cotton Belt.*—The agriculture of this region centers upon cotton. In a few localities other enterprises are well developed, such as citrus fruits in Florida, truck crops in Florida and along the Atlantic Coast, sugar-cane in Louisiana, and rice in Louisiana and Texas. The dotted line separates the light sandy soils of the Coastal Plain from the heavier clays and clay loams of the Piedmont.

5. *Plains Region.*—Topography, rainfall, etc., combine to make this a distinct agricultural region. Wheat, oats, barley, and flax are important crops in the northern three-fourths of the region, while sorghums



MAP 1.—Agricultural regions of the United States.

such as kafir and milo are grown in the southern part. Native vegetation is utilized in the production of live stock. Much of the grain is grown by dry farming methods.

6. *Inter-mountain Area*.—A variety of crops mostly grown under irrigation in the valleys. Small grains by dry farming methods. Live stock under range conditions.

7. *Southwest Area*.—Climatic differences due to latitude separate this area from 6. A variety of crops mostly grown by irrigation. Live stock production under range conditions. Truck in southern Texas. Much waste land.

8. *Desert Area*.—A comparatively large part of this region is waste desert. Crops are grown in many small areas where water is available for irrigation. Live stock is produced under range conditions.

9. *California Area*.—The geographic position of California makes it an agricultural region by itself. There is wide variation in the agricultural products, from those that require semitropical conditions to those that are entirely hardy in more northern latitudes.

10 and 11. *Columbia Basin and the Pacific Northwest*.—The geographic position and the more or less distinct types of agriculture make these separate regions. The difference is largely due to climatic influences. The section west of the Cascade Mountains (indicated by the dotted line) has a heavy rainfall and is very different agriculturally from the region east of the Cascades.

Tabulating Locality Possibilities and Limitations.—Choice of a farm business, in so far as it rests upon locality possibilities and limitations, can be materially simplified by drawing up a set of tables, one for each business, and listing in separate columns the advantages and objections as they come to mind. Advantages and disadvantages are usually purely personal matters and vary in intensity and order. They even interchange places when gauged by different individuals.

Considerable time may be necessary for completing these tables, and often field trips and first hand study are necessary to augment knowledge before a final selection is made. Any delay, however, for purposes of better informing oneself or better permitting the drawing of accurate deductions constitutes a factor of safety which should not be ignored.

Example of Locality Limitations and Possibilities. *Chester County, Pennsylvania*.—As an example how to present conditions for and against farm enterprises, a table from Professional Paper 341, from the Office of Farm Management¹ presents in a graphic form findings for Chester County, Pennsylvania.

TABLE 5.—ILLUSTRATING FAVORABLE AND UNFAVORABLE CONDITIONS AFFECTING TYPES OF FARMING, CHESTER COUNTY, PENNSYLVANIA

Enterprise	Favorable conditions	Unfavorable conditions
Dairy.....	Good markets; excellent pastures; hay; corn; size of farms; character of labor; gives winter employment.	High price of hay and grain.
Hay.....	High prices; usefulness as feed; soil; climate.	Short season of employment.
Potatoes.....	Nearness to markets; climate favorable; distributes labor.	Prices variable; low yields; soil.
Wheat.....	Soil; nurse crop for grasses; seasonal distribution of labor; furnishes bedding.	Small farms; western competition; small profit per acre.
Poultry.....	Excellent markets; soil; climate; production of home supplies; utilization of spare time and waste materials.	Competition from small flocks everywhere.
Hothouse products.....	Nearby great city; provide winter work.	Diseases; danger of overproduction.
Hogs.....	Good market; pastures.	High price of concentrates; danger from cholera; competition with dairying; lack of skim-milk.
Corn.....	Good market; usefulness as fuel; soil; climate.	Furnishes no profitable employment from July to late September.
Truck crops.....	Good market; home supplies.	Competition of better nearby soils.
Fruit.....	Good market; home supplies.	Soil; topography; fluctuation of production and prices.
Beef cattle.....	Good market; crops; pastures, climate.	High price of feed; smallness of farms; competition with dairying.
Sheep.....	Good market; crops; pastures; climate.	High price of feed; smallness of farms; parasites; dogs; competition with dairying; small percent of non-arable land.
Oats.....	Value as feed.	Climate; small value per acre; poor nurse crop.

This is clear evidence that many conditions, some favorable, others unfavorable, influence type of farming. The adaptation of crops to soil and climatic conditions; crop yields; the price of products; markets; cost of feed; availability, cost, and seasonal distribution of labor; the ravages of insects and of plant and animal diseases; all have their influence in determining type of farming in any locality.

On Muck Lands of Indiana and Michigan.—On muck lands frost is an important determining factor. The growing season on such soil is considerably shorter than on other soils in the same region. In northern Indiana and southern Michigan the earliest frost on these lands sometimes occurs as early as September 1st, and the latest as late as June 10th.

These conditions have been summarized for the more important muck-farm enterprises of this region.

TABLE 6.—ILLUSTRATING FAVORABLE AND UNFAVORABLE CONDITIONS AFFECTING TYPES OF FARMING ON MUCK LAND IN NORTHERN INDIANA AND SOUTHERN MICHIGAN³

Farm enterprise	Favorable conditions	Unfavorable conditions
Corn.....	Good yield and price, labor cost low.	Danger of frost in spring and fall; weeds frequently troublesome.
Onions.....	High yield per acre and possibility of very large income per acre.	Fluctuation in price great; weeds hard to control; large amount of labor required; insect enemies.
Celery.....	Muck soil best for celery; large income per acre.	Large amount of labor required; danger of blight and rotting; price unstable.
Peppermint.....	Muck soil best for peppermint; possibility for very large income per acre with moderate amount of labor.	Demand very limited; fluctuation in price great; expensive equipment needed.
Potatoes.....	Easy to plant, cultivate, and harvest potatoes on muck.	Market discrimination against muck potatoes.
Hay.....	Yield good; price fair; labor cost very low.	Quality of muck hay sometimes poor due to rust.
Oats.....	Yield and price fair; labor cost low; good feed.	Danger of frost in spring; and lodging at harvest time.
Wheat.....	Good yield; price stable; labor cost low.	Frequently heaves badly in winter, hard to get firm seed bed.
Rye.....	Good value as feed.	Yield and price usually low.
Hemp.....	Good income per acre.	Large amount of skilled labor required.
Cabbage.....	Possibility of good income per acre.	Fluctuation in price; danger of rotting; large labor requirements.
Live stock.....	Good pasture and abundance of feed crops; value of manure.	High price of feed.

Ellis County, Texas.—The following diagram, showing factors affecting the principal enterprises, is for Ellis County, Texas:⁹

TABLE 7.—ILLUSTRATING FACTORS AFFECTING PROFITABLENESS OF ENTERPRISES, ELLIS COUNTY, TEXAS

Enterprise	Favorable conditions	Unfavorable conditions
Cotton.....	Cash crop, fair profit; adapted to soil and climate; favorable market conditions; utilizes labor of whole family; size of farm; low machinery requirements.	Adverse effect upon succeeding crops; uneven distribution of labor; keeps children from school for picking; small percentage horse labor utilized; root rot.
Corn.....	Feed crop; supplements cotton in labor distribution; soil.	Adverse effect upon succeeding crops; local market limited.
Oats.....	Utilizes labor otherwise unused; winter pasture.	Climatic conditions—drought, smut, rust; big machinery requirements; requires large amount of labor for harvesting and thrashing.
Sorghum.....	Asure crop; hay; good yields; drought resistant.	Limited market; adverse effect upon succeeding crops; very difficult to handle.
Wheat.....		Climatic conditions; large labor requirements for thrashing; requires big machinery.
Alfalfa.....	Improves soil; even labor distribution; fair yields.	Limited market; root rot; presence of Johnson grass; drought.
Stock.....	Utilizes waste feed; soil improvement; furnishes supplies for home consumption.	Limited pasture; less profitable than cotton; poor quality.

Extensive Farming More Stable.—As a rule, those enterprises that are of large extent such as corn, wheat, hay, dairying, and hog raising, are less subject to wide fluctuations in prices than those less extensive, such as truck farming, hop culture, fruit growing, and potato culture. It is seldom wise to base the business of a farm entirely on enterprises that are subject to violent fluctuations in prices.

Ninety Per Cent of Farm Lands in Twelve Crops.—It is important to bear in mind that but 12 crops constitute over 90 per cent of the total crop acreage of the United States. Oranges, walnuts, other fruits and nuts, are, in point of acreage, of less importance agriculturally to the United States than the field crops of wheat, corn, oats, barley, rye, buckwheat,

flaxseed, potatoes, hay, cotton, rice, and tobacco. The total acreage in crops is about 311,000,000; of which about 280,000,000 acres are in these 12 crops.



FIG. 17.—Dairying, a business of regular and quick returns, flexible as to size and capital requirements; but requiring a market for the product, proper feed conditions, daily attention to the needs of the cows and a sympathetic understanding of stock.

Summary of Factors Determining Desirability of a Farm Enterprise.—

The factors which must be taken into consideration in determining the desirability of an enterprise in any given case may be summarized as follows:

1. Profitableness, as determined by general and by local experience.
2. The extent and distribution of the enterprise. This has much to do with determining stability of the supply and demand.
3. Location with reference to markets.
4. Conditions existing in the market centers, as combinations of dealers to control prices.
5. Soil and climatic conditions.
6. Cost of equipment required.
7. Amount and character of labor required.
8. Seasonal distribution of labor.
9. Extent of possible market for the product and the probable effect of a considerable increase in the supply on market prices.
10. Effect of the enterprise on the productivity of the soil.

In an extended treatise on farm management each of the principal agricultural enterprises could be considered in detail from the standpoint of each of the foregoing factors.¹⁰

Where a choice is possible, the type of farming should conform to the conditions on the individual farm. Crop farming, as a rule, requires

flaxseed, potatoes, hay, cotton, rice, and tobacco. The total acreage in crops is about 311,000,000; of which about 280,000,000 acres are in these 12 crops.



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less capital, and is much more simple to master and practice than is live stock farming. The keeping of live stock is an advantage, however, to utilize feed that would otherwise be wasted, while the manure is, in most communities, a distinct asset.

Established Sections Have Advantages.—In general it will pay to go where the particular industry to be followed is already established. By going to a grain section to raise grain advantage is gained of harvesters, warehouses, freight rates, and similar established assets. In the same way, the different agricultural industries, where broad enough to warrant it, have drawn to themselves the best facilities for caring for, disposing of, and shipping their crops. Buyers go to the centralized industries and compete for the products. Creameries and factories for making cheese, evaporated milk, albumen, milk sugar, and casein reach into well established dairy sections; fruit packing houses and canneries spring up in fruit and vegetable districts; commission men establish branch quarters in the field crop districts; elevators are built in the grain growing districts; sugar mills are erected where cane or beets are grown. Shipping facilities improve when local output becomes large enough to be worth while. Laborers go where industries are centralized and steady employment more or less assured.

Diversified vs. Specialized Farming. *Change in Status of Farmers.*—Up to recent years the farmer strove to live on the products of his farm. It was then the practice of the farmer to produce as much as possible from his own lands of things needed by his farm and his family.

During the past few years the farmer has been drawn more extensively into commercial relationships and businesses. His farming is being brought closer to the same principles which underlie all business undertakings.

This is the result largely of the farmer's receiving more nearly adequate returns for his product so that he has been able to catch up with his work and reap some of the just returns for his investment in lands, live stock, and equipment, and for his labor—physical and mental. When a man had to hustle from daylight till long after dark merely to make a bare living he had little time to worry about the scientific aspects of his work, or the business principles underlying it. When his returns became more nearly adequate, he began to have opportunity to think over his work, and particularly and more to the point, he could get far enough ahead in his bank account to furnish the funds required for bringing about changes in his schemes of operation.

Decline of the Self-supporting Farm.—As a result of more prosperous times the self-supporting farm has today largely given way to the general or specialized farm. In other words, where the farmer formerly lived on the products of his farm, he now lives upon the profits.

Classification of Present-day Farming.—Today the different combinations of agricultural enterprise may readily be considered as falling into four general classes:

(a) The farm which makes a specialty of one crop or one industry, as peaches, apples, seed production, cotton, corn, barley, beans, grapes, nursery stock, dairying, hogs, beef cattle.

(b) The second class of farm uses a combination of industries which are closely correlated and any one of which is essential to the profitability of the whole undertaking.

Examples of this class are dairying with the attendant production of alfalfa, pasture, and possibly grain; beef cattle combined with grain raising, natural pasture, and alfalfa hay production; dairying with hogs on the side and alfalfa for feed; sugar beets, grain, and beans, in rotation; potatoes, grain, and alfalfa for maintaining crop production; hogs with alfalfa and grain production.

(c) The third class of farm is organized with several departments each producing its independent share of the total income.

Examples of this class are farms producing tobacco, beef and pork; or sugar beets, apples and dairy products; or hops, wool, lambs, and grain hay; or fruit, poultry products, and truck. These farms, being of a diversified nature, vary in their organization through wide extremes. As a group they constitute the most common type of farming.

(d) The fourth class covers more particularly the larger agricultural enterprises such as corporation and company farming, and also the farms and ranches large enough to maintain several industries not particularly closely related.

One western enterprise of 1,000,000 acres is outstanding. Ranches of this corporation raise grain on large acreages not only for local needs of work stock, feeding and fattening cattle, but also for sale. They breed, rear, and fatten thousands of cattle, sending them to a market where they maintain their own abattoir and retail trade routes. Smaller ranch abattoirs are also maintained at two country points which take care of the inferior cattle. Four dairies of 200 cows each are located at different points on the property. During a single year for experimental purposes they raised 40 acres of rice, 100 acres of sugar beets, patches of popcorn and peanuts, plantings of shallu, feterita, and common sorghum, dwarf and standard kafirs, teosinte, milo maize, and Jerusalem artichokes. The breeding and sale of horses is an important industry. Orchards and gardens occupy a prominent position, although the sale of products outside of apples and prunes is not great, since the local consumption by 2,600 employees requires large quantities of fresh and dried fruits and green vegetables. The making of vinegar and cider, the drying of grapes for raisins, the production of apples, peaches, pears, prunes and figs, offer a wide range of horticultural activities, many of which are complete in themselves without reference to any other industry. Rice, peanuts, sugar beets, drying fruit, and the like, are not absolutely essential to the raising of cattle, yet in a way they lend themselves to the general scheme, either as food for the men or as partial feed for cattle. The tops of the sugar beets and the stubble of the rice, for instance, are most valuable feeds even after selling the sugar

*Miller and Lux Inc., California, Nevada and Oregon.



FIG. 18.—Sheep production.

A business handled under either range or farm conditions for production of wool and meat. Either a small flock proposition as a side issue or on a range scale of hundreds of head.

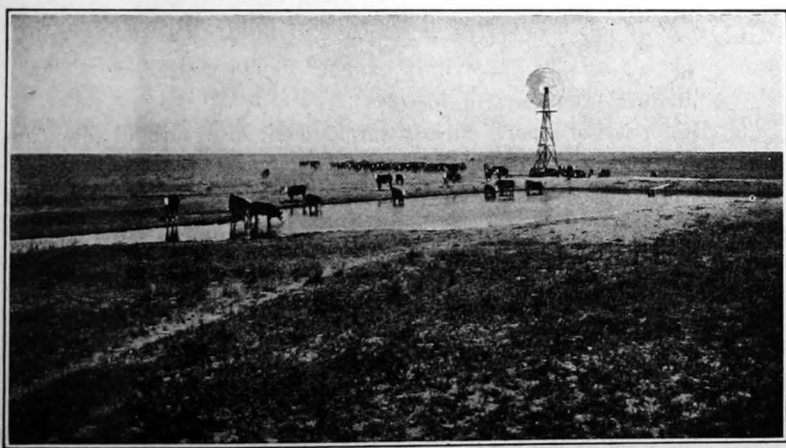


FIG. 19.—Beef production and fattening.

A business mostly for the large operator, as it requires extensive acreage, much capital, a shrewd business head, and several years to establish.

The western contrast, cattle and sheep. A cattleman or a sheepman has no trouble in making up his mind as to which of these two kinds of stock raising he prefers to follow.

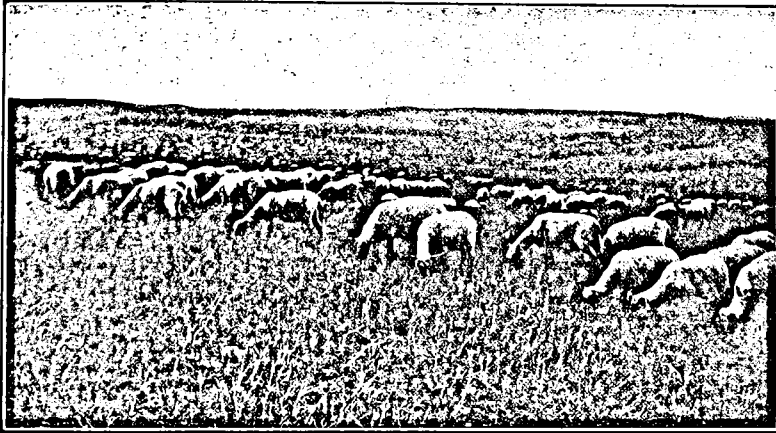


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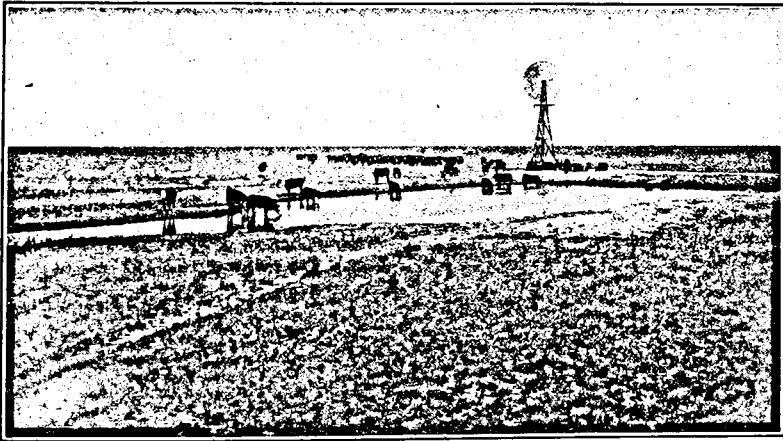


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beet roots to the factory and harvesting the rice grain for food. In the same way the use of alfalfa plantings as a companion industry is very apparent. As pasture or hay it is required in great acreage for the cattle, horse, sheep, hog, and dairy industries. Grain, too, is necessary in large quantities. The hog industry fits in well with the dairies to consume the skim-milk and, with the abattoir, to utilize what would otherwise be wasted. On the other hand, the alfalfa and cattle industry can be successfully carried on without reference to the dairy business. Hogs with alfalfa and grain can be successfully raised without skim-milk and dairy products. Rice, peanuts, and sugar beets, where soil and climatic conditions are right, are profitable crops in themselves.

Comparison of General Farming and Specialized Farming.—Both the specialized and general types of farms have advantages and disadvantages. For purposes of consideration, they may be briefly listed as:

Advantages of General Farming.—Mixed farming permits:

(a) Better use of equipment. Several crops, dove-tailing one within the other, will permit a more profitable use of labor, work stock, and implements.

(b) Better utilization of crops. Live stock in connection with crops permits greater returns from the crops.

(c) More money-producing factors. There are more sources of income. Market fluctuations are not as important.

(d) Better farming practices as:

1. Crop rotation.
2. Maintenance of productivity.
3. Clean tillage.
4. Storage of moisture.
5. Reduction of loss from pests.

(e) Better use of labor. Steady employment brings about retention of better men. Good housing can be furnished if used steadily.

(f) Better use of by-products. Certain industries naturally go together to economic advantage, and thus permit proper utilization of by-products.

(g) Returns are usually quicker and more regular.

Advantages of Specialized Farming.—

(a) A start is usually possible with less capital.

(b) The products of specialized farming are more easily marketed, particularly in a community where specialization is carried to a high degree.

(c) The work is liable to less neglect, for it is not so confining nor exacting.

(d) Better equipping. The farmer who grows 50 acres of potatoes can afford to employ the best potato growing machinery; the farmer who grows 5 acres must do without the expensive implements, or employ them at a loss because the proportion of fixed charges incident to ownership, which must be borne by each acre, is so great that it will exceed the saving effected in using the machinery.

- (e) Less land is required.
- (f) Less equipment is required.
- (g) Less labor is needed.
- (h) More specialization and hence more expertness is possible in producing and caring for the given product.
- (i) There is less chance for undetected leaks.

Comparison of General and Specialized Farming.—The advantages when lined up against the disadvantages of diversification, as now advocated, show that the diversified type of farming generally offers more economical use of equipment, a better utilization of crops in that some can be fed to live stock, by-products in less danger of being wasted, safety in the increased number of money producing factors, and lastly, and most important, the chance for better farming methods to increase the crop producing power of the land by the use of crop rotation, incorporation of green manure crops, clean tillage, and elimination of pests. Mixed farming, as diversified farming is sometimes called, does, however, have some disadvantages when viewed in comparison with specialized farming. By specialized farming we mean those farms or ranches which obtain at least 50 per cent of their gross returns from one main product or industry. We, therefore, under this measure have specialized farms producing wheat or beans or sugar beets or alfalfa or poultry products or dairy products or, beef. Western farming tends toward specialization rather than to diversification: in eastern farming the reverse is perhaps true. Advocates of specialized farming point out that a minimum of land is required. That is, a man who would require 40 acres of good land to make a family living in diversified farming, can make as much from 20 acres of fruit, or even from 10 acres. That 5 acres will, in many sections, provide a family-sized poultry plant is a proven fact. Less equipment is needed for specialized farming. Better facilities are available for the handling and marketing of the product, because the specialized industries tend toward community centralization. Thus the selling end is helped out by the incoming of buyers attracted by offerings in wholesale quantities. Usually the work on a specialized farm is not so exacting in its requirements. The man who is raising nothing but grain will be busy during 3 or 4 months of preparing his land and in putting in his crop. From then on, with the exception of perhaps a rolling or a harrowing, he will be free until harvest. Harvest, hauling off, and marketing consume perhaps the greater part of but 2 or 3 months. If this grain grower puts in all the time needed, he can be busy but 7 months out of the year. In the same way the fruitman who specializes in one crop finds himself with considerable leisure on his hands.

Tendency Is Toward Specialized Farming.—Future studies may, to some extent, modify the findings of today as more investigation is given to farm management practices in the newer agricultural sections and to

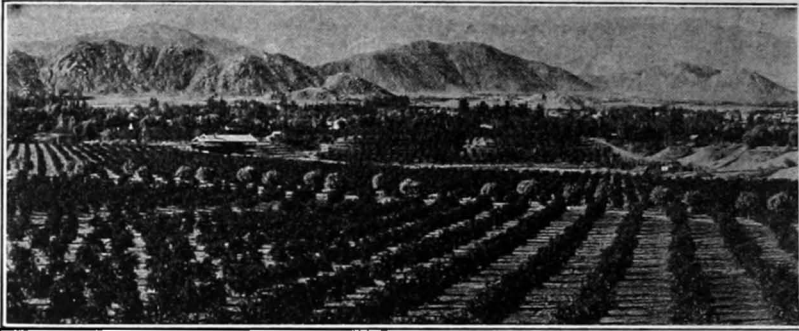


FIG. 20.—Citrus, Riverside, California.

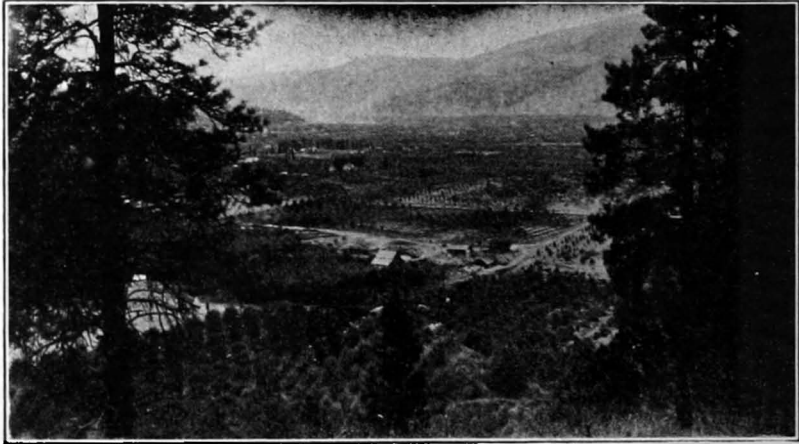


FIG. 21.—Apples, Wenatchee Valley, Washington.



FIG. 22.—Ohio apple orchard.

The fruit business—pleasant, profitable and intensive, but requires capital, time to develop, detailed knowledge of horticultural practices, and attention to proper handling and marketing of product.

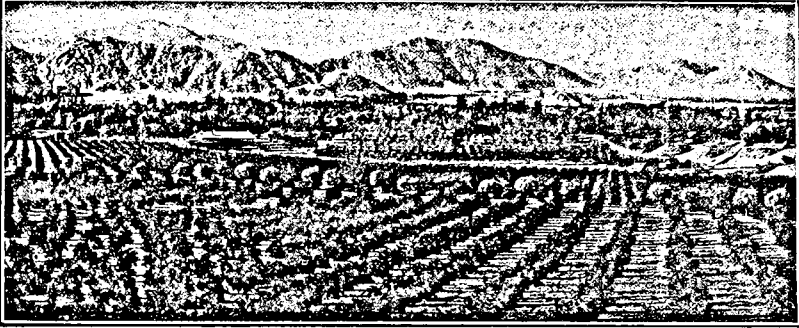


FIG. 20.—Citrus, Riverside, California.



FIG. 21.—Apples, Wenatchee Valley, Washington.

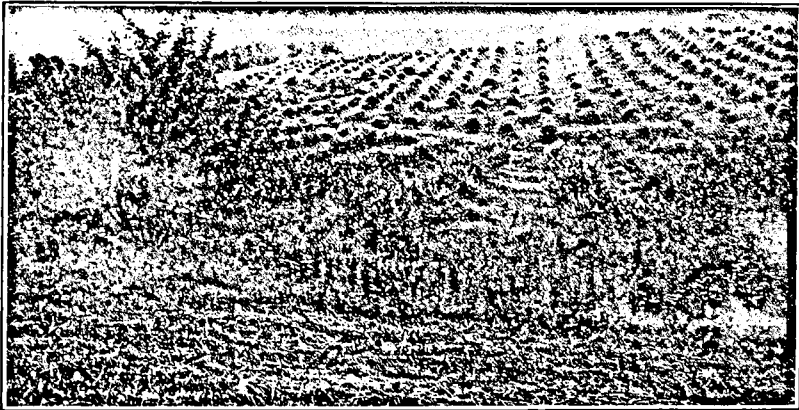


FIG. 22.—Ohio apple orchard.

The fruit business—pleasant, profitable and intensive, but requires capital, time to develop, detailed knowledge of horticultural practices, and attention to proper handling and marketing of product.

the farms specializing in single products. Diversity, as already pointed out, provides an opportunity to increase productivity, to keep labor constantly employed, and to have a variety of products to market. Even so, the present tendency of working farmers is towards more specialization with the attending greater concentration on producing and properly marketing one major product, with some escape in consequence from year-round routine, multiplicity of duties, and scattering of effort. It may not be too much to believe that future findings may show that there is a well defined place for specialized agriculture—poultry, fruit, dairy products, grain, hay, beef.

A recent modified conclusion published by the United States Department of Agriculture states that "Diversity of the farm business is, as a rule, an important factor of success in farming. A medium degree of diversity, sufficient to give good seasonal distribution of labor, complete utilization of land, and a considerable variety of sale products, is better than either extreme diversity or a low degree of diversity."

Survey Findings.—While this matter of diversification is before us we may well inquire into what Eastern investigations show in those sections where the agriculture is sufficiently old and established so that an equilibrium in practice has been obtained. Federal investigators have, by means of farm management surveys, made studies of the various factors affecting farm profits. Of 20 or 30 surveys made in different parts of the country, the results of which are now available, ranging in location from the cotton fields of the South, the cut-over land of Wisconsin, Minnesota, and Michigan, the rich corn-belt lands of Iowa, Indiana, and Illinois, the bluegrass region of Kentucky, the high altitudes of Utah with its irrigation farming, the reclaimed desert lands of Arizona, to surveys in Texas, New Hampshire, Oregon, Missouri, and Pennsylvania, there are two or three facts which are constantly emphasized. One of these is the effect of diversification upon farm incomes. The point is stressed time and time again, that diversification increases farm profits. For instance:

Haskell, reporting a Brooks County, Georgia survey, found that the matter of diversity was forcibly brought to the attention of the farmers of the South by the decline in the price of cotton following the outbreak of the European War. His findings as to the effect of diversification are: farms having an average of less than two major industries or crops received 15 per cent less return per year than farms having from two to four industries represented in the farm's activities. Farms having an average of over four showed 16 per cent greater return than those having the average of two to four.²⁶

A Pennsylvania survey reports its findings in dollars rather than in percentages, with "labor income" as the measure. Labor income is the amount of money left over at the end of the year, if there is any left over, to reimburse the operator for his time and labor. The sum is obtained, as used by farm management men, by deducting from the total receipts all expenses, including depreciation, interest on the investment at a fair rate, and the value of any labor of the family not covered under expenses.

Here, with farms averaging ninety acres in size, the labor income increased with diversification from an average of \$663 for 79 farms where but one or two major industries were being followed, to an average of \$888 for 125 farms having four to five important enterprises.⁷

A Nebraska study shows that diversification increased the labor income from \$105 for farms averaging but one to two industries to \$560 for those averaging five or more. Some adjustment should, however, be made for increase of acreage, as the group with the higher income averaged 213 acres as against 137 acres for the small income producing areas.

As against the trend toward specialization, Bradford Knapp, Chief, U.S.D.A. Office of Extension Work in the South, a keen observer of the influence of different factors in farming, offers seven objections to the one crop system:

First.—Because the system depends upon market and crop conditions of the one crop alone. Failure of crop and failure of market alike bring serious disaster.

Second.—Because it does not provide for the maintenance of productivity.

Third.—Because it fails to provide for a sufficient live stock industry to consume the waste products of the farm and make its waste lands productive.

Fourth.—Because it does not provide for a system of farm management under which labor, teams, and tools may be used to the fullest advantage.

Fifth.—Because it brings return in cash but once a year instead of turning the money over more than once a year.

Sixth.—Because it does not produce the necessary foods to supply the people upon the farm and keep them in health and strength.

Seventh.—It limits knowledge, narrows citizenship, and does not foster home building, but does encourage commercial farming.

General Farming More Exactng.—The best farm manager is he who is able to manage successfully a mixed farming proposition. This provides a real test of his capabilities—organization of work and men, crop planning, utilization of crops, and knowledge of crop and stock requirements.

General Farming for Beginners.—Diversity in farming operations is, moreover, a good thing for the beginner in agriculture or for the newcomer who may be unfamiliar with local methods. If there are several major activities comprising the farm business, the chances of some of them returning a profit is sufficient insurance over the dangers of the one crop or one industry method to deserve careful consideration.

On the other hand, diversification does not help all farmers.

CHAPTER IV

SELECTING THE FARM

In choosing a farm one has the following options: (1) Buying a farm with the intention of operating it as his entire business; (2) buying a small farm and renting enough additional land to meet his needs; (3) renting a farm either on a share or on a cash basis.

When to Rent.—If one has only a small amount of capital and wishes to undertake farming as a business from which to derive one's entire income, he should, in nearly all cases, begin as a renter. However, if he wishes to buy a farm on which to live, deriving a part of his income from other sources, then perhaps purchasing is desirable, even though capital is limited.

Again, in many cases if one is able to purchase a small farm it is possible to develop this as a basis of operations and rent additional land in the neighborhood. This is not an altogether desirable method of operation, as one can never be sure of suitable lands being available. It is an expedient, however, that enables one to operate a much larger business than he could otherwise with the amount of capital he has, and at the same time have a home which he can call his own.

Selecting the Right Land.—The basic essentials are selection of the right land for the given operator, with his given limitations and qualifications, and acquisition of this land at the right price. The "colonies" of the west are full of sad misfits as between the farmer, his land, and its price. Quite apart from the men who should never have turned to farming under any consideration, because of mental or physical unfitness, the observer finds numberless cases of natural grain or stock land forced into fruit or beans or alfalfa, and of land best suited to fruit required to produce hops or cotton. The extremes may be too large or too small; 20 acres is not enough for diversified farming on most colonies, 40 acres is almost never sufficient for sole grain farming, while on the other hand 100 acres in fruit may prove unwieldy, or a square mile of grain too much for the capital or working equipment available.

Prices Sometimes Too High.—Land at too high a price is common. Its purchase price may be far out of proportion to its income-producing power, or the fault may be in excessively high yearly installments. Some land is cheaper at an initial cost of \$300 if payments may be extended over a 20-year period than the same land at \$200 if the full sum must be liquidated in 5 years.

Some colonies have spent too much in developing and equipping. Concrete lined canals, concrete power poles, high-cost grading and leveling, expensive fences and buildings, have in a number of subdivisions run to too great a per-acre figure. Land worth, with improvements, \$100, cannot instantly be put on the market at \$150 merely on the strength of unusual equipment.

Overhead in subdivision has in many instances made the price top-heavy. Overhead as used here means interest, legal expenses, and selling expenses, including advertising and profit. Land bought wholesale at \$200 an acre—its market value—and retailed at \$600, or even at \$300 with no improvements other than promises and surveying, can impose a burden too heavy for the actual settler. Stony land at \$700 to be planted to citrus fruit which will not come in for 8 years, the land itself being incapable of intercropping, will not pay living and operating costs, to say nothing of meeting terms of \$100 per year and interest at 8 per cent on deferred payments.

Choice of Farm a Personal Matter.—The choice of a farm as to climate and kind of farming to be followed, is largely, as we have already shown, a personal matter. One may prefer the kind of farming that is carried on in a northern state, another may like the climate of a southern state. Again, a man may have personal reasons for taking up dairy farming, or fruit farming, or some other type.

Turning to Established Sections.—If one has a preference for a particular type of farming, it is a general proposition that he should go where that type is well developed, since such development in itself is proof that conditions for the business are generally favorable. Embarking on an entirely new type of farming in a region where it has not been before followed is an exceedingly hazardous undertaking. Sometimes it is successful, but the chances are that there are very good reasons why such a type of farming is not found in that region. One man intensely interested in a special type of farming might make a success of it in a comparatively unfavorable region through great care and skilled management, while another less experienced or less competent in the same type of farming would almost certainly fail.

Finding the Farm.—In going about the selection of a farm two ways are open. The prospective buyer may work up a clear mental conception of what he wants and then set out to seek it. Or he may look over the available sections and farms and determine what is best suited to his needs and pocketbook. Both ways have advantages, although there may be no such ideal place as that envisaged by the first plan. Probably an intermediate course is best—to have in mind a clear conception of what is wanted in the way of climate, soil, neighbors, water, etc. and still be willing to consider all those available.

FACTORS TO CONSIDER WHEN SELECTING A FARM

A list of items which are usually considered in choosing a farm may serve as a guide. Other items will occur to those who have had buying experience; to the inexperienced this list may be helpful in pointing out what to look for. The various factors may be classed as (a) personal, (b) earning capacity, and (c) financial.

In detail these cover such things as:

Personal.—Under personal considerations, items should be listed affecting the comfort, health, and welfare of the operator and his family. These items fall into several well defined groups, as:

Climate: pleasant or unfavorable for a part or all of the year; necessity of going away during a portion of the year; too glaring hot in summer; too cold in winter; degree of humidity; amount of fog; intensity and frequency of hot or cold winds; number of hot nights; frequency and intensity of rainfall.

Physical conditions of community: dust, mud, swamp, sand, rocks; open, long, flat stretches of treeless plains; forest covered mountain ranges; too high or too low an altitude; too far from or too near the ocean.

Social facilities of community: accessibility and character of schools, churches, libraries, theaters, stores, doctors, hospitals, banks, transportation facilities.

Isolation of farm: distance from neighbors; impassability of roads at certain seasons of the year; influx of summer visitors.

Opportunities: for social life, hunting, fishing, automobiling, self-improvement and pleasure.

Neighbors and community: nationalities of residents and settlers, sociability, assimilability, progressiveness.

Healthfulness and comfort: as for example, presence of or freedom from malaria, mosquitoes, hay fever, rheumatism.

Farmstead: possibility of establishing a real home; conveniences like piped water, heating system, comfortable kitchen, screened porches, shade, opportunity to grow flowers, shrubs, lawns, fruit trees, vegetables, etc.

Drinking water: amount; character as to alkali, sulphur, etc; freedom from barnyard, cesspool, or other contamination; palatability.

These are enough to show the wide scope attending such inquiry and something of the sort of items to be considered.

Earning Capacity.—Items affecting personal welfare determine how far a community and a farm therein can meet a family's home standards. Items affecting the earning capacity are fully as important, since upon them may depend not alone the desirability of acquiring the property but the future ability to support both home and business.

Of the many items affecting the earning capacity of a farm, that of the crop producing power of the land stands first in importance. The

yield of crops determines the amount of product that can be disposed of: crops—field, fruit, truck; stock—beef, sheep, hogs, horses, poultry, breeding stock; stock products—milk, eggs, honey, wool, manure; crop products—fuel, fruit cuttings, fruit buds, sirup. Therefore, careful weighing of the factors affecting the crop producing power is paramount.

Physical Factors¹¹

Such items are to be considered as climate, soil, shape or boundary outline, topography, water, frosts, hail, thunder storms, disease, pests, etc. A few of these and similar items are examined below in some detail.

The Shape of the Farm.—The shape of the farm necessitates consideration wherever farm boundaries are irregular and follow no geometrical design. In buying a farm with a view to practicing general farming, shape must be reckoned with in order to determine the feasibility of dividing the land into fields of proper size, easily accessible from the farm buildings.

Less attention is needed when land is sold by sections or fractions of sections, since the farm is then generally of rectangular shape, well suited to subdivision into fields and to economical handling.

Farm Arrangement.—In choosing a farm one can seldom find the ideal arrangement of buildings and fields, and a farm which may be very desirable in many other particulars may be undesirable in this respect. In the eastern states the buildings and fields were laid out and arranged in the days when labor was comparatively cheap and there was little thought of saving it. At present the saving of labor is a most important factor, and the arrangement of a farm may be such that much time is lost because of irregularity in the shape of fields, or because important fields are far from the buildings. The latter fault sometimes can not be remedied. In the eastern states three factors have determined, more or less, the location of the buildings: (1) The water supply, (2) the roads, and (3) the area of good arable land nearby. In regions where spring water is generally used the buildings were invariably placed so that the water could be piped or carried to them. Thus water supply had a greater weight in determining the location of the buildings than ease of reaching the fields or the highway. It is not uncommon to find the best fields distant from the farm buildings, or to find the buildings far removed from the highway, matters that depreciate very materially the value of the farm.

Again, the arrangement of the buildings themselves, as regards ease in doing chores or other work about them, is important. Often the buildings were planned for one type of farming, since discontinued, so that the remaining structures are no longer best suited to the particular kind of farming now practiced. Frequently, however, alterations can be made which will improve the arrangement in many respects.

Topography.—By topography is meant the general lay of the land. The prevailing slope, its direction and rate, and the presence of ravines, canyons and hills, are considered under topography.

Low or sheltered lands may be unsuited to certain fruits because of their tendency to late spring frosts; hillsides may be too steep for the economical use of implements, while loss by washing or leaching of soil may be serious. Certain exposures are best suited to the production of certain kinds of fruit. Where irrigation is to be practiced proper consideration of the topography is important, since opportunity to develop a water supply and to handle the irrigation of the fields is largely determined by their topography.

If irrigation water must be pumped, a good deal of time can be profitably spent in investigating the possibilities of a constant, ample supply from moderately deep wells. Study of contour maps, neighboring wells, and log books of local well borers, will go far towards settling irrigation questions for fairly small acreages not too far removed from the wells in question and having similar conditions of soil and subsoil.

Consideration of topography is necessary to determine the possibility of bringing about proper draining and satisfactory disposing of waste water.

Where authentic maps are not available showing the contour lines of any farm under consideration, one should be made and studied, to determine the chances of economical irrigation or drainage.

Soil Quality.—The quality of soil on a farm is its most valuable asset. Upon soil quality depend to a large extent the yields of crops and the period during which such yields will continue.

Much stress is laid by agricultural advisors upon how to determine soil quality, but my experience leads me to conclude that a correct knowledge of how to tell land that is rich from that which is not, or to know the land which is out of condition because of neglect or wrong handling, can be best obtained in the school of experience. The actual handling and observation of different soils under various conditions is the surest—perhaps the only—way to learn how to tell a good soil from a poor one, since productivity as shown by crop yields is the real meaning of soil quality. If one hasn't had this training it is very desirable to call in some one for consultation who can help to a decision. Use may be made of chemical and mechanical tests, and of examination of the plants that are natural to the land. However, as a result of thousands of analyses of the partial soil analysis type the conclusion is generally held that there is no relation between such analyses and productivity. On the other hand, there is evidence to show that complete analyses do show some relation to productivity.

Physical Properties.—Study of physical properties of the soil is essential, particularly where crops are to be raised under irrigation

methods. For this purpose the soil auger and the local well borer's log books should be consulted. Information concerning presence of hardpan, stiff plow pans, gravel streaks, bed rock, presence of layers of adobe or stiff clay, and the like, is necessary for a proper knowledge of the possibilities of any ranch. So, too, presence of brush, wild trees, rocks, alkali, and waste land must be taken fully into account. On waste land, study of soil character is important. Adobes and heavy clays cost more to work, are not easy to handle, and will not permit working except within narrow limits of moisture content. In general, however, one should bear in mind that soils difficult to work are more productive than those easily tilled. As a rule, for most crops the loamy soils are best. They work easily under fairly wide limits of moisture, and are commonly so rich that they permit of growing a wide variety of crops. The order of productivity is generally clay loams, silt loams, loams, clays, silts, fine sands, coarse sands, gravels. In color it follows in order of black, brown, red, yellow, gray, white.

Healthfulness.—The farm should be in a healthful location. What is wholesome for one man may not be for another. Dry, intense heat impairs the energy of some men; cold, snowy winters are a hardship for others; while malaria, alkali water, strong winds, and fogs, present barriers to still others.

Improvements.—Buildings, shade, fences, ditches, land leveling, orchards, vineyards, and similar improvements, all add to the value of the farm.

The buyer, however, should be cautious to see that the character of the buildings is not in excess of their real value—that is, for producing interest on the invested capital. Money is made from the land, not from the buildings—the latter serve merely to economize the gains from the soil.

Water Supply for Family and Live Stock.—An assured supply of good water for domestic and live stock purposes constitutes a very obvious necessity. The experienced farmer knows that a farm without an adequate supply of water is most undesirable. In buying or leasing he is likely to direct his attention, first of all, to the quality of the water, then to the question of whether the supply is dependable at all seasons of the year, and to the cost of obtaining. The cost of upkeep of water supply on a farm is often a big item. Except in regions where there is an abundant supply of spring water, it usually costs more per unit of measure on a farm than in a city. If live stock farming is carried on, special attention should be given to the dependability of the water during hot, dry months and also during the winter months. It is difficult to obtain water from streams or to drive cattle long distances during severely cold weather. Water in the various pastures sufficient for the live stock is always a valuable asset.

Ease and Cost of Upkeep.—Ease and cost of upkeep refers to the time, energy, money, and material required for the maintenance of structures, equipment, and work stock and of drainage, irrigation, and reclamation systems and facilities.

Markets.—Markets are of such importance in determining the selection of a ranch that the available ones, both local and general, should be investigated thoroughly. Profits depend almost wholly upon the possibility of satisfactory marketing, especially when perishable goods are produced. In this relation such details demand observation as length of haul to marketing or shipping point, condition of roads, marketing facilities at terminals, demand for products, prices obtainable, and terms of settlement locally customary.

Waste Lands.¹²—Land values are directly influenced by the proportion of total area which can be made productive. If comparison be made of a farm of 100 acres at \$200 per acre, having 95 acres in shape to yield available products, with another of the same acreage at \$150 per acre, having 65 acres productive (all other features of these two farms being similar), the former should prove more profitable, as the productive land thereon costs but \$210 per acre as against \$230 per acre for the "cheaper" farm. The table below shows the cost per acre of the productive land on 100-acre farms costing \$100 per acre, with various percentages of the land available for productive purposes. It is not always the farm that costs the least per acre that is the most economical to buy or operate.

TABLE 8.—RELATION BETWEEN PERCENTAGE OF LAND AVAILABLE FOR PRODUCTION AND COST PER ACRE (VALUE OF LAND, \$100 PER ACRE)

Percentage of land available for production	Cost per acre of available land
100	\$100.00
90	111.11
80	125.00
70	142.86
60	166.67
50	200.00
40	250.00
30	333.33
20	500.00
10	1,000.00

Productive Land.—Broadly speaking, productive farm land is that used for:

- Production of crops.
- Economic pasturing of animals.

Woodland yielding marketable timber or firewood, maple sugar, or other salable forest products.

Nonproductive Land.—Nonproductive farm areas may be roughly classified as follows:

Wasted.—Land unnecessarily taken up by farm buildings and lots.

Land taken up by unnecessary lanes and roads.

The part of any public road included in a farm area.

Land occupied unnecessarily by fence rows, open ditches, headlands, or turning spaces bordering fields and terraces.

Waste.—Land rendered untillable by swamps, boulders and ledges, ravines, steep slopes, sloughs, streams, etc.

Woodland not yielding salable products

Partly waste pasture land.

All land necessarily occupied by farm buildings, fences, etc., is essential to the development and management of the rest of the farm; hence, "nonproductive land" may be taken to mean only such land as is either left untilled by inefficient management or is not susceptible of profitable improvement. The land taken out of the farm total by these nonproductive areas is in many cases a large proportion of the whole. Such waste or wasted areas should be carefully considered by the prospective buyer of a farm.

Percentage of Improved Land in U. S.—Table 9 shows the average percentages of improved land on farms in the states and divisions of the United States. The difference between improved land and productive land should be noted in this connection, as the terms are not wholly synonymous. Unimproved land, such as good timber land, sugar groves, etc., may be productive; while improved land, such as is occupied by the farm buildings, fences, and roads, may produce nothing.

There are other causes of nonproductivity, such as large areas of alkali, little or no rainfall, etc., but these causes affect whole regions rather than parts of individual farms and are not considered here.

Effect of Highways on Acreage.—Not infrequently a part of the area of the public highway touching the farm is included in the total farm area. This is a fixed practice in certain regions. In determining the value of a farm, consideration should be given to the area of highways included in the acreage, so that the farm can be judged by its actual available area and not by that called for by the deed measurements.

Permanent and Temporary Waste.—Areas found on some farms are permanently untillable by reason of the presence of rocky ledges, steep slopes, deep ravines, wide stream areas, or undrainable swamps. Permanently untillable areas can be made productive by pasturage if they will grow enough grass to make it economy to pasture them, or they can sometimes be given over to the production of timber.

SELECTING THE FARM

TABLE 9.—PERCENTAGE OF IMPROVED FARM LAND, BY DIVISIONS AND STATES, CENSUS OF 1910

Division and State	Improved land	Division and State	Improved land
New England:	Per cent	West North Central:	Per cent
Maine.....	37.5	Minnesota.....	71.0
New Hampshire.....	28.6	Iowa.....	86.9
Vermont.....	35.0	Missouri.....	71.1
Massachusetts.....	40.5	North Dakota.....	72.0
Rhode Island.....	40.2	South Dakota.....	60.8
Connecticut.....	45.2	Nebraska.....	63.1
Middle Atlantic:		Kansas.....	68.9
New York.....	67.4	South Atlantic:	
New Jersey.....	70.1	Delaware.....	68.7
Pennsylvania.....	68.2	Maryland.....	66.3
East North Central:		District of Columbia....	84.7
Ohio.....	79.8	Virginia.....	50.6
Indiana.....	79.5	West Virginia.....	55.1
Illinois.....	86.2	North Carolina.....	39.3
Michigan.....	67.8	South Carolina.....	45.1
Wisconsin.....	56.5	Georgia.....	45.6
East South Central:		Florida.....	34.4
Kentucky.....	64.7	Mountain:	
Tennessee.....	54.3	Montana.....	26.9
Alabama.....	46.8	Idaho.....	52.6
Mississippi.....	48.5	Wyoming.....	14.7
West South Central:		Colorado.....	31.8
Arkansas.....	46.4	New Mexico.....	13.0
Louisiana.....	50.5	Arizona.....	28.1
Oklahoma.....	60.8	Utah.....	40.3
Texas.....	24.3	Nevada.....	27.7
		Pacific:	
		Washington.....	54.4
		Oregon.....	36.6
		California.....	40.8

Other areas, broken by stumps, brush, large boulders, gullies, swales, etc., can be reclaimed by resort to proper methods. In valuing such areas the probable cost of bringing under the plow should be carefully compared with the market value of good arable land in the neighborhood.

Woodland.—Woodland is ordinarily productive land, but often farm wood lots producing only firewood for home consumption are maintained under uneconomic conditions. The more valuable the land, the more likely this is to be the case. Where timber occupies high-priced land which would be tillable if cleared, it is often questionable whether it is economic to allow it to remain. The cost of clearing, salable value of timber products, interest on the investment, prospective increased farm value of the land when cleared, and added annual expense for firewood,

must be weighed carefully before a decision can be reached in any such case.

Poor Pasture.—Land given over to use as pasture which will not support sufficient stock to make any reasonable return on the investment properly belongs in the category of nonproductive land.

Relation of Use to Price.—It should be borne in mind that the quality of the production in relation to the land value is an important consideration in choosing a farm. For instance, what is economic pasture on land that is worth \$10 per acre might, on land valued at \$100 per acre, be decidedly uneconomic. This relation should be carefully studied in buying a farm with much pasture land. To determine whether pasture land is economic or not, practical data should be secured as to the number of acres necessary to support one head of stock and the interest on the value of the land in question compared with the current charge per head of the same kind of stock for a season's pasturage. Or the estimated value of the return in increased value of the stock or its products may be used for comparison. By this means the relative economy of pastures may be determined. Similar reasoning applies to all crops.

Labor, Social, and Financial Factors

Of almost equal weight with physical conditions as determining crop producing powers are the following:

Labor.—Amount, character, availability, cost (including wages, board, lodging and supervision).

Neighbors.—The community should be a congenial one. The associations of country life to the man who is adapted to fit in and to enjoy the friendship of outdoor people constitute one of the big rewards of farming. And indirectly these associations may even affect the profitableness of a given venture. If a newcomer, be sure the community is favorable to strangers and will give them a fair deal. There are sections where newcomers find not only cold shoulders but actual hostility or, what is worse, trickiness, as in the case of the beginner who attempts to raise sheep in a cattle country hostile to sheep. Some communities show well defined opposition to certain nationalities and races.

Financial.—The financial side of choosing a farm is concerned with the amount of money and its availability either immediately or in the future for the purchase of the property, after taking into account the reserving of necessary sums to insure eventual discharge of other obligations and to meet personal needs and operating requirements. The sum available must be determined from the standpoint of individual command of capital—cash, credit, and probable earnings—either immediately at hand or subsequently forthcoming.

A few items will serve to illustrate the scope of the financial inquiry as it concerns the purchase:

Amount and availability of capital as cash, local credit, loans (local, state, federal, personal), legacies, liquidation of life insurance policies (either immediately usable or susceptible of later use), terms of purchase (all cash or part down and balance payable in installments), interest rate on deferred payment.

Possible returns: if any returns can be diverted towards meeting the purchase price these may well be included. Such sources as receipts from sale of products or payments for outside work of teams, equipment, or personal service, may be partly available for applying against the purchase price.

Once the proposed plan takes shape it should be tested in accordance with some such outline as that given immediately below.

FINANCIAL TEST FOR PROPOSED FARM PROPOSITION

Briefly, a test of any proposed plan involves two steps:

(a) The cost to establish.

(b) The profitableness of the plan when in full running order.

A fully defined plan of procedure must precede actual inquiry into the financial side. The following suggestions will provide a starting point and indicate something of the scope of a desirable inquiry.

Description of the Property

1. Work up a complete description of the farm or plan under consideration, stating in as definite terms as possible the acreage, soil types, water, climatic, transportation, and marketing conditions, neighbors, proposed industries to be followed, acreages of crops and numbers of animals to be kept, methods of growing and feeding, and similar data. The plan should be well rounded out by careful attention to crop and animal needs as well as to the desires of the operator.

Profitable use may be made of U. S. D. A. "Soil Surveys," U. S. G. S. "Water Supply Papers" and topographical maps.
Local descriptive matter.

Cost to Establish

2. List all equipment needs.
Equipment needs cover a careful determination of land, buildings (individually determined as to number, kind, size, and detail of construction), work stock, other live stock, trees, landscape plantings, harness, implements, machinery, tools, shop material, special equipment, (as dairy house, fruit equipment, fences, bridges, irrigating plant, ditch boxes, furniture).
3. Determine total of all equipment costs.
Careful calculations of the costs of all equipment listed in paragraph 2 from present day catalogs of supply houses, lumber concerns, live stock dealers, and similar sources. Labor costs of construction to be included.
4. Estimate length of period which must elapse from time of taking hold until the business is in full running order, prorating this period according to normal divisions of work.

5. Make up carefully prepared table of operating costs to show for each period, as per paragraph 3, the items of expense to be met, and the amount, less any possible income. If money is borrowed or interest on investment is demanded, compound annually at the prevailing or demanded rates.
6. Calculate the total investment including operating costs to establish.

Testing the Business When Fully Established

7. Determine for the business in mind the gross receipts to be obtained when the business is in full running order.

Receipts should be based on intelligent estimates of the amount of production possible, based on an average covering a period of years, and on average prices under normal circumstances for the special conditions pertaining to the particular farm or plan in mind.

Specially good sources of information as to yields for a particular ranch are:

- Horticultural commissioners for fruit, commission men for field crops.
- Buyers.
- Packing houses and canneries.
- Warehouses.
- Farm books.

8. Determine all operating expenses to be met.

Calculations of operating expense should cover labor—horse and man, feed, sacks, twine, boxes, lumber, seed, fertilizer, water, power, fuel, office expense, foreman's wages, taxes, insurance, replacement of stock, rent of extra machinery, cost of marketing, cost of contract work (*e.g.*, threshing and baling), living expenses of operator, incidentals like axle grease, minor repairs, etc.

9. Compare requirements and receipts.

A final test may now be made to find out what the business is capable of doing. For instance, as an investment comparable with commercial businesses the farm would be expected to return a sum sufficient to pay all operating expenses, interest at the prevailing rate obtainable by the operator for the moneys invested, a sinking fund for emergencies, a fair rate to cover depreciation, wherever such occurs, and a just rate for supervision.

10. If the obligations are in advance of the receipts an analysis should be made to determine the cause. An explanation may be found in too high an original land cost, too expensive building equipment, too small an acreage to meet the demands made upon it, too expensive or too elaborate equipment, too high a rate of interest demanded, too large a factor of safety in the way of a sinking fund, too heavy a managerial charge, too fancy feeding of the stock, too much expenditure on growing crops, too low a yield for the expense; or in a wrong choice of industry for the land involved, or in some error in judgment, information, or management.

Inherent Possibilities.—In studying the earning capacity of a given property attention should be directed not alone to the existing output but to the inherent possibilities. A well-founded ability to foresee undeveloped earning capacities has made many a farm fortune. The prospects of future development may cause a revision of original estimates of value.

As illustrations of inherent possibilities note the increased value of reclaimed delta lands, which has risen seven-fold after levees have been built, the land cleared, and pumping plants installed; or the value increase in former grain lands—which when planted to orchard have risen four- to eight-fold; the increase in land values resulting from high prices for farm products and the attending greater demand—from two- to six-fold increase; the increase in output by putting in dairy cows or hogs where no stock was previously handled; the increase in crop output where intelligent fertilizing, green manuring, crop rotation, seed selection have been initiated; the increase where buildings have been repaired, painted, sometimes altered and provided with a pleasing landscape setting. Installation of irrigation on dry farmed areas; reduction of operating costs by substituting machine for hand labor; putting up of a creamery or drier the better to utilize the output; direct selling instead of through ordinary commercial channels; feeding of hay and grain to stock instead of selling direct; better control of insect, fungus, weed, and rodent troubles, all these furnish good illustrations.

To sense such opportunities and to realize fully upon them are good tests of one's business judgment and ability.

Influence of Rise in Land Prices.—Rapid rise in capital value of farm lands has taken place in this country during the last 20 years, and no one can predict with certainty the probable course of values in the future. The buyer of a farm, however, should look carefully into the history of the development of the region with a view to determining whether present values have been brought about by speculation in lands or whether they are attributable to the inherent good qualities of the land and the proximity to markets. He should also note those features which might affect its value in the future, such as the possibility of new railroads, of improvement of existing highways, of the development of near-by markets, of increase or decrease in demand for the particular products produced in that region, etc.

Elements of the Successful Farm.—In sum, to achieve success in an ordinary farming venture it is almost essential to have these advantages:

1. Opportunity for a paying size or volume of business.
2. A type of soil or kind of live stock that will yield returns that more than cover the cost of production.
3. Suitable conditions, both as to natural resources and environment and as to markets, to permit the development of a dependable organization of diversified activities.¹³

Relative Value a Personal Matter.—The relative importance of these various items—personal, physical, financial—is a matter for individual calculation. Each should, however, be carefully sized up and its importance weighed, and then it should be either discarded or included in part or as a whole, according to the idea of the investigator.

It is easy to acquire a poor farm; it is much harder to dispose of one. It is hard to acquire a good farm; it is very easy to dispose of one.

When the farming plan calls for the obtaining of property by outright purchase or under lease, need arises for very careful consideration

of the relative value of different factors. The relative importance of the different items varies, as already suggested, with the individual. Varying values will be ascribed to such factors as the kind of dwelling on the place; the heat of summer or the cold of winter; distance from town, schoolhouse, church, or library; nationality of the community, presence of shade trees. In times of agricultural prosperity the offerings need special scanning as the desire or need of parting with farm lands is at a minimum. In hard times the numerous possibilities require care in determining the extent of income possible.

Test Questions.—In attempting to reach a decision concerning a given property, securing of correct answers to the following questions will aid in reaching a final conclusion. Other questions will suggest themselves to the investigator.

What annual income do I require to cover personal needs?

How much capital—cash or credit—can I command?

What net incomes have been derived annually from this property in the last 5 years?

What ways are there for me to increase the net income?

How much capital do I need to obtain the property and to finance the farming of it in all phases while taking care of personal monetary needs?

Is this a business I want to follow?

Does the environment satisfy as to climate, neighbors, roads, nearness to towns, schools, churches, and the like?

Will the proposition fulfill my social desires?

Have I the required experience and training to succeed with this?

Have I the physical strength?

Have I the courage?

Can I successfully obtain any additional help needed?

(The use of the personal pronoun in the above should be changed to "family and me" for a married man.)

Test questions such as these will tend to clear thinking and sound decisions. There are many types of farm businesses and many kinds of country, so that if the answers do not warrant the taking of the first proposition in the first locality, the search may continue until a satisfactory combination of test answers be obtained. A study of rain fall, crop producing conditions, soils, topography, equipment, etc., precedes interrogation of one's self.

Size of the Farm

In connection with earning capacity and capital needs, the size of the farm is vital.

The "Minimum Efficient Unit."—The "minimum efficient unit" in agriculture is a farm of sufficient size and so organized as to give full employment at productive labor to the farm family. The farm may be

any amount larger than this, provided the operator has sufficient managerial ability to make the larger business efficient, but there are very distinct disadvantages if the farm business is smaller than the most efficient unit. When such is the case the farm family does not have an opportunity to exert its full earning power.

Minimum Efficient Unit Relatively Small.—The fact that the minimum efficient unit in farming is relatively very small as compared with most other industries is the most attractive feature of farming as a business. Because of the small size of this unit, economic independence is fairly easy of accomplishment, and many prefer independence with a small competence to dependence with a very small chance of pronounced success.

Ideal Size.—The ideal size of farm is somewhat larger than the minimum efficient unit. It is such as to permit a high standard of living and the education of the farm children.

Farms in the North Atlantic States are mostly small in area. In increasing the farm business on these small farms to meet the competition with larger farms in the West, the line of least resistance was represented by the development of more intensive farming rather than by extension of acreage, though examples of both methods of enlarging the business are frequently found. It requires somewhat greater ability on the part of the farmer to conduct an intensive business on a small area than is required for a more extensive business of similar magnitude on a larger area. Hence, a large proportion of eastern farmers each with small area of land at his disposal has not been as successful as might be wished in developing a business of suitable magnitude. There are very many eastern farms that are far too small for satisfactory results.

Just the opposite condition is found in the corn belt. There magnitude of business is obtained by extent of acreage, and large farms are the rule, small ones the exception.

Acreage Required to Produce Given Income.—A comparison of cost of production and receipts will give a rough guide as to the probable returns per acre, when determined from local conditions and applied to a given farm. Suppose one's purpose is to secure \$3,000 net income per year. It is evident that he must have sufficient acreage of land so that the per acre profits for his industry will figure up to the sum desired.

How to Determine Size of Farm to Produce a Given Income.—Under California conditions, the income above operating expenses for selected crops is as shown in the table immediately below. The acreage necessary to provide \$3,000 above operating expenses is therefore as indicated in the last column.

TABLE 10.—ILLUSTRATING SIZE OF FARM TO PRODUCE A GIVEN INCOME ABOVE OPERATING EXPENSE

Crop	Yield	Income per acre above operating expenses	Number of acres to produce \$3,000 above operating expense
Barley.....	Good	\$ 16	188
Alfalfa.....	Good	36	84
Raisin grapes.....	Good	61	50
Lemon.....	Good	292	11
Peach (canning).....	Best	210	14
Potatoes.....	Good	167	18

Influence of Productivity upon Income.—In making similar studies for a given proposition, care must be used to see that the data are applicable and the calculations correct. Otherwise disappointment may follow.

Example of Influence of Productivity upon Income.—The next table shows the variation in number of acres required to produce a given income where yields are variable. It is evident in each case that it will not be safe to provide land based on good yields, if only usual yields are possible. On the other hand, the lesser acreage of good land, if available, might be financed where the greater acreage of land of usual producing capacity could not be handled.

TABLE 11.—ILLUSTRATING INFLUENCE OF PRODUCTIVITY IN DETERMINING ACREAGE TO PROVIDE A GIVEN INCOME

Crop	Yield	Income per acre above operating expenses	Number of acres to produce \$3,000 income above operating expenses
Barley.....	Usual	\$ 6	500
Barley.....	Good	16	188
Barley.....	Best	39	77
Alfalfa.....	Usual	\$ 17	177
Alfalfa.....	Good	36	84
Alfalfa.....	Best	56	54
Lemon.....	Usual	\$142	21
Lemon.....	Good	292	11
Lemon.....	Best	742	4

Findings from Surveys Concerning Size of Farm to Provide a Given Labor Income

TABLE 12.—SIZE OF FARMS PROVIDING LABOR INCOMES OF FROM \$500 TO \$700 (FROM SURVEY DATA)

Key No.* and location	Type of agriculture	Labor incomes for farms grouped according to size	
		Size in acres	Labor income
2. Utah.....	Beets and fruit.....	42	\$589
	Grain and live stock.....	73	620
4. Pennsylvania.....	General and dairy.....	52	550
5. Indiana and Michigan.....	Celery, onions, peppermint, stock and grain.....	18	503
7. Georgia.....	Cotton, grain and stock.....	101 to 150	636
9. Utah.....	Fruit and beets.....	77	598
10. Montana.....	Stock and grain.....	96 to 125	617
	Grain and fruit.....	65 to 95	598
12. Georgia.....	General field crops as cotton, oats, sugar beets and corn.....	over 250	512
14. Southern Arizona.....	Dairying.....	40	578
17. Oregon.....	General farming.....	121	689
19. Southern Kentucky.....	Wheat, tobacco, livestock and general farming.....	89	559
20. New York.....	General farming and dairying....	177	635
23. New York.....	Dairying.....	126	568
24. Missouri.....	Corn, wheat, and other field crops	121 to 200	525
25. Montana.....	Stock and grain.....	240	558
26. Eastern Nebraska.....	Stock and grain.....	237	684
27. Southeastern Minnesota.....	Stock and grain.....	301 to 350	551
28. Utah.....	Stock, grain, and forage crops....	70 to 99	672
29. New Jersey.....	General farming.....	87	721
	Dairying.....	30	659
30. New Jersey.....	Potatoes.....	64	702

*The key number corresponds to the same number in the list of farm management surveys described in Chap. 27.

Size of Farms to Provide Labor Incomes of \$500 to \$700.—The influence of the size of farms as a measure of the magnitude of the business indicates that there is a limit below which it is not profitable to go. What this limit may be is largely a personal matter since the size of necessary income to meet all needs varies with such things as nationality, size of family, ages of members, early environment, training, and working capacity. If the findings of selected surveys are grouped by acreages and those arbitrarily selected that show the acreage for an average labor income of from \$500 to \$700, the foregoing table is obtained. It should be borne in mind that the use of home grown products, house rent, etc., are additions to the labor income, while interest on the investment is available for the use of the family. The idea here is to show something of the acreage needed to provide a given farm income, rather than to discuss what constitutes a figure to provide decent living conditions.

Other Examples of Sizes.—McNair¹⁴ found that for farms in Arkansas, family farms are from 28 to 38 acres, the acreage varying with such factors as type of farming, crop yields, soil types, and size of family.

Levi Chubbuck of the United States Department of Agriculture (Office of Farm Management) in studying 100 citrus groves in southern California, found that by grouping them according to size, the majority ranged from 10 to 20 acres in extent, thus:

TABLE 13.—SIZE OF CALIFORNIA CITRUS GROVES

LIMIT, RANGE IN SIZE, ACRES	NUMBER OF GROVES
5-10	24
10-20	58
20-30	12
30-40	3
40-50	3

Cory¹⁵ states that a 40-acre unit, of the usual federal irrigated reclamation district, intelligently cultivated, can be cared for by the owner and his family, while an 80-acre farm will require the services of at least one hired man.

The consensus of opinion of project managers as to the desirable acreage for farm units on Reclamation Service projects was found to be as follows:

TABLE 14.—SIZE OF FARMS RECOMMENDED FOR RECLAMATION SERVICE PROJECTS

Project	Economical acreage	
	From	to
Umatilla, Ore.....	20	40
Truckee-Carson, Nev.....	40	80
Milk River, Mont.....	40	80
Klamath, Ore.....	40	80
Orland, Cal.....	10	40
Okanogan, Wash.....	20	..
Shoshone, Wyo.....	40	80
Strawberry Valley, Utah.....	40	40
Sunnyside, Wash.....	10	40
Huntley, Mont.....	40	

From data collected in California for the Land Settlement Commission¹⁶ the size of business needed for certain specialized industries was found to be:

TABLE 15.—SIZE OF FARMS RECOMMENDED FOR FIVE CALIFORNIA SPECIALIZED TYPES OF FARMING

BUSINESS	RANGE	AVERAGE
Grain.....	80-640 acres	320 acres
Fruit.....	10-40 acres	20 acres
Poultry.....	1,500-3,000 fowls	2,500 fowls
Dairying.....	10-30 cows	20 cows
Diversified farming.....	10-80 acres	40 acres

Other sizes of farms are shown in tables under "The Capital Requirements of Farming" and "Farm Profits," and attention is directed to these for further data.

Actual Examinations and Report

The Actual Examination of the Farm.—The actual examination of any farm it is proposed to acquire is best made at two or three widely separated times. The first trip can be in the presence of the owner or agent, but subsequent trips are best taken unaccompanied in order to permit a careful investigation in a manner free from bias and influence. It is well, if possible, to watch the property through a complete season and see what it will do. Or it may be feasible to rent for a year with the privilege of buying should the property reach expectations and come up to the claims made for it by the seller.

In looking over a farm a great deal of valuable information as to its past behavior can be gained by an examination of the books and records, if such contain detail sufficient to show acreages, crop yields, receipts and expenditures.

A vital part of the actual examination of any farm is the frequent use of the soil auger.

Preparing Report.—To guard against omission of important items, to urge mental consideration of the various factors, and to condense and record the findings, a written report should be prepared covering in fullest detail the entire proposition. Such a report, if properly made, will include a list of items as suggested above with a frank statement of the investigator's conclusions as to climate, neighbors, isolation, crop producing power of the land, drawbacks and good points, value of the property, probable future, etc. Such crystallization into written form will bring about a study not only of personal reaction to conditions but is sure to include a necessary study of soil types, rainfall and other climatic data, and an investigation of the more profitable businesses in the community, etc.

Preparing Report Is Interesting.—Such a study, involving preparation of a report, will, to the sincere student, prove to be very interesting. In many instances it will aid in forming a judgment concerning the wisdom of purchasing a given property.

Suggested Form for Report

An outline is subjoined showing the method of rendering a business report of farm properties.

1. Give a description of the property, legal, general, and descriptive, with reference to state, county, township, towns, railroads, distance to school, neighbors, churches, stores, libraries.

2. Describe conditions on the farm as regards soils, topography, climate, water for domestic use and for irrigation, agricultural conditions at present, kinds and yields of crops, methods of farming, presence of alkali, weeds, disease (cholera, anthrax, blight, malaria).

3. Present condition of buildings, improvements, equipment, and live stock.

4. Investigate the title.

5. Determine amount banks will loan on property.

6. Insure right of way.

7. Show possibilities of the farm as to new crops, new industries, milk, poultry, hogs, increase in present production, reclamation, drainage.

8. Investigate local labor conditions, especially during peak loads, and occurrence of adverse conditions such as smelter smoke, danger of rains during fruit harvest, late frosts and damaging winds.

9. Make a recommendation concerning price.

10. State best plan of operating farm to justify investment.

11. List sources of information.

Score Cards.—Score cards are sometimes offered for use in gauging farms, and are of value in focusing the attention upon salient features. The relative standing of the different items varies, however, with the individual concerned. The card is valuable only in giving a list of the

items or points to be taken into consideration. It is not practicable to assign relative weights to any particular items. For instance, a farm might score perfect in every respect except water supply, but if no water was available it would be useless. Hence assigning to each item a percentage or weight might lead to erroneous conclusions. A better method seems to be to examine carefully all the features of two or more farms and then view the matter in a broad, common-sense way.

BLANK FORM FOR USE IN SELECTING A FARM¹⁷

Location of farm.....
 Owner.....
 Address.....
 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
 waste land.....; in roads, buildings, lots, swamps, lakes, etc.....; acres
 in stump or brush land..... Kind of timber.....; ease in getting
 out timber or wood.....
 Topography as regards economy of cultivation.....; irrigation.....;
 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.....; 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.....; 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.....; nearness to farmstead.....
 Kind of orchards.....; condition.....
 Adequacy of trees for home use.....
 Climate: As to growing season.....; days available
 for farm work.....; healthfulness.....
 Neighborhood: Character of people.....; available labor
 supply.....
 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.....
 Desirability of farm as a home or place to retire.....
 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 live stock production.....
 Sureness of market for major crops grown.....
 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 which are successful..... How long have they been farmed?.....
 What are some of the operators' difficulties?.....
 How soon can the farm be made a going concern?.....

A blank showing questions of importance in describing farm properties, as developed by the Extension Service of the Maryland College of Agriculture, is of interest in considering how to judge farm properties.

FARM DESCRIPTION BLANK

County..... Election District.....
 Farm of..... acres, located..... miles from..... P. O.,
 (R. F. D. No.)..... miles from steamboat wharf, on..... river;
 miles from railway station, on..... R. R. line;
 miles from auto bus or truck line;..... miles from..... electric car
 line;..... miles from..... school;..... miles from
 churches.....
 (Give denominations)
 Nature of highways from farm to above places.....
 (macadam, gravel, unimproved)
 Nearest city or town..... population..... Nearest market
 or markets (local and wholesale)..... General surface
 features of land..... altitude.....
 (level, hilly, rough)
 Character of soil..... Drainage.....
 (gravely, sandy, loam, clay) (good, acres that need drainage)
 acres: Tillable..... used as meadow.....
 in timber....., nature of timber.....
 (kind and size of trees)
 in fruit....., Varieties and number of each.....
 What crops do best on this land?.....
 Fences, kind and condition.....
 House, size and condition (give full description).....
 Barns and outbuildings.....
 (give full list with statement of size and condition of each)
 Water facilities.....
 (running water, wells, cisterns, streams or rivers)
 Water frontage..... By whom occupied (owner or tenant).....
 Reasons for selling.....

Lowest sale price..... Terms.....
 Will owner rent with option to buy?.....; on what plan?.....
 Estimate of capital needed to make improvements on buildings.....
 Soil improvements..... Fences.....
 Give any other useful information, and if possible a map of the farm on the back of
 this sheet.....

Valuing Farm Lands

Valuing Farm Lands for Purchase.—With the increasing demand for farm lands and resultant rise in land values, the inexperienced prospective buyer is often at a loss to distinguish between real and inflated values.

In many sections brisk demand accompanied by speculation has resulted in unwarranted prices and the unloading of considerable property at prices beyond all reason.

Factors Determining Land Values.—In attempting to determine what one is justified in paying for a farm or agricultural land, greater ease in reaching a decision will result if the value of the place in mind is considered, *first*, upon the basis of what may be expected in the way of profit—in other words, the producing power of the land; *second*, upon the basis of its worth as a home; and *third*, potential future increase in value.

All these factors may contribute to the real value of the land. There are lands so situated that from the producing standpoint they are extremely valuable, yet because of climatic or social conditions they offer small attractions as a home. Such lands should be valued solely upon their producing power.

There are other lands, the producing value of which is but moderate, yet because of good roads, churches, schools, pleasant neighbors and other evidences of civilization, together with a congenial climate, scenic advantages, or easy accessibility, they command prices far above those justified by the profits which can be secured for them.

Lands, for instance, in many parts of Florida, California, and similar regions, are sought out and acquired with special reference to their desirability as home sites. A combination of agreeable climate, pleasant neighbors, good roads, schools, churches, towns, and other evidences of civilization, creates a value in excess of the strict producing power of the land in the way of profit.

On the other hand, lands in many sections of the southwest, some of the deltas, the more remote cattle ranges, and similar situations, perhaps offer little in the way of a home to most people but much as sources of profitable returns.

Land Values and Returns.—Since land values determine investment and investment in turn demands satisfactory returns, it is well to recognize the fact that a man operating in a section valuable for both its home and investment features, can not expect as high returns as the man operating in a section where values are based solely upon the producing power of the land.

In attempting to reach a correct decision one should separate these two factors and determine what one is justified or willing to pay for each of the two items.

Estimating Home Value of Farm Lands.—Any figure designed to cover the home aspect must of necessity be the result of careful individual determination. A certain place may offer an environment most desirable for a man with a family, yet not at all to the liking of a single man. One man may wish to settle near certain neighbors or within easy access of his business, or to acquire a special landscape. To consummate his wishes he is willing to pay well for the place which will fulfill his requirements. There is no general rule in this regard. Care, however, should be exercised not to invest beyond one's means since the farm land can not justly be expected to make returns upon capital expended solely for the home aspect.

Estimating Productive Value of Farm Lands.—The value of the lands based upon their producing ability is relatively easier to determine than the home value.

From the business standpoint the test of the real value of farm property is the net return which can be secured upon the investment. Therefore, in order to arrive at the value of any given property, it is necessary to reverse the usual order of procedure and work back until the sum is determined which is equivalent to interest on the investment. In the case of any farm, determine the gross returns which can be expected under the plan of procedure which it is expected will be followed. This sum should be carefully determined, as should all the other details entering in, to insure an accurate decision. From the sum representing gross receipts is to come first, the outlay for operating expense. This includes outlay for labor—horse and man, including the labor of the farmer himself—material, sacks, seed, etc.—taxes, insurance, and such other items as enter into the carrying on of the project. Secondly, from the gross receipts should come sums to offset depreciation of buildings, implements, and stock, a just sum for management, and a sinking fund for emergencies.

When these sums, together with such other items as naturally enter into the handling of a farm are deducted from the gross receipts, the remainder will be equivalent to interest on money invested, the rate to be determined by the individual, *i.e.*, one may expect to get 6 or even 10, or perhaps 15 per cent interest on the investment in farming properties. This, then, will give the *total* producing value of the property.

Examples of Determination of Productive Land Values.—For instance, apples and barley may be used as concrete examples to illustrate the method. Let us say that for two given farms, careful determinations indicate that these figures will cover the various items enumerated above. The reasoning will then result in land values per acre as indicated below.

	APPLES	BARLEY
Labor and material.....	\$ 94	\$ 6.50
Management.....	18	2.50
Depreciation.....	3	.50
Taxes and insurance.....	4	1.25
Interest on operating capital.....	1	.60
Sinking fund.....	5	.50
Total cost per acre.....	\$125	\$11.85
Yield of crop.....	175 packed boxes	12 sacks
Value of crop.....	\$155	\$13.20
Less expense.....	125	11.85
Sum equivalent to 6 per cent interest returns on land.....	\$ 30	\$ 1.35
Or land is worth per acre with all im- provements and equipment.....	\$500	\$22.50

When Returns Are Insufficient to Meet Charges.—If, on the other hand, the returns from the sale of the crops are not sufficient, after covering the various items outlined above, to leave anything for interest on the land value, it is evident that the land is in the wrong crop, that the acreage is too small, that the product does not command the proper price on the market, or that the land is not being made to produce as it should. If, on thorough investigation one can assure oneself that these factors can be overcome, one will have justification for purchase, because the value of the land is not in its present producing power but rather its *possible* producing power viewed from the standpoint of crop requirements, costs of production, and ability to market. Thus this barley land may be worth only \$22.50 per acre for grain, but if it will produce 175 boxes of apples per acre, worth \$155 per acre, and leave a margin of \$30 to cover interest, it has an inherent and intrinsic value of \$500, on the basis of 6 per cent, less whatever it costs to bring the orchard to bearing.

Potential Values of Farm Lands.—An increase in market values of land will usually occur when lands are obtained at a price less than their producing value. Such lands will doubtless ultimately reach their true value and give the operator a just additional profit, if he sells. Lands so situated that they may become especially valuable property for homes carry with them an individual valuation, and any increase from this source must be based upon individual judgment.

Good and Bad Lands.—Good and bad lands are terms which are relative in their application, since they apply to the crops it is intended to grow. Thus lands poor for wheat or barley may be excellent for pears; land poor for potatoes may be excellent for grains. Or, on the

other hand, lands worth \$500 for peaches may not be worth \$20 for grain, or land worth \$40 for grain may be worth \$150 for alfalfa. Thus land is good when used for the purpose for which it is suited and bad when used for crops not adapted to it.

Buying and Selling Farm Lands

Buying and Selling Farm Lands.—Sale of farm lands, when the terms of sale have been agreed upon, involves an abstract of title or certificate of record, and a deed. When total purchase price is not paid down, then will also be attached a mortgage—realty or chattel or both, or a contract setting forth the selling agreement. A few words of explanation of these may be of help to those unacquainted with the conditions surrounding land sales.

Abstract of Title.—An abstract of title consists of copies of records of all patents, sales, deeds, attachments, trust deeds, court actions, legal decisions, in fact all proceedings which may affect the title of the property under consideration, which are on file in municipal, county, and state offices.

Great variation occurs in abstracts of title since there is much difference in frequency in transfer of ownership, in litigation, in use as security for loans, in lapses of time since issuance of first patents. Multiplicity of documents is occasioned whenever additional lands are subsequently acquired, or whenever sales of a portion are made from the original acquisition.

Example of Abstract of Title.—Because of the wide range of terms, access by the student to a few original abstracts is very desirable. The example given below is selected merely to show something of the scope of an abstract. This property (a California ranch) is comparatively new—patent being issued in 1871 under the terms of the "Swamp and Overflow" Act—and consists of 1,088 acres of an original 1,600 acres. The abstract records a history of development, starting with overflow land of an alluvial nature and continuing through clearing, improving and planting crops until 1918—when the last record appears.

The scope covered in the legal and financial activities surrounding this property covers 389 pages of legal folio paper, embracing recorded legal documents as follows, (numbers in parenthesis indicate number of times appearing):

Statement describing property covered by abstract (6).

Abstract Company certification as to correctness of abstract memoranda (7).

Map (1).

Letters patent from State (under "Swamp and Overflow" Act) (6).

Deeds (recording sales) (44).

Sheriff's certificate of sale on foreclosure (3).

Mortgages (18).

Assignment of mortgage (4).

Attachments (3).

Trust deed (to secure loans) (6).

Trust deed (to provide a railway right of way) (1).

- Deed of reconveyance and release of mortgage (after loans protected by a trust deed are fully paid) (6).
- Petition for letters of administration, court orders, details, and outcome (1).
- Bond for a deed (1).
- Notice of foreclosure of mortgage (3).
- Certificate of redemption (to set aside suit to recover sum advanced under mortgage, debt fully paid) (1).
- Complaint and action to foreclosure, summons, stipulations, answers, decree (2).
- Court order of sale (1).
- Sheriff's deed (on foreclosure) (2).
- Agreement to continue lease (1).
- Tax statements (3).
- Power of attorney (2).
- Certificate of purchase (2).
- Action to quiet title, abstract of proceedings, decree (2).
- Petition for a reclamation district (1).
- Action condemning riparian rights (1).
- Judgments for debts (3).
- Tax sales (2).
- Release of judgment (1).
- Articles of incorporation (3).
- Action to collect reclamation district assessments (2).
- Action to determine validity of reclamation district assessments (4).
- Commissioner's certificates of sale after foreclosure (1).
- Decree of partial distribution (estate) (1).
- Decree of final distribution (estate) (1).
- Sale for non-payment of state taxes (1).
- Contract to sell (under stipulated terms) (1).
- Transfer of title in contract to sell (1).
- Lease (1).
- Assignment of contract to purchase (2).
- Assignment of contract to sell (1).
- Assignment of lease contract (2).
- Action arising from disagreement over cutting wood and clearing land, details, outcome (1).
- Rights of way deeded to county (2).
- Quitclaim deed (1).
- Crop mortgage (1).
- Release of assignment (1).

Abstracts of title have a human interest background not shown by a bare summary such as that given above. Records such as these are replete with evidences of bickerings, feuds, misunderstandings, incriminations and reincriminations, so that when read in their entirety these dusty records become shining mirrors of human attempts and achievements in the march of agriculture to the present day status. The mortgage records show that during a period of 50 years the acreage represented by this property has figured in loans totaling close to \$200,000.

There are persons, firms, or corporations which make it their business to abstract titles and who are called abstractors of titles, or searchers

of records. On smaller transactions it is not customary to insist upon an abstract of title, but to secure in place of it a certificate of title, which is in effect a statement by the person, firm, or corporation that it has examined the title and certifies that it is valid, or if the title is not clear states in what way the title is clouded. Even if the searcher of records is not a public officer, he constitutes at present the accepted means of securing advice concerning land titles.

Certificate of Title.—A certificate of title is a guarantee of title and covers a statement by an incorporated abstract company, reciting that after a careful examination of county records it certifies the title is unclouded and acceptable.

Example of Certificate of Title.—A common form of abstract follows:

THE HANFORD ABSTRACT COMPANY INCORPORATED
E. E. BUSH, *President* HANFORD, CALIFORNIA.

Unlimited Certificate

Made at request of _____

After a careful examination of the Official Records of the County of Kings, State of California, and of the Records of the County of Tulare, State of California, prior to the organization of the said County of Kings (said Kings County formerly being a part of said Tulare County), except those hereinafter mentioned, in relation to the title of that certain tract of land hereinafter described.

THE HANFORD ABSTRACT COMPANY

(A corporation. Its principal place of business being in the City of Hanford, County of Kings, State of California.)

hereby certifies that the title to said land, appears of record in.

This certificate does not include an examination of, or a report on:

1. Rights reserved in United States Patents, or in the Certification of Indemnity Land selections, existing roads, ditches, canals, levees, water locations, mining claims, crops, or matters relating thereto.
2. Records of or relating to Irrigation, Drainage, Reclamation, Levee, Protection, Storm Water, Boulevard, Fire and Sanitary Districts, if the property described herein lies within the boundaries of any such districts.

3. Municipal taxes and assessments (except those collectable in the County Tax Collector's office) and the effect and operation of the municipal laws, ordinances and regulations, proceedings for street, sewer and other municipal improvements, and for opening, widening and other changes in streets or alleys, if the property described herein lies within the boundaries of any incorporated city.

4. Proceedings for street lighting, sewer, shade trees and sidewalk improvements, and for opening, widening and other changes in streets or alleys in any City, unless the amount of assessments therefor has become fixed and shown as a lien by the recording of same in the public office designated by law.

5. Instruments, trusts, defects, liens, easements, incumbrances and right or claims of parties in possession of all or any portion of said property, not shown by any public record of the County of Kings, State of California, and errors and omissions in surveys.

6. The validity of tax sales, street assessments, attachments, leases, easements, declarations of homestead and money judgements if any are mentioned as incumbrances in this Certificate.

IN WITNESS WHEREOF, The Hanford Abstract Company has caused this Certificate to be signed by its Manager, and its corporate seal to be hereto affixed this.....

day of.....19....., at.....o'clock.....M.

THE HANFORD ABSTRACT COMPANY

By.....Manager,

Certificate No.....
 Copy Book No.....Page.....
 Examiner.....

Deed.—A deed is a document conveying all rights of possession to a purchaser for consideration.

Example of a Deed.—An example of a deed indicates its character.

THIS INDENTURE, made this 13th day of December, 1920, between GUSTAVE BRENNER of the City and County of San Francisco, State of California, the party of the first part, and FRANK F. BEZERA of the County of Kings, State of California, the party of the second part.

WITNESSETH

That the said party of the first part, for and in consideration of the sum of Five Dollars, (\$5.00) lawful money of the United States of America, to him in hand paid by the party of the second part, the receipt whereof is hereby acknowledged, does by these presents grant, bargain, sell, convey and confirm unto the said party of the second part, and to his heirs and assigns forever, all that certain lot, piece or parcel of land situate, lying and being in the County of Kings, State of California, and more particularly described as follows; *to-wit:*

COMMENCING at a point on the center line of Section 12, Township 18 South, Range 20 East M.D.B. & M. which center line runs North and South and is the Easterly boundary line of the West half of said Section and the Westerly boundary of the East half of said Section, distant thereon 30 feet Northerly from the Southerly line of said Section; running thence Northerly and along said center line of said Section 1,072.5 feet; thence at a right angle Westerly 264 feet; thence at a right angle Southerly 1,072.5 feet and thence at a right angle Easterly 264 feet to the point of commencement, containing 6.5 acres.

TOGETHER with all and singular the tenements, hereditaments, and appurtenances thereunto belonging or in anywise appertaining, and the reversion and reversions, remainder and remainders, rents, issues and profits thereof.

TO HAVE AND TO HOLD all and singular the said premises, together with the appurtenances, unto the said party of the second part, his heirs and assigns forever.

IN WITNESS WHEREOF the party of the first part has hereunto set his hand and seal the day and year first above written.

Signed, sealed and delivered
in the presence of,

I, JULIA BRENNER, wife of said Gustave Brenner do hereby consent to the foregoing conveyance and do hereby grant, bargain, sell, convey and confirm unto the grantee therein named, Frank F. Bezera, any interest which I may have in and to the real property therein described.

DATED: This _____ day of _____ 1921.

Selling Contracts.—These contracts are of various kinds, specific needs determining the phraseology, length, type, and scope of the written contract. These agreements are usually executed in duplicate.

CHAPTER V

ORGANIZING THE FARM BUSINESS

Organizing the business of a farm means first the selection of enterprises that will fit together into a satisfactory plan of management, and, second, the working out of the details incident to putting the plan into operation. Ordinarily this comes to a system that will permit the maximum use of power, labor, and capital within the limits of the owner's available resources; that will require a minimum of equipment with the maximum use of that equipment; and that will so distribute the labor during the seasons that the farmer and his available help, both man and beast, will be profitably occupied at all times without being too much crowded at any one time. It also involves the determination of the character and extent of the equipment required for the satisfactory conduct of the business, and the installation of this equipment.

Advantages of a Farm Plan.—Several advantages are gained from a careful working out of the farm plan in advance. To do so means testing possible income, necessary expense, probable profit, and ability to meet deferred financial obligations from the returns, and from these deductions drawing as to the feasibility of the plan itself and the desirability of acquiring the farm in question. If the business is a going concern, and not merely bare land, the continuance of its present plan of operation will of course be given fair consideration. A new plan is not necessarily a better plan, but obviously it is desirable to have, if possible, a number of tentative plans for any farm; to compare is to insure selection of the best.

Drawing up a plan of work compels, furthermore, a close study of needs, and should therefore lead to avoidance of emergencies. A likely result, for example, is more careful attention to the matter of required reserves of hay, grains and other feeds, to the reserving of necessary seed, and to providing all supplies and materials sufficiently in advance of actual use to prevent delay. In the calendar of operations, which forms an important part in any plan of work, estimates of necessary equipment, motive power—tractors, trucks or work stock—and extra help can be computed and arrangements made to insure their presence when needed. Times of slack work, or overcrowded periods, will likewise show up.

Therefore, both in preliminary studies and in actual practice, the plan of work constitutes an important part of management.

It parallels the building of a house, in that it provides a basic plan and furnishes the foundation upon which the farming operations are to rest.

Determining the Principal Objective.—In drawing up working plans for a given enterprise it is of prime importance to determine the principal immediate objective. This may be present pressing need for gaining additional capital; it may be, rather, foundation-laying for greatest ultimate returns; perhaps it will be maintenance or increase of soil productivity.

If for instance productivity is the prime consideration, a given field known to offer greater returns from barley than from beans, yet needing the soil betterment obtainable from legumes properly handled, may be devoted for a season or more to beans. In this case the ultimate increase of yields is assumed to be worth more in the long run than the surplus of returns derivable from the continued planting of barley. Sometimes a combination is desired, as for instance a plan to improve the soil while providing immediate returns for use in meeting operating expenses. An example is found in the running of a dairy for the sake of both the manure—to be used in bettering the soil quality, and the monthly cream check—to assist in financing the enterprise.

Necessity of Knowing Local Practices and Conditions.—The general program in operating a given property is largely determined by the individual aims of the operator, based upon the soil, water, climate, markets, transportation, and financial possibilities. Familiarity with types of farming in the community, both those in actual use and those possible of use, should precede organization of the farm business, since variations in practice are so great that individual study must rule.

In southern Michigan, for instance, corn, oats, wheat, and hay are the principal farm crops. Alfalfa is a special crop. Live-stock products are more important, however, than crop products. General farming with a reasonable amount of live stock is the prevalent type. In southern Ohio, the general or mixed type of farming is prevalent, about one-half of the land being used for pasture for beef cattle and fine-wooled sheep, and one-fourth in growing feed crops for live stock kept on these farms.

In the Blue Grass region of Virginia, live stock on the large farms and tobacco on the smaller farms are the two prevalent types of agriculture; while corn, wheat, and hemp occupy less important positions in the cropping program. Sumter County, Georgia, is strictly a cotton growing section, more than one-half of the land under cultivation being devoted to that crop, and nearly 90 per cent of all farm receipts coming from that source. In large areas of Oregon, wheat and oats are grown to the exclusion of almost all other field crops under a practice by which one-fourth to one-third of the land is summer-fallowed annually.

The most important crop of the Provo irrigated area of Utah is the sugar beet, though apples and peaches more recently introduced are growing in importance. With the exception of a few small fruit and poultry farms, alfalfa is the basis of farming in the irrigated valleys of Southern Arizona. With ample alfalfa efforts to farm profitably have resulted in the production of hay, rental of pasture, and alfalfa seed, dairy products, and fattened beef cattle.

California's interest in farming runs more generally to the production of fruit, both citrus and deciduous; although large areas are devoted to cereals, especially barley, while the production of truck crops—in a wholesale way—asparagus, potatoes, onions, celery, etc. is important. Beans, sugar beets, hops, and hemp are factors in California agriculture, while alfalfa is grown extensively for the purpose of producing hay, seed, and pasturage for cattle, sheep, and hogs.

Tabular Presentation of Sectional Differences in Types of Farming.—Differences in types of agriculture as practiced in various sections, taken from surveys conducted at widely separated points, are exhibited in statistical detail in the following tables. As illustrating the sort of thing the planmaker must consider, they will repay careful study.

Georgia.

TABLE 16.—AGRICULTURE OF SUMTER COUNTY, GEORGIA, AS SHOWN BY THE SOURCES OF FARM RECEIPTS ¹⁸

Source of income	50 acres and less (25 farms)	151 to 250 acres (31 farms)	Over 450 acres (11 farms)
Cotton.....	69.1%	75.0%	78.4%
Cotton seed.....	7.1	10.1	12.5
Total cotton.....	76.2	85.1	90.9
Corn.....	1.5	3.7	3.7
Small grains.....	0.5	1.0	1.5
Hay.....	0.9	1.0	1.0
Cane sirup.....	1.4	1.1	0.1
Sweet potatoes.....	0.5	(a)	0.2
Fruit and nuts.....	0.1	(a)	
Miscellaneous crops.....	0.7	0.2	0.5
Total crops.....	81.8	92.1	97.9
Increase feed and supplies.....	6.3	1.3	0.3
Cattle.....	3.4	0.4	(a)
Horses and mules.....	0.8	0.1	
Hogs.....	3.4	4.7	0.3
Poultry.....	2.2	0.2	(a)
Bees.....	0.1		
Total stock.....	9.9	5.4	0.3
Miscellaneous sources.....	2.0	1.2	1.5

(a) Less than one-tenth of 1 per cent.

Michigan.—

TABLE 17.—AGRICULTURE OF LENAWEE COUNTY, MICHIGAN, AS SHOWN BY THE SOURCES OF FARM RECEIPTS (AVERAGE OF 300 OWNERS)¹⁹

Source of income	Per cent of total receipts	Source of income	Per cent of total receipts
Dairy products.....	31.8	Corn.....	1.3
Dairy cattle.....	5.4	Potatoes.....	0.6
Beef cattle and feeding steers.....	0.7	Wheat.....	7.9
Horses.....	0.3	Oats.....	3.8
Colts.....	2.0	Barley.....	0.7
Sheep.....	3.6	Other grain.....	0.1
Feeding sheep.....	1.9	Hay.....	3.6
Hogs.....	15.4	Seeds.....	0.2
Poultry.....	6.9	Truck.....	0.4
		Fruit.....	0.9
Total live stock.....	68.0	Miscellaneous (a).....	3.5
		Feed and supplies (b).....	9.0
		Total crop and miscellaneous.....	32.0

(a) Labor, lumber or wood sold, etc.

(b) Increased inventory.

Utah.—

TABLE 18.—AGRICULTURE OF PROVO AREA, UTAH, AS SHOWN BY THE SOURCES OF FARM RECEIPTS²⁰

Source of receipts (averages)	First group, 35 small farms		Second group, 30 fruit and beet farms	
	Per farm	Per cent	Per farm	Per cent
Corn.....	....	...	\$ 7	1
Potatoes.....	\$ 44	7	39	3
Wheat.....	10	2	39	3
Oats.....	....	...	39	3
Barley.....	4	1	43	3
Hay.....	28	4	125	9
Beets.....	188	30	746	56
Truck crops.....	23	4	84	6
Apples.....	85	14	48	4
Peaches.....	88	14	60	5
Other fruit.....	145	24	86	6
Miscellaneous crops.....	2	...	9	1
Total.....	617	100	1,325	100

Corn Belt.—

TABLE 19.—AGRICULTURE OF REPRESENTATIVE AREAS OF INDIANA, ILLINOIS AND IOWA AS SHOWN BY THE SOURCES OF FARM RECEIPTS ²¹

Sources of income	Operated by owners (273 farms)		Operated by tenants (247 farms)	
			Both landlord and tenant	
	Receipts	Per centage of total	Receipts	Percentage of total
Crops.....	\$ 858	27.9	\$1,333	49.3
Stock.....	1,715	55.8	778	28.8
Stock products.....	143	4.6	111	4.1
Increased inventory.....	331	10.8	459	17.0
Labor.....	26	0.8	20	0.7
Miscellaneous.....	3	0.1	2	0.1
Average or total.....	\$3,076	100.0	\$2,703	100.0

Local Practice a Guide in Organizing the Work.—In general, the type of agriculture practiced in the section will rule in planning the farm business. Grain farming in a grain belt is conducted in line with existing agencies to harvest, store, and sell. Districts specializing in fruit growing, bring about available packing houses, harvest help, box factories, storing and shipping facilities, etc. Therefore, the starting point in planning is to study present farming methods and uses prevailing in the section where the land is located.

The farm enterprises in any well-developed agricultural region are mainly those which the experience of farmers has shown to be profitable. In the process of selecting such enterprises the soil and climate are fundamental factors. Additional limiting factors may be a profitable market or the availability of the right kind of labor. Still another factor, not so evident as either of these, is the way the various enterprises fit in with each other so as to interfere as little as possible. Each crop not only has its peculiar method of cultivation, but also its own peculiar seasons for the various operations required. Not only must a certain amount of labor be given, but this labor usually must be applied within definite seasons. Hence the organization of these enterprises must take into account economy in the distribution of labor. Even though an enterprise like tobacco, for instance, may yield a very large profit per acre, the amount that can be handled profitably on a given farm is limited not only by the amount of good tobacco soil, but by such a relation of the tobacco crop to other enterprises as will bring about the most advantageous distribution of available labor.

Farm Management Fundamentals.—Various farm management surveys have convincingly supported present day farm management theory in developing the following fundamentals truths which will help to decisions in the process of formulating plans for organizing a given business.

Diversity.—Diversity of the farm business is, as a rule, an important factor of success in farming. A medium degree of diversity, sufficient to give good seasonal distribution of labor, complete utilization of land, and a considerable variety of sale products, is better than either extreme diversity or a low degree of diversity.

Expense of Operating Small Farms.—On small farms the expense of operation is much greater per unit of product than on large farms of similar type.

Local Practice Best.—When conditions affecting the agriculture of a region have remained stable for a considerable period, local agricultural practice tends to become approximately what it should be for best results, provided the practice which gives the best immediate returns does not unfavorably affect soil fertility. When conditions change, even slightly, and the change persists, local farm practice begins to change and ultimately adapts itself to the new conditions.

Type of Farming Limited.—The type of farming followed in any given case must be adapted to local soil, climatic, and labor conditions, and especially to local conditions with reference to markets and market facilities, as well as to the business conditions existing on the individual farm.

Size of Business.—Success in farming, measured in terms of the family income and standard of living, is directly proportional to the magnitude of the farm business, although the percentage of profits on the farm investment is, within wide limits, independent of the magnitude of business.

Optimum Crop Yields.—In the matter of yield of crops per acre, the point of diminishing returns is reached on a considerable proportion of farms. Profits increase as yields increase until the yields are considerably above the average for the locality, but beyond this increased yields are obtained at the expense of farm profits.

Optimum Dairy Cow Production.—In quantity of product per dairy cow, the point of diminishing returns is not reached in ordinary farm practice. Hence, on dairy farms, quantity of product per cow is, on the average, a more important factor of success in farming than is yield of crops per acre.

Increasing Crop Yields.—It is both easier and more profitable to increase low acre yields than high ones, and a small product per cow than a large one. In other words, profits can be increased most easily by attention to the weakest points in a system of farming. The more vital the weakness, the greater the increase in profits that can be made.

Prorating Acreage.—With a given type of farming, under given condi-

tions, there is a certain way of dividing acreage among the several enterprises of the farm which is more profitable than any other way; that is, there is a most profitable acreage for each crop. Similarly there is a most profitable proportion of income from each source. If the acreage of any crop or the proportion of income from any enterprise be greater or less than this optimum, the profits of the farm as a whole are lowered thereby.

Specialization.—Future studies may modify to some extent the findings of today as more information is available, especially from the farm management practices in the newer agricultural sections, and as to the farms specializing in single products. Diversity as now recommended provides an opportunity to increase productivity, to keep labor constantly employed, and to have a variety of products to market. In many localities, however, the present tendency is for farmers to work towards more specialization—with the attending greater concentrations on producing and properly marketing one major product with some escape from year round routine, multiplicity of duties, and scattering of effort. That is to say, one who considers most of the present-day specialized farming to be adventitious or experimental, must agree that in time this sort of farming will appear to be in numerous instances soundly based on the economic as well as on the technical side.

Plan Depends on Outstanding Individual Need.—The plan to be placed in operation will depend not only on the principal objectives, as already indicated, but quite as much—sometimes even more—on the more pressing individual need of the operator or of the farm, or upon the needs of both in the form of compromise or fusion. Sometimes the ultimate plan is of necessity suspended for the time being to permit the substitution of a temporary plan required to meet immediate needs. Sometimes small parts of the broad program are set aside in favor of minor changes, to meet unforeseen or temporary contingencies.

The objects sought in the adopted plan or plans—whether it be the broad scheme under which the property is finally to be handled, or the one designed to meet temporary needs—must be worked out carefully in each instance, for necessity varies with individuals, localities, farms, and producing and distributing conditions. The plans may be designed to put into operation at once the scheme which it is expected will result in the greatest possible profit; or, planning may be needed to provide immediate capital for operating expense, or to increase or maintain the crop producing power of the land, or to provide fruits, vegetables, or other farm products for home consumption, or to reorganize going concerns for greater profits or greater ease in handling.

And we cannot too strongly insist on the early recognition both of the need to exercise study and care in formulating an effective and economical plan of work along the lines most important to be developed,

in accordance with the conditions under which the work is to be—or is being—conducted; and of the fact that such a plan will materially assist in bringing the business under the operation of farm management principles.

Planning to Provide Immediate Capital.—A way to provide immediate capital is frequently the most pressing consideration in planning the farm work. To men starting out with limited means it is often the vital issue. The actual securing of capital quickly is, however, a special subject. Most farm managers and practicing farmers are more concerned with the formation of those plans, which in being carried out, will make for the largest possible profit from operations extending over a long term of years, rather than for a provision by which the farm itself can be drawn upon as a means of providing the major part of its working capital.

An example will indicate the method of procedure to find out what crops will bring the most money.

TABLE 20.—SELECTING THE MOST PROFITABLE CROP FOR QUICK RETURNS

Crop	Yield	Market value	Value per acre at market	Order of greatest value per acre based on market value
Pink beans.....	1,000 lb.	\$ 5.00 per cwt.	\$50.00	1
Barley hay.....	2 tons	14.00 per ton	28.00	4
Barley.....	1,000 lb.	2.00 per cwt.	20.00	5
Milo.....	1,500 lb.	2.50 per cwt.	37.50	2
Wheat.....	900 lb.	3.50 per cwt.	31.50	3
Volunteer hay.....	1½ tons	12.00 per ton	18.00	6
Alfalfa hay.....	1 ton	16.00 per ton	16.00	7

Crop	Cost to produce per acre	Profit per acre after deducting cost to produce	Order of greatest profit based on profits at farm	Cost to market per acre	Net profit	Final order of profitability
Pink beans.....	\$32.00	\$18.00	2	\$ 2.70	\$15.30	2
Barley hay.....	12.70	15.30	4	11.60	3.70	5
Barley.....	9.50	10.50	6	1.70	8.80	4
Milo.....	21.34	16.16	3	2.16	14.00	3
Wheat.....	9.42	22.08	1	2.43	19.65	1
Volunteer hay ..	9.00	9.00	5	8.10	.90	6
Alfalfa hay.....	20.00*	Loss 4.00	7	5.40	Loss 9.40	7

* Returns are based on results of the first year only, as immediate cash returns are desired.

Summed up, the table indicates that for this particular 100 acres with seven crops available, it is possible to make nearly \$2,000 from wheat as against an additional cash outlay of \$940 for the alfalfa.

Example of Selecting the Most Profitable Crop for Quick Returns.—One hundred acres of land is available and it is decided to plant the crop which will produce the quickest cash returns for the year's work. Probable yields, cost, and probable market returns are known. The line of procedure will follow three definite steps. These are determination of:

1. Market value per acre.
2. Profit less cost to produce.
3. Net profit after deducting cost of production and selling expense.

The accompanying table shows the outcome. Under cost of production are included items of: Plowing, Harrowing, Seed, Seeding, Cutting, Raking, Mowing, Baling, Sacks, Twine, Etc.

Under selling expenses are included:

- Hauling to shipping plant,
- Freight to market,
- Selling commission.

Necessity for Complete Work.—Note that there is no relationship between the value per acre, the cost to produce, and the cost to market. It is therefore necessary to take all these into account in order to decide with assurance what can be done.

Applied to Live Stock Farming.—The same line of reasoning may be applied with equal force and value to the determination of the relative profitableness of different live stock enterprises, or to the comparison of possible crop and live stock phases.

Planning for Ultimate Profit.—Planning for greatest ultimate profit is the primary object in mind from the business standpoint, when one is establishing any enterprise for an investment or a lifework. It means that the operator must plan his work to result in returns commensurate with those demanded of the usual business investment, or at least with his idea of what he may reasonably expect of his business.

Producing or Purchasing.—As a general rule, in planning the organization of the business, both at the start and from year to year thereafter, the things should be grown which can be more cheaply produced than purchased, and, conversely, the things should be bought which can be landed more cheaply at the farm than they can be produced upon it. This applies to hay, grain, seed, manure, poultry, eggs, milk, cream, fruit, vegetables, etc.

No man on a relatively small ranch, needing his time for supervision or actual labor, should attempt to build implements or wagons and expect to put out a cheaper or better wagon than the firms which make a specialty of this kind of work. Yet there are ranchers who have paid wheelwrights to build wagons at a cost easily 50 per cent over the price in the open market. The size of a certain ranch necessitated the employing of a wheelwright, and the superintendent thought that by occupying the man's attention in this way during dull times he was actually making money. The building of wagons, however, as a subsequent investigation showed, encroached upon time which could have been employed to better advantage in a number of different ways.

Another man—a superintendent of 25,000 acres—boasted that he had made all of his gang plows, 17 in number, in his own shop. While no books were available, a careful estimate showed that the tools stood him more in actual dollars and cents than the price of bringing reputable implements from a good house.

The same line of thought should be applied to the planning of the farm work, especially in regard to side issues not vital to the primary object for which the farm is being run.

For instance, land in the heart of the citrus belt is worth so much for oranges that the raising of grain or hay would not give the returns which should be forthcoming. If 20 acres of good orange land is worth in the unimproved state \$300 an acre, it is clear judgment indicates that it should go into the best producing crop as soon as possible, since such crops will return 8 per cent on \$1,000 with product at \$1.75 per box, while grain yielding 2,300 lb. would return less than 8 per cent on only \$200, if sold at \$1.10.

Choosing the Profitable Enterprise.—Farm management surveys provide material showing the influence of crop or live stock choice upon profits.

Texas Illustration of Relative Profitableness of Different Farm Enterprises.—An example from Texas²² will illustrate the choice of crops based on the relative profitableness of crops which can be successfully grown in the community:

TABLE 21.—RELATIVE PROFITABLENESS OF FARM ENTERPRISES AS SHOWN BY AVERAGE FIGURES, FROM FARM MANAGEMENT SURVEY RECORDS, TAKEN DURING 1916 IN ANDERSON, ATASCOSA, BEXAR, BRAZOS, COLLIN, CORYELL, COMANCHE, DALLAS, HARRIS, FALLS, TARRANT KERR AND RED RIVER COUNTIES, TEXAS

Enterprise	No. of farms reporting	Total No. of acres	Returns per acre for man labor	Man hr. of labor per acre	Returns per hr. for man labor, cents
Sorghum for silage.....	6	80	\$25.92	32	81
Small grain (oats and wheat).....	67	2,444	7.80	13	60
Sorghum for hay.....	58	337	17.40	29½	59
Sweet potatoes.....	28	53	44.24	79	56
Peanuts.....	36	564	18.24	38	48
Cotton.....	75	2,882	22.00	48	46
Grain sorghum.....	24	196	11.88	27	44
Corn.....	104	2,200	8.40	20	42
Barley.....	7	36	3.60	9	40
Millet.....	7	45	1.90	10	18
Blackeyed peas.....	20	240	6.37	49	13
Poultry.....	...	.....	.....	.....	46
Hogs.....	.....	.....	.....	.....	34
Cattle.....	.....	.....	.....	.....	29

Ohio Illustration of Relative Profitableness of Different Farm Enterprises.—A study in 1909²³ of 23 Ohio farms showed the layout to be divided into:

TABLE 22.—RELATIVE PROFITABLENESS OF FARM ENTERPRISES—OHIO

	ACREAGE	PER CENT OF TOTAL
General farm use.....	5.51 acres	3.32
Household use.....	2.04 acres	1.23
Laborers use.....	0.08 acres	0.05
Stock.....	46.50 acres	85.71
Crops.....	85.71 acres	51.68
Orchard.....	1.95 acres	1.18
Woodland.....	34.09 acres	14.53
Value of bare land.....	\$45.96 Per acre	

Iowa Illustration of Relative Profitableness of Different Farm Enterprises.—Munger²⁴ shows the effects upon labor income of the proportion of total acres in crop and pasture of farms in northeastern Iowa. He points out that farmers having less than 20 per cent of the land in pasture received labor incomes of over \$400, but with an increase in pasture the labor incomes rapidly declined. Farmers with over 40 per cent in pasture not only had no labor incomes but lacked \$120 of making 5 per cent interest on their investment. An average labor income of —\$41 resulted where less than 60 per cent of the farm was in crops, as compared with a labor income of \$480 where more than 80 per cent was devoted to crops.

A difference in labor income of more than \$800 was found in comparing a group of farms containing 20 per cent and less of the farm in corn, and a group with over 50 per cent in corn; and this in spite of the fact that farms in the last group averaged 165 acres as compared with 245 in the first.

West Virginia Illustration of Relative Profitableness of Different Farm Enterprises.—Dadisman and Sarle²⁵ from a study of 520 records taken for 2 years on 260 farms in southeastern West Virginia, report the effect of business upon income. Of these farms 239 were operated by owners and 21 by tenants.

Of owner-operated farms, 98 were beef farms or those on which 40 per cent or more of the total income came from beef cattle, 121 were general farms, their receipts being derived from both live stock and crops; and 20 were dairy farms deriving 40 per cent or more of their total receipts from the dairy. Averaging the 2 years, the beef farms made the largest income, \$1,590, or nearly \$100 more than 5 per cent interest on the investment, and a labor income of \$94. The general farms made a family income of \$532, or a little less than 5 per cent interest on the investment for the 2 years, and a labor income of —\$60. The 20 dairy farms show a family income of \$1,268, which was 5 per cent interest on the investment and fair wages in addition, and a labor income of \$366.

Different Plans Bring Different Results.—In the working out of a given farm by different men different results will appear.

Example of How Different Plans Bring Different Results.—In illustration note the outcome in planning the utilization of 97 acres of land valued at \$500 per acre. No restriction was made as to capital. The requirements were to get the most out of the land in its total area, and to determine profit and loss. The results of four men follow:

LABOR INCOME	INDUSTRY
\$3,200 (average of 2-5 years)	Dairy
5,028 (average of 9 years)	Hogs, dairy, fruit
3,398	Dairy
9,282	Fruit

The investment varied from \$55,000 to \$81,000.

Planning to Provide a Diversity of Enterprise.—Under present finding and recommendations, if other things are equal, the plan should provide for diversity of enterprise. Examples of the effect of diversity upon incomes, taken from farm management surveys, are presented below:

Example of Effect of Diversity upon Incomes, Pennsylvania.—A Pennsylvania study⁷ shows:

TABLE 23.—RELATION OF DIVERSITY TO INCOME, PENNSYLVANIA (OWNERS)⁷

Diversity index	Number of farms	Average labor income	Average size of farms
Less than 1 to 2.9.....	79	\$663	83
3 to 3.9.....	107	718	90
4 to 4.9.....	125	888	94
5 and over.....	67	866	90
Total and averages.....	378	789	90

Example of Effect of Diversity on Cost of Labor and Farm Profits, Georgia. A study made in the south indicates:

TABLE 24.—RELATION OF DIVERSITY TO COST OF WORK-STOCK LABOR AND TO FARM PROFITS (BROOKS COUNTY, GEORGIA)²⁶

Diversity index	No. of farms	Average diversity index	Acres of crop land per farm	Cost of mule labor per day	Crop index	Index of earnings
Less than 2.....	27	1.5	89	\$1.20	0.98	85
2 to 3.9.....	54	3.0	147	1.04	1.02	100
4 and over.....	25	4.7	194	0.98	1.00	116
All farms.....	106	3.0	145	\$1.07	1.00	106

Example of Relation of Diversity to Labor Income and Other Factors, Nebraska.—An example from a western state, Nebraska, shows:

TABLE 25.—RELATION OF DIVERSITY TO LABOR INCOME AND OTHER FACTORS²⁷

Range of diversity	Average diversity index	Number of farms	Labor income per farm	Animal units per man	Crop acres per man	Crop acres per horse	Average area of farms (in acres)
1.0-1.9	1.3	8	\$105	6.9	72	18.0	137
2.0-2.9	2.4	36	355	9.5	94	24.0	184
3.0-3.9	3.4	85	358	11.9	97	24.6	218
4.0-4.9	4.4	47	426	12.4	104	26.7	227
5 and above.....	5.5	19	560	13.1	122	27.0	213

Unprofitable Diversification.—It is possible for diversification to be carried to an unprofitable extreme. Beyond a not, however, as yet well-defined limit, further diversification may be at the expense of skill and attention to the details of the major sources of income. But it does not appear that any of these groups of farmers have gone beyond that limit.

Planning to Provide Days of Productive Labor.—Labor income increases with the number of productive days' work per farm. A work unit is the average amount of work done in a day by the average workman. Some men do much less and some do much more than this. Some men also have their work so organized that a given amount of effort accomplishes more work than the average.

Within limits, the labor income of the farmer increases with the size of his farm, and, especially on small farms, with the diversity of the enterprises followed; that is, large farms are more profitable than small ones, and farms having several kinds of products to sell are more profitable than farms having only a few kinds to sell. The reason for both of these facts is probably the same, *i.e.*, that a large farm even when devoted to a few of the leading farm enterprises and a small farm having a large number of enterprises will ordinarily give the farmer opportunity to find profitable employment for a greater portion of the year than a small farm with only a few enterprises. In both cases, also, the farmer has the opportunity to employ more labor, of both man and beast, as well as more capital.

Organizing the work will go far to provide for ample productive labor, as illustrated below from farm management survey findings.

Example of Relation of Productive Work Units to Profits and Other Factors, Pennsylvania.—This is shown in the results of a Pennsylvania survey:

FARM MANAGEMENT

TABLE 26.—RELATION OF PRODUCTIVE WORK UNITS PER MAN TO PROFITS AND OTHER FACTORS IN FARMING ON 378 OWNER FARMS, CHESTER COUNTY, PA.⁷

Productive work units per man	Average per man	Number farms	Average size, acres	Productive work units per horse	Labor income	Labor income of operator per day of productive labor
Less than 100.....	83	22	58	38.5	\$ 181	\$2.18
100 to 149.....	126	62	72	45.2	366	2.90
150 to 199.....	176	114	90	55.8	625	3.55
200 to 249.....	222	102	96	59.1	959	4.32
250 to 299.....	272	49	108	62.7	1,147	4.22
300 to 399.....	336	23	107	63.2	1,535	4.57
400 and over*.....	448	6	101	66.7	1,833*	4.09
Average.....	201	378	90	78.3	\$ 789	\$3.93

*One farmer out of the six met with serious loss for which he was not responsible, thus causing a minus labor income of \$49. The average labor income of the other five was \$2,209, with an average wage of \$4.93 per work unit.

Example of Relation of Productive Man Work Units to Labor Incomes, Missouri.—A Missouri study shows:

TABLE 27.—RELATION BETWEEN PRODUCTIVE MAN WORK UNITS AND LABOR INCOMES (Mo.)²⁸

Productive man work units per man per year	Labor incomes		
	Owner	Part owner	Tenant
100 or less.....	\$ 27	\$ 165	\$168
101-125.....	176	225	326
126-150.....	334	383	325
151-175.....	303	407	496
176-200.....	460	492	571
201-225.....	511	672	825
Over 225.....	752	1,178	962

Example of Relation of Labor Income to Man Labor, Nebraska.—The results of a Nebraska study gives:

TABLE 28.—RELATION BETWEEN LABOR INCOME AND EFFICIENCY OF MAN LABOR (NEB.)²⁷

Area of farms (in acres)	Average labor income per farm	Average number of men per farm	Average number of crop acres per man	Productive animal units per man
40-100.....	\$122	1.11	58.5	6.7
101-150.....	355	1.14	90.0	9.5
151-200.....	322	1.38	101.9	10.9
201-250.....	684	1.90	101.2	13.5
251-320.....	445	2.14	114.0	11.9
Over 320.....	324	2.61	113.5	16.6
Average (195 farms).....	\$385	1.54	98.5	11.4

Planning to Reduce Labor Requirements.—During times of scarcity of and high prices for labor, plans to reduce labor requirements are often of interest. Such reduction must of course be accompanied by a study of the possible effect upon farm incomes. Some idea of the labor requirements of crops is obtainable:

1. By listing the operations required in commercial crop production.
2. By determining the amount of man and horse labor required for each operation.
3. By reducing the data thus obtained to man days and horse days per acre, and
4. By taking the yield into consideration.

Example of Selecting Crops of Low Labor Requirements.—Certain western crops recently studied²⁹ summarize as follows:

TABLE 29.—LABOR REQUIREMENTS OF CROPS (CALIFORNIA)

Crop	Average yield (tons)	Man-hours per acre	Horse-hours per acre	Man-hours per ton	Horse-hours per ton
Alfalfa.....	8.3	49.0	56	5.8	7
Barley.....	1.3	11.2	47	8.4	36
Cannery peas.....	2.6	204.0	51	78.0	17
Cantaloupes.....	6.5	188.0	119	29.0	18
Corn (Milo).....	1.3	28.0	41	25.0	36
Cotton (seed).....	0.5	90.0	51	175.0	99
Currants.....	1.7	250.0	15	151.0	9
Early potatoes.....	3.0	119.0	38	40.0	13
Grain hay.....	2.0	9.3	31	5.3	15
Green corn.....	2.1	102.0	50	52.0	25
Rhubarb.....	4.1	190.0	21	47.0	5
Strawberries.....	5.3	1542.0	11	308.0	2
String beans.....	7.5	815.0	85	110.0	12
Sugar beets.....	13.5	83.0	64	6.2	5
Sweet peas.....	0.3	170.0	66	685.0	258
Tomatoes.....	11.3	149.0	52	13.2	5
Wheat.....	1.1	11.7	53	11.2	49

Data from miscellaneous publications are presented in round numbers:

TABLE 30.—LABOR REQUIREMENTS OF CROPS—UTAH, GEORGIA, MISSOURI, WEST VIRGINIA, PENNSYLVANIA

Locality	Crop	Labor requirements per acre	
		Man-days	Horse-days
Utah ⁶⁰	Strawberries.....	40.0	9.2
	Raspberries.....	61.0	11.0
	Peaches.....	34.0	12.0
	Prunes.....	33.0	13.0
	Pears.....	22.0	7.0
	Apples.....	24.0	12.0
	Alfalfa.....	2.5	2.9
	Canning peas.....	9.5	11.0
	Small grain.....	3.2	3.4
	Snap beans.....	31.0	10.0
	Tomatoes.....	37.0	17.0
	Potatoes.....	13.0	13.0
	Onions.....	38.0	15.0
	Sugar beets.....	16.0	16.0
Georgia ²⁶	Cotton (upland).....	14.0	50.0
	Corn.....	3.3	3.1
	Peanuts.....	23.0	2.9
	Oats.....	1.3	1.9
	Cowpea hay.....	1.9	2.1
	Sorghum silage.....	6.7	6.8
	Watermelons.....	5.4	5.0
	Sweet potatoes.....	10.3	5.0
	Sugar cane.....	26.2	14.4
	Missouri ²⁸	Corn, husked.....	2.5	4.0
Wheat, oats and rye....		1.5	2.5
Cowpeas.....		2.0	2.5
Potatoes.....		6.0	4.0
Tomatoes.....		12.0	10.0
W. Virginia ³¹	Oat hay.....	0.8	1.9
	Corn.....	5.7	4.3
	Wheat.....	2.3	3.4
	Hay.....	0.8	0.7
	Potatoes.....	10.2	8.2
Pennsylvania ³¹	Tobacco.....	38.0	5.3
	Corn, grain.....	6.9	6.2
	Corn silage.....	6.5	7.2
	Potatoes.....	9.7	9.3
	Oats.....	1.6	2.6
	Wheat.....	2.0	3.9
	Alfalfa.....	6.1	8.7

Detailed Labor Requirements of Cotton and Strawberries.—To illustrate the method of finding a basis for computing the figures in Tables 29 and 30 two detailed individual cases are given:

TABLE 31.—DETAILED LABOR REQUIREMENTS OF PRODUCING COTTON (CALIFORNIA)
Yield $\frac{3}{4}$ bale = 1,200 lb. seed cotton

Operations	Acres per day per man	Acres per day per horse	Man- hours per acre	Horse- hours per acre
Plow, 6-7 in., 8 mules, 2-14-in. bottoms.....	5.0	0.62	2.0	16.0
Irrigating once, 3-ft. head.....	10.0	....	1.0	
Double disc, 4 horses.....	10.0	2.5	1.0	4.0
Drag, 8 horses.....	10.0	1.25	1.0	8.0
List, 3 horses.....	5.0	1.67	2.0	6.0
Smooth, 2 horses.....	10.0	5.0	1.0	2.0
Plant (2 horses, 2 rows, 36 in. apart).....	12.0	6.0	0.8	1.6
Irrigating (2 times between Apr. 15 and May 15).....	5.0	....	2.0	
Disc-cultivate (away from, "bar off," 2 horses)	10.0	5.0	1.0	2.0
Chop.....	1.0	....	10.0	
Cultivate up to—"warp".....	10.0	5.0	1.0	2.0
Irrigate 3 times.....	4.0	....	2.5	
Cultivate 3 times (alternate to Aug. 15).....	10.0	5.0	1.0	2.0
Irrigate 3 more times.....	4.0	....	2.5	
Hoe twice.....	0.5	....	20.0	
Pick—man pick 150-250 lb. per day— $\frac{1}{6}$ acre..	0.17	....	60.0	
Totals.....	....	....	108.8	43.6

TABLE 32.—DETAILED LABOR REQUIREMENTS OF PRODUCING STRAWBERRIES
(CALIFORNIA)
(Flat Land, Irrigated)
Yield 200 chests per acre

First year operations	Acres per day per man	Acres per day per horse	Man-hours per acre	Horse-hours per acre
Plow (8 in. deep, 4-6 horse gang).....	4.0	0.8	2.5	12.5
Harrow (2 times, 4 horses).....	8.0	2.0	1.2	5.0
Ridging (1 horse and plow).....	4.0	4.0	2.5	2.5
Smoothing by hand.....	0.07	...	140.0	
Planting out.....	0.05	...	200.0	
Hoe and weed twice.....	0.04	...	250.0	
Cultivate (twice by hand).....	0.5	...	20.0	
Irrigate 5 times.....	2.0	...	5.0	
Bedding in runners.....	0.05	...	200.0	
Total first year.....	...	...	821.2	20.0
Operations other years:				
Cutting off tops once.....	0.08	...	125.0	
Cultivate (by hand 3 times).....	0.1	...	100.0	
Hoe and weed (3 times).....	0.02	...	500.0	
Irrigate (once a week, man does 10 acres per day).....	0.4	...	25.0	
Picking (2-3 chests per day).....	0.01	...	1,000.0	

Since plants bear 3 crops, multiply 1,750
by 3
5,250
Add man-hours, first year 820
Total man-hours, four years 6,070
Average man-hours, per year 1,520

Average yields
First year — 25 chests
Second year—300 chests
Third year —350 chests
Fourth year—125 chests

4)800
200

Hence 1,520 man-hours and 5 horse-hours per year produce 1 acre or 200 chests of strawberries.

Variation in Labor Needs.—An example of the range in labor needs for the same crops grown under different conditions of soil, topography, yield, and equipment is illustrated in the following tables:

TABLE 33.—VARIATION IN LABOR NEEDS OF BARLEY (CALIFORNIA)

Case No.	Crop	Yield tons	Man-hours per acre	Horse-hours per acre
1	Barley	1.4	14.0	42
2	Barley	1.4	9.0	59
3	Barley	1.6	22.0	72
4	Barley	1.4	7.5	46
5	Barley	1.4	7.0	24
6	Barley	1.2	18.0	27
7	Barley	1.1	5.2	67
8	Barley	1.0	7.0	43

Planning to Produce Family and Farm Supplies.—In the chapter, "Farm Profits," is shown the value of home, family food, and fuel. These contribute in a substantial way to the farm income. Their inclusion in the farm program should be carefully considered.

Planning to Produce Vegetables.—The vegetable garden, in itself, offers an interesting example of planning the work to obtain a steady supply of vegetables and at the same time meet crop growing requirements.

Goodrich writes for the South.²²

TABLE 34.—PLANTING PLAN FOR VEGETABLE GARDEN IN THE MIDDLE COTTON BELT
(For a farm family of five adults or their equivalent. Size of plot, 200 ft. long by 144 ft. wide, rows 200 ft. long)

Row No.	Row space, feet	Earliest planting period	First crops	Final plantings	
				Period	Crop
1	4	Feb. 15-Mar. 15	150 ft. asparagus, 50 ft. herbs		
2	3	Jan. 1-Feb. 28	Cabbage, lettuce between cabbages	Aug. 1-15	Sweet corn
3	3	Feb. 1-28	Early white potatoes	do	do
4	3	do	do	do	do
5	3	do	Early garden peas	Aug. 30	Cauliflower
6	3	do	Early turnips; radishes to mark rows	Aug. 15-30	Green beans
7	3	do	Green onions from sets	do	Cabbage
8	3	Feb. 15-Mar. 15	Spinach	do	do
9	3	do	Cauliflower	Sept. 15-Oct. 1	Spinach
10	3	do	100 ft. early beets, 100 early carrots		
11	3	do	Dry onions from seed; radishes to mark rows		
12	3	do	do		
13	3	do	100 ft. parsnip; 100 ft. salsify; radishes to mark rows		
14	3	Mar. 1-30	Medium garden peas	Aug. 1-30	Celery
15	3	do	Snap beans	Oct. 1-15	Turnip
16	3	Mar. 1-30	Early sweet corn	Oct. 1-15	Kale
17	3	Mar. 15-Apr. 15	Early sweet potatoes	do	Green onions
18	3	do	do	do	Beets
19	3	Apr. 1-30	Medium early snap beans	do	Collards
20	3	do	Medium early sweet corn		
21	3	do	do		
22	4	Mar. 15-Apr. 15	Early tomatoes		
23	4	do	Medium early tomatoes		
24	4	do	Pole lima beans		
25	3	do	100 ft. egg plant, 100 ft. pepper		
26	3	do	Okra		
27	6	do	100 ft. cucumber, 100 ft. summer squash		
28	6	do	Muskmelon		
29	9	do	Watermelon		
30	9	do	do		
31	9	do	do		
32	9	do	Winter squash		
33	4	May 1-30	Main crop tomatoes		
34	4	do	do		
35	3	do	Third planting sweet corn		
36	3	do	do		
144					

A garden laid out according to this plan would contain a little less than $\frac{2}{3}$ acre. In addition it is advised that $\frac{1}{2}$ acre of late sweet potatoes and $\frac{1}{3}$ acre of late white potatoes be planted to provide a winter supply of these vegetables. It is suggested that cowpeas or some other catch crop be planted between the rows of the long-season crops at their last cultivation and that fall and winter cover crops be planted on ground not occupied by vegetables all the season, these crops to be turned under for improving the soil.

Size of Garden to Provide Vegetables.—The size of the garden necessary to supply vegetables for a family of a given number of persons will be influenced largely by the climatic conditions, the quality of the soil, the likes and dislikes of the family, and the method of cultivation of the garden (whether largely by horse labor, by man labor, or by a combination of both).

Kentucky finds³³ that a $\frac{1}{4}$ -acre plot, systematically cropped, can be made to supply a family of six.

In California a garden on good soil, 100 ft. square, will furnish ample vegetables for a family of five, excepting potatoes and dry beans.

Planning to Produce Fruit.—The family orchard is a factor in both reducing the living costs and in adding variety to the menu.

Goodrich³² suggests for a Southern family of five:

10 apple trees	3 Japanese persimmon trees
3 pear trees	11 peach trees
2 plum trees	15 grape vines
2 fig trees	25 dewberry vines
strawberries between trees to extent desired.	

Taylor,³⁴ with California conditions in mind, offers a plan of planting to include:

6 apple	2 walnut	6 raspberry
6 apricot	2 pecan	6 blackberry
2 cherry	6 pear	6 hybrid berries
2 nectarine	1 quince	12 currant
10 peach	2 fig	200 strawberry
6 plum	30 grape	2 lemon
4 prune	6 olive	2 orange
4 almond		

Several varieties of different times of ripening are to be selected, to prolong the season of supply.

Planning the Reorganizing of Going Concerns.—When a given farm business is already established but doubt is felt concerning the wisdom of continuing, a frank facing of assets and liabilities will aid. Merely talking the matter over with an interested audience often helps to clarify one's vision, especially if the audience is an understanding one. The mere presentation tends to crystallize one's ideas into concrete shape and brings about deductions to guide the future course of procedure.

For instance, a certain ranch was devoted to alfalfa, dairy, and hogs. More capital was needed. Due to the small size of the dairy and hog herds, only about one-half the alfalfa acreage was required for stock needs. Alfalfa produced and sold as hay would command a price only sufficient to pay the cost of production. By turning under the excess acreage and planting to sugar beets and milo, a cash surplus of \$2,000 above operating expenses was made available.

In another case, the question arose as to whether a given farm business should be continued. Investigation showed that an expense of \$13,000 could be met only to the extent of \$12,000—unless further investments were made. Heavy interest on deferred payments and a high cost of irrigation water were responsible. The estimate of \$12,000 gross income did not include the risk of loss from disease or climatic factors. The only way to break even was a further investment of \$10,000 the better to organize and conduct the business.

A group of colonists located on small acreages, agreeing to make payments monthly or to forfeit their payments and improvements. Seventy-five per cent failed because of lack of capital or insufficient returns to pay running and household expenses and to meet payments all at the same time. Many of the failures were traceable to ignorance of farming or to carelessness in investigating the agricultural possibilities of their purchases.

A man purchased 20 acres of shallow land, put in a pumping plant and seeded 18 acres to alfalfa. His yields were $3\frac{1}{2}$ tons per acre, and his market paid \$11. Even with this price, which happened to be a good one at the time for alfalfa in his section, his total income—\$700—was not sufficient to meet his payments and pay operating expenses. Purchasing at \$125 per acre, paying \$25 down and assuming a debt of the remainder to be paid off in five equal installments with interest at 7 per cent, his annual payments amounted to \$512 at the end of the second year.

Suggestions for Reorganizing a Going Concern.—It behooves a man to make a careful study of his expenses and receipts in order to gain a clear cut understanding as to where he stands. If he cannot see his way clear under present arrangements to win out, he must take proper steps to reorganize his business. There is no given rule for making changes, but for most men some suggestion will be found in the following:

(a) *Increasing Acreage.*—A larger acreage is needed. This may be secured by purchase or by leasing.

Forty acres in barley, producing 16 sacks, worth on an average \$2.00, gives a gross income of \$1,280. If a gross income of \$3,000 is needed and grain must be continued, by leasing at a rental of one-fourth the crop, this sum can be secured from 70 additional acres if same conditions are to be met on the leased land and equal care given the crop.

(b) *Change in Crop.*—A change should be made in the character of crops being raised, selecting those offering greater acreage returns.

One hundred acres of land now cropped to Egyptian corn, yielding 2,000 lb. per acre, and worth \$3.00 per hundredweight and costing \$3,350 to produce, all work being hired, may be suitable for the production of sugar beets and raise 10 tons per acre, worth \$10.00 per ton at a cost of \$70. The returns above operating expenses could thus be increased from \$2,650 to \$8,000 by the substitution of a more profitable crop.

(c) *Introduction of Live Stock.*—The introduction of live stock, either to provide an opportunity for utilizing one's labor to a greater extent, or to turn crops into greater profits by selling off as meat.

On an alfalfa ranch, situated far from a market, the crop, sold as hay, year in and year out brought only the cost of production, \$3 or \$4. By feeding to dairy cows along with corn, silage, stock beets, or concentrated feeds, the operator can find profitable employment throughout the year instead of only during the summer months. Moreover, with cows producing an average of 20 lb. of milk daily for a 300-day milking period, and the butterfat sold, the annual gross income per cow was \$80. If \$30 be set aside for labor and overhead charges and \$20 for feeds other than hay, each cow paid \$30 for the use of the alfalfa, or at the rate of about \$8 per ton—while the cost of harvest was to some extent eliminated. The value of the hay was more than doubled.

A small flock of sheep or poultry to consume farm or kitchen wastes and thus return an income for what would otherwise be wasted, is another example of the introduction of live stock.

(d) *Improving Soil Quality.*—The building up of the quality of the soil.

A farm situated on certain of the lighter types of soil, utilized for 50 years for grain, is capable of raising neither large nor varied crops under present conditions. By the use of green manure crops, stable manures, intelligent selection of certain commercial fertilizers, or the growing of leguminous crops, the land can once more be brought to a high state of productivity.

(e) *Utilizing Labor.*—A change in cropping program to permit more work for man and stock, to eliminate idle horses, to increase the number of crops, or to work with less stock.

If a farm is given over to the raising of one crop—barley for instance—it is evident that the bulk of the work comes during the months of preparing a seed bed and planting—November, December, January, or February—and again during harvest—June and July. Sufficient stock must be available to get the crop planted or harvested within rather narrow limits of time. The stock is then usually idle the rest of the year—at least so far as work on the home place is concerned. If, however, instead of a straight grain program, other crops are included demanding attention at times not required by the grain, the stock, men, and implements can be worked more days and to better advantage. On the farm in mind milo, Egyptian corn, or beans might be included—thus helping out the work schedule and providing the first step towards a rotation of crops, something usually very desirable. Any of these crops can be put in, grown, and harvested, without interfering with the time required by the grain.

When it costs about 25¢ per day to feed a horse and an additional 25¢ for overhead charges—interest, depreciation, horse-shoeing and mortality, each horse necessitates a yearly expenditure of \$175. If a ranch, operating under such costs, consists of 320 acres, and ten horses will handle the grain, then, under the usual method of grain raising, they will work not to exceed 150 days out of the year. This makes a charge of nearly \$12 a day for horse work. If, however, 120 acres should be put in summer crops and 200 acres in grain, the work could be handled by 8 horses—two head less—and there would be 185 days' work available—or the cost per day would drop from \$12 to less than \$7.

On another farm, it may be possible to institute a rotation of crops without increasing the number of work stock so that three crops can be secured in 2 years, thus adding to the number of sources of income. An irrigated farm now raising beans, crops might be rotated in a way to produce a summer crop of sugar beets, followed by a fall sowing of barley to be cut for hay, this in turn to be followed by a summer crop of a non-saccharine sorghum, or of beans.

(f) *Use of Tractor.*—Replacement of horses with a tractor.

On large areas farmed to grain or to one special field crop, study may indicate the desirability of replacing a certain amount of work stock by a gasoline tractor. This is particularly possible when a large number of horses must be kept the year round for a limited period of work; when two shifts can be worked to advantage on a rush job; when the tractor can be used for clearing land, breaking new ground, pumping for irrigation, in connection with a harvester, or when weedy grain makes horse harvesting difficult.

(g) *Financing.*—Increased or better financing to utilize land to better advantage.

A farmer raising alfalfa on 230 acres, specializing in hay production, and maintaining 75 cows and 20 sows, finds (1) that alfalfa sold as hay pays but little more than the cost of production; (2) that the dairy is profitable; and (3) that the hogs are the most profitable. More financing is needed, however, in order to purchase stock to utilize the alfalfa in excess of that needed by the present herd. This, when secured on the basis of profits already made, will permit a doubling of the income right from the start.

Another farm newly developed has an indebtedness of \$8,000, payable one-fourth each year, with interest on deferred payments at 7 per cent. This means that \$2,560 must be forthcoming at the end of the first year, \$2,420 at the end of the second year, and so on. Even if the ranch or general farm, contains as much as 100 acres, the indebtedness to be met places a heavy burden upon it. This is especially true in the case of young orchards when the crops which can be raised between the trees are limited in variety and acreage. By floating a new loan through other sources which will permit the loan to run five years before becoming payable and allowing payment to extend over a period of ten years, the new venture may be successfully financed, whereas in the first case the project would have great difficulty in making enough to meet the payments as they come due. This would be particularly true if the operator were not well versed in the handling of a farm under his local conditions.

A reduction of the rate of interest from 8 to 7 per cent would result in a saving of \$100 annually on a loan of \$10,000. It should be stated, however, that, in financing farms, the rate of interest is of less importance than the terms of paying off the principal. One may have the choice of paying 7 per cent for the money he needs and be allowed 10 years to meet the loan, or he may pay 6 per cent and be obliged to wipe out all indebtedness in 5 years. While the character of the industry will determine the rate of speed with which the loan can be paid, the longer period, even at a slightly higher rate, is more desirable for the average man.

(h) *Providing Irrigation.*—Provision for better irrigation.

A certain ranch devoted to wheat is capable of raising high yields. Under dry-farming conditions, this would be 1,500 lb. If water could be secured for \$2 an acre per year, the yield would be 2,000 lb. Taking into account the increased cost of harvest for the larger crop, the results would stand (1919 data):

	COST TO PUT IN	COST OF GROWING	COST OF HARVEST	TOTAL COST, INCLUDING TAXES AND INSURANCE
Dry farmed.....	\$5.50	.....	\$ 8.50	\$14.60
Irrigated.....	5.50	\$2.00	12.50	22.00
	VALUE OF YIELD @ 4¢	GROSS PROFIT FROM 100 ACRES	IN FAVOR OF IRRIGATION	
Dry farmed.....	\$30.00	\$1,540		
Irrigated.....	40.00	1,800	\$260	

(i) *Reducing Operating Expenses.*—Many short cuts are possible in farm work with resultant reduction of operating expenses.

One firm stacks hay with a crew of 19 men; another with a crew of 7 men. While the first puts up 60 tons a day, the work is not well organized and the hay costs 68¢ a ton to stack. In the second field the cost is 50¢ a ton, although the crew puts up but 36 tons a day.

A certain small farm devoted to fruit production and run by a paid manager cut its annual expense from \$2,700 to \$1,500 by the substitution of a working foreman for a former office man.

Other short cuts may be noted in such suggestions as:

1. Water horses before feeding grain.
2. Let fowls have the run of the corrals and save what would otherwise be waste grain.
3. Use no good hay for bedding.
4. Save time by the use of a large milk separator.
5. Feed hay to stock cows in the field by placing in small bunches rather than in large piles.
6. Save all grain sacks.
7. Watch hired cooks—especially to see that they utilize leftovers.
8. Feed eggs instead of meat when the hens are laying plentifully.
9. Buy the cheaper cuts of meat, give plenty of milk and vegetables. Watch the garbage can as a check on a hired cook.
10. Let cultivation replace excessive irrigation.
11. Protect implements from the weather.
12. Clean ditch banks before weeds go to seed.
13. Repair machinery in advance of sending it into the field.
14. Buy those things which can be purchased more cheaply than made or raised—*i.e.*, farm implements, wagons, and the like.
15. Provide proper sleeping quarters for the men.

(j) *Increasing Yields.*—Increasing yields now below the optimum.

On a certain ranch devoted to the production of potatoes, it was found that by plowing twice as deep, at an additional cost of \$2.50, and giving \$5 worth more of soil preparation and crop cultivation, the crop returns would be \$20 to \$30 additional for the \$7.50 invested.

There is, however, in crop production a point where increased yields can not be secured without disproportionate increased expenses. This is the so-called "point of diminishing returns."

If a given ranch in a high state of cultivation is producing 4,000 lb. of barley per acre worth \$1.10 per hundredweight, to effect an increase to 4,500 lb. may necessitate field management involving an expenditure of \$10 to \$12, so that the increased yield is not sufficient to warrant the added cost required to obtain it.

Planning Special Programs.—In localities, remote from sources of supply, where the time and energy involved will make proportionate

returns, attempts should be made to include a good vegetable garden, a family fruit orchard, poultry, a cow or two, and enough hogs to consume the kitchen waste and to work over the stable manure. A judicious planting of flowers, shrubs, and lawn will always pay in added attractiveness to the home.

These items take time and close attention. They add materially to the variety of the table and offer additional income, but they make it necessary for some one to be on hand to milk, feed, and water 365 days in the year. For this reason many orchardists and others specializing in one or at most two or three crops do not take kindly to a change in program making, as it makes not only for more work but for greater confinement.

Gathering Data in Planning.—The necessity for care in reasoning and calculating farm management problems may be judged from the following answers to a test question given advanced students who had had a term of class work, asking as to the possibilities of profit from a given farm plan. The answer, for conditions existing at the time, was a \$1,600 labor income.

Determinations of labor income were submitted as follows:

\$	800
	1,000
	1,600
	2,300
	3,300
	4,900
	7,300

The first two answers did not do the business credit; the last four would mean bankruptcy or close figuring if other means were not available than provided for in the plan.

Correct Data Essential.—Special stress must be placed upon the necessity of using correct data in drawing deductions concerning any project. Each item entering into the scheme should be carefully scanned and critically tested. It is better to have too much rather than too little information. This applies to the prospective farmer, to the man who is thinking of agriculture as a field for investment, to the man already established who desires to know how he stands, and to the established farmer who wishes to branch out into larger or different industries.

Sources of Data.—In this connection it is well to accept opinions only from reliable, well-informed, experienced, disinterested men versed in the local conditions affecting the problem. Precaution suggests the avoidance of data not directly applicable. The use of material collected from different sections of a state, and, therefore, applying only to state wide conditions should not be used as an absolute index to an individual ranch.

This may be illustrated by the influence of crop yields. Assume one is interested in the production of apples and finds it necessary to obtain \$4,000 annually to cover interest, operating, and family expenses. If the land in mind is typical of the conditions prevailing in certain well-established commercial sections, and the crop is valued at an average of \$1.00 per box, the acreage sufficient to produce this sum will vary with the possible yields. If the land is capable of producing best crops—and very few growers obtain them—of an annual output of 400 boxes per acre, only 10 acres of bearing orchard will be required to give \$4,000. If the land will produce good crops of 250 boxes, 16 acres will be required instead of 10. Should the land, however, be only usual land and thus producing yields of 150 boxes, the area necessary to return \$4,000 will amount to 27 acres. Hence the need of detailed knowledge:

1. As to what sums are needed by the operator.
2. A clear understanding as to the producing power of a given farm.

This second point may be further amplified by studying its present production and its possible production if better methods are employed, which again will influence the necessary acreage.

CHAPTER VI

THE SOIL FACTOR

Soil quality, with its far reaching effect upon crop production, claims an important place when plans are being drawn up to serve as a basis for conducting a farm business, and due consideration should be given to plans which provide for the maintenance or actual increase in soil productivity.

Success in Farming Depends on Crop-producing Power of the Land. Continued success in farming largely depends on the crop-producing power of the soil; or, in other words, upon maintenance or increase of present fertility rests in great measure the earning power of the land. But in matters pertaining to soil fertility, science is far ahead of practice. That is, investigations of the need of improving soil conditions, and the methods by which such improvements can be attained, have advanced beyond actual field practice. Farmers are slow to take up methods of rebuilding soils, and yet of all practices, maintenance or increase of the crop-producing power of the land is first in importance.

There would be no particular gain in analyzing why this is so; it makes little difference to what the delay and hesitancy are due. It may be lack of information concerning needs or methods, or lack of faith in the outcome; or indifference, or lack of courage to face a program often of long time duration, or it may be lack of capital or equipment, or inability to spare fields for the required periods.

Correlating Recommendations and Practices.—The farm manager new to agriculture or to a community is likely to find himself at a loss properly to correlate two apparent extremes, the one being recommendations of what should be done and how to proceed; the other what is actually being accomplished in a commercial way. There is as a rule sufficient evidence to support the recommendations, there are also conditions in many instances which operate to force a change in the suggested plan, and, at times, to prohibit its use in any way.

For instance, a recommendation to plow under straw or manure, in dry land farming where insufficient moisture is available to rot the mass of vegetation turned under, may result in the introducing of an insulating layer and seriously interfere with the germinating and growth of the next year's crop. Or the suggestion that a year be lost in growing cash crops so that a legume crop may be included in the rotation for green manure purposes, may curtail receipts to an untenable extent. A proposed plan including a hoed crop for the sake of killing weeds may be out of place where labor is scarce or at a premium.

A farm manager should, however, be thoroughly posted concerning the recommended practices for maintaining or increasing the crop-producing power of the land, and should learn intelligently to sift out what can and what cannot be used to advantage. He should also be aware of the usual practice in the community, and possess a working knowledge of what has been tried and found wanting.

Introducing New Practices.—To introduce new practices into a community requires courage, patience, perseverance, foresight, knowledge. Clear thinking and acting on the part of a farm manager to bring about a more stable agriculture through attention to soil matters, offers a real field for public service.

Accepting Experiment Station Findings.—Since land must ordinarily be used for money-making purposes rather than as an experiment station, it pays to accept as correct the teachings of government and state institutions and to concern oneself only with how these apply to specific conditions.

I have no wish to discourage experimentation. My aim rather is to impress the fact that one can not afford to duplicate extensive investigations—*e.g.*, green manuring as a means of replacing humus, proper preparation of the seed bed, selection of a pedigreed sire, age to breed, methods of feeding. These have been or are being well worked out. One can therefore spend his time to better advantage determining the adaptability of detailed findings for his particular farm. His queries should run—does my farm need green manuring? Will it pay me to utilize the stable manure produced? Shall I plow deep or shallow? Where can I secure pure seed?

Take advantage of the findings of your agricultural institutions, see what your neighbors are doing, investigate every possible detail.

Most individual problems are purely local, and involve a determination as to how far the needs of a particular farm necessitate or permit the adoption of definite principles.

There is much work to be done in proving that a well kept summer fallow will actually kill weeds, conserve moisture, and increase crops; that properly handled straw, manure and green vegetation will improve the humus content; that breaking of a plowpan, even though expensive, pays; that judicious use of fertilizers, intelligently handled, will often pay dividends; that properly handled stable and barnyard manure, properly cared for, has a substantial value.

Ways of Improving Soil Quality.—Briefly summed up, the ways of improving soil quality are by use of one or more of the following methods:

- (a) Rotation,
- (b) Green manuring,
- (c) Commercial fertilizers,
- (d) Stable manures.

Will Improving Soil Quality Pay?—From the farm management viewpoint the question involved in considering the utilization of any (or all) of these is, will it pay?

In our treatment of these subjects we shall follow a procedure to show:

1. The definite purpose of each,
2. Farm management recommendations,
3. Extent of present actual use.

ROTATION OF CROPS AND CROPPING SYSTEMS

Definition of Rotation of Crops.—Rotation of crops is the utilization of botanically different crops in a sequence of planting. An example of a rotation is grain followed by potatoes the second year and beans the third; or alfalfa three years, followed by grain during the fall of the fifth year, corn the summer of the sixth year, grain the fall of the sixth year, and back into alfalfa the spring of the seventh year.

Purpose of Rotation of Crops.—Rotation of crops first of all provides facilities for the preservation of fertility by permitting the growing of green manure crops to keep up humus and plant foods, by alternating deep and shallow rooted crops, by providing for a balanced removal of plant food, by providing for the actual restoring of plant food as in the case of nitrogen restored by legumes. It also aids in controlling insects, diseases, and weeds, and in permitting better methods of cultivation and an occasional advantageous change in the depth of plowing.

Crop Rotation Presupposes Prepared Plan.—Rotation of crops usually presupposes the use of a well thought out plan for supplying sufficient feed—particularly roughage, hay, and pasture, with possibly grain for the stock—and for producing the most profitable cash crop or crops possible in the locality, in combination with a system which will build up productiveness, control pests, and systematize labor.

Definition of Cropping System.—A cropping system is systematic crop rotation evenly balanced on several fields in such a way that one crop will follow another in a definite order and according to a definite plan, while yet uniform production is so maintained that the annual acreage of all crops remains constant year in and year out during the entire period of the rotation.

Cropping systems cover, therefore, several fields under the standard rotation, and with this rotation so handled that at any given time each field is at a different stage of the rotation from the others, so as to insure a constant supply of products.

Multiplying Cropping Systems.—More than one cropping system can be planned for the same farm, and in fact, if the farm is large enough more than one will be required.

Determining Cropping Systems.—Just what rotation to institute will largely depend on the local conditions and the purpose for which the ranch is being run.

For instance, where alfalfa and cattle are being raised, grain will fit in admirably, using one-half the ranch for grain and one-half for alfalfa, alternating a portion each year, as follows: alfalfa 4 years, grain annually for 4 years. Each year plow up one-fourth of the oldest and most run out alfalfa and seed to barley. During the same season seed down one-fourth of the last year's barley land to alfalfa. This may seem a short rotation, but it may be noted that cattle pastured on the alfalfa materially shorten its life, so that it is well not to retain the planting too long. The barley benefits from the nitrogen left by the alfalfa, and at the same time its annual cultivation kills out the foxtail, or other weeds that tend to creep into deteriorating stands of alfalfa.

If labor conditions will permit, a corn crop can be grown between grain crops, or, if the soil requires humus, green manure crops can be substituted or run with the grain crops.

Or if the general scheme is the production of potatoes, a rotation can be figured out to include alfalfa—both for its beneficial action on the soil and for the hay it will yield for the work stock, or if the land cannot be spared for alfalfa, another legume such as beans could be used.

Rules for Use in Planning Rotations.—For general guidance in planning rotation of crops or cropping systems the following rules are well had in mind.

(a) Alternate crops requiring deep plowing with crops doing well with shallow plowing.

(b) Aim to have the land in a perennial legume or sod for several consecutive years.

(c) Follow a leguminous crop with a non-leguminous.

(d) Follow a winter-growing crop with a summer crop rather than fallow, if the crop and water are available.

(e) Follow deep rooting crops with shallow rooting crops.

(f) Have a succession of crops always available for pasture purposes if stock feeds must be provided.

(g) Avoid fallowing—better utilize a green manure crop.

(h) In general a good rotation includes one money crop, one clean-tilled crop, one hay crop, one leguminous crop.

(i) Alternate occasionally with a clean cultivated crop to control weeds.

Example of a Rotation and Cropping System.—Having determined the crops which it is possible to grow at a profit on a given piece of land, a scheme can be evolved which will cover both the farm and the soil needs. The following example will illustrate crop rotations worked into a cropping system:

Selecting the Crops.—Given a farm which has 640 acres of good tillable land, suitable for alfalfa, beans, peas, beets, potatoes, and grain, the alfalfa, beans, and peas will usually fulfill all the requirements of the soil as regards nitrogen-gathering. When

the soil is poor in humus, or where the humus burns out rapidly, provision must be made for returning it to the soil. This can be accomplished most easily and quickly by sowing with the grain crop some form of green manure crop which can be left to make its growth after the grain is off, and can then be plowed under. Or, if ample water is available from rainfall or irrigation, after the grain is off, the land can be moistened and then prepared for the reception of the green manure crop. With the warm weather present in the summer time the crop will make a quick growth and will be ready for plowing under in the fall in time to permit it to rot during the winter. In the rotation which we will consider, clover can take the place of alfalfa, peas the place of beans, and oats, wheat, or barley can constitute the grain.

Planning the Order of Crops for the Example.—After selecting the crops, which in this instance are to be alfalfa, barley, beans, and potatoes, the next step will be the planning of the order in which these crops are to be raised. In the majority of cases it will be found better to leave the alfalfa in for 2 years. By this method some hay can be obtained the first year, and considerable the second. The last crop should be left and plowed under. By this means humus is replaced in the soil. Alfalfa is lending itself as a most desirable crop, as the crops which follow it are recordbreakers. In order to facilitate the killing of alfalfa before putting in the next crop—something which can be done with comparative ease, as the alfalfa will not be old enough to possess roots of the size and toughness of old alfalfa fields—potatoes or beans should follow the alfalfa. Potatoes do very well on this land, and, as they do not tax the soil, they leave it in excellent shape for the beet crop. As they are planted in wide rows, the frequent and thorough cultivation which they require can be easily done and will at the same time kill the alfalfa shoots which may come up. Beets might follow the alfalfa, but more or less trouble would be experienced in cultivating. It is better for the beets to follow potatoes for 1 or 2 years. Grain follows the beets, part being cut for hay and part for grain.

Including Commercial Fertilizers in the Example.—When commercial fertilizers are required, they will go on the crop will profit most. The manure, when used, will go on the land to be in potatoes or beets, being put on the previous fall, or on the grain crop.

The Final Rotation of the Example.—The rotation for each field will, therefore, consist of:

TABLE 35.—A CROP ROTATION FOR A GIVEN FARM

First year.....	beets
Second year.....	beans
Third year.....	grain
Fourth year.....	alfalfa
Fifth year.....	alfalfa
Sixth year.....	potatoes

The Cropping System from an Example.—To maintain approximately uniform annual production requires that several fields should be devoted to the rotation, and to follow out the scheme to the best advantage the farm should be divided into fields as nearly of the same size as possible. The ideal condition is level, uniform land under irrigation. But as this happy ideal is seldom met with, each farmer must do the best he can with what he has. This scheme would call for six fields, the farm would therefore be divided into six parts. Each part or field would then receive the treatment according to the scheme, each field starting in at a different point of the rotation the first year, that is, field No. 1 would have beets the first year, beans the second year and so on down the list. But field No. 2 would omit the first year's beets, starting with the second year and then continue. Field No. 3 would start in with the third year's crop—grain—and then continue, and so on until all the fields were accounted for.

Summed up, it would give:

TABLE 36.—A CROPPING SYSTEM FOR A GIVEN FARM

FIELD	FIRST YEAR	SECOND YEAR	THIRD YEAR	FOURTH YEAR	FIFTH YEAR	SIXTH YEAR
1	beets	beans	grain	alfalfa	alfalfa	potatoes
2	beans	grain	alfalfa	alfalfa	potatoes	beets
3	grain	alfalfa	alfalfa	potatoes	beets	beans
4	alfalfa	alfalfa	potatoes	beets	beans	grain
5	alfalfa	potatoes	beets	beans	grain	alfalfa
6	potatoes	beets	beans	grain	alfalfa	alfalfa

By this means one-sixth of the farm is in each of beets, of beans, and of barley or other grain, one-sixth in first-year alfalfa, one-sixth in second-year alfalfa, and one-sixth in potatoes. Congestion of work is prevented and provision is made for the principal crop to be beets, while the land is left in good shape for the succeeding crop.

To Provide More Grain in the Example.—This example considers only one-sixth of the land in grain. If more is wanted, some variation will be required from the plan given above. In such a case a rotation might prove feasible consisting of

First year.....	beets
Second year.....	grain followed by green manure crops
Third year.....	potatoes
Fourth year.....	beans

In planning the rotations, those fields which are to have the same crops at the start should lie together to facilitate handling.

Planning a Field Arrangement for Rotation of Crops.—When crop rotations are to follow a given plan involving much man and horse labor, or when the plan of the farm provides for a cropping system producing about the same acreage of pasture, cash, and feed crops annually, all fields, lanes, and fence lines, should be planned or rearranged in the most efficient way to save time and steps and to waste as little land as possible.

Use of a Map in Arranging Fields for Crop Rotation.—In order to plan a permanent rotation of crops a map should be made of the fields of the farm. It is not necessary that this should be an actual survey, although a survey map is of great convenience; a drawing giving merely acreages of fields to within a quarter or even a half an acre is sufficient for practical purposes. An outline map may be made by first pacing the boundaries of the farm, noting the field divisions in the sections, and measuring angles. The figures thus obtained can then be applied to scale and the areas of the various fields secured by mathematical calculations based on dividing the map into triangles and getting their measurements in areas by using a ruler. The total of the fields should nearly check with the area of the farm as given in the deed. An easy way of measuring angles is to lay off a good distance, say 100 or 200 ft., down each leg of the angle and then to find the distance between these points.

The advantage of such a map is obvious. It will give the farmer a better idea of the layout of the farm and make it easier to plan the crops. It can be used for recording important items for reference, such as crops grown, fertilizers or manures applied, total yield of crop per acre secured, cost of production, income and net profit per acre.

If the original map is drawn on tracing cloth, black line prints with a white background can be obtained at nominal cost, and any changes in crop acreage or field boundaries can be noted plainly.

GREEN MANURING

Definition of Green Manure Crops.—Green manure crops are crops grown on the land and turned under green, or even dead, for the purpose of improving soil conditions. With certain crops, such as alfalfa, it is sometime possible to take off a cutting or two, but the majority of them are turned under without harvesting any part.

Purpose of Green Manuring.—Green manure crops accomplish several objects. Their main use, however, is to return humus and nitrogen to the soil. Two classes of green manure crops are recognized—one with nitrogen-gathering power, and the other without. Plants such as beans, peas, vetches, bur clover, horsebeans, velvet beans, cowpeas, and clovers are nitrogen-gatherers, that is they are able to gain their nitrogen from sources other than the natural supply in the soil. It is gained by means of microscopic bacteria which develop in the knob-like excrescences or nodules found on the roots of such plants. Plants which do not have the capacity to gather their nitrogen by means of these bacteria are far less desirable green manure crops. Of course such nitrogen as non-legumes appropriate from the soil is returned when the plant is plowed under, but there is no increase. For most purposes one of the plants possessing the nitrogen-gathering property—a legume in other words—should always be selected for green manuring.

Determining Need for Artificial Inoculation with Bacteria for Legumes.—Different legumes require different bacteria. No soil is naturally inoculated for all legumes although many soils are abundantly supplied with the bacteria needed by leguminous plants commonly grown in a community. Once in a while, however, an exception to this rule occurs and it is then necessary to introduce the required form of bacteria. Whether or not bacteria are needed can be usually told by examining the roots of the growing plants upon which they are desired. The plants should be carefully dug out—never pulled—and the clinging soil gently washed off in a stream of water. If on examination of the legume, which has been taken up so carefully that there was no chance of scraping off the nodules, none are found, it is a sign that the land needs bacteria. The small roots should be examined as well as the long main ones.

Methods of Introducing Bacteria.—Several ways are open for gaining the needed bacteria. The use of half a load of soil from fields where the plants show the nodules can be resorted to, or else a supply of the bacteria in bottles can be secured from the United States Department of Agriculture free of charge, with full directions for using.

Definition of Humus.—Humus is partly decayed animal or vegetable matter. A green manure is not humus at the time it is turned under.

Various agencies of decay and disintegration must work upon this mass of green stuff and break down its composition. When the process has reached the point where there is no resemblance to the original material it is humus. Continued beyond this point it becomes nothing but ashes. Humus is the black, earthy material without definite form which gives soils their dark tint on being moistened.

Purpose of Humus.—Humus plays a very important part in soil quality as it has the ability to mellow clay soils and perhaps to bind sandy soil, thus preventing crusting and cracking. It permits free circulation of air in the soil, gathers and retains moisture, binds loose sandy soils, and overcomes the close retentiveness of clays. Finally, in breaking down, it liberates plant food.

Green Manure Crops as Sources of Humus.—The value of a green manure crop depends on the amount of humus and nitrogen which can be obtained from it. This is based on the amount of green growth produced, found by weighing the crop, and by the plant's ability to collect nitrogen from the air, which is determined by chemical analysis. For most practical purposes the legume yielding the most tonnage will prove the best manure crop. Just what plant to use will depend on local conditions, one plant doing better in some sections than others. For most localities the vetch, Canada field pea, or alfalfa will probably be found satisfactory. In addition to the nitrogen gathered from the air by the nodule bacteria, other bacteria that live in the decaying vegetable matter also fix atmospheric nitrogen.

Value of Plant Foods from Green Manure Crops.—The following table gives an idea of the different yields and the value of the crop in dollars and cents, based on its nitrogen, phosphoric acid, and potash content. It means that if these plant foods had to be purchased in the open market, in the form of commercial fertilizers, the cost would be in the neighborhood of the sum set opposite each crop.

TABLE 37.—MONEY VALUE OF PLANT FOODS FROM GREEN MANURE CROP

Values: Nitrogen.....	15¢ per lb.
Phosphorus.....	6¢ per lb.
Potash.....	20¢ per lb.

NOTE.—Both phosphorus and potash are taken from the soil and therefore are not net additions to be credited to the crop.

Plant food value per ton of dry yield		Yield dry per acre (tops and roots) estimated, tons	Value per acre
\$ 9.39	Vetch.....	2.4	\$22
5.94	Bur clover.....	1.6	9
5.20	Cowpeas.....	1.2	6
5.46	Barley.....	4.4	24
6.21	Melilotus indica.....	2.4	25
14.62	Alfalfa (young).....	1.1	16

COMMERCIAL FERTILIZERS

Important Elements.—Of the more common elements required for plant growth, phosphoric acid, potash, nitrogen, and lime, when added to the soil, usually increase yields. The mineral manures or fertilizers on the market today are designed to furnish these ingredients, either as simple elements or else in proportions mixed for special crop needs.

Getting Value from Commercial Fertilizers.—With the increasing use of commercial fertilizers the problem of how to secure the most value from them is worth considering. Under proper conditions fertilizer investments place an additional burden upon the crops so great that any way of saving which will lighten this burden should be practiced in justice to the crop. When improper methods are followed, the cost of fertilizing can easily run up into such prohibitive amounts that no recompense will follow the use of commercial fertilizers.

In general, five possible ways of saving money spent upon fertilizers suggest themselves to the scientific farmer. Summed up they are: (a) by supplying only such elements as actually give results, eliminating all others; (b) by supplying better cultivation, pruning, spraying, and other farm practices, rather than by counting on the stimulating effects of fertilizers; (c) by closely checking up the plant food values of all purchased fertilizers; (d) by mixing the ingredients for any special formula on the farm, when the same combination can not be purchased equally cheap in the open market; and (e) by using high-grade materials in preference to those carrying but small percentages of plant foods.

In fertilizing, the cost of the fertilizer must be more than offset by greater net returns, whether this be from increased quantity or better quality; or by prolonging the life of the tree, in case of an orchard; or by enhancing growth. Whether fertilization will pay or not depends on whether they increase yields sufficiently. In well drained, deep, well tilled soils, properly supplied with organic matter from stable or green manure crops, a special element may still be profitable as a fertilizer.

To secure the greatest value for the money invested, the first step is to choose a fertilizer which embodies all the needs of the crop, and to supply the fertilizer for its food value alone. The second step is to check up the plant food value of the fertilizer and compare it with the purchase price.

How Commercial Fertilizers are Priced.—Fertilizers are sold either at a ton price or at so much per unit or pound of plant food contained—a unit representing 1 per cent of a ton, or 20 lb. Of the two methods, the second is by far the fairer of the two. It carries with it a guarantee that the purchaser is getting all that he pays for, as he can quickly check up the value of the fertilizer by multiplying the guaranteed analysis given him by the manufacturer, or printed on the tag attached to the sacks of fertilizer, with the current trade value of the plant foods.

Correctness of Analyses.—The usual guarantee is correct, because a strict watch kept by each State Experiment Station over all fertilizers sold in bulk tends to eliminate deceit. From the Director of the Station can be obtained a statement as to the value of the different ingredients. These vary in different states, because to the original cost must be added freight rates from points of supply.

When buying is done at ton prices, the value of the fertilizer can be quickly determined from a knowledge of plant food values, and thus a close check can be kept on all fertilizer purchases.

Farm Mixtures Versus Factory Mixtures.—Whether it will prove cheaper to buy the natural elements and mix them on the farm can be rapidly answered by comparing the cost of the material as put up by the fertilizer company with the cost to the farm of buying the raw materials and going to the expense of mixing them.

High-grade Materials Preferable.—Other things being equal, fertilizers made of high-grade materials, or in other words, testing high in analysis, are to be preferred, the cost of mixing, sacking, freighting, handling, carting, and spreading being materially reduced. The usual filler is of little or no value to the land and can be left out just as well as not. Should it have any value, as lime, it can usually be put on more cheaply as a separate ingredient.

Stable Manures

Composition of Stable Manures.—The composition of manure differs with age, feed, the kind of animals producing it, and with the handling it receives before going on the field. General approximate analyses show the following amounts of plant foods present:

TABLE 38.—COMPOSITION OF STABLE MANURES

	Pounds per ton of manure		
	Nitrogen	Phosphorus	Potash
Cow manure, with straw, fresh from stable.....	9	6	9
Horse manure, with straw, fresh from stable.....	10	6	10
Mixed manure, from yard, spring.....	10	8	12

Cash Value of Stable Manures.—At the prevailing prices for these ingredients (1920) the manure is worth from \$3.51 to \$4.38 a ton, or an average of \$3.92. In this calculation, values per unit used are nitrogen \$3.00, phosphorus \$1.20, potash \$4.00.

Physical Value of Stable Manures.—The value of its plant foods is not the sole value of the manure. In addition it has a marked humus value, and for soils light in color, sticky, dense, with little porosity and friability, and liable to bake and crack, it will prove very beneficial. It will loosen heavy, compact soils and bind light ones, thus making both kinds easier to handle, warmer, better moisture collectors and retainers, and more suitable for plant growth. Often the need of humus is so great that the cost of getting the manure on the land can well exceed the fertilizer value. Just how much the manure will be worth when bought outside the ranch will depend on how badly the land needs the humus and on what increased crops the fertilizer ingredients are capable of producing.

Limitations of Stable Manures.—Manure is rather slow in action, and its nitrogen does not become immediately available. For this reason when rapid forcing results are desired, it is well to supplement the manure with some quick commercial form of fertilizer, as nitrate of soda. This slow action is most noticeable on heavy soils, and even here is more marked with fresh manure. With soils of this character rotted manure is best for quick fertilizing results. But for bettering the physical texture fresh manure will prove more desirable. On light or sandy soils the reverse holds true, that is, fresh manure for quick fertilizing and well rotted for improving physical texture.

Cold and Warm Manures.—Manures from cows and hogs are classed as cold manure. They contain much water, and heat and ferment slowly. That from horses and sheep is classified as warm manure. These heat and ferment quickly, dry rapidly, and are in danger of burning. Mixing warm and cold manures can be done to the advantage of both.

Amount of Stable Manures Produced by Live Stock.—As each horse will produce about 50 lb. of manure a day, cows 60 to 80 lb., sheep $2\frac{1}{2}$ to $3\frac{1}{2}$ lb., and hogs 6 to 8 lb., the amount of manure on the average farm is considerable and will well repay attention to its preservation.

Handling Stable Manures.—If the manure can not be hauled as made, it should be kept under cover and treated with some kind of absorbent to prevent the escape of the ammonia. Just what absorbent to use will depend on the needs of the soil. If the soil is deficient in potash or phosphoric acid materials strong in these should be used. When used on the manure they need not be put on the field as extra applications. Kainit will provide potash, and finely ground phosphatic rock or acid phosphate will give the phosphoric acid. If no fertilizer is needed, gypsum (calcium sulphate) will serve the purpose of holding the ammonia most admirably. These should be used at a rate of 2 lb. per hundred of manure. They can be dusted over the manure piles every day or else sprinkled in the stalls.

Stable Manures Tend to Force Growth.—Manure tends to force growth and is better for grasses and forage crops than for grains. For sugar beets, potatoes, or tobacco it should be used on the preceding crop in the rotation.

Recommendations for Use of Crop Rotations, Commercial Fertilizers and Stable Manures

Since theory and practice in the general use of crop rotations, commercial fertilizers, and stable manures are somewhat divergent, and because local practices vary, a rather full discussion follows concerning (a) common farm management recommendations and (b) common local practices.

Farm practices as commercially carried on locally, give an idea of what farmers are actually doing. Local practices vary but these must govern in determining a starting point in planning the work, so that the general statements given here are to be used as indicative rather than for actual guides. As in much farm management work, an intimate knowledge of methods practiced in a given state, or better in a given community, must precede actual planning if best results are to be obtained.

Recommended Crop Rotations³⁹

Crop rotations primarily designed to meet the varying conditions of different localities are listed below. These have been drawn from various sources, but particularly from the suggestions of men in the Office of Farm Management, U.S.D.A. They offer a starting point for planning the work in communities having similar conditions.

Further than to indicate examples it is not necessary to go, as there is ample information elsewhere available in textbooks, treatises, and in State and Federal agricultural bulletins.

Crop Rotations Recommended for Farms in Northern Latitudes.—A cropping system that will furnish a home-grown ration in which corn and alfalfa are the principal feed crops may be arranged as follows:

	ACRE
Permanent alfalfa.....	25
Rotation:	
1. Corn for silage or grain.....	20
2. Oats.....	20
3. Oats or barley.....	20
4. Pasture.....	20
5. Pasture.....	20

Another rotation also well adapted for northern regions

	ACRES
Corn for silage.....	13
Rotation:	
1. Soy beans.....	18
2. Oats or barley.....	18
3. Clover or timothy.....	18
4. Pasture.....	18
5. Permanent alfalfa.....	15
6. Permanent pasture.....	20

Crop Rotations Recommended for Farms in Middle Latitudes.—
 A number of rotations well suited to middle latitudes will furnish a home-grown ration for farm animals, as follows:

	ACRES
1. Permanent alfalfa.....	25
Permanent pasture.....	40
Rotation:	
1. Corn for grain or silage.....	12
2. Corn for silage.....	12
3. Oats or wheat.....	12
4. Wheat.....	12
5. Clover and timothy.....	12
2. Permanent pasture.....	40
Rotation:	
1. Corn for grain or silage.....	12
2. Corn for silage.....	12
3. Wheat.....	12
4. Alfalfa.....	12
5. Alfalfa.....	12
3. Permanent alfalfa.....	25
Permanent pasture.....	40
Rotation:	
1. Corn for grain or silage.....	12
2. Mangels or other roots.....	6
3. Soy beans for grain.....	6
4. Corn for silage.....	12
5. Wheat.....	12
6. Clover and timothy.....	12

Rotation (1) gives an opportunity for more wheat and less hay. It also illustrates the manner of changing the alfalfa field when this is necessary, in this case by planting alfalfa on fields 3 and 4.

Rotation (2) will produce more highly nitrogenous hay and a larger gross income from crops, and permit the sale of surplus alfalfa hay.

Rotation (3) introduces mangels as a root crop to supplement silage and alfalfa.

On the whole these rotations give the greatest variety of forage crops and the most satisfactory home grown ration. The farmer need not worry about feed prices when such a system has been permanently established. From a business standpoint rotation is important because it increases crop yields, distributes the risk of crop failures, and gives a better distribution of farm labor.

Other possible rotations are:

Three-year rotation: First year, cultivated crop, as corn; second year, grain; third year, clover or some annual leguminous crop. Rape can be sowed among the corn, and if, instead of clover, an annual leguminous crop is used, rape can be sowed among the wheat.

Four-year rotation: First year, cultivated crop; second and third years, clover and timothy; fourth year, grain; or, first year, cultivated crop; second year, annual leguminous crop; third and fourth years, grain, planting rape or turnips among the cultivated and grain crops, which here are sown in the spring.

Five-year rotation: First year, cultivated crop; second year, grain; third and fourth years, clover and timothy; fifth year, grain, planting rape among the corn or other cultivated crop the first and among the grain crop the fifth year.

Six-year rotation: First year, cultivated crop; second year, grain crop; third, fourth, and fifth years, grass; sixth year, grain; or, first year, cultivated crop; second year, grain crops; third and fourth years, clover and timothy; fifth and sixth years, grain; or, first year, cultivated crop; second year, grain; third and fourth years, clover and timothy; fifth year, cultivated crop; sixth year, grain, planting catch crops in the grain and corn.

Crop Rotations Recommended for Arkansas.—McNair¹⁴ offers suggestive rotation systems for Arkansas, for the average family farmed acreage of 28 to 38 acres, growing principally 200 lb. of lint cotton and 20 bu. of corn, worked with two horses and the labor of a man and a boy. Starting with a common system of two-thirds cotton (22 acres) and one third corn (11 acres), cowpeas planted in the corn, 10 systems are discussed, ending with a system including alfalfa in the rotation and providing a plentiful use of cowpeas, potatoes, and sorghum hay. From his study, McNair bears down on the necessity of diversification and use of legumes, such as cowpeas, peanuts, soy beans, and alfalfa.

Crop Rotations Recommended for Utah.—From his Utah studies of the main labor requirements of strawberries, raspberries, peaches, prunes, pears, apples, alfalfa, small grain, tomatoes, potatoes, onions, sugar beets, canning peas, snap beans, edible dry beans, Connor³⁰ outlines a "feasible but purely tentative cropping system for a man on a small Utah farm where it is desired to concentrate on sugar beets."

TABLE 39.—CROP ROTATIONS RECOMMENDED FOR UTAH
(Reg. = regular : ext. = extra)

Period	Days available	Cropping system						Total 42 acres	
		Alfalfa 15 acres		Small-grain 12 acres		Sugar beets 15 acres		Days of labor	
		Days of labor		Days of labor		Days of labor		Days of labor	
		Reg.	Ext.	Reg.	Ext.	Reg.	Ext.	Reg.	Ext.
Winter.....	46	.....	.....	.....	.....	30.00	.....	30.00	.....
Mar. 1–May 1.....	35	2.55	...	9.84	.....	14.55	.....	26.94	.....
May 1–July 1.....	42	8.70	375	4.20	.....	40.05	19.50	52.95	23.25
July 1–Sept. 1.....	50	11.70	375	6.96	9.60	16.20	10.05	34.86	23.40
Sept. 1–Nov. 1.....	42	8.70	375	.....	.....	18.75	75.00	27.45	78.75
Nov. 1–Dec. 1.....	20	.....	...	8.04	.....	15.00	.....	23.04	.....

The only periods when the operator of such a farm as above would be rushed occur during the blocking and thinning of the sugar beets, and at the harvest season for the same crop. In practice some men on one-man farms grow larger areas of beets without difficulty in securing harvest labor. They exchange with neighbors for part of the harvest requirement and hire the rest. The cropping system outlined would en-

able a man to concentrate on beets, would give him two cash crops—grain and sugar beets, and would provide a goodly supply of hay for farm stock. The beet harvest is carried on intermittently from the latter part of September until the first or the middle of November, and sometimes even later. The rotation which is given has been followed in actual practice in this community, as shown by a survey of 58 beet farms.

Crop Rotations Recommended for Georgia.—The Georgia State College of Agriculture recommends (1919) the following acreages of crops to be grown on the average Southern one-horse farm:

- 5 acres in corn and velvet beans.
- 5 acres in cowpeas for hay to be followed by winter oats.
- 5 acres in cotton.
- 5 acres in peanuts, to be crushed for oil or grazed down by hogs.
- 1½ acres in sweet potatoes, to be followed by winter cover crops.
- 1 acre in rape, oats, vetch, cowpeas, or soy beans.
- 1 acre in truck crops, followed by hay, or grazing crops for hogs.
- 10 acres should be set aside for pasturage for cows and hogs.
- ½ acre in orchards.
- ½ acre in garden.
- Total cultivated land, 26 acres.

This size farm should maintain, in addition to the one horse or mule used for work, the following to supply the family with meat, butter, chickens, and eggs:

1 calf	1 yearling (slaughter for meat)
2 milk cows	2 brood sows
	50 hens

Recommended Green Manures

Green Manures Recommended for Farms of the Gulf Coast Region of Alabama, Mississippi, and West Florida.—Since practically no farms in the region maintain enough live stock to supply sufficient manures for soil needs, Crosby³⁶ suggests increased use of such legumes as velvet beans, cowpeas, soy beans, bur clover, vetch, crimson clover, peanuts, beggarweed, and lespedeza or Japan clover. The addition of vegetable matter is felt to be of primary importance in this section.

Green Manures Recommended for Sandy Lands of Indiana, Michigan and Ohio.—Keenly recognizing the necessity of suggesting means of soil improvement under existing handicaps of poor land and lack of capital, Drake³⁷ offers soy beans and cowpeas, both for sale and for feed, as an approach to the problem of soil improvement for the sandy farms under conditions similar to those of northern Indiana, southern Michigan, and a part of northwestern Ohio. In order of importance, fertilization should provide for nitrogen and organic matter as of first consideration, then phosphorus, with lime third, and potash as of least moment.

Green Manures Recommended for the Coastal Plain.—For the coastal plain section of New Jersey, Maryland, Delaware, and Virginia, decreasing fertility resulting in reduced yields now presents the big problem of economically getting organic matter into the soil. Miller³⁷ points out three ways—farm manure, roots and stubbles left from crops, and green crops turned under. Of these it was found that merely alternating crops was not sufficient, that while crop residues helped, the addition of live stock or the regular turning under of green crops was needed. Because of lack of live stock, greatest reliance must be placed on growing crops to supply organic matter. Crops suggested in order of value are cowpeas, crimson clover, soy beans, vetch, red clover, rye, and buckwheat. In addition to humus, use of legumes or a mineral fertilizer to supply nitrogen, and economical application of phosphoric acid and potash, are recommended.

Green Manures and Other Fertilizers Recommended for Kentucky and Tennessee.—Farm practices that increase crop yields in Kentucky and Tennessee are reviewed by Arnold in a *Farmers' Bulletin*³⁸ as comprising fertilizers, lime, keeping of live stock, plowing under of by-products such as straw, legumes, and grasses. An essential basis of fertilizing is a plentiful supply of vegetable matter. While great variations in soil types, topography, and kinds of farming, make general rules inadequate, the evidence indicates the planting of legumes to supply nitrogen for bluegrass soils (the order of value being red clover, alsike clover, Japan clover (*Lespedeza*), sweet clover, crimson clover, vetch, cowpeas, soy beans, Canada field peas), the addition of both nitrogen and acid phosphate to other soils, the general use of lime, the occasional use of nitrate of soda as a stimulant, the increased use of live stock for the manure, the desirableness of growing bluegrass, redbtop, timothy and other forage grasses, and the plowing under of straw, stalks, weeds, stubble, and leaves, as all being of value.

Evidence of Improvement from Farm Practice to Increase the Crop-producing Power of the Land

Evidence of improvement resulting from the use of legumes, green manure crops, rotation of crops, commercial fertilizers, and stable manure must be sought in the older agriculture of the United States. Study of farm practices in sections of depleted soils and resulting low yields furnishes abundant evidence of the efficacy of these methods to increase the crop-producing power of the soil.

Evidence from the Coastal Plain.—Miller³⁷ says, "Perhaps the most rapid progress in the improvement of depleted farm lands in this section (the Coastal Plain Section of Central Atlantic States) is attributable to this method of procedure" (*i.e.*, crops grown for the purpose of supplying organic matter).

In the same publication, four detailed examples from actual farms are described. Use of cowpeas and crimson clover as green manure crops in 5 years raised the corn yields from averages of 15 and 18 bu. to 40 and 50 bu. on one Virginia farm. The growing of cowpeas, crimson clover, and rye over a period of 4 years raised the yields on a Virginia sandy cotton land from the point where tenants refused to work the land, to more than a bale of cotton per acre (570 lb. of lint) and to 40 bu. of corn per acre. By growing red clover, sodding, and intelligent fertilizing, wheat yields from a Delaware farm were raised from $8\frac{1}{2}$ to 30 bu. Corn yields of 12 to 15 bu. climbed to 50 bu. on another Delaware farm—situated on a coarse sand—by continual use of crimson clover with judicious use of fertilizers.

Evidence from Kentucky and Tennessee.—Arnold³⁸ gives six outstanding examples of Kentucky and Tennessee farms which have increased their crop production by intelligent cropping plans and judicious use of fertilizers. A 300-acre live stock and grain farm is getting 100 per cent better yields than the average in the community. A 200-acre farm, practically abandoned, was in 8 years developed into “one of the most productive farms in the State” by use of live stock and soil building with rye, vetch, cowpeas, Alsike, red clover, and various grasses. With a 4-year rotation of corn, rye, oats, or wheat, and 2 years of clover or mixed grasses for meadow and pasture, together with legumes and proper fertilization utilized in connection with stock, a Kentucky farm increased its yields from 2 to 6 bu. of wheat and 10 to 15 bu. of corn to as high as 27 bu. of wheat and 70 bu. of corn. In the three other examples, yield increases are noted of from 100 per cent to as much as 300 per cent by use of stock, crop rotations, legumes, green manures, lime, and acid phosphate.

Evidence from the Gulf Coast Region.—Ashley³⁵ finds for the Gulf Coast Region that in general, farm experience shows that the incorporation of large quantities of vegetable matter into the soil is the principal factor in building up and maintaining soil quality in this section, and any system of farm practice which fails to recognize this will fail in maintaining crop productiveness at a point that insures profitable farming. Examples of successful farming based on rotation and green manure crops are taken from Baldwin County, Alabama, and from Mississippi. In one instance it is pointed out that following 5 years of good farm practices yields increased from 15 to 35 bu. of corn, 10 to 20 bu. of velvet beans, with other crops in like proportions.

Actual Farm Practices in the Use of Crop Rotation, Commercial Fertilizers, and Stable Manures

Much publicity is given to recommending results of experiments and experiences pointing the way to the maintenance or increase of the crop-

producing power of the soil; so much so that the question arises as to what extent farmers have adopted new methods. Believing that at least a partial answer will be of aid to the farm manager in connection with planning what should be done, a rather full discussion is inserted. These data, collected by field men of the Federal Office of Farm Management,³⁹ were made available to me in January, 1919.

The notes on actual farm practices are interesting in that they tend to show the slowness with which farmers have taken up the recommendations for increasing the crop-producing power of their land, and the wide variations in practice, which of course reflect the great differences existing in soil, types of agriculture, and local variations in farming methods. Only general practices are included, no attempt being made to treat of local or individual variations, although these are many and striking.

Under *rotations* the order of cropping is noted. Unless specifically mentioned, the cropping is for a single period.

Under *fertilizers* in writing of a "2-10-2" formula, use is made of the common practice in designating a fertilizer according to its content, usually guaranteed, in order of nitrogen, phosphoric acid, and potash. Formulæ are from pre-war, normal time, studies. Great variations in price, composition, and amounts used have resulted because of war conditions, the principal effect perhaps being the almost complete elimination of potash from all formulæ.

Rotations in Use by Farmers³⁹

Rotations Used by New England Farmers.—A standard dairy farm rotation is:

- First year —Corn for silage or for grain, and potatoes for home use.
- Second year—Oats, barley, or mixed grain to be threshed or cut for hay.
- Third year —Clover.
- Fourth year to seventh year—Mixed hay (mostly timothy).

A potato rotation of Aroostock County, Maine is:

- First year —Potatoes.
- Second year—Potatoes.
- Third year —Oats.
- Fourth year—Clover.
- Fifth year —Mixed hay.

Rotations Used by New York Farmers.—The dairy region rotation of southern New York is:

- First year —Cultivated crops of cabbage or potatoes.
- Second year—Cultivated crops of corn for silo.
- Third year —Oats for cash crops and grass for feed.
- Fourth year—Clover and timothy for 2 or 3 years.

The rotations of the cereals and live stock section of central New York is:

- First year —Oats.
- Second year—Barley.
- Third year —Wheat.
- Fourth year—Meadow for several years.

Rotations Used by Pennsylvania Farmers.—A rotation common to the dairy region of northern Pennsylvania is:

- First year —Cultivated crops, usually corn for silage or potatoes for cash crops.
- Second year—Oats, wheat, or rye for feed and catch crop for grass.
- Third year —Grass for hay (or pasturage until it runs out—2 or 3 years).

A definite rotation as practiced on general farms of Delaware and Chester Counties is:

- First year —Corn.
- Second year—Corn for silage, potatoes for family use, and the remainder of the field in oats.
- Third year —Wheat.
- Fourth year—Clover and timothy for hay, the field often held for 3 years.

Lancaster County, tends to a rotation of:

- First year —Corn.
- Second year—Tobacco.
- Third year —Wheat.
- Fourth year—Clover for 1 and sometimes for 2 years.

Cumberland Valley uses:

- First year —Corn.
- Second year—Oats.
- Third year —Wheat.
- Fourth year—Clover and timothy, 1 to 3 years.

Rotations Used by New Jersey Farmers.—The white potato section in central part of the state uses a general rotation of:

- First year —Corn.
- Second year—Potatoes (sometimes followed by potatoes a second year).
- Third year —Clover and timothy (sometimes preceded by a crop of wheat).

The trucking region of Gloucester County makes little attempt to rotate, although a rotation is sometimes put in of:

- First year —Corn.
- Second year—Sweet potatoes.
- Third year —Early tomatoes, cantaloupes, egg plants, or pepper.
- Fourth year—Clover and timothy.

The small fruit and trucking section of Gloucester County has a rotation consisting of:

- First year —White potatoes.
- Second year—White potatoes or strawberries.
- Third year —Strawberries.
- Fourth year—Strawberries and sometimes beans as a second crop.

Rotations Used by Delaware, Maryland, and Virginia Farmers.—There are many different rotations on the grazing, general farming, and fruit lands of western Maryland and western Virginia. A common one is:

- First year —Corn.
- Second year—Small grains.
- Third year —Grass for 1 year or more.

In the truck, small fruits, peanuts, cotton, and general farming sections of Delaware, eastern Maryland, and eastern Virginia, no definite rotations are followed, largely because of the variety of crops and the variation in selection from year to year. Some attempt is made to introduce a legume from time to time.

Very little definite rotating is practiced in the tobacco district of southern Virginia. Lands for tobacco are set aside for this specific purpose, and tend to a 3-year rotation of tobacco, rye, and redtop pasture.

Rotations Used by North and South Carolina Farmers.—Crop rotations are planned with a tendency to grow first the crops needed for home use, such as corn, oats, cowpeas, and truck, the remainder of the land being in cotton. This usually results in planting cotton on the best soil and cowpeas on land needing improvement, with corn and oats on the fields less adapted to cotton and not requiring immediate improvement. In typical cotton areas, 60 per cent of the cropped area is given over to cotton, one crop following another.

Rotations Used by Alabama and Mississippi Farmers.—Rotation of crops is not followed in any general way. Principally a cotton country, with a large percentage of the land in this crop (running as high as 75 per cent), a definite crop rotation is hardly practicable, and any attempt toward rotating is more a matter of convenience than a matter of pre-conceived plan. Soils are usually selected according to what they are best suited for, with some provision for soil restoration by green manure crop.

Rotations Used by Kentucky, Tennessee, and West Virginia Farmers.—No well-defined single system is followed in the bluegrass lands of Kentucky, Tennessee, and West Virginia. A typical rotation is:

- First year —Corn or tobacco.
- Second year—Small grain, usually wheat.
- Third year —Red clover, grass, or hay.
- Fourth year—Grass for pasture.
- Fifth year —Grass for pasture.

Where orchard grass is grown for seed in Jefferson County, Kentucky, a common rotation is:

- First year—Corn or potatoes.
- Second year—Wheat.
- Third year—Orchard grass for hay.
- Fourth year—Orchard grass for seed.
- Fifth year—Orchard grass for seed.

Rotations Used by Iowa, Indiana, and Ohio Farmers.—While in general the rotations vary from 2 to 5 years in duration, there are wide variations in practice. Certain prevailing practices give point:

Two-year Rotation (grain farms).

- First year—Corn.
- Second year—Oats or wheat with a seeding of red clover or sweet clover.

Three-year Rotation (grain or live stock farms).

- First year—Corn.
- Second year—Oats or wheat.
- Third year—Red clover or sweet clover.

Four-year Rotation (grain and live stock farms).

- | | | |
|---|--------|---|
| (a) First year—Corn
Second year—Oats
Third year—Wheat
Fourth year—Clover | } or { | Corn
Corn
Oats (or wheat if previous crop is cut for silage)
Clover (sometimes mixed with timothy and pastured a 5th year) |
| (b)* First year—Wheat
Second year—Wheat
Third year—Clover
Fourth year—Corn | } or { | Wheat
Clover
Wheat
Corn |

Six-year Rotation (on certain alfalfa farms).

- First year—Corn
- Second year—Corn.
- Third year—Barley with a seeding of alfalfa.
- Fourth year—Alfalfa.
- Fifth year—Alfalfa.
- Sixth year—Alfalfa.

Rotations not Available to Farmers of the Western Plains Area, Kansas, Nebraska, and Dakotas.—Lack of rainfall and limited number of available crops prevents a well established rotation.

Rotations Used by Montana and Utah Farmers.—A typical rotation on irrigated land in vicinities of Montana, and in Provo and Bear River Valley, Utah, is:

- Alfalfa—3 to 8 years.
- Grain—1 year.
- Sugar beets—5 years.
- Grain—1 year.

* Sometimes on the thinner lands timothy is substituted for clover and mowed for several successive years.

Where corn growing is of chief interest the rotation tends toward:

First year—Corn.

Second year—Corn.

Third year—Oats (or wheat if previous crop is cut for silage).

Fourth year—Clover (sometimes mixed with timothy and pastured during 5 years).

Rotations Used by Idaho, Washington, and Oregon Farmers.—A northern Idaho rotation provides for:

Beans or peas—1 year.

Wheat, oats or barley—1 year.

In the irrigated sections of southern Idaho, various rotations are practiced, of which the following are samples:

1. Alfalfa—4 to 5 years.
Potatoes—1 year.
Beans—1 year.
Spring wheat—1 year.
2. Alfalfa—3 to 5 years.
Potatoes—1 year.
Wheat, oats, or barley—1 year.
3. Alfalfa—3 to 8 years.
Potatoes—1 year (sometimes 2 years).
Sugar beets—2 to 3 years.
Grain—1 year.
4. Alfalfa—5 to 7 years.
Grain—1 to 2 years.

Crop production has not resolved itself into any very definite rotations in western Washington. On the dry land areas of eastern Washington, the amount of rainfall determines the rotation. Where less than 15 in. occurs, a common rotation is:

Grain, usually wheat—1 year.

Summer fallow—1 year.

Where the rainfall is sufficient to saturate the soil every year the rotation provides for two crops in 3 years:

In the Willamette Valley, Oregon use is made of:

Winter wheat—1 year.

Oats, wheat or barley—1 to 3 years (usually one year).

Summer fallow—1 year.

Grain—1 year.

A rotation in the valley soils is:

1 to 3 years—Clover.

1 to 2 years—Grain.

On the Red Hill or clay soils a common rotation is:

1 year—Winter wheat.

2 years—Oats.

1 year—Summer fallow.

Rotations Used by California Farmers.—In California, rotations are the exception rather than the rule. Specialized crops of fruit, grain, cotton and alfalfa, are grown more or less continuously. When a variety of crops is grown, rotations do not follow any definite preconceived plan. In dry-farmed areas of limited rainfall, summer fallow will alternate with a cereal crop; in areas of more abundant rainfall, beans and sugar beets are grown in rotations. In irrigated sections a wide variety of crops is grown under many different combinations, based largely upon the market outlook for sale of crops and the seasonal climatic conditions; where alfalfa is grown extensively it is followed by grain or sorghums to benefit from the increased fertility; in the peat lands, some attempts are made to rotate in various combinations, barley, potatoes, onions, Indian corn, hemp, asparagus, and, in the older lands, alfalfa, sugar beets, and beans.

Rotations Not in Use by Arizona and New Mexico Farmers.—Rotation of crops in eastern sections of these states is unknown. The nearest approach is the periodical plowing up of alfalfa fields when over-pastured or overrun with Bermuda grass and Johnson grass, followed with wheat or barley, usually two crops, with often a crop of milo between the two grain crops.

Commercial Fertilizers and Stable Manures Used by Farmers³⁹

Use of Fertilizers in New England.—Much reliance is placed on manure. Common rates of application are 12 tons per acre to planted crops, 9 to 10 tons on grass seeding, and 6 tons on other meadows.

Commercial fertilizers are used to supplement stable manure on annual crops. Acid phosphate is commonly used at rates with manure of 200 to 300 lb. for corn and grain. When no manure is applied, 300 to 400 lb. of a 2 per cent nitrogen and 8 to 10 per cent phosphic acid is used. Potatoes receive 500 to 800 lb. of a 2-10-0 fertilizer, together with manure. Lime is indispensable.

Use of Fertilizers in New York.—In the southern New York dairy region, manure is spread on meadows or corn stubble. Lime is used at the rate of 500 to 2,000 lb. per acre on all cultivated crops except potatoes. Corn receives 250 to 300 lb. of a 3-9-2 fertilizer; potatoes and cabbage 500 to 1,000 lb. of a 2-8-10; oats about 250 lb. of a 2-10-0 mixture.

In the cereals and live stock region of central New York, straw tends to replace any deficiency in manure supplies. Lime is applied to acid soils fields or when alfalfa is to be grown. Grain, corn, field peas, and beans receive 200 lb. of a 2-10-0 fertilizer. Wheat on limestone lands is given 200 lb. of 14 to 16 per cent acid phosphate. Potatoes and cabbage receive 300 to 1,500 lb. of potash.

Use of Fertilizers in Pennsylvania.—In the dairy region of northern Pennsylvania, barnyard manure is spread on meadows. Soils deficient in lime receive 200 to 2,000 lb. per acre, usually applied to the clover crop

of the rotation. 200 to 300 lb. of a 2-10-2 fertilizer is used for corn, and 500 lb. of a high potash content fertilizer for potatoes. Grain receives 200 to 300 lb. of a 2-10-0 formula and occasionally 200 to 300 lb. of a 10 to 25 per cent acid phosphate.

In the general farming districts of southeastern Pennsylvania, if applied to corn, an application of 200 or 300 lb. of a 2-8-3 fertilizer governs, although for light soil this may be 3-8-4. Oats receive very little fertilizer; potatoes 700 to 800 lb. of 3-8-6; wheat, 300 to 350 lb. of 2-9-3 or 3-8-3, or equal parts of ground bone and acid potash; alfalfa, heavy application of lime or limestone, 300 lb. each of basic slag and acid phosphate, or 300 lb. of a 3-10-6 fertilizer.

Use of Fertilizers in New Jersey.—In the white potato section in the central part of the state, 1,200 to 2,000 lb. of a 4-8-6 or a 4-8-10 formula is given.

Truck crops of Gloucester County in the more common practice receive:

Early tomatoes.....	700 lb. per acre of 3-7-5
Sweet potatoes.....	900 lb. per acre of 2-8-6
White potatoes.....	1,500 lb. per acre of 4-8-6
Cantaloupe.....	600 lb. per acre of 4-8-6
Asparagus.....	2,000 lb. per acre of 4-8-10 or 6-7-5
Peppers.....	800 lb. per acre of 3-8-6
Strawberries.....	500 lb. or more per acre of 5-8-8

Use of Fertilizers in Delaware, Maryland, Virginia.—In the grazing, general farming, and fruit sections of the western parts of Maryland and Virginia, fertilizer practices vary greatly. The most general fertilizer application is 200 to 300 lb. on wheat of a 2-8-2 or 2-8-3 fertilizer. Alfalfa, corn, cowpeas, and apples may or may not receive fertilizers. If given, the practice varies.

In the truck, small fruits, peanuts, cotton, and general farming sections of Delaware and eastern parts of Maryland and Virginia, corn, peanuts, cotton, and small grains usually receive 200 to 400 lb. of a 2-8-3; cowpeas and clover, 200 to 300 lb. of 14 to 16 per cent acid phosphate; potatoes 400 to 1,000 lb. of a 3-6-6 fertilizer; other truck crops 300 to 600 lb. of a 3-8-4.

In the tobacco district of Southern Virginia, 400 to 1,000 lb. of a 4-8-6 is used on tobacco, while wheat receives 200 to 300 lb. of a 2-8-2 or a 2-8-3. Corn and other crops sometimes receive 200 to 300 lb. of 16 per cent acid phosphate.

Use of Fertilizers in Alabama and Mississippi.—Fertilizer practices are extremely varied. Acid phosphate, 100 to 250 lb. per acre, or a mixture of equal parts of acid phosphate and cotton seed meal applied at the rate of 200 to 400 lb. per acre, or ready mixed fertilizers varying from a 2-10-2 to a 4-8-4, are used on corn, cotton, Irish potatoes, sweet potatoes, and truck crops.

In the black prairie belt and Yazoo-Mississippi delta, commercial fertilizer is not extensively used.

Use of Fertilizers in North and South Carolina.—Practice with commercial fertilizers varies greatly. In the coastal region a common practice is to use:

	COTTON,	CORN,	OATS,
Acid phosphate.....	300 lb.	200 lb.	
Cotton seed meal.....	300	150	
Nitrate of soda.....	100	100	75 lb.

In the Piedmont section, the following are typical:

	COTTON,	CORN,	OATS,
Acid phosphate.....	200 lb	200 lb.	
Cotton seed meal.....	200	100	
Nitrate of soda.....	...	75	75 lb.

Kainit, when available, is used extensively in the coastal region and slightly in the Piedmont.

Use of Fertilizers in Kentucky, Tennessee and West Virginia.—In general farming the principal use of commercial fertilizer is acid phosphate applied at the rate of 200 to 300 lb. for small grains, 100 to 150 lb. to corn, and 300 to 500 lb. to potatoes.

Use of Fertilizers in Iowa, Illinois, Indiana and Ohio.—Although the use of corn fertilizer is increasing, comparatively small quantities are used on the average general farm. Corn growers of Illinois are large users of acid phosphate, analyzing 2-12-0, 1-8-1; or one of the bone meals, varying from 1.6 to 3.7 nitrogen, 20 to 27 phosphoric acid and potash, applied in amounts ranging from 150 to 300 lb. per acre. Some growers use rock phosphate and lime. On muck lands a fertilizer high in potash is required.

The treating of barnyard manure with acid phosphate, usually at about the rate of 40 lb. per ton, is practiced in Ohio, and to some extent in Indiana.

Iowa farmers are not generally users of fertilizer.

Illinois wheat growers frequently use 80 to 200 lb. of a formula analyzing from 1.8-8-1 to 1.6-10-2, bone meal of 1.6-20-0 to 2-23-0. Orchardmen use limestone and bone meal or nitrate of soda. The dairymen tend to rely on farm manure.

Use of Fertilizer in Washington and Oregon.—Willamette Valley growers use from 50 to 100 lb. of gypsum on clover and alfalfa. Strawberry growers at Kennewick are users of tankage. In the Willamette Valley the use of lime is being greatly extended. In Western Washington, potash is used in a limited way.

The Hood River orchardists, of Oregon, use nitrate of soda, the range of use being from 1½ to 7 lb. per tree, with 2 to 4 lb. as the usual practice.

Use of Fertilizers in California.—For orchards and truck crops manure is generally used, but for field crops, its use is not valued particularly high, although an increasing number of trials are being made on grain, sugar beets, and on the peat lands of the deltas. The utilization of commercial fertilizers is confined to an occasional deciduous orchard and to the citrus groves. In the last mentioned practice varies greatly as to amount and time of application and kinds; ranging through tankage, dried blood, bone meal, ammonium sulphate, and nitrate of soda. A type of citrus fertilization in bearing groves is:

7 lb. bone meal per tree, applied in October.

2 lb. sodium nitrate per tree, applied in November.

12 lb. tankage per tree, applied in April.

5 cu. ft. stable manure per tree, applied in August.

Locally, gypsum is used in certain alfalfa sections and lime in districts of heavy rainfall.

Where Use of Fertilizers is not Extensively Practiced.—States where farmers make little use of barnyard manure, and practically none of commercial fertilizers, are Nebraska, Kansas, the Dakotas, Arizona, New Mexico and Washington.

Green Manure Crops Used by Farmers

New England.—Inquiry as to the practice of green manuring in various parts of New England resulted in findings that the use of green manures is not common, although rye, or sometimes a second crop clover, is turned under for the benefit of subsequent crops.

Use of Green Manures by New York Farmers.—Neither in the dairy region in the southern part of the State, nor in the cereals and live stock region in the central part is green manuring generally practiced. The turning under of green crops tends to promote a sour condition.

Use of Green Manures by Pennsylvania Farmers.—In the dairy region of Pennsylvania, the growing of green manure crops is uncommon. The short season permits but one crop, and the limited available acreage can not be spared for green manures. Weeds are turned under. The natural acidity is intensified by green manures.

Use of Green Manures by New Jersey Farmers.—Green manure crops are somewhat common in the sandier lands, use being made of rye, buckwheat, and vetch.

Use of Green Manures by Delaware and Maryland Farmers.—Very little green manuring is done in the farming sections of the western parts of Maryland and Virginia. In the eastern parts of Maryland and Virginia, and in Delaware, where truck, small fruits, peanuts, cotton, and general farming are followed, crimson clover is sown at the last working of intertilled crops, or else buckwheat, rye or wheat, and cowpeas are used for the combined benefits of soil improvement and forage.

No general practice of green manuring is followed in the tobacco districts of Southern Virginia.

Use of Green Manures by North and South Carolina Farmers.—Green manure crops are used but slightly. Some crimson clover is sown between the cotton rows in the Piedmont section, to be later turned under, and some oats and rye, grown similarly, are occasionally found.

Use of Green Manures by Alabama and Mississippi Farmers.—Green manuring is but little practiced. Crops grown for soil improvement are usually cut for hay or grazed off, and only the roots, stubble, and similar residues plowed under. Cowpeas and velvet beans are crops most commonly utilized.

Use of Green Manures by Iowa, Illinois, Indiana, and Ohio Farmers.—In some instances, red clover is sown in oats for plowing under, and clover for a hay crop or pasture and then plowed under, but on the whole, plowing under of green crops is an unusual practice.

A few farmers sow cowpeas, soy beans, and rape in corn for pasture and soil improvement. Orchardmen grow cowpeas, alsike, and sometimes sweet clover, for green manure crops.

Use of Green Manures by Kentucky, Tennessee, and West Virginia Farmers.—The use of rye and cowpeas, with preference for the former, is common in this section.

Use of Green Manures by Nebraska, Kansas, and Dakota Farmers.—Green manures are not commonly grown.

Use of Green Manures by Washington and Oregon Farmers.—Vetch, vetch and rye, or vetch and wheat are used by berry growers of western Washington and Oregon.

In the Wenatchee and Yakima apple districts of Washington, the use of alfalfa in the orchards as a combined hay and green manure crop is practiced.

Clover is frequently used as a green manure crop in the apple orchards of the Hood River district of Oregon.

Use of Green Manures by California Farmers.—In general farming, no well defined practice is followed of growing crops to plow under. In the citrus groves, use is made of bitter clover, vetch or peas, and barley or rye, sometimes alfalfa and the usual weed growth. In the deciduous orchards, an attempt is made to increase the organic matter by the use of heavy weed growths, and sometimes planted crops of peas, and occasionally alfalfa. Green manuring in field crop production is seldom attempted.

Use of Green Manures by Arizona and New Mexico Farmers.—Reliance for increasing organic matter is placed almost entirely upon the roots and stubble of alfalfa fields and accompanying weeds.

Farm Management Findings Concerning Use of Rotation and Manures

From the farm management standpoint, there are certain findings based on farmers' experiences which should be realized in organizing a farm business.

An interesting deduction from a study of what is being done by farmers is the realization of the limited provision for including in farm plans a systematic soil-building campaign for several years' duration. This is especially interesting when contrasted with the extent of teaching that this phase of agricultural practice has received.

In older sections where agriculture is more settled, a principle of rotation is to grow two plowed crops, one of which shall be cultivated, followed by a legume such as clover or alfalfa. Sometimes accompanying the clover is timothy to remain in sod for 2 or 3 years and furnish hay or pasture.

Farmers' experiences seem to show that in areas of deficient rainfall, neither commercial fertilizers nor green manures are profitable under present-day conditions.

Attempts to arrive at uniform and standardized methods are more common with farmers primarily interested in crop production. Where live stock interests predominate, or constitute a large part of the business, the necessity of producing feed under seasonable climatic changes and fluctuating market conditions, introduces influences tending toward unstable, or at least, variable rotation practices. Where crops are the chief interest, rotations in common use may be found over a large number of farms. In dairy and stock districts, the rotation is more likely to be a result of individual needs, and in consequence to be worked out independently on the different farms.

The widespread variation in conditions, interests, and needs prevents the formation of a rule of general application. Knowledge of the general principles, intelligent recognition of their value, practice in accordance with local conditions and findings, must govern.

Use of Rotation and Manures by Farm Managers

The farm manager is charged with the responsibility of finding how far he can go in planning for the building up of his soil. His concern is to provide for this in his particular farming operations, by working out a system which takes care of soil improvement to an extent justified by his local conditions.

Theoretically, the organization of the farm to increase or maintain productivity should follow certain well-defined principles. Practically, the extent that these principles can be incorporated into a given plan depends on how closely the operator will adhere to his prearranged plan.

In actual practice few farmers follow any hard and fast extensive rotation through a long series of years. Many farmers believe it is

impossible to follow such a plan and that it is not advisable to attempt it. Certain it is that farmers who are giving careful attention to the handling of their fields with a view to definite rotations and soil improvement are few and far between. An explanation may be found in the likelihood of unforeseen possibilities tending to introduce new and unlooked-for influences. Changes in the kind or amount of live stock handled, failure of certain crops planned for the rotation, delays in getting the work done, need for extra hay and grain, fluctuations in market demands for crops, necessity for controlling weed, insect, and fungus pests, are influencing factors. Another influence is a reluctance to plow under crops of a monetary value. Most farmers will sacrifice larger yields of future crops to immediate cash in hand.

CHAPTER VII

THE CALENDAR OF OPERATIONS

Once the plan of work is well thought out, or plans for the season definitely made, they should be tested by making out a calendar of operations. This calendar or schedule will also be of use in checking up activities as the season progresses.

Definition of the Calendar of Operations.—The calendar of operations, or work schedule, is a graphic or tabular presentation showing the kinds of farm operations to be performed during the season, and the time limits within which the work must be done.

Value of a Calendar of Operations.—Its value lies in one's learning in advance what work is to be done so that needs for implements, work-stock, and extra help may be arranged for in time; it helps to eliminate lost motion in carrying on operations; it points out the danger of too little or too much work coming at one time; it permits a good test of the feasibility of working plans and indicates conflicting operations, such as corn cutting for silage when alfalfa work is pressing, or bean and corn planting, cultivation, and harvest coming at about the same times, or grain harvest coming in the height of the planting season for summer crops.

A western grain farmer follows such a program as this:

December 1 to March 1.....	Plows
January 1 to March 1.....	Seeds and harrows or discs
June 1 to August 1.....	Harvests
August 1 to September 1.....	Hauls off crop.

He is therefore idle, so far as his grain crop is concerned, from September 1 to December 1, and from March 1 to June 1, or about 5 months out of the year.

A fruit grower has a more complicated schedule. A western apple grower, for instance, irrigates but little; in January or February, he prunes his trees and sprays with lime-sulphur; in April he sprays twice, for codling moth; May he thins his fruit; March he plows and works down his land into good condition; from April to December he cultivates; harvest starts about July 25 and continues to August 15 or September 15 to November 1. Even with so many different operations, each takes such a short time that a man with 20 acres of orchard, doing personally as much of the work as he can, will be idle about $6\frac{1}{2}$ months out of the year.

Manner of Making a Calendar of Operations.—The method of procedure in making a calendar of operations is:

First: List the different industries which make up the farm business.

Second: List all operations to be done in connection with each industry, *i.e.*, methods of preparing land, seeding, harvesting, etc., and ways of caring for stock.

Third: Indicate time limits within which the work must be done.

In working up a calendar of operations the succession of farm operations for all crops must be known.

Example of Kind and Sequence of Farm Operations on Selected Crops (Pennsylvania).—For a section in Pennsylvania, the United States Department of Agriculture finds methods of growing important crops and times for the different practices to be:⁴⁰

Wheat

(1) Plowing.—Cut stubble, soon after harvesting, land allowed to lie fallow until about October 1; when wheat follows potatoes or corn the ground is plowed (sometimes only disced) immediately after the harvesting of those crops. (2) Rolling or planking.—After plowing, sometimes also before seeding. (3) Harrowing.—Majority of the farmers use disc followed by spring-tooth or spike-tooth harrow; many use spring-tooth harrow only, working two or three times; when disc is used instead of plow, the ground is worked four to six times. (4) Seeding.—With drill. (5) Harvesting.—With 3-horse 6-ft. binder. (6) Hauling.—To stack or mow. (7) Thrashing.—Done at barn, occasionally in the field.

Timothy and Clover

(1) Manuring.—As top dressing on sod, in fall or winter; on new seeding, in summer. (2) Plowing.—Often soon after wheat harvest. (3) Rolling or planking.—After plowing; sometimes again before seeding. (4) Harrowing.—Nearly 50 per cent of the farmers use disc, followed by spike-tooth harrow; many use spring-tooth harrow only; a few use disc followed by spring-tooth harrow. (5) Liming.—Usually after wheat harvest when the land is prepared and seeded in August. (6) Seeding.—Timothy is seeded with wheat, and clover the following April; about 23 per cent prepare wheat stubble and seed in August. (7) Harvesting.—With 5-ft. mower; hay fork is used and hay loader frequently.

Alfalfa

(1) Manuring.—About 12 tons per acre as a top dressing or at seeding of previous crop. (2) Plowing. (3) Rolling or planking.—Immediately after plowing; again between harrowings and often after seeding. (4) Harrowing.—Disc generally used twice after plowing. (5) Liming.—With the distributor, except in a few instances. (6) Inoculation. (7) Seeding.—with drill or wheelbarrow seeder, 20 to 25 lb. per acre. (8) Cutting. (9) Tedding.—Tedder not always used when followed by side-delivery rake. (10) Raking.—Side-delivery rake generally used; some of the smaller farms use a dump rake. (11) Cocking.—Immediately after raking when the hay is to be protected with hay caps; in this case hay stands in cock for 1 to 3 days and is opened up 2 hr. before hauling. (12) Hauling.—Where a loader is used the hay is picked up from the windrow. (13) Top dressing.—Manure sometimes applied in fall; fertilizer in early spring or immediately after first or second cutting. (14) Harrowing.—Disc or special sharp-pointed spring-tooth harrow often used after cutting, to eradicate blue grass and weeds.

Example of Kind and Sequence of Farm Operations in Producing Alfalfa (California).—The commercial practice for California produced alfalfa rests upon well defined requirements and operations, as shown in the following outline.

Alfalfa

Time to Maturity.—1 year, first cutting 3 to 6 months from planting.

Life.—12 years (range 2 to 40 years).

Calendar of Operations.

Seeded.—Seed tested for germination and purity (especially for dodder).

Varieties.—Common (Chili) most generally grown.

Time.—Fall—October or November, or spring—January 15 to May, timed to escape severe frosts or hot weather during germination and early stage.

Quantity Seed.—18 lb. (range 10 to 20 lb).

Majority of seeding done during February and March. Nurse crop usually omitted. *Method and Distance.*—Broadcasted, harrowed, dragged, or brushed in. Sometimes drilled.

Irrigation.—After well established, irrigated once or twice, depending upon the soil, with 2 to 6 acre inches of water between cuttings, April to October; irrigated thoroughly one time in winter (December or January) if soil is retentive or rain-fall light.

Harvest.

When.—When $\frac{1}{2}$ in bloom or when new shoots are 4 or 5 in. tall. Usually every 4-6 weeks, beginning April 15, until December 1.

How.—Mowed, raked, shocked, stacked, baled. Raked in windrows 2 hr. to 2 days after cutting—put in cocks as soon as possible after raking; cured for 2 to 10 days in cocks. Then baled from field or else stacked in field. Sometimes baled from stacks.

Yield for Season per Acre.

First year.

Good—2½ tons.

Usual—1½ tons.

After Maturing.

Good—8 tons.

Usual—5 tons.

Example of Kind and Sequence of Farm Operations in Producing Peaches (California).—A fruit crop has its own requirements in the way of cultural operations.

Setting Out and Caring for Orchards to Maturity.

Distance Apart of Trees..... 20 × 20 ft. to 24 × 24 ft.

Average Number per Acre..... 75 to 108; 100 average

Time of Planting Out..... December-March

Age to Self-sustaining Crop..... 5 years

Age to Maturity..... 8 years

Length of Profitable Life..... Estimated 20 years or longer

Most Popular Varieties.

Shipping Peaches.—Alexander, Triumph, Hales's Early, Yellow St. John, Strawberry, Crawford's Early, Crawford's Late, Elberta, and Salway.

Drying Peaches.—Lovell and Muir.

Canning Peaches.—Tuskena (Tuscan Cling), Phillips' Cling, Lemon Clingstone, Orange Clingstone, and McKevitt's Cling.

Calendar of Operations.

- Irrigation.—If given, twice by furrows or checks, June to October or November.
- Pruning.—Pruned annually.
- Fertilizing.—Cover crops for soils lacking in body. Usually intercropped.
- Spraying.—November–December, Bordeaux. February—with lime sulphur, trunks whitewashed and protected from rabbits, during second year.
- Cultivation.—Plowed and cross plowed in February and March (sometimes fall plowed in October or November); harrowed twice, cultivated at frequent intervals from April to October.
- Companion Cropping.—Intercropped to berries, small fruits, grain, beans, beets, corn, and sometimes alfalfa. Usually discontinued after trees are 3 or 4 years old.

Caring for Bearing Orchards.

Calendar of Operations.

- Irrigation.—If given, twice by furrows, June and October.
- Pruning.—December–February. Pruned to open up head, thin out wood, and shorten growth.
- Fertilizing.—Cover crops grown when soil lacks body.
- Cultivation.—February–March, plowed and cross plowed (sometimes fall plowed) —October or November crop cultivated at frequent intervals from March to November. Worked down into good condition.
- Fumigating.—None.
- Thinning Fruit.—Thinned to leave one peach every 4 to 6 in. apart. Thinned as early as possible (April).
- Spraying.—February—Given lime sulphur when buds are swelling. Borers when present are removed from trunks once a year.
- November—Given Bordeaux if blight is present.

Harvest.

- Time.—July–September.
- Method.—Picked by hand, or shaken off if for drying. Trees gone over two to five times.

Preparing for Market.

- Green.—Packed in 20-lb. crates or 25-lb. baskets.
- Dried.—Cut in half, pitted, sulphured, dried in sun on trays. Dry 4 or 5 to 1.
- Canning.—Delivered in lug boxes.

Yields.

	CANNING FRUIT, TONS	DRIED OR SHIPPING, TONS
Good.....	8	1.5
Usual.....	6	1.0

Influence of Available Work Days.—An estimate of available days when men and teams can work in the fields is essential. The total depends on the month and the rainfall, and varies over a considerable range. The following tables are illustrative.

Work Days in Arkansas.—Number of work days in Arkansas¹⁴ has been shown to be:

TABLE 40.—AVAILABLE WORK DAYS IN KANSAS

January.....	10	July.....	20
February.....	10	August.....	20
March.....	15	September.....	20
April.....	18	October.....	20
May.....	20	November.....	15
June.....	20	December.....	12

Work Days in Utah.—The number of days available for farm work is shown by Connor from his Utah study³⁰ to be:

TABLE 41.—AVAILABLE WORK DAYS IN UTAH

	TOTAL NUMBER DAYS	AVAILABLE NUMBER DAYS
November 1 to December 1.....	30	20
December 1 to March 1.....	96	46
March 1 to May 1.....	60	35
May 1 to July 1.....	61	42
July 1 to September 1.....	62	50
September 1 to November 1.....	61	42

An average of 73 per cent.

Work Days in Pennsylvania.—Billings for Chester County, Pennsylvania,⁴⁰ gives the available days as:

TABLE 42.—AVAILABLE WORK DAYS IN PENNSYLVANIA FOR FIELD WORK AND HOURS IN WORK DAY

DATA	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
Days available.....	3	3	10	16	19	21	22	22	21	17	14	6
Hours in work day.	7	7	8	9	9	9	10	9	9	9	8	8

This gives the number of days (exclusive of rainy days and Sundays) available for the several field operations.

Graphic Presentations of Calendar of Operations.—Many different ways of presenting Calendars of Operations are in use. The illustrations which follow are typical and can be studied to advantage for clearness of detail, simplicity, ease in analyzing, etc.

The Chart System of Making Calendars of Operations.—One plan provides for dividing each month into three periods, the first and second periods being 10 days each and the third the remainder of the month, which will make the third period 8, 10, or 11 days according to the length of the month. A chart is then made having the dates in the left-hand column and the various crops or other enterprises for the headings of the remaining columns. Under each heading is inserted in each 10-day period the work to be done on a particular enterprise during that period. It will, of course, not be possible, on account of the vagaries of the weather, to follow such a schedule blindly, but at the same time the schedule will be of great service in keeping track of the farm work. It is especially helpful as a means of foreseeing what equipment as well as what teams and men will be needed at particular times. This enables the manager to be prepared for work at the time it should be done.

Example of Chart System of a Calendar of Operations.—An example of the chart system of scheduling operations is taken from Utah *Bulletin* 165.³⁰

TABLE 43.—A CALENDAR OF OPERATIONS MADE AFTER THE CHART SYSTEM COVERING GRAIN, RASPBERRIES, PEACHES, AND TOMATOES²⁰

Small Grain

Operations	Period	Days	
		In period	Available for field work
Clean ditches.....	Mar. 1-May 1	61	35
Fit.....	Mar. 1-May 1		
Sow.....	Mar. 1-May 1	61	42
Harrow.....	Mar. 1-May 1		
Water furrow.....	Mar. 1-May 1	62	50
Irrigate.....	May 1-July 1		
Cut.....	July 1-Sept. 1	30	20
Shock.....	July 1-Sept. 1		
Stack.....	July 1-Sept. 1		
Thrash.....	July 1-Sept. 1		
Plow.....	Nov. 1-Dec. 1		

Raspberries

Manure.....	Winter	92	46
Clean ditches.....	Mar. 1-May 1	60	35
Prune and thin.....	Mar. 1-May 1	61	42
Cultivate.....	May 1-July 1		
Hoe.....	May 1-July 1	62	50
Irrigate.....	May 1-July 1		
Weed.....	May 1-July 1	62	50
Haul and make crates.....	May 1-July 1		
Pick, haul, etc.....	July 1-Sept. 1		
Irrigate.....	July 1-Sept. 1		

Peaches

Clean ditches.....	Mar. 1-May 1	61	35
Prune.....	Mar. 1-May 1	61	42
Haul brush.....	Mar. 1-May 1		
Spray.....	Mar. 1-May 1	62	50
Plow.....	Mar. 1-May 1		
Spray.....	May 1-July 1	61	42
Cultivate.....	May 1-July 1		
Irrigate.....	May 1-July 1	62	50
Cultivate.....	July 1-Sept. 1		
Irrigate.....	July 1-Sept. 1	61	42
Haul and make cases.....	July 1-Sept. 1		
Pick, pack, haul, etc.....	Sept. 1-Nov. 1	61	42
Plow.....	Nov. 1-Dec. 1	30	20

Tomatoes

Manure.....	Winter	92	46
Clean ditches.....	Mar. 1-May 1	61	35
Hot bed.....	Mar. 1-May 1	61	42
Cold frame.....	Mar. 1-May 1		
Weed and water frames.....	Mar. 1-May 1	62	50
Fit.....	Mar. 1-May 1		
Weed and water frames.....	May 1-July 1	61	42
Fit.....	May 1-July 1		
Furrow.....	May 1-July 1	62	50
Transplant.....	May 1-July 1		
Reset.....	May 1-July 1	61	42
Cultivate.....	May 1-July 1		
Irrigate.....	May 1-July 1	62	50
Hoe.....	May 1-July 1		
Cultivate.....	July 1-Sept. 1	61	42
Irrigate.....	July 1-Sept. 1		
Hoe.....	July 1-Sept. 1	61	42
Weed.....	July 1-Sept. 1		
Harvest and haul one-half crop.....	July 1-Sept. 1	61	42
Harvest and haul one-half crop.....	Sept. 1-Nov. 1		
Plow.....	Nov. 1-Dec. 1	30	20

The Line System of Making Calendars of Operations.—The following form of presenting is used by the Federal Office of Farm Management in

its farm economics presentation.⁴² It illustrates the line system of recording farm operations in a graphic manner.

TABLE 44.—A CALENDAR OF OPERATIONS MADE AFTER THE LINE SYSTEM (CHESTER COUNTY, PENNSYLVANIA)

CROPS	JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV.	DEC.
CORN			MANURE		CULTIVATE							
			FLOW						MANURE			
			ROLL						CUT		FLOW	
			DISC HARROW							HUSK		
			SPRING TOOTH HARROW							HAUL GRAIN		
			SPIKE TOOTH HARROW & WEED							HAUL STALKS		
			DRILL FERTILIZER									
			PLANT									
POTATOES			MANURE		CULTIVATE							
			FLOW		SPRAY					MARKET		
			ROLL							DIG		
			DISC HARROW							PICK UP & BAG		
			SPRING TOOTH HARROW							HAUL & STORE		
			PLANT									
			SPIKE TOOTH HARROW									
OATS												
			FLOW									
			ROLL									
			HARROW									
WHEAT												
CLOVER & TIMOTHY												
ALFALFA												

The full line represents the period when most farmers perform their farm operations, and the dotted line gives the range within which these operations may be performed.

THE CALENDAR OF OPERATIONS

TABLE 46.—THE CALENDAR OF OPERATIONS AS A MEANS OF SHOWING A GRAZING SCHEME IN OPERATION ON A GIVEN FARM, GEORGIA

Crops	Acres of Crops	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Oats for grain (a)	11	_____												
Oats and rye, pasture		_____												
Rape	4	_____												
Bermuda pasture	2	_____												
Cattail millet	4	_____												
Early corn and cow-peas	3	_____												
Early corn and Spanish peanuts	10	_____												
North Carolina peanuts and velvet beans (b)	20	_____												

(a) Grown primarily as a grain crop.

(b) Interplanted with 40 acres of corn, the latter being harvested. The peanuts and beans therefore are treated as 20 acres of grazing crops.

CHAPTER VIII

CHOICE OF FARM EQUIPMENT

The extent, variety, and nature of the equipment will be determined by the kind of enterprise, the working conditions, and, where choice is possible, by the tastes and financial resources of the operator.

It is merely sound business policy to tie up in implements, work stock, buildings, and other equipment, the least amount of money consistent with the work to be done.

The beginner is especially liable to pay out too large a proportion of funds in equipment, or to sacrifice economy to ideals of construction or to building up an over-elaborate plant. This is particularly true with respect to buildings. It should be borne in mind that buildings are not direct producers of wealth, but rather aids to production. Under most conditions building construction should proceed but slowly. Erection of buildings should be postponed until actual need arises for their use. Construction of milking barns may well be put off until new alfalfa plantings, for the use of the herd, are matured enough to warrant the purchase of the herd; purchase of ladders, drying trays, lug boxes, sprayers, or building of packing sheds necessary for older orchards but not needed for newly set fruit plantings can well be postponed until a need has developed. Sometimes early purchasing results in enough substantial savings to warrant the practice, but usually to postpone purchases until actually needed means a reduction from over-equipment and capital waste.

Temporary buildings or less expensive implements will often serve. Examples are, use of wood instead of concrete when the future of the structure may be in doubt, as in starting a new dairy business and erecting a silo; use of straw-thatched shelters for stock; use of canvas for wood.

Factors Governing Selection.—Six factors will ordinarily govern selection of equipment. These are: crops, soils, size of outfit, amount of capital, personal choice, local custom.

Examples of Factors Governing Selection.—Illustrations of how choice of equipment depends upon one or more of the six factors listed above can be found on every hand.

Character of Crops.—The influence of the character of the crop on the kind of equipment is seen at once upon comparing the equipment selected for putting in and caring for grain—such as gang plows, spike tooth harrows, disc harrows, drills or broadcasters, combined harvesters, binders or headers and stationary thrashers—with, for instance, the tools of the fruit business; *viz.*, walking plows or single or double gang plows, corrugated rollers, spring tooth harrows, spike tooth harrows, spraying

outfits, trays, lug boxes, picking baskets, ladders, etc. In the same way crops planted by broadcasting with no subsequent cultivation differ from row planted crops with cultivation following.

Character of Soils.—Heavier equipment is necessary for soils of gumbo, adobe, or heavy clay texture in contrast with that for light, sandy, or friable soils. In other words, differences of soil type influence profoundly the selection of plows, harrows, cultivators, and similar equipment. Again, where topography is reflected in equipment witness the side hill plow for rolling conditions as against the non-reversible mold board plow of the flat lands.

Size of Outfit.—Size of outfit refers to equipment necessary for the two- to four-horse farm as contrasted with farms working six, eight, and ten animals in a team. Tractors are possible for use on farms of comparatively large scale, while horses must be the rule for small-sized enterprises.

Amount of Capital.—Amount of capital when limited may necessitate securing of second-hand equipment rather than new, and smaller equipment such as two-horse outfits rather than six-horse.

Personal Choice.—Where choice is possible, personal taste justifies the selection of a certain type of rake, seeder, harrow, or cultivator; the selection of a disc instead of a mold board plow; or a leaning toward a given make of tractor.

Local Customs.—Local customs will influence the selection of equipment. It is usually better to give workmen the equipment with which they are familiar rather than to attempt the installation of new methods locally untried. This is illustrated by the retention in certain communities of hand pitching, and wagon hauling of hay to stacks, as against the use elsewhere of buck rakes or hay slings. Hay loaders and side delivery rakes and walking cultivators illustrate types of equipment which often find local favor but are not generally in use.

Environment a Factor in Determining Equipment.—There are sometimes, perhaps often, reasons for local practices. Consider, for example, the stone walls found all over New England, where rock is so abundant that fences, buildings, and field clearing can best proceed in conjunction; the split rail fence of timbered countries where timber is cheap and convenient; the wire fence of the open plains where building material is scarce and costly; the mule of the south, the ox-team still occasionally found in Maine, the heavy draft horse of adobe lands, the one-horse equipment of the southern one-man cotton farm; the grain "combines" of the north-west requiring 26 to 32 horses to draw (or equal tractor power); the grain sack of the Pacific Coast; the grain elevator of the Middle West; sleds in snow countries; wide-tread wagon wheels for muddy lands. The point is first to know local needs and local practices, and then to expand this knowledge by means of observation and study of other and perhaps better types of equipment used elsewhere under similar conditions.

Some choices are due to habit, to former association, or to demand and supply, but conditions such as these are easily recognized, *e.g.*, use of abode in hot countries with little wood, blinds on eastern houses, steep-pitched roofs in snow countries *vs.* quarter-pitch roofs in countries of limited rainfall. In sections of scant rainfall, hay is stacked in the open, in localities of heavy snow or much rain inside storage facilities must be

provided. Icehouses are a part of the building equipment in states of cold winters and warm summers; water towers, tanks, and windmills are necessary in countries needing water storage facilities for stock, domestic, and irrigation uses. The availability and kind of building materials will have a material influence on the type of building. Use of easily available materials should rule. This means use of rock or concrete or lumber or even adobe according to the resources of the community.

Grouping of Items.—A full list of all equipment needs should be made up for a specific enterprise.

For convenience the various items may well be grouped under general headings, as:

Farm Business.

- Buildings.
- Fences.
- Implements and machinery.
- Motive power—work stock, tractor, truck, automobile.
- Live stock other than work stock.
- Small tools.
- Special equipment, as for
 - Dairy house.
 - Poultry plant.
- Irrigating facilities.
- Draining facilities.
- Domestic water supply including piping for
 - House.
 - Stock.
- Sewage disposal.

Personal.

- Household furnishings.
- Automobile.

A further classification can be made by re-segregating these items into

Investment equipment	}	Buildings
		Improvements, as fences, water supply, etc.
		Implements and machinery
Operating equipment	}	Live stock
		Motive power
		Tools.
Personal equipment		Household goods.

Experience Necessary.—A little practical experience in using different kinds of implements under the direction of a competent man will prove the quickest way to learn what implements should be included in a list of equipment.

Where one can not bring personal experience to bear, a list should be made up based on the recommendations of those who have had this experience and can give proper advice.

Justifying Equipment

In the purchase of equipment, the expenditure of money in every case should be justified by an investigation into the costs and savings as measured by business principles.

The following examples will indicate the line of reasoning which should be followed. In every case they take into account the charges of interest, depreciation, and repairs, and place these against the possible saving in time or labor, or the possible gain in efficiency.

Justifying Farm Buildings.—One man builds a plain, dignified, serviceable set of buildings costing \$1,200. Another, perhaps a student of architecture, puts up a set of buildings more finished, but for farm purposes no more beautiful, dignified, or serviceable, at a cost of \$6,000.

Interest at 6 per cent on average value, plus depreciation at 5 per cent and repairs at respectively 2 and 1 per cent, totals

First case	\$120
Second case	\$540

If these buildings are each on 40 acres of similar land, each acre of land, to carry its share of the building investment, must produce above operating costs \$13.50 per acre in the second case, as against but \$3.00 in the first case.

Justifying Individual Structure.—In many sections, under normal conditions, a good single walled hog house can be built at a cost of from \$30 to \$40 a pen. If the cost is \$35 per pen and each is used to raise four litters a year, the cost per litter will amount to

Interest on \$17.50 at 5 per cent.....	\$0.88
Repairs on \$35.00 at 2 per cent.....	0.70
Depreciation on \$35.00 at 5 per cent.....	1.75
	<hr/>
	\$3.33

or an average cost of 83¢ per litter.

Compare this house with a hog house, ideal in every respect except cost, such as can be found occasionally. One in the writer's mind consists of 18 pens, feed bins, and fixtures. It cost \$4,000 completed, or \$222 a pen. Its financial aspect is therefore:

Interest, \$111* at 5 per cent.....	\$ 5.55
Repairs, \$222 at 2 per cent.....	4.44
Depreciation, \$222 at 5 per cent.....	11.10
	<hr/>
	\$21.09

or a cost per litter of \$5.27 as against 83¢ for the other house.

* Upon average investment.

Justifying Implement.—

A manure spreader costs.....	\$120.00
The upkeep cost is.....	2.50 annually
An old wagon which would answer the purpose, we will say is worth.....	40.00
Its upkeep is.....	1.00
Hauling done semi-occasionally.	
Loading time equal.	
Unloading.	
Spreader = 6 min.	
Wagon = 24 min.	

Time of man and team valued at 40¢ per hour. Machinery charges involve interest, depreciation, and upkeep costs. These figure:

For spreader (10 years of life).....	\$18.00
For wagon (5 years of life).....	10.00

thus giving an apparent saving of \$8 by wagon. This, however, is offset by longer time required for unloading to an extent determined by the tonnage of manure to be spread, thus:

TONNAGE	SAVING BY SPREADER (1-TON LOAD), HOURS	VALUE OF SAVING
25	7½	\$ 3.00
50	15	6.00
75	22½	9.00
100	30	12.00

Hence for 75 tons or more the saving is sufficient in this instance so that a manure spreader, if money can be spared for its purchase without affecting more important capital needs, is justified. For less than 75 tons, the wagon is cheaper.

Justifying Special Equipment.—Justifying special equipment is illustrated by use of milking machines and corn binder.

Milking Machine. Based on 120 milking cows the data for a given dairy showed that with hand milking one man could milk 30 cows, at a monthly wage of \$60 and board—the latter worth \$20. By machine milking one man could handle 60 cows if paid a monthly wage of \$75 and board. The cost of outfit installed amounted to \$600 for two double unit machines. Comparison necessitates consideration of:

- Interest on outfit.
- Depreciation of outfit.
- Repairs of outfit, *e.g.*, new tubing, cups, etc.
- Gasoline, oil, and operating expense.
- Any spoiling of cows.
- Extra labor to care for machines.

Hence:

Depreciation 25 per cent on \$600.....	\$ 150
Interest at 6 per cent on \$300*.....	18
Repairs (estimated).....	40
Operating machine, fuel, oil, etc., 6 hr. day at \$0.10 per hour....	219
Extra labor (1 hr. per machine per day, 730 hr. at \$0.25)....	183
2 operators at \$1,140.....	2,280
	<hr/>
	\$2,890
Cost of hand milking, 4 men at \$960.....	\$3,840
In favor of machine.....	\$ 950

Investigations by the U. S. D. A.⁴⁵ covering the labor requirements of dairy farms as influenced by milking machines tended, when the data were taken, to show that for dairies having less than 30 cows, hand-milking was cheaper; for dairies having more than 30 cows, machine milking was more economical. Against the saving in time per cow by machine milking (about 4¼ min. being required by machine, nearly 7 min. by hand), were considered interest on investment, fuel and oil, repairs, depreciation, and labor on the machine. Summed up with labor at but \$0.123 per hour, the findings are:

SIZE OF HERD	MACHINE MILKING	HAND MILKING
15 cows or less.....	\$11.77	\$10.91
16 to 30 cows.....	10.14	10.26
31 to 50 cows.....	9.22	10.11
51 cows or more.....	7.34	10.45

Justifying Corn Binder vs. Hand Cutting for Silage Corn.—On a given farm the cost of a corn binder was found to be \$285. Acreage was 8 acres of corn grown for silage.

Use of machine.

Interest at 6 per cent on \$142.50.....	\$ 8.55
Depreciation at 10 per cent on \$285.....	28.50
Twine, 8 balls at \$0.75.....	6.00
Repairs, estimated on 10 years life.....	5.00
	<hr/>
Total.....	\$48.05

Labor with machine.

Cutting, 4 horses at \$1, one man at \$3.50, 3 days.....	\$ 22.50
Loading, two men at \$3.50, 6 days.....	42.00
	<hr/>
Total for machine, including interest, depreciation, etc.....	\$112.55

All hand labor.

Cutting and loading, eight men at \$3.50 for 6 days.....	168.00
--	--------

Comparison of costs per acre.

By machine.....	\$ 6.25
By hand.....	\$ 9.22

* On average investment.

Justifying Tractors.—A gasoline tractor to replace horse stock, must cover the depreciation, interest on the investment, labor, fuel, and repairs.

There are a large number of combinations under which engines can be considered to replace horses, but the final consideration is the amount of work to be done. In this example work which can be done by either horses or tractor is equivalent to 10 work animals. Only the work stock which can be actually replaced are taken into account.

TABLE 47.—TESTING TRACTOR VS. HORSES FOR GIVEN FARM IN DETERMINING EQUIPMENT NEEDS
(1919 data)

NUMBER OF DAYS WORK 75 ON HOME PLACE	TWO FLOW UNIT	
	6 HORSES	22-HP. TRACTOR
First value—motive power		
Six horses at \$150.....	\$ 900	
Harness and collars.....	112	
Tractor.....		\$1,100
Total.....	\$1,012	\$1,100
<hr/>		
Annual expense		
Feed, or fuel and oil.....	\$ 467	\$ 280
Labor in field.....	375	450
Labor when not working.....	60	50
Repairs and incidentals.....	30	186
Total operating expense.....	\$ 932	\$ 966
<hr/>		
Overhead		
Depreciation { 12 per cent on work stock.....	\$ 108	
{ 20 per cent on harness.....	22	
{ \$1,100 ÷ 400 work days (life) × 75 days		\$ 225
Interest at 6 per cent on average investment.....	30	36
Total overhead charge.....	\$ 160	\$ 261
<hr/>		
Total operation and overhead.....	\$1,092	\$1,227
Credits		
Profit on outside work.....	\$ 60	\$ 100
Manure.....	\$ 20	
Colts (at time of weaning).....	40	
Total credit.....	\$ 120	100
<hr/>		
Final net cost.....	\$ 972	\$1,127
Cost per day (about).....	\$ 13	\$ 15

Tractor Equipment.—To the above items may well be added the additional capital requirements, with attending charges of interest and depreciation, for any difference in equipment involved in the working of either

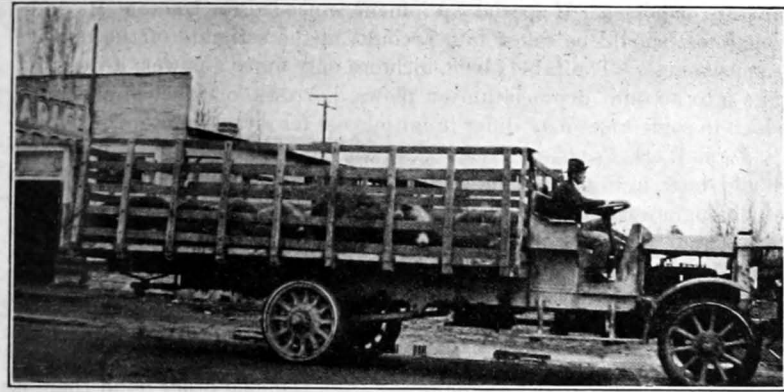


FIG. 26.

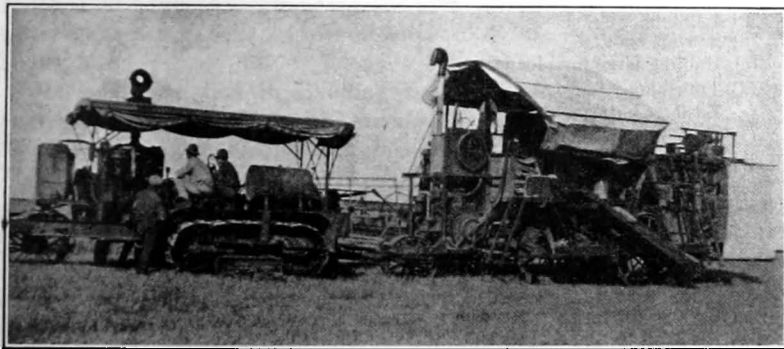


FIG. 27.



FIG. 28.

The present trend in motive equipment is toward increased motor driven machinery.

Above: Three and one-half ton farm truck.

Center: Caterpillar type tractor and combined grain harvester.

Below: Battery of "75-s" pulling giant land levelers.

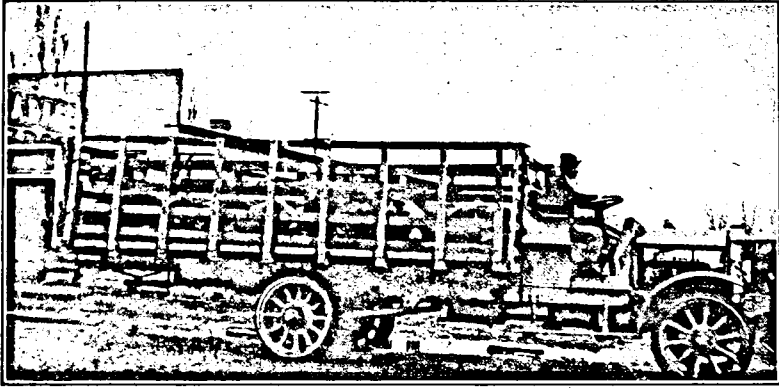


FIG. 26.

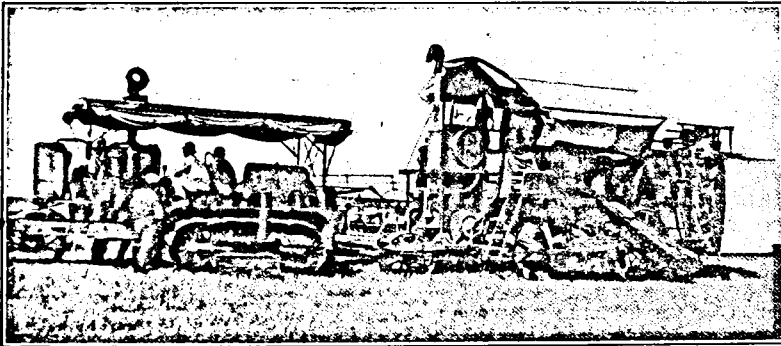


FIG. 27.

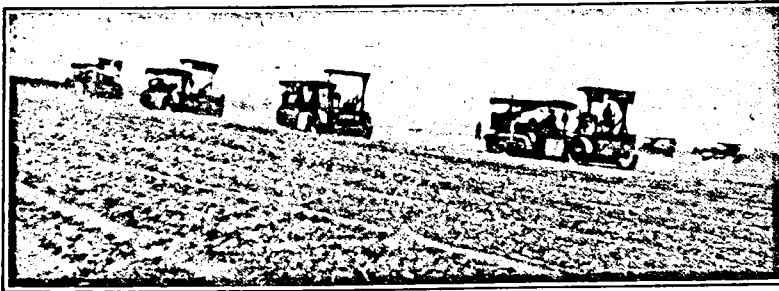


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Above: Three and one-half ton farm truck.

Center: Caterpillar type tractor and combined grain harvester.

Below: Battery of "75-s" pulling giant land levelers.

tractors or horses. If special equipment is needed for tractors, its additional cost should be taken into account in the estimate of the relative expensiveness. The table above includes only motive power; it does not take into account depreciation on plows, harrows, or other implements, which in some cases may differ in initial cost for either tractors or horses.

Farm Work Requiring Horses.—In working out similar projects one should bear in mind that on all farms some horses are needed for work which engines can not do, such as:

- (a) Hauling on road.
- (b) Cleaning ditches.
- (c) Odd jobs of scraper work.
- (d) Mowing, raking, and hauling off hay.
- (e) Cleaning around barns, pens, corrals, etc.

Farm Work Requiring Mechanical Force.—On the other hand there is work an engine can do to advantage, such as:

- (a) Pumping water.
- (b) Sawing wood.
- (c) Hauling large road loads.
- (d) Threshing.
- (e) Ensilage cutting.
- (f) Grubbing trees or pulling stumps
- (g) Cleaning grain.

Replacement of Horses by Tractors.—In general on the small farm great care is needed to determine to what extent tractors can profitably replace horses, since to be most economical, engines can replace to advantage only work stock used primarily for field work. In general it is interesting to note that the more time horses are idle the greater is the advantage which the tractor enjoys.

Literature on Farm Tractors.—To provide tractor data for farm management use several publications are obtainable. The latest are included in the reference list:

		PUBLISHED
U. S. D. A. Department <i>Bulletin</i>	174	1915
U. S. D. A. Farmers' <i>Bulletin</i>	719	1916
U. S. D. A. Farmers' <i>Bulletin</i>	963	1918
U. S. D. A. Farmers' <i>Bulletin</i>	1,004	1918
U. S. D. A. Farmers' <i>Bulletin</i>	1,035	1919
Purdue University <i>Circular</i>	89	1919
Pennsylvania State College <i>Bulletin</i>	158	1919
Kentucky Agr. Experiment Station <i>Bulletin</i>	222	1919
Iowa Agr. Experiment Station <i>Circular</i>	63	1919
U. S. D. A. Farmers' <i>Bulletin</i>	1,093	1920

CHAPTER IX

BUILDING EQUIPMENT

A discussion of satisfactory building types cannot be fully made in the space here allotted to the subject. Farm management is, however, directly concerned to insure selection of suitable types of structure to meet given needs, and either to keep expenditures within economical limits or else to relieve the farm business of the responsibility of unduly heavy outlay for lavish or freakish or surplus or "folly" buildings, charging the difference between that which is just and proper, and that which is extravagant and unnecessary, to its proper place, *i.e.*, to personal taste, ignorance, experience, wilful disregard of business principles, or to luxury.

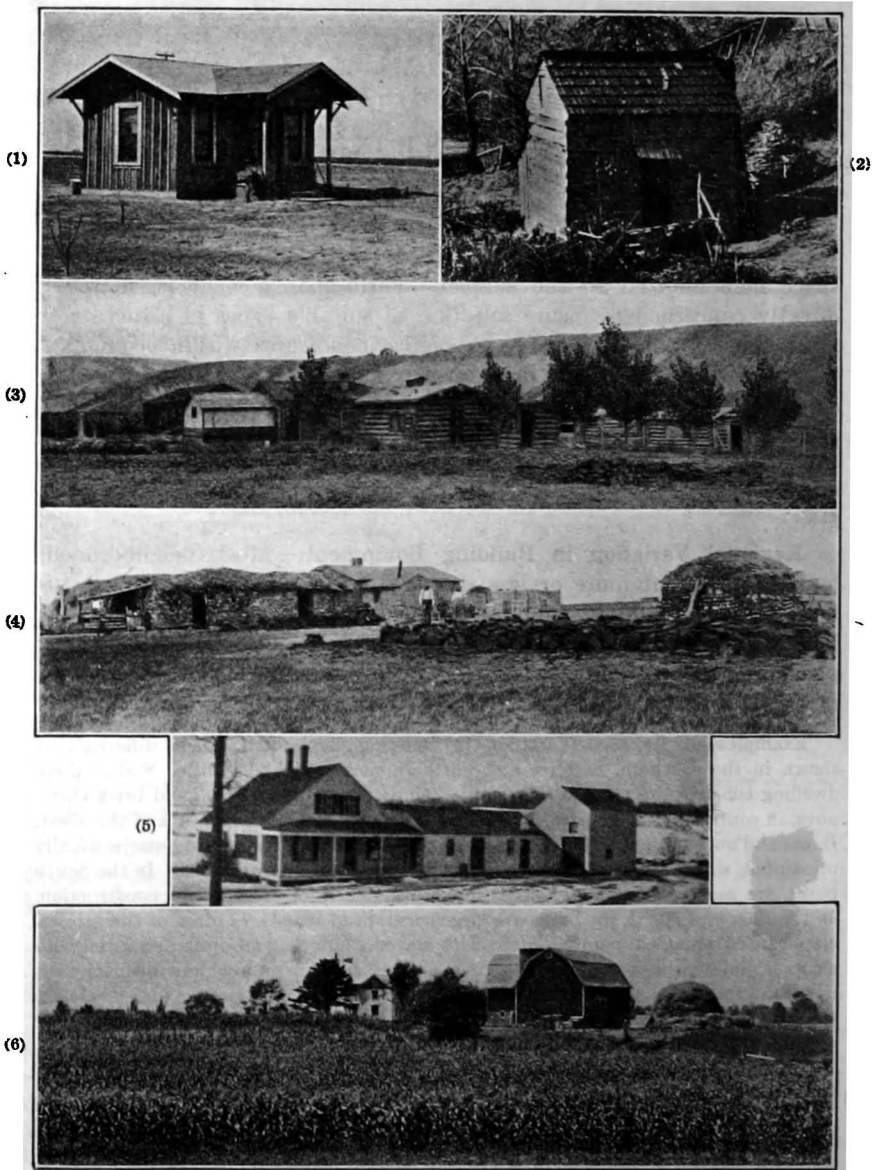
Regional Variation in Building Equipment.—Most neighborhoods have worked out more or less standard types of buildings under the limitations of climate, building material, building skill, and taste. This applies not only to dwellings but to stock and hay barns, hoghouses, poultry shelters, implement sheds, and outbuildings. Some idea of this regional variation is conveyed in the accompanying photographs.

Examples of Regional Variation in Building Equipment.—This difference is shown in the southern, eastern, and northern portions of the United States where dwelling construction runs to clapboards, blinds, brick foundations, and brick chimneys, in contrast with the sawed rustic, tile chimneys, and concrete sills of the West. Barns and outbuildings in the West, are of plain boards or boards and battens usually unpainted, single story with shingle or shake or galvanized iron roofs. In the South barns are mostly small, unpainted, makeshift affairs of nondescript construction. In the East and North the barns are large substantial structures often of two stories, clapboarded, shingled, painted, fitted with glazed windows, and often decorated with a cupola and weather vane. Other structures are limited in number and inconspicuous in the South, while eastern farmers build implement sheds and storage quarters, clapboarded, shingled, and painted. In the West the collection is usually rather large and of motley appearance, being built from time to time as needs arise.

Further evidences of difference are found in interior arrangement, equipment, and finish.

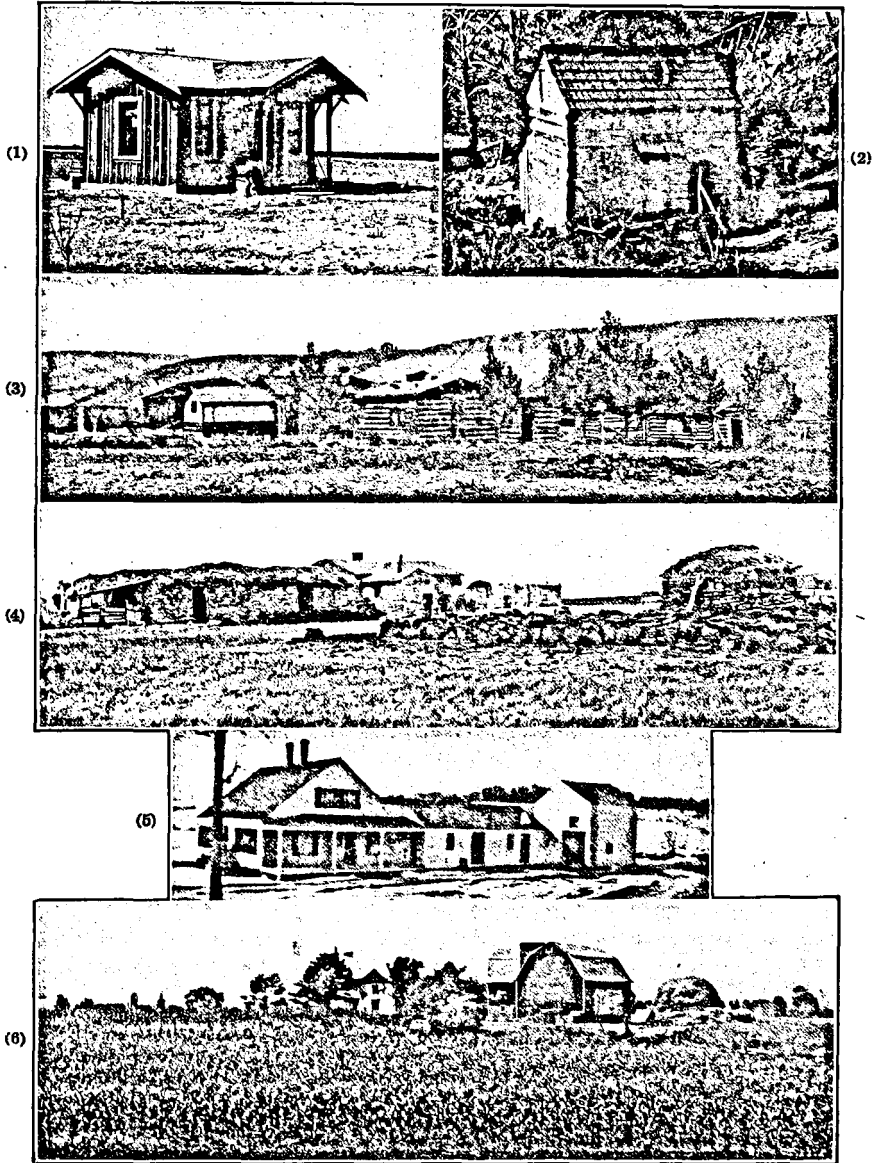
Variation in Interior Finish and Equipment.—The better class of eastern barns are ceiled with tongue and groove, a practice seldom met under western conditions. All eastern and northern structures are well floored; many western barns still rest on nothing but natural ground.

Types of mangers and watering devices differ, according to local custom and to amount and character of feeding methods. In cold climates where cows are indoors much of the time, swinging stanchions are the rule; in sections where the cows are housed only for milking, cheaper, rigid tie-ups satisfactorily serve the purpose



Figs. 29-34.—Types of farm dwellings.

1. Settler's cottage on newly opened western land (California).
2. A Kentucky cabin.
3. Buildings of logs sealed with adobe (Colorado).
4. Buildings of stone, straw and mud. Russian construction. Semi-arid region. Note the blocks of dried manure for fuel piled in foreground.
5. The New England type of continuous building. Promotes comfort in winter, but at greater risk of fire.
6. Buildings of the dairy region (Michigan).



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6. Buildings of the dairy region (Michigan).

Good and Bad in Farm Buildings.—There is no one outstanding *best* structure for all conditions. That is, one cannot suggest a single standard type of cowbarn or house or hog pen or fence that will fit all conditions. As has already been said, much depends upon the use to which the structure is to be put, to climatic conditions, to the location of the structure, and to available building materials. A few general rules, however, are possible for guidance and caution.

Building Equipment Should Be Economical and Simple.—The first point to bear in mind is to construct buildings as cheaply and simply as possible. The simpler the construction compatible with length of life, the better they will serve the purpose. This is especially worth considering in regions of mild climates, where the weather renders unnecessary



FIG. 35.—Stacking hay in open, where feasible, saves barn and shed space and lessens labor.

the costlier buildings called for elsewhere. Money put into costly buildings is not only unavailable for other and perhaps better use, but the product of the ranch must pay interest thereon as discussed above.

Buildings Should Serve the Profit-making Farm Enterprises.—When the farm is viewed from the standpoint of a “business proposition”—a means of making money—it will be more clearly seen that the relation of buildings to the general scheme must be dependent on their usefulness in contributing to the money-making power of the ranch. Looked at in this way, all the structures to stand the test must be built consistent with the nature of the produce turned off. Let them therefore be plain and substantial; well protected by paint from weathering, if of wood; provided with ample space in relation to purpose, with maximum convenience as regards both relative positions of buildings and interior arrangement of each individual building, and with abundant light and ventilation when these are needed; and one has all that sound business and good farming demand.

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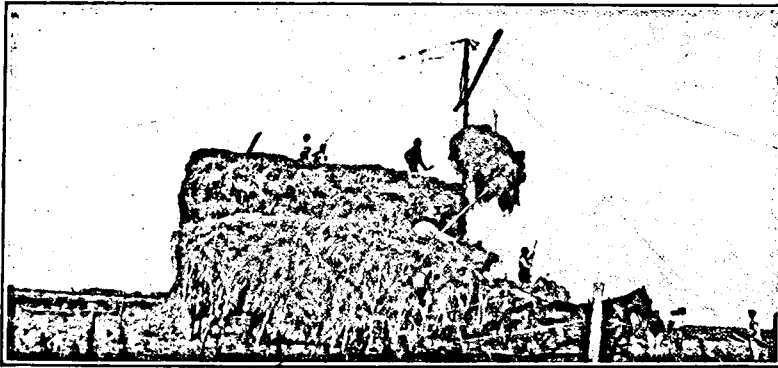


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It is, of course, not to be inferred from the above that buildings must be grotesque, ugly, weird, or abnormal, to fulfil their mission. Wisdom suggests against the use, for instance, of matched boards where rough lumber would do; of shingles where shakes would serve as well or of galvanized iron if this is more expensive, of ginger-bread decorations, and of unnecessarily fancy interior finish. On the whole, as a redeeming feature, one will find that most farm buildings which fulfill their purpose best, are usually of good substantial proportions, and by their very plainness have a certain dignity of outline which appeals.

Studying Proposed Buildings.—When the type and size of each building has been agreed upon, rough plans should then be made on paper, the ground floor plan staked out, and the whole proposed structure studied from every angle. Suggestions may well be sought from those men who will have to use it, *i.e.*, of carpenter and blacksmith and harness maker concerning their respective shops, of cooks regarding kitchens, women regarding house arrangement, irrigator regarding ditch structures, etc. After such tentative building plans are made, the farm manager should in his mind go over the various operations to be carried on within the structures, thus forming a mental impression of the future use to see if the arrangement as planned is as nearly ideal as possible. It is well, too, to plan the structures so that additions can be made later. This applies particularly to farm house, barn, bunkhouse, and granary, especially if the land is capable of greater development.

Procedure in Building.—While the services of an architect and contractor are desirable in providing new building equipment, nearly every farmer and rancher must ordinarily rely upon himself. Handicapped by lack of capital or by remoteness, the planning and erection must commonly rest on local resources. It therefore stands one in hand to know how to begin. The ordinary procedure is:

- (a) Select the proper buildings for the purpose.
- (b) Draw up a bill of materials.
- (c) Estimate costs.
- (d) Make a working plan for carpenters' use.
- (e) Locate each building and the whole group on the most favorable site.
- (f) Establish an order of grouping which will retain the proper location of one building with respect to another—the farmstead arrangement.

Construction Suggestions.—Have sewer facilities and running water in the house. The convenience and pleasure of decent living more than offset the additional cost.

Put in plenty of bins, shelves, and cupboards for provisions and utensils. Have them handy. Proper putting away of provisions means saving; in dishing up flour, sugar, there is no spilling; damage by mice, ants, cockroaches is reduced to a minimum; and a ready inventory of

stores can be taken quickly, thus avoiding duplication or an over-abundance of supplies. It saves the cook's time, too, when hurrying to prepare a big meal.

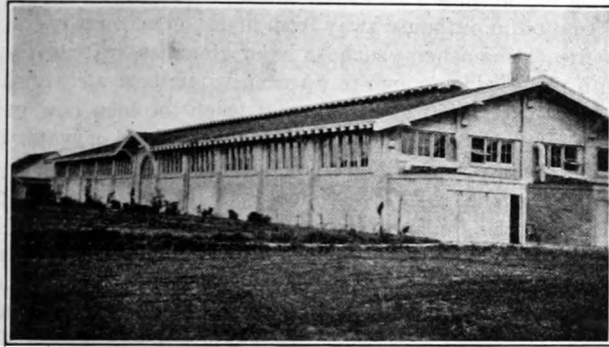


FIG. 36.

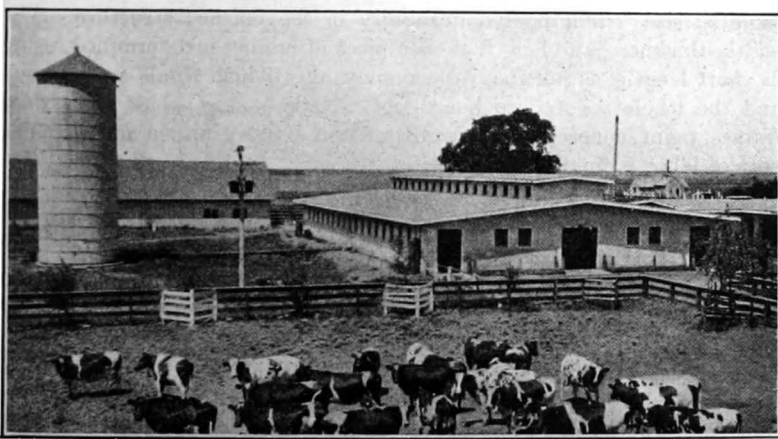


FIG. 37.—Two unusual types of Farm Structures.

Above: Private fruit packing shed costing \$20,000.
Below: Dairy equipment of a State Hospital.

When married men are hired, give their wives wash-house facilities. Such a place can also be used for canning and storing fruits, vegetables, etc.

Have proper washing facilities for the men. For personal use a wash room with wooden sink containing basins is satisfactory enough, together with a shower bath in a room partitioned off. Men will not use bath tubs. Facilities in the way of a stove or open fireplace with kettle should

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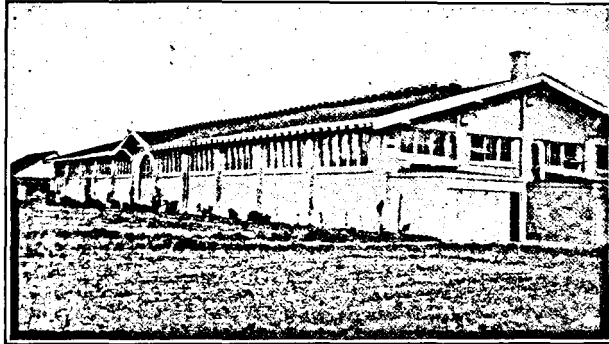


FIG. 36.

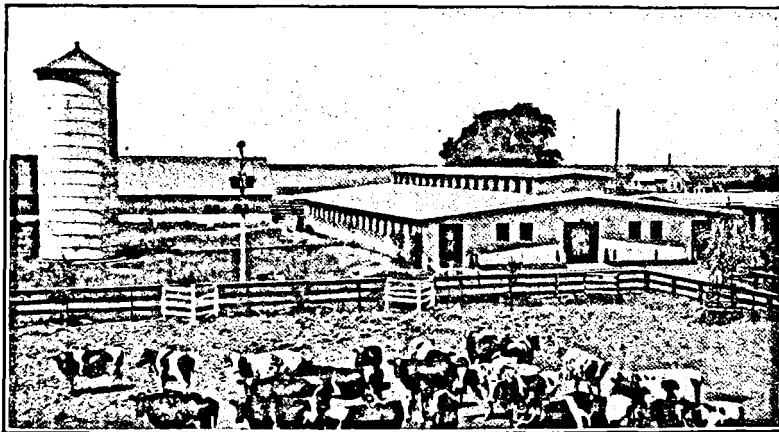


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be given the men to wash their clothes. It can often be arranged to pipe hot water to the shower bath by putting a coil in the bunk house stove.

Utilize the space under water towers for storage or sleeping rooms by boarding in the sides.

Keep coal oil in outhouse away from house on account of fire danger.

Keep fire extinguishers, such as hand grenades, in easily accessible places, or if place is big enough to warrant it, purchase a chemical engine—which costs from \$150 to \$500—and teach the men how to operate it. Have an occasional fire drill. Axes and buckets of water reserved for fire use only have many times put out small fires in time to prevent serious conflagrations.

Provide facilities for keeping meat and milk.

Definition of Bill of Materials.—A bill of materials is a statement covering the various sizes, kinds, and amounts of lumber, nails, hardware, shingles, paint, milled goods, concrete, necessary to the construction of a building.

Making a Bill of Materials.—This is obtained by determining the kinds and quantities of lumber or other material needed to secure the required size, strength, and durability in the finished structure. The width, thickness, and length of each piece of lumber is determined, using as short lengths as possible for economy after which totals are secured, and the whole reduced to board-feet. Nails, spikes, bolts, sash, door frames, paint, concrete work, hardware and extras are then added. The cost of labor is finally affixed.

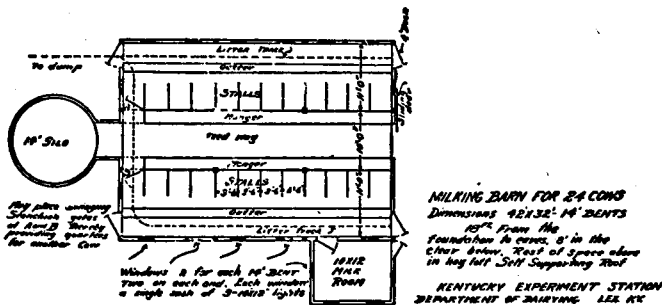


FIG. 38.—Ground plan of dairy barn⁴⁶ for which bill of materials is listed in text.

Examples of Bills of Materials.—*Bill of Materials for Dairy Barn.*—The following is an example of a detailed bill of material for a milking barn for 24 cows.⁴⁶ The dimensions of this barn are 42 by 32 ft. and 18 ft. from foundation to eaves. A large amount of storage room for hay is provided. The drawing shows a width of 32 ft. Some dairymen prefer a barn 34 ft. wide, and this plan may easily be changed to the latter dimension at a slightly added cost.

Either horizontal or vertical siding may be used, the cost being practically the same in either case. A bill of materials for horizontal siding is given below.

BILL OF MATERIALS—HORIZONTAL SIDING—SELF-SUPPORTING ROOF
18 ft. to eaves. Dimensions 42 by 32 ft.

Sills—

West side, 3 pieces $2 \times 6 \times 14$.

East side, 3 pieces $2 \times 6 \times 14$.

Two ends, 4 pieces $2 \times 6 \times 10$.

Studs—

West side, 22 pieces $2 \times 6 \times 18$.

East side, 22 pieces $2 \times 6 \times 18$.

(Continued on next page.)

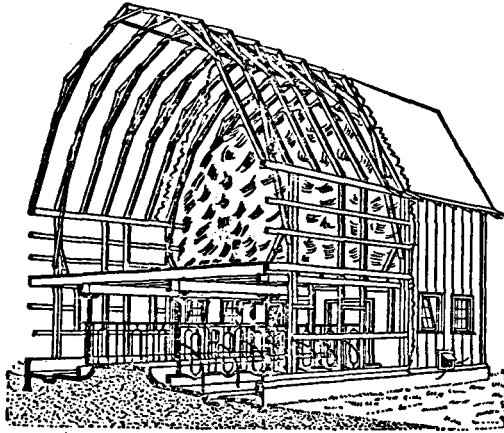


FIG. 39.—Illustrating framing balloon barn for vertical siding.

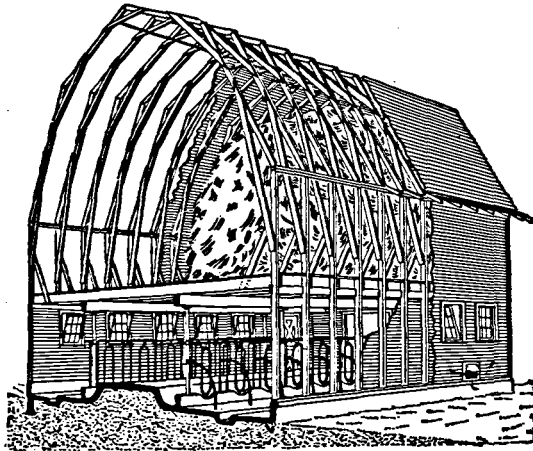


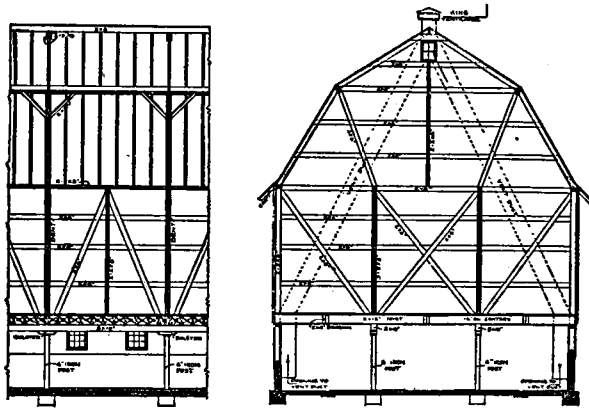
FIG. 40.—Illustrating framing of balloon barn⁶⁶ for horizontal siding.

Examples of framing for horizontal or vertical siding.
(Same barn as Fig. 38.)

Two ends, 28 pieces $2 \times 6 \times 18$.
 For north end above eaves, 8 pieces $2 \times 6 \times 14$.
 For north end above eaves, 4 pieces $2 \times 6 \times 12$.
 For south end above eaves, 8 pieces $2 \times 6 \times 14$.
 For south end above eaves, 4 pieces $2 \times 6 \times 12$.
 Corner storm braces for sides, 4 pieces $2 \times 8 \times 24$.
 Corner storm braces for ends, 4 pieces $2 \times 8 \times 24$.

Plates—

West side (nail together 2 pieces 2×6) 6 pieces $2 \times 6 \times 14$.
 East side, 6 pieces $2 \times 6 \times 14$.
 North end, 4 pieces $2 \times 6 \times 16$.
 South end, 4 pieces $2 \times 6 \times 16$.



DANEL BETWEEN TRUSSES

END CONSTRUCTION

FIG. 41.—Example of side and end framing of barn.⁴⁶ (Same barn as Fig. 38.)

Center posts, 8 pieces $6 \times 6 \times 7$.
 Girders, 6 pieces $6 \times 10 \times 14$.
 Side joists, 44 pieces $2 \times 10 \times 12$.
 Center joists, 22 pieces $2 \times 10 \times 10$.
 Joist support or ribbon, 6 pieces $2 \times 6 \times 14$.

Roof Truss—

Top section of rafters, 44 pieces $2 \times 6 \times 10$.
 Ridge pole, 3 pieces $1 \times 6 \times 16$.
 Side section of rafters, 44 pieces $2 \times 6 \times 14$.
 Braces between side and top, 88 pieces $1 \times 6 \times 10$.
 Braces between side and posts, 44 pieces $1 \times 6 \times 10$.
 Braces between studs and joist, 44 pieces $1 \times 6 \times 8$.
 Braces at top (collar beam), 22 pieces $2 \times 6 \times 6$.
 Extension at eaves, 44 pieces, $2 \times 6 \times 4$.
 Cornice, 13 pieces $1 \times 6 \times 14$.
 Window framing, 16 pieces $\frac{7}{8} \times 8 \times 14$.
 Weather strips for window frames, 16 pieces $\frac{1}{2} \times 1 \times 12$.

BUILDING EQUIPMENT

169

Loft floor tongue and grooved second grade, 1,400 sq. ft.
 Roofing, 2,400 sq. ft. actual surface measurement, 21,600 shingles.
 4 in. sheathing 4 in. space between, 1,500 sq. ft.

Siding (drop siding No. 2 grade)—

For sides, 1,500 sq. ft.

For ends, 1,800 sq. ft.

Hardware—

Roofing nails required (3 lb. per 1,000 shingles) 66 lb.

2 kegs 20d nails—200 lb.

3 kegs 8d nails—300 lb.

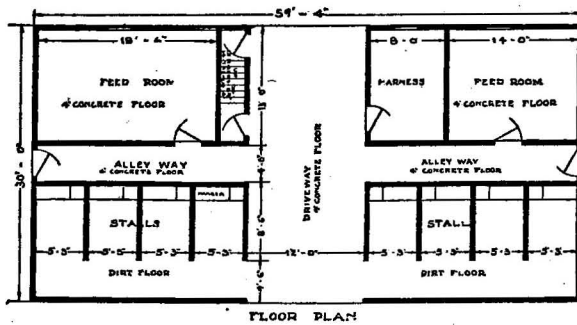
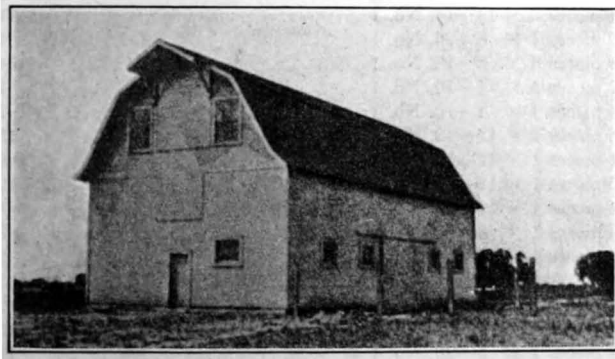
5 pairs screw barn door hinges.

16 pairs 3-in. strap hinges for windows.

10 ft. track for sliding door.

1 pair barn door hangers complete.

16 window sash, 9 lights 10 × 12 in.



Figs. 42-43.—Horse barn for which bill of materials is indicated in text.⁴⁷

BUILDING EQUIPMENT

169

Loft floor tongue and grooved second grade, 1,400 sq. ft.
 Roofing, 2,400 sq. ft. actual surface measurement, 21,600 shingles.
 4 in. sheathing 4 in. space between, 1,500 sq. ft.

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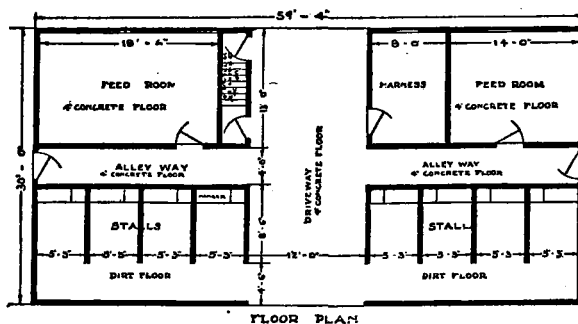
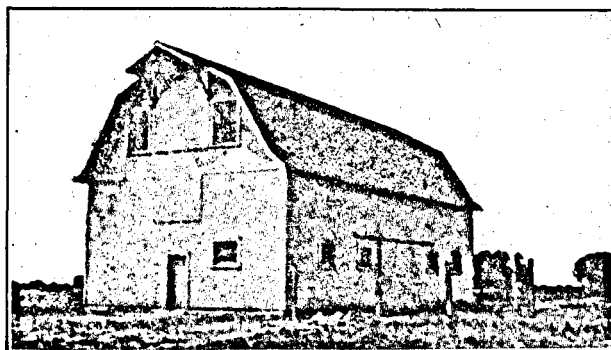
5 pairs screw barn door hinges.

16 pairs 3-in. strap hinges for windows.

10 ft. track for sliding door.

1 pair barn door hangers complete.

16 window sash, 9 lights 10 × 12 in.



FIGS. 42-43.—Horse barn for which bill of materials is indicated in text.⁴⁷

Bill of Materials for Horse Barn.—A summarized bill of materials for a barn for eight head of work stock runs as follows:⁴⁷

BARN FOR WORK ANIMALS (See Figs. 42-43)		
LUMBER		BOARD FEET
10 pieces 2 × 4-12, No. 1.....		80
76 pieces 2 × 6-12, No. 1.....		932
14 pieces 2 × 6-14, No. 1.....		196
120 pieces 2 × 6-16, No. 1.....		1,920
74 pieces 2 × 6-18, No. 1.....		1,332
47 pieces 2 × 6-20, No. 1.....		940
2 pieces 2 × 6-22, No. 1.....		44
8 pieces 2 × 6-24, No. 1.....		192
25 pieces 2 × 8-20, No. 1.....		667
2 pieces 2 × 8-16, No. 1.....		43
2 pieces 2 × 12-16, No. 1.....		64
31 pieces 2 × 12-14, No. 1.....		868
31 pieces 2 × 12-18, No. 1.....		1,116
1 pieces 4 × 6-20, No. 1.....		40
10 pieces 6 × 6-18, No. 1.....		540
1 pieces 4 × 4-10, No. 1.....		13
1 pieces 4 × 4-16, No. 1.....		21
13 pieces 1 × 12-12, No. 1.....		156
4 pieces 1 × 12-16, No. 1.....		64
6 pieces 1 × 12-20, No. 1.....		120
4 pieces 1 × 10-12, No. 1.....		40
3 pieces 1 × 8-16, No. 1.....		32
6 pieces 1 × 5-10, No. 1.....		25
6 pieces 1 × 5-12, No. 1.....		30
4 pieces 1 × 5-16, No. 1.....		27
14 pieces 1 × 5-18, No. 1.....		105
14 pieces 1 × 5-20, No. 1.....		117
11 pieces 1 × 6-12, No. 1.....		66
62 pieces 1 × 6-14, No. 1.....		434
66 pieces 1 × 6-16, No. 1.....		528
8 pieces 1 × 6-18, No. 1.....		72
16 pieces 1 × 6-20, No. 1.....		160
Drop Siding No. 117.....		3,600
D.&M. flooring.....		2,400
D.&M. flooring 23-1 × 4-14, No. 1.....		108
D.&M. flooring 18-1 × 4-16 No. 1.....		96
D.&M. flooring 10-1 × 4-10 No. 1.....		33
Shiplap No. 2-1 × 8.....		2,300
58-1 × 4-10 No. 1.....		190
83-1 × 4-12 No. 1.....		332
4-1 × 4-16 No. 1.....		21
1 × 4 No. 2.....		1,760
Total.....		21,744
To 21,744 board ft. lumber at \$27.50 per M.....		\$597.96

Other material:

66 ft. 12-in. galvanized iron ridge roll at 12¢ foot.....	\$7.90
14 pairs 8-in. strap hinges, at 25¢ pair.....	3.50
48 ft. barn door track, at 12½¢ foot.....	6.00
8 barn door hangers, at \$1.25 each.....	10.00
80 ½ by 8-in. bolts, at 5¢ each.....	4.00
500 lb. nails at \$4.50 per 100 lb.....	22.50
6 single-sash, 6-light, glass 12 × 14 in. windows at \$1.50 each	9.00
4 check rail windows, 12-light, glass 12 × 14 in. at \$3.00 each.	12.00
32,000 shingles, at \$4.00 per M.....	128.00
3,000 sq. ft. No. 1 shiplap, at \$25.00.....	75.00
Total.....	\$277.92

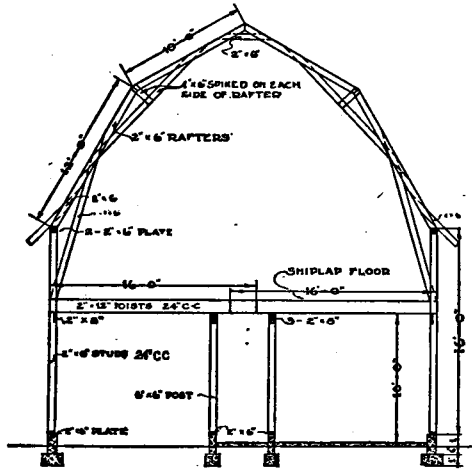


FIG. 44.—Example of framing truss for balloon frame barn.⁴⁷ (Same barn as Fig. 41.)

Foundation:

Continuous concrete:

8 cu. yd. sand, at \$1.25 per yard.....	\$ 10.00
50 bbl. cement, at \$2.00 barrel.....	100.00
55 cu. yd. sand and gravel, at \$1.35 per yard.....	74.25
Total.....	\$184.25

Concrete piers:

Forty piers, 9 × 9 × 18 in., footings 18 × 18 × 12 in. 3 cu. ft., concrete in each pier.

8 cu. yd. sand and gravel, at \$1.35 per yard.....	10.80
6 bbl. cement, at \$2.00 barrel.....	12.00

Extra lumber for sills:

16 pieces 6 × 6—12—576 ft.,	
6 pieces 6 × 6—16—288 ft.—864 ft.,	
at \$27.50 per M.....	23.75
Total.....	\$ 46.55

Detailed Plans of Construction.—Detailed plans of construction for practice in reading working drawings are herewith illustrated. Variety exists in framing designs according to type of structure, and size, and local practices. Those shown are, however, typical.

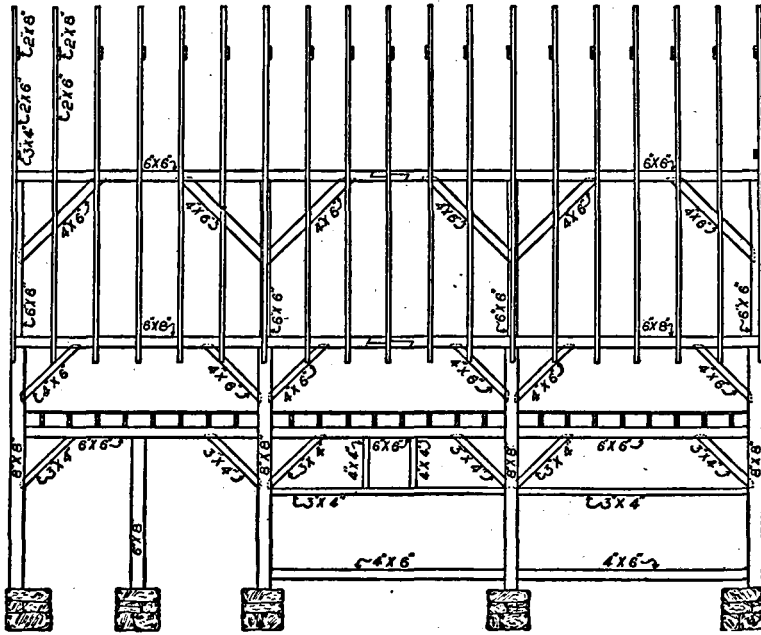


FIG. 45.—Illustrating side framing of barn.⁴⁸

Space Allotment in Buildings.—Ohio²³ found the average floor, and cubic space per head of live stock, averaged for 21 farms to be:

TABLE 48.—AVERAGE BUILDING SPACE FOR ANIMALS (OHIO)²³

	Average space per head	
	Floor	Cubic
Horses.....	87.5	748.8
Cattle.....	83.4	708.4
Sheep.....	11.6	100.9
Swine.....	19.2	171.3

Other common dimensions allotted for stock are shown in the next table.

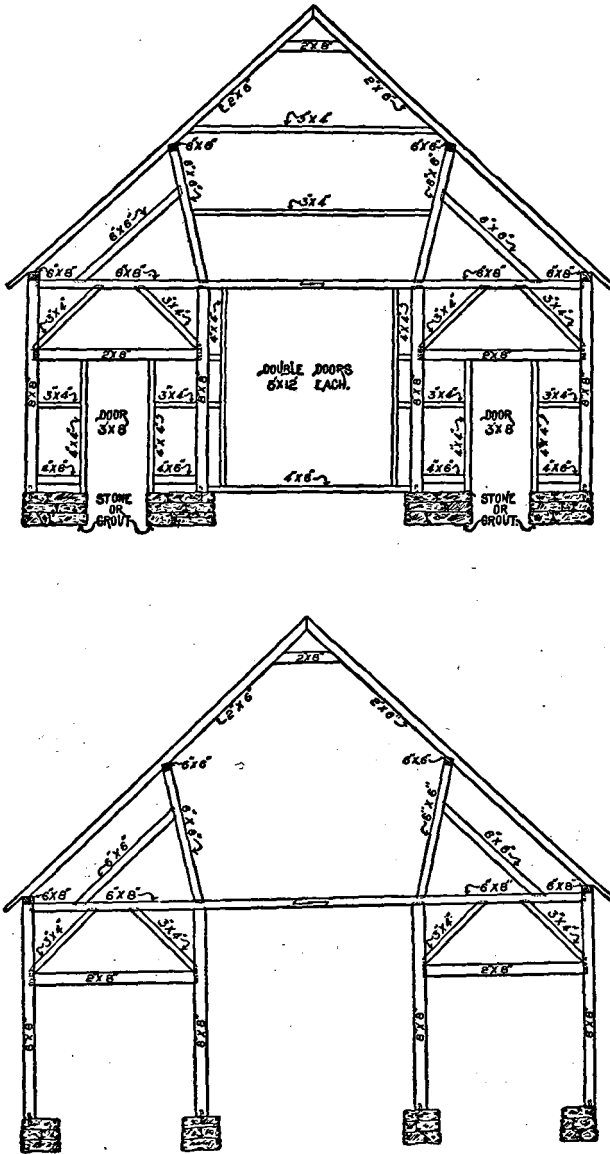


FIG. 46.—Example of end and truss framing of A-roofed barn.⁴⁸

TABLE 49.—BUILDING SPACE ALLOTMENTS

Cow Barns

	FEET
Usual length of cow stands.....	5
Usual width of cow stands.....	3½
Rear alley, including gutter.....	5
Feed alley, including mangers.....	18
Height of walls to eaves.....	9
Pitch of roof.....	¼
Width of manger.....	2

Horse Barns

Usual length of single stalls, including mangers.....	10
Usual width of single stalls.....	5
Width of mangers.....	2
Rear alley.....	8
Height of walls to eaves.....	10
Pitch of roof.....	¼
Box stalls.....	12 × 12

Hay Barns

	CUBIC FEET
Usual allowance of space per ton:	
Loose grain hay.....	500
Baled grain hay.....	155
Baled alfalfa hay.....	160

Warehouses

Usual allowance of space per ton:	
Sacked barley.....	65
Sacked wheat.....	50
Middlings and bran.....	70
Dried sugar beet pulp.....	135

Hog Pens

Farrowing pens—inside 6 × 9 ft., outside.....	6 × 12 ft.
Feed alley between farrowing pens.....	5 ft.
Partitions.....	4 ft.

Poultry Houses

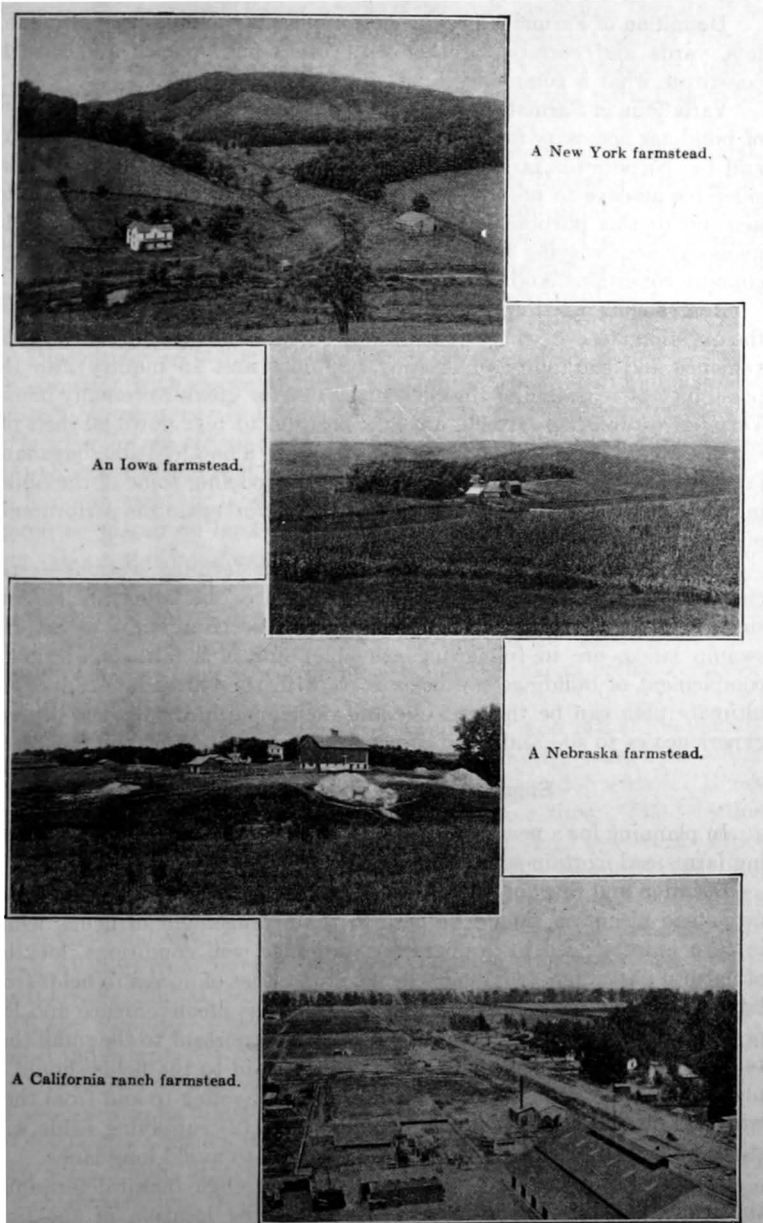
Allowance per fowl of floor space.....	2 sq. ft.
Allowance per fowl of perch room.....	10 in.

The Farmstead⁴⁹

Once the list of structures for a given business has been worked out, in accordance with the discussion of the last section, an inquiry logically follows into the placing of buildings. Both the relation of one building to another and the relation of the group to the rest of the farm are matters for consideration. In providing building equipment the investment is so large that time and attention to these two particulars are amply justified.

Consideration should be directed in the order of:

1. The location of the farmstead as a unit, and
2. The arrangement of structures comprising the farmstead.



Figs. 47-50.—Examples of farmsteads and building layouts.



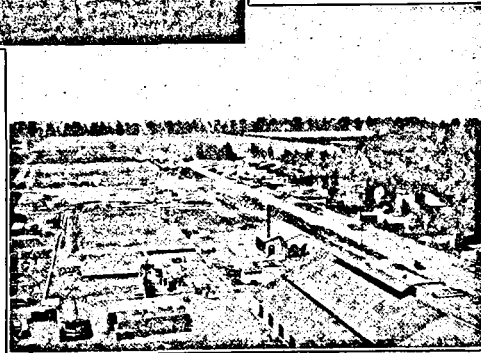
A New York farmstead.

An Iowa farmstead.



A Nebraska farmstead.

A California ranch farmstead.



Figs. 47-50.—Examples of farmsteads and building layouts.

Definition of Farmstead.—The group of farm buildings and adjoining lots, yards and corrals, together with the home orchard and garden, constitute what is commonly called the farmstead.

Variations in Farmsteads.—Farmsteads range from a very simple set of buildings necessary for a family-size farm to those of the large ranches and big corporation farms,—of extensive sets of buildings requiring considerable acreage to provide satisfactory setting. For every farm must give up to this purpose more or less of valuable land, the size of the necessary area varying with the type and magnitude of the business, the climatic conditions, and the individual tastes of the operator.

Rearranging Existing Farmsteads.—In the older agricultural sections the question of new structures is usually secondary to a study of the convenience and suitability of existing buildings and an inquiry into the possibility of rearranging the present layout for greater economy in use. Very few established farmers are in a position to tear down all their old structures and build entirely anew or to move to a new location, but many farms can be improved by rearranging or remodeling some of the buildings in order to save the time and energy of the workers in the performance of routine duties.

Planning New Farmsteads.—In the newer farming sections—especially in the western States where subdivision of the large ranches into small farms, settling up of large holdings, and reclamation of desert and swamp lands, are in full swing—the planning of a farmstead and its complement of buildings can often start with the bare land, and so the ultimate plan can be thought out and developed in the light of present experience as to site and as to choice and arrangement of buildings.

Suggestions for the Farmstead

In planning for a new farmstead or in preparing to rearrange an existing farmstead, certain suggestions should be kept in mind.

Location and Site for Farmstead.—In determining the position of the farmstead attention should be paid to the arrangement of fields, which in turn is influenced by topography, drainage, soil conditions, location of natural pasturage, cropping scheme, etc. Ease of access to fields from buildings is highly desirable; without it, there is inconvenience and loss of time. This consideration is, of course, less important to the small than to the large farm. The relation of the farmstead to the fields should be planned to reduce the time consumed in: (1) traveling to and from them with various implements, or in driving stock, (2) supplying fields with stock water from a central supply, (3) fencing, to avoid long lanes.

Relation to Highway.—Probably the greatest single factor determining the general disposition of farm buildings is the location of the farm in relation to the highway. If it is desirable or more convenient to establish the farmstead close to the highway, something may be lost in the

reduction of economic access to the fields, yet, while the farmstead so placed may be subjected to considerable dust, passing traffic is often a source of much interest, and ability to observe at close range or to hail those passing tends to promote social intercourse and participation in community affairs.

A cross-road is often the logical site, for towns, railroads, schools, churches, etc., may all so lie that such a corner of the farm is nearest to them. If more important considerations do not oppose, this factor might well determine the farmstead site, on the grounds of time saved in traveling to and from the farm, quick access to both highways, and the handling of live stock and farm traffic through a rear entrance, dwelling and front yard thus being left undisturbed.

Topography.—For the site of a farmstead, select land having a moderate elevation with slopes to the south and east, neither so high as to be difficult of access nor so low as to be subject to frost, poor in drainage, or lacking in air circulation. Such a choice is essential not alone in the reduction of costs but in relation to the good health of the family.

Even though the desired slope cannot be obtained, the farmstead should be placed on land sufficiently high to carry off all surface water from about the buildings and grounds, and to provide for sewers or other sanitary conveniences. Good drainage insures comparatively dry yards, corrals, barns, and driveways, making it easier to get around in bad weather and more comfortable for the stock. The building site should be on good soil, if it is obtainable, for the sake of orchard, garden, and wind-break.

It is better to sacrifice a little crop-producing land rather than handicap the farmstead with poor soil. Sandy or gravelly soils, if favorable for plant growth, possess the desirable quality of rapid drainage. Hence they lend themselves particularly well for building sites. The selection of good soil needs special attention in many semi-arid western localities where on the level plain lands a knoll is occasionally found that is attractive because of its elevation but is heavily impregnated with alkali. While good soil within the farmstead should be sought, care should be taken to keep from having too much valuable crop producing land in yards, roads, and lanes.

Water Supply.—The relation of the farmstead to the water supply is also important. If the water can be piped from a stream, spring, or well, for delivery by gravity, the advantage of such an arrangement ought by all means to be taken into account.

Sightliness.—Study of possible sites should also look to obtaining both a maximum degree of sunlight during the rainy or winter season and shade sufficient to provide relief from the glare of the burning days of the dry or summer months. The sun's course must be observed in connection with the placing of stock shelters and sheds. Attention, too,

should be paid to pleasing landscape vistas. While an attractive view in a certain direction does not warrant sacrificing important features in the farmstead plan, yet its possible enjoyment from the dwelling may make it worthy of very careful consideration. The direction of the wind, especially during the summer months, should determine the location of the dwelling so that odors and dust shall be carried away.

Breezes.—So too, the farmstead should if possible get the benefit of the prevailing summer breezes.

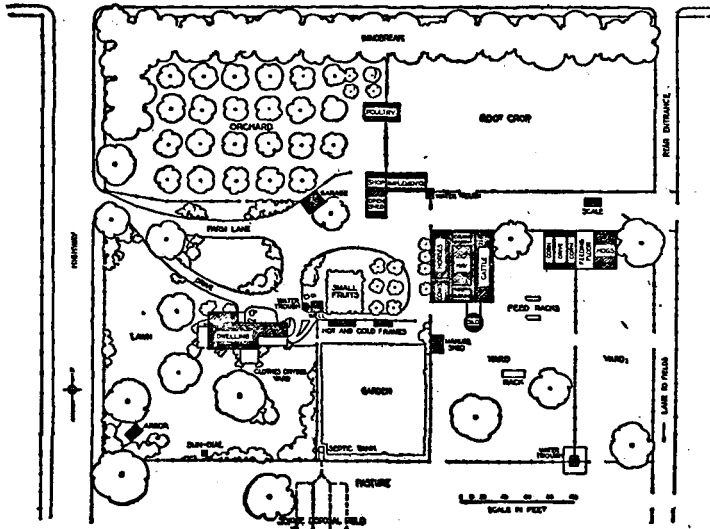


FIG. 51.—Typical groundplan outline of farmstead. Note the provision for location east of highway, distance of dwelling from road, easy access to the house, avoidance of dust, lane for the heavier farm purposes, pleasing landscape plantings, grouping of farm structures according to use, freedom from farm yard odors, and saving of steps and energy in caring for stock.⁵¹

Natural Protection.—It is desirable that protection be provided against cold winds, rain, and snow. It not only costs more to warm an exposed house, but also more feed is required to maintain stock in unsheltered lots and fields. Usually a south or southwest slope will be more protected from winds and storms, while on the other hand the planting of trees may furnish a windbreak. This may be provided by an orchard; or else a shelter belt to windward may be grown of trees selected according to their desirability. The hardier varieties, including a goodly proportion of evergreens, should make a permanent planting. Buildings may also be placed in a way to act as windbreaks to yards or to one another. Board fences instead of wire are also valuable in sheltering yards from cold winds.

Fences.—Needless fences should be avoided on account of costs of building and maintenance, loss of land occupied, and danger of harboring weed and insect pests.

Not Necessary to Cramp the Farm Building Site.—While efficiency should aid in selection of site and determination of size in providing for farm buildings, it should not entirely govern. Adverse comment is frequently directed toward country places using one or two acres of \$1,000 land for the farmstead and its lawns, flowers, and gardens. It looks large at first glance, yet a common 50-ft. city lot at \$40 or \$50 per front foot amounts to \$2,000 to \$2,500 and no one complains that its user is extravagant. This city lot of about $\frac{1}{2}$ acre is not fully equalled in price by 2 acres in the country.

Size need not be the limiting factor in country places but rather proper utilization of the land reserved for the home and farm buildings. The amount of money, time, and energy available to prepare, plant out, and care for the land and structures must guide. A smaller acreage, well tended, "homey" and attractive, is far superior to a large acreage if size is attained at the expense of proper care and neatness. Yet the larger area is entirely justified if it can be given the proper care. Space, trees, flowers, shady nooks, pleasant vistas, hammock room, summer houses, sunshine, peace, and outdoor opportunities for the children contribute largely to the charm of the country. Individual tastes and pocketbooks must determine how much one can have, but the more the better, if fullest enjoyment of country life is to be gained.

Grouping Buildings.—After selecting the numbers and types of buildings their arrangement within the farmstead follows.

This involves the placing of the various buildings, yards, corrals, etc., with relation each to the other, to fields, and to highways.

Five factors should be borne in mind in making up the layout. These are:

1. *Economical Arrangement.*—An economical arrangement to insure a minimum of time consumed, no necessity for retracing steps, and curtailment of lost motion in executing the routine work of the farm. This means the putting together of structures which have a common function.

Carrying of feed, milk, harness, and other routine details amount to many miles during the year, so that saving but a few minutes a day can result in a material saving when totaled for the year. Steps can be saved by placing buildings which logically go together as closely as possible without to an undue extent incurring additional fire risk.

In dairies, the bull pens, milking sheds, calf barns, feed corrals, separator room, and silos, naturally go together. Mixing sheds for stock feed should be close to the feeding yards. All hog pens, soaking vats for grain, store houses, farrowing pens, boar pens, tank houses, and dipping and sorting pens, form a natural group. The barns for work stock, storage and feed, harness shops, wash racks, garage, sheds, stud barns,

hospitals, and corrals, similarly form a unit. The implement house should be near the quarters for the work stock. In the same way, wood shed and meat house should be close to the kitchen. The tank house, if water is pumped by power, should be close to the beaten path of the man who looks after it. If drainage permits, the well should be between the house and stock watering places, and—to save piping—on as nearly a direct line as possible.

2. *Legal Restrictions.*—Legal restrictions, if they be involved, are illustrated in the production of whole milk, since municipal regulations often prescribe the environment under which the city's supply of milk shall be produced.

In California, for instance, the milking barn must be 50 ft. from horse stables or manure piles and 100 ft. from privy vaults or hog pens. The milk house must be 100 ft. from each of these four sources of contamination, and must be entirely separate from the milking quarters.

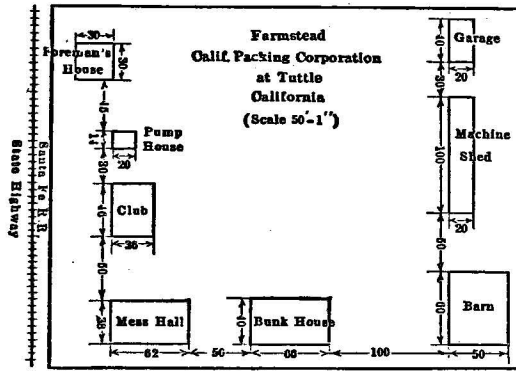
3. *Individual Taste.*—Personal taste is reflected in a desire to be near the highway, to have the house face a particularly pleasing view, to remove the dwelling from the rest of the ranch buildings, and in various similar ways. Personal taste ought to be guided, however, by common practice, for in the event of sale, eccentric or freakish arrangements are liable to reduce the selling value of the plant.

4. *Extensiveness of the Plant.*—On many small farms the building equipment consists of dwelling, barn, tank and tank tower, chicken house, implement shed, and fenced area for a small planting of shrubbery, sometimes a kitchen garden, and occasionally a family orchard. On the large holdings the list is extended to include the owner's or superintendent's dwelling, barns, bunkhouses, blacksmith and harness repair shops, corrals, office building, cook house, warehouses, and structures specially needed according to the type of farming, such as milk houses, hide storehouse, slaughter house, winery, shed for cutting, drying, and storing fruit, stock quarters, oil house, gardener's quarters, tractor sheds, etc., through a long list.

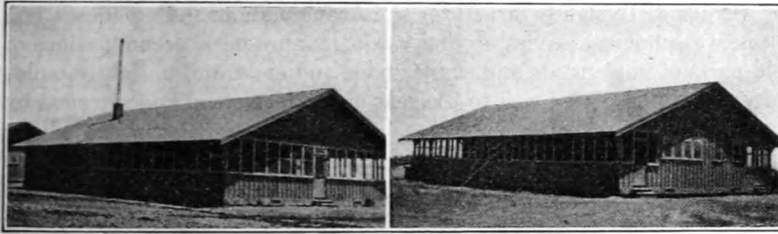
The planning of the small farmstead is a rather simple matter, and can be largely determined by personal desires and tastes, supplemented by a few standard suggestions. The planning of buildings for the large holdings calls for considerable study and forethought.

5. *Available Capital.*—Use of temporary structures, or less elaborate than might be desirable, is necessary if available capital is limited; and limitation of capital will to a great extent be a factor determining both the indulgence of personal tastes and the obtaining of the most economical arrangement.

Distance Between Buildings.—Usually a minimum of 100 ft. should separate the house from the highway. This distance permits of an attractive setting, provides a measure of privacy, and at the same time retains intimate relation with the highway, while no great length of

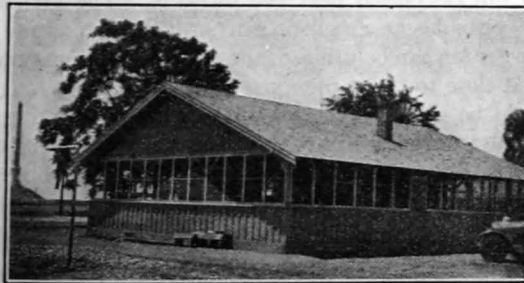


1. Ground plan.

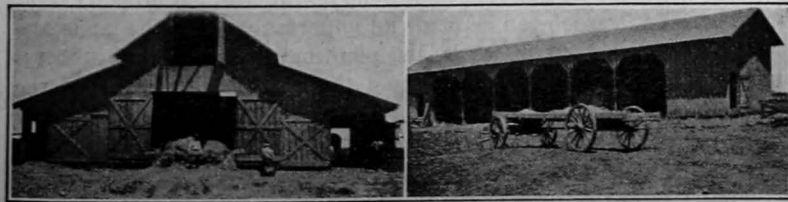


2. The messhall.

3. The bunkhouse.



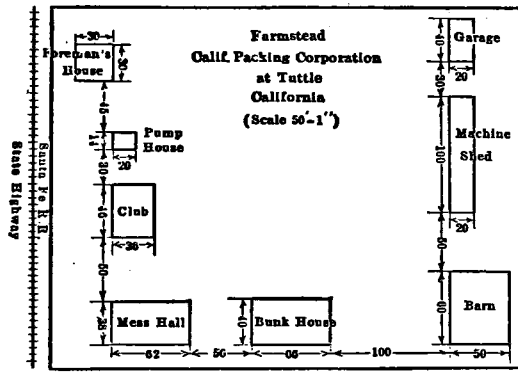
4. The recreation quarters.



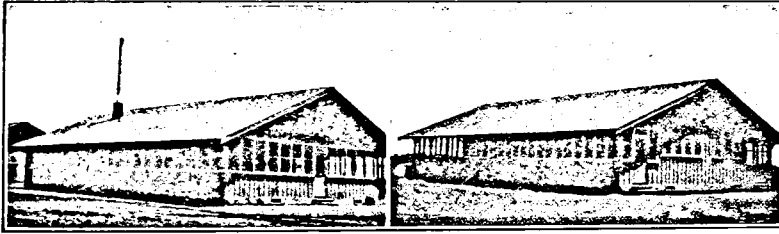
5. The barn.

6. The implement shed and carpenter shop.

FIGS. 52-57.—Standard farmstead arrangement and buildings of 320-acre orchard units, designed and erected by a California fruit growing corporation. Very satisfactory under conditions of hot summers and mild winters.

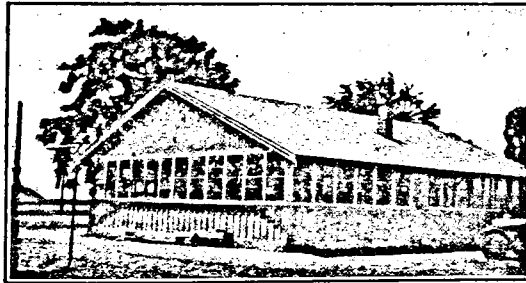


1. Ground plan.

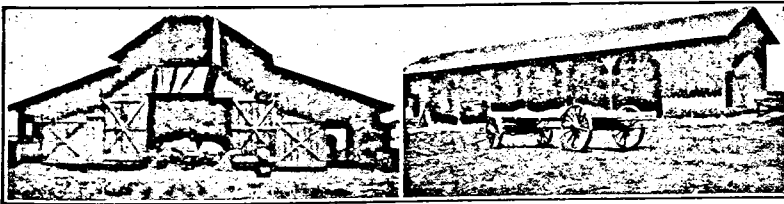


2. The mess hall.

3. The bunkhouse.



4. The recreation quarters.



5. The barn.

6. The implement shed and carpenter shop.

Figs. 52-57.—Standard farmstead arrangement and buildings of 320-acre orchard units, designed and erected by a California fruit growing corporation. Very satisfactory under conditions of hot summers and mild winters.

drive need be built, maintained, or repaired. The barns should be 150 ft. from the house, to the rear, and where the door of the barn may be visible from the house.

Lanes.—Lanes to farm buildings should be so placed that there is a minimum loss of land, with no likelihood of dust or mud to inconvenience the family. Often a lane to the buildings separate from that provided for the dwelling is a distinct advantage.

Axis of Stock Barns.—The axis of the stock barns should be so placed that the stock have the benefit of some sunlight during part of the day and of cool breezes blowing throughout the length of the structure during the hot season.

Location of Silos.—Silos should be located close to the barn or feed yard, yet far enough away from the neighboring structures to permit ease in filling and emptying.

Screening Unsightly Structures and Accumulations.—Hen houses, hog pens, wash houses, privies, drying yards, manure piles, accumulations of old parts of implements and similar odds and ends, and unsightly buildings, should be placed well to the rear of the farmstead and screened by proper kinds of plantings.

Confining Poultry and Live Stock.—Live stock, and especially poultry, should not be allowed to run at will over the farmstead, if in so doing they become a nuisance. Their quarters should be convenient to the dwelling in case the womenfolk are called upon to care for them, but the hen house should not be placed near the dwelling. The orchard, if made poultry-tight, provides an excellent run; or if trimmings and waste from the vegetable garden can be utilized, the poultry house may with advantage be placed close to the garden.

Care should be given to the planning of stock watering places and sewage disposal to provide convenient, sanitary, unobtrusive facilities.

Landscape Effects.—The planting of hedges and shrubbery, and erection of trellises to shut out unsightly buildings or accumulations, should proceed as soon as practicable. Where conservation of winter sunlight is desired, trees that shed their leaves during the winter season are to be preferred; and especially let it be remarked that those which shed within a limited time make far less work in cleaning up rubbish. If properly kept, the orchard and garden can be made an important part of the landscape effect. The laying out of roads, the planting of lawn and shrubbery, should combine both the practical and the esthetic. Trees about the house are both ornamental and useful in that they provide an attractive setting for the farmstead and frame views from the house, and by their shade add comfort and pleasure. The use of grass may be extended to the poultry or stock yards where the added production will be a decided benefit.

Trees for Temporary Landscape.—If the selected site is lacking in natural foliage, a few trees of rapid growth can be planted for temporary use to be cut out when more desirable but slower growing varieties have attained sufficient size. A neatly designed and well kept boundary fence may be made a distinct asset in the landscape effect and at the same time assist in excluding animals.

Details of planting plans and landscape arrangement are available in a 63-page *Bulletin* from the pen of F. L. Mulford, published by the United States Department of Agriculture.⁵⁰

The Plan on Paper⁵¹

In order to study the arrangement of a farmstead or the planning of farm buildings to the best advantage, plans should be worked out on paper. When the approximate location of the farmstead has been decided and before any building or fencing is done, there should be prepared two plans—one of the whole farm, at a scale which will admit of ample and easily read legends and notes (100 ft. to the inch answers the purpose very well), and one of the farmstead at a much larger scale, preferably 20 ft. to the inch.

Details of the Farm Plan Map.—The first plan or plat should show the location of the farmstead, all roads and lanes, fields, streams, drains (the location of which is easily forgotten), ditches, fences, permanent natural objects, and all buildings in block form. The fields should be numbered or designated by letters, and the sizes indicated. This will be of assistance in determining the amount of fertilizer and seed needed, in calculating the returns from the crops, in the farm bookkeeping, and in keeping the record of each field, etc.

The plat should be made in ink on tracing linen or thin, tough paper, from which blueprints or, better, whiteprints, can be made. The original should be carefully preserved and the prints used for recording crop rotations, amount of fertilizer and seed used, and any other desirable data. Changes in layout can be made on the original, and a print of the original retained as a record.

Details of the Farmstead Map.—The second, or farmstead plan, should be in much greater detail than the general farm plat, and therefore should be drawn on a larger scale. In this plan the several buildings should be shown with the general interior arrangements indicated; all minor accessories, such as watering troughs, feeding racks, scales, fences, gates, hitching rail, all lanes and driveways, walks, trees, shrubbery, etc., should be located upon the plan, each feature being placed with due consideration of its use and its relation to other features, as has been pointed out. It is an excellent scheme to cut out flat pieces of paper representing each structure. They should be made to the same scale as the plan, and should show the general arrangement of the interiors,

so that the relations of each to the other may be studied. They may be shifted about into different positions until a satisfactory arrangement has been secured.

The working out of the farmstead plan on paper is of inestimable value to the farmer whose land is unimproved, for the careful study incident to its preparation can save him money and annoyance. The established farmer would do well to prepare plans of his farmstead and buildings and to study them carefully, with a view to remodeling or changing the location of some of his equipment in order to increase the efficiency of his plant.

CHAPTER X

FENCING, WORK STOCK, IMPLEMENTS AND MACHINERY

Fencing Equipment⁵²

The enormous extent of farm-fence construction by the farmers of the United States can best be shown by the use of figures given in the reports of the last census, combined with data obtained in the studies of the Federal Office of Farm Management. In 1909 there were 6,361,502 farms in the United States, averaging 138.1 acres each. It has been found that the average 140-acre farm requires 6 rods of fence to the acre, or a total of 826.6 rods to the farm. This would mean that there were in round numbers 5,271,000,000 rods or 16,472,000 miles of fence in use in the United States in 1909. This amount of fence would encircle the earth about 659 times.⁵²

Kinds of Fencing Used in the United States.—The percentage of the different kinds of fence used in selected areas is shown in Table 50 and will give an idea of the range in types.

TABLE 50.—PERCENTAGE OF FENCE TYPES USED IN VARIOUS LOCALITIES

Area	Wide woven wire, per cent	Narrow woven wire with barbed wires, per cent	Barbed and smooth wire, per cent	Hedge, per cent	Types of wooden fencing, per cent	Stone fence, per cent
Western Dakota, Nebraska, Kansas, and northern Minnesota.....	5.5	10.2	84.0	0.03	0.3	0.0
Eastern Dakota, Nebraska, Kansas, and southern Minnesota.....	8.8	20.0	63.0	6.4	0.6	0.6
Iowa.....	8.0	45.5	43.5	2.1	0.9	0.0
Missouri.....	13.8	49.4	27.2	5.6	3.8	0.04
Wisconsin.....	13.5	33.4	49.8	0.04	2.3	0.8
Illinois.....	11.4	41.7	29.0	12.4	5.5	0.0
Michigan.....	55.9	11.8	11.9	0.6	19.7	0.0
Indiana.....	53.3	18.0	12.9	1.6	14.1	0.05
Ohio.....	59.8	3.8	7.0	1.2	27.9	0.05

Type of Farming and Size of Farm Determines Fencing.—The kind and amount of fence needed on a farm is regulated by the kind of farming practiced and the size of the farm.

Factors influencing the amount of fence are the number and kind of stock kept, the pasturage customs, the length of the rotation, and the size of the farm. Many farms have fields not easily accessible or too rough for cultivation, such fields being often kept permanently in pasture. If all the stock is on this permanent pasture during the entire crop growing season, economy results, for no division fences are necessary between the crop fields. On other farms, small acreages in permanent pasture are supplemented by pasture in rotation. Often it is the custom to turn stock into the cultivated fields to clean up after the crops have been harvested. Pasturing stock entirely on permanent pastures is not generally feasible. In order to utilize all farm land to its fullest extent, therefore, it is necessary for the average farm to be rather fully fenced.

Field Arrangement Influences Fencing.—Field arrangement is a large factor in the amount of fencing required. Field arrangement in turn is governed by the natural topographic conditions of the land, the shape of the farm, the roads running through or around it, and the cropping system followed. When the farm is located in a hilly or rolling country it is essential that the field arrangement be such as to make it as easy as possible to work over the uneven land. In a level country, topography need not be considered.

The distribution of fence on the farm, and the effect of farm size upon fencing, are shown below.⁵³

TABLE 51.—FENCE TYPES ON FARMS OF DIFFERENT SIZES, NORTH CENTRAL STATES (SELECTED SIZE GROUPS)

Kind of fence	Size of farms (acres)					Average
	100 and under, per cent	141 to 180, per cent	241 to 320, per cent	401 to 600, per cent	1,501 and over, per cent	
Road.....	24.6	30.9	535.3	34.8	43.4	36.3
Line.....	25.7	23.2	22.3	23.4	20.8	22.3
Permanent inside.....	40.7	37.8	35.6	36.1	32.5	35.3
Temporary inside.....	1.0	1.5	1.5	1.1	0.7	1.2
Farmstead.....	8.0	6.4	5.4	4.6	2.6	4.9

It may be noted that as size of farm increases the proportionate amount of road fence increases, while that of line or division fence decreases. In other words, the amount of permanent inside and farmstead fence is relatively smaller on the larger farms. It will be noticed that permanent inside fence constitutes on an average 35.3 per cent of the total farm fence, and that there is but 1.2 per cent of temporary inside

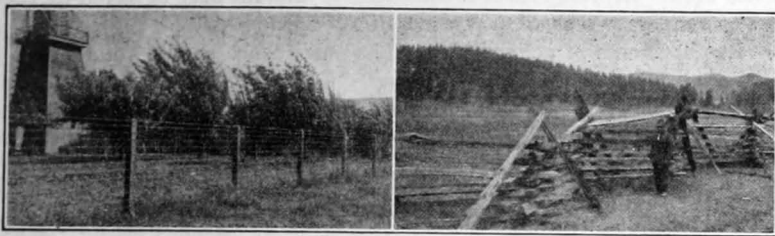


FIG. 58.

FIG. 59.

58. Neat, well stretched woven wire topped with two barbed wires, on 4 by 4 in. sawed posts, set 10 ft. apart. Woven wire 48 in. high. Economical, substantial and easily kept.

59. Zigzag or Virginia split rail fence, common in wooded countries; wasteful of space and harbor for pests.

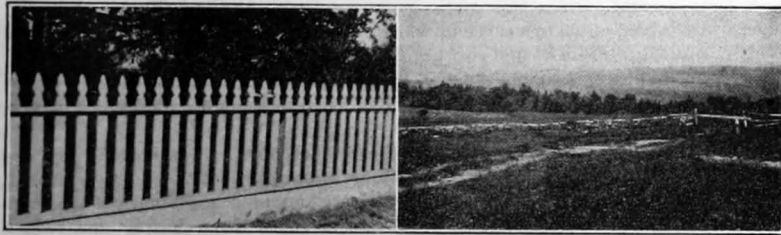


FIG. 60.

FIG. 61.

60. Neat paling fence on road, of 3 ft. sawed pickets with baseboard and molding set on 4 by 4 in. sawed posts placed 8 ft. apart, and two 2 by 4 in. stringers.

61. Stone wall common in rocky countries. Use of stone serves the double purpose of providing building materials and clearing fields of loose stone.

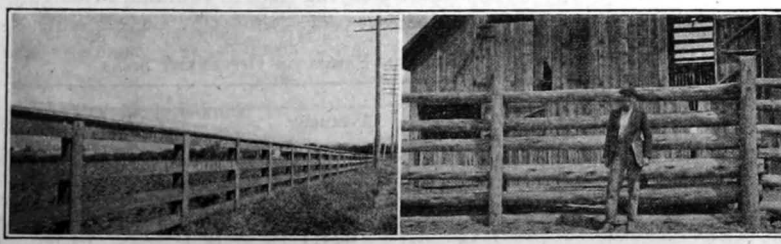


FIG. 62.

FIG. 63.

62. Board fence of four 4 by 6 in. boards with 1 by 6 in. caps, fastened to 4 by 5 in. split posts set 12 ft. apart with face board. Well built, substantial but rather expensive.

63. Heavy corral or yard fence, economically possible only in wooded sections where lumber is cheap and easy to obtain. A strong fence.

FIGS. 58-63.—Types of farm fence.



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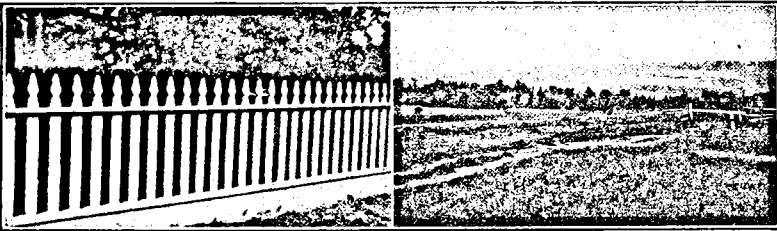


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FIGS. 58-63.—Types of farm fence.

fence used. In many cases a considerable amount may be saved by the use of temporary instead of permanent interior fences.

Requirements of a Farm Fence.—A farm fence should combine the two qualities of service and economy. To give satisfactory service it must be constructed so as to turn all kinds of stock, and that without injuring them. To be economical it must be built as cheaply as is consistent with durability. The fence erected at a low initial cost is not necessarily economical, for it may be short-lived and therefore very expensive.

A certain kind of fence may be economical when erected on one type of farm, yet very impractical if used on another type.

For example, a general farm in Ohio and a cattle ranch in western Dakota, representing widely varying conditions. The Ohio farm averages about 90 acres, of which 70 acres are in crops. Cattle, horses, swine, and sheep are pastured on this farm, and the entire farm is often pastured at some time during the year. The fence, therefore, must be a general-purpose one and adequate to meet the varying requirements. Woven wire is best suited to such conditions. A barbed-wire fence here would require so many wires as to make its first cost nearly equal to that of a good woven-wire fence, while its cost of upkeep would be much greater. In addition, it means constant danger of injury to stock. The farmers in Ohio have mostly abandoned the use of barbed wire.

Conditions in western Dakota are radically different. On the stock ranches comparatively little land is in crops, while large acreages are devoted to permanent pasture. The stock are mostly cattle, and they are kept on pasture much of the year. Barbed-wire fences sufficient to turn cattle can be much more cheaply constructed than woven-wire fences, and under the conditions prevailing in Dakota are nearly as satisfactory. Even if a few steers are lost as a result of wire cuts, their saving would go but a short way toward balancing the higher cost of building and maintaining woven-wire fences.

Gates.—The number of farm gates is an item of no little importance. The number of gates used on farms of varying sizes in Indiana, Michigan, Wisconsin, and Illinois is shown below.

TABLE 52.—GATES REQUIRED ON FARMS OF DIFFERENT SIZES

Acreage grouping	Average acreage	Number of gates per farm	Rods fencing per gate
100 and under.....	78.5	9.9	61.50
101 to 140.....	124.1	12.7	64.60
141 to 180.....	166.0	14.3	67.60
181 to 240.....	212.3	16.6	69.30
241 to 320.....	286.3	19.2	71.70
321 to 400.....	360.0	21.6	75.10
401 to 600.....	479.4	29.2	73.00
601 to 1,000.....	740.7	32.6	110.30
1,001 to 1,500.....	1,151.3	52.9	83.80
1,501 and over.....	2,047.1	40.9	119.10

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The larger farms not only require less fence to the acre but they also require fewer gates for a given amount of fence. There is an average of one gate to every 61.5 rods of fence on the smallest farms, as compared with one to 119.1 on the largest and to 71.2 on all farms. The average value of gates is \$3.27 each.

Life of and Test for Wire Fencing.—The cost and the life of the various styles of woven-wire fencing differ greatly. Many purchasers consider the first cost of the various kinds to such an extent that they lose sight of the difference in their length of service, which is the factor controlling their ultimate cost. The following table has been computed from the experience of a large number of farmers in the use of different styles of fencing, and shows the relative durability of the different weights and heights of woven wire.

TABLE 53.—RELATIVE AMOUNT OF SERVICE GIVEN BY DIFFERENT WEIGHTS OF WOVEN-WIRE FABRIC

Size of wire	Number of estimates	Average life, years	Size of wire	Number of estimates	Average life, years
No. 9 throughout.....	637	21.1	No. 9 top and bottom, No. 11 laterals, No. 12 stays..	53	17.7
No. 7 top, No. 9 bottom, laterals and stays, No. 11 or No. 12.....	35	20.3	No. 10 top and bottom, No. 11 laterals and stays.....	23	16.7
No. 9 top and bottom, No. 10 laterals and stays.....	73	18.0	No. 11 top and bottom, No. 12 laterals and stays.....	43	14.6
No. 9 top and bottom, No. 11 laterals and stays.....	490	17.5	No. 12 top and bottom, No. 14 laterals and stays.....	46	12.7
No. 9 top and bottom, No. 12 laterals and stays.....	349	17.4			

TABLE 54.—RELATIVE AMOUNT OF SERVICE IN YEARS GIVEN BY DIFFERENT WIDTHS OF WOVEN-WIRE FABRIC

Height of fence, inches:.....	26	32	36	39	42	47	55
Number of estimates.....	206.0	214	19.0	247.0	42.0	865.0	156.0
Life of wire, years.....	17.0	17	18.3	18.8	19.9	18.9	21.7

It is becoming generally recognized that the heavier styles of woven-wire fencing are more economical. The initial cost of the heavy wire is greater, but it lasts more than enough longer to offset the additional

cost. It costs practically as much to construct a fence in which a light grade of woven wire is used as to build one of the heavier wire; and as the heavy material lasts much longer the cost of construction is distributed over a longer time, hence it is less per year. And during the life of the two types of fence the repair costs of the heavier fencing are less. The percentage of heavy wire manufactured and sold for fencing purposes has greatly increased in the last five years. The use of the wider styles of woven fence has become more general. But it has been the experience of farmers that they are more expensive to maintain, as animals get their heads under the surmounted barbed wires and crowd down the woven wire. This is especially true where large hogs come into contact with these fences. The preceding table shows the higher fence has the longer life.

Posts.—In the construction of a fence the selection of posts is very important. Cheapness of posts will vary with local conditions. The kinds of native timber and their costs must be considered. It is not advisable to construct a permanent wire fence on posts that will not last as long as the wire.

TABLE 55.—AVERAGE LIFE OF DIFFERENT KINDS OF FENCE POSTS, 4 IN. IN DIAMETER

	YEARS
Osage orange.....	29.9
Locust.....	23.8
Red cedar.....	20.5
Mulberry.....	17.4
Catalpa.....	15.5
Bur oak.....	15.3
Chestnut.....	14.8
White cedar.....	14.3
Walnut.....	11.5
White oak.....	11.4
Pine.....	11.2
Tamarack.....	10.5
Cherry.....	10.3
Hemlock.....	9.1
Sassafras.....	8.9
Elm.....	8.8
Ash.....	8.6
Red oak.....	7.0
Willow.....	6.2
Concrete (estimated).....	48.0
Stone.....	36.3
Steel (estimated).....	29.9

The life of posts is, of course, influenced by size, seasoning, preserving, quality of timber, soil, climate, and kind of stock to be fenced, but the table shows something of the relative length of life.

Work Stock

Work Animals.—A well-broken mule is in many respects the best work animal obtainable. Emphasis should be placed upon "well-broken." The mule combines intelligence, strength, vitality, ease and economy in keeping. It will stand more abuse than a horse. As to the greater intelligence of the mule over the horse, one will almost never see a runaway mule get into a barbed wire fence. A team of 10 mules will weave around and around in a perfect tangle, yet straighten itself out with no assistance. A mule knows when quitting time comes: if overloaded, a mule won't kill himself straining, after he finds he can't budge his load on reasonable trial, a mule won't walk on an unsafe bridge.

On the other hand, one will go far to find a meaner more cantankerous pest than a mule made cranky by improper breeding or by poor handling at the time of breaking. Such combine fear, bridle-shyness, balkiness, and about every other equine sin.

Character of Farm Work Determines Type of Work Animals.—The nature of work required of stock will largely determine the kind that should be obtained. If a general all-round team is wanted to do road work, field work, various farm operations, and perhaps a little driving, I favor the 1,200-lb. horse, not too big and ungainly, nor too lanky and small boned. He should be neither too much of a clod, nor too long legged. The close-coupled, big-chested, chunky, stout-legged fellow will prove a desirable choice.

On the other hand, where the stock is to be worked only in light operations, one can use under-weight, off-grade stuff, and even young stock.

For long term, continuous plowing, the heavier, sound, solid animals, able to stand the long strain, are needed.

Extremes in Work Animals Not Desirable.—For general work, it will not pay any farmer to run to either extreme. The light animals cost almost as much per head to care for as larger stock, and yet can not do the heavier work. The big heavy stock waste too much time getting around and are liable to go lame when on the road.

Horses trained to fast walking are more profitable than slow animals, provided the gain in speed is not made at the expense of vitality, weight, or strength. This applies not only to road, plow, cultivator, and harrow teams, but to stock on mowers, rakes, scrapers, excavators, harvesters, and the like, provided the animals walk steadily and evenly.

For the lighter work—scraping, harrowing, raking, hay wagons, etc.—use the lighter, weaker class of stock (if one has such to work) and mares well along in foal.

Poor Work Animals Uneconomical.—It costs more to do farm work with poor, half-starved, run down, weak, lame work stock than with good

animals. The cost of keeping 10 good head is but little more than the cost of keeping 10 scrubs. Moreover, when one starts out with a good



FIG. 64.—A Maine scene (March, 1919).

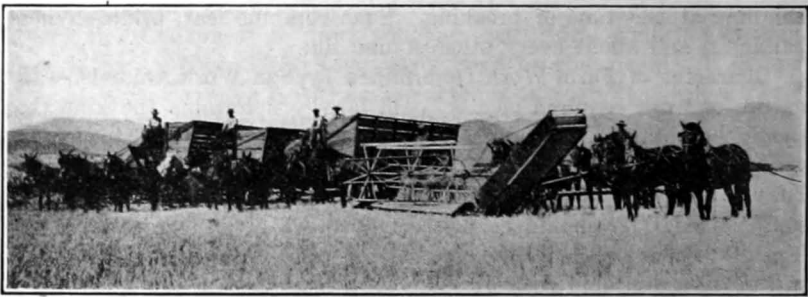


FIG. 65.—Workstock on California farm.



FIG. 66.—Long line teams reduce manpower but increase stock needs. This scene shows teams hauling 5 to 6 tons of sugar beets to the load.

Types of workstock.

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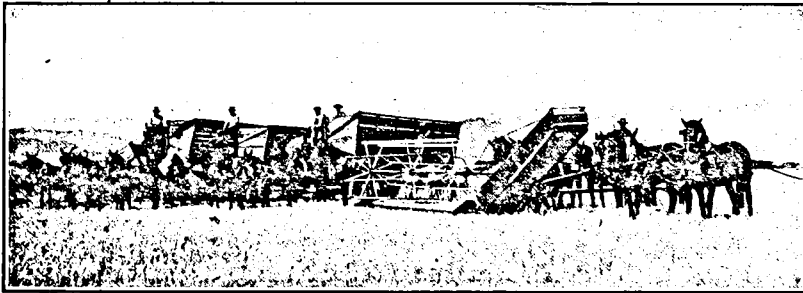


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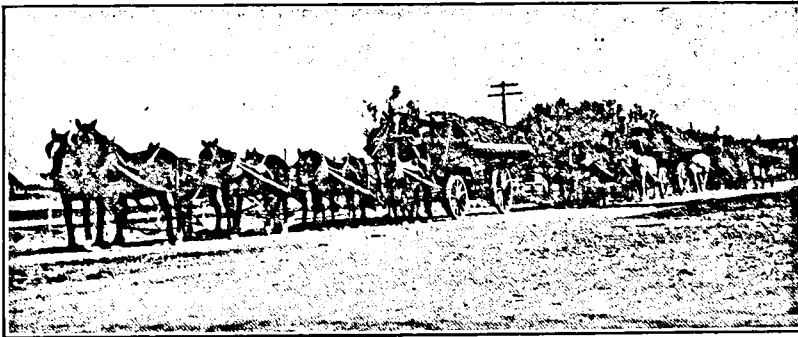


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required to keep the weakest animal going, the loss of heart experienced by the driver of a sluggish team, or the time lost in hitching or working with outlaw stock will figure into a goodly item of waste.

Mating Teams.—In this connection may be mentioned the necessity of properly mating teams in order to eliminate waste effort. The smaller the numbers in a team, the more efficient will be the work. Traits of disposition, rates of traveling, strength, build, stamina, age, and vitality, vary so in different animals that a careful study of the teams in action must be made. In lining up work teams they should be matched to secure in each span as nearly as possible equal qualities.

Working Stock.—Men should be watched when working stock. They should never be permitted to abuse the animals by swearing, kicking, or otherwise. A lover of horses won't stand by and see a big brute of a man grab a horse by the bit and kick him in the sides to the tune of a torrent of cuss words. It helps neither the man nor the animal and it may do harm, especially if it be a colt new to the work, still a bit heedless because of immaturity, or a mare in foal.

Number of Work Animals Required.—On a farm of 160 acres, four animals are ordinarily required to do the work. Five horses would permit the raising of colts from two of them.

In the United States one horse is kept, on the average, for every 30 acres of improved land.

Implements and Machinery

Implements and machinery constitute items of equipment which require care in selection.

Factors Determining Implement and Machinery Equipment.—In line with the factors governing choice of equipment, which have already been pointed out, lists of implement needs vary according to the six items of (1) type of business, (2) soils, (3) size of outfit, (4) capital, (5) personal taste, and (6) local customs.

Influence of Type of Business on Implement and Machinery Equipment. On the cattle ranch, for instance, the riding stock, saddles, bridles, branding irons, fence building and repairing equipment, and implements for raising hay, grain, or other feeds, are radically different from the equipment needed in poultry production. A farm given over to barley, corn, and alfalfa will require altogether different types and sizes of equipment from that of a farm concentrating on fruit.

Influence of Soils on Implement and Machinery Equipment.—The influence of soil upon types of equipment can be readily noted by comparing the more lightly constructed implements used in sandy soils with the stronger, heavier implements used in gumbos and adobes. Presence of rocks or roots may necessitate a disc plow rather than a mold-board plow. Steep slopes may demand a side-hill plow, a quite different implement from the plow of level lands.

Influence of Size of Outfit on Implement and Machinery Equipment.—Size of outfit may eliminate the possibility of tractors and necessitate use of work stock, the latter requiring lighter implements than the former. Again, size may justify the purchase of harvesters, baling apparatus, milking machines, and similar labor-saving devices profitable in a large business but extravagant for the small outfit.

Influence of Capital on Implement and Machinery Equipment.—Capital may necessitate use of second hand equipment rather than better new equipment; or capital may require purchase of less desirable types of equipment than would be warranted if ample capital were available.



FIG. 67.—Implements and machinery comprise a large and varied assortment for most farm business.

Influence of Personal Taste on Implement and Machinery Equipment.—Personal taste is reflected in desire for certain makes of implements or types of equipment wherever a choice is possible. For instance, some men prefer tractors to horses, and other things being equal, will equip with machinery rather than with live stock. Certain workers have a preference for certain makes of mowing machines, rakes, plows, etc.

Influence of Local Custom on Implement and Machinery Equipment.—Local custom is reflected in the choice of equipment in that the methods employed in a given community may fix the kind of equipment which must be procured. Thus, in some communities the practice continues of plowing with Stockton gang plows even though other plow types are to be preferred, the use of one- or two-horse equipment even though doubling up is possible with a resulting saving of man power; stacking of hay in the open by hand, pitching to wagons and unloading by means of the Jackson fork, or use of rope slings and derricks. Men do better with equipment in which they have faith and with which they are familiar. Local custom will therefore be of moment in selecting equipment if hired help must be relied upon.

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TABLE 56.—DETERMINING IMPLEMENT AND MACHINERY EQUIPMENT FOR A GIVEN 240-ACRE FARM BY MEANS OF A CALENDAR OF OPERATIONS

H = Horses M = Men @ = Rate of Work d = Days Required

CROP, ACREAGE AND YIELD (Estimated)	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER		
BEANS 10 Acres 1000lb Yield per Acre	← Plow 6 in. → 6H, 1M @ 4 Acres 2½ d.				← Replow 4-6 in. → 6H, 1M @ 5 Acres = 2d ← Disk → 6H, 1M @ 10 Acres = 1d ← Harrow → 6H, 1M @ 40 Acres = ¼ d. ← Drag → 2H, 1M @ 10 Acres = 1d.	← Plant → 2H, 1M @ 18 Acres = ½ d.	← Cultivate → 2H, 1M @ 10 Acres = 1d.	← Cultivate → 2H, 1M @ 10 Acres = 1d.	← Irrigate → 2H, 1M = 1d. ← Cultivate → 2H, 1M @ 20 Acres = 3d. ← Cultivate → 2H, 1M @ 10 Acres = 1d.		← Cut and Shock → 2H, 1M = 1d. ← Thresh → 1M = 1d. (by contract) ← Haul off → 2H, 1M @ 3 trips of 100 bales = 3d.			
CORN for Silage 5 Acres 20tm Yield per Acre	← Plow 8 in. deep → 6H, 1M @ 4 Acres ½ d.				← Replow 6 in. → 6H, 1M @ 5 Acres = 1d. ← Disk → 6H, 1M @ 10 Acres = 1d. ← Harrow and Cross Harrow → 6H, 1M @ 40 Acres = ¼ d.	← Plant → 2H, 1M @ 12 Acres = ½ d.	← Cultivate → 2H, 1M @ 10 Acres = ½ d.	← Cultivate → 2H, 1M @ 10 Acres = ½ d.	← Cultivate → 2H, 1M @ 10 Acres = ½ d.		← Cut and Haul → 4H, 4M, 3d. ← Filling Silo → 3M = 3d.			
ALFALFA for Hay 60 Acres Yield 8 tons per Acre			← Irrigate → 2M @ 6 Acres = 10d.			← Plow → 2H, 1M @ 8 Acres = 1d. ← Rate → 2H, 1M @ 20 Acres = 1d. ← Shovel → 6H, 3d. ← Stack → 6H, 3d.	← 2nd. Cutting → Same crew and time as in Apr. 2M @ 6 Acres = 10d.	← Irrigate → 2M @ 6 Acres = 10d.	← 3rd. Cutting → Same crew and time as in Apr. 2M @ 10d.	← Irrigate → 2M @ 10d.	← 4th. Cutting → Same crew and time as in Apr. 2H, 1M @ 10d.	← Irrigate → 2M @ 10d.	← 5th. Cutting → Same crew and time as in Apr. 2M @ 10d.	← 6th. Cutting → Same crew and time as in Apr. 2M @ 10d.
BARLEY for Grain 160 Acres Yield 20 sacks (about 3000) per Acre	← Plow 6 in. → 6H, 1M @ 6 Acres = 2Td. ← Disk, Harrow, Drill → 6H, 1M | 6H, 1M | 6H, 1M @ 8 Acres @ 40 Acres @ 20 Acres 18d. | 4d. | 8d.					← 1st. Harvest → 2H, 1M @ 2 Acres = 1d. ← Rate → 2H, 1M @ 2 Acres = 1d. ← Shock → 1M @ 10 Acres = 1d. ← Haul → 2H, 2M = ½ d. ← Stack → 2H, 2M = ½ d.	← Cut combine (one total) → 2H, 1M @ 8 Acres = 1d. ← Rate → 2H, 1M @ 2 Acres = 1d. ← Harvest with → Combine (by contract)	← Harvest with → Combine (by contract)	← Haul off Crop → 6H, 2M @ 60 sacks per load, 3 trips per d. = 18d.					
STOCK BEETS for Feed 5 Acres Yield 20 tons per Acre				← Plow 8 in. → 6H, 1M @ 4 Acres = ½ d. ← Replow 6 in. → 6H, 1M @ 5 Acres = 1d. ← Disk and Harrow → 6H, 1M = ¼ d. ← Plant → 2H, 1M @ 10 Acres = ½ d.		← 2nd. Cultivate → 2H, 1M @ 10 Acres = ½ d.	← Cultivate → 2H, 1M @ 10 Acres = ½ d.	← Cultivate → 2H, 1M @ 10 Acres = ½ d.	← Irrigate → 2M = 1½ d. ← Cultivate → 2H, 1M = ½ d.		← Harvest → as needed 2M @ 6 tons = 8d.			

Use of a Calendar of Operations in Estimating Implement and Machinery Equipment.—Determination of equipment for any given farm business depends mostly upon determination of the kinds and amounts of crops to be grown. These once decided, a list can be drawn up to cover the implements needed to do the work within the time limits available for the various operations with respect to size of outfit and capacity of implements. In this connection a calendar of operations is useful.

The way to make one is to draw up in detail the various methods to be followed in putting in crops or caring for stock, the time available for the work, and the usual size of outfit best suited to do it.

Example of Use of Calendar of Operations in Determining Implement and Machinery Equipment.—The following example shows such a calendar for a 240-acre western farm laid out for the production of 160 acres of barley, 60 acres of alfalfa for hay, 5 acres each of corn for silage and of stock beets, and of 10 acres of beans.

Number of Work Animals for This 240-acre Farm.—A study of the preceding calendar with reference to the work stock required with a given size of outfit results as follows:

TABLE 57.—NUMBER OF WORK ANIMALS NEEDED FOR THE 240-ACRE FARM

Month	Number of work days available	Size of outfit, horses	Number of work days required for all work	Number of work stock required
Nov. or Dec.....	20 } 38	6	33½	6
Jan.....	16			
Feb.....	20	6	3	
		2	½	6
March...	22	6	5	6
		2	1	
Apr.....	26	6	3	
		2	13	6
May.....	26	6	3	
		2	15	6
June.....	26	6	3	
		2	14½	6
July.....	26	6	18	
		2	4	6
Aug.....	26	6	3	
		2	13	6
Sept.....	26	6	3	
		4	3	6
		2	16½	
Oct.....	26	6	3	
		2	20½	6

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Thus six head can handle the work, and will be the minimum number under the conditions of the particular farm.

Implement and Machinery Needs for This 240-acre Farm.—It follows that the list of equipment depends on the size of the work stock unit, the speed with which the work must be done, and local custom in preparing for, putting in, and caring for a crop.

Implement Needs of Barley.—Starting with the barley, as representing the greatest need for implement equipment, the 160 acres will necessitate under the work conditions of this particular project:

- (a) A 4-gang 12-in. moldboard plow.
- (b) An 8-ft. disk harrow.
- (c) An 18-ft. spike tooth harrow (in four sections).
- (d) A 12-ft. grain drill.
- (e) A 5-ft. mowing machine.
- (f) A 12-ft. horse rake.
- (g) A 2½-ton running gear with bed.

Additional Equipment Needs of Other Crops.

- (i) A stacker, complete with mast, fork, and rope.
- Renovation can be taken care of with the other equipment.

The beans require in addition to such of the preceding equipment as can be used for this crop:

- (j) A 2-gang 12-in. moldboard plow.
- (k) A 10-ft. home made plank dray.
- (l) A 12-in. walking plow.
- (m) A 2-row bean planter equipped for beans, corn, or beets.
- (n) An adjustable cultivator, utilizable for beans, corn, or beets
- (o) A bean cutter for harvesting.

There will be also required for the crop work:

- (a) Harness.
- (b) Eveners, doubletrees, and neck yokes.
- (c) Knives for the corn harvest.
- (d) Thinning hoes for the beets.
- (e) Pitchforks for the hay.
- (f) Shovels for irrigating.

The corn and beet crops require no additional equipment beyond that already provided for.

Value of Calendars of Operations in Determining Implement and Machinery Needs.—Similar charts for proposed businesses are a help in visualizing the types, numbers, and kinds of farm implements and the number of animals needed. The working out of details of such charts results in a better understanding of the minimum amount required and of the probable necessary investment.

In the various determinations full justification must be secured after the manner already explained at length* before any item is included.

Special and Minor Equipment

Special and Minor Equipment.—Under this heading are to be included the cans, separator, cooler, feeding apparatus, milking stools, and other minor equipment required upon a dairy; the pruning shears, fruit trays, picking baskets, ladders, spraying outfit, and similar equipment needed in the fruit business; the egg scales, collecting baskets, water fountains, feeding apparatus, storage quarters, and special equipment needed in the poultry business.

What Constitutes Minor Equipment.—In selecting the minor tools to equip a farm, provision must be made for the articles needed for the care and repair of buildings, fences, machinery, etc., the care of live stock, the production of crops, and the various other interests of the farm. With every change in the type of farm, involving a new combination of enterprises, a change in minor equipment will be necessary. For each of the many specialized types of farms certain articles will be needed which will not be found necessary on general farms.

Example of List of Minor Equipment.—An idea of the number, variety and kind of minor articles of farm equipment can be gathered from a study of 38 Ohio general farms.⁵³

TABLE 58.—MINOR EQUIPMENT FOUND ON OHIO FARMS

ITEMS	NUMBER NEEDED	ITEMS	NUMBER NEEDED
General purpose		General purpose	
Anvil.....	1	File (flat).....	2
Auger handle.....	1	File (round).....	1
Auger bits.....	Set of 6	File (taper).....	2
Ax.....	2	Forge.....	1
Ax (hand).....	1	Grindstone.....	1
Awl.....	1	Grubbing hoe.....	1
Barrel.....	1	Hammer (claw).....	2
Basket.....	1	Hammer (rivet).....	1
Bell (farm).....	1	Hammer (sledge).....	1
Bench screw.....	1	Hatchet.....	1
Brace and bits.....	1	Hoisting block.....	1
Brush hook or scythe.....	1	Jackscrew.....	1
Chalk line.....	1	Ladder.....	1
Chisel (cold).....	2	Ladder (step).....	1
Chisel (wood).....	4	Lantern.....	2
Compasses.....	1	Level.....	1
Ditch cleaner.....	1	Machine oil.....	1 gal.
Drawing knife.....	1	Mallet (wood).....	1
Drill press.....	1	Mattock.....	1
Drills.....	4	Maul.....	1

* See pages 155 to 160.

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TABLE 58.—MINOR EQUIPMENT FOUND ON OHIO FARMS. (Continued)

ITEMS	NUMBER NEEDED	ITEMS	NUMBER NEEDED
General purpose		General purpose	
Nippers (farrier's).....	1	Trap (steel).....	1
Oil can.....	1	Trowel (brick).....	1
Padlock.....	1	Trowel (plastering).....	1
Paint brush.....	1	Tongs.....	1
Pick.....	1	Tool grinder.....	1
Pinch bar.....	1	Vise.....	1
Pliers.....	1	Wedge (iron).....	2
Pincers (carpenter's).....	1	Whetstone.....	2
Plane.....	2	Whitewash brush.....	1
Punch.....	2	Wire splicer.....	1
Post-hole digger.....	1	Wire stretcher.....	1
Rasp.....	1	Wrench (pipe).....	1
Sand sieve.....	1	Wrench (monkey).....	2
Saw (buck).....	1		
Saw (compass).....	1	Household and farm	
Saw (crosscut).....	1	Hoe.....	2
Saw (hack).....	1	Hog scraper.....	2
Saw (hand).....	2	Hog hook.....	1
Saw (set).....	1	Kettle.....	1
Scale (counter).....	1	Lard press and sausage stuffer.....	1
Scale (farm).....	1	Lawn mower.....	1
Scale (spring).....	1	Tree pruner.....	1
Scale (steelyard).....	1	Pruning shears.....	1
Scratch gauge.....	1	Rake (garden).....	1
Screw driver.....	2	Rake (lawn).....	1
Screw plate.....	1	Spade.....	1
Shovel.....	1	Sprinkler.....	1
Shovel (round pointed).....	1	Trowel.....	1
Tinner's snips.....	1		
Spade (tile).....	1	All live stock	
Square (bevel).....	1	Broom.....	2
Square (steel).....	1	Clipping machine.....	1
Square (try).....	1	Hand sprayer.....	1
Tape line.....	1	Manure fork.....	2
Trap (rat).....	1	Pail.....	3

Additional Minor Equipment.—The following supplemental list prepared by sifting suggestions submitted by farmers scattered throughout the country, will be found to include certain tools which though not essential, perhaps, are useful items of equipment for the average farm:

- | | |
|---|-----------------------|
| Assortment of machine and carriage bolts. | Pipe stocks and dies. |
| Bag truck. | Pipe tongs. |
| Bolt cutters. | Pipe vise. |
| Gasoline blow torch. | Soldering outfit. |
| Harness repairing outfit. | Staple puller. |
| Pipe cutters. | Wrecking tool. |

Costs of Minor Equipment.—The costs of these items, priced at the time of study (1916), amounted to:

For general purposes	
Essential.....	\$ 57.45
Desirable but not essential.....	81.15
Total.....	\$138.70
For household and farm	
Essential.....	\$ 7.70
Desirable but not essential.....	8.00
	\$ 15.70
For live stock	
Essential.....	\$ 6.85
Desirable but not essential.....	10.00
	\$ 16.85
For horse and driving	
Essential.....	\$ 16.65
For cattle	
Desirable but not essential.....	\$ 6.45
For dairy	
Essential.....	\$ 9.95

Examples of Lists of Total Equipment

As illustrations, lists are presented below for five selected types of farming, to show the equipment variations due to different kinds of agriculture and something of the extent of equipment needed.

1. List of Equipment for 20 Acres of Fruit Orchard.

<i>Buildings</i>	150-gal. spray outfit
Dwelling	Pitch fork
Windmill, well, tank and tank house	Hoe
Horse barn, 12 by 20 ft.	Pruning saw
Blacksmith shop and implement shed	1 pair 30-in. pruning shears
<i>Fences</i>	6 ladders, 10-14 ft.
For entire ranch (3 strands barbed wire, posts 1½ rods apart)	6 3-gal. picking buckets
<i>Implements and Machinery</i>	1,000 trays
12-in. walking plow	800 lug boxes 40-lb.
10-in. walking plow	Sulfur house
9-ft. spike tooth harrow	Pick
2-sect. spring tooth harrow	2 shovels
6-ft. disc harrow	2 fruit trucks for drying house
5-ft. corrugated roller	Cutting shed
9-ft. plank drag (home-made)	2-ton road wagon
Fresno Scraper	1 buggy
Double and single trees, ropes, halters, etc.	<i>Work Stock and Harness</i>
1½-ton fruit truck	Team and harness
	<i>Live Stock other than Work Stock</i>
	Poultry

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Examples of Lists of Total Equipment (Continued)

<p><i>Special Equipment</i> Piping to buildings</p>	<p><i>Small Tools and Shop Material</i> Nails, nuts, bolts, iron, lumber, etc. Small tools</p>
<p>2. List of Equipment for 20-cow Dairy Farm (on Alfalfa).</p>	
<p>Dairy producing butter fat</p> <p><i>Buildings</i> Dwelling Windmill, well, tank and tank house Hay (100 ton) and horse barn and corrals Cow barn (28 by 40 ft.) with cement floor and corrals Wood silo (14 by 20 ft.) Blacksmith shop and implement shed Milk room</p> <p><i>Fences</i> Around farm (3 strands barbed wire, posts 1½ rods apart).</p> <p><i>Implements and Machinery</i> 12-in. walking plow 9-ft. spike tooth harrow Fresno scraper 5-ft. mower 10-ft. rake 1½-ton wagon Hay rack 2 shovels 3 pitchforks Double and single trees, ropes, halters, etc.</p> <p>Spring wagon and single harness</p> <p><i>Work Stock and Harness</i> 2 work horses and harness Driving or riding horse and harness</p>	<p><i>Live Stock other than Work Stock</i> 20 cows 1 bull</p> <p><i>Special Equipment</i> Piping to buildings Cesspool and sewer 2 drinking troughs Wheelbarrow 16-bu. feeding truck 40-ft. hose 2 barn shovels 2 brooms 2 hoes 2 stable forks Jackson hay fork 2 milk stools 2 20-qt. pails 2-compartment wash sink 2 h.p. boiler 20-ft. 8-in. stack; roof plates; spark arrester and damper Large separator 1 dozen brushes Keg washing powder Ideal sanitary cream cooler Babcock tester Scales</p> <p><i>Small Tools and Shop Material</i> Material, as nails, nuts, bolts, scrap iron lumber, etc. Small tools and blacksmith outfit</p>
<p>3. List of Equipment for Grain Ranch (320 Acres).</p>	
<p><i>Buildings.</i> Dwelling Windmill, well, tank and tank house Hay and horse barn Implement shed and blacksmith shop</p> <p><i>Fences</i> For entire farm (3 strands barbed wire, posts 1½ rods apart)</p> <p><i>Implements and Machinery</i> 1 Stockton gang plow 1 spike tooth harrow, 4-sect. 1 grain drill</p>	<p>1 grain binder 1 mower, 5-ft. 1 hay rake, 10-ft. 1 Jackson fork 1 hauling wagon 1 cart 2 hay racks 6 pitchforks 1 post hole auger 1 wire stretcher 1 shovel 1 Fresno scraper Lead bars</p>

Examples of Lists of Total Equipment (*Continued*)

<i>Work Animals and Harness</i>	1 wheelbarrow
8 work horses, collars and harness	1 drinking trough
1 driving horse and harness	Piping to buildings
<i>Live Stock other than Work Animals</i>	Incidentals as rope, halters, buckets, etc.
Poultry and cow	<i>Small Tools and Shop Material</i>
<i>Special Equipment</i>	Blacksmith outfit and small tools
2 manure forks	Shop material—nails, bolts, iron, lumber, etc.
1 broom	

4. List of Equipment for 2,500-fowl Poultry Plant.—Greater variety and individuality are expressed in the poultry business than in almost any other farming. There is no hard and fast rule covering either equipment or type of houses. The following is, however, reasonably typical when white leghorns are run in flocks of 500 each.

<i>Buildings</i>	<i>Live Stock Other than Work Animals</i>
Dwelling	1,200 6-month pullets
Windmill, well, tank and tank house	3,200 chicks
Hay and horse barn and implement shed	<i>Special Equipment</i>
5 flock houses, 50 by 18 ft.	42 feeding troughs
2 wooden houses, 34 by 16 ft.	3 watering troughs
<i>Fences</i>	Broom
5-ft. woven wire, posts 1 rod apart	Hand sprayer (for inside)
<i>Implements and Machinery</i>	Power mixer
10-in. walking plow	Kale cutter
1-sect. spike tooth harrow	30 feed buckets (wood)
Cultivator	Scoopshovel
Hoe	Wheelbarrow, hand wagon or sled
Shovel	Grinder
Scythe	Cooking pot
Rake	6 egg buckets (wood)
Spade	6 dozen glass eggs
Post hole auger	4 dozen 36-dozen egg cases
Wire stretcher	2 distill distillate heaters
Low yard truck	6 drinking fountains
Scraper	Water system and piping
<i>Work Animals and Harness</i>	<i>Small Tools and Shop Material</i>
Horse	Small tools, lumber, and shop materials
Harness	

5. List of Equipment for a 60-acre Farm.—This western farm consists of 60 acres of land under a community cooperative ditch from which water can be obtained whenever needed at the rate of \$2 per acre per year. The land has never been under irrigation, is of average quality, and situated from standpoint of climate, soil, and market so that best results will follow its use for:

- 35 acres of alfalfa for dairy, hogs, and hay
- 10 acres for almonds
- 10 acres for prunes
- 2 acres for corn for silo. Remainder for corrals and buildings.

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The alfalfa is to be utilized for a 10-cow dairy and 10 brood sows. Concentrates will be purchased. Land will produce at the rate of 6 tons of alfalfa hay, 12 tons of corn silage, and good yields of remaining crops.

The cows are to be pastured on alfalfa from April 1 to December 1 and fed 4 lb. of concentrates per head at all times when milking. From December 1 to April 1 they are to be fed 20 lb. of alfalfa hay and 30 lb. corn silage.

The swine are to be pastured at usual rate on the alfalfa throughout the year,—on poorest portion in winter.

Ranch can sell either whole milk or butter-fat.

Land in its present state without checks or improvements of any kind, is valued at \$200 per acre where orchards are to be set out and at \$125 for remainder.

A determination of the amounts, kinds, and types of equipment necessary properly to conduct the business resulted in findings as follows

Dwelling	Shop
Horse barn for 4 horses	Small hen house
Granary	Silo
Harness room	Farrowing pens for sows
Hay storage	Field shelters for hogs
Milking barn	Field shelters for cows
Implement shed	Well, tank, windmill and tower
Shed for use in fruit harvest and for storage of drying trays and boxes when not in use.	Ditch boxes
	Sanitary necessities
	Sewer and cesspool

Piping—from tank to house, stock troughs and gardens.

Dwelling to be of five rooms, moderate priced, as usually constructed.

For purposes of convenience and economy, the hay storage for horses, horse barn, implement shed, storage for grain, spare harness room, and shop will be combined in one structure.

Figuring hay for four work horses at 30 lb. per day and counting on storing 6 months' supply (at other times put in one or two months' supply from harvest field), is needed for 12 tons. At 512 cu. ft. per ton, 6,144 cu. ft. are required.

Horse stalls to be 2-ft. double stalls—8 by 10 ft. including mangers, with a 6-ft. walk behind the stock. Implement shed shall provide about 300 sq. ft. of floor space. Shop to be 10 by 10 ft.; grain storage 10 by 14 ft.

These needs will be best met by a structure 28 by 52 ft., with main barn having a floor space of 20 by 28 ft. and 10 ft. to eaves, with two wings attached running the length of the barn and 16 ft. in width.

Milking barn to provide for 10 cows, *i.e.*, stalls $3\frac{1}{2}$ by 5 ft. with 2-ft. manger, 1-ft. gutter, and 4-ft. walk. Concrete floor. 7 ft. at eaves rear of cow, hip or A-roof and 8 ft. at feed end, roof pitch = $\frac{1}{4}$, shingle roof, pine framing and redwood siding, size 12 by 36 ft. Cow hay to be stored in the open. Feeding to be done from outside.

Hen house for 25 fowls at 3 sq. ft. per fowl = 75 sq. ft. or small building 8 by 10 ft., shed roof, 5 ft. in rear to eaves, pitch of $\frac{1}{4}$, hence 7 ft. in front, wire in front with board floor and conveniences for cleaning out and collecting eggs. Tar-paper roof.

One shed will serve double purpose for use during fruit harvest and to store boxes and trays when not in use. For the purpose, a shed 12 by 16 ft. will be ample, built on wooden sills 2 by 6 in., 4 by 4-in. posts, 6 or 8 ft. apart, 7 ft. from ground

to eaves at rear, shed roof, $\frac{1}{4}$ pitch, boarded at rear and both ends, shingle with 5-in. lap, floor of 1 by 8-in. pine on 2 by 4-in. this joists set on ground.

Silo

Since cows are fed 30 lb. ensilage for 4 months, this = 2 tons by 10 = 20-ton silo needed. Silo 10 by 20 ft. = 26 tons.

Farrowing Pens

2 rows of five each separated by 4-ft. alley. Pens to be 8 by 8 ft. in size, boarded up solid with 1 by 6-in. pine, all to be roofed over with shake roof, enclosed on one side, but open on other side and ends. Each inside pen to connect with outside pen 8 by 12 ft. long, built of 1 by 6-in. spaced 4 in. apart. Floors to be of earth, except a strip of 3 ft. wide across and near alley for feeding floor.

Field Shelter for Hogs

To be 10 by 16-ft. shed roof, $\frac{1}{2}$ pitch, and 4 ft. to eaves to rear, roofed with battened boards and boarded in at rear and both ends, mounted on 3 by 6-in. runners and braced to permit moving.

Well, Tank, Windmill and Tower

Usual domestic well, *i.e.*, 50 ft. deep, tank, windmill and tower.

Ditch boxes

To be placed only at ditch take-outs—banks to be cut to let water into checks. For 60 acres if checks are 50 by 200 ft. and in even series, seven ditches needed, or eight take-outs including one where water enters ranch. Ditch requires structure 12 ft. long, 6 ft. high, with wings 4 ft. long and 6 ft. deep and base 4 ft. wide and 6 ft. long for each ditch. Total, seven double structures.

Fences

Needs

- Around fruit
- Around alfalfa hay and pasture field
- Horse corral
- Poultry yard
- Around farmstead

Kinds

For hog corrals

3 barb wires, 26-in. woven wire, on posts 16 ft. apart with two pickets between (to be called fence No. 1).

For pastures, cow corrals, hay fields, and fruit

Four strands barbed wire on posts 16 ft. apart with one picket between (to be called fence No. 2)

Horse corral fence

96 ft. square of 2 by 8-in., 1 ft. apart, 6 ft. high, 4 × 4—8 posts spaced 8 ft. apart (to be called fence No. 3) set 2 $\frac{1}{2}$ ft. in ground.

Poultry fence

6 ft. high of woven wire placed on 2 by 4-in. posts, 12 ft. apart, with 1 by 6-in. baseboard to enclose space 48 by 96 ft. (to be called fence No. 4).

Farmstead fence

Board fence of four 1 by 6-in. boards spaced 12 in. apart on square 4 by 4 in. posts, set 12 ft. apart (fence No. 5).

Lengths required—(based on layout plan)

- Number 1—2,640 running feet
- 2—9,380 running feet
- 3— 400 running feet
- 4— 300 running feet
- 5—1,150 running feet

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<i>Fruit Trees</i>	
550 each almonds and prunes	
<i>Work Stock</i>	
4 work horses	
<i>Live Stock</i>	
25 hens	
10 milk cows	
1 bull	
10 sows	
1 boar	
<i>Implements and Machinery</i>	
1 14-in. walking plow	
1 10-in. walking plow	
1 8-ft. spike tooth harrow	
1 4-ft. disc harrow	
1 spring tooth harrow	
1 plank drag	
1 buggy	
1 orchard wagon	
1 light spring wagon	
1 1½ ton wagon with flat rack and hay rack	
1 hand spraying machine	
1 2-horse cultivator	
1 2-horse Fresno scraper	
1 5-ft. mower	
1 10-ft. rake	
1 hand corn planter	
1 jackson fork and derrick	
<i>Miscellaneous Equipment</i>	
2 shovels	
3 pitchforks	
Pick	
Double trees, single trees, lead bars, and eveners	
Rake	
Post hole auger	
Wire stretcher	
4 halters	
25 lb. rope	
Wagon jack	
Curry comb and brush	
	Horse brush
	2 corn knives
	10 feeding troughs for hogs (home made)
	2 feed racks for dairy corral (home made)
	4 10-gal. milk cans
	2 20-qt. milk pails
	Dipping vat and pens for hogs (home made)
	Spade
	10 drinking troughs (for hogs—home made)
	2 drinking troughs (for horses and cows—home made)
	Wheelbarrow
	16-bu. feeding truck
	40-ft. hose
	Broom
	2 hoes
	1 stable fork
	Milk stool (home made)
	Can brush
	Keg washing powder
	Babcock tester and bottles
	Scales
	2 sets chain harness
	1 set light harness
	1 single harness
	2 sets of canvas for use in almond harvest
	2 knocking poles
	Pruning saw
	1 pair 30-in. pruning shears
	2 12-ft. ladders
	400 hug boxes
	600 trays for drying fruit
	(i.e. 30-ton crop in three pickings = 30 ton green fruit drying at once at 50 lb. per tray = 600 trays)
	Dip for prunes
	(NOTE.—Silage cutter to be rented)

Carpenter and Blacksmith Outfits and Shop Materials

Carpenter outfit (brace and eight bits, claw hammer, square, try square, marking gauge, rip saw, handsaw, keyhole saw, jack plane, smoothing plane, three chisels, level, draw knife, dividers, wood rasp, two screw drivers, wood bench and vice with nails and screws).

Blacksmith outfit (10-lb. sledge hammer, machinist's ball peen hammer, two cold chisels, five punches, center punch, adjustable hacksaw frame, one dozen hack-saw blades, 12 twist drills, six assorted files with handles, screw-cutting files, straight lip tongs, two bolt tongs, forge with blower, steel-faced anvil, iron bench and vice).

Other tools (soldering tools, harness repair tools, two monkey wrenches, 5 S-wrenches, wire cutting pliers, pipe-threading outfit, single-wheel pipe cutter, two Stillson pipe wrenches, open-hinge pipe vice, pinch-point steel crowbar, trowel for concrete work, pointing trowel, sidewalk edger, sidewalk groover, putty knife, glass cutter, melting ladle for babbitting, babbitt metal, assorted paint brushes, grindstone, axe).

Personal Effects

Furnishings for house

Special Equipment

40 fruit trees for family orchard

20 ornamental trees.

Desirability of Second-hand Equipment.—The buying of second-hand equipment is frequently considered by the man short of capital and anxious to make every dollar count. This applies not only to implements and machinery but to old horses, worn-out cows, and second-hand dairy supplies.

In general the first wear is the most profitable. The older things become, the greater is the lost motion; parts break more frequently, and the rate of wear increases.

How much one can afford to pay for such second-hand things depends on the usefulness still available.

Determining Value of Second-hand Implements and Machinery.—For instance, if new equipment of plows, harrows, and similar implements, costing \$400, will last 10 years, and an outfit cost \$400, the annual charge will be \$52, being interest at 6 per cent on the material average valuation and depreciation at 10 per cent. If a second-hand outfit suitable for the same purpose is offered for \$200 and has but 4 years of life, the charge will amount to \$56 per year for its use; if it will last but 2 years the cost will be \$106. At the same time an estimate must be made to cover breaks and repairs which increase with age and amount to a greater figure for the second-hand stuff than for new equipment. On the other hand, if the material average valuation could be obtained for \$150 and half their usefulness still remains, a saving can be effected of about \$20 a year over the cost of the new things.

Determining Value of Work Animals.—The same thing holds with work animals, although not to so marked an extent. Ten years is considered the average working life of a horse, or to 13 years of age, yet if one finds a fairly sound, well preserved animal of 10, he will probably be good for 5 or 6 years more and one can afford to pay more for him in proportion to his years than for a young animal.

If work animals at 4 years of age are worth \$200, figured on 10 years of service, \$20 must be charged off each year. At this rate a 10-year old animal will have worked 7 years and accordingly under this arrangement is worth but \$60. But, if \$20 is the average yearly value of a good work animal, a 10-year-old with 5 or 6 years good work still remaining is worth

from \$100 to \$120. On the other hand a 6-year-old horse abused for 2 years may have but 2 or 3 years left to him and in consequence will not be worth over \$40 to \$60.

Determining Value of Dairy Cows.—Dairy cows offer a somewhat more complicated problem since they have beef values as well as milking values. A dairy cow's usefulness is figured as covering 10 years; or, she will be ready to beef at 12 years of age. At 2 years old a good heifer, let us say, is worth \$40 to \$50; at 3 perhaps \$10 more, and at 4 from \$60 to \$70. As beef, these cows are worth about 50 per cent of good beef cattle: under prices of 7¢ for beef they are worth \$35 to \$40 for the block. On this basis a cow appreciates from two to four years of age. Beginning at 4 years, however, they lose about \$30 in the 6 remaining years, although in actual practice the loss usually occurs only during the last couple of years. A cow therefore is worth practically full price from 4 to 8 years old, then drops about \$10 a year in value thereafter.

Depreciation Mounts with Age.—From these few pointers one gathers that the older stock or implements are, the less one can afford to pay for them. Moreover, unless the price is low enough they may prove more costly in the long run than young stock or new implements.

When Second-hand Equipment Is Especially Worth While.—There is one other way to look at this matter, however. Sometimes a man with limited capital, anxious to make it go as far as possible when starting in to farm, had better buy second-hand things to begin with. While he will pay higher premiums for the use of such stock and implements he will not infrequently at the same time be able to make his ready money go farther and in the long run get sufficiently greater returns, through the release of capital, to warrant the higher cost exacted by second-hand purchases.

Costs of Equipment

The costs of equipment in the following examples are figured by carefully determining the list of necessary items and their costs at the farm. As examples, the costs of the 320-acre grain farm and the 20-cow dairy referred to under lists of equipment (page 201) were found for the conditions and priced where these farms were located (California), to be:

Cost of Equipping a 20-cow Dairy

<i>Buildings</i> —(Material only)	
Dwelling.....	\$800.00
Windmill, well, tank and tank house.....	250.00
Hay (100 tons) and horse barn and corrals.....	400.00
Cow barn (28 by 40 ft.) with cement floor and corrals.....	345.00
Wood silo (14 by 20 ft.).....	250.00
Blacksmith shop and implement shed.....	150.00
Milk room.....	50.00
	2,245.00

Fences

Around farm—3 strands barbed wire, posts 1½ rods apart. 65.25

Implements and Machinery

12-in. walking plow.....	21.50	
9-ft. spike tooth harrow.....	18.70	
Fresno scraper.....	21.00	
5-ft. mower.....	72.00	
10-ft. rake.....	40.00	
1½-ton wagon.....	85.00	
Hay rack.....	25.00	
2 shovels.....	1.50	
3 pitchforks.....	3.00	
Double and single trees, halters, ropes, etc.....	15.00	
Spring wagon and single harness.....	100.00	402.70

Work Stock and Harness

2 work horses and harness.....	342.00	
Driving or riding horse and harness.....	125.00	467.00

Live Stock Other than Work Animals

20 cows at \$90.00 each.....	1,800.00	
1 bull.....	150.00	1,950.00

Special Equipment

Piping to buildings.....	20.00	
Cesspool and sewer.....	50.00	
2 drinking troughs.....	50.00	
Wheelbarrow.....	5.00	
16-bu. feeding truck.....	28.40	
40 ft. hose.....	20.00	
2 barn shovels.....	3.00	
2 brooms.....	3.00	
2 hoes.....	1.20	
2 stable forks.....	2.00	
Jackson hay fork.....	10.00	
2 milk stools.....	2.50	
2 20-qt. pails.....	7.00	
2-compartment wash sink.....	27.00	
2-hp. boiler.....	101.00	
20-ft. 8-in. stack; roof plates; spark arrester and damper...	16.00	
Separator.....	90.00	
1 dozen brushes.....	4.00	
Keg washing powder.....	4.40	
Ideal sanitary cream cooler.....	12.00	
Babcock tester.....	12.00	
Scales.....	2.50	497.50

Small Tools and Shop Material

Material, as nails, nuts bolts, scrap iron, lumber, etc.....	20.00	
Small tools and blacksmith outfit.....	50.00	70.00

Total.....		\$5,697.45
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Cost of Equipping a 320-acre Grain Ranch

<i>Buildings—Material only</i>		
Dwelling.....	\$800.00	
Hay and horse barn.....	600.00	
Windmill, well, tank and tank house.....	250.00	
Implement shed and blacksmith shop.....	200.00	\$1,850.00
<i>Fences</i>		
For entire farm (three strands barbed wire, posts 1½ rods apart).....		783.00
<i>Implements and Machinery</i>		
2 Stockton gang plows.....	130.00	
1 spike tooth harrow, 4-section.....	40.00	
1 grain drill.....	115.00	
1 grain binder.....	175.00	
1 mower, 5-ft.....	72.00	
1 hay rake, 10-ft.....	40.00	
1 Jackson fork.....	15.00	
2 hauling wagons.....	120.00	
1 cart.....	65.00	
2 hay racks.....	50.00	
6 pitchforks.....	6.00	
1 post hole auger.....	2.50	
1 wire stretcher.....	2.50	
1 shovel.....	1.80	
1 Fresno scraper.....	21.00	
Lead bars.....	15.00	870.80
<i>Work Stock and Harness</i>		
12 work horses, collars and harness.....	2,004.00	
1 driving horse and harness.....	150.00	2,154.00
<i>Live Stock Other than Work Stock</i>		
Poultry and cow.....		100.00
<i>Special Equipment</i>		
2 manure forks.....	2.00	
1 broom.....	1.50	
1 wheelbarrow.....	5.00	
1 drinking trough.....	13.00	
Piping to buildings.....	20.00	
Incidentals as rope, halters, buckets, etc.....	25.00	66.50
<i>Small Tools and Shop Material</i>		
Blacksmith outfit and small tools.....	50.00	
Shop material—nails, bolts, iron, lumber, etc.....	50.00	100.00
Total.....		\$5,924.30
<p>Cost of Equipping 60-acre Diversified Farm.—Costs of equipping the diversified farm for which equipment was selected (see page 202) result in cost summaries, based on pre-war (1915) and post-war (1919) conditions, as follows:</p>		
	PRE-WAR	POST-WAR
Trees 1,140 at 25¢.....	\$ 385.00	\$ 410.00

Buildings

House.....	473.00	898.00
Barn.....	205.00	389.00
Milk barn.....	141.00	267.00
Hen house.....	13.00	15.00
Fruit shed.....	28.00	45.00
Silo (at \$1.50 per ton capacity).....	40.00	70.00
Farrowing pens.....	84.00	155.00
Field shelter for hogs.....	11.00	15.00
Field shelter for cows.....	18.00	32.00
Well, tank, windmill and tower (erected).....	250.00	375.00
Ditch boxes (300 b. ft. in each at \$30 per M. clear lumber).....	72.00	180.00
Sewer and cesspool (200 ft., 6-in. sewer pipe and wooden lined cesspool).....	70.00	130.00
200 ft., 3/4-in. galvanized iron piping and fittings.....	36.00	65.00
Total.....	\$1,440.00	\$2,636.00

Fences

Fence No. 1 (hogs)		
3 barb wires, 26-in. woven wire, on posts 16 ft. apart with 2 pickets between 160 rods.....	140.00	270.00
Fence No. 2 (cow pasture and boundary)		
4 strands on posts 16 ft. apart 570 rods.....	222.00	387.00
Fence No. 3 (corral) requires		
50 posts 8 ft. long of 4 by 4 in. 1,200 running ft. of 2 by 6 in. Hardware.....	37.00	74.00
Fence No. 4 (chicken yard) requires		
22 posts 2 by 4 in. 1,400 sq. ft. wire netting 1 by 6-in. baseboard, 2,300 running feet Staples, hinges and hardware.....	14.00	27.00
Fence No. 5 (farmstead fence) requires		
7-ft. posts 4,600 running feet of 1 by 6 in. Nails, and braces and gate material.....	81.00	151.00
Total.....	\$466.00	\$909.00

Work Animals..... **\$600.00** **\$600.00**

Live stock—fowls, cows, sows, boar, bull..... **1,205.00** **2,145.00**

Implements and Machinery

14-in. walking plow.....	20.00	38.00
10-in. walking plow.....	15.00	34.00
8-ft. spring harrow.....	8.00	16.00
4-ft. disc harrow.....	22.00	34.00
1 four-section spike harrow.....	32.00	64.00
Plank drag (home made).....	3.00	10.00
Buggy.....	96.00	110.00
Orchard wagon.....	90.00	98.00

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1½-ton wagon with hay and flat racks.....	110.00	213.00
Light spring wagon.....	100.00	130.00
Hand spraying machine.....	26.00	30.00
Land cultivator.....	60.00	106.00
4-horse land scraper.....	21.00	36.00
5-ft. mower.....	72.00	98.00
10-ft. rake.....	35.00	63.00
Corn planter, hand.....	3.00	5.00
Jackson fork and derrick.....	90.00	128.00
Total.....	\$803.00	\$1,213.00
<i>Miscellaneous Equipment</i>		
2 shovels.....	2.00	3.00
3 pitchforks.....	3.00	3.75
Double and single trees, lead bars, and eveners.....	15.00	18.00
Post hole auger.....	2.50	4.00
Wire stretchers.....	2.50	5.00
4 halters.....	5.00	10.00
25 lb. rope.....	4.50	6.00
Rake.....	1.25	2.00
Wagon jack.....	1.00	1.50
Curry comb and brush.....	1.00	1.50
2 corn knives.....	1.00	2.00
4 10-gal. milk cans.....	11.20	18.00
2 20-qt. milk pails.....	5.00	5.00
Dipping vat for hogs (material).....	12.00	24.00
Spade.....	1.50	2.50
Material for troughs and feed racks.....	8.00	16.00
Wheelbarrow.....	4.50	7.00
16-bu. feeding truck.....	28.40	35.00
40 ft. hose.....	6.40	10.00
Broom.....	0.50	0.75
2 hoes.....	1.30	2.00
Pick.....	1.00	1.50
Stable fork.....	1.00	1.50
Can brush.....	1.00	1.25
Washing powder.....	4.50	6.00
Babcock tester and bottles.....	12.00	15.00
Scales.....	2.50	3.50
2 sets chain harness.....	70.00	108.00
1 set light harness.....	35.00	60.00
1 single harness.....	20.00	30.00
Canvas for almond harvest.....	12.00	26.00
Knocking poles (4).....	2.00	4.00
Pruning saw.....	0.50	0.70
30-in. pruning shears.....	3.00	3.00
Ladders.....	7.20	14.40
400 lug boxes (50 lb.).....	60.00	96.00
600 drying trays.....	210.00	360.00
Prune dip.....	162.00	225.00
Total.....	\$720.75	\$1232.65

Carpenter outfit.....	31.00	48.00
Blacksmith outfit.....	47.00	75.00
Other tools.....	29.00	46.00
Personal effects.....		
Ornamentals (20).....	10.00	15.00
<i>Total Cost of Equipping</i>		
Buildings and structures (other than fences).....	1,440.00	2,636.00
Fences.....	466.00	909.00
Trees.....	385.00	410.00
Work stock.....	600.00	600.00
Live stock.....	1,205.00	2,145.00
Implements and machinery.....	803.00	1,213.00
Miscellaneous equipment.....	720.75	1232.65
Small tools.....	107.00	169.00
Personal effects.....		
Ornaments.....	10.00	15.00

GRAND TOTAL (not including value of personal effects)..... \$5,736.75 \$9,329.65

For the sake of brevity summaries only of costs for the other industries for which lists of equipment are given (pages 200 to 206) are inserted for comparison. These were found to be:

Industry	Total equipment costs	Buildings	Fences	Implements and machinery	Work stock and harness	Live stock	Special equipment	Small tools and shop material
20-acre fruit orchard....	\$3,260	\$1,300	\$ 65	\$1,438	\$342	\$ 25	\$ 20	\$70
2,500-acre poultry farm	4,809	1,925	950	84	125	1,056	639	30

When figures are based on pre-war prices, it is in the belief that a return to the pre-war basis is likely. The costs of the same equipment, if figured under war conditions (1919), should be increased 82.6 per cent for building materials 51.1 per cent for implements, wagons, and farm machinery; 48.4 per cent for miscellaneous minor equipment and supplies; 100 per cent for labor; little or none for work animals; 90 per cent for other live stock.

State Findings Concerning Costs of Equipping Farms

Michigan⁶⁴ Costs of Equipping Dairy Farms.—Studies conducted during 1914–15 found a wide range in amount of investment per farm and per cow in dairy buildings and dairy equipment. Summarized for 29 farms the findings were:

Investment in	Range		Average per cow
	Per farm	Per cow	
Dairy buildings.....	\$632.00 to \$4,500.00	\$41.45 to \$240.92	\$95.26
Dairy equipment.....	8.24 to 170.56	0.64 to 6.54	1.97

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The investment in pails, cans, strainers, coolers, etc., averaged less than \$2.00 per cow.

If one expresses these three classes of investment in percentage terms they will be approximately as follows:

	PER CENT
Investment in cattle.....	45
Investment in buildings.....	54
Investment in equipment.....	1

When individual farms are studied a considerable range of investment per cow is noted. This is occasioned by the kind and condition of the cows; the number, age, and state of repair of the buildings; and the amount and condition of the other equipment.

Dairy Farm Equipment Costs—Wisconsin, Michigan, Pennsylvania, and North Carolina.—From a study of four dairy farms located in Wisconsin, Michigan, Pennsylvania, and North Carolina,⁵⁵ the investment per cow in dairy buildings was found to be, respectively, \$34, \$50, \$83 and \$80 per cow for dairy barns.

Relation of Dairy Equipment Investments to Returns.—Other things being equal, the larger the herd that can be accommodated with a given investment the lower the overhead per cow.

The question of an economic investment in equipment and supplies is closely related to that of buildings, and the same general principles hold true in both cases. Expensive milk coolers and ice supplies, which may be absolutely necessary in the production of high-grade milk for a special market, might be both unnecessary and extravagant in the production of cream to be sold on the butter-fat basis. In other words, expenses for buildings, equipment, and supplies should never be so high as to make it difficult or impossible to realize a reasonable dividend on the capital invested in the herd.

Building Equipment Costs—Ohio.—From a study of 21 Ohio²³ farms costs were found to range about as follows:

TABLE 59.—BUILDING EQUIPMENT COSTS—OHIO

Building.	Type	Size, ft.	Cost
Stock barn.....	Basement or "bank".....	36 by 60	\$1,800
Hay.....	.....	16 by 32	150
Crib.....	Double driveway between	20 by 28 by 10	200-250
Workshop.....	.....	22 by 30 by 12	250-300
Hog house.....	4 pens 6¾ by 8 ft.....	12 by 27	60-100
Poultry house.....	Allowing 4 sq. ft. per fowl	12 by 20	50-75

Total Farm Equipment Costs—Ohio.—The cost of equipping a farm, based on the average of 21 farms,²³ was found to be:

Farm buildings.....	\$ 2,700.00
Household buildings.....	2,500.00
Fences.....	763.74
Drainage.....	366.43
Water supply.....	225.00
Work animals.....	640.71
Colts and driving horses.....	250.95
Cattle.....	582.26
Sheep.....	201.05
Swine.....	158.34
Poultry.....	52.60
Bees.....	3.23
Harness.....	131.05
Machinery.....	1,125.48
Minor articles.....	200.00
Produce, supplies, etc.....	631.19
Total.....	<u>\$10,532.77</u>

In actual practice innumerable factors enter in to reduce the cost of equipping farms. Few farms in the older sections of the United States like Ohio are equipped outright with new buildings, fences, and machinery, and the summary just given would, of course, apply to only a few cases. It is interesting, however, in showing the amount of money which can be spent over a course of years in bringing the equipment up to a profitable working basis.

Costs of Equipping Apple Orchards. *Western Colorado.*—For apple-bearing orchards in western Colorado the cost of equipment was found to be \$650 for orchards averaging 38 acres in size of which 10.8 acres were in bearing orchard and 4.2 acres in young orchard.⁵⁶

Oregon.—An average 40-acre Hood River Valley farm of Oregon having 46 per cent in bearing apple orchard represented an outlay of \$491 for equipment and \$333 for work stock.⁵⁷

Washington.—Study of 120 representative bearing orchards in Yakima Valley, Wash., averaging 15.82 acres in size and 6.39 acres of bearing trees, in 1915 had an average investment in equipment of \$405.48 for each ranch or \$30.88 for every acre of bearing orchard.⁵⁸

Idaho.—In the Payette Valley, Idaho, a study of 38 representative bearing apple orchards,⁵⁹ made in 1915, averaging 53.39 acres with an average of 11.33 acres of orchard, indicated a ranch investment in equipment of \$542.63 or a per acreage rate prorated over bearing orchard of \$20.50.

Equipment Costs as Shown by Farm Management Surveys.—Equipment costs resulting from farm management survey inquiries are given

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in the chapter on capital. The summaries show totals of equipment costs on the many different types of farms in various localities. The student is referred to pages 240 to 246 for these data.

Costs of Farm Equipment Vary.—Fluctuations from time to time in the costs of various items of farm equipment are extensive. It is therefore necessary for farm management students to collect accurate data based on local conditions and prevailing prices. Costs of various items vary within wide extremes in different parts of the country. For instance, barns built in timber region where farmers are skilled as carpenters will cost much less than in a treeless country where lumber must be shipped in from long distances and where union carpenters must be employed. Concrete costs are materially reduced when the farm possesses a good gravel bed. Distance of shipment, amount of competition, and the credit rating of a community, are factors affecting cost of implements and machinery.

Example of Costs, and Variation in Costs, of Farm Equipment.—Some idea of the costs of implements and supplies is furnished in the following table showing the costs of selected farm equipment, collected for western farming conditions. The prices indicate the influence of war conditions. They are for the years 1915 and 1919, the former representing pre-war, the latter war conditions.

TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
Farm implements, wagons, and machinery		
- Cleaner, for grain.....	\$ 45.00	\$ 65.00
Cultivators		
Crop, 1-horse.....	8.00	10.00
Crop, 2-horse.....	50.00	87.00
Land.....	60.00	106.00
Derricks, hay, 14-ft. mast.....	90.00	128.00
Diggers, potato, elevator type.....	135.00	224.00
Harrows		
Disc, 8-ft., 16-18-in. discs.....	70.00	111.00
Spike, 4-8-ft. sections.....	32.00	64.00
Spring tooth, 9-ft.....	16.00	23.00
15-ft.....	22.00	34.00
Harvesters, grain binder, 6-ft.....	150.00	227.00
Corn binder, 6-ft.....	175.00	207.00
Grain, headers, 10-ft.....	250.00	361.00
Mower, 5-ft.....	72.00	98.00
Planters, corn, 2-row 2-horse.....	48.00	78.00
Bean, 2-row 2-horse.....	40.00	78.00
Potato, 2-row 2-horse.....	106.00	185.00
Beet, 4-row 2-horse.....	50.00	96.00

TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
Plows, breaker		
12-in. single.....	18.00	29.00
14-in. single.....	22.00	32.00
16-in. single.....	25.00	35.00
Plows, disc		
24-in. with 1 disc.....	65.00	100.00
24-in. with 2 discs.....	82.00	186.00
24-in. with 3 discs.....	96.00	213.00
24-in. with 4 discs.....	112.00	250.00
24-in. with 5 discs.....	125.00	280.00
Plows, gang		
12-in. 2-gang.....	77.00	126.00
14-in. 3-gang.....	81.00	132.00
12-in. 3-gang.....	70.00	171.00
12-in. 4-gang.....	115.00	206.00
Plows, stockton gang		
8-in. 3-gang.....		54.00
8-in. 4-gang.....		62.00
10-in. 4-gang.....		67.00
Plows, side-hill		
10-in. single.....	14.00	27.00
12-in. single.....	16.00	29.00
Plows, sulky		
14-in. single.....	58.00	105.00
16-in. single.....	60.00	107.00
Plows, walking		
10-in.	15.00	34.00
12-in.	18.00	35.00
14-in.	20.00	38.00
Press (18 by 22-in.) hay.....	350.00	625.00
Rakes		
10-ft. 1-horse.....	35.00	63.00
12-ft. 2-horse.....	42.00	68.00
Buck.....	40.00	65.00
Rollers, corrugated iron		
5-ft.....	60.00	70.00
8-ft.....	85.00	100.00
Scrapers, Fresno		
5-ft. 4-horse.....	21.00	36.00
Seeders		
Broadcasters.....	25.00	40.00
Drill, 16-7-in. single discs		
4-horse.....	124.00	204.00
Drill, 16-7-in. double discs		
4-horse.....	130.00	230.00
Drill, 10-ft., steel wheels.....	107.00	223.00
Spreaders, manure, 2-horse.....	170.00	258.00
Stacker, hay, complete.....	70.00	115.00

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TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
Thresher		
Grain, 26-in. cylinder, not mounted.....	350.00	650.00
Grain, combine.....	2,500.00	4,000.00
Grain, stationary.....	5,000.00	6,500.00
Wagons, farm		
Buggy.....	96.00	110.00
Single.....	90.00	98.00
1½-ton.....	110.00	213.00
2½-ton.....	145.00	243.00
Building Materials.		
Lumber, per M. (thousand board feet)		
Pine,		
*Common: 1 by 3, 1 by 6, 1 by 8, 1 by 10, 6 to 18 ft. long.....	20.00	40.00
Common: 3 by 10, 3 by 12, 4 by 4, to 4 by 12—12 to 20 ft.....	18.00	40.00
Same: 34 to 40 ft.....	23.00	50.00
Flooring, T. & G, S1S, 1 by 4, assorted lengths, to 8 ft.....	34.00	66.00
Ceiling, T&G, S1S, 5/8 by 4, assorted lengths, 4 to 10 ft.....	31.00	48.00
Lath 1½ in. by 4 ft., per thousand.....	5.00	7.50
Rustic, 1 by 6, 6 to 20 ft.....	32.00	52.00
Redwood,		
*Common, 1 by 3, 1 by 4, 1 by 6, 1 by 8, 10 to 20 ft.....	21.00	40.00
1 by 12, 10 to 20 ft.....	24.00	46.00
2 by 3, 2 by 4, 2 by 6, to 2 by 10—10 to 20 ft.....	20.00	40.00
4 by 4 to 4 by 10, 10 to 20 ft.....	21.00	42.00
Clears, 3 and 4-in.		
Rustic, 1 by 4, 6 to 20-ft.....		57.00
1 by 6, 6 to 20-ft.....	37.00	60.00
Bevel siding, 1 by 4, 6 to 20-ft.....	32.00	
¾ by 4, 6 to 20-ft.....		44.00
Ceiling, 1 by 4, V under 6-ft.....	20.00	41.00
Battens ½ by 3, per lineal foot.....	0.00¾¢	0.01
Shakes, sawn, 6 by 36 per 1,000 pieces.....	15.00	30.00
Shingles, No. 1, per bundle.....	0.60	1.20
Shingles, No. 2, per bundle.....	0.50	1.00

*In estimating lumber add 10 per cent for waste, 1,000 shingles (4 bundles) will cover 80 sq. ft. if laid 4 in. to the weather, 90 sq. ft. at 4½ in., and 1,000 sq. ft. at 5 in. 1,000 shakes laid "shake fashion" (lapping 6 in. at ends and 1½ in. at sides) will cover 900 sq. ft. 1,000 shakes laid "shingle fashion" (16 in. exposed—double layer) will cover 700 sq. ft.).

TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
<i>Galvanized Iron Roofing</i>		
No. 24, per 100 lb.....	4.00	9.45
No. 26, per 100 lb.....	3.85	9.55
(Comes in lengths 24 by 72 in. and weighs per square foot, 24, 1.156 lbs., 25, .906 lbs.)		
<i>Miscellaneous</i>		
Cement, per 100 lb.....	0.85	0.85
Linseed oil, per gal.....	1.00	3.00
Nails, 100 lb., base.....	4.50	6.50
Paints, per gal.....	2.00	3.60
<i>Windmills</i>		
8 ft. in diameter.....		55.00
10 ft. in diameter.....		80.00
12 ft. in diameter.....		145.00
<i>Water Tanks</i>		
1,500 gal., 8-ft. diameter, 5 ft. high.....		40.00
2,500 gal., 8-ft. diameter, 7 ft. high.....		60.00
4,000 gal., 10-ft. diameter, 8 ft. high.....		80.00
<i>Fencing Materials</i>		
Posts, 4 by 5, 7-ft. split.....	0.23	0.35
Pickets, 3 by 3, 7-ft. splits.....	0.12	0.21
Barb wire, per 100 lb.		
Heavy, four point.....	3.00	6.70
Medium, four point.....	3.10	6.80
(Figure 1,350 running feet per 100 lb. of heavy, Figure 1,600 running feet per 100 lb. of medium)		
Woven wire—hog and sheep fence		
Heavy, per rod		
26 in. per rod.....	0.35	0.71
32 in. per rod.....	0.37	0.83
39 in. per rod.....	0.40	0.96
Medium, per rod		
26 in.....		0.53
32 in.....		0.63
39 in.....		0.72
<i>Poultry and Rabbit Fence</i>		
2-in. mesh, per square foot		
1 to 6 ft. wide.....	0.00 $\frac{1}{10}$	0.01 $\frac{1}{10}$
1-in. mesh, per square feet.....	0.01 $\frac{1}{10}$	0.01 $\frac{1}{10}$
1 to 6 ft. wide		
(Figure 165 running feet per roll)		
<i>Wire Gates</i>		
Walk gates.....	1.50	3.50
Single, drive gates.....	3.50	6.50
Staples		
$\frac{3}{4}$ in., per pound.....	0.04	0.12 $\frac{1}{2}$
1 $\frac{1}{2}$ in., per pound.....	0.03	0.10

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TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
(Figure 480 per pound of $\frac{3}{4}$ in. and 60 per pound of $1\frac{1}{2}$ in.)		
Wire stretcher.....	4.50	6.50
<i>General Equipment and Supplies</i>		
Brooms.....	0.50	1.00
Coal oil, gallon.....	0.13	0.15
Grindstone.....	5.00	8.00
Halters.....	1.25	2.50
Harness		
Single.....	20.00	30.00
Work, double (leather).....	45.00	60.00
Work, double (chain).....	35.00	54.00
Horse blankets.....	3.00	6.00
Horse collars.....	7.00	9.00
Lanterns.....	1.00	1.50
Lead bars		
Single, per dozen.....	5.00	6.00
Double, per dozen.....	10.00	12.00
Rope, per pound.....	0.18	0.25
Saddles.....	40.00	55.00
Water pipe, per foot		
Black		
$\frac{3}{4}$ -in.....	0.05	0.07
$1\frac{1}{2}$ -in.....	0.07	0.09
Galvanized		
$\frac{3}{4}$ -in.....	0.10	0.16
$1\frac{1}{2}$ -in.....	0.13	0.20
Wheelbarrows.....	4.50	7.00
Whips.....	0.75	1.00
<i>Tools and Hand Implements</i>		
Axe.....	1.25	2.50
Hatchet.....	0.75	1.10
Hoe.....	0.65	1.00
Pick.....	1.00	1.50
Pitchfork.....	1.00	1.25
Scythe and snath.....	1.25	3.50
Shovel.....	1.00	1.50
<i>Irrigating Equipment and Materials</i>		
Discharge pipe, per foot		
Wooden, banded		
4-in.....		0.31
6-in.....		0.45
8-in.....		0.54
10-in.....		0.68
Steel		
4-in.....		0.49
6-in.....		0.68
8-in.....		0.83
10-in.....		1.02

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TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
Drilling wells, per foot		
10 in. to first 100 ft.....	1.00*	2.00**
12 in. to first 100 ft.....	1.25*	2.25**
14 in. to first 100 ft.....	1.50*	2.50**
Electric motors, with pulleys, bases, and starters,		
5 hp.....		115.00
10 hp.....		240.00
20 hp.....		315.00
40 hp.....		555.00
Fuel, per gal., in quantity		
Distillate.....	0.08	0.15
Gasoline.....	0.12	0.22
Gasoline engines, each		
5 hp.....		220.00
10 hp.....		388.00
20 hp.....		1,345.00
40 hp.....		3,660.00
Irrigating pipe		
Galvanized, per foot		
10-ft. lengths		
8-ft. 22-gauge.....		0.45
10-ft., 20-gauge.....		0.73
Pumps, centrifugal each		
2-in.....		75.00
2½-in.....		85.00
3-in.....		110.00
4-in.....		140.00
6-in.....		235.00
Well Casing, Hard Steel, per foot.		
Double, 12-gauge		
8-in.....		2.49
10-in.....		3.12
12-in.....		3.63
Double, 14-gauge		
8-in.....		1.85
10-in.....		2.20
12-in.....		2.57
Single, with collar, 12 gauge		
8-in.....		3.38
10-in.....	1.12	4.12
12-in.....	1.51	4.83
Single, with collar, 14 gauge		
8-in.....	1.00	2.50
10-in.....	1.12	3.00
12-in.....	1.24	3.48

* 25¢ raise per foot for every 50 ft. additional increase in depth.

** 50¢ raise per foot for every 60 ft. additional increase in depth.

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TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
<i>Dairy Equipment</i>		
Babcock tester.....	12.50	15.00
Boiler, 1½ hp. with 20-ft. 8-in. stack, roof plates, spark arrester and damper.....	117.00	154.00
Bottle brushes, per dozen.....	3.50	6.00
Bottle filler, 4 by 5 valves.....	110.00	137.00
Bottles		
Quart size, per gross.....	8.75	13.00
Pint size, per gross.....	5.75	10.00
Cans, 10-gal. size.....	3.00	6.00
Cream cooler (Tube), with catch basin and strainer.....	40.00	68.00
Feed truck, 16-bu.....	28.00	35.00
Feeding buckets, for calves		
Tin, each.....	0.42	0.60
Wooden, each.....	0.40	0.50
Hose, per foot		
¾-in. size.....	0.12	0.18
1-in. size.....	0.15	0.25
Pails, milking, 10-qt.....	2.50	2.50
Pasteurizer, 50-gal.....	225.00	225.00
Refrigerating plant, 2-ton.....	700.00	830.00
Scales, hand.....	2.50	3.50
Separators, cream		
135-lb. per hour size.....	40.00	63.00
335-lb. per hour size.....	60.00	90.00
675-lb. per hour size.....	85.00	117.00
1,100-lb. per hour size.....	120.00	195.00
Wash sink, 2-compartment.....	30.00	35.00
Washer, turbine, for bottles.....	18.00	22.00
Washing powder, per 100 lb.....	5.00	6.00
Wooden vat, for cooling milk.....	12.00	20.00
<i>Orchard Equipment and Materials</i>		
Bluestone, per pound.....	0.05¼	0.12
Carbon bisulphide, per gal.....	1.25	2.00
Drying trays (apricot and peach).....	0.42	0.60
Drying trays (prune and pear).....	0.35	0.50
(both 3 by 8 ft.)		
Ladders, per foot.....	0.25	0.50
Lime, per barrel, 180-lb.....	2.15	3.00
Lug boxes, 40-lb. size.....	0.12	0.18
Lug boxes, 50-lb. size.....	0.15	0.24
Picking pails.....	0.25	0.35
Potassium cyanide, per pound.....	0.25	0.32
Prune dipper and grader.....	75.00	125.00
Pruning shears, long.....	3.00	3.00
Pruning shears, short.....	2.50	2.50

TABLE 60.—COSTS, AND VARIATION IN COSTS, OF FARM EQUIPMENT. (Cont'd)

	COSTS AS OF	
	1915 (PRE-WAR)	1919 (WAR)
Spray outfit		
Hand.....	2.50	3.50
Hand driven, unmounted.....	50.00	65.00
Power, 150-gal. size.....	275.00	325.00
Sulphur, per pound.....	0.02 ³ / ₄	0.05
Sulphur blower.....		15.00
Sulphuric acid, commercial, per pound.....	0.02	0.03
Trucks for drying house.....	12.50	15.00
Poultry Equipment		
Egg cases, 36 dozen size.....	0.75	1.25
Egg scales.....	0.25	0.50
Feed buckets.....	0.15	0.25
Feed mixer, power.....	60.00	75.00
Feed troughs.....	0.75	1.00
Kale cutter.....	25.00	26.00
Nest eggs, per dozen.....	0.20	0.35
Water troughs, with float.....	2.50	3.50

CHAPTER XI

THE CAPITAL REQUIREMENTS OF FARMING

Among the vital factors of the successful outcome of one's farming operations, probably none outranks the factor of sufficient capital. It is, of course, but one element in the business of farming: with it must go knowledge of farming methods, crop requirements, and stock handling; experience in handling details; personal ability; a liking for the work. No one cares to dwell upon failures. But failures in farming have occurred, are occurring, and will occur. And so many of these failures trace to lack of capital that one is compelled to emphasize the quite obvious fact that farming as at present constituted necessitates capital.

Recognition of Importance of Capital a Safeguard.—Success in farming doesn't rest wholly on capital; but just as surely it doesn't rest entirely on enthusiasm, no matter how ardent. Capital is ammunition in the farming battle. And just to recognize how essential some capital is as a prerequisite to embarking upon farming, is in itself a protection. The next step is to see clearly how much capital is required to safeguard the investor and how he should prorate and budget his available resources.

The trend to be taken by a discussion of the capital needs of farming depends on the reader. Its greatest value is for the new-comer or the would-be beginner in agriculture; its least value to the man who has passed his probation period and has "arrived."

"Capital" Covers Cash and Credit.—The procuring, equipping, and carrying on of any farm business represent a considerable investment. The required funds need not, however, be all cash in hand. The term "capital," in its broadest sense, covers credit as well as cash.

Capital means the financial backing necessary to project, develop, and carry out a desired plan.

Thus the man who desires 40 acres of land costing \$200 per acre, must have \$8,000 capital, but if he avails himself of the common plan of paying 10 per cent down and the balance in installments, his initial cash requirements for the land cost need not exceed \$800 plus such advance interest payments on the balance as he may agree to make. Similarly, accounts established for such items as family living, feed, or seed, to run for a season before payment need be made, represent capital as credit rather than as actual cash. The tenant, crop farming on a share basis, has in cash but a small proportion of the actual capital necessary to the conduct of his operations. In the same way, to carry on a stock industry may necessitate annual purchases of feed to the extent of \$200, yet if credit is established at the local feed store, only a small part of this sum need be cash in hand.

The California Land Settlement Board, a State-financed enterprise to put men on farms, found that total average needs of \$16,900 to finance a family-sized farm, could be handled by the settler with but \$3,000 to \$5,000 cash on hand. These figures are based on 1920 costs and receipts. Under the Board's plans the settler can procure his land, erect buildings, obtain equipment, and live until his business is self-supporting because he need pay but 5 per cent of his land purchase and 40 per cent of his improving and equipping costs.

Credit Expands Farming Opportunities.—If it were not for the credit available to those properly qualified, fewer men could enter into farming for themselves. Men of limited means can, however, with some cash, take advantage of tenanting, local and Federal bank loans, credit in purchasing supplies, and advance payments on future deliveries of crops and stocks. These channels provide means of financing what otherwise might prove to be an investment too heavy for the operator to carry.

Wisdom of Determining Capital Needs.—In planning to take up farming for one's self or to introduce changes in existing plans of a going concern, determination of the capital needs and assurance that the necessary money will be forthcoming should be carefully worked out in advance. Any rural community furnishes examples of ill-advised farming operations which have proved disastrous because of lack of capital. Unscientific use of available funds exhausted in paying too high a price for land, in erecting unnecessarily elaborate buildings, in obtaining inadequate or unsuitable implements, is only too common. So are cases of taking over—and subsequently releasing—enterprises too large for the money available.

Capital Needs are Variable.—A grower setting out an orchard with the prospect of several years before returns for the fruit will meet operating expenses, faces a very different situation from that of the man who is putting in a crop of potatoes or beans or some other crop from which full returns may be expected by the end of the first season; or from that of the man who takes over a well-established, income-producing orchard.

To embark in the cattle business with a small herd of breeding stock and to wait until calves are fit to market requires different capital needs from those for putting in an annual field crop. A family going into egg production and planning to develop a 2,000-fowl plant, must face a quite distinctive allocation of the total capital needs. A rundown place requiring immediate repairs uses funds not so required on a well-preserved place.

Factors Affecting Capital Requirements of Farming.—Capital requirements are materially affected by such initial costs as price of land; by the number, kind, size, and variety of equipment—buildings, fencing, motive power, live stock, implements, and machinery, as determined by the kind of business, soil types, and climatic conditions; by costs of clearing, preparing for irrigating or draining; by personal considerations such as size of family, standard of living, family living arrangements;

by operating expenditures for seed, feed, repairs and parts, sacks, boxes, lumber, water, taxes, labor—the items and their amounts varying for different businesses. This variation is easy to see, for one who is interested. When on some trip through a farming country observe the variations in size of farms; the widely divergent types of farming with the attendant differences in equipment and operating needs and in styles and costs of buildings and other structures; the nationality of the farmers as it bears on size of family and standard of living; the number of automobiles, trucks, and tractors. If one wishes a specially fascinating problem, he can find it in attempting to estimate the capital used by ten farms having outstanding differences in plan and method of operating. When one unacquainted with farm needs assumes a moral obligation to do this, and to follow it with a similar study of 20 to 30 farms typical of the particular kind of farming that he wishes to follow, a better understanding of capital needs accrues, and to the distinct advantage of the investigator.

Individual Determinations Necessary.—To safeguard the finances necessary to establish and carry on a given business, each proposition must be worked out by itself through a careful tabulating of probable expenses and receipts. No general sums that would be of practical value can be given, since capital needs, as already stated, vary between wide extremes.

Estimating and Grouping Capital Needs.—The determination of capital requirements is aided by some such grouping of items as is given below. The main precautions to observe in making a tabulation are: (a) to include all items of expense; (b) to cover all possible receipts; (c) to exercise discretion in estimating both expenses and receipts so that the figures will approximate actual conditions as closely as possible. Too much pyramiding of expenses may do the business an injustice; too optimistic a statement covering receipts may later work a hardship in making up a deficiency. Each item should be carefully scanned, and figured from all available data with as few off-hand estimates as possible, so that the final result represents a conservative, carefully worked out, and clearly exhibited statement of the probable financial situation to be met.

The grouping as given below is not fixed, it may be varied to suit.

(a) *Purchase of Land.*—The sum needed will be either for outright purchase or for covering the first payment. If for the latter only, it is essential to give most careful and practical consideration to subsequent payments of both principal and interest.

(b) *Necessary Improvements.*—If upon raw land, there may be expenditures required for checking, making ditches, building lanes, bridging, fencing, leveling, removing natural vegetation, and the like.

Water supply for domestic use or for irrigation.—This includes cost of equipment, such as casing for wells, drilling wells, wind-mill, motor, gasoline engine, pump tank

and tower, reservoir, piping, or provision for whatever method is used in obtaining and conveying the water.

Sanitary provisions for proper disposal of sewage from house and conservation of manure from the barns.

(c) *Equipment*.—Buildings will be a substantial item. Dwelling, barn, implement shed, milking shed, poultry houses, hog pens, are to be considered.

Under this item comes also the money for providing the various implements, tools, wagons, and machinery, for carrying on the business. As the kind and amount varies with the business, it is necessary to make an individual determination for every case.

Under this heading should also be included the necessary power such as work stock, tractors, engines, and the like. So too the other live stock called for by the business—*e.g.*, dairy cows, hogs, poultry, beef cattle, sheep.

(d) *Operating Expense*.—It is especially necessary when starting a new business to allow a sufficient sum for carrying on the work until the plan is in full operation. This sum must cover all possible expenditures for such things as labor, horse feed, irrigation water, blacksmith and harness bills, seed, fertilizer, orchard trees, axle grease, oil, gasoline, cotton waste, taxes, insurance and the many other items incident to a farm business.

(e) *Personal Expense*.—This is of necessity an individual item. It covers grocery and butcher bills, clothing, books, entertainment, travel, medical attendance, and the various family demands upon the finances.

Estimating Possible Returns.—Against the capital needs are to be put the possible sources of income, from:

(a) The different farm activities. Pessimism rather than optimism should prevail in determining possible sources of income from the proposed business.

(b) Labor done outside, such as country road work, caring for property of non-residents, hauling, or (if the owner has a trade which can be followed in odd times) such work as plumbing, keeping books, acting as secretary, etc.

Variation in Possible Returns.—The sources of immediate income are of considerable variety, as for example intercrops between growing fruit trees; temporary growing of small lots of truck, seed, or cannery stuff, or field crops of relatively high acreage value; growing berries; making jellies, canning fruit for sale; temporary keeping of a few dairy cows, a flock of hens, or some brood sows for quick returns; making of maple syrup; cutting of firewood; outside labor of self or horses; letting out of hired men and equipment.

Conservatism Should Rule in Estimating Possible Returns.—One should recognize, however, that the amount of filling in that one can do is usually limited in most neighborhoods. A careful investigation should be made in the community where one expects to settle, and care exercised in estimating the possible income from this source. This is specially true of farm work which must be done within limited periods of time, since, when the pressure on the home place is over, outside places similarly situated will no longer be demanding labor. The same thing holds of ordinary non-agricultural work. There is usually a generous supply of this at the time when one can afford to be away from his own place.

In estimating possible returns from sale of such occasional stuff as pasturage, railroad ties, Christmas trees, gravel, etc., care must be constantly exercised to use dependable data. Indeed, returns from small family orchards, from woodlots, from maple sugar, from berry patches, from the vegetable garden, from bees, from hiring out tractor, team, or machinery, from chances to do outside work, from hand labor, from sale of extra cream, milk, or eggs, or from other minor interests, must be computed only after marketing conditions are investigated and costs of putting into marketable shape are taken into account. Sources of income roughly estimated in an offhand way, frequently do not prove out in actual practice, so that later the calculated income is seriously curtailed. Such a condition might have been foretold if sufficient study had been given to the marketing end and to the cost of production and shipping as well as merely to yields.

Care in Estimating Items of Family Expense.—The same care should govern in determining the items of family living. Following a compilation of total annual needs for the operator and his dependents—shelter, food, clothing, entertainment, medical service, charity, schooling, etc.—a careful estimate is made of what the farm can supply in the way of house rent, fuel, ice, eggs, poultry, pork, fruit, milk, vegetables, butter, maple sugar, etc. The difference between what is needed and what the farm can supply indicates the amount of cash to be obtained for family use.

In a subsequent chapter—on farm profits—rather full consideration is given to the part that farm products play in meeting living expenses, and the reader is referred thereto for data amplifying this subject.

Tabulating Capital Requirements.—For greater ease in presenting and reviewing figures showing the capital requirements of a given business, a table can be made up exhibiting totals, segregated into investment items and operating items. The period over which the study is to extend should then be divided into convenient units. The unit for a going concern may well be a year. For a development proposition the first six or eight months may be placed in one period to cover the time spent in getting equipment and material together, in erecting buildings, and in making preparation for actual farm operations; the second period may cover the months of breaking land, building fences, putting in irrigation or drainage facilities; the third period the first year of crops; and the fourth and subsequent periods each equal in length to the farm year. For orchard plantings or similar types of farming involving relatively long lapses of time, the number of periods will be greater than under short term production.

Method of Tabulating Capital Requirements.—The tabular method is convenient in that it provides a place for inserting items of capital at the time when they must be acquired. Cows and hogs are not purchased

until sufficient feed is assured; fruit equipment is not needed until the trees begin to bear; stock quarters or stock fences need not be put up until the business is ready for them. But the study of capital requirements should provide for the acquisition or control of all factors necessary to the conduct of the business.

Possible receipts, tending to reduce capital needs, are to be determined, so far as may be, and deducted. If interest is to be charged upon any or all moneys invested, because of borrowings or a belief that investments should be earning returns, the proper calculations are to form a part of the study.

The totals will afford an interesting opportunity to observe the time of greatest investment, the actual cost when the business is established, the influence of interest charges, and the cost versus the market value of farm products. This, however, is secondary. One should understand that the purpose of the study here outlined is simply to find out how much capital one must command to insure probable success of the enterprise.

Precautions to be Observed in Determining Capital Requirements.—In working up data such as these, a few precautions should be observed.

1. Use best available data, seeing to it that estimates of investment, expenses, and receipts are all founded on the same schedule of prices.
2. Work out each detail carefully, checking and rechecking until satisfied that the figures represent the best available information.
3. Be conservative in presenting data.
4. Be careful to include all items, since needs vary with localities and individuals.
5. Use data applicable to the community and suited to the requirements of the operator.

The Safety Factor in Estimating Capital Requirements.—Since there are likely to be contingencies that can not be specifically provided against, it is well to add a certain percentage to the cost of establishing, and to operating funds. This percentage is a variable factor and will fluctuate with the tone of the market. The probability of lower prices will increase the percentage, while the possibility of a higher market will reduce it. Other factors influencing the amount to add are, extent of one's training, knowledge, strength, and experience, the undeveloped potential capacities of the property, availability of necessary labor, the size of the business, its degree of stability, the amount of help or hindrance to be expected from one's family, and similar items.

Amount of the Safety Factor.—In studies when conditions are favorable at least 5 per cent should be added. This implies a frugal, resourceful operator who knows his business and the conditions under which he is to carry on and is not afraid of hard work; whose farming is of a stable character and whose farm is a proven producer and of sufficient size;

whose market is reasonably sure; whose family can be counted upon to lend physical and moral support and to practice due economies.

But if conditions involve a relatively high degree of ignorance of farming or of the community; if conditions involve doubt whether the business is large enough to meet expected obligations; if they involve questions as to the working capacity of the operator or the living requirements of his family, or the producing power of the farm, or the receptivity of the market; in any or all of these cases as much as 20 per cent may have to be added to the expense estimates.

The percentage to be allotted—the safety factor to be allowed for—is thus not fixed, it is a thing to be estimated as justly as may be after a study of the individual and his working conditions. Farming by newcomers or beginners—in practice or on paper—is only too liable to be seen in an over-rosy light. Dry farming under semi-arid conditions is more hazardous than where rainfall is frequent and ample. To plant an orchard, and then wait until crops are ready for marketing, is more speculative than to produce annual field crops. Crop farming as a general rule calls for more detailed knowledge and closer attention than does stock farming. The small-sized business is a greater risk than the more extensive plant. A favorable attitude toward the country of city raised families is liable to be fraught with more uncertainty than the change of residence of farm reared folk from one country community to another.

Moreover, safety in calculating justifies the addition of some figure to cover the unexpected. If the unexpected results in greater profit, the result does not carry the dire possibilities that may be attached to an underestimate of farm needs or of income producing possibilities.

Example of Table Showing Method of Making Determinations of Capital Requirements.—This problem covers the purchase of 40 acres of good alfalfa land which has been in grain and is to be fitted for irrigating. The total acreage is to be planted to alfalfa with the exception of 2 acres reserved for farmstead and 1 acre for a family orchard. When the alfalfa is established 10 dairy cows and a bull and 10 brood sows and a boar are to be purchased. Four head of workstock will furnish the motive power, and a full set of equipment is to be provided. The land costs \$250 per acre, and is obtainable under terms of 25 per cent down, the balance payable in 10 equal installments with interest on deferred payments at 6 per cent. Control is to be taken over August 1.

Although an example based on alfalfa planted for dairying and hay production may have rather limited application, it will nevertheless show how to make up a table of capital requirements, with its segregation of details under proper headings and according to years of expenditure. The fewer enterprises represented in the farm business, and the more information available as to yields and prices, the easier is the working out of the capital needs.

The data for this particular example follows:

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TABLE 61.—METHOD OF DETERMINING CAPITAL REQUIREMENTS FOR A GIVEN BUSINESS

	Periods				
	Aug. 1, year of purchase to Nov. 1 of succeeding year.	Second year	Third year	Fourth year	Fifth year
<i>Investment Items</i>					
Land.....	\$ 2,500	\$ 750	\$ 750	\$ 750	\$ 750
Buildings:					
Dwelling (materials and labor).....	3,000				
Horse barn and implement shed (materials and labor).....	650				
Milkbarn (materials and labor).....			500		
Milkhouse (materials only).....			75		
Tankhouse (materials, piping, and labor).....	250				
Poultry house (materials only).....	100				
Farrowing pens (materials only).....			400		
Fencing.....	200		250		
Work stock (4 head).....	600				
Live stock other than work stock:					
Cows (10).....			1,000		
Bull (1).....			150		
Sows (10).....			500		
Boar (1).....			100		
Poultry (200).....	200				
Implements and machinery (can be itemized to advantage in individual problems).....	754				
Special equipment:					
Orchard:					
Trees.....	25				
Equipment.....	10			5	
Dairy:					
Hogs.....			142		
Shoes.....			240		
Ornaments.....	20				
Office equipment.....	30				
Total capital for investment items.....	\$ 8,414	\$ 750	\$ 4,107	\$ 755	\$ 750
<i>Operating Items</i>					
Labor					
Surveying.....	15				
Man and team to assist in preparing land.....	885				
Putting up hay.....	20	100			
Putting up hay and assisting with stock.....			650	650	650
Feed:					
Horses.....	150	50	50	50	50
Dairy.....			50	50	50
Swine.....			800	1,600	1,600
Poultry.....	50	300	300	300	300
Taxes and insurance.....	100	165	165	230	230
Seed:					
Alfalfa.....	242				
Vegetables.....	5	5	5	5	5
Irrigation water.....	80	80	80	80	80
Repairs, parts, and shop materials.....	100	50	75	75	75
Hog serum, stock medicine, stock salt, veterinary services, and similar incidentals.....			50	80	80
Contracts:					
Baling hay.....	576	800	450	450	450
Office.....	50	25	35	35	35
Total capital for operating expenses.....	\$ 1,273	\$ 1,575	\$ 2,710	\$ 3,605	\$ 3,605
<i>Personal Items</i>					
Household furnishings.....	400				
Living and personal expenses.....	1,200*	1,000	1,200	1,200	1,200
Total capital for personal items.....	\$ 1,600	\$ 1,000	\$ 1,200	\$ 1,200	\$ 1,200

* Fifteen months.

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TABLE 61.—METHOD OF DETERMINING CAPITAL REQUIREMENTS FOR A GIVEN BUSINESS (Cont'd)

	Periods				
	Aug. 1, year of purchase to Nov. 1 of succeed- ing year	Second year	Third year	Fourth year	Fifth year
<i>Overhead Items</i>					
Replacement:					
Orchard.....		5			
Horses**.....		75	75	75	75
Cattle**.....				100	100
Swine**.....				50	50
Poultry**.....					50
Buildings**.....				25	25
Implement and machinery**.....				50	50
Special equipment**.....				25	25
Interest on money borrowed for operating expenses					
Interest on deferred land payments.....	450			315	270
Total capital for overhead items.....	\$ 450	\$ 485	\$ 510	\$ 640	\$ 595
Total capital needs for all items.....	11,737	3,810	8,527	6,200	6,150
Probable sales:					
Poultry.....	416	882	882	882	882
Dairy.....			700	1,570	1,570
Hogs.....			900	3,870	3,870
Alfalfa.....	1,440	3,600	2,016	2,016	2,016
Outside work.....					
Total receipts.....	\$ 1,856	\$4,482	\$ 4,498	\$ 8,338	\$ 8,338
<i>Recapitulation</i>					
Total gross capital needs.....	11,737	3,810	8,527	6,200	6,150
Reduced by receipts.....	1,856	4,482	4,498	8,338	8,338
Necessary resources outside of business.....	\$ 9,881	\$ 672*	\$ 4,029	\$ 2,138*	\$ 2,188*
Add for safety factor 5 per cent of total gross needs	585	190	425	310	310
Total needs by years.....	\$10,466	gain of \$ 482	\$ 4,454	gain of \$ 1,828	gain of \$ 1,878
Cumulative needs for all years.....	\$10,466	\$9,984	\$14,438	\$12,610	\$10,732
Maximum need.....			\$14,428		

** Prorated over entire period.

Capital Requirements Vary with the Business.—The influence of type and extent of business, of the individual, of the locality, can be seen in the two following examples. The first is a summary of capital requirements resulting from a study covering a proposed purchase of 60 acres at \$100, under terms of one-fifth down and the balance in 5 years with interest at 6 per cent, land to be ditched, checked, and irrigated under gravity system—a purchase in one of the federal reclamation projects. The purchaser was a man who had 35 years' farming experience under similar conditions to those surrounding the purchase and who of late years had been superintendent of large holdings. He proposed to put 30 acres in almonds, 20 acres in alfalfa, 10 acres in tomatoes, beans to be intercropped in the orchard, and his assets consisted of \$2,500 cash and ability to raise \$800 more at the end of the year. The man himself was a bachelor, somewhat failing in health, so the physical factor was in doubt.

Tabulation of various details indicated that total capital requirements amounted to \$4,353 for the first two years, with total assets of \$3,300. It is obvious that the undertaking, as conceived, was not to be considered with the present available needs. The summary showed:

	First year	Second year	Third year	Fourth year
Capital needs.....	\$5,285	\$4,108	\$3,050	\$2,918
Possible receipts.....	2,700	3,040	3,540	3,350
Net needs.....	2,585	1,068	gain of 490	gain of 432
Add 20 per cent for emergencies.	500	200	125	100
Actual needs.....	3,083	1,268	gain of 365	gain of 332
Accumulative needs by years...	3,083	4,351	3,986	3,654

The second, and a more elaborate, example is represented in the totals showing the financial requirements by years for a period of 10 years covering a 108 acre business to be purchased for purposes of raising alfalfa hay on 40 acres, running 20 brood sows, handling 20 acres in fruit (one-half prunes and one-half pears), 10 acres in sugar beets, 10 acres in non-saccharine sorghums or Indian corn to be grown for grain. In this case use of all moneys required for the business was borrowed with interest at 6 per cent, the land itself cost \$250 per acre of which 10 per cent had to be paid down at time of purchase and the balance met in nine equal installments—interest being covered in the total interest charge. Increase in investment by years after proper allowance is made for receipts, amounted to:

END OF	NET CAPITAL NEEDS INCLUDING INTEREST ON INVESTMENT
First year.....	\$24,970
Second year.....	32,068
Third year.....	39,547
Fourth year.....	47,281
Fifth year.....	55,307
Sixth year.....	61,019
Seventh year.....	65,994
Eighth year.....	69,158
Ninth year.....	70,500
Tenth year.....	71,750

Amount and Division of Farm Expenses as Indicating Capital Requirements

Analysis of expenses indicates in a general way something of the operating needs in farming and how these expenses are prorated.

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Amount and Distribution of Farm Expenses, Pennsylvania.—A study made in Pennsylvania summarized thus:⁷

TABLE 62.—AMOUNT AND DIVISION OF FARM EXPENSES—PENNSYLVANIA (SELECTED GROUPS)

	Acres				Total, owner, farms	Total for tenant farms
	40 and less	61 to 80	101 to 120	over 160		
Number of farms	54	60	52	22	378	124
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Paid labor.....	13.0	24.4	24.6	36.1	26.8	23.5
Board, paid labor.....	4.2	6.1	5.8	3.5	5.6	5.6
Family labor.....	16.4	10.1	12.9	5.0	9.6	9.4
Machinery repairs.....	1.5	1.4	2.0	1.6	1.6	1.6
Building repairs.....	2.7	1.2	1.2	0.1	1.8	1.8
Fence repairs.....	1.4	0.9	1.4	0.7	1.0	1.3
Drain repairs.....				0.2	0.1	
Feed, silage, etc.....	1.1	1.1	1.1	1.7	0.9	0.9
Feed, grain, etc.....	24.7	18.1	19.7	21.3	18.7	22.0
Feed grinding.....	1.6	1.4	1.1	1.1	1.3	1.5
Ice and milk haul.....		0.6	1.0		0.3	
Horseshoeing.....	2.7	2.5	2.0	1.3	2.1	2.4
Breeding fees, vet.....	0.9	0.8	0.7	0.7	0.8	0.9
Seeds, plants, etc.....	3.9	4.3	3.4	3.6	4.3	3.9
Fertilizer.....	11.3	13.5	11.4	11.3	12.3	11.2
Spray material.....	0.1		0.1			
Twine.....	0.2	0.4	0.3	0.3	0.4	0.4
Threshing.....	1.4	1.6	1.2	1.3	1.4	1.4
Pressing.....	1.0	2.0	1.8	2.1	2.0	1.6
Machine hire.....	0.5	0.3	0.3		0.2	0.3
Fuel, oil, barrels, etc.....	0.5	0.6	0.7	0.6	0.7	0.6
Insurance.....	2.7	1.9	1.6	1.9	1.9	2.2
Taxes.....	8.0	6.8	5.8	5.6	6.7	7.3
Miscellaneous.....	0.2				0.1	0.2
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

(a) Less than one-tenth of 1 per cent.

The table shows in detail the nature and relative amount of expenditure for different purposes on owner and tenant farms of different sizes. The data for tenant farms are given in such manner as to include both tenants' and landlords' expenses, leaving out the rent paid by the tenant.

Expense of Hired Labor.—On owner and tenant farms the largest single item of expense is for hired labor, this item being slightly greater on owner than on tenant farms. The owner operator, having both labor and capital income, can afford to hire a greater proportion of his labor, although, on the average, owner farms are smaller than the tenant farms in this region.

Expense of Feedstuffs.—The next largest item is for concentrated feedstuffs, in this case the expenditure being somewhat greater on tenant farms than on the others. Tenant farms are somewhat more heavily stocked with dairy cows than are owner farms.

Expense of Fertilizers.—The third most important item is for fertilizers, in this case the larger expenditure being made by owner operators. The slight difference in this item on the two classes of farms may be due in part to the fact that a larger number of cattle are kept on tenant farms, and farther, to the less interest by most tenants in maintenance of soil quality.

Influence of Size of Farm on Costs.—The expenditure for hired labor increases materially with increase in size of farm. The smaller the farm, the larger the proportion of the work the farm family is able to do. The only other item of expense which shows a noticeable increase on the larger farms is that for baling hay and straw. This is because of the fact that the larger farms sell a somewhat larger proportion of their hay. On the other hand, many of the items are seen to decrease in relative amount as the size of the farm increases. It is quite natural that the item of family labor should thus decrease, for reasons already stated. Expenditures for repairs of buildings and fences, for horse shoeing, insurance, and taxes decrease relatively as the size of farm increases because of the relatively larger proportion of capital invested in the items concerned on the smaller farms. Purchased feed decreases on the larger farms because of their ability to produce a larger proportion of the required feedstuffs.

Amount and Division of Farm Expenses—Utah Lake Valley.—Three groups of Utah farms⁶⁰ operated by owners and two groups whose owners rent additional land, had their expenses distributed thus:

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TABLE 63.—DISTRIBUTION OF FARM EXPENSES ON 97 FARMS, UTAH LAKE VALLEY⁶⁰

Item of expense	On 75 farms operated by their owners							
	First group, 26 small farms		Second group, 29 fruit and beet farms		Third group, 20 live-stock farms		Average, 75 farms	
	Per farm and proportion of total							
		Per cent		Per cent		Per cent		Per cent
Paid labor and board . . .	\$130	20.2	\$ 244	20.4	\$ 397	25.2	\$ 245	22.3
Family labor	61	9.5	192	15.2	218	13.9	154	14.0
Improvements and new equipment	143	22.2	283	24.6	267	17.0	231	21.0
Repairs	23	3.6	51	4.3	59	3.7	43	3.9
Feed	74	11.5	79	6.6	221	14.1	116	10.5
Horseshoeing	10	1.5	14	1.2	19	1.2	14	1.2
Seed and fertilizers	14	2.2	19	1.6	8	0.5	15	1.3
Spray material	14	2.2	25	2.1	5	0.3	16	1.4
Machine work hired	20	3.1	30	2.5	43	2.7	30	2.7
Interest, taxes, etc.	70	10.9	144	12.0	175	11.1	127	11.4
Miscellaneous*	41	6.4	80	6.7	65	4.1	60	5.4
Stock purchased	43	6.7	34	2.8	97	6.2	54	4.9
Total	\$643	100.0	\$1,195	100.0	\$1,574	100.0	\$1,105	100.0

* Includes decrease inventory.

FARM MANAGEMENT

Amount and Distribution of Farm Expenses—Corn Belt.—A survey of representative areas in Indiana, Illinois, and Iowa resulted thus in findings as to distribution of expenses:¹¹

TABLE 64.—DISTRIBUTION OF FARM EXPENSES (IN PERCENTAGES OF TOTAL EXPENSES) ON FARMS OPERATED BY OWNERS AND TENANTS IN INDIANA, ILLINOIS AND IOWA

Item of expense	Operated by owners, 273 farms	Operated by tenants, 247 farms		Landlord
		Farm total	Tenant	
	Per cent	Per cent	Per cent	Per cent
Labor.....	33.0	31.0	34.6	0.4
Seeds.....	2.1	2.5	1.1	4.1
Fertilizer.....	0.3	0.4	....	0.9
Feed and grain.....	18.8	10.5	9.9	4.4
New machinery and harness.....	5.6	9.2	10.0	0.8
Machinery and harness repairs.....	1.3	1.6	1.8	0.1
New fences.....	1.7	1.4	....	4.0
Fence repairs.....	1.3	1.5	0.1	3.9
New buildings.....	10.9	8.4	....	22.8
Building repairs.....	0.6	0.8	0.2	1.6
Tile drains.....	3.8	6.7	....	18.4
Twine and thrashing.....	4.4	6.5	7.0	0.8
Insurance.....	1.0	1.3	0.7	2.0
Taxes.....	10.4	14.4	1.8	35.0
Rent.....	28.8
Miscellaneous.....	4.8	3.8	4.0	0.8

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Amount and Distribution of Farm Expenses—Georgia.—A study in Sumter County, Georgia,¹⁸ gave:

**TABLE 65.—DISTRIBUTION OF FARM EXPENSES—SUMTER COUNTY, GEORGIA
(SELECTED GROUPS)**

Item of expense	Percentage of farm expenses in each specified tilled acreage group		
	51 to 100 acres (41 farms)	151 to 250 acres (31 farms)	Over 450 acres (11 farms)
Wage hands.....	8.6	12.2	15.4
Cotton picking and chopping (extra labor).....	6.5	5.7	9.7
Share croppers.....	31.8	37.8	30.5
Family labor.....	4.7	1.9	
Total labor.....	51.6	57.6	55.6
Repairs			
Machinery.....	0.9	1.0	2.7
Buildings.....	3.6	2.0	2.2
Fences.....	0.9	0.6	(a)
Terracing.....	0.3	0.4	0.2
Feed			
Hay, etc.....	0.6	0.7	0.2
Grain, etc.....	2.1	1.7	1.1
Horseshoeing.....	0.4	0.2	0.1
Breeding fees and veterinary.....	0.2	0.2	0.1
Seeds and plants.....	1.1	1.1	0.8
Fertilizer			
Croppers.....	10.3	12.6	14.8
Wage hands.....	17.1	12.4	14.5
Thrashing and twine.....	0.2	0.4	0.2
Ginning, bags, ties, etc.....	5.1	4.6	3.9
Machine hire, fuel, and oil.....	0.1	0.1	0.6
Insurance.....	0.3	0.5	0.1
Taxes.....	3.1	2.5	1.6
Interest on loan.....	1.2	1.1	0.6
Miscellaneous.....	0.9	0.3	0.7

(a) Less than one tenth of one per cent.

The larger the size of business, the greater becomes the expense for different things, even though the proportion may be constant. In this study the average expense for labor outside that performed by the operator was found to be \$196 per farm in the smallest-size group against an average of \$5,412 in the largest-size group. In all the size-groups, except the first, the expense for labor was over 50 per cent of the total farm expenditures. This low labor cost, so noticeable in the smaller-size groups, is due to these farms being of such size that the operator did all or a part of the work of a laborer. After these farms become of such size (about 100 tilled acres) that the operator's time is mostly taken up in the general supervision of the business, the expense for labor is higher and quite uniform. The small farms furnish a greater proportion of family labor than the large farms, but this difference is offset by the fact that the larger farms hire more wage hands.

The machinery-repair charge is considerably higher on the larger farms, chiefly because these farms maintain more numerous and more expensive implements than do the smaller farms. The building-repair expense runs quite uniform in all the groups, but repairs of fences are relatively higher upon the smaller farms.

Capital Requirements of Farming

Although general averages are usually of little value in their application to individual cases, a knowledge of what has been found necessary in amount of funds is of special interest to the man who is considering farming as a business or who wishes to compare the needs of different types of farming or of different farming communities. Findings from various sources may well be included in a discussion of capital needs.

Capital Requirements of Farming—As Owner.—The amount of capital invested in farm enterprises, as determined in various sections of the United States, selected for study by the Survey method (for description of which see page 314), varies within rather wide limits. The findings offer some valuable material for comparison and study.

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TABLE 66.—SURVEY FINDINGS CONCERNING CAPITAL REQUIREMENTS—AS OWNERS

Key No.*	Locality and year	Type of farming	Size of farms	Total capital required
1	Southern New Hampshire, 1909	General, fruits, poultry and dairying	108 acres—31.9 under cultivation	\$ 5,350
2	Utah Lake Valley	Fruit and field crops	46.6 acres—30.9 under cultivation	9,000
3	Selected areas of Indiana, Illinois and Iowa	Corn, oats, wheat, hay and clover	175	30,606
4	Chester County, Pennsylvania, 1916	Hay, corn, wheat, some oats, and small fruits	90 acres—36.9 cultivated	10,486
6	Cut-over lands of Michigan, Wisconsin and Minnesota, 1916	Hay, oats, corn, potatoes, and dairying	108 acres—55.2 cultivated	6,856
7	Sumter County, Georgia, 1913			
	White	Mostly cotton	158 acres cultivated	13,773
	Colored	Mostly cotton	95 acres cultivated	5,984
8	Central Kentucky	Mostly live stock and tobacco	303 acres cultivated	37,741
9	Provo Area, Utah	Fruit, truck, live stock, and field crops	64 acres—4 cultivated	11,688
10	Monett, Mo.	Grain, live stock, fruit, dairying	81 acres	9,033
11	Lower Rio Grande Irrigated District of Texas,	Truck gardening, stock and general	73 acres—59 cultivated	14,000
12	Brooks County, Georgia, 1918	Cotton, hogs, corn, peanuts, oats	331 acres—145 cultivated	8,992
13	Anderson County, South Carolina, 1918	Cotton, corn, oats, and hay	136 acres—71.7 cultivated	8,940
14	Irrigated valleys of Southern Arizona, 1918	Alfalfa with some small fruits and poultry	95 acres	20,706
15	Ellis County, Texas, 1918	Practically confined to cotton	84 acres	16,153
16	Lenawee County, Michigan, 1918	General with some dairying	104 acres	11,756
17	Willamette Valley, Oregon, 1918	Oat, wheat, some leguminous crops and potatoes	202 acres—141 cultivated	22,700
18	Washington County, Ohio, 1918	Sheep and cattle with corn, wheat, and hay	156 acres—43 cultivated	6,378
19	Southwestern Kentucky, 1918	Tobacco, wheat, general, live stock	300 acres—225 cultivated	17,029
20	Northwestern Pennsylvania	Live stock and crop	101 acres	7,644
21	Central New York, 1908	General and dairying	103 acres—72 cultivated	5,578
23	Johnson County, Missouri, 1912	Stock, grain, some hogs	138 acres—115.7 cultivated	14,629
26	Gallatin Valley, Montana, 1913-14	Stock and grain	255 acres—182 cultivated	27,173
27	Eastern Nebraska, 1912-1914	Stock and grain	208 acres—158 cultivated	26,543
28	Southeastern Minnesota, 1912	Stock and grain	135 acres—105 cultivated	14,401
29	Seven counties of Utah, 1914	Forage, hay, grain, sugar beets, and stock	106 acres—54 cultivated	11,886
30	Monmouth County, New Jersey, 1914	Potatoes, corn, wheat, and hay	98 acres—73 cultivated	17,673

* The numbers in this column refer to the prefix numbers in the list of Farm Management Surveys page 326) where a description of the conditions surrounding the collection of data can be found.

Classification of Capital Requirements—as Owner.—Segregation of the total capital need as shown in the preceding table into requirements for land, buildings, work stock, operating capital, etc. gives an idea of the way to budget available appropriations for farm purposes:

TABLE 67.—CLASSIFICATION OF CAPITAL REQUIREMENTS—AS OWNER

Locality	Total investment	Land	House	Other buildings	Live stock	Machinery	Feed
Southern New Hampshire.....	\$ 5,350.00	(All real estate \$4,124)			\$ 772	\$311	\$ 128
Chester County, Pennsylvania.....	10,486.00	\$ 3,019	\$2,464	2,569	1,436	587	262
Sumter County, Georgia							
White.....	13,773.00	8,952	937	1,253	1,184	386	689
Colored.....	5,895.00	4,332	347	395	485	129	251
Lower Rio Grande.....	14,000.00	10,000	800	400	1,400	...	350
Irrigated District of Texas							
Brooks County, Georgia.....	8,992.00	4,970	1,154	364	1,064	333	809
Anderson County, South Carolina...	8,940.00	(All real estate \$7,748)			596	173	423
Irrigated valleys of Southern Arizona	20,706.00	14,452	1,470	393	3,147	663	497
Ellis County, Texas.....	16,153.00	13,342	937	420	727	258	468
Lenawee County, Michigan.....	11,756.00	6,983	1,317	1,340	1,258	400	388
Willamette Valley, Oregon.....	22,700.00	(All real estate \$20,702)			1,385	477	147
Washington County, Ohio.....	6,378.00	2,934	1,020	829	957	319	478
Central New York.....	5,576.00	(All real estate \$4,070)			892	319	223
Johnson County, Missouri.....	14,629.00	(All real estate \$2,074)			1,859	271	425
Gallatin Valley, Montana.....	27,173.00	(All real estate \$ 23,252)			2,521	817	583
Eastern Nebraska.....	26,543.00	21,727	1,053	1,036	1,793	398	536
Southeastern Minnesota.....	14,401.00	9,592	1,217	1,160	1,632	520	280
Seven Counties of Utah.....	11,886.00	7,482	1,056	412	2,107	449	380
Monmouth County, New Jersey.....	17,673.00	9,098	2,879	2,168	1,394	847	1,287

Classification of Capital Requirements—Ohio.—Amount and distribution of investment in 21 Ohio farms studied in 1909²³ averaged:

TABLE 68.—CLASSIFICATION OF CAPITAL REQUIREMENTS—OHIO²³

	Range	Average
Acres.....	49.6 to 388.9 acres	165.88 acres
Investment.....	\$4,472 to \$34,563	\$15,093
Investment	Range, Per cent	Average per cent
Land.....	32.9—67.5	50.8
Farm buildings.....	4.3—21.4	10.2
Household building.....	4.6—19.1	10.0
Fences.....	0.5— 6.3	3.5
Drainage.....	....—11.9	2.4
Water supply.....	0.3— 4.9	1.1
Live stock.....	5.0—21.5	12.5
Machinery, etc.....	3.2—14.1	5.1
Produce, supplies, etc.....	1.0— 7.4	4.2

Capital Requirements of Apple Orchards.—Average investments in apple orchards resulted in findings from studies as follows:⁶¹

TABLE 69.—CAPITAL REQUIREMENTS OF APPLE ORCHARDS

Region	Year of study	No. of orchards	Investment per acre of bearing orchard
Wenatchee Valley, Washington.....	1914	87	\$1,925
Western Colorado.....	1914-15	125	708
Hood River Valley, Oregon.....	1915	54	990
Yakima Valley, Washington.....	1915	120	1,531
Payette Valley, Idaho.....	1915	38	613

Capital Required by Irrigation Farmers.—Data compiled to show all capital required for 20- 40- and 60-acre irrigated farms on projects of the Reclamation Service,¹⁵ lead to certain useful conclusions based on averages. Capital requirements, as has been pointed out, vary with the individual. The figures following are for costs of improvement, equipment, feed, seed, trees, and new equipment, including work on buildings by the farmer assisted by a carpenter, but not including cost of household goods or living, since these vary with the tastes, desires, and frugality of the family. The projects vary, being intensive, semi-intensive, and diversified.

The figures are based on pre-war prices. They are for minimum requirements.

Costs for 20-acre Farm. Structures.—Buildings and other structures for a 20-acre irrigated farm such as house, barn, granary or fruit shed, other buildings, fences, well and ditch structures, range from \$900 to \$1,700, totals which may be reduced about \$300 for the warmer climates if the operator is disposed to be contented with the accompanying inconveniences.

Other Equipment.—Equipment, such as soil tools, seeding tools, harvesting tools, sprayers, harness, vehicles, small tools, range from \$280 to \$410. Stock—*i.e.*, horses, cattle, hogs, sheep, fowls, and bees—range from \$345 to \$565.

Operating Expense.—Allowance for feed ranges from \$380 to \$460; for seeds and trees, \$180.

Totals for 20-acre Farm.—These figures total from \$2,085 to \$3,315.

Costs for 40-acre Farm.—Totals for a 40-acre irrigated farm range as follows:

	RANGE
Buildings.....	\$1,100 to \$1,900
Equipment.....	335 to 1,085
Stock.....	570 to 793
Feed.....	390 to 520
Seed and trees.....	150
Grand total.....	\$2,545 to \$4,450

These figures may be reduced by \$350 for the warmer climates and if the operator is disposed to be contented with the accompanying inconveniences.

Costs for 60-acre Farm.—For a 60-acre irrigated farm the estimated capital needs for equipment are:

	RANGE
Buildings.....	\$1,250 to \$2,080
Equipment.....	605 to 1,315
Stock.....	795 to 1,120
Feed.....	580 to 800
Seed and trees.....	175
Grand total.....	\$3,405 to \$5,490

Here again the figures are susceptible of a reduction of about \$350.

Irrigation Costs.—To these figures must be added a payment for water rights, overhead and maintenance charge of irrigation facilities, land payment, living, and extra labor where needed.

Estimated Returns.—In the same body of data estimated farm returns and increased stock values for the first 3 years of operation on farms in Reclamation projects run as follows:

TABLE 70.—ESTIMATED RETURNS FROM RECLAMATION DISTRICT FARMS

	SMALL	FAIR	GOOD
20-acre farm			
First year.....	\$150	\$ 300	\$ 400
Second year.....	320	530	660
Third year.....	380	560	680
40-acre farm			
First year.....	270	430	530
Second year.....	560	730	900
Third year.....	730	900	1,100
60-acre farm			
First year.....	320	560	640
Second year.....	640	840	900
Third year.....	800	1,100	1,180

Capital for California Farms.—A study of capital required by the average California family farm brought out results as shown in the following tables, which in themselves are self-explanatory. Figures were based

on estimates made by experienced and qualified farmers for the size of business considered to be correct for the average farm family doing most of the work without employing outside help. Figures are for 1919. The tables are instructive, as indicating the extent of capital needs in different types of farming commonly engaged in.

Type of Business and Size of Farm.—According to type of business the area of farms was found to range in size and to average, thus:

TABLE 71.—SIZE OF FAMILY FARM—CALIFORNIA

BUSINESS	RANGE	AVERAGE
Grain.....	80-640 acres	320 acres
Fruit.....	10-40 acres	20 acres
Poultry.....	1,500-3,000 fowls	2,500 fowls
Dairying.....	10-30 cows	20 cows
Diversified farming.....	10-80 acres	40 acres

These five examples have been selected from the various types of agriculture as being of rather general interest.

Costs of Equipping.—With costs as of 1919 the total to equip and establish each of these five types represent capital outlay as follows. For grain, 320 acres at \$100 an acre, the total is \$40,172, of which \$32,000 goes for land and \$8,712 for equipment. The fruit land, 20 acres at \$250 requires \$10,178, of which \$5,000 is for land, and \$5,178 for equipment. Ten acres are enough for a family-sized poultry project, which at \$500 makes a land investment of \$5,000, to which is to be added \$8,797 to cover the necessary equipment—a total of \$13,797. Dairy farming means an average of 20 cows, for which 30 acres of land are considered necessary, costing \$7,500, with equipment costing \$7,400, bringing the total investment to \$14,900. The diversified farm is usually a 40-acre place, valued in its undeveloped state at \$200 an acre, which with the equipment, \$6,511, means a total of \$14,511. Acreages are in each instance, in the opinion of farmers conducting similar businesses, those needed to insure a satisfactory family living and to meet the ordinary operating requirements. A small balance to cover profit, to make improvements, or to discharge financial obligations, could be counted upon for ordinary conditions if the operator is a practical farmer.

Costs of Operating.—To the costs of obtaining land and equipment, must be added two additional items, if full capital requirements are to be covered. These are (1) operating sums necessary to bring the farm to its maximum stage of production, and (2) sums incident to the operation of the business after it is established.

These totals for the businesses here under consideration are:

TABLE 72.—CAPITAL REQUIREMENTS FOR OPERATING—FIVE SELECTED CALIFORNIA FARM BUSINESSES

KIND OF FARMING	TO ESTABLISH BUSINESS LESS POSSIBLE RETURNS	AFTER BUSINESS IS ESTABLISHED
Grain.....	\$3,800	\$2,800
Fruit.....	4,050	2,600
Poultry.....	1,825	8,750
Dairy.....	3,875	2,100
Diversified farming.....	3,900	2,650

Total Operating Costs.—From the above may be determined the total requirements, which are, for grain, \$6,600; for fruit, \$6,650; for poultry, \$10,575; for dairying \$5,975; for diversified farming \$6,550.

Total Costs.—Summarizing all needs results in these totals.

TABLE 73.—TOTAL CAPITAL REQUIREMENTS FOR FIVE SELECTED CALIFORNIA FARM BUSINESSES

Business	Acreage	Total capital needs	Made up of		
			Land	Equip- ment	Operating sums
Grain.....	320	\$47,312	\$32,000	\$3,712	\$ 6,600
Fruit.....	20	16,828	5,000	5,178	6,650
Poultry.....	10	24,372	5,000	8,797	10,575
Dairy.....	30	20,875	7,500	7,400	5,975
Diversified farming.....	40	21,061	8,000	6,511	6,550

Capital Requirements of Tenant Farming.—To show that ways are open of getting started with less capital than as owner, a table comparing the capital needs of tenants and owners is shown below. Averaging these sections indicates that less than 15 per cent as much capital is needed to rent as to own.

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TABLE 74.—CAPITAL REQUIREMENTS OF TENANTING COMPARED WITH OWNING

Key* No.	State from whence data were obtained	Farms operated by tenants			Farms operated by owners		
		Aver- age total acre- age	Aver- age tilled acre- age	Capital	Aver- age total acre- age	Aver- age tilled acre- age	Capital
3	Indiana, Illinois, Iowa . . .	172	...	\$2,431	178	.....	\$30,606
4	Pennsylvania.....	106	75	2,244	90	63.9	10,486
7	Georgia.....	...	85	890	...	158.0	13,773
9	Utah.....	89	79	1,117	64	45.0	11,688
14	Arizona.....	126	...	3,785	95	.....	20,706
16	Michigan.....	102	...	1,765	104	.....	11,756
21	New York.....	127	87	1,281	103	72.0	5,527
23	Missouri.....	134	112	1,547	136	114.0	12,555
26	Montana.....	275	203	3,239	255	182.0	27,677
27	Nebraska.....	200	158	3,335	214	149.0	27,078
28	Minnesota.....	151	116	1,680	135	105.0	14,636
30	New Jersey.....	165	78	3,699	106	66.0	14,582

* Refers to number affixed to list in chapter discussing farm management surveys.

Capital Under Tenanting Compared with Owing—California.—In the next table are exhibited the lesser requirements under share tenanting as compared with ownership for the selected California businesses discussed above under "Capital for California Farms." Note the substantial decrease in total capital requirements of lands rented on shares as contrasted with ownership needs.

TABLE 75.—CAPITAL REQUIREMENTS OF OWNER AND TENANT—FAMILY FARMS—CALIFORNIA

CROP	AS OWNER	AS TENANT
Grain.....	\$47,312	\$2,800
Fruit.....	16,828	2,600
Poultry.....	24,372	5,550
Dairy.....	20,875	2,100
Diversified farming.....	21,061	2,650

Effect of Type of Farm Business upon Capital.—Numerous examples can be found in every locality showing the effect of the type of business upon capital requirements. So variable are farming conditions that each proposition, to a very large extent, must be worked out separately.

The farm surveys illustrate these effects of different kinds of business upon capital.

Desirability of Testing Capital Requirements When a Choice of Business is Possible.—When a choice of enterprise is possible on a given farm, study should be made of the effect of each possible industry in its relation to capital needs.

For example, an 80-acre alfalfa farm which could be used (a) to produce hay, (b) for dairying, or (c) for hog raising, required nearly three times as much capital for dairying as for hay raising, and twice as much for dairying as for hogs. Leaving the land value out of account, since it is common to all three, the details, based on 1919 data, gave:

TABLE 76.—EFFECT OF TYPE OF BUSINESS UPON CAPITAL REQUIREMENTS—ALFALFA FOR HAY, HOGS, OR DAIRYING

80-acre alfalfa used for	Total equipment costs	Made up of			Work-stock and harness	Live stock
		Buildings	Fences	Implement and machinery		
Hay.....	\$ 5,519	\$2,670	\$ 505	\$1,183	\$1,161	none
Hogs.....	8,314	2,918	1,170	1,115	791	\$2,320
Dairying.....	13,770	3,729	600	2,067	474	6,900

California Data.—Collection of California data in 1919 illustrates the capital needs of different businesses:

TABLE 77.—EFFECT OF TYPE OF BUSINESS UPON CAPITAL REQUIREMENTS—CALIFORNIA

Kind of business	No. of records	Average size of farm, acres	Average capital requirements
Fruit.....	38	81	\$18,120
Field crops.....	23	140	16,418
Poultry.....	21	26	8,671
Live stock.....	6	474	29,407

Sources of Capital.⁶² *Banks.*—In providing capital for farm-mortgage loans, banks appear to furnish from their own funds approximately \$740,000,000, or more than one-fifth of the total amount invested in farm mortgages in the United States. So far as the bank funds in any

State invested in farm mortgages represent local capital, there is the advantage of first-hand contact with borrowers, of enabling the investor to see that the security is properly cared for during the term of the loan. The banks in certain sections, such as the New England and the Middle Atlantic States, which customarily lend in other States, lack this advantage, and must operate through other agencies in placing their loans.

Life Insurance Companies.—Life insurance companies supply approximately \$700,000,000 for farm-mortgage capital in the United States. Substantially one-half of this insurance money is invested in the four States of Iowa, Missouri, Kansas, and Nebraska. Iowa alone holds nearly 22 per cent of the total amount of insurance money invested in farm mortgages. In most of the Southern or Rocky Mountain States the insurance funds invested in farm mortgages do not represent more than one-half of 1 per cent of the total farm-mortgage capital.

The life insurance companies either have their own farm-mortgage departments, through which they receive and pass on applications for loans, or they purchase farm mortgages outright in the commercial market. The latter practice generally is limited to the smaller insurance companies, the volume of whose business in this field is not sufficient to warrant their establishing separate machinery for the selection of farm-mortgage securities.

On the other hand, the larger insurance companies, which invest considerable amounts in farm mortgages, have very well organized departments, through which they carry on a regular farm-mortgage loan business. They usually limit their loans to territory such as they can approve for this purpose, and hire salaried appraisers, whose inspection of a given property is required before the application is finally accepted. Ordinarily these companies receive applications through local agencies or correspondents, usually local banks. The application blanks and legal papers used by these insurance companies, including mortgages and notes, have been carefully standardized and adapted to the conditions in the various States where loans are made. While some of the companies show a tendency to make loans at relatively high rates, insurance companies more often represent a highly conservative class of investors in the farm-mortgage business. Their advent into any given State for investment purposes usually leads to a lowering of charges on farm mortgages. Local investors often are governed in their charges by the practices of competing insurance companies.

Percentage of Farm-mortgage Loans Held by Banks and Life Insurance Companies.—The following table shows the extent of banks and insurance companies as factors in financing farm loans for the individual states:

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TABLE 78.—PERCENTAGE OF FARM-MORTGAGE LOANS HELD BY BANKS AND LIFE INSURANCE COMPANIES

Geographic division and state	Farm mortgages held by life insurance companies	Farm mortgages held by banks
	Percentage of estimated total	Percentage of estimated total
New England:		
Maine.....	0.1	43.7
New Hampshire.....	.....	20.5
Vermont.....	0.1	27.3
Massachusetts.....	*	36.2
Rhode Island.....	.....	23.9
Connecticut.....	0.4	29.4
Middle Atlantic:		
New York.....	0.1	10.8
New Jersey.....	0.6	7.3
Pennsylvania.....	0.2	9.2
East North Central:		
Ohio.....	13.1	20.1
Indiana.....	36.9	39.3
Illinois.....	14.3	15.8
Michigan.....	1.4	37.8
Wisconsin.....	1.2	19.7
West North Central:		
Minnesota.....	24.5	30.0
Iowa.....	32.0	22.3
Missouri.....	26.8	15.6
North Dakota.....	19.4	5.0
South Dakota.....	33.6	6.7
Nebraska.....	40.4	6.3
Kansas.....	35.7	6.4
South Atlantic:		
Delaware.....	0.7	23.3
Maryland.....	1.5	18.5
Virginia.....	2.7	20.0
West Virginia.....	0.3	19.5
North Carolina.....	10.8	32.9
South Carolina.....	15.6	36.1
Georgia.....	52.1	26.9
Florida.....	1.5	57.9
East South Central:		
Kentucky.....	17.4	32.2
Tennessee.....	41.9	15.7
Alabama.....	6.8	14.3
Mississippi.....	9.5	36.6
West South Central:		
Arkansas.....	20.3	27.1
Louisiana.....	7.1	42.6
Oklahoma.....	39.7	2.9
Texas.....	20.5	6.0
Mountain:		
Montana.....	20.6	30.4
Idaho.....	13.7	10.2
Wyoming.....	6.8	16.8
Colorado.....	8.5	5.7
New Mexico.....	26.0	8.7
Arizona.....	9.0	38.5
Utah.....	12.6	88.0
Nevada.....	0.5	35.2
Pacific:		
Washington.....	7.1	11.5
Oregon.....	3.1	11.5
California.....	8.1	45.0

* Less than one-tenth of 1 per cent.

Mortgage Companies.—Mortgage companies figure prominently in the farm-mortgage business in all parts of the country, and include a number of foreign companies which have invested heavily in farm mortgages in the West South Central, Rocky Mountain, and Pacific States.

School and Land-grant Funds.—Approximately \$25,000,000 is loaned from school or land-grant funds directly to farmers in certain States, such as Indiana, Iowa, North Dakota, South Dakota, Oklahoma, Idaho, Utah, and Oregon. The interest charge on these loans is usually 5 or 6 per cent, though in Idaho the rate is 7 per cent. These loans are handled directly from the State departments in North and South Dakota, Oklahoma, Idaho, Utah, and Oregon; in Indiana and Iowa, however, the loans are handled through the counties, which are held responsible for all losses on account of insufficient security or through defalcations by county officers. In certain States, such as New York, Pennsylvania, Michigan, and Wisconsin, the amount of capital supplied by private investors is relatively large.

Factors Which Influence Terms on Farm-mortgage Loans.—The careful investor in farm mortgages considers all the known factors affecting the income of the farm offered as security. He studies (a) the relation of farm income to price of land, (b) the degree of regularity in income from year to year, (c) the tendencies in the direction of diversified agriculture, (d) the business habits of the farm owners and the kind of care given to the farm products.

Method of Farming.—Farm-mortgage investors, in determining their attitude toward loans in a given area, give greatest consideration to the prevailing method of farming.

Climatic Conditions.—Climatic conditions are important in their effect on the value of the farm security. The semi-arid regions of the Western States do not attract capital as freely as the farming sections further east, where rain is relatively abundant. Important sources of capital, including insurance companies and savings banks, often refuse to loan money on farm-mortgage security where the average rainfall is below a certain figure.

Soil and Topography.—The character of the soil and the general contour of the country are also important. Capital does not flow as freely to southern Illinois as to other parts of that State, partly because of differences in soil conditions. Similarly, the Red River Valley, in the northern part of Minnesota and North Dakota, attracts capital relatively more freely than north-central Minnesota, largely because of differences in natural conditions. Illustrations of the effect of soil, contour, and climate on the flow of farm-mortgage capital could also be given from other parts of the country.

Remoteness.—The distance from financial centers is an important factor. In studying the average interest rates for the different States, a

gradual rise in costs is noted as one moves outward from the leading financial centers.

Financial Agencies.—The character of the financial agencies through which farm-mortgage capital reaches the farmer is also of great importance. One needs to consider the part played by agencies that render local savings available for this purpose, as well as the kinds of facilities through which outside capital reaches the farmers of any given locality. Where local savings institutions have been well developed, as in Iowa or California, the effect on available local capital for farm-loan purposes is readily discerned. On the other hand, the result of a general lack of suitable local savings institutions, as shown especially in many regions of the South and West, is likewise apparent.

Banking.—Ninety-five per cent of the country's business is done by credit currency, such as checks, drafts, money orders, notes, and the like.

Advantages of Banking.—Banking carries with it many advantages:

1. The depositor's credit and influence are measured largely by the size and regularity of his bank account.
2. A tendency to economize by a desire to increase the bank balance.
3. The banker becomes bookkeeper and business counselor.
4. Security against fire and robbers.
5. Indorsed checks are both records and receipts of payment.
6. A benefit to the community by keeping the money in circulation.
7. Convenience in making change.
8. The bank will always loan to a good depositor in preference to one who is not a depositor.

Banks usually welcome small accounts, for the small account of today may be the large account of tomorrow, while there is always the possibility that a depositor, though small, may serve to attract another and larger depositor.

Using Banking Credit.—The young farmer, other things being fairly equal, will wisely choose for his bank that institution from which he is most likely to be able to borrow money.

The big city bank usually makes a business of loaning on stock exchange collateral and not on real estate, for land, though safe for permanent investment, is not at all liquid. Such an institution can not loan on ordinary commercial paper as it is issued today in this country.

Banks of this character consider only the highest grade railroad bonds, the receivables or other business paper of the big corporations and so-called trusts, and the loans of brokers on stock exchange collateral.

The bank the young business man will naturally select is an institution that will assume risks and will loan at 6 per cent to a local store-keeper even when it can obtain the same rate from a great railroad corporation; in fact, the best bank for the young business man often is the bank that is operated by men who are unfamiliar with bonds and other listed securities, and who have no facilities for buying the high-grade commercial paper of the great industrial trusts.

Crop and Stock Mortgages.—Use of crops and stock as collateral to secure loans from banks is a common method in obtaining money. Ownership in the collateral offered must be unquestionable and clear.

Example of a Crop and Stock Mortgage.—A common example of a crop and stock mortgage follows:

THIS MORTGAGE, made this First day of May, 19—^a by of the County of Kings, State of California, by occupation Ranchers hereinafter designated as Mortgagor, to BANK & TRUST COMPANY OF CENTRAL CALIFORNIA, a corporation of the County of Fresno, by Occupation Banking corporation hereinafter designated as Mortgagee.

WITNESSETH: That as security for the payment of a promissory note of which the following is a copy, to-wit:

\$5,000.00 Fresno, Cal. May 1, 1919 No.

On Demand after date, without grace, for value received, I promise to pay to the BANK AND TRUST COMPANY OF CENTRAL CALIFORNIA (a corporation), or order, at its Banking House in Fresno, California, the sum of Five thousand and No/100 Dollars with interest thereon at the rate of Seven per cent. per annum from date until paid. Interest to be paid Quarterly and if not so paid as it becomes due, to bear interest at the same rate as said principal sum, but if default be made in the payment of interest, then the principal sum of this note shall immediately become due at the option of the holder hereof. If suit is brought to collect his note, I agree to pay a reasonable attorney's fee together with all legal expenses incurred for collection. All payments which become due are to be made in United States Gold Co in

.....
 This note secured by a Crop Mtg. and a Chattel Mtg. of even date
 \$1.00 in U. S. I. R. Stamps placed on original note and duly canceled

and also the repayment of all advances by the Mortgagor or assigns to the Mortgagee not exceeding the sum of Ten thousand and No/100 Dollars, and also of all expenses, including attorney's fees incurred by the Mortgagee in enforcing or protecting this security, or protecting the property hereby mortgaged, with interest on such advances and expenses from dates when made and incurred, at the rate stipulated in said note, the Mortgagor mortgages to the Mortgagee all the crops of Alfalfa, 191 acres, Wheat, 187 acres, Barley, 282 acres, Oats, 70 acres, and other annual crops growing or to be grown thereon; growing and to be grown and produced during the year 1919, upon that real property situate in the County of Kings, State of California, described as follows, to-wit:

The so-called "Ranch" comprising Section 11, and portions of Section 2, 10 and 12, Township 18 South, Range 20 East Mt. Diablo Base and Meridian Kings County, State of California, embracing 1,088 acres more or less.

And it is agreed that the Mortgagor will care for and protect the mortgaged property until it is fit for harvest, and will then pick, cure and deliver it to the Mortgagee, or assigns who may sell the same at private sale without demand of performance or notice; that the Mortgagee at all times may enter upon the premises to view said mortgaged property and in case default be made by Mortgagor in the payment on said day, or in any of the conditions herein to be performed by the Mortgagor, and said default continued for 10 days after written demand of performance, then the Mortgagee or assigns, shall be entitled to and may take possession of the Mortgaged property, care for, pick, cure and pack the same, and without demand of performance or notice may, at either public or private sale, without notice, sell the mortgaged property, cured or uncured, in such market as the Mortgagee may select, and from the proceeds thereof may retain all expenses incurred and the debt hereby secured, and the costs and Attorney's fees incurred in enforcing this security.

WITNESS the hand and seal of the Mortgagor the day and year first above written.

Signed, Sealed and Delivered in the Presence of: _____ (Seal)
 _____ (Seal)
 _____ (Seal)
 _____ (Seal)

(Followed with spaces for notary attestments)

Use of Credit.—The first and most important rule to be observed in the use of farm credit, as pointed out by Carver,⁶³ is "to make sure that it is for a productive purpose, that is to say, make sure that the purpose for which the borrowed money is to be used will produce a return greater

than needed to pay the debt. Except in extreme cases, it is bad policy to borrow for the purpose of purchasing anything which will not help to pay for itself. As a rule, the purchase of these things should be postponed until the farmer has accumulated the wherewithal out of his own earnings."

Continuing, Carver suggests certain fundamental principles which should govern in the use of farm credit. Briefly these are:

(a) The length of time the debt is to run should have a close relation to the productive life of the improvement for which the money is borrowed. This will do away with the necessity of having the loan frequently renewed, and it will free the borrower from subjection to an unscrupulous lender who might refuse to renew a short-time loan and insist on foreclosure.

(b) Provision should be made in the long-time loan for the gradual reduction of the principal. There are two well-recognized ways of doing this. One is to provide in the note that, on any interest date, the borrower may, if he so desires, repay a part of the principal. As the principal is gradually reduced the annual interest charge is likewise reduced, and by paying the same sum annually, the debt is gradually wiped out. Another method is to provide in the note itself for a definite rate of amortization by fixed annual or semi-annual payments. Each of these fixed payments not only pays the interest but a small part of the principal besides, eventually wiping it out completely. Farmers are strongly advised, in all long-time loans, to insist on one or the other of these methods of repayment. It may be necessary to organize and work together in order to secure these and other favorable terms.

(c) As low interest rates as possible should be secured. Interest rates, like prices in general, depend upon the law of supply and demand. When there is more loanable capital in a community than is wanted by the borrowers of that community, the rate of interest is low and the borrowers can dictate terms. When there is less loanable capital than is wanted by borrowers, interest is high and lenders dictate terms. Obviously, therefore, it is to the interest of the borrowers to increase the number of lenders, or, at least to increase the amount of loanable capital in their community.

Amortization Method of Paying Loans.—When it can be effected, the amortization method of paying farm loans offers a simple and in general a satisfactory way of paying loans. Amortization in relation to farm loans means the payment of a long time loan in installments, usually annual or semi-annual, covering both interest and principal. For example, if \$1,000 is borrowed at 5 per cent interest, to be paid back in 20 annual installments on the amortization plan, a payment of \$80.24 at the end of each year for 20 years will cancel the debt.

Out of amortization payments an amount is taken sufficient to cover interest on unpaid principal, the balance being applied to the immediate reduction of the principal. Payments are made at the *end* of the year. Thus a new and smaller principal results each year and hence a smaller and smaller interest charge and a proportionately larger payment on the principal.⁶⁴

Prevailing Interest Rates.—A study conducted by the United States Department of Agriculture to determine costs and sources of farm-mortgage loans in the United States, the results of which were published July, 1916⁶⁵ shows:

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TABLE 79.—PREVAILING AVERAGE RATES IN THE UNITED STATES FOR INTEREST AND COMMISSION

Geographic division and state	Average interest rate	Average annual commission	Interest plus commission
New England:			
Maine.....	6.1	0.1	6.2
New Hampshire.....	5.3	(1)	5.3
Vermont.....	5.6	(1)	5.6
Massachusetts.....	5.6	(1)	5.6
Rhode Island.....	5.7	0.2	5.9
Connecticut.....	5.7	(1)	5.7
Middle Atlantic:			
New York.....	5.5	0.1	5.6
New Jersey.....	5.5	0.3	5.8
Pennsylvania.....	5.5	0.3	5.8
East North Central:			
Ohio.....	5.9	0.2	6.1
Indiana.....	5.8	0.4	6.2
Illinois.....	5.7	0.3	6.0
Michigan.....	6.3	0.3	6.6
Wisconsin.....	5.7	0.1	5.8
West North Central:			
Minnesota.....	6.3	0.5	6.8
Iowa.....	5.6	0.3	5.9
Missouri.....	6.2	0.6	6.8
North Dakota.....	6.9	1.8	8.7
South Dakota.....	7.0	1.0	8.0
Nebraska.....	6.3	0.8	7.1
Kansas.....	6.1	0.8	6.9
South Atlantic:			
Delaware.....	5.6	(1)	5.6
Maryland.....	5.7	0.4	6.1
Virginia.....	6.1	0.7	6.8
West Virginia.....	6.2	0.2	6.4
North Carolina.....	6.3	1.4	7.7
South Carolina.....	7.8	0.6	8.4
Georgia.....	7.6	1.1	8.7
Florida.....	9.0	0.6	9.6
East South Central:			
Kentucky.....	6.7	0.4	7.1
Tennessee.....	7.3	0.6	7.9
Alabama.....	8.7	0.7	9.4
Mississippi.....	8.0	0.5	8.5
West South Central:			
Arkansas.....	9.0	0.6	9.6
Louisiana.....	8.2	0.4	8.6
Oklahoma.....	6.6	1.8	8.4
Texas.....	8.4	0.6	9.0
Mountain:			
Montana.....	8.4	1.6	10.0
Idaho.....	8.2	0.7	8.9
Wyoming.....	9.2	0.8	10.0
Colorado.....	8.3	0.6	8.9
New Mexico.....	9.7	0.8	10.5
Arizona.....	9.1	0.3	9.4
Utah.....	8.6	0.4	9.0
Pacific:			
Washington.....	7.9	0.8	8.7
Oregon.....	7.7	0.3	8.0
California.....	7.4	0.2	7.6

¹ Less than one-tenth of 1 per cent.

Commissions.—The commission figures used in making up this table represent the average annual commission, or where a single advance commission is paid on a long-term loan, the equivalent annual commission. It will be seen that, in general, the average costs for interest and commission together are highest in the Southern and Rocky Mountain States, and that the lowest figures appear in the New England and Middle Atlantic States and the more highly developed agricultural sections of the corn belt. The average commissions are shown to be especially high in certain States, notably North Dakota, North Carolina, Oklahoma, and Montana.

Range in Interest Rates.—The range in interest rates for the various States is indicated in the next table.⁶²

TABLE 80.—RANGE IN INTEREST RATES IN DIFFERENT STATES (ROUND NUMBERS)

Geographic division and state	Percentage of total number of replies showing, for interest plus commission, a rate of							
	5 per cent	6 per cent	7 per cent	8 per cent	9 per cent	10 per cent	11 per cent	12 per cent or over
New England:								
Maine.....	4	77	13	6				
New Hampshire.....	75	25						
Vermont.....	26	74						
Massachusetts.....	35	65						
Rhode Island.....	33	50	17					
Connecticut.....	26	74						
Middle Atlantic:								
New York.....	38	58	4	1				
New Jersey.....	33	57	7	3				
Pennsylvania.....	32	57	9	1	..	..	1	1
East North Central:								
Ohio.....	8	75	15	2				
Indiana.....	3	78	15	4	1			
Illinois.....	23	53	21	3				
Michigan.....	4	50	35	8	2	1		
Wisconsin.....	34	51	13	2				
West North Central:								
Minnesota.....	5	46	27	14	1	5	..	1
Iowa.....	13	77	9					
Missouri.....	1	45	30	17	4	2		
North Dakota.....	..	2	17	28	20	27	3	3
South Dakota.....	2	20	25	18	9	14	5	7
Nebraska.....	5	42	20	14	9	10	1	
Kansas.....	1	44	37	11	3	4	1	
South Atlantic:								
Delaware.....	38	63						
Maryland.....	9	74	14	3				
Virginia.....	2	53	29	12	1	..	2	2
West Virginia.....	..	80	8	10	..	2		
North Carolina.....	..	40	22	16	6	7	3	6
South Carolina.....	..	..	6	64	21	5	2	2
Georgia.....	..	2	8	43	27	15	2	3
Florida.....	..	..	..	24	13	52	7	4
East South Central:								
Kentucky.....	1	45	17	24	5	8		
Tennessee.....	..	19	20	33	9	19	1	1
Alabama.....	..	1	2	33	16	32	6	11
Mississippi.....	..	8	8	46	14	21	1	3
West South Central:								
Arkansas.....	..	..	2	13	18	60	3	4
Louisiana.....	..	3	1	58	14	14	5	5
Oklahoma.....	..	3	14	44	15	22	1	1
Texas.....	..	2	7	34	18	30	6	4
Mountain:								
Montana.....	..	..	1	10	16	52	6	15
Idaho.....	..	..	4	36	34	19	6	1
Wyoming.....	..	..	2	18	12	49	10	10
Colorado.....	..	4	15	26	22	16	10	9
New Mexico.....	..	..	..	7	19	33	14	28
Arizona.....	..	..	..	36	9	45	..	9
Utah.....	..	..	..	33	27	40		
Pacific:								
Washington.....	..	1	10	40	31	11	3	5
Oregon.....	..	6	16	53	13	9	1	1
California.....	..	8	37	43	6	6		1

*Rates are approximated to the nearest unit; that is, rates from 5.50 per cent to 6.49 per cent are counted as 6 per cent, etc.

Legal Interest Rates and Statutes of Limitations.—The following table shows the rate of interest fixed by law, and the number of years that judgments, notes, and accounts may run before they expire and become no longer collectible under the law.⁶²

TABLE 81.—LEGAL INTEREST RATES AND STATUTES OF LIMITATIONS OF STATES

State	Legal rate, per cent	By contract, per cent	Statutes of limitations on notes (number of years)
Alabama.....	8	8	6
Arkansas.....	6	10	5
Arizona.....	6	Any	4
California.....	7	Any	4
Colorado.....	8	Any	6
Connecticut.....	6	6	
Delaware.....	6	6	6
District of Columbia.....	6	10	8
Florida.....	8	10	5
Georgia.....	7	8	6
Idaho.....	7	12	5
Illinois.....	5	7	10
Indian Territory.....	6	10	
Indiana.....	6	8	10
Iowa.....	6	8	10
Kansas.....	6	10	5
Kentucky.....	6	6	15
Louisiana.....	5	8	5
Maine.....	6	Any	6
Maryland.....	6	6	3
Massachusetts.....	6	Any	6
Michigan.....	5	7	6
Minnesota.....	7	10	6
Mississippi.....	6	10	6
Missouri.....	6	8	10
Montana.....	8	Any	8
Nebraska.....	7	10	5
Nevada.....	7	Any	6
New Hampshire.....	6	6	6
New Jersey.....	6	6	6
New Mexico.....	6	12	6
New York.....	6	6	6
North Carolina.....	6	6	3
North Dakota.....	7	12	6
Ohio.....	6	8	15
Oklahoma.....	7	12	5
Oregon.....	6	10	6
Pennsylvania.....	6	6	6
Rhode Island.....	6	Any	6
South Carolina.....	7	8	6
South Dakota.....	7	12	6
Tennessee.....	6	6	6
Texas.....	6	10	4
Utah.....	8	Any	6
Vermont.....	6	6	6
Virginia.....	6	6	5
Washington.....	6	12	6
West Virginia.....	6	6	10
Wisconsin.....	6	10	6
Wyoming.....	8	12	5

Days of Grace.—Days of grace on notes and drafts are given in the following states and territories; Alabama, Arkansas, South Dakota, Georgia, Indian Territory, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New Mexico, North Carolina, Oklahoma, South Carolina, Texas and Wyoming.

CHAPTER XII

FARM PROFITS

Farm profits is perhaps the most important subject in farm management, since profits are the goal of most farmers. Given a decent farm income, the value of the farm home and farm environment will prove itself.

What the Business Should Pay.—From the farm-management viewpoint a profit accrues only after the farm business has met the different demands that any business should be called upon to meet before declaring a profit. Briefly these items consist of:

(a) Repayment of all operating expenses, including the value of work done by the operator and his family, incurred in the growing of crops and stock and their marketing,—whether these expenses be actual cash paid out for seed, feed, labor, rent, etc., or be represented by the value of homegrown products such as hay, grain, seed, etc., used in the production for sale of secondary products, or the product paid the owner in share renting.

(b) Interest on the average investment, at the prevailing rates paid for the use of money.

(c) Interest on moneys advanced for operating expenses.

(d) A sum for management.

(e) A sinking fund.

(f) Depreciation of equipment or of plant.

Any sum remaining over and above these items constitutes profit.

Other Ideas of Profit.—This view differs considerably from the view often taken, which calls profit anything above operating expense, or which considers interest on the investment as profit, or which accepts as satisfactory profit, any sums above bare operating and depreciation allowances.

The Business Should Be Credited with All Production.—Since, however, the business is expected to meet all demands made upon it, the converse must hold—to credit the farm with all it produces not only for cash sale or for exchange, but for use upon the family table or for the family comfort. Only by fully following this plan is a real knowledge possible of what the farm is doing.

Productive, Speculation, and Home Values.—In determining the interest charge, investment should be taken at its productive value; neither speculative nor home value should be included. By productive

value is meant that sum invested in the business capable of paying the going rate of interest. For instance, if a given business pays a profit of \$2,000 and the prevailing rate of interest is 5 per cent, the business is actually worth \$40,000 for productive purposes. If the section is a desirable one in which to live, the actual market value may carry an additional sum to cover this, say \$20,000. This figure represents home, environment, site, or living value, as it is variously called. If the outlook is for increased property values, a third addition may be forthcoming to meet a part of this potential or speculative value—the possible increase. If this sum be set at \$5,000 for this example, the total market value of \$65,000 reflects all three items—productive, home, and speculative. Yet from a financial stand-point the business should be asked to bear the going rate of interest only upon the productive value. If no home or speculative values attach, the determination of productive value is easy; but if the three are involved, care must be exercised in determining how much of any total investment represents sound immediate business worth.

Reference to Determination of Land Values.—A further discussion of how to determine land values will be found in the chapter taking up inventory making (pages 348 to 356) and in the chapter having to do with costs of production studies (pages 409 to 411).

Deductions for Home and Speculative Values.—In many sections in respect of home value, a reduction must be made of as much as 50 per cent from the market price, and in respect of speculative value a reduction of as much as 25 per cent. Both speculative and home values should be ignored in determining the sum for which interest is demanded.

Interest upon Operating Capital.—The charge for interest upon operating capital should include only moneys actually used in meeting the current expenses of the business.

Charge for Management.—Since neither capital nor labor can produce profits without guidance and direction, a charge for management is a just one. A workable, and usually satisfactory, determination of what to charge can be obtained by using the prevailing salaries paid for similar duties, where the supervision is hired done, and where the superintendent or manager does no manual work. The business should then bear its prorates based on its size as compared with the usual size handled by paid men. For example, if the going wage is \$250 cash and \$50 perquisites per month for superintending on diversified farms averaging 640 acres, then the annual acreage charge amounts to approximately \$5.50. An 80-acre place may justly be called upon to meet its proper prorata, or in this case, \$440 for management.

The Sinking Fund.—The sinking fund is a sum set aside during prosperous years to tide the business over dull times of crop failure, accident, disease, market slumps, etc., and is obtained by dividing the actual sum required during the off year by the number of prosperous

years which can contribute. For example, if in a given deciduous fruit district a partial crop failure occurs about once in 5 years and the average farm needs \$2,000 to carry it over the lull, the \$2,000 represents the necessary sinking fund and is made up by charging the business with \$500 per year for each of the four prosperous years.

Depreciation Charge.—Depreciation covers the wear and tear of implements and machinery, the decay of buildings and fences, the ageing of work horses and other live stock; in other words, it covers the determination of all things contributory to maintain the original values of the business which are subject to shrinking and the neglect of which would eventually mean the running down of the business to a point where new investment of capital must be made. Rates of depreciation and method of determining are covered later on in the chapter on Farm Bookkeeping (pages 356 to 362).

Examples of Estimating What a Farm Business Should Pay.—Two examples, based on data perhaps applicable to but a single region, show the method of procedure in determining what the business should pay:

TABLE 82.—EXAMPLE OF WHAT A FARM SHOULD PAY WHEN SPECIALIZING IN BARLEY PRODUCTION (FARMED BY OWNER)

<i>Investment</i>	
160 acres land at \$60.....	\$9,600
Buildings.....	2,000
Fences and other improvements.....	400
16 head work-stock at \$150.....	2,400
Implements and machinery.....	600
Working capital.....	1,000
	\$16,000
 <i>Annual Operating and Overhead Charges to be Met by Receipts</i>	
Actual labor, horse and man, on crop at \$4.25.....	\$ 680
Outlay for materials (seed, etc.).....	700
Interest on investment at 6 per cent.....	960
Depreciation (12 per cent on stock, 10 per cent on implements and machinery, 5 per cent on buildings).....	448
Taxes and Insurance.....	100
Sinking fund (\$1,200 wanted, covered by three crops in 4 years).....	400
Management or executive ability (going wage is \$960 for 640 acres or \$1.50 per acre).....	240
	\$ 3,528
Sum which should be obtained.....	

TABLE 83.—EXAMPLE OF WHAT A FARM SHOULD PAY WHEN SPECIALIZING IN APPLE PRODUCTION (MATURE ORCHARD, FARMED BY OWNER)

<i>Investment</i>	
20 acres orchard at \$1,000.....	\$20,000
Buildings.....	2,400
Tractor.....	480
Small automobile.....	500
Implements and machinery.....	200
Working capital.....	600
	\$24,180
<i>Annual Operating and Overhead Charges to be Met by Receipts</i>	
Actual labor.....	\$ 1,920
Outlay for materials (spray, etc.).....	50
Interest on investment at 6 per cent.....	1,350
Depreciation (tractor \$100, automobile \$150, implements and machinery \$20, buildings \$120).....	390
Taxes and Insurance.....	160
Sinking fund (\$600 to be prorated over four good years to cover a possible bad year once in five).....	150
Management or executive ability (going wage is \$1,200 for 100 acres or \$12 per acre).....	240
	\$ 4,260

Reasons for Demanding Full Returns of the Farm Business.—It is manifest that the total of the returns demanded is great enough materially to affect the size of the business. Unless a farmer receives pay for his own labor and the labor of that portion of his family which works on the farm, proper returns for the use of his capital, and a bonus for his responsibilities and risks, he is not justified in continuing in the business. There is no justice or reason in asking farmers to produce at less than cost merely that consumers may be supplied with cheap food. Farmers in general, as they realize that this is happening, always curtail production until supply and demand have so interacted that returns are again sufficient properly to cover all reasonable cost and profit items. As agriculture is organized, some farmers are likely always to continue to produce at a loss, because contributing circumstances and ignorance will never be entirely wiped out. But as prices come nearer to meeting costs, then there tends to be a reduction in luxury production, a reduction in city populations, a quicker settling of farm labor problems, and a better use of now unproductive lands.

Labor Income as a Measure of Profits.—In order to compare the profits of groups of farmers use is made of "labor income." As explained in an earlier chapter labor income is the amount of money left over to reimburse the operator for his labors—manual and supervisory, after deducting from the gross receipts all operating expenses, including deprecia-

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tion, the value of any unpaid labor of other members of the family, and interest at the going rate upon the farm investment. The value of labor income as a measure of profits, in determining the profits of an individual farm or operator, is restricted; as said above, it is mainly useful when one wishes to make a comparison with group findings. Then, too, the farm management surveys report their conclusions in terms of labor income, findings of which are to follow.

TABLE 84.—TABLE OF INCOME DERIVED FROM FARMING AS SHOWN BY FARM SURVEY DATA

Key No.*	Locality and year	Type of farming	Size of farm, acres	(a) Farm income	(b) Labor income
1	New Hampshire, 1909	General, with fruits, poultry, and dairying	108**	\$ 654	\$337
2	Utah Lake Valley	Fruit and field crops	31.9 (Cult.) 46.8 30.9 (Cult.)	867	417
3	Representative areas of Indiana, Illinois, and Iowa, 1911	Corn, oats, hay, wheat, and clover	175	1,488	627
4	Chester County, Pennsylvania, 1916	Hay, corn, wheat and some oats, and small fruits	90 63.9 (Cult.)	.....	789
6	Cut-over lands of Michigan, Wisconsin, and Minnesota, 1916	Hay, oats, corn, potatoes, and dairying	108 55.2 (Cult.)	391	49
7	Sumter County, Georgia				
	White	Mostly cotton	158 Cult.	1,542	853
	Colored	Mostly cotton	95 Cult.	682	383
8	Central Kentucky	Mostly live stock, and tobacco	300	2,419	686
9	Provo Area, Utah	Fruit, truck, live stock, and field crops	64 45 (Cult.)	1,312	728
10	Monett, Mo.	Grain, live stock, fruit, dairying	81	.....	370
11	Lower Rio Grande irrigated district of Texas, 1918	Truck gardening, stock raising and general	78 (Cult.)	1,471	
12	Brooks County, Georgia, 1918	Cotton, hog-raising, corn, peanuts and oats	331 (Cult.)	952	232
13	Anderson County, South Carolina, 1918	Cotton, corn, oats, and hay	145 (Cult.) 135.8 (Cult.)	557	-158
14	Irrigated valley of southern Arizona, 1918	Alfalfa with some small fruits and chicken raising	95	2,370	713
15	Ellis County, Texas, 1918	Practically confined to cotton	84	1,294	
16	Lenawee County, Michigan, 1918	General with limited dairying	104	1,068	481
17	Willamette Valley, Oregon, 1918	Oats, wheat, some leguminous crops, and potatoes	202 (Cult.)	1,322	
18	Washington County, Ohio, 1918	Sheep and cattle raising, also corn, wheat, and hay	141 (Cult.) 156 (Cult.)	506	187
19	Southwestern Kentucky, 1918	Tobacco, wheat, and general livestock	300 (Cult.) 225 (Cult.)	1,208	356
20	Northwestern Pennsylvania	Live stock and crop	101	659	285
21	Central New York, 1908	General and dairying	103 72 (Cult.)	757	423
23	Johnson County, Missouri, 1912	Stock and grain, some hogs	137.8 (Cult.) 115.7 (Cult.)	1,218	487
26	Gallatin Valley, Montana, 1913-14	Stock and grain	225 (Cult.)	2,185	555
27	Eastern Nebraska, 1912-14	Stock and grain	182 (Cult.) 207.5 (Cult.)	1,717	385
28	Southeastern Minnesota, 1912	Stock and grain	158 (Cult.) 135 (Cult.) 105 (Cult.)	1,209	319
29	Seven counties in Utah, 1914	Forage, hay, grain, sugar beets, stock	105.7 (Cult.) 54.1 (Cult.)	1,135	541
30	Monmouth County, New Jersey, 1914	Potatoes, corn, hay, and wheat	98.3 (Cult.) 73 (Cult.)	1,801	917

* The numbers in this column refer to the prefixed numbers in the list of Farm Management Surveys (p. 328) where a description of the conditions surrounding the collection of data can be found.

** Cultivated area.

(a) Farm income is income after deducting expenses from receipts.

(b) Labor income is the amount of money that the farmer has left after paying all business expenses of the farm, and deducting both the going rate of interest on the money invested in the farm business and the value of unpaid family labor other than operator's.

Findings Concerning Farm Profits from Farm Management Surveys.
While average incomes as reported from the surveys are only of general

interest in comparison with the individual's own problem, they at least are a means of indicating something of what may be expected from the farming business. To one who has never had an opportunity to study closely the possibilities of income from farming, the rather low rate of returns will be informing. It should be remembered, however, that these are *average* returns for groups of farms. Some of the operators received greater returns than is shown here. On the other hand some of the returns were not so great. The amount of returns is influenced by such various factors as size of farm, amount of capital, kind of business, accessibility of market, experience, training, and capacity of operator, quality of soil, labor supply.

If one will study these figures with a realization that they are indicative of without necessarily limiting the entire field, they will be found valuable for purposes of comparison and to show something of the situation in various sections of the United States at the time when the surveys were made.

Figures have been averaged to include both tenants and owners unless otherwise stated.

Incomes as Tenant or Owner.—Several farm management surveys present their data in a way to permit a comparison of labor incomes obtained by groups of owners and of tenants.

The key number refers to the survey, brief description of which is to be found in the chapter on "Farm Management Surveys."

TABLE 85.—LABOR INCOMES, TENANT AND OWNER

Key No.	State whence data were obtained	Farms operated by tenants			Farms operated by owners		
		Average total acreage	Average tilled acreage	Labor income	Average total acreage	Average tilled acreage	Labor income
3	Indiana, Illinois, and Iowa.....	172	.....	\$ 870	178	.....	\$408
4	Pennsylvania.....	106	75.0	739	90	63.9	548
7	Georgia.....	...	85.0	547	...	158.0	853
9	Utah.....	89	79.0	1,012	65	45.0	728
14	Arizona.....	126	.....	1,377	95	.....	713
16	Michigan.....	102	.....	651	104	.....	481
21	New York.....	127	87.0	379	103	72.0	423
23	Missouri.....	134	112.6	501	136	114.0	314
26	Montana.....	275	203.0	605	255	182.0	474
27	Nebraska.....	200	158.0	921	214	149.0	203
28	Minnesota.....	151	116.0	474	135	105.0	255
30	New Jersey.....	165	78.0	768	106	66.0	491

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Averaging the twelve surveys represented in the table, the labor income amount to:

For owners	\$491
For tenant	737

In noting this comparison it should be borne in mind that these figures are for *labor income* and not for total farm income. Each group has the use of interest on its investment (usually at 5 per cent) and the value of unpaid family labor. Interest in the case of owners amounts to a figure considerably in excess of the tenant interest sums, as can be seen by referring to the table of relative capital invested by tenants when compared with owner's invested capital. (Page 245.)

Sums Available, per Acre, above Operating Expenses, 34 California Crops, 1915 and 1919 Data.—The sum above operating costs, which under

TABLE 86.—SUM AVAILABLE ABOVE OPERATING EXPENSE—CALIFORNIA CROPS

Crop	Usual yields			Good yields		
	Yield	1915	1919	Yield	1915	1919
Alfalfa.....	5 tons	\$ 11	\$ 37	8 tons	\$ 15	\$ 54
Almond.....	700 lb.	46	96	1,200 lb.	84	172
Apple.....	150 packed bx.	15	143	400 packed bx.	90	375
Apricot.....	4 tons	36	52	8 tons	256	471
Asparagus.....	4,000 lb.	85	64	5,000 lb.	115	93
Barley.....	1,200 lb.	4	17	2,000 lb.	10	33
Beans.....	1,000 lb.	25	24	1,500 lb.	41	44
Cabbage.....	10 tons	47	80	15 tons	104	171
Cherry.....	2 tons	102	148	4 tons	230	336
Corn, Indian.....	1,000 lb.	(a)	(a)	2,000 lb.	12	11
Cotton, medium.....	400 lb.	118	145	750 lb.	240	294
Fig.....	2 tons	112	435	2½ tons	145	549
Grape (raisin).....	1 ton dry	24	125	1½ ton dry	46	210
Grape (table).....	4 tons	19	91	7 tons	50	187
Hay (grain).....	1 ton	4	....	2 tons	12	7
Hops.....	1,400 lb.	136	696	2,000 lb.	212	1,015
Lemon.....	150 packed bx.	111	(a)	300 packed bx.	359	132
Oats.....	900 lb.	5	9	1,500 lb.	13	28
Olive.....	1½ ton	49	76	2 tons	69	106
Onion.....	7½ tons	14	98	15 tons	244	620
Orange.....	125 packed bx.	41	190	250 packed bx.	114	363
Peach.....	6 tons	50	82	8 tons	266	384
Pear.....	5 tons	69	199	10 tons	232	569
Pea, dry.....	800 lb.	63	99	1,200 lb.	83	124
Plum.....	3½ tons	(a)	(a)	6 tons	4	48
Potato.....	3 tons	(a)	52	7½ tons	34	173
Prune.....	2 tons	79	143	3 tons	341	548
Rice.....	2,500 lb.	5	20	3,500 lb.	65	111
Sorghum (grain).....	1,200 lb.	(a)	13	2,500 lb.	14	46
Sugar beet.....	10 tons	29	59	15 tons	74	137
Sweet potato.....	3 tons	27	62	5 tons	89	179
Tomato.....	10 tons	49	111	20 tons	63	150
Walnut.....	1,000 lb.	41	75	1,500 lb.	215	342
Wheat.....	1,000 lb.	4	6	700 lb.	13	18

(a) Receipts less than expenses.

ordinary producing conditions would be available to meet interest, depreciation, profit, risk, and other charges aside from necessary outlay for growing the crop, was found to be for 34 California crops, as shown here. The figures are for both usual (ordinary) and good (occasional but not exceptional) yields, under conditions of the years 1915 and 1919, the former fairly representing pre-war, the latter of post-war periods.

Cost data covering these same crops are given in the chapter on "Cost of Production."

The gross returns of the 34 crops listed above averaged \$107 per acre in 1915 and \$230 per acre in 1919. The costs of production averaged \$66 in 1915 and \$110 in 1919. The sum, therefore, available above operating expense, climbed from \$41 in 1915 to \$120 in 1919. In other words the profits, when measured as sums above operating expense, about tripled, while expense of production did not quite double. In percentages, based on usual prices, the increase in 1919 over 1915 ranged from minus 10 per cent to 328 per cent, with a general average increase in returns to farmers of 115 per cent.

What the Table Shows.—A study of the table shows (a) the influence of the high prices of 1919, (b) the influence upon income of good producing land compared with the income possibilities of average land, (c) the variation of different crops in their income producing possibilities, (d) the amount of acreage to provide a given farm,—or net income from selected crops, (e) the necessity of knowing what a given piece of land is capable of doing in advance of purchasing.

Examples of Large Returns from Farming.—The average labor income as indicated in the findings of farm surveys may be so discouraging to some that a further analysis is desirable. In each group there are operators who are making far greater incomes than the average shown. Examples of these are given:

(Numbers refer to farm management surveys—see pages 326 to 334.)

No. 4.—(a) An intensive dairy farm of 80 acres in Chester County, Pennsylvania, under very efficient management gave a labor income of more than \$2,000.

(b) A labor income of \$3,000 was obtained from a 120-acre farm in the same county. This was also a dairy farm but quite diversified in character, having several kinds of important crops.

(c) The largest labor income in this group was \$3,700 on a farm of about 175 acres.

No. 5.—Seven of the more successful grain and stock farms of the muck land of northern Indiana and southern Michigan made labor incomes averaging \$1,994.

No. 7.—(a) One diversified farm of 268 crop acres in Sumter County in central Georgia operated with the help of three wage hands and one cropper family—\$600 extra labor—returned a labor income of \$4,468.

(b) A typical cotton farm of 243 crop acres in the bluegrass region of Kentucky, as represented by Mason, Scott, and Madison Counties, operated with the help of six wage hands and two cropper families and \$800 extra labor, gave a labor income of \$4,344.

No. 10.—An exceptional, highly specialized fruit farm near Monett, Missouri, gave a labor income of approximately \$2,500.

No. 14.—One cotton and hog farm in an irrigated district in southern Arizona made a labor income of \$4,235. However, this farmer is engaged in the business of buying hogs, keeping them a short time on his farm and then selling them.

The average labor income of nine dairy farms in the same region was \$2,567 and on seventeen live stock farms the average labor income was \$3,318.

No. 19.—A 160-acre diversified farm in southwestern Kentucky gave a labor income of \$2,766, and a 1,091-acre diversified farm yielded a labor income of \$4,206. These farms were selected as examples of good farm organization in the area studied.

No. 21.—(a) About one farmer in every one hundred in the townships of Ithaca, Dryden, Danby, and Lansing, in Tomkins County, Central New York, made a labor income of over \$2,000.

(b) A well-organized diversified dairy and field crop farm in this section gave a labor income of \$2,750 one year and \$3,551 the next year.

(c) Another farm of similar organization gave a labor income of \$2,436.

(d) A milk, hay, and potato farm had a labor income of \$2,920.

(e) A diversified farm gave \$2,802 labor income.

(f) Other farms showed a labor income of \$2,416, \$6,217 (father and son), \$2,107, \$2,305, \$3,462, \$3,668.

No. 24.—Records of farms in various counties in different parts of New York State showed the labor income of a dairy farm to be \$2,239, and of a dairy and field crops farm \$2,859 in one instance and \$3,270 in another case.

No. 26.—(a) The best paying farm in Gallatin Valley, Montana, made a labor income of \$4,413.

(b) Three other farms in the survey made labor incomes of over \$2,000, \$3,888, \$2,770, \$2,216, respectively. These were all stock and crop farms, averaging about 31 per cent of their receipts from stock.

No. 28.—A 200-acre farm in Rice County, southeastern Minnesota, having as its major sources of income cattle, dairy products, swine, and grain, yielded a labor income of \$2,484.

No. 30.—A well managed farm in Monmouth County, New Jersey, gave a labor income of \$2,499, while another farm with larger capital gave a labor income of \$1,221 other factors than capital being nearly equal.

California Examples of Farm Profits.—Examples of western farm profits from selected ranches are given below. Note that we are now concerned with individual cases rather than with group averages, should comparison be made of these figures with the survey data given above.

TABLE 87.—CALIFORNIA EXAMPLES OF FARM PROFITS—(SELECTED CASES)

Business	Acres	Investment	Operating costs	Interest	Depreciation	Total	Receipts	Labor income
Apples and pears.....	90	\$ 79,200	\$7,200	\$4,752	\$ 495	\$12,447	\$26,000	\$11,553
Pears.....	38	85,025	4,066	5,100	535	9,701	17,626	7,925
100-cow dairy and field crops.....	258	160,170	9,030	9,610	1,669	20,309	25,355	5,046
400-cow dairy.....	500	170,315	.....	.....	.....	38,880	44,232	5,352
30-cow dairy.....	39	45,500	2,798	2,730	490	6,185	7,742	1,557
800 fowls.....	2	2,165	1,507	130	156	1,793	2,605	812
1,200 fowls.....	2	1,520	2,631	91	198	2,920	3,837	917
Prunes.....	10	12,400	610	744	80	1,434	2,400	966
Prunes and apricots....	7.5	9,800	510	588	230	1,328	2,940	1,612

Value of Perquisites.—Labor incomes represent only the sum of money available to reimburse the operator for his labor. In actual farming there is available for use of the family in addition to this sum, interest on all moneys invested by the operator, and fair valuation for use of the house, home grown food products, fuel, and other perquisites.

Determined Value of Perquisites. Georgia.—From a study of farming made in 1914 in Sumter County, Georgia,¹⁸ reports from 50 farms gave an average annual value for the food, fuel, and house of \$519.63 per family of five members. Of this sum \$363.03 was for food products and represented 78.3 per cent of the total food expense of the family. Fuel amounted to \$51.60; use of house \$92.00.

A study also made the same year, in Brooks County, Georgia,²⁶ gave a range of values of from \$267 to \$612 of farm grown food supplies, \$33 to \$306 value of house, or a general average for white operators of \$754, including \$15 for wood.

Arizona.—The average contribution of the farm to the living of the family and board of hired labor, a total average of four adults, on 476 irrigated farms in southern Arizona, from a study made in 1913-14-15, was \$270 for farm produced eggs, dairy products, meat, fruits, and vegetables, and \$94 as the annual rental value of the dwelling for an average 80-acre irrigated farm.⁴¹

Ohio.—Additional income furnished by the farm is reported from a six-year study in Washington County, Ohio, covering 1912 to 1916 inclusive, as amounting to \$325, or 90 per cent of the needs of an average family of four. The \$325 is divided into food \$215, dwelling \$87, and fuel \$23.⁴⁵

Kentucky.—In southwestern Kentucky the estimated value of family living and house furnished by the farm is figured at \$500 for the year 1915 and covering studies of 342 farms.⁴⁶

Missouri.—A study conducted in Johnson County, Missouri, in 1912, and covering 669 farms, shows that a little more than one-third of the owner's actual income came from the products which the farm furnished him, as vegetables, fruit, poultry, dairy products, and meat, valued at \$163, plus a house to live in.²³

Nebraska.—Study of forty farms during 1915 in eastern Nebraska resulted in an average valuation of \$477 for house, animal products, vegetables, and fruits furnished by the farm.²⁷

Utah.—The conclusions from a study of 309 irrigated farms of Utah, made during 1914, give a value of \$600 for farm products consumed by the average family.⁴⁷

Family Needs as Found in Georgia.—One hundred six farms in Brooks County, Georgia, produced, on an average, family food to the extent shown in the following table:²⁶

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TABLE 88.—FAMILY FOOD PURCHASED AND PRODUCED ON THE FARM;
AMOUNTS AND VALUES PER FAMILY AND PER PERSON (106 FARMS,
BROOKS COUNTY, GEORGIA)

Kinds of food	Unit	Per family		Per person (a)	
		Quantity	Value	Quantity	Value
Purchased:					
Flour.....	Pounds	810.0	\$ 30.34	153.0	\$ 5.73
Sugar.....	Pounds	191.0	13.37	36.0	2.52
Coffee, tea, cocoa, chocolate, postum	Pounds	.....	7.33	.....	1.38
Rice.....	Pounds	55.0	4.37	10.0	0.83
Meat, lard, cheese, fish.....	Pounds	.....	2.60	.....	0.49
All other food.....	.....	.....	14.79	.....	2.77
Total food purchased.....	.....	.....	\$ 72.70	.....	\$ 13.72
Produced on farm:					
Pork.....	Pounds	770.0	108.40	145.0	20.47
Lard.....	Pounds	185.0	23.00	35.0	4.34
Dairy products (b).....	Gallons	471.0	118.50	89.0	22.36
Poultry.....	Number	69.0	24.50	13.0	4.62
Eggs.....	Dozens	111.0	21.90	21.0	4.13
Other live-stock products (c).....	.....	.....	1.56	.....	0.29
Corn (meal and hominy) (d).....	Bushels	27.4	27.40	5.2	5.17
Cane sirup.....	Gallons	38.6	15.50	7.3	2.92
Sugar cane.....	Stalks	524.0	8.02	99.0	1.51
Peanuts.....	Bushels	0.86	0.86	0.16	0.16
Peanas.....	Pounds	40.9	7.38	7.7	1.39
Sweet potatoes.....	Bushels	52.2	26.10	9.85	4.92
Irish potatoes.....	Bushels	8.9	8.86	1.68	1.67
Beans and peas (green in hulls) (e).....	Bushels	15.2	11.30	2.87	2.13
Turnips, rutabagas, and collards.....	.....	.....	6.80	6.80	1.28
Watermelons.....	Number	128.0	6.32	24.15	1.19
Tomatoes.....	Bushels	4.4	4.54	0.83	0.86
Cabbage.....	Heads	83.0	4.12	15.67	0.78
Green corn.....	Bushels	3.8	3.83	0.72	0.72
Okra.....	Bushels	2.6	2.60	0.49	0.49
Onions.....	Bushels	1.6	1.80	0.30	0.34
Squash and pumpkins.....	Bushels	2.0	0.88	0.38	0.17
Cucumbers.....	Bushels	0.9	0.87	0.17	0.16
Beets.....	Bushels	0.8	0.83	0.15	0.16
Other vegetables.....	Bushels	.....	1.02	.....	0.19
Grapes (scuppernong).....	Bushels	3.9	4.70	0.74	0.89
Peaches.....	Bushels	1.9	3.75	0.36	0.71
Figs.....	Bushels	2.3	2.73	0.43	0.52
Pears.....	Bushels	2.1	2.12	0.40	0.40
Oranges and grape fruit.....	Bushels	.....	1.77	.....	0.33
Apples and vinegar.....	.....	.....	1.33	.....	0.25
Total food produced.....	.....	.....	\$453.29	.....	\$85.52

NOTE.—Values of food produced represent sale values on the farm.

(a) Adult equivalent. (b) Milk, cream, and butter expressed as their equivalent in gallons of whole milk. (c) Honey, \$1.52; goats and kids. (d) Includes some corn bread and hominy fed to hogs and chickens. (e) Lima beans and cowpeas.

Farm Contributions Toward Family Living as Found in Nebraska.—
Nebraska found the farm contribution towards the family living to be:²⁸

TABLE 89.—FARM CONTRIBUTIONS TOWARD LIVING—NEBRASKA

Richardson County	Tenant, 12 farms	Owner, 28 farms	Average, 40 farms
Area in acres.....	216	169	183
Value of house.....	\$988	\$2,154	\$1,804
Life of house—years.....	29	43	39
Cost of house—year.....	\$105	\$ 201	\$ 172
Pork.....	60	56	57
Beef.....	12	8	9
Mutton.....	1	1	1
Poultry.....	28	21	23
Whole milk.....	30	34	33
Other milk.....	1	1	1
Cream.....	33	34	34
Butter.....	41	41	41
Honey.....	0	3	2
Eggs.....	33	27	29
Apples.....	3	7	6
Other fruit.....	1	7	5
Irish potatoes.....	16	16	16
Other vegetables.....	19	20	20
Wheat exchanged.....	4	4	4
Wood.....	13	25	21
Cobs.....	3	3	3
Total.....	\$405	\$ 509	\$ 477

Living Costs in Minnesota.—On Minnesota farms, F. W. Peck⁶⁸ found the yearly cost of living for an average family of five, as determined by a study covering 1905-14, to be:

TABLE 90.—LIVING COSTS PER FAMILY AND PER PERSON—MINNESOTA

Item	Average, all farms	
	Per family	Per person
Purchased food.....	\$196.64	\$ 39.04
Farm produce.....	181.05	35.94
Labor.....	234.65	46.60
Equipment.....	41.17	8.17
Fuel.....	55.42	11.01
Rent.....	107.60	21.36
Total.....	\$816.63	\$162.12

CASH SPENT ANNUALLY FOR FARM LIVING

ITEM	AVERAGE, ALL FARMS
Per family	
Purchased food.....	\$196.64
Fuel.....	49.74
Labor.....	22.12
	<hr/>
Total.....	\$268.50
Per month.....	22.37
Per person	
Purchased food.....	\$ 39.04
Fuel.....	10.51
Labor.....	4.53
	<hr/>
Total.....	\$ 54.08
Per month.....	4.51

Family Living an Important Item.—Funk⁶⁹ found that “it is what the farm furnishes directly toward living expenses of his family which enables the farmer to get along, even though his crops are poor or the loss on his live stock eats up his profits. Food and shelter are the important requisites of life, and a good proportion of these necessities are furnished by the farm in addition to the income derived from the sale of farm products. The labor income is therefore, not the limiting factor in determining how much a farmer shall have to eat, but it is of the wage earner in the city.”

Value of Family Living in a Number of States.—Studies in 1913 and 1914 were conducted by Funk⁶⁹ under widely varying conditions, since the quantity of farm products furnished to the household is affected by the weather, the type of farming, and the length of the growing season.

Description of Areas Studied in 1913.—Data were collected in 10 different areas in the year 1913. The three cotton-growing areas visited were in Gaston County, North Carolina; Troup and Meriwether Counties, Georgia; and McLennan County, Texas. The types of agriculture in the North Carolina and Georgia areas are fairly similar, cotton and corn being the main crops. In the Texas area, however, a definite rotation of corn, oats, and cotton is followed. Farming is here done more extensively. The annual rainfall is considerably less than in the other two cotton-growing areas visited. Cloud County and Montgomery County, both important corn-growing districts, were selected for the work in the States of Kansas and Iowa, respectively. The chief crops grown in the Kansas area are corn, wheat, and alfalfa, though some farmers raise only corn and alfalfa. A series of dry years had discouraged the growing of all but a few vegetables. In the Iowa area the agriculture is more diversified, considerable oats and wheat being grown. Hog raising is an important industry in both these sections. The Jefferson County,

Wisconsin, area is wholly a dairy region. The money crops raised are oats and barley. Considerable pure-bred Holstein and Guernsey live stock is raised here. General farming is the prevailing type in Champaign County, Ohio, and in Bucks County, Pennsylvania. Corn, oats, wheat, and hay are the principal crops, with small dairies on many of the farms. In Otsego County, New York, and in Lamoille County, Vermont, dairying is the chief enterprise. The growing seasons here are appreciably shorter than in any of the other areas.

Result of 1913 Studies.—These 1913 studies resulted in findings as shown in the following table. The average values per family of food, fuel, and use of house are shown by States.

TABLE 91.—AVERAGE ANNUAL VALUE OF FOOD, FUEL, AND USE OF A DWELLING FURNISHED BY THE HOME FARM TO 483 FAMILIES IN 10 REPRESENTATIVE AGRICULTURAL DISTRICTS STUDIED 1913⁸⁹

State	Number of families	Persons in family	Food		Fuel		House rent		Total	
			Per family	Per person	Per family	Per person	Per family	Per person	Per family	Per person
North Carolina.....	55	4.5	\$330.65	\$73.47	\$41.87	\$ 9.30	\$ 56.00	\$12.45	\$428.52	\$ 95.22
Georgia.....	50	5.4	376.03	69.65	51.60	9.56	92.00	17.04	519.63	96.25
Texas.....	44	5.3	275.62	52.00	4.13	0.78	83.00	15.66	362.75	68.44
Kansas.....	46	4.5	292.48	65.00	17.97	4.00	116.00	25.80	426.45	94.80
Iowa.....	51	4.4	297.28	70.80	30.20	7.20	158.00	37.62	485.48	115.62
Wisconsin.....	46	4.2	209.44	47.60	35.80	8.14	130.00	29.54	375.24	85.28
Ohio.....	44	4.1	248.28	60.57	30.50	7.44	172.00	42.00	450.78	110.01
Pennsylvania.....	43	5.2	201.69	38.80	17.91	3.44	163.00	31.34	382.60	73.58
New York.....	55	4.0	189.60	47.40	53.80	13.45	188.00	47.00	431.40	107.85
Vermont.....	49	4.8	192.43	40.10	63.40	13.21	93.00	19.38	348.83	72.69
Total or average.....	483	4.6	\$261.35	\$56.54	\$34.72	\$7.65	\$125.10	\$27.78	\$421.17	\$91.97

The average total cost per family was \$595.08, of which \$421.17 was furnished by the farm and \$173.91 purchased.

The average annual value of food, fuel, oil, and shelter per person for the families visited was \$129.74, of which \$91.97 was furnished directly by the farm and \$37.77 purchased.

The average cost of the food consumed per person was \$89.23. Of this food 63 per cent was furnished by the farm. The total food products consumed annually were distributed as follows: groceries, 24.8 per cent; animal products, 57.3 per cent; fruits, 6.3 per cent; vegetables, 11.6 per cent. Three-fourths of the food consumed belonged to the general class of farm-furnished products, although only 63 per cent of the food used was actually taken directly from the farm.

The average annual value of the use of the farmhouse was found to be \$125 per family. The value of the dwelling is generally considered

a part of the value of the farm and is thus furnished free for the use of the farm family. The importance of this is fully appreciated by the family in the town or city paying house rent.

The house labor was performed chiefly by members of the family, only 4 per cent being hired. The average value of this labor was \$203 per family.

Description of Areas Studied in 1914.—In 1914 more specialized sections in New Jersey, Maine, North Dakota, and California were visited. The New Jersey area in Gloucester County was distinctly one of market gardening and trucking. Much of the produce was hauled by the farmer to Philadelphia, a distance of about 10 miles, affording a good opportunity to buy household supplies. Vegetables and fruits were raised in great variety. The Maine areas in Androscoggin and Oxford Counties were dairy and fruit regions. Apples and dairy products were the important farm sales. Considerable sweet corn was also grown for canning purposes. In North Dakota, Cass County was visited. Grain growing is the chief industry there. The farms are large and the distance to market relatively great. Practically no fruit is raised, and the variety of vegetables grown for home use is small. The region studied in Santa Clara County, Cal., is an irrigated fruit area. The farms are small and most of the area is devoted to fruit. The most generally grown fruits are prunes, apricots, and peaches. On many of the small farms all the land is devoted to fruit trees, no land being set aside for family garden.

Results of 1914 Studies.—The following table presents the findings for 1914:

TABLE 92.—AVERAGE ANNUAL VALUE OF FOOD, FUEL, AND USE OF A DWELLING FURNISHED BY THE HOME FARM (950 FAMILIES)—STUDIED 1914

Location of regions in which study was made (county and state)	Food		Fuel		House rent		Total	
	Per family	Per person	Per family	Per person	Per family	Per person	Per family	Per person
Oxford, Me.....	\$200.00	\$44.49	\$43.42	\$ 9.65	\$111.00	\$24.63	\$354.62	\$ 78.77
Lamoille, Vt.....	192.43	40.10	63.40	13.21	93.00	19.38	348.83	72.69
Otsego, N. Y.....	189.60	47.40	53.80	13.45	188.00	47.00	431.40	107.85
Bucks, Pa.....	201.69	38.80	17.91	3.44	163.00	31.34	382.60	73.58
Gloucester, N. J.....	266.16	56.63	15.04	3.20	164.00	34.84	445.20	94.67
Gaston, N. C.....	330.65	73.47	41.87	9.30	56.00	12.45	428.52	95.22
Troup, Ga.....	376.03	69.65	51.60	9.56	92.00	17.04	519.63	96.25
McLennan, Tex.....	275.62	52.00	4.13	0.78	83.00	15.66	362.75	68.44
Champaign, Ohio.....	248.28	60.57	30.50	7.44	172.00	42.00	450.78	110.01
Jefferson, Wis.....	209.44	47.60	35.80	8.14	130.00	29.54	375.24	85.28
Montgomery, Iowa.....	297.28	70.80	30.20	7.20	158.00	37.62	485.48	115.62
Cloud, Kan.....	292.48	65.00	17.97	4.00	116.00	25.80	426.45	94.80
Cass, N. D.....	384.58	62.03	18.04	2.91	175.00	28.21	577.62	93.15
Santa Clara, Cal.....	175.62	35.84	16.51	3.37	149.00	30.40	341.13	69.61
Average, all families.....	\$260.00	\$54.60	\$31.44	\$ 6.83	\$132.00	\$28.28	\$423.58	\$ 89.71

Based on an average family of 4.8 persons the findings were to the effect that:

Annual value of food, fuel, and use of house

Average per family \$642 {
 Furnished by farm \$424 (66 per cent)
 Bought 218 (34 per cent)

Annual value of food

Average per family \$448 {
 Animal products, 58 per cent } From farm 58 per cent
 Groceries 25 per cent } Bought 42 per cent
 Vegetables 11 per cent }
 Fruits 6 per cent }

Annual value of fuel

Average per family \$62 {
 Wood (9.4 cords), \$36.30 } From farm, 54 per cent
 Coal (2.6 tons), 17.85 } Bought, 46 per cent
 Oil (55 gal.), 6.33 }

Annual use of house—Value

Average per family, \$132

Annual value of housework

Average per family \$288 {
 Furnished by family, \$217 (95 per cent)
 Hired 11 (5 per cent)

It was found that the average annual value of meats (other than poultry) consumed per family was \$107.25; of poultry products, \$55.40; and of dairy products \$98.36. (The quantity of dairy products consumed was equivalent to 2,640 qt. of milk.)

Meats constitute the most important group of foods. As use increases in relation to other foods, the total food value consumed per family increases. Those families having a relatively greater consumption of either groceries, vegetable, or dairy products use relatively less meats, and their total consumption of food is less in value.

Families living on their own farms reported higher consumption of food and a larger proportion of food derived directly from the farm than did those living on rented farms.

The average quantity of fruit canned annually per family was 122 quarts; of vegetables, 32 quarts.

The cost of board (as of hired hands) in food, fuel, and housework was shown to be \$129 per year. Thirty-one per cent of this represents cash outlay.

Perquisites Important to Farmers.—From which it is logical to conclude that the farmer's cost of living in actual cash expenditures is very materially reduced by what the farm furnishes in food products, fuel, and house rent; in fact, the income from this source adds as much to the real wealth of many farmers as does the net income from the sale of farm products.

If it were not for those products contributed by the farm without any cash expenditure, a great many farmers would not have a comfortable living. Extensive investigations relative to the profits in farming indicate that the average labor income of the farmer probably differs little

from ordinary farm wages, but in addition to this he has the products contributed by the farm.

Value of Perquisites to Individuals.—How far the farm business can go in providing additional income in the way of housing, vegetables, eggs, fruits, poultry, etc., etc., towards meeting living costs, depends on the type of farming, the living standards of the family, the size of the family, the ages of the individual members, and the equipment of the farm. The value of house rent, for instance, depends on the character of the dwelling on the place. Some families will confine consumption to the small, gnarled fruit, eggs from stolen nests, cull vegetables, aged fowls, and will save the best produce for market. The environment under which the family was reared largely determines its standard of living, and will vary with the individuals comprising the family. One family will obtain several hundred dollars from its farm by-products and minor industries, sufficient to meet perhaps 50 per cent of its wants; another family is able to obtain but 20 or 25 per cent of its needs. This is especially true in comparing diversified with specialized enterprises. The former tend to provide a greater variety for longer periods, and thus to increase the products available for home consumption.

Living Needs and Standards of Families Vary.—Factors affecting the amount of income obtainable and the varying needs of the operators may be realized when an attempt is made to compare:

(a) The production of stuff for home consumption on a Florida citrus grove with that on a Pennsylvania or New York general farm, or the value of home goods on a farm specializing in poultry products with the diverse enterprises of the corn belt.

(b) The needs of a single man just starting out, with that of a family of five, the children of which are all under fifteen, or either of these with a family of six including four grown sons, or a family composed largely of daughters.

(c) A family frugally raised and used to a simple standard of living with the city reared family used to specially prepared foods.

(d) The requirements of different races *e.g.*, the Latin, the Scandinavian, the Slav, the Chinese, the Filipino, the Japanese, the Negro.

(e) The log cabin, the simple family cottage, the more pretentious farm house, and the elegant mansion of the country estate.

The determination of what circumstances of the farm income can be obtained from given proposition must be individually made from stand-points of both the character of the farm business and the needs of the family.

The Unearned Increment.—Although direct farm profits may appear to be surprisingly small to those heretofore not fully acquainted with the facts, the indirect profits should not be ignored. Much of the big profits in farming is the outcome of increasing land values.

The rapid settling of new communities, the planting out of orchards, the reaching out of city boundaries, the building of highways, the improvement of the automobile, the extension of railroad and street car systems, have all tended to increase the demands for land. Future possibilities of profits from this source can not be predicted. The "unearned increment," as these profits are termed, is subject to many influences. Study of the trend of agricultural development is well worthy of consideration, as ability to forecast coming changes will influence plans and tend to increase profits. While increased profits due to rising land values are of special value to the land owner, such information will help tenants, and managers working on salary, especially if operating under long-term contracts.

In planting additional orchards where many new plantings have been already set out, study is necessary of prospective markets and their ability to absorb the increased output. Subdivisions to be developed for farms warrant study on the part of buyers if costs of putting on markets are to be met. Buying a farm for its probable increasing land values calls for sagacious judgment, especially if based on prospects of railroad extension, town development, or development of new agricultural enterprises such as creamery, cannery, or sugar factory.

CHAPTER XIII

FACTORS AFFECTING PROFITS

Farm management surveys, as pointed out in another chapter, are conducted for the scientific gathering of facts for analysis and deduction. These surveys deal with averages, and tend to eliminate the unusual, spectacular or astonishing things.

For when the conditions affecting the agriculture of a region have remained stable for a considerable period, local agricultural practice tends to become approximately what it should be for best results; it tends towards a level or uniform character. Best final results and best *immediate* results, however, may differ widely; the latter may be in a practice very unfavorable to maintenance of soil fertility, as, for example, the year-in and year-out western grain farming of a generation ago.

But when conditions change, even slightly—if the change is permanent—local farm practice tends to alter, and ultimately adapts itself to the new conditions.

Thus studies conducted in a given locality aim to show what actual farmers have found most satisfactory to them as means of obtaining profits. Such studies are indicative, but at the same time the low labor income so often met is sufficient evidence of the need for even greater endeavor to organize farming properly in the interest of increased returns.

Factors Affecting Profits.—The findings of investigations are to the effect that certain well defined influences largely affect farm incomes. Summed up the factors of outstanding interest are:

1. The type of business.
2. The size of business as:
 - (a) Area of land, or as
 - (b) Amount of working capital, or as
 - (c) Amount of productive labor.
3. The quality of the business whether appearing in:
 - (a) Crop yields, or in
 - (b) Income per animal.

In studying the data one may well bear in mind that the specialized farm in its pure form is not, to any significant extent, included in the data presented, since these studies were conducted for the most part in communities of diversified agriculture. Perhaps for the single-industry farm there is a place not yet fully recognized.

Below are presented a number of extracts from farm management surveys.

The Type of Farming as Affecting Profits.—The type of farming followed in any given case must be suited to soil, climatic, and labor conditions; to market facilities; to individual capacities; and to the business conditions applicable to individual farms.

With a given type of farming, under given conditions, there is a certain way of dividing the acreage among the several enterprises which is more profitable than any other way; that is, there is a most profitable acreage for each crop. Similarly, there is a most profitable proportion of income from each source. If the acreage of any crop or the proportion of income from any enterprise, be greater or less than this optimum, the profits of the farm as a whole are lowered proportionately.

Examples of Effect on Profits of Type of Business.—An indication of the influence of kind of farming upon profits is shown in a California study of farms grouped according to their type of farming.

TABLE 93.—EFFECT OF TYPE OF BUSINESS UPON PROFITS—CALIFORNIA

Business	No. records in group	Average size of farm, acre	Net income	Labor income	
				Range	Average
Field crops.....	23	140	\$1,826	\$-2,469 to 2,305	678
Fruit.....	38	81	2,430	-997 to 4,526	1,477
Live stock.....	6	474	3,485	801 to 2,941	1,871
Poultry.....	21	21	2,211	62 to 4,216	1,717

The segregation of the fruit farms shown in the above table, according to the kind of fruit raised, is also indicative.

TABLE 94.—EFFECT OF DIFFERENT TYPES OF FRUIT GROWING UPON PROFITS—CALIFORNIA

Kind of fruit	No. records	Average acreage per farm	Labor income	
			Per farm	Per acre
Apples.....	12	18	\$1,352	\$112.66
Wine grapes.....	8	17	1,033	129.12
Prunes.....	11	13	1,929	175.36
Pears.....	10	10	2,522	252.20

Size of Business as Affecting Profits

The size of business may be measured as (a) area, (b) amount of working capital, (c) amount of productive labor.

In comparing farms with respect to size or volume of business, some of the more important factors to be considered are size of farm, acres in crops, the amount of live stock carried, the amount of capital invested, and amount of labor required in operating the farm. On farms where one enterprise predominates, such as a specialized cotton, fruit, or dairy farm, the best measure of size of business may be the acres in cotton, acres in fruit, or number of cows. The amount of labor required in operating the farm may be used to good advantage in comparing farms of different types. Twenty acres of truck crops may, under suitable conditions, equal 200 acres of grain, hay, and general live stock both as to labor required and income received.

Effect of Size of Farm Area upon Income.—Examples of the effect of size of business measured as area are numerous in the farm management surveys.

Pennsylvania.

TABLE 95.—EFFECT OF AREA OF FARM UPON LABOR INCOME (378 FARMS OPERATED BY OWNERS IN CHESTER COUNTY, PENNSYLVANIA)⁹

Size of farms, in acres	Number of farms	Average size, acres	Average labor income	Per cent of farms with labor income \$1,000 or more
13 to 40.....	54	28	\$ 240	6
41 to 60.....	61	52	550	10
61 to 80.....	60	73	730	25
81 to 100.....	68	93	848	34
101 to 120.....	52	110	937	46
121 to 160.....	61	136	1,094	46
161 to 393.....	22	203	1,575	68
Average.....	378	90	789	30

*Corn Belt.*TABLE 96.—EFFECT OF AREA OF FARM UPON INCOME (273 FARMS OPERATED BY OWNERS IN INDIANA, ILLINOIS, AND IOWA)²¹

Area, acres	Farms		Distribution per acre			Money available for farmer's living if free of debt
	Number	Average size, acres	Receipts	Expenses	Interest	
40 and less.....	32	37.4	\$18.10	\$6.98	\$9.03	\$ 416
41 to 80.....	51	72.9	17.09	5.46	8.45	848
81 to 120.....	48	106.9	16.22	6.88	8.22	998
121 to 160.....	44	149.4	15.62	5.80	8.30	1,467
161 to 200.....	31	179.1	18.04	7.12	8.58	1,956
201 to 280.....	36	239.8	18.12	6.70	8.42	2,738
281 to 400.....	19	321.8	13.89	5.07	8.32	2,838
401 to 1,250.....	12	623.8	16.19	6.28	7.90	6,182
Total or average...	273	178.3	\$17.25	\$6.38	\$8.58	\$1,938

*Georgia.*TABLE 97.—EFFECT OF AREA OF FARM UPON CAPITAL, RECEIPTS, EXPENSES, AND INCOME (160 FARMS OPERATED BY WHITE OWNERS, SUMTER COUNTY, GEORGIA)¹⁸

Tilled acres per farm	Number of farms	Farm income	Labor income
50 and less.....	25	\$ 288	\$ 138
51 to 100.....	41	626	307
101 to 150.....	40	1,147	636
Total, 150 and less tilled.....	106	\$ 743	\$ 391
151 to 250.....	31	\$2,184	\$1,374
251 to 450.....	12	2,957	1,411
Over 450.....	11	5,886	3,223
Total, over 150 tilled.....	54	\$3,110	\$1,759
Grand total.....	160	\$1,542	\$ 853

*Michigan, Wisconsin, and Minnesota.*TABLE 98.—EFFECT OF AREA OF FARM UPON INCOME (301 FARMS, CUT-OVER LANDS OF MICHIGAN, WISCONSIN, AND MINNESOTA)⁷⁰

Tillable area per farm, acres	Farms in group	Tillable area, acres	Size of farm, acres	Farm income	Labor income
20 or less.....	50	15.5	60	\$ 62	\$-118
20.1 to 40.....	246	31.6	77	194	- 56
40.1 to 60.....	237	50.2	107	377	47
60.1 to 80.....	151	68.8	124	437	52
80.1 to 100.....	54	88.9	148	667	195
100.1 to 140.....	43	115.1	169	1,016	463
Over 140.....	20	179.5	254	1,388	495
Total and average of all farms.....	801	55.2	108	391	49

*Arizona.*TABLE 99.—MAXIMUM AND MINIMUM FARM INCOMES FROM FARMS OF DIFFERENT AREAS, AND THE PERCENTAGE OF FARMS IN EACH GROUP FURNISHING AN INCOME OF \$1,500 OR MORE—SOUTHERN ARIZONA⁴¹

Size-group, acres	Number of farms	Average area, acres	Maximum farm income	Minimum farm income	Percentage of farms in group furnishing incomes of \$1,500 or more
0 to 19.....	54	11	\$ 2,621	\$ 151	5.6
20.....	45	20	3,359	97	15.6
21 to 39.....	54	30	3,876	69	29.6
40.....	84	40	4,711	25	27.4
41 to 79.....	103	62	5,492	347	62.1
80.....	75	80	5,323	88	74.7
81 to 119.....	47	101	4,692	723	80.9
120 to 159.....	39	137	7,707	834	92.3
160.....	44	160	9,062	860	90.9
161 to 320.....	50	244	14,266	385	98.0
Over 320.....	32	530	24,215	3,386	100.0

*Michigan.*TABLE 100.—EFFECT OF AREA OF FARM UPON INCOMES (300 OWNER AND 153 TENANT FARMS, LENAWEE COUNTY, MICHIGAN)¹⁹

Size of farm, acres	Working owners				Tenants renting for cash				Tenants renting for share			
	Number of farms	Average size of farm	Average farm income	Average labor income	Number of farms	Average size of farm	Average farm income	Average labor income	Number of farms	Average size of farm	Average farm income	Average labor income
60 and less..	66	45	\$ 540	\$ 277	7	38	\$ 500	\$ 456	4	37	\$278	\$249
60-100.....	124	84	922	445	14	86	730	648	35	84	526	474
101-160.....	72	129	1,172	434	8	131	728	614	57	133	630	553
Over 160...	38	223	2,272	1,047	4	216	1,214	1,078	24	230	889	777
All farms...	300	104	\$1,069	\$ 481	33	102	\$ 739	\$ 651	120	125	\$640	\$564

*New York.*TABLE 101.—EFFECT OF AREA OF FARMS UPON PROFITS (586 NEW YORK FARMS OPERATED BY OWNERS)⁷¹

Acres	Number of farms	Average size, acres	Labor income
30 or less.....	30	21	\$168
31 to 60.....	108	49	254
61 to 100.....	214	83	373
101 to 150.....	143	124	436
151 to 200.....	57	177	635
Over 200.....	34	261	946
Totals and average.....	586	103	\$415

*Missouri.*TABLE 102.—EFFECT OF AREA OF FARM UPON LABOR INCOMES (MISSOURI)²⁰

Size of farm, acres	Labor income		
	Owner	Part owner	Tenant
40 or less.....	\$128	\$ 139	\$183
41 to 80.....	130	268	304
81 to 120.....	213	383	339
121 to 200.....	411	508	719
201 to 400.....	424	874	940
Over 400.....	924	2,150	115

*Eastern Nebraska.*TABLE 103.—EFFECT OF AREA OF FARM UPON LABOR INCOME (EASTERN NEBRASKA)²⁸

Area of farms, in acres	Average area per farm	Number of farms averaged	Average labor income per farm
40 to 100	80.0	20	\$122
101 to 150	124.0	27	355
151 to 200	167.0	68	323
201 to 250	237.0	33	684
251 to 320	292.0	27	444
Over 320	423.0	20	324
All farms	207.5	195	\$385

Summary of Survey Findings, Effect of Size of Farm upon Income.⁷²

Here the farm profits for small, medium, and large-sized businesses are shown for a number of areas. The farms are divided in size-groups on the basis of the measure which seems to indicate best the size of business for each area under study. Whether the chance of receiving a good income in these areas is best in operating a small business, a medium-sized business, or a large business, is answered in the following table.

TABLE 104.—EFFECT OF AREA OF FARM UPON INCOME

Areas	Number of farms	Labor income. Average of farms with			Percentage of return on investment. Average of farms with		
		Small business	Medium business	Large business	Small business	Medium business	Large business
Gloucester Co., N. J.	125	\$686	\$ 867	\$1,479	7.8	8.6	11.2
Frederick Co., Md.	150	189	304	611	3.4	4.6	5.8
Chester Co., Pa.	502	475	816	1,242	7.0	9.2	10.4
Mercer Co., Pa.	349	221	282	354	2.6	4.1	4.9
Washington Co., Ohio.	25	148	228	432	1.9	3.4	5.8
Clinton Co., Ind.	100	342	518	828	5.0	5.6	5.7
Lenawee Co., Mich.	453	340	501	725	4.3	6.1	6.2
Dane Co., Wis.	60	278	408	542	3.1	4.5	4.9
Tama Co., Iowa.	210	943	1,587	1,837	4.6	5.7	5.6
Warren Co., Iowa.	184	555	431	918	3.5	3.2	4.6
Barry and Lawrence Co., Mo.	244	180	291	628	3.2	5.1	7.4
Palouse area, Washington and Idaho.	246	221	328	756	5.4	6.5	7.4
Skagit Co., Wash.	202	66	94	244	2.2	3.2	5.2
Sumter Co., Ga.	280	174	741	2,435	5.5	8.9	9.9

Effect of Amount of Working Capital upon Income.—Size of business may also be measured in terms of amounts of working capital. Examples follow.

Corn Belt.—The relation of the farm owner's capital to his income on 273 farms in Indiana, Illinois, and Iowa⁷ was found to be:

TABLE 105.—RELATION OF CAPITAL TO INCOME—INDIANA, ILLINOIS, AND IOWA

Size of business in capital	Number of farms	Average labor income
\$ 5,000 and less.....	9	\$ 74
5,001 to 10,000.....	37	45
10,001 to 15,000.....	44	283
15,001 to 20,000.....	45	265
20,001 to 30,000.....	55	264
30,001 to 40,000.....	32	483
40,001 to 60,000.....	29	315
60,001 to 80,000.....	10	1,114
80,000 and over.....	12	1,804

In this study it was found that of the entire number nine men with less than \$5,000 capital received \$74 for their year's work. Only two farmers out of 46 with less than \$10,000 invested made over \$400. Out of the entire 273 only 12 men received over \$2,000 labor income. Each of these had more than \$20,000 invested. The chance of a farm owner's making a labor income of \$1,000 with less than \$15,000 invested is less than 1 in 20.

New York.—Relation of capital to profits as shown by 615 New York farms operated by owners:⁷¹

TABLE 106.—RELATION OF CAPITAL TO INCOME—NEW YORK

Capital	Number of farms	Average labor income
\$ 2,000 or less.....	36	\$ 192
2,001 to 4,000.....	200	240
4,001 to 6,000.....	183	399
6,001 to 8,000.....	94	530
8,001 to 10,000.....	95	639
10,001 to 15,000.....	44	870
Over 15,000.....	13	1,164

Missouri.—Relation of capital to labor income was determined for Missouri to be:²⁹

TABLE 107.—RELATION OF CAPITAL TO INCOME—MISSOURI

Capital	Labor income,		
	Owner	Part owner	Tenant
\$ 2,000 or less.....	\$ 42	\$ 243	\$211
2,001 to 4,000.....	171	220	258
4,001 to 6,000.....	148	298	288
6,001 to 8,000.....	172	372	401
8,001 to 10,000.....	282	343	424
10,001 to 15,000.....	267	618	769
15,001 to 25,000.....	702	752	952
25,001 and over.....	829	1,450	593

Nebraska.—Relation between capital per farm and other financial factors for farms studied in Nebraska resulted in:²⁸

TABLE 108.—RELATION OF CAPITAL TO INCOME—NEBRASKA

Capital per farm	Farm income	Labor income
Under \$10,000.....	\$ 596	\$214
\$10,000 to 18,000.....	1,012	272
18,000 to 25,000.....	1,398	352
25,000 to 35,000.....	2,790	399
Average.....	\$1,717	\$385

Kentucky.—Capital and incomes on farms of different sizes in Kentucky range:⁷³

TABLE 109.—RELATION OF CAPITAL TO INCOME—KENTUCKY

Total average capital	Number of farms	Farm income	Labor income
\$12,502	19	\$1,083	\$ 473
21,241	48	1,537	518
30,697	51	2,015	595
48,618	33	2,554	299
75,836	15	4,809	1,542
97,009	12	6,504	2,130
\$37,793 (All farms)	178	\$2,419	\$ 686

Arizona.—Effect of the amount of capital upon farm income and labor income on 446 owner farms in the irrigated valleys of southern Arizona was found to be:⁴¹

TABLE 110.—RELATION OF CAPITAL TO INCOME—ARIZONA

Capital invested	Number of farms	Farm income	Labor income
\$ 5,000 and under.....	32	\$ 523	\$241
5,001 to 8,000.....	57	833	299
8,001 to 12,000.....	100	1,356	578
12,001 to 16,000.....	63	1,947	818
16,001 to 20,000.....	63	1,995	577
20,001 to 30,000.....	52	2,490	558
30,001 to 50,000.....	45	4,064	1,043
50,001 to 167,962.....	34	8,721	2,108
All farms.....	446	\$2,370	\$ 713

Effect of the amount of capital invested by tenant on farm income and labor income on 96 tenant farms in the irrigated valleys of southern Arizona.⁴¹

TABLE 111.—RELATION OF TENANT'S CAPITAL TO INCOME—ARIZONA

Capital invested by tenant	Number of farms	Tenant's farm income	Tenant's labor income
\$1,000 and under.....	11	\$ 593	\$ 582
1,001 to 2,000.....	31	868	749
2,001 to 3,000.....	13	1,428	1,222
3,001 to 5,000.....	17	1,671	1,366
5,001 to 8,000.....	11	2,474	1,937
Over 8,000.....	13	4,104	3,273
All farms.....	96	\$1,677	\$1,377

Michigan.—Relation of capital to labor income on 300 owner farms, Lenawee County, Michigan gave:¹⁹

TABLE 112.—RELATION OF CAPITAL TO INCOME—MICHIGAN

Capital	Number of farms	Average labor income
\$ 7,000 and less.....	67	\$ 276
7,001 to 11,000.....	109	386
11,001 to 15,000.....	54	488
15,001 to 20,000.....	39	569
Over 20,000.....	31	1,139
All farms.....	300	\$481

Effect upon Income of Efficient Use of Land, Equipment, and Labor.—Many farmers realize but meager incomes because the business of each is small. Such men often feel that the farm business is sufficiently large to keep them busy the entire year, when, as a matter of fact, the actual results accomplished represent less than a half year's work. An acre of hay normally requires 8 to 10 hr. of man labor, or approximately 1 day's work for each cutting; an acre of wheat, 15 to 20 hr.; an acre of potatoes, 80 to 110 hr.; caring for and feeding a dairy cow, 150 to 200 hr. per year. Only about 250 to 275 days are actually available for productive work. Much time is lost in doing jobs about the farm which take time, but really count for little. A farmer may keep busy the whole year, but if he has accomplished during that time only such work as should normally be done in 200 days his wages will be in proportion. A large volume of business may be done on a farm of few acres, while only a small business may be conducted on a poorly managed farm of much larger acreage. Without reasonable size of business there is little opportunity for a satisfactory profit in farming.

The larger the farm, the more efficient is likely to be the use of labor, horses, and working capital.

Examples of Effect upon Income of Efficient Use of Land, Equipment, and Labor.—Extracts from farm management surveys well illustrate this.

Pennsylvania.

TABLE 113.—EFFECT UPON INCOMES OF EFFICIENT USE OF LABOR AND WORKING CAPITAL (CHESTER COUNTY, PENNSYLVANIA, OWNERS)⁷

Sizes of farms in acres	Productive work units per farm		Crop acres per man	Man labor per crop acre	Value of labor per month per man	Crop acres per work horse	Value of machinery per crop acre
	Man	Horse					
13 to 40.....	184	82	13.7	\$20.74	\$23.93	9.0	\$15.11
41 to 60.....	299	140	20.2	15.78	26.60	11.9	12.57
61 to 80.....	372	177	23.2	13.98	27.12	13.9	11.92
81 to 100.....	475	226	25.2	13.46	28.30	14.5	10.79
101 to 120.....	551	259	25.6	13.64	29.22	15.0	11.80
121 to 160.....	582	286	29.0	11.80	28.50	16.8	9.20
160 and over.....	856	444	31.1	13.05	33.77	17.4	8.94
All sizes.....	439	211	24.7	\$13.69	\$28.27	14.7	10.88

*Utah.*TABLE 114.—RELATION OF SIZE OF FARM TO CROP AREA PER WORK HORSE, UTAH²⁰

	Size of farms, acres	Crop area per horse, acres
Small farms.....	20.5	8.3
General and fruit.....	59.6	11.2
Grain and live stock.....	178.0	12.0

*Michigan.*TABLE 115.—RELATION OF SIZE OF FARM TO ANNUAL COST OF BUILDINGS, FENCES,
AND MACHINERY PER FARM AND PER ACRE (LENAWEE COUNTY, MICHIGAN)¹⁹

	All farms	Farms with each specified acreage			
		60 acres and less	61 to 100 acres	101 to 160 acres	Over 160 acres
Number of farms.....	300	66	124	72	38
Annual cost per farm					
Buildings.....	\$143.00	\$ 99.00	\$128.00	\$164.00	\$226.00
Fences.....	19	14	16	25	27
Implements and machinery.	26	14	23	32	50
Total.....	\$188.00	\$127.00	\$167.00	\$221.00	\$303.00
Annual cost per acre.....	\$ 1.81	\$ 2.85	\$ 1.99	\$ 1.71	\$ 1.36

*Georgia.*TABLE 116.—RELATION OF NUMBER OF PRODUCTIVE DAYS MULE LABOR PER MULE
TO FARM RETURNS, ACRES PER MULE, AND COST OF MULE LABOR PER DAY
(BROOKS COUNTY, GEORGIA)²⁶

Productive days mule labor per mule	Number of farms	Average number of mule days per mule	Cost of mule labor per day
75 and less.....	12	62	\$1.70
76 to 100.....	26	88	1.23
101 to 125.....	33	112	1.00
126 to 150.....	21	137	0.84
151 and over.....	14	172	0.72
All farms.....	106	113	\$1.07

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TABLE 117.—RELATION OF CROP AREA PER WORK ANIMAL TO FARM EFFICIENCY (ANDERSON COUNTY, GEORGIA)⁷⁴

Number of crop acres per work animal	Number of farms	Percentage of return on investment	Income per mule
11 or less.....	7	2.64	\$238
12 to 15.....	13	3.30	267
16 to 19.....	33	3.67	324
20 to 23.....	28	4.32	422
24 to 27.....	23	3.62	396
28 or more.....	6	2.86	386

Texas.

TABLE 118.—RELATION OF SIZE OF FARM TO EFFICIENCY OF HORSE LABOR (ELLIS COUNTY, TEXAS)⁹

Size of crop area	Number of farms	Average size of crop area	Horse days per horse	Acres per horse	Horse days per acre	Cost of horse labor per crop acre	Cost of work stock per day of labor
80 acres or less.....	37	62.5	60.3	18.5	3.25	\$5.47	\$1.68
81 to 120 acres.....	39	100.1	66.7	20.6	3.22	4.95	1.54
121 acres and more.....	38	188.9	79.1	25.2	3.14	3.99	1.27
All farms.....	114	117.5	71.7	22.4	3.19	\$4.53	\$1.42

Corn Belt.

TABLE 119.—RELATION OF SIZE OF FARM TO NUMBER OF CROP ACRES ON WHICH A HORSE CAN BE UTILIZED (700 FARMS IN INDIANA, ILLINOIS AND IOWA)²¹

Area, acres	Farms				
	Number	Average size, acres	Average crop area, acres	Average number of work horses	Crop area per horse, acres
40 and less.....	45	36.6	26.4	2.8	9.4
41 to 80.....	114	71.4	56.7	3.6	15.7
81 to 120.....	120	107.2	86.0	4.5	19.1
121 to 160.....	130	149.3	122.4	5.8	21.1
161 to 200.....	93	183.6	143.4	6.6	21.7
201 to 240.....	75	227.4	184.9	7.8	23.7
241 to 280.....	35	262.5	211.2	8.4	25.1
281 to 320.....	37	305.6	233.8	9.5	24.6
321 to 400.....	30	364.1	298.0	10.8	27.6
401 to 560.....	12	474.8	368.6	13.1	28.1
561 to 720.....	5	652.6	555.4	19.4	28.6
721 to 1,250.....	4	991.2	612.0	19.0	32.2

*Kentucky.*TABLE 120.—RELATION OF SIZE OF FARM TO UTILIZATION OF LABOR, POWER, AND MACHINERY (KENTUCKY)⁷³

Size of farms, acres	Number of farms	Percent- age of available time util- ized by man labor	Percent- age of avail- able time utilized by work stock	Cost of work stock per power unit	Cost of machinery per power unit
Less than 100.....	19	78	27	\$2.68	\$0.46
100 to 200.....	48	95	28	1.84	0.35
201 to 300.....	51	87	33	1.54	0.21
301 to 500.....	33	84	33	1.78	0.17
501 to 700.....	15	80	37	1.36	0.13
Over 700.....	12	80	48	1.18	0.07

Ways of Increasing the Size of the Farm Business.—There are a number of ways of increasing the size of the farm business, some of which are:

1. *Procuring Additional Land.*—By buying or renting more land farmers owning or renting small farms often rent additional land adjoining. This permits the use of a larger area with comparatively little additional capital.

2. *Use of More Intensive Crops.*—Growing crops requiring more labor, that is, following a more intensive form of farming. One hundred acres devoted to corn, oats, wheat, etc., which may not be sufficient to keep two men busy, can easily be increased to a full two-man farm by the addition of a few acres of such crops as sugar beets, potatoes, or fruit, depending upon the market demand. Many persons have made the mistake of buying a small area, with the intention of following an intensive type of agriculture in localities where there is no market for the products of such farming. The fact that land is suitable for truck crops is not sufficient justification for attempting to grow them. There must be the possibility of disposing of the products at remunerative prices.

3. *Addition of Live Stock.*—The addition of more live stock, sometimes even beyond the point where the farm itself will support them. This is a practice followed by a large number of dairy farmers in some of the eastern states. This necessitates the purchase of feed where the nature of the land is such as to prohibit the raising of grain as cheaply as it can be bought, or where the production of roughages and succulent feeds is more profitable than grain growing. Loss is liable to result in this undertaking unless the additional animals are of high producing quality. This is the one way open to many farmers whose business would otherwise be too small to give them a good living. The success of many farms is in

large measure dependent upon the number of high-quality cows or other live stock that can be kept.

4. Outside Work.—By performing work outside the farm, such as teaming or working at lumbering during the winter. In many farming regions the opportunity for using this source of income is very limited.

No one realizes better than the farmer that as a rule no phenomenal profits can be expected, and persons going into farming as a business should consider this fact. Agriculture is a good life work; it will pay wages and moderate returns on investment, provided both capital and labor are wisely expended. Large success is most difficult to attain, however, unless the farm business is large enough to permit the efficient use of capital, labor, and managerial ability.

Quality of Business as Affecting Profits

Illustrations from surveys showing the effect upon income of crop yields and production per animal—matters of quality of business—are recorded below.

Limitations to Improving Quality of the Business.—The results of available studies seem to show that in crop production the point of diminishing returns has been reached, nationally speaking, while in stock-raising this does not appear as yet to be the case. This means that in crop production it is possible to reach a stage beyond which to increase yields necessitates costs out of proportion to the possible income, so that the additional yields may cost more than the values of these yields and be at the expense of farm profits. Excessive fertilization, or extra man labor at high wages may sum up expense beyond the value of the resultant returns. But production per unit of stock, so high that the cost of obtaining such increase is excessive, does not seem, from the survey findings, to have as yet been reached.

Influence of Crop Yields upon Farm Profits.—Crop yields greatly influence farm profits. Some farmers make fair profits with low yields because some other phase of the farm business is sufficiently developed to offset the poor yields, but it is doubtless true that these same farmers could make more money with higher yields. Profits increase at least until yields are obtained considerably above the average for the region, but beyond this limit very high yields are liable to be obtained at the expense of farm profits.

Where Greater Profit-taking Is Easier.—It is both easier and more profitable to increase low acre yields than high ones, and a small product per fowl or animal than a large one. In other words, profits can be increased most easily by attention to the weakest points in a system of farming. The more vital the weakness, the greater is the increase in profits that can be made by the proper correction.

Examples of the Effect of Crop Yields upon Income. Kentucky.—The relation of crop yield to labor income was determined for Kentucky to be:⁷⁵

TABLE 121.—EFFECT OF CROP YIELDS UPON INCOME—KENTUCKY

Crop index	Number of records	Size of farm, acres,	Labor income
90 or less.....	35	303	\$ 217
91 to 100.....	37	297	519
101 to 110.....	47	273	701
111 to 120.....	30	362	1,080
Over 120.....	29	341	1,103

Texas.—The relation of yield to cost of corn, 19 crops, 114 farms, Ellis County, Tex., amounted to:⁹

TABLE 122.—EFFECT OF CROP YIELDS UPON COSTS OF CORN—TEXAS

Yield per acre	Number of records	Cost per bushel
20 bushels or less.....	37	\$0.94
21 to 30 bushels.....	62	0.53
31 bushels or more.....	20	0.45
All crops.....	119	0.58

*Oregon.*TABLE 123.—EFFECT OF CROP YIELDS ON FARM INCOME (212 FARMS IN MARION AND POLK COUNTIES, OREGON)⁷⁶

Soil Type	Crop index	Number farms	Average farm income
Salem clay.....	91 and less	23	\$ 653
	92 to 106	23	1,085
	107 and over	22	1,596
Silt loam.....	89 and less	43	746
	90 to 109	50	1,485
	110 and over	51	1,940

Ohio.—Effect of size (crop area) and quality of business upon labor income (245 farm records, Palmer Township, Washington County, Ohio) was determined to be:⁶⁵

TABLE 124.—EFFECT OF QUALITY OF CROPS AND STOCK UPON INCOMES—OHIO

Size (crop area), acres	Labor income		
	Poor quality (a)	Medium quality (b)	Good quality (c)
30 acres and less.....	...	\$ 72	\$137
31 to 45.....	\$63	125	214
Over 45.....	88	213	453

(a) Poor quality includes: Poor crops and poor stock; poor crops and medium stock; medium crops and poor stock.

(b) Medium quality includes: Poor crops and good stock, medium crops and medium stock; good crops and poor stock.

(c) Good quality includes: Medium crops and good stock; good crops and medium stock; good crops and good stock.

Missouri.—Relation of crop yields to labor income from Missouri studies²⁸ was found to be:

TABLE 125.—EFFECT OF CROP YIELDS UPON INCOME—MISSOURI

Crops index, per cent	Labor income		Tenants
	Owners	Part owners	
60 per cent or less.....	\$ 46	\$ -26	\$105
61 to 75.....	-21	51	128
76 to 90.....	72	442	473
91 to 110.....	376	484	601
111 to 130.....	554	1,040	857
130 and over.....	678	920	908

Survey Findings.—A more condensed and easier measure of comparison follows.⁷²

TABLE 126.—EFFECT OF CROP YIELDS UPON INCOMES (SURVEY DATA)

Area	Num- of farms	Labor income. Average of farms with			Percentage of return on investment. Average of farms with		
		Poor yields	Me- dium yields	Good yields	Poor yields	Me- dium yields	Good yields
Gloucester County, New Jersey..	125	\$515	\$ 923	\$1,609	4.5	8.7	14.5
Frederick County Maryland.....	150	181	371	551	3.6	4.7	5.5
Chester County, Pennsylvania...	502	508	892	1,129	6.1	9.1	11.3
Mercer County, Pennsylvania...	349	129	303	423	1.4	4.5	5.8
Washington County, Ohio.....	25	165	284	364	2.0	3.9	5.2
Clinton County, Indiana.....	100	198	583	890	3.9	5.5	6.9
Lenawee County, Michigan.....	453	284	517	765	3.8	5.7	7.1
Dane County, Wisconsin.....	60	266	407	561	3.6	4.0	4.9
Tama County, Iowa.....	210	676	1,309	2,158	4.2	5.3	6.2
Warren County, Iowa.....	184	233	725	936	2.5	4.0	4.8
Barry and Lawrence Counties, Missouri.....	244	120	355	682	2.2	5.4	8.6
Palouse Area, Washington and Idaho.....	246	119	434	750	5.1	6.5	7.8
Skagit County, Washington.....	202	49	147	214	2.7	3.9	4.1
Sumter County, Georgia.....	280	57	1,124	2,230	4.2	8.5	11.5

Influence of Live Stock Receipts upon Farm Profits.—On farms where live stock predominates, the quality of the stock is very important. On a majority of farms, except in the South and certain of the Western States, more of the crops are fed to live stock than are sold direct. On many farms the animals are fed with the crops, hence the production of these is a most important factor in farm profits. The best of corn and hay crops will count for little when fed to animals that make returns below the market prices for these crops. On the other hand, good live stock on the individual farms may not be profitable if not fed and cared for economically.

Good dairy stock adds materially to success in dairy farming. The following tabulation, based upon dairy income per dairy animal unit, clearly brings out this fact.

Examples of the Influence of Live Stock Receipts upon Farm Profits. Arizona.—Effect of quality in dairy live stock upon success in dairy farming in the irrigated valleys of southern Arizona⁴¹ was found to be:

FACTORS AFFECTING PROFITS

TABLE 127.—EFFECT OF RECEIPTS PER COW UPON DAIRY INCOMES—ARIZONA

Income per dairy animal	Average dairy income per dairy animal unit	Number of farms	Average farm income	Average labor income
\$55 and under.....	\$ 47	36	\$1,709	\$ 357
\$55.01 to \$ 65.....	60	50	2,405	826
\$65.01 to \$ 80.....	72	45	2,818	1,207
\$80.01 to \$100.....	89	32	2,380	1,041
Over \$100(a).....	124	29	3,249	1,745

(a) Some of the farmers in this group retailed their milk.

Michigan.—Relation of receipts per cow to labor income, 212 owner farms, Lenawee County, Michigan¹⁹ worked out to:

TABLE 128.—EFFECT OF RECEIPTS PER COW UPON LABOR INCOMES—MICHIGAN¹⁹

Receipts per cow	Having five or more cows			
	Number of farms	Average of number of cows	Average receipts per cow	Average labor income
\$40 and less.....	38	8	\$ 29	\$ 245
\$41 to \$50.....	37	9	46	361
\$51 to \$60.....	35	10	56	401
\$61 to \$70.....	37	9	65	542
\$71 to \$90.....	41	11	79	915
Over \$90.....	24	10	105	1,053
All farms.....	212	9	\$ 61	\$ 564

Pennsylvania.—Relation of receipts per cow to labor income, Pennsylvania owner farms, amounted to:⁷

TABLE 129.—EFFECT OF RECEIPTS PER COW UPON LABOR INCOMES—PENNSYLVANIA⁷

Divided according to receipts per cow	Five and more cows		
	Number of farms	Average receipts per cow	Labor income
\$ 50 and less.....	48	\$ 42	\$ 418
\$ 51 to \$ 60.....	43	68	592
\$ 61 to \$ 70.....	27	57	783
\$ 71 to \$ 80.....	51	75	782
\$ 81 to \$ 90.....	24	86	831
\$ 91 to \$100.....	39	96	1,185
\$101 to \$120.....	29	110	1,422
Over \$120.....	28	138	1,602
Total.....	289	80	\$ 906

Within the limits found in this survey the labor income increases markedly as the income per cow increases. Forty-eight farmers received \$50 or less income per cow. Their labor income was 45 per cent below the general average. Twenty-eight farms had incomes per cow of more than \$120, and their labor incomes were 75 per cent above the average.

Michigan, Wisconsin, and Minnesota.—Findings concerning income on dairy farms as affected by receipts from cows on the cut-over lands of Michigan, Wisconsin, and Minnesota, average of 164 farms, showed:⁷⁶

TABLE 130.—EFFECT OF RECEIPTS PER COW UPON INCOMES—MICHIGAN, WISCONSIN, AND MINNESOTA

Grouping	Number of farms	Average number of cows	Average income per cow	Farm income	Labor income
Less than \$50.....	64	8	\$35.10	\$ 35.75	\$-266.75
\$50 or more.....	96	12	72.30	700.00	122.30

Survey Data.—A condensed presentation is tabulated below:⁷²

TABLE 131.—EFFECT OF RETURNS FROM LIVE STOCK UPON INCOMES (SURVEY DATA)

Area	No. of farms	Labor income			Percentage of return on investment.		
		Average of farms with			Average of farms with		
		Poor live-stock returns	Medium live-stock returns	Good live-stock returns	Poor live-stock returns	Medium live-stock returns	Good live-stock returns
Frederick County, Maryland....	150	\$ 76	\$ 285	\$ 737	2.8	4.5	6.5
Chester County, Pennsylvania...	502	413	912	1,215	5.0	9.6	12.0
Mercer County, Pennsylvania...	349	136	244	473	1.4	3.9	6.3
Washington County, Ohio.....	25	54	243	528	0.2	3.5	7.6
Clinton County, Indiana.....	100	82	605	995	3.6	5.7	6.9
Lenawee County, Michigan.....	453	208	543	817	2.8	5.9	7.8
Dane County, Wisconsin.....	60	-9	500	740	1.7	4.7	6.2
Tama County, Iowa.....	210	726	1,271	2,137	4.2	4.9	6.6
Warren County, Iowa.....	184	-70	631	1,339	2.0	3.8	5.5
Barry and Lawrence Counties, Missouri.....	244	223	317	541	3.2	4.5	7.7
Palouse Area, Washington and Idaho.....	246	250	463	577	5.5	6.5	7.2
Skagit County, Washington.....	246	-79	100	393	1.7	3.8	5.3

Effect of All Four Factors upon Incomes.—The results of the effect of size of business, yield of crops, production of live stock, and efficiency in the use of labor, are evidence that no one of these is the determining factor for success. Size of business is very important, but a large business conducted without attention to these other factors will probably result in a loss. In Table 132 is shown the effect upon profits of having one, two, three, or all four factors (size of business, crop yields, production of live stock, or efficiency in the use of labor) better than the average of the region. Those with two of these factors better than the average make more than those with only one, and those with all four factors above the average far excel all others in profits. Only a small proportion, usually less than 10 per cent, of the farms are better than the average in all four respects, while from 20 to 30 per cent of the farms in each area have only one factor better than the average of the region, and from 9 to 21 per cent of the farms are below the average in all four factors.

TABLE 132.—EFFECT UPON FARM PROFITS IF ONE, TWO, THREE OR FOUR OF THE FACTORS AFFECTING FARM INCOMES (i.e., SIZE OF BUSINESS, CROP YIELDS, RETURNS FROM LIVE STOCK, AND EFFICIENT USE OF LABOR) ARE ABOVE THE AVERAGE OF THE REGION?²

Area	Number of farms	Farms above the average of the region in							
		One factor		Two factors		Three factors		Four factors	
		Per-centage of total farms	Average labor in-come	Per-centage of total farms	Average labor in-come	Per-centage of total farms	Average labor in-come	Per-centage of total farms	Average labor in-come
Frederick County, Maryland.....	150	28	\$ 94	39	\$ 400	19	\$ 774	4	\$1,288
Chester County, Pennsylvania....	502	28	432	38	827	21	1,339	6	1,807
Mercer County, Pennsylvania....	349	28	190	35	304	19	424	7	665
Washington County, Ohio.....	25	31	137	21	176	20	480	14	611
Clinton County, Indiana.....	100	27	252	29	496	22	943	9	1,606
Lenawee County, Michigan.....	453	24	321	36	467	20	930	7	1,241
Dane County, Wisconsin.....	60	24	165	35	345	25	655	6	1,044
Tama County, Iowa.....	210	29	512	30	1,352	25	2,480	5	3,700
Warren County, Iowa.....	184	28	351	36	629	16	1,339	8	1,662
Barry and Lawrence Counties, Missouri.....	244	22	168	26	450	18	527	13	898
Palouse Area, Washington and Idaho.....	246	29	117	33	501	15	1,069	7	1,186
Skagit County, Washington.....	202	27	15	35	160	16	190	8	673

Influence of High Prices on Profits.—A study of 10 farms producing fruit, poultry, stock, or field crops, in Napa County, California, for the years 1917-18-19 reflects the prosperity due to high prices received for farm

products. Continuous records for these farms resulted in findings as follows:

TABLE 133.—EFFECT OF HIGH PRICES UPON PROFITS—CALIFORNIA

	1917	1918	1919
Capital.....	\$10,461.00	\$10,814.00	\$11,293.00
Receipts.....	2,476.48	3,052.19	3,736.26
Expenses.....	1,409.17	1,585.60	1,867.80
Farm income.....	1,359.07	1,775.33	2,358.15
Labor income.....	722.78	1,178.44	1,698.50

Twenty farms in several counties of the same State show the same thing for the two years of 1918-19.

	1918	1919
Capital.....	\$21,296	\$21,706
Receipts.....	4,016	4,748
Expenses.....	2,807	2,906
Farm income.....	1,741	2,473
Labor income.....	765	1,326

Increasing Profits by Curtailing Waste

There are two ways to make money from farming. The first, and more commonly considered, is the direct method of producing crops, stock, and stock products for sale. The second method is an indirect, but by no means inconsequential way. It is to increase profits by curtailing, eliminating, and reducing waste.

In many ways the elimination of waste can be brought about, so many in fact that any presentation must be confined to outlining a few suggestions. Other ways will readily come to the reader's mind, if he be at all familiar with farming operations.

Ways of Curtailing Waste.—Ways of curtailing losses may be considered under different groupings, to cover:

- (a) Curtailing losses caused by rodents and predatory animals.
- (b) Curtailing losses caused by weeds.
- (c) Curtailing losses caused by insects and fungi.
- (d) Curtailing losses caused by disease.
- (e) Saving energy of workers.
- (f) Eliminating unprofitable operations.
- (g) Curtailing lost motion.
- (h) Instituting methods to detect waste.
- (i) Curtailing operating waste.
- (j) Curtailing wastes in feeding stock.
- (k) Curtailing wastes in boarding men.
- (l) Eliminating unprofitable investments.
- (m) Eliminating excess labor.

Examples of Ways of Curtailing Waste Are Easy to Find.—An hour's travel in almost any farming community will show ways by which profits can be increased by remedying improper practices and plain carelessness. Such things can be found as young stock pastured on wet fields without shelter; failure to remove dead stock which, if diseased, might prove a source of general infection; failure to remove pelts and hides from dead animals, chicken yards wet and muddy; swollen streams carrying off top soil from freshly plowed fields where a little levee work would have kept the water within bounds; uncrowned country roads hub-deep in mud and all but impassable; improperly built, flat, uncrowned haystacks incapable of shedding water; implements left in the fields unprotected from weather and soil; barnyards deep in water where a little draining would accomplish wonders; hogs and cattle on new alfalfa; grain in swales turning yellow for lack of attention to draining off surface water; woodwork of buildings unprotected by paint; structures blown over for failure to reinforce anchorage or foundation in time; weed seeds carried from ditchbanks to farmed fields; and so on, and so on.

Sounds rather mournful, doesn't it? Yet the remedy is simple in most cases, if proper attention and forethought are but given to the details of the business.

Curtailing Losses Caused by Rodents and Predatory Animals.—This means the destruction of rats, mice, gophers, moles, prairie dogs, ground squirrels, coyotes, skunks, weasels, wolves, hawks, and similar enemies of farming activities. It is beyond our scope to discuss methods of ridding the farm of pests, but full information concerning preventive and exterminative measures should constitute a part of the working knowledge of every farm manager. So, too, is desirable a proper discrimination between friends and enemies: *e.g.*, between hawks that harry poultry and the kindred species that live on rodents and noxious insects.

Curtailment of Losses Caused by Weeds, Insects, and Fungi.—Injurious insects, weeds, and fungi are important in direct ratio to their destructive abilities. The presence of wild morning glory, of Johnson grass, of sunflowers, of quack grass, of wild millet and others of a long list of weeds; the challenge of the codling moth, the gipsy moth, the potato beetle, the corn ear worm, the San Jose scale, the threat of grain rust, smut, potato blight, fruit scale, mildew, curly leaf, yellows;—all add to the operating costs, but if not met in a timely and proper manner they can, and often do, become very effective in reducing farm profits.

To reduce or eliminate losses due to these causes necessitates a clear understanding of the life history of the pest under consideration, and a knowledge of the feasible methods of control. To comprehend properly a plan of control, involves at times an intensive and exhaustive study in order to control effectively. Further, it is necessary to be fully informed concerning State legislation which may affect one's permitting obnoxious weeds to grow on his lands or on the bordering roadside.

Curtailing Losses Caused by Animal Disease.—This has to do with the recognizing and the preventing or remedying of such troubles as glanders or founder in horses; tuberculosis in cattle and hogs; hoof-rot, worms, or scab in sheep; cholera in hogs; pneumonia in various life stock; blackleg in cattle; and a host of other such profit reducers. Here knowledge is needed not only to recognize trouble, and to know its effect, and possible control, but to foster community regulations for the disposal of diseased stock.

Saving Energy of Workers.—Consideration of saving energy of workers may begin with the owner or manager, whose efforts can be materially aided by planning in advance of the work for sufficient labor and equipment. The energy of the men can be increased by providing good sleeping quarters, by maintaining a reasonable work day, by insisting on Sunday rests, by providing good food, by furnishing bathing and washing facilities, by eliminating unnecessary walking, by keeping equipment in first class working order. The energy of the wife or cook can be conserved by furnishing running water; by mending leaking pumps; by cutting down the distance to the fuel supply; by providing facilities for washing clothes; by adding ample shelf and cupboard room, sinks, and pantry space; by saving steps caused by long halls, many doors, or distance between household facilities; by keeping the kitchen cool in summer, by providing a screened, cool space for preparing vegetables during the hot weather.

Other ways of saving energy will suggest themselves, as a better arrangement of fields; fewer gates; use of colony instead of individual stock quarters; the supplying of ample power in plowing or other farm work; concentrating work in farm operations to decrease supervision.

Eliminating Unprofitable Operations.—Elimination of unprofitable operations is illustrated in the matter of farming hillsides so steep that the costs involved offset the profits which could be obtained if the same time and energy were expended elsewhere; in the use of steep farm roads where a gradual grade even at greater expense will ultimately reduce operating expenses more than enough to offset the cost of construction.

Curtailing Lost Motion.—The use of inferior work stock, of poorly mated teams, of worn out equipment, of insufficient help, or of not enough capital, often cuts down profits.

Establishing Methods to Detect Waste.—This refers to such provisions as a properly installed and properly kept system of farm books and records, and close study of all operations with a view to cutting down costs. Often such a system can be undertaken to marked advantage.

Reducing Various Waste.—These are legion. Agriculture offers abundant examples of items that can be utilized in efforts to increase profits. Such things can be considered as substitution of power machinery for hand labor, use of bonus system in piece work, building fences

when the ground is wet and soft, timely repairing of buildings and implements, keeping plow shares bright and sharp, using plenty of good grade oil on bearings, watering work stock often, especially in hot weather, covering sacked grain when stacked in the field, keeping mangers free of accumulations of dirt and dust, using straw instead of good hay for bedding, providing hens to pick up scattered grain, keeping a cat in the granary, keeping stock quarters clean, dry and sanitary, relying upon a good dog or two to kill rabbits, chase coyotes, protect property, kill gophers during irrigation or to drive cattle or sheep—these are all good ways to reduce operating costs. The ordering in advance of the season of parts to be held for emergencies or to replace those broken, the putting of implements in condition, the replacing of broken parts, painting wood greasing working surfaces, and equipping with wrenches and oil cans,—each is a profitable practice. The use of crude oil or distillate instead of wood or coal for heating and cooking is under some conditions in the interests of economy.

Curtailing Wastes in Feeding Stock.—Reduction of this waste may be illustrated by feeding grain to work stock after they fill up on hay or after watering; in field-feeding stock cattle, by putting out hay in small piles so that all cattle will have a chance at this feed and little will thus be lost from trampling and dirtying; by having one man among a number of workmen act as feeder, so as to save wasteful feeding of pet teams; by the use of good hay for feed only and never for bedding; by grinding or soaking hard coated grains; by chopping hay for feeding purposes; by the use of cheaper substitutes when of equal feed value.

Curtailing Wastes in Boarding Men.—Examples are numerous, as, *e.g.*, insisting that hired cooks from time to time pick off sprouts from stored potatoes and onions, that potatoes be boiled unpeeled, that bread be cut in half slices to prevent waste, that soup bones be made into soups, surplus meat into hash, and waste bread into puddings, that lettuce and onions, because of their sedative effects, be served only at night, that men carry off no good food to feed stray dogs, that boiling meat occasionally be substituted for roast, that all meats be hung up in a cool place, produced from flies, that hired cooks use tallow and fat instead of lard.

Eliminating Unprofitable Investments and Surplus Labor.—This admonition needs no special consideration here, as the reader should readily find examples of conditions which, if corrected, will make for increased profits.

CHAPTER XIV

FINANCIAL FORECAST OF PROPOSED FARM PLANS

A financial forecast, or "paper farm" as it is sometimes popularly called, is a try-out on paper of a proposed plan involving substantial money investments and transactions—a methodical predetermination, so far as possible, of the possibilities and probabilities of a given proposition.

Objects of Financial Forecast.—To test a farm by paper methods usually gives exceedingly useful insights as to its financial feasibility, capital requirements, returns, limitations; into the decisions which must be faced; into a recognition of the amount and kinds of details that are likely to be met. And it provides a means of testing plans when one is established in a farm business, just as well as for testing proposed plans after a given industry has been chosen and a farm selected.

Limitation of Financial Forecasts.—Novices figuring from available tables conclude about as follows: "The profit per hen is stated to be \$1 per year. With 5,000 hens, I am assured of a \$5,000 income," or, "beans yield 1,000 lb. under the local conditions of the farm I have in mind to buy. They are worth 3¢ a pound on the average. They cost \$20 per acre to produce. I can therefore obtain the gross income I desire—\$1,200—from 120 acres."

In actual practice, as every practical farmer well knows, the "paper profits" of the paper farm turn out a good deal differently—smaller profits will accrue in practice where large profits show on paper, greater losses will occur in practice than the preliminary figuring shows. The reason is to be found in the occurrence of elements which can not be figured in a preliminary plan, as they can not be foretold with any degree of accuracy. Presence of destructive weeds, insect pests, or certain fungi may seriously curtail production of major crops. Accidents to machinery, to implements, to work stock, to the men or to the operator, may seriously cripple operations and act as definite profit reducers. Lack of capable help in rush seasons, when the work is most pressing, a cold spell when warm sunny weather is needed, or hot spells when cool weather is most to be desired, hot drying winds at blossoming time, and drouth, are definite depressors of profit. So are floods, with their attendant washing, sediment depositing, excess watering, cutting new channels, and changing old sources of water supplies. So is fire. So is over-production with attendant low prices. Then to the regular work must be added items of extra work around the farm which are usually overlooked

in a preliminary study, such as time and labor spent in cleaning ditches, repairing levees, cleaning barns and corrals, moving stock, feeding stock, cutting firewood, harvesting ice, clearing roads, repairing buildings and fences, etc.

Justification of Financial Forecasts.—When these things are pointed out to the operating or would-be farmer who has been taken with the idea of paper farming, the first query he advances is, "Then, why go to the work of testing out a scheme on paper?" There are good reasons why the method is worth a trial by one investigating farming conditions, be he old and wise or a novice.

Necessitates Collection of Data.—The first reason is that in trying out a given scheme most individuals find it both desirable and necessary to collect a lot of data in regard to methods of handling crops and stock, cost items, and the similar matters which otherwise are likely to be passed over as immaterial or overlooked altogether.

Shows Probable Profits.—Secondly, when a given scheme is thoroughly tested out on paper it falls into one of three classes; it shows a profit, it shows a loss, or it falls on a deadline between profit and loss. Since a "paper farm" even if rightly worked out shows profits usually in excess of what can be obtained in actual practice, it is evident that those schemes which show a loss may be condemned at once, while those on the deadline had also better be discarded unless there are ways of reorganizing under a plan permitting more than average success. Therefore, as a general rule, by this kind of planning one can reduce his scheme down to a consideration of only those which indicate a possible paper profit.

Indicates Reasons for Limitations.—Lastly, the trial test may prove a means of finding out the weak spot in the plan. It may be that prices asked are too high for the land, or that too much equipment is needed, or that the land is so far from market that transportation costs are prohibitive.

Use of Financial Forecast Usually Worth While.—It is, therefore, very desirable to test out in this way any scheme whether it be large or small, contemplated or acquired, for crop production or animal industry.

Actual Practice Likely to Vary from Paper Plans.—The financial forecast is, however, but a method of studying farm businesses—prospective or actual. In actual practice a prearranged farming plan cannot be adhered to strictly. New influencing factors will occur, warranting changes from the preconceived plan. A subsequent change from crops to live stock, or in the type of crop or live stock farming, as from beans to wheat, or from dairying to sheep; a delay in operations because of labor troubles or late rains or heavy weed growth or accidents to men, work stock, or implements; unexpected occurrence of disease or insects; an unforeseen need for home production of stock feeds; a need to curtail expenses; an unlooked for rise in seed, feed, or supply prices;—these are

items that illustrate the limitations. The paper farm does, however, help a beginner to realize something of what he must look for in farming. It aids him to plan his future operations more intelligently. It assists him to discard the less profitable ventures. It offers a means of analyzing a going concern, to effect savings in overlapping enterprises, to stop gaps responsible for losses, to make adequate use of land, labor, and capital.

Procedure in Making up a Financial Forecast

The kind of information sought in drawing up a farm on paper will naturally determine the method of procedure. In any event a full description of the property and plan should precede any financial studies.

Description of the Property.—The first step in drawing up a paper plan means getting a statement of the soil, topography, market, climatic, social, and other important conditions. To secure information to this end, full use should be made of local publications like those of boards of trade, chambers of commerce, State departments such as Commissions of Agriculture and State Experiment Stations, and of all federal publications having a bearing upon the place in question, such as the Federal Farm Management surveys, the forestry reports, the U. S. D. A. Soil Surveys, and the U. S. D. A. Quadrangles. The initial statement should cover:

1. The locality in general.
2. The farm in particular according to the principles set forth in Chapter IV on "Selecting the Farm."

The description will be illuminated and rendered more interesting if photographs and maps are incorporated.

A good, clean-cut map of the property in mind should be drawn to as large a scale as possible and with clear indication of the various fence lines, ditch lines, buildings, soil types, and other factors of importance. It is well to exhibit contours and set down acreages. If the land has been in crops and the data can be secured, it would be well to show yields for as many years back as possible, with prices received and cost of production.

This map is preferably drawn on the tracing paper from which Van Dyke negatives are made, from which in turn as many white prints can be run off as may be desired. This is a distinct advantage where it is planned to carry on the operations for several years, as copies can be made, one for each year, and all bound together, giving a history of the work of the farm from one year to another.

The Plan of Work.—The proposed plan of conducting the farm should be written out in full. The mere act of visualizing the proposed business and mentally going over it step by step is good preliminary training for actual operations. If the farm is a going concern, the present method of

handling should be described, together with observations covering present status and whether good or bad results are traceable to past handling. If overstocking has injured pastures, if neglect has caused a setback in orchard trees, if soil conditions have become bad, if stock is inbred, if soil erosion is occurring; these facts should be noted, and comments added covering recommendations for changes in existing methods.

Where the business is a new one, as in developing bare land, all possible types of farming should be considered, and the advantages and objections carefully studied and weighed from the standpoints of personal desire, available capital, capacity of the farm, profitableness, home and speculative values. Much thought can well be spent investigating all possible enterprises and combinations of enterprises which appear promising in developing the farm plan.

Once the plan of campaign is decided upon, a detailed calendar of operations should be drawn up, to assist in estimating equipment needs and in checking conflicts or lapses in the farm work, to determine labor requirements, and to summarize for closer study.

The Necessary Equipment.—The equipment should be looked into. In the case of an established business this means taking an inventory of what is on hand, with special investigation of its condition. To this list should be added a full statement setting forth the amount, kind, and quality of all additional necessary or desirable equipment.

For new businesses, to be built up on bare land, the determination of equipment requires care in selecting only what is needed for the type of farming to be followed and in observing the limitations of capital, local custom, personal taste, and size of outfit.

The determination of equipment needs should include:

1. A complete list of all buildings and structures, number, type, size, construction, and materials.
2. A full list of implements and machinery requirements, to care properly for crops, stock, and chores, and to insure proper upkeep of land, buildings, fences, water supply, and working equipment.
3. A list of special equipment needed in the dairy, poultry plant, orchard, vegetable garden, or in producing or caring for special crops and stock products.

The Financial Test.—Study of the financial side should be delayed until the conditions surrounding the property are well known, the plan of conducting the farm business carefully worked out, and the equipment needs fully determined. When these matters have been attended to, the time is ripe for the financial test. Several steps are involved, the order being that which makes for ease in studying rather than the natural inclination to attempt an immediate answer of "What is this plan capable of making in the way of profit?" Much calculating is needed before the answer to this question can be given.

The calculations should include several important financial phases:

1. *Costs of Equipment.*—A careful determination of the costs of the equipment. These cost data should be very complete as shown by correctly made detailed computations based on prevailing prices. The cost of each building should be figured separately, so too the costs of work stock, tractor, or other motive power, the costs of all live stock other than work stock, the cost of each implement or item of machinery, the costs of special equipment carried out to include such things as brooms, pitchforks, buckets, etc. Pipe for conveying water for domestic or stock uses, sewer pipe, and fencing are also to be included.

2. *Costs of Establishing the Business.*—The cost of establishing the business is a determination of the period which must elapse when taking over a partly developed business or starting with bare land from the time of taking hold until the business has reached a point when the plans can be considered as fully matured. The time which must elapse varies with different businesses. With many annual field crops, the business can be fully established in a year's time. The same is often true of the range cattle business, with certain poultry plants, and in establishing a dairy on land already in crops. Alfalfa, on the other hand, requires 2 and sometimes 3 years before it can be safely turned over for pasture purposes; the planting of vineyards necessitates an interval of 3 or 4 years, and of deciduous fruits 6, 7, 8 years or even more, before these types of farming may be considered as established. Other considerations also influence, such as the necessity of clearing or reclaiming land; of breeding up stock to obtain the desired number fully to equip the business; of making necessary improvements, such as road building, draining, protection from overflow, of increasing productivity, of removing alkali, of subduing hardpan.

During this period of development, funds must be forthcoming for all the years to elapse before the business becomes self-sustaining, to meet charges for materials, labor, feed, taxes, insurance, living, personal expenses, interest on mortgages or deferred payments, land payments falling due, repairs and parts, and operating incidentals.

In taking hold of undeveloped land, allowance must be made for a period sufficient to erect buildings and fences, prepare for planting, buy equipment, and get things under way for a start at actual crop or stock production.

3. *Costs of the Established Business.*—A determination of capital needs after the business is established involves items such as labor, feed, seed, fertilizer, sacks, boxes, twine, taxes, insurance, replacement of stock, rent of machinery, marketing costs, contract work—baling, threshing, cutting wood, constructing buildings—personal expenses, incidentals as axle grease, blacksmith coal, stock salt, stock medicines, etc., repairs and parts, upkeep of buildings, fences and other improvements.

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4. *Interest on the Investment.*—If money is borrowed or if interest is demanded from the business for all capital invested, a determination is made of the amount based on the size of the investment at a fair rate of interest and the sum figured into the totals.

If the study is designed to find out how far the business is capable of meeting all justifiable financial obligations, charges should be added to cover interest on moneys invested and replacement of capital reduced by depreciation. This part can be omitted if the test is to be confined to a determination of actual capital needs only. Sums, then, are included to cover immediate replacements only.

5. *The Safety Factor.*—As described in chapter on "Capital Requirements," the safety factor should also be considered in connection with paper testing on farm plans, and a figure added to cover this item, if there are factors which can not be forecast with a reasonable degree of accuracy.

6. *Income Possibilities.*—A determination of the income. The income possibilities should be worked out for both (a) the period from time of taking hold until the business is established, and (b) for average years after the business is fully under way.

Usually the expenses exceed the receipts during periods of development, but whatever is available constitutes a sum which can be applied to the reduction of the total capital needs.

Income should be carefully and conservatively figured, to cover both sales and exchanges, and differences in the inventory. The business should be credited with all it produces that has a selling value either immediate or later.

Increase in the producing power of the land will be taken care of in crediting greater yields, whether this be due to improving fertility conditions, to growing trees, to establishing perennial crops, to providing a better plant environment as by irrigation, drainage or, to reduction of erosion, removal of alkali, protection from flooding, etc. The costs of this work, should of course appear in the estimates of expenses. For this reason indirect profits resulting from enhanced land values may be ignored. On the other hand, if the plan is a study of a proposed development scheme having sale of the property as the goal, the effect of the contemplated plan upon market prices and its ability to increase the selling value are of considerable moment.

In figuring incomes, crops retained for seed purposes, or young stock for breeding or replacement purposes, are often deducted from the statement of possible sales. If this method is pursued, care should be exercised to relieve the account of corresponding expenses, or else a duplication will occur.

When making a financial test covering the justification of the entire business, the safer, and more scientific way is to charge under

expenses all the needs of the business—seed, feed, young stock, etc., at farm prices whether these are to be purchased or home raised, and to credit it under income with all it produces. Such a method brings out in a clear, concise way the totals involved in the conduct of the business and makes possible a study of the expenses and income producing possibilities of the different departments involved.

When the determination is to be confined to an estimate of capital needs, the replacement feature can be handled by deducting from the output such feed, seed, stock, etc. as are needed for home use.

7. *Interest and Depreciation.*—Items of interest and depreciation are to be handled for the period after the business is established in the same manner as described for the years of development. The same objects of study will also rule, *i.e.*, to include all items if the study is to cover the entire business possibilities of the farming plans; or else, if the test is to be one of determining actual capital needs, to ignore all but the sums actually required to keep the business going.

Summing Up.—The next step consists in bringing together the various items for summing up the total and net investment requirements. This is figured from the expense items and possible income. With these data in completed form it is now possible to estimate the rate of returns upon the investment and to determine the actual producing value of the property. It is to this point that the previous work has all been tending.

Reviewing the Test.—The last step is a review of the entire proposed plan, a weighing of the advantages and objections, and the making of a final decision as to whether or not the scheme is worth while. Here is included the increased market value of the plant resulting from the proposed activities. Here is consideration of alternative plans, as leasing out or selling. And now that the plan has been fully worked out, it should be subjected to rechecking and reconsideration. If the profit is unsatisfactory a change may be possible in equipment costs by substituting cheaper equipment or by practicing greater economies in constructing buildings or in the plan of work, or by curtailing operating expenses, or by leasing in whole or in part instead of buying, or by developing better marketing plans.

The paper testing of a farm has great possibilities, and, moreover is both interesting and instructive.

Example of a Financial Forecast.—An example of the method of testing the financial side of a proposed farm business may perhaps be here inserted to advantage. It illustrates the need and scope of detail in testing proposed businesses and the procedure in testing financial possibilities and capital needs of a selected business.

Reverting to an Example Used Earlier.—Continuing with the 60-acre ranch, described as an example of how to estimate equipment (see pages 202 to 206) a summary of costs figures out as shown below, 1915 data being used as representative of pre-war or normal times.

FINANCIAL FORECAST OF PROPOSED FARM PLANS 307

Net Cost of Establishing Business. Cost of Equipping.—The cost of equipping, including

Land 40 acres.....	\$ 5,000
20 acres.....	4,000
	\$ 9,000
Equipment (as shown in detail on pages 209 to 212).....	5,537
	\$14,537

Time of Taking Hold.—Time of taking hold is August 1, so as to have sufficient time to put up buildings and fences, put in ditch gates, check land, and have things in readiness to sow alfalfa seed and set out trees in February. Two horses to be bought at once, together with sufficient feed to keep these horses. Two extra horses are to be hired to haul building materials and to prepare land for planting. No live stock to be purchased until feed is ready. Other two horses not to be purchased until business is established.

Figuring back from February 1, when land must be seeded, and assuming work days available as follows:

January—20
 December—20
 November—22
 October—24
 September—30

must begin work of checking by August 15.

Cost of Labor for Structures.—Roughly estimated, depending of course on the men, three men (carpenter and two helpers) should put up the buildings needed at once, *i. e.*, dwelling, barn, and ditch gates, in 40 working days. At \$4.50 for carpenter and \$2.50 for helpers, this work will cost \$360. The fencing and other buildings will be erected while the alfalfa is getting established—an extra man being hired to help on this work. The structures, other than dwelling and barn, will require additional help to the extent of \$200, 80 days at \$2.50 per day—carpenter's helper—of which \$25 is for ditch gate construction, \$60 on fences, \$25 on fruit shed, \$25 on sewer and piping, and balance on field shelters, hog pens and milk barn. Total for labor..... \$560

Cost of Rented Work Stock.—Considering hiring of extra stock and 4 horse scraper to do checking at ½ acre per day—120 days needed to check the acreage—two head of stock and harness at \$1.00 and 25¢ per day for scraper..... \$270

Cost of Surveying.—Surveying—two days at \$8..... 16

Cost of Horse Feed.—Feed for horses from August 1 to May 1 (when first hay cutting is made):

Owned stock at 20 lb. of hay, and 10 lb. barley, when working

Hay—240 days at 40 lb. = 5 ton at \$10 = \$50

Barley—150 days at 20 lb. = 3,600 lb. at \$26 = 39 (Includes 10 days hauling supplies and 20 \$89 days on intercrops)

Hired stock

40 lb. hay for 150 days = 3 ton at \$10 = \$30 (hired by month)

20 lb. barley for 120 days = 2,400 lb. at \$26 = 31

\$61

Total feed for stock until haying time..... \$150

Stock is not to be placed on the alfalfa until it is 2 years old; or if planted in February, 1918, not to be pastured until April, 1920—thus 32 months must elapse until business is fully established.

Expenses During Period of Establishing.—Expenses to be provided during this time are:

Living and salary of foreman 32 months at \$110.....	\$3,520.00
Some barley for stock—say 500 lb. each annually, 1,000 lb. for 2 years, 2,000 lb. at \$26 per ton.....	26.00
Taxes, at 1 per cent of land value and improvements, \$14,600 for 32 months.....	388.00
Blacksmith and repairs at \$25 annually.....	60.00
Alfalfa seed—35 acres at \$3.....	105.00
Extra labor—during haying at \$96 per year.....	192.00
Baling alfalfa—280 ton at \$1.75.....	490.00
Insurance to be carried on buildings at 75¢ per \$100 for average of \$1,500 for 2 years.....	15.00
Water—2 years at \$2 per acre, \$120 per year.....	240.00
Incidentals at \$50 per year—32 months (axle grease, minor repairs, shop materials).....	100.00
Office expense.....	30.00
Total expense.....	\$ 6162.00

Returns During Period of Establishing.

From corn land (2 acres) and $\frac{1}{2}$ of fruit land (12 acres) available for 2 years—can be used for tomatoes, beans, corn, sugar beets, or other high value crops; estimated returns above seed, material, and extra help to grow and sell crop at \$35 per acre per year.....	\$ 980.00
For hay—first season..... 100 tons	
second season..... 200 tons	
300 tons	
Less horse needs and reserves 20 (5 tons first year, 15 tons second year)	
Available for sale.....	280 tons
Worth.....	\$8
	<u>\$2,240</u>
	<u>2,240.00</u>

Total receipts..... \$3,220.00

Net Needs During Period of Establishing.

Labor (construction).....	\$ 560.00
Labor (haying).....	192.00
Horse hire.....	270.00
Surveying.....	16.00
Horse feed.....	176.00
Living.....	3,520.00
Taxes.....	388.00
Blacksmith and repairs.....	60.00
Seed.....	105.00
Insurance.....	15.00
Water.....	240.00
Baling.....	490.00
Incidentals.....	100.00
Office expense.....	30.00
Total needs.....	6,162.00
Less returns.....	3,220.00
OPERATING CAPITAL UNTIL ESTABLISHED.....	<u>\$2,942.00</u>

FINANCIAL FORECAST OF PROPOSED FARM PLANS 309

Operating Costs After the Business is Established.—Labor Needs
(Determined from a calendar of operations)

Outside of operator's work.

General work—480 man days at \$2.....	\$ 960.00
Fruit harvest	
Picking almonds at \$40 a ton, 6 tons.....	240.00
Picking up prunes at \$6 per dry ton, 30 tons.....	180.00
Total labor needs.....	\$1,380.00

Horse Feed

All hay raised

Should feed some barley when haying, hauling, or doing heavy work.

Extra work

Hauling fruit

Renovating alfalfa and corn land

Haying—506 10 hr. horse days, 10 lb. barley per head requires 2½ tons at \$25.....

\$ 62.50

Stock Feed.

Dairy

Fed 4 lb. concentrates for 300 days = 12,000 lbs. or 6 ton at average of \$30.....	180.00
Barley.....	\$26.00
Beet pulp.....	26.00
Bran.....	30.00
Middlings.....	40.00
Shorts.....	32.00
Average.....	\$30 00

Hogs

Require at 2 per cent live weight for growing stock 325 lb. of grain, or for 100 pigs, 32,500 lb. at \$1.00.....	325.00
Feed for pigs to weaning age at \$2.00 per litter, 20 litters	40.00
Feed for sows at ½ per cent, 400 lb. at ½ per cent = 2 lb. × 365 = 730 lb. × 10 = 7,300 lb. at \$1.00.....	73.00
Feed for boar at 2 per cent on 500 lb. 10 lb. × 365 days = 3,650 lb. at \$1.00.....	36.00
Total for Swine.....	\$474.00

Seed, Fertilizer, etc.

Cover crop seed for trees at \$2 per acre.....	40.00
Seed for corn 2 acres at 25¢.....	.50
Seed for renewing alfalfa—winter pastured by hogs 5 acres at \$3.....	15.00
Vegetable seeds.....	5.00
	\$60.50
Irrigation water 60 acres at \$2.....	120.00
Sacks, twine, boxes, etc.....	none.
Other material	
Salt, sulphur, dip.....	\$10.00
Spray.....	10.00
	\$20.00

<i>Taxes</i>	\$240.00
<i>Insurance</i> .	
Only on buildings.....	\$22.50
<i>Replacement of Stock</i>	
1 cow (no calves raised).....	85.00
<i>Rent of Extra Machinery</i>	
Silo cutter and engine at \$3.00 for 2 days.....	6.00
<i>Cost of Marketing</i> .	
Dues to almond association at 1.1¢ per pound.....	\$132.00
<i>Cost of Contract Work</i> .	
Baling 81 tons at \$1.75.....	142.00
<i>Salary</i>	720.00
<i>Office Expense</i>	50.00
<i>Incidentals</i> .—As axle grease, minor repairs, shop material, etc.	50.00
<i>Summary of Operating Needs</i>	
Labor.....	\$1,380.00
Horse feed.....	63.00
Stock feed.....	654.00
Seed, etc.....	61.00
Other material.....	20.00
Irrigation water.....	120.00
Taxes.....	240.00
Insurance.....	23.00
Replacement of stock.....	85.00
Rent of extra machinery.....	6.00
Cost of marketing.....	132.00
Contract work.....	142.00
Salary.....	720.00
Office expense.....	50.00
Incidentals.....	50.00
Total.....	\$3,746.00

Determining Income.—What income should be obtained from the dairy and how is it figured?

Dairy.—Ten dairy cows, if fairly good, will give 20 lb. of 3.8 per cent milk for 300 milking days, 6,000 lb. = 750 gal. Whole milk pays better than butterfat hence—

Sale of milk.....	\$115.00
Calf sold at \$3.....	5.00
Returns per cow.....	\$120.00
or returns from herd.....	\$1,200.00
Sale 1 cow.....	40.00

 Returns from dairy..... \$1,240.00

Swine.—What is the basis of figuring and the gross returns from the swine?

10 sows at 2 litters × 5 pigs = 100 pigs, less 2 gilts retained =	
98 pigs at 180 lb. = 17,640 lb. at 8¢.....	\$1,311.00
1 old sow sold 400 lb. at 5¢.....	20.00

 Total swine returns..... \$1,331.00

FINANCIAL FORECAST OF PROPOSED FARM PLANS 311

Hay.—How much pasture is needed for the live stock?

11 acres for cows and bull—April 1–December 1

10 sows at 400 lb. = 4,000 lb.

50 pigs at 180 lb. = 9,000 lb.

13,000 lb. at 1 ton per acre = $6\frac{1}{2}$ acres for sows.

How many horses must be kept? Four.

What will the hay needs be?

Hay for dairy

20 lb. per head (11 head) for 120 days = $13\frac{1}{2}$ tons for dairy = $2\frac{1}{4}$ acres

Hay for horses

4 head at 20 lb. for 365 days = 15 tons = $2\frac{1}{2}$ acres

or, a total alfalfa acreage of $22\frac{1}{4}$ acres.

Any hay for sale?

Thirty-five acres in alfalfa and but $22\frac{1}{4}$ acres needed, hence, $12\frac{3}{4}$ acres of hay for sale at 6 tons = $76\frac{1}{2}$ tons at \$8 = \$612.

Almonds.—What returns may be expected from 10 acres of almonds?

1,200 lb. \times 10 acres \times 14¢ = \$1,480

Prunes.—What returns may be expected from 10 acres of prunes?

6,000 lb. \times 10 acres \times 4¢ = \$2,400

Total Returns.—What total returns from the ranch?

Almonds.....	\$1,480
Prunes.....	2,400
Dairy.....	1,240
Hogs.....	1,331
Alfalfa.....	612

\$7,063

Net Income.—We are now in a position to determine the rate of interest payable on the total investment; the investment if interest is added at 6 per cent compounded annually for use of all moneys needed to bring the business to a self-supporting state; and lastly what can be paid for land if owner (a) is satisfied with 4 per cent, or (b) if he demands 10 per cent returns, presupposing that all other items remain the same,

Investment.—The total investment when investment is taken with interest compounded amounts to:

To equip.....	\$14,598
To establish.....	2,942
Total.....	<u>\$17,540</u>
Gross income.....	7,063
Operating expense.....	<u>3,746</u>
Difference.....	\$3,317

Depreciation.—Rate of depreciation to be charged:

Land.....	\$ 0
Buildings—\$1,440 at 5 per cent.....	72
Fences—\$446 at 5 per cent.....	23
Workstock—\$600 at 12 per cent.....	72
*Dairy cows and bull	
*Poultry	
*Swine	

*Covered in replacement of stock and shown in income or operating expense.

312 FARM MANAGEMENT

Implements and machinery \$809 at 10 per cent.....	81
Miscellaneous equipment	
\$460 at 10 per cent.....	46
116 at 25 per cent.....	29
Tools \$107 at 10 per cent.....	11
Trees (estimated cost \$3,000 ÷ 50 years' life).....	60
Total.....	\$394

Rate of Interest on Investment.—\$3,317 less \$394 depreciation = \$2,923 as interest on investment. This is nearly 17 per cent on investment, and if man is owner he also receives salary item. Based on no compounding of interest.

Investment by Periods.—The investment by years is:

Item	(a)	(b)	(c)
Land.....	\$ 9,100		
Buildings.....	1,146		\$ 294
Fences.....	95	\$ 371	
Work stock.....	600		
Live stock.....	25		1,180
Tools.....	107		
Fruit trees.....	385		
Ornamentals.....	10		
Miscellaneous equipment.....	219		357
Implements and machinery.....	809		
Labor (construction).....	410	75	75
Labor (haying).....		96	96
Surveying.....	16		
Stock feed.....	150	13	13
Seed.....	105		
Water.....		120	120
Taxes.....	96	146	146
Blacksmith and repairs.....	30	15	15
Insurance.....			15
Hired stock.....	270		
Rental of machinery.....			
Contract work.....		245	245
Office expenses.....	10	10	10
Incidentals.....	50	25	25
Salary.....	880	1,320	1,320
Total.....	\$14,413	\$2,436	\$3,911

(a) Preliminary period, April 1—August 1—(8 months)

(b) April 1—April 1 (12 month)

(c) April 1—April 1 (12 month)

FINANCIAL FORECAST OF PROPOSED FARM PLANS 313

	(a)	(b)	(c)
Totals.....	\$14,413	\$2,436	\$3,911
Returns.....	0	1,250*	1,970**
	<hr/>	<hr/>	<hr/>
Actual cash needs.....	\$14,413	\$1,186	\$1,941

Compounding Interest.

Interest at 6 per cent for period (a).....	\$ 576
Investment beginning period (b).....	14,989
Capital needs for period (b).....	1,186
Investment end of period.....	16,175
Interest at 6 per cent for period (b).....	971

Investment beginning of period (c).....	17,146
Capital needs for period (c).....	1,941
Interest at 6 per cent per period (c).....	1,145

Investment when established..... \$ 20,232

Land Values.

(a) Since land represents \$9,000 of \$20,232, rest of investment is \$11,232

Interest at 4 per cent on this = \$448

\$2,923 less \$448 = \$1,474 as interest on land

\$1,474 ÷ 4 × 100 per cent = land worth \$36,850, or \$614 per acre with improvements.

(b) Interest at 10 per cent on \$11,232 = \$1,123

\$2,923 less \$1,123 = \$1,800 interest on land, or at 10 per cent, land is worth \$18,000 = \$300 per acre.

Note difference when borrowing capital vs. charging no interest for own capital i.e., costs \$20,232 - 17,540 = \$2,692 increase

*From corn land and intercrops in orchard.....	\$ 490
From hay land (100 tons less 5 tons horse needs) 95 tons at \$8	760

**From corn land and intercrops in orchard.....	\$ 490
From hay land (200 tons less 15 tons horse feed and reserves) 185 tons at \$4.....	1,480

CHAPTER XV

FARM MANAGEMENT SURVEYS

Farm management surveys are conducted along three general lines:

- (a) To provide a financial analysis of the year's business of selected farms.
- (b) To determine, from farmer's estimates, cost of production.
- (c) To obtain information regarding farm practices.

Warren in a Cornell University publication has summed up in a clear and concise way the objects of agricultural surveys, the importance of knowing the normal, the facts that can be determined by studying farms, the relative costs of surveys, their limitations, and the order in which they should be done. In his summary a brief historical sketch of the development of statistical agricultural surveys is included. He also discusses the accuracy of the survey method. As to methods, Warren points out the necessity of a definite object, the limiting of the scope of the survey, the complete filling of each record, and the general organization of the party and the conduct of its work. He ends with a study of the data themselves. The bulletin is a well presented discussion of agricultural surveys.⁷⁷

Purposes of Farm Management Surveys.—More in detail, the purposes of these surveys—sometimes called “farm business analysis surveys”—are (a) to determine the fundamental factors which make some farms of an area more profitable than others—such factors as utilization of land area, sources of income, operating expenses, crop yields, and live stock production; (b) to determine the standards of operation for the farms of various types and sizes, such as the proper distribution of investment, efficiency of man and horse labor, etc; (c) to study the various forms of land tenure; (d) to determine the yearly variations of profit on individual farms and on regional groups of farms; (e) to determine, as far as practicable, the effect of such factors as rainfall, market prices, crop yields live stock losses, etc., upon profits and upon the magnitude of the affected enterprises over a period of years.

Method of Making Farm Management Surveys.—By the survey method, qualified investigators visit growers in selected districts, and, with blanks prepared previously, seek by questions to draw forth the

desired data. These are recorded as given, and later tabulated for the deducing of conclusions. In farm business analyses, investigators attempt to gather definite figures covering the previous year; in cost of production studies, the questioning aims to develop estimates of usual or normal costs and activities.

Use of the Survey Method for Collecting Farm Management Data.—The survey method has been used extensively by the Office of Farm Management of the United States Department of Agriculture and by a number of state colleges.

This type of investigation has been conducted throughout the country with marked uniformity. Its use has been brought about principally by the cooperative methods used by the Federal Office of Farm Management in furnishing colleges and other institutions with practically all the blanks, together with the publication in 1915, by the Office, of *Farmer's Bulletin* 661, "A Method of Analyzing the Farm Business."

Its use can be defended on the grounds that it is a saver of costs and time, and that, if a sufficient number of records are taken, it is a reasonably accurate index of existing conditions.

A discussion of the accuracy of the survey data and deductions, with a justification of the survey method, is given by Spillman in a publication of the Office of Farm Management.⁷⁸

Personal Opinion Concerning Farm Management Surveys.—My own conclusions covering a rather complete study of farm management surveys is that the greatest value lies in furnishing information upon what is being done in given localities; they present a picture of agriculture in each community studied. Perhaps their greatest value lies in educating the investigator. And at that, a man to do farm management survey work must have had adequate farm contact and training to insure successful taking of records. The requirements include tact in dealing with farmers, ability to draw out the necessary information, intelligence and industry in filling out and interpreting findings.

Much interpretation is needed, as the influence of war conditions, hail storms, labor, loss through epidemics, etc.; more interpretation than a layman can give.

Farm management survey data provide valuable material for purely scientific analysis. They may be of small interest or value to the active farm manager, except as general rules or basic principles, yet the mere furnishing of data to the farm management surveyor may be a happy stimulus to the farmer. Question and answer compel him to make a mental review of his affairs; this often means a new perspective, perhaps for the first time a good look at his operations from a business point of view. A good illustration of this reaction upon farmers interviewed and their neighbors is found in the numbers whom the surveys have set to doing something in the way of farm bookkeeping.

Single Year vs. Continuous Records.—Out of the experiences in conducting farm management surveys two lines of investigation have developed:

1. An investigation which covers a study of farms for a single year.
2. Studies of the same farm carried over a period of successive years.

Experience shows that each of these types of study has its value, depending upon the information desired and the type of farming under consideration.

Surveys Are Based on Farmers' Estimates.—Farm management surveys must be conducted with great care, and the results used with caution. Being a compilation of farmers' estimates, the possibility of error is greater than in industrial cost accounting studies. To insure reasonable accuracy, the individual farm records must be strictly confined to comparable farms, they must be taken by interviewers skilled in conducting examinations, and they must be carefully computed according to the best method of analyzing data. The survey method results in a presentation of estimates, and as such must rest on as extensive and substantial a foundation as possible. Estimates may be made over a wide range of subjects. They may consist of a determination of the year's sales, farm prices, and purchases, and from these more simple findings progress to estimates of actual productive man and horse labor, materials used in production, and to estimates of rates to cover machinery charges, pro rata of taxes, insurance and overhead items.

Possible Objection to Method of Reporting Survey Data.—A possible objection may be registered in that farm management surveys tend to reduce all investigations to terms of dollars and cents, ignoring, perhaps unfortunately, the personal element involved in farming operations. By the personal element is meant the general capacity of the operator, the tastes and wishes of the family, handicaps like ill health, wilfulness, discontent, extravagance, penuriousness, and similar traits.

Sample Forms Used in Farm Management Survey Work.—The scope of information obtainable, is, however, great. Examples of the kind of data obtained from farm management surveys can be gathered by a study of sample forms.

No. 2

	CROPS			FIELD				OPERATOR'S SALES			LANDLORD'S SALES		
	SPAN.	ACRES.	PER ACRES.	TOTAL	AMOUNT	PER ACRES	TOTAL	AMOUNT	PER ACRES	TOTAL	AMOUNT	PER ACRES	TOTAL
Wheat													
Alfalfa													
Oat hay													
Oats and barley													
Oats and peas													
Field beans													
Cabbage													
Tobacco													
Hops													
Beans													
Peas													
Apples, bearing													
Apples, not bearing													
Other fruit													

CROPS HELD FOR SALE

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
FARM MANAGEMENT

No. 1 Date _____

Name _____ State _____ P. O. Address _____ Age _____

Operator _____ P. O. Address _____ Age _____

Landlord _____ Soil type _____ Area owned by landlord _____ Share rented _____

Township _____ Location _____ Owned by operator _____ Cash rented _____ Waste, roads, etc. _____

Forest area _____ Woods pastured _____ Other pasture not tillable _____ Total pasture _____

Woods _____ Permanent pasture tillable _____ Pasture in rotation _____

LANDLORD'S SALES

	CROPS			FIELD				OPERATOR'S SALES		
	SPAN.	ACRES.	PER ACRES.	TOTAL	AMOUNT	PER ACRES.	TOTAL	AMOUNT	PER ACRES.	TOTAL
Corn for grain										
Corn for silage										
Other corn										
Potatoes										
Spring wheat										
Winter wheat										
Rye										
Oats										
Barley										
Stock wheat										
Straw										

OPERATOR'S LIVE STOCK

No. 2

	ANIMALS						SALES				FORAGE		SHEP.	
	SPAN.	NO.	TOTAL	TOTAL	NO.	TOTAL	NO.	PER ACRES	TOTAL	NO.	TOTAL	NO.		
Cows														
Heifers														
Calves														
Bulls														
Spent														
Swine														
Horses														
Mules														
Oxen														
Ewes														
Lambs														
Breed cows														
Other hogs														
Pigs														
Chickens														
Turkeys														
Ducks														
Geese														

A=Jan.; B=Feb.; C=Mar.; D=Apr.; E=May; F=June; G=July; H=Aug.; I=Sept.; J=Oct.; K=Nov.; L=Dec.

FORM 1.—Example of Blank Forms Required in Making Farm Financial Surveys, U. S. D. A. Field Sheets.

FARM MANAGEMENT

RECEIPTS										No. _____
DATE RECEIVED	AMOUNT	FROM	DESCRIPTION	LANDLORD	RECEIVED BY	DATE	DESCRIPTION	LANDLORD	RECEIVED BY	DATE
Butter							Labour			
Creamery milk							Mechanics work			
Market milk							Cash rent for acres			
Wool							Rest of buildings			
Eggs							Hay and sugar			
Smelting loss							Lumber, posts, wood, etc.			
Other										
Money										

FEED AND SUPPLIES					
DATE	AMOUNT	FROM	DESCRIPTION	LANDLORD	RECEIVED BY
Hay					
Wheat					
Oats					
Barley					
Other					
Total					

CAPITAL										No. _____
VALUE OF FARM BUILDINGS AND DEPRECIATION CHARGES					DEPRECIATION CHARGES					
DESCRIPTION	AMOUNT	PERCENT	REMAINDER	DATE	DESCRIPTION	AMOUNT	PERCENT	REMAINDER	DATE	
Real estate value					Depreciation					
Cash on hand					Depreciation					
Improvements					Depreciation					
New buildings					Depreciation					
New fences					Depreciation					
The doctor					Depreciation					

NOTES:

Breed of cows _____ Number purchased _____ Years in this breed _____

Breed of bull used _____ Years used this breed _____

Breed of sheep _____ Number purchased _____

Amount of operator's mortgage _____ Interest rate _____ %

Education _____

Occupation of landlord _____

Was he ever a farmer? _____ On this place _____

Years farm has been tenanted _____

Operator farmed in what other States? _____

Reasons for shifting _____

Business of farmer's labor _____ No. months _____

Number in family on farm _____ Under 10 years _____

Number in family not on farm _____

No. boys not on farm who are farmers _____

No. girls not on farm who are farmers _____

Highest school attended by operator _____

Years in this school _____

Years farm laborer _____ Other occupations _____

Years tenant _____ On this farm _____

Years owner _____ On this farm _____

Account _____

Grade _____

Encumbrance _____

LANDLORD'S LIVE STOCK														No. _____
DATE	CATTLE				HORSES				PORKERS				SHEEP	
	NO.	SEX	AGE	WEIGHT	NO.	SEX	AGE	WEIGHT	NO.	SEX	AGE	WEIGHT		
Owned														
Not owned														
Total														

MACHINERY									
VALUE AT BEGINNING OF FARM YEAR									
DATE	NO.	DESCR.	1911			1912			REMARKS
			NO.	EXH.	VAL.	NO.	EXH.	VAL.	
Owned		Heavy wagon							Key lock and anchor
Not owned		Wagon, light, right, etc.							Machine operator
Owned		Light wagon							Feed grinder
Not owned		Flume wagon							Corn sheller
Owned		Single plow							Endless center
Not owned		Walking plow							Corn chaffer
Owned		Barley plow							Potato planter
Not owned		Disk harrow							Potato cutter
Owned		Spoke-tooth harrow							Potato sprayer
Not owned		Wagon, light, right, etc.							Potato digger
Owned		Spoke-tooth harrow							Outboard sprayer
Not owned		Roller							Gasoline engine
Owned		Wagon							Truck pump
Not owned		Corn planter							Wool mow
Owned		1-horse cultivator							Wool harrow
Not owned		2 or 3 horse cultivator							Light harrow
Owned		Corn binder							

FORM 1.—(Continued).

**U. S. DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
FARM MANAGEMENT**

Farm No. _____ State _____ County _____

Farm year beginning _____ 191__

FARM INFORMATION										CURRENT EXPENSES			NOTES			
Operator	P. O. Address			Age			Farm	Operator	Landlord	Breed of cows	Number pure bred					
Landlord	P. O. Address			Age						Breed of bull used	Years used this breed					
Township	Soil types			Topography			Miles from market			Breed of sheep	Number pure bred					
Location	Acres owned by landlord			Cash rented			Shares rented			Amount of operator's mortgage, \$	Interest rate, %					
Farm area	Owned by operator			Woods pastured			Other pasture not tillable			Rotation						
Woods	Permanent pasture tillable			Pasture in rotation			Total pasture			Occupation of landlord						
Tillable area										Was he ever a farmer?	On this place?					
RECEIPTS FROM STOCK PRODUCTS										Repair of machinery			Years farm has been tenanted			
RECEIPTS FROM STOCK PRODUCTS										Repair of other buildings			Owned farm in what other States			
RECEIPTS FROM STOCK PRODUCTS										Repair of fences			Reasons for shifting			
RECEIPTS FROM STOCK PRODUCTS										Feed: Hay, silage, etc.			* Estimate of farmer's labor			
RECEIPTS FROM STOCK PRODUCTS										Feed: Grain concentrates			Number in family on farm			
RECEIPTS FROM STOCK PRODUCTS										Silo filling			Under 16 years			
RECEIPTS FROM STOCK PRODUCTS										Corn shedding			Number of boys who are farmers			
RECEIPTS FROM STOCK PRODUCTS										Milk hauling			Number of girls who are farmers			
RECEIPTS FROM STOCK PRODUCTS										Ice			Highest school attended by operator			
RECEIPTS FROM STOCK PRODUCTS										Horsehoes			Years in this school			
RECEIPTS FROM STOCK PRODUCTS										Breeding fees			Years a farm laborer			
RECEIPTS FROM STOCK PRODUCTS										Veterinary			Years tenant			
RECEIPTS FROM STOCK PRODUCTS										Seed, plant, trees			Years owner			
RECEIPTS FROM STOCK PRODUCTS										Fertilizer, manure			Accounts			
RECEIPTS FROM STOCK PRODUCTS										Spray material			Enumerator			
RECEIPTS FROM STOCK PRODUCTS										Twine			EFFICIENCY FACTORS			
RECEIPTS FROM STOCK PRODUCTS										Tanning			Live Stock			
RECEIPTS FROM STOCK PRODUCTS										Baling			Aver. No.			
RECEIPTS FROM STOCK PRODUCTS										Machine work hired			Units			
RECEIPTS FROM STOCK PRODUCTS										Fuel and oil for farm work			Net Receipts			
RECEIPTS FROM STOCK PRODUCTS										Barrels, bags, crates			Per head			
RECEIPTS FROM STOCK PRODUCTS										Cotton ginning			Per unit			
RECEIPTS FROM STOCK PRODUCTS										Insurance			Dairy cattle			
RECEIPTS FROM STOCK PRODUCTS										Taxes			Beef cattle			
RECEIPTS FROM STOCK PRODUCTS										Water tax			Horses and mules*			
RECEIPTS FROM STOCK PRODUCTS										Cash rent			Sheep			
RECEIPTS FROM STOCK PRODUCTS													Swine			
RECEIPTS FROM STOCK PRODUCTS													Poultry			
RECEIPTS FROM STOCK PRODUCTS													Total average			
RECEIPTS FROM STOCK PRODUCTS													* Work stock reserved			
RECEIPTS FROM STOCK PRODUCTS										TOTALS			VALUE OF BLDGS. AND DEPRECIATION CHARGES			
RECEIPTS FROM STOCK PRODUCTS										Value			Value farm feed			
RECEIPTS FROM STOCK PRODUCTS										Operator			Feed per L. S. unit			
RECEIPTS FROM STOCK PRODUCTS										Landlord			Total feed			
RECEIPTS FROM STOCK PRODUCTS										\$ of			Number of men			
RECEIPTS FROM STOCK PRODUCTS										Other buildings			M. W. units cross			
RECEIPTS FROM STOCK PRODUCTS										\$ of			Total M. W. units			
RECEIPTS FROM STOCK PRODUCTS										\$ of			Per man			
RECEIPTS FROM STOCK PRODUCTS										\$ of			No. work horses			
RECEIPTS FROM STOCK PRODUCTS										Total charge			Crop area			
RECEIPTS FROM STOCK PRODUCTS										Machinery			H. W. units			
RECEIPTS FROM STOCK PRODUCTS										Improvements and equipment			Per work horse			
RECEIPTS FROM STOCK PRODUCTS										New buildings			No. cows			
RECEIPTS FROM STOCK PRODUCTS										New fences			Receipts per cow, milk products			
RECEIPTS FROM STOCK PRODUCTS										Tile drains			Per cent receipts crops			
RECEIPTS FROM STOCK PRODUCTS										New machinery			Working capital			
RECEIPTS FROM STOCK PRODUCTS										Percent received on investment			Crop index			
RECEIPTS FROM STOCK PRODUCTS													L. S. index			
RECEIPTS FROM STOCK PRODUCTS													Size index			
RECEIPTS FROM STOCK PRODUCTS													Diversity index			

FORM 2.—Example of Office Summary Sheet for Condensing Items from Field Sheets (e.g. Form 1) of Farm Financial Studies. This one used by U. S. D. A.

FARM MANAGEMENT SURVEYS

FARM NO.														
Crops			Yield			Farm Sales			Operator's Sales			Landlord's Sales		
Kind	Acres	Per acre	Total	Amount			Price			Value				
				Amount	Price	Value	Amount	Price	Value	Amount	Price	Value		
Corn for grain														
Corn for silage														
Other corn														
Peanuts														
Spring wheat														
Winter wheat														
Rye														
Oats														
Barley														
Buckwheat														
Sow														
Hay														
Alfalfa														
Oat hay														
Oats and barley														
Oats and peas														
Field beans														
Cabbage														
Tobacco														
Hops														
Beets														
Beets														
Beets														
Apples, bearing														
Apples, not bearing														
Peaches														
Cherries														
Pears														
Strawberries														
Crops held for sale														
TOTALS														

OPERATOR'S STOCK														
Animal-kind	Sales			Purchases			Died							
	No.	Value	Total	No.	Value	Total								
Cows														
Heifers														
Calves														
Bulls														
Steers														
Oxen														
Horses														
Mules														
Colls														
Ewes														
Lambs														
Brood sows														
Other hogs														
Pigs														
Chickens														
Turkeys														
Ducks														
Bees														
TOTALS														

LANDLORD'S STOCK														
Animal-kind	Sales			Purchases			Died							
	No.	Value	Total	No.	Value	Total								
Cows														
Heifers														
Calves														
Bulls														
Steers														
Oxen														
Horses														
Mules														
Colls														
Ewes														
Lambs														
Brood sows														
Other hogs														
Pigs														
Chickens														
Turkeys														
Ducks														
Bees														
TOTALS														

1, 2, 3, 4, Feb.; 5, Mar.; 6, Apr.; 7, May; 8, June; 9, July; 10, Aug.; 11, Sept.; 12, Oct.; 13, Nov.; 14, Dec.

FORM 2.—(Continued).

UNITED STATES DEPARTMENT OF AGRICULTURE

Office of Farm Management
Farm Organization and Practice in Wheat Farming

Date _____

State _____ County _____ Township _____
Operator _____ P. O. Address _____ Location _____

ACRES AND YIELD OF FIELD CROPS

Crops	Winter wheat	Summer wheat	Barley	Oats	Corn							Acres	Value	
													per acre	
Acres.....													In farm.....	Share % Cash \$
Yield 191.....												Cultivation.....		
High yield.....												Pasture.....		
Low yield.....												Woods and waste.....		
Estimated average yield.....												Owned.....		
Per cent sold.....												Rented for Wheat.....		
Farm value 191.....														

LIVE STOCK KEPT AND RAISED ON FARM

Kind of animals	Work stock	Other horses	Colts raised	Dairy cows	Other cows	Calves raised	Heifers	Other stock and beef calves	Ewes	Lambs raised	Sows	Pigs raised	Poultry	Chickens raised	Live stock units
Number.....															
Value.....															
Cash receipts 191.....															

Notes: Description of soil _____ Surface _____
 Total value of implements _____ Dwelling _____ Other buildings _____ Fences _____ Water fixtures _____
 Drains _____ Value of live stock purchased 191 _____ Value of feed purchased 191 _____

HARVESTING

Usual practice	Acres	Yield per acre	Size of machine	Crew		Usual number of days	Usual season	Man hours per acre	Horse hours per acre
				Men	Horses				
Bind and shock.....									
Stack.....									
Head and stack.....									
Combined harvester and thrasher.....									

FORM 3.—Example of Field Form for Collecting Data on Farm Organization and Practice in Crop Production. This One Used by U. S. D. A. for Wheat Studies.

THRASHING

Usual practice	Number of acres	Yield, bushels	Usual number of days	Bushels per day	Crew furnished by farmer		Number of horse feeds furnished		Charge per bushel	Usual season	Man hours per acre	Horse hours per acre
					Men	Horses	Farmer	Thrasher				
Thrash from shock.....												
Thrash bound grain in stack.....												
Thrash headed grain.....												
Combined harvester and thrasher.....												

HAULING AND MARKETING

	Grain, machine to granary	Machine to market	Granary to market	Total	Notes
Distance hauled.....					
Amount hauled.....					
Crew { Number of men.....					
{ Number of horses.....					
Loads per day.....					
Hours per acre.....					

FITTING SEED BED AND SOWING GRAIN

Usual practice	Acres, number	Plow times	List times	Disk times	Harrow times	Roll times	Plank times	Sled down	Spread manure	Spread straw	Drill	Usual number days required	Total hours	
													Man	Horse
Wheat after row crop	*(1) *(2) *(3) *(4)													
Wheat after small grain or sod	(Plow) (List) (Disk) (Stubble in) (Summer fall)													
Usual crews { Men.....														
{ Horses.....														
Size of implements.....														
Acres per day.....														
Usual hours per acre.....														
Usual price of work hired (per acre or day).....														
Season.....														

* (1) Drill in standing corn between rows. (2) Drill in after cutting row crop without fitting. (3) Drill after disking or harrowing. (4) Plow harrow and drill.

FARM MANAGEMENT SURVEYS

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HORSE LABOR CHARGES

Item of cost	Quantity per horse	Price	Expense per item
Grain.....	lb.	per cwt.	
Hay.....	lb.	per cwt.	
Pasture.....		per mo.	
Interest.....		per cent	
Depreciation.....		per cent	
Shoeing.....	times	each	
Hours per year horse work.....		Total expenses.....	
Cost per hour.....		Hours	
		Cents	

MAN LABOR CHARGES

Kind of labor	Number	Days employed	Hours per day	Cash wages		Board and perquisites		Wage per hour
				Day	Month	Day	Month	
Regular month hands.....								
Harvest hands.....								
Thrashing hands.....								
General day labor hired.....								
Operator labor.....								
Family labor unpaid.....								
Supervision.....								

QUANTITY AND PRICE OF MATERIAL PER ACRE

Item	Quantity per acre	Price	Per cent charged to wheat	Cost per acre
Seed.....				
Twine.....				
Commercial fertiliser.....				
Lime.....				
Green manure (include cost of seed, sifting and planting).....				
Stable manure.....				
Chemicals.....				
Fuel.....				

INSURANCE

Kind of insurance	Basis of charge		Rate, per cent	Charge per acre
	Bushels per acre	Dollars per acre		
Hail.....				
Fire.....				
Tornado.....				

CREDITS

Item	Quantity	Value per acre
Straw.....	lb. per acre	
Pasture.....	acres per A. U.	

USE OF IMPLEMENTS

	Number	Size	Cost new	Cost to wheat		Per cent annual charge for interest, repairs, oils, depreciation	Annual charge to wheat
				Per cent	Amount		
Binder.....							
Header.....							
Combine.....							
Disk harrow.....							
Sulky plow.....							
Gang plow.....							
Walking plow.....							
Mower.....							
Rake.....							
Hay loader.....							
Road wagon.....							
Low truck wagon.....							
Barges and racks.....							
Drill.....							
Corn planter.....							
Lister.....							
Disk sled.....							
1-row cultivator.....							
2-row cultivator.....							
1-horse cultivator.....							
Harrow.....							
Roller.....							
Tractor.....							
Truck.....							
Small engine.....							
Electrical generator.....							
Elevator.....							
Farming mill.....							
Miscellaneous tools.....							
Total.....							
Per acre.....							

U. S. DEPARTMENT OF AGRICULTURE
 OFFICE OF THE ASSISTANT SECRETARY FOR STATISTICS

State _____ County _____ Location _____
 Operator _____
 Total land, acres _____
 Apple bearing _____
 Acres _____

CHERRY ORCHARD

Crop _____
 Total per acre _____
 Investment _____

Land and Improvements

Equipment _____
 Work year (months) _____
 Other _____

Yield

Value of apple load, per acre _____
 Actual value of apple load, per acre _____
 Value of load per month, \$ _____
 Picking cost of season _____

Month	1918				1919				1920			
	Acres	Value	Cost	Net	Acres	Value	Cost	Net	Acres	Value	Cost	Net
Jan												
Feb												
Mar												
Apr												
May												
June												
July												
Aug												
Sept												
Oct												
Nov												
Dec												

Spent per day required for one man to do above _____
 Value of load per month, \$ _____ Total for year, \$ _____
 Total acres, including land, \$ _____ Total hours _____ Bushes per hour _____

OTHER LABOR OR LABOR BY OCCASION

OPERATION	Hours	Rate	Total	Per Acre	Per Bush	Per Ton
Mowing						
Pruning						
Hoisting brush						
Planting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						

Cost of Labor

OPERATIONS	Acres	Value	Cost
Pruning			
Harvesting			
Marketing			
Transporting			
Harvesting			
Marketing			
Transporting			
Harvesting			
Marketing			
Transporting			
Harvesting			
Marketing			
Transporting			
Harvesting			
Marketing			
Transporting			
Harvesting			
Marketing			
Transporting			
Harvesting			
Marketing			
Transporting			

Value of crop grown _____
 Value of fruit _____
 The orchard harvested with crop _____

CHERRY ORCHARD, COSTS YEAR LABOR (CONTINUED)

Crop or crop	1918		1919		1920	
	Acres	Value	Acres	Value	Acres	Value
Pruning						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						
Harvesting						
Marketing						
Transporting						

Freight and storage _____
 Shipping in season _____

Yield

Yield, No. bushels _____
 No. bushels _____

Per cent of crop stored _____
 Length of time stored _____
 Per cent waste in storage _____
 Price at harvest time, per bushel _____
 Price received for stored apples _____
 Amount of deficit _____
 Pints received _____
 Amount of table apples _____
 Price received _____

Times Over:

Item	Total	Per Acre	Per Bushel
Labor—Man			
Man			
Water			
Direct expense			
Taxes			
Insurance			
Machinery			
Interest on investment			
General expense			
Times			
Quality			
If any over			

Depth of plowing _____ inches
 Day on which season is applied _____
 Description of soil _____ Depth _____
 Description of soil _____
 Surface—Elevy, rolling, level _____
 Fertilizer _____ lbs. _____
 Distance from shipping point _____ miles
 Distance from marketing market _____ miles

FORM 4.—Example of Enterprise Survey Blank Form. Field Sheets Used by U. S. D. A. in Determining Costs of Apple Production.

List of Farm Management Surveys

Farm management surveys are being conducted by many states and by the United States Department of Agriculture, working in cooperation and separately. New publications are constantly appearing so that an exhaustive list is not possible. From the score or more surveys, the results of which have been published, the following selections will show the scope of the findings and the data in completed form for use in a given locality. The list is fairly indicative of what is now available. It is arranged in order of dates of publishing.

1. **Federal Farm Surveys.**—In 1909 the New Hampshire Agricultural College and the Office of Farm Management of the United States Department of Agriculture, then in the Bureau of Plant Industry, conducted a careful study of the equipment, expenses and incomes of 266 farms in the townships of Amherst, Hollis, Lyndeboro, and Milford, a group of four townships in the southern part of Hillsboro County, New Hampshire. The purpose of the survey was to determine the relative condition of the farms in the region, the prevailing types of farming, and their relative profitableness. The results were published by E. H. Thomson as *Circular 75* of the United States Department of Agriculture, Bureau of Plant Industry, issued March 16, 1911. No one type of farming was found to predominate in the region, although fruit growing, poultry raising, and dairying are rather widely practised.

2. A survey to determine the profits that farmers receive in irrigated districts and to analyze the farm business as to the factors affecting incomes was conducted in the Utah Lake Valley of Utah. Records were taken covering the crop year of 1913 from 118 farms, small in area, and intensively farmed. Sugar beets and fruit are the most important crops in connection with general farming, dairying, and poultry production. The findings were published as U. S. Department of Agriculture *Bulletin 117*, contribution from the Bureau of Plant Industry, E. H. Thomson and H. M. Dixon, joint authors, dated July 24, 1914.

3. A survey of three representative areas in Indiana, Illinois, and Iowa to determine profits and the factors controlling income was conducted in 1911. Records were obtained from about 700 farms in Clinton and Tipton Counties, Indiana; Cass and Menard Counties, Illinois; and Guthrie and Greene Counties, Iowa, where the agriculture largely consists of corn, oats, wheat, hay, and clover seed. The results were published as *Bulletin 41* of the United States Department of Agriculture, contribution from the Bureau of Plant Industry, dated January 14, 1914, E. H. Thomson and H. M. Dixon, authors dated July 24, 1914.

4. A survey taken during 1911-12 in Chester County, Pennsylvania, had for its objects the working out of a method of studying regional farm management problems, the discovering of fundamental principles of

farm management, and a trial application of these principles to a definite agricultural region. Records were taken from 643 farms in an old and prosperous agricultural region growing cereals, potatoes, and fruit, and producing dairy and poultry products. The findings were contributed as a *Professional Paper* from the Office of Farm Management, and were published as *Bulletin* 341 of the United States Department of Agriculture, Office of the Secretary, under date of January 17, 1916. W. J. Spillman, J. M. Dixon, and G. A. Billings are the joint authors.

5. A survey of the muck land farms of northern Indiana and southern Michigan was conducted in 1914-15 to study their organization, the most profitable practices, intensive and extensive methods of handling, and methods of utilizing unimproved lands of this type. Records were secured from 140 farms growing celery, onions, cabbage, potatoes, and peppermint as intensive crops, or else practicing extensive farming with corn, oats, wheat, with some cattle and hogs. The results were published October 10, 1916 by the United States Department of Agriculture as *Farmer's Bulletin* 761 from the Office of Farm Management, Office of the Secretary, H. R. Smalley, author.

6. A survey of the cut-over timber lands of northern Wisconsin, Michigan, and Minnesota, covering 801 farms, was carried on in 1915 to determine the most profitable farm practices and factors essential to the development of the region. The type of farming was found to be not definitely established, corn, hay, and oats being the predominating crops together with some dairying, hog raising, and highly specialized mixed farming. The results appeared as *Bulletin* 425, from the Office of Farm Management, Office of the Secretary, United States Department of Agriculture. Published October 24, 1916, J. C. McDowell and W. B. Walker, authors.

7. In 1913, 534 farms of Sumter County in central Georgia were surveyed to bring out the economic significance of such factors as tenure, size of farm, farm organization, crop yield, and cost of cotton production. The area is devoted approximately one-third to cotton, one-third to pasture and miscellaneous crops, one-third to uncleared timber. The results are given in a *Professional Paper, Bulletin* 492 of the United States Department of Agriculture, Office of Farm Management, Office of the Secretary, published February 10, 1917, H. M. Dixon and H. W. Hawthorne, authors.

8. Farming in the bluegrass region of Kentucky as represented by Mason, Scott, and Madison Counties constituted the basis of study of organization and management of 178 Kentucky farms. The area produces principally live stock, tobacco, corn, wheat, and hemp. The study comprises the United States Department of Agriculture *Bulletin* 482, Office of the Secretary, Office of Farm Management, published February 19, 1917, J. H. Arnold and Frank Montgomery, authors.

9. A survey conducted in 1914 covering 104 farms in the Provo area of the Utah Lake Valley in Utah repeated a previous study in this section (see No. 2 listed above) to check the results of the first survey. The findings appeared as United States Department of Agriculture *Bulletin* 582, from the Office of Farm Management, Office of the Secretary, under date of January 7, 1918, L. G. Connor, author.

10. Factors of successful farming as practised near Monett, Missouri, were made the object of a survey of 274 farms during 1915 in the Ozark district in the southwestern part of the state. Very few stock or poultry farms were found, the chief crops being wheat, corn, oats, hay, and apples and small fruits. The study aims to analyze the farm businesses as collected and show the factors of successful farming. The findings are embodied in the United States Department of Agriculture *Bulletin* 633, Office of Farm Management, Office of the Secretary, W. J. Spillman, author, dated February 25, 1918.

11. The irrigated districts of the Lower Rio Grande in the State of Texas received attention in 1914-15, the status of farming being investigated on 59 farms. Truck, specialized crops as strawberries and sugar cane, staple crops as corn, alfalfa, sorghums, and stock beets with some dairying and hogs, prevail. The findings were published April 29, 1918 as *Bulletin* 665 of the United States Department of Agriculture, Office of Farm Management, Office of the Secretary Rex E. Willard, author.

12. In 1914 a survey was conducted in Brooks County, Georgia, on 106 farms to ascertain the most satisfactory type of farming under normal conditions of such factors as crop yields, organization, labor conditions. Corn, peanuts, cotton, oats, potatoes and truck with some hog raising and cattle, are included in the farming practices of the community. The data are available as United States Department of Agriculture *Bulletin* 648, Office of Farm Management, Office of the Secretary, published May 1, 1918, E. S. Haskell, author.

13. In 1914 a combined farm management and cost determination survey was conducted on 112 farms of Williamstown, Belton, Broadway and Honeapath townships in Anderson County, South Carolina, to determine the degree of success in a community of raising cotton as the chief crop but also producing corn, oats and wheat, with very little live-stock. The findings appear as United States Department of Agriculture *Bulletin* 651, Office of Farm Management, Office of the Secretary, published May 8, 1918, A. G. Smith, author.

14. A survey of 627 irrigated farms in southern Arizona undertook to determine the factors of business management and farm practice making for financial success. The survey was probably conducted in 1916, although the date does not specifically appear in the publication. A large portion of the area surveyed—Yuma, Salt River Valley, and Gila

Valley—is devoted to dairying and alfalfa, while the fattening of cattle, and the production of cotton, grain, fruit, poultry, and truck are also practised. The material collected was published under date of June 14, 1918, as United States Department of Agriculture *Bulletin*, 654, Office of Farm Management, Office of the Secretary, R. W. Clothier author.

15. A study of 120 farms of Ellis County, Texas was conducted in 1914 by the survey method, to gain data on farms almost entirely given over to the growing of cotton. The findings appeared as United States Department of Agriculture *Bulletin* 659, Office of Farm Management, Office of the Secretary, under date of June 17, 1918, with Rex E. Willard as author.

16. A study of 300 owner and 153 tenant farms was made in Lenawee County, Michigan, to determine successful farming methods and factors affecting profits in this portion of the Corn Belt. Farming practices tend toward diversified farming on medium-sized farms. Hay and other field crops are the leading crops although there is an increasing tendency toward dairying and hog raising. The survey was probably made in 1911, the exact date not being given. The findings were published July 24, 1918, by the United States Department of Agriculture as *Bulletin* 694 from the Office of Farm Management, Office of the Secretary, H. M. Dixon and J. A. Drake, authors.

17. A survey of 212 farms in Marion and Polk Counties, Oregon, based upon the business year of 1912, presents some of the important factors influencing farm profits in this area on both the Valley silt and the Red Clay hill farms. Oats, wheat, dairy cattle, horses, poultry, and sheep are raised, but live stock tends to be a sideline to cash crop farming. The results, published July 27, 1918, by the United States Department of Agriculture, appeared as *Bulletin* 705, Office of Farm Management, Office of the Secretary, Byron Hunter and S. O. Jayne, authors.

18. A 5-year survey in Palmer Township, Washington County, Ohio, was planned to ascertain the types and profits of farms in a long established community where land prices are low and shipping facilities poor; the effect of size and quality of farm business upon economic organization; the most successful farm practices; the value of the single year farm survey; changes in practice over a 5-year period; and amount and effect of yearly variations of such factors as crop yields and expenses. Mixed farming prevailed on the 73 farms surveyed, with corn, wheat, hay, beef, cattle, sheep, and poultry predominating. A report covering the years 1912–1916 inclusive was published under date of September 26, 1918, by the United States Department of Agriculture *Professional Paper* 716, from the Office of Farm Management, Office of the Secretary, H. W. Hawthorne, author.

19. In 1915, 342 farms in southwestern Kentucky were studied to find out the factors making for successful farming. Prevailing types of

farming were wheat, tobacco, and general live stock production. The report groups the farms into five types, and appeared as *Professional Paper* 713, of the United States Department of Agriculture dated October 9, 1918, being a contribution by J. H. Arnold of the Office of Farm Management, Office of the Secretary.

20. Records of 422 farms to be analyzed for information relative to farm organization, crop production, and profits, were collected for the farm year 1916 from an area in western Pennsylvania considered typical of western Pennsylvania, southwestern New York, eastern Ohio, and parts of West Virginia. General live stock and crop farming, giving way to dairying, comprised the type of business. The results appeared as *Bulletin* 853, Office of the Secretary, Office of Farm Management under date of July 20, 1920, and written by Earl D. Strait and H. M. Dixon.

State Surveys

21. Records of 983 farms in the townships of Ithaca, Dryden, Danby, and Lansing in Tompkins County, Central New York were collected in 1908, to find out individual farm profits and the factors determining profit. General crops, or general farming combined with livestock prevailed. The survey was conducted by the Department of Farm Management, Cornell University, Ithaca, New York, and the findings published March, 1911 as *Bulletin* 295, G. F. Warren and K. C. Livermore, authors.

22. The results of a survey in 1912 of 50 farms in the Gallatin Valley, Montana to determine factors of successful farming are available in *Bulletin* 97 of the Montana Agricultural College, Bozeman, Montana, published February, 1914, with E. L. Currier as author.

23. Six hundred sixty-nine farms in the townships of Jackson, Kingsville, Madison and Centerview, of Johnson County, Missouri, were made the basis of a study in 1912 to determine capital requirements, receipts and expenses, cropping systems, land tenure, and other business factors of farm organization. Wheat, corn, and pasture predominated, while live stock included hogs, beef, and dairy cattle. The findings with reference to land tenure are available as *Bulletin* 121 of the University of Missouri, put out December, 1914, O. R. Johnson and W. E. Foord, authors.

24. Records of 2,743 farms in various counties, as Tompkins, Livingston, and Jefferson in different parts of New York State were collected during a period extending over 8 years prior to 1914. General farming and dairying are practised almost exclusively. The findings appeared July, 1914 as *Bulletin* 349, Cornell University, Ithaca, New York, from the Department of Farm Management, G. F. Warren, author.

25. In 1912 a study of 668 farms in the western part of Johnson County, Missouri, was made to determine the relationship between size of farm, amount of capital, crop yields, productive labor and profits.

Corn, wheat, and hay are the chief crops, while poultry, cattle and hogs are produced. The findings were published as *Bulletin* 410, April, 1916, by the University of Missouri, O. R. Johnson and W. E. Foord, authors.

26. One-hundred eighty-six records were secured in the irrigated districts of the Gallatin Valley, Montana, for the fiscal year beginning April 1, 1913, to study the relationship between the different elements of farm business. Field crops, as peas, oats, wheat, barley, clover, hay, alfalfa hay, and timothy hay, were grown to a variable extent. The results of the survey were made available in *Bulletin* 111 of the University of Montana published October, 1916, with E. L. Currier as author.

27. A survey to determine the controlling factors of efficient farm management was conducted in Platte Valley in 1911, Merrick County in 1912, Madison County in 1913, Richardson County in 1914, Nebraska. One hundred ninety-five farms raising wheat, corn, oats, hogs, cattle and poultry were studied. The results were published October 15, 1916, as *Bulletin* 157 of the University of Nebraska, H. C. Filley, author.

28. A survey in 1912 of Bridgewater, Wheeling, Walcott, and Cameron City Townships in Rice County, Southeastern Minnesota, covered 400 farms. The study was conducted to find out what profits the farmers were making, to determine factors influencing and limiting these profits, and to obtain data for concrete suggestions to the farmers of the region. The important crops of the district are wheat, oats, barley, flax and corn. Live stock raising is well developed, cattle and hogs predominating. The findings were published as *Bulletin* 172 of the University of Minnesota, October, 1917, Andrew Boss, A. H. Benton, and W. L. Cavert, joint authors.

29. Records of 367 farm businesses were taken by the survey method during 1914 in seven irrigated areas of Utah where hay and forage were the leading crops with wheat, oats, barley, potatoes, sugar beets, following in the order given. Live stock includes beef, sheep, dairy cows, horses, swine, and poultry. The results were published September, 1917, as *Bulletin* 160 of the Utah Agricultural College, E. B. Brossar, author.

30. An investigation of 284 general farms and 75 dairy farms in Monmouth County, New Jersey, to determine the amount of farm profits and factors affecting them, was conducted during 1914. The principal crops of the region are corn, hay, rye, potatoes, with some wheat, fruit, and truck. The findings were published January 15, 1917 as *Bulletin* 312 of the New Jersey Agricultural College, Frank App, author.

Farm Practice Surveys

Farm practice surveys undertaken to study methods of farm practice in given localities and for given crops have been carried out by both the Federal Office of Farm Management and the Farm Management Depart-

ments of State Universities. A brief list of typical surveys of this nature appear below.

31. **Studies of Sugar Beet Farms.**—A survey of three sugar beet districts—Provo in Utah County, Utah, Garland in Boxelder County, Utah, and Idaho Falls, Bonneville County, Idaho, was carried on in 1914 and 1915. The object of the study was two-fold—(a) to study farm practices, and (b) to determine total costs of production. One hundred seventy-three farms were studied, nearly all growing sugar beets, grain and potatoes. In some cases beets were grown on the same field for 18 years; in many cases beets were grown from 3 to 7 years without rotation. The findings appeared as *Bulletin* 693, July 16, 1918, of the United States Department of Agriculture, joint contribution from the Office of Farm Management and Bureau of Plant Industry, with L. A. Moorehouse of the Office of Farm Management and James W. Jones of the Bureau of Plant Industry as joint authors.

32. In 1914 and 1915 a survey was made in the Greeley, Fort Morgan, and Rocky Ford Districts of Colorado, for the purpose of finding out the factors controlling field practice and related costs. The area is mostly devoted to sugar beets; although other crops used in rotation are: alfalfa, cantaloupes, potatoes, beans, and grain. The data are based on 371 farm surveys, and were published December 14, 1918, as *Bulletin* 726 by the United States Department of Agriculture as a joint contribution from the Office of Farm Management and the Bureau of Plant Industry, with L. A. Moorehouse, R. S. Washburn, and T. A. Summers of the Office of Farm Management and S. B. Nichols of the Office of Sugar Plant Investigations, Bureau of Plant Industry, as joint authors.

33. Three hundred twenty records were taken from farms in the vicinity of Caro, Alma, and Grand Rapids, Michigan and from northwestern Ohio during the crop seasons of 1914 and 1915. The study was made to ascertain the field practices employed and to determine the relationship of these operations to the cost of growing the crop. Sugar beets are the chief crop, with clover, corn, and grain used in rotation. The findings were published as *Bulletin* 748, January 28, 1919, from the Office of Farm Management, Office of the Secretary and the Bureau of Plant Industry with R. S. Washburn, L. A. Moorehouse, and T. H. Summers of the Office of Farm Management and C. O. Townsend of the Office of Sugar Plant Investigation of the Bureau of Plant Industry, as authors.

34. United States Department of Agriculture *Bulletin* 760, Office of the Secretary, contributed jointly by T. H. Sumners, L. A. Moorehouse, and R. S. Washburn of the Office of Farm Management and C. O. Townsend of the Bureau of Plant Industry, comprises the fourth in the federal sugar beet growing series. The publication reviews the findings of 165 farm records taken during 1915 and 1916 from four typical sugar beet

areas of California in Los Angeles, Orange, Ventura, and Monterey Counties. The data show farm practice and the cost of producing the crop.

Studies of Apple Orchards.—Five *Bulletins* from the Federal Office of Farm Management, United States Department of Agriculture, present the farm practices in apple growing for selected districts of the United States. These are:

35. *Bulletin* 466, dated January 10, 1917, by G. H. Miller and S. M. Thomson, being a study, made in 1914, of the current cost factors involved in the maintenance and handling of orchards and the handling of the crop in Wenatchee Valley, Washington.

36. *Bulletin* 500, dated March 14, 1917, by the same authors, covers a similar detailed study, made in 1914-15, of 125 farms in the fruit regions of Mesa, Delta, and Montrose Counties in western Colorado.

37. *Bulletin* 518, dated March 17, 1917, by the same authors, covers a detailed study, made in 1915, of 54 farms in the Hood River Valley, Oregon.

38. *Bulletin* 614, dated April 20, 1918, by the same authors, covers a detailed study, made in 1915, of 120 representative bearing orchards in the Yakima Valley, Washington.

39. *Bulletin* 636, dated May 10, 1918, by the same authors, covers a detailed study, made in 1915, of 38 representative bearing orchards in the Payette Valley, Idaho.

40. The cost of producing apples in five counties in western New York for the period 1910-15, written by G. H. Miller, appeared as U. S. D. A. *Bulletin* 851 Office of the Secretary, Office of Farm Management, under date of July 30, 1920. Results are reported of 218 apple growers producing fruit in conjunction with field crops. The study treats of the relation of the orchard to other enterprises, of orchard practices, effect of practice upon yields, returns obtained, and cost of maintaining orchards.

41. **Studies of Potato Farms.**—A survey of 370 potato farms in Monmouth County, New Jersey, to determine the factors affecting profits was conducted in 1914 and published April 20, 1916 by the New Jersey Agricultural College as *Bulletin* 294, Frank App, author.

42. **Studies of Poultry Farms.**—Survey records of 150 poultry farms in Cumberland County and the northwestern part of Sussex County, New Jersey, were taken between November 1, 1915 and November 1, 1916, to determine the profits and the factors affecting the profits of poultry raisers. The results constitute an 88-page *Bulletin* 329 of the New Jersey Agricultural College, published March 15, 1918, with Frank App, Allen G. Waller and Harry R. Lewis as authors.

43. **Studies of Dairy Farms.**—A survey of 460 farms, almost exclusively devoted to dairying and the production of forage crops, was made in Sussex County, New Jersey, during 1914, to determine farm

profits and the factors affecting them. The data and conclusions were published by the New Jersey Agricultural College, July 1, 1917 as *Bulletin* 320, Frank App, author.

44. An investigation of the economic side of dairying as carried on in Shelby, Spencer, Oldham and Hardin Counties, on 162 farms within about 40 miles of Louisville, Kentucky, was made in 1916 and 1917. In addition to dairying and the production of forage crops, a few farms reported sheep, hogs, beef cattle, corn, wheat, tobacco and clover. The findings were published under date of July, 1918 as *Bulletin* 217 of the University of Kentucky, with W. D. Nicholls and J. B. Hutson, authors.

45. **Studies of Cotton Cultivation.**—Practice in the cultivation of cotton, as shown by data collected from 19 areas in Missouri, North Carolina, South Carolina, Georgia, Tennessee, Arkansas, Texas, Oklahoma, Florida, Louisiana, Mississippi and consisting of at least 25 records from each area, is presented in tabular form in U. S. D. A. *Professional Paper* 511, joint contribution from the Bureau of Plant Industry and the Office of Farm Management, written by H. R. Cates and published under date of March 31, 1917.

46. Studies of cotton production costs based on estimates from 842 farms in ten cotton districts, 3 in Alabama, 3 in Georgia 2 in South Carolina and 2 in Texas, are reported in U. S. D. A. *Bulletin* 896, from the Office of Farm Management and Farm Economics, dated November 19, 1919. L. A. Moorhouse and M. R. Cooper, authors.

PART II

INTRODUCTION TO PART II

Reference to the table of contents of this book will reveal its division into two parts. Part I deals with certain considerations to be taken up before one embarks upon actual farming as owner, tenant, or employee. It covers the scope and place of farm management, the selecting of farming as a business, the choice of farm, the organization of the work, the equipping of a farm business, capital requirements, profits of farming, testing proposed plans, and the farm management surveys as sources of information.

This section—Part II—is given over to the activities of a going concern; *viz.*, farm bookkeeping and accounting, cost of production, farm labor, tenancy, marketing, farm law, and ending with a brief discussion of how one is to get started if he is obliged to rely, as many beginners must, upon his own initiative and resources.

CHAPTER XVI

FARM BOOKKEEPING

Much has been written on farm bookkeeping, so much in fact that, for farm management uses, the bringing together of the excellent material from available but scattered sources is perhaps of more real value than to attempt to provide original matter. (For references see Nos. 79 to 87 inclusive in References Index, pages 647 to 655.)

Definition of Farm Bookkeeping.—Farm bookkeeping is a system of records written to furnish a history of the business transactions of the farm, with special reference to its financial side.

Farm bookkeeping is not a direct way of making money, but rather a means of showing where the money goes, of pointing out where profits are being made and where leaks occur. If a system of books does not show a profit, it does not necessarily follow that there is actually less money coming from the business, but it does show the need of reorganizing the farm business for greater earning power.

Do Farmers Keep Records?—Investigations show that fully 40 per cent of all farmers keep records of some kind. Most of these are only records of receipts and expenses.

In southern Arizona to the question, "Do you keep farm accounts?" put to 647 farmers, 179 answered "Yes," and 181 that they kept a partial system of accounts.

Other surveys report record keeping as follows:

TABLE 134.—EXTENT OF ACCOUNT KEEPING BY FARMERS

Survey	Number farms visited	Percentage keeping accounts			
		Bookkeep- ing accounts, receipts and expenses	Partial book accounts	No book accounts but some records	Percent- age keeping some record
Ohio (1918) (general farms).....	25	36	40	24	76
Pennsylvania (1917) (dairy farms).....	419	8	15	77	23
Florida (1917 truck farms).....	144	15	30	55	45
Florida (1917 citrus farms).....	132	36	28	36	64

A report of the Farm Demonstration Section of the United States Department of Agriculture shows that due to the work of State representatives of the Department 37,497 farmers kept accounts for the year ending June 30, 1918, as against 18,761 for the preceding year. As a

result of their accounting 4,051 farmers readjusted their businesses to increase net income.

Purpose of Farm Accounts.—Accurate records and accounts are necessary in the management of every enterprise, great or small, because no business can attain greatest continuous success unless its condition be determined from time to time. Farming conducted in accordance with business principles requires that the farmer or farm manager be able to find out how his affairs stand not only with others but with himself.

Experience shows that it is not possible to distinguish profitable farms by casual observation. A farmer operating a large business may have sufficient funds to give a prosperous appearance to his farm and yet not be earning a fair rate of interest on his investment and an equitable wage for himself.

The primary purpose of keeping accounts is usually to obtain information that will help to accumulate property or to increase profits. Well kept farm books, embodying a continuous record of business transactions, point the way to the future.

Let us tabulate this still more concretely to show that the reason for keeping farm books usually rests in one or more of the following desires.

1. To determine the degree of profit that the business is making.
2. To suggest ways for increasing profits.
3. To provide an argument when soliciting loans.
4. To determine the details of farm investment, receipts, expenses, and net income.
5. To determine the net returns from individual farm enterprises, for the purpose of detecting losses or indicating sources of greatest profit.
6. To furnish a memorandum of bills owed by or to the farm.
7. To provide a written record of operations for future guidance.
8. To furnish specific information, as the amount of feed fed to live stock, amount of production, and efficiency of methods used in production.

Record-keeping Results in Closer Attention to Details.—An attempt to keep careful records of the farm business invariably results in closer attention to details. Properly heeded, these records will lead eventually to a better understanding of and insight into the business affairs of the farm, and therefore, as pertinent use is made of them, to constant improvement and greater profit.

Account-keeping Can Be Made Attractive.—Accounts to supply pertinent information can be not only a means of increasing profits, but a source of real pleasure and satisfaction by presenting in a concise and concrete way the financial status of the business.

Preliminaries in Starting Farm Bookkeeping.—In beginning record-keeping it is of vital importance to have a clear understanding as to just

what facts about the farm business should be shown by the records day by day and at the end of the year. Each one must decide for himself what he desires to obtain from his record-keeping. Some men particularly need accounts of the moneys expended for labor, others of the sums paid for feed, and others of the amounts of crops or stock products sold. Some operators chiefly desire sufficient records to determine the profit made from the entire business during a given year. Others wish to analyze their business and find out the enterprises that are being operated at a profit and those that are returning a loss. Some farmers like to determine their returns in terms of labor income.

To begin keeping records without some such preliminary consideration is as foolish as to start digging a foundation for a building without deciding on the kind and size of structure to be erected, or to start a team on field work without first determining the crop to be grown.

For obvious reasons the simpler the accounts kept by the beginner the greater is the chance of their proving of use.

Simple accounts may well give way to more complex as the system grows familiar and easy to keep. Desire for more detailed and more extensive data is sure to accompany a growing recognition of the value of properly kept records.

Scope of Complete Farm Accounts.—A complete system of accounts will show:

- (a) How the business stands with the farmer and with others.
- (b) Cost of production of the various farm enterprises.
- (c) Household and personal expenses.
- (d) A history of the various fields and enterprises.
- (e) Basic data for purposes of obtaining loans, and calculating income taxes or other taxes.

Less complete accounts may serve the purpose in mind when keeping accounts. Individual need of data will determine the extensiveness of the records.

Simple Accounts.—The more simple accounts may include only (1) records of happenings and (2) records of money transactions.

Simple records of happenings, written down in a way that makes reference to them easy, are often of much usefulness. Examples of these are dates when animals are bred; dates when men are hired or discharged, records of accidents, days when work on a given crop begins and ends, weather conditions, occurrence of the first autumn or the last spring frost, purchase of animals, dates, rates and periods of obtaining loans.

The most important use of a record showing the cash received and paid out, that is records of money transactions, is to determine the degree of profitableness of the farm business as a whole, or to find out what ones of a number of enterprises are the more profitable. These records, however, have other uses.

They help in checking up bills and in seeing if all payments have been properly credited. This value alone is sometimes enough to warrant the keeping of these records.

To secure more detailed data requires additional records to show (1) place and amount in use of labor—horse and man, (2) records of production, (3) records of materials used—feed, seed, fertilizer, sprays, market packages, etc. These records, together with those of happenings and cash transactions, constitute the basis of cost accounting.

Cost Records.—Cost records, while of great use if properly assembled and intelligently interpreted, can be obtained only by the outlay of considerable time and attention to detail.

In cost records there are added to the inventory and cash accounts:

1. Labor records.
2. Feed records.
3. Supply records.
4. Crop yield records.
5. Animal production records.

These require time to summarize and to distribute indirect costs.

Their use should be undertaken only when the need for the work is apparent, and a successful carrying out of the records assured.

Value of Cost Records.—When conditions permit, the keeping, summarizing, and studying of such systematic records are of great value. The labor records will show the amount of labor, horse and man, expended in carrying on the work and the proportion of the labor spent on each enterprise. They show the proportion of labor necessary to produce income as against labor for odd jobs or routine chores. Labor records provide a guide to indicate the number of horses or the amount of labor needed to complete the year's work so that plans may be laid in advance to insure the necessary labor at times when it is needed.

Feed records present valuable data on the amounts of grain and roughage consumed by the work stock and in maintaining breeding stock, in carrying on the dairy, poultry, feeding, or other live stock enterprises. Their use points out the need for reserve stores of feed and shows the kinds of feeds for greatest or most economical gains, furnishes a comparison of the relative profits from different live stock enterprises, and indicates the balance between crops and live stock.

Records of crop yields, animal products obtained, and supplies used by the different farm enterprises, are useful in that they show what yields of crops and by-products are obtained year by year, what and how much the animals produce, and by what departments miscellaneous supplies are used.

What Records to Keep.—Farm records may vary from the taking of an annual inventory to carrying the most complete and detailed system of cost accounts. The following outline illustrates three types of farm accounting from the simplest to the most complex.

TABLE 135.—TYPES OF FARM RECORDS⁴¹

Type	Records necessary	Information that may be obtained
I. Property record.....	1. Inventories made once a year	1. Investment in each kind of farm property and net worth of the farm as a whole 2. Increase or decrease in net worth during the year
II. Farm bookkeeping (accounts with the farm as a unit)	1. Inventories made once a year 2. Financial records 3. Value of supplies furnished by the farm to the family 4. Value of board furnished by family to paid farm laborers 5. Unpaid family labor devoted to farm work	1. Investment in each kind of farm property and net worth of each farm as a whole 2. Increase or decrease in net worth during the year. 3. Classified summary of farm receipts and expenditures 4. Farm income 5. Net farm profit 6. Household and personal expenses 7. Value of food, fuel, and use of house furnished by farm to family
III. Farm cost accounts (accounts with the farm and with each farm product and department as a separate unit)	1. Inventories made once a year 2. Financial records 3. Value of supplies furnished by the farm to the family 4. Value of board furnished by family to paid farm laborers 5. Value of other perquisites furnished by farm to paid farm laborers 6. Unpaid family labor devoted to farm work 7. Labor record 8. Feed records 9. Live stock production records 10. Crop supply and yield records	1. Investment in each kind of farm property and net worth of to farm business as a whole 2. Increase or decrease in net worth during the year 3. Classified summary of farm receipts and expenditures 4. Farm income 5. Net farm profit 6. Household and personal expenses 7. Value of food, fuel, and use of house furnished by farm to family 8. Cost per hour of man labor 9. Cost per hour of horse labor 10. Complete distribution of all costs 11. Complete distribution of all income 12. Complete allocation of all profits and losses 13. Cost of production in each department 14. Margin between cost and market value 15. Efficiency factors in farm management

Use of Inventories.—If only the total personal net gain or net loss of the farmer for a given year is wanted, this information can be obtained by comparing the inventories taken at the beginning and at the end of the farm year. The difference between these inventories gives the net increase or decrease for the year in the farmer's capital, thus showing personal gain or loss. But this method measures only the amount of

progress. The increase or decrease in net worth does not represent the profit or loss on the farm business, since it is affected also by the affairs of the farm family.

Use of Records of Money Transactions.—If to the inventories is added a record of money transactions, an idea can be obtained as to changes in capital, amount of profit or loss, extent of household and personal expenses, distribution of farm receipts and expenses, and amount of labor income. These records constitute the accounts most often used by farmers.

Records of Labor, Feed, Production, etc.—Should analysis be desired, the records of inventory and cash transactions may be augmented by detailed records of labor, crop production, and live stock production, with supplementary notes. Increasing the number of records increases the work of keeping them but enlarges the scope of the information obtained. In addition to the data forthcoming as indicated in the preceding paragraph, the farmer is able from this stricter bookkeeping to determine his distribution of costs and income over the different enterprises making up his farm business, and thus uncover the income, cost, and profit of each group of live stock and each crop to as fine a degree of detail as he cares to go.

Records Used in the Simple System.—Inventories and cash accounts (records of cash transactions) constitute a simple system of farm bookkeeping. A full set of records of inventory, cash transactions, details of labor expenditure, and crop and stock production, means an intensive system of cost accounting—the “last word” in farm paper work.

Comparison of Bookkeeping and Cost Accounting.—Complete farm cost accounts if successfully carried out will give the actual, as well as the relative, cost and profit of all the farm enterprises, and other valuable data as well. But cost records can be obtained only by the outlay of much time and by close attention to detail. A man who works hard all day at manual labor rarely has inclination to spend his leisure over ledgers. Only when the conditions seem to warrant the assumption that the accounts will be carried through to a successful end, should they be attempted.

The difference between bookkeeping and cost accounting should therefore be definitely understood. Let us risk a little repetition. Bookkeeping is the keeping of records that will set forth the income, cost, and profit of the business as a whole, or of a complete unit; cost accounting involves the finding of cost, returns, and profit on production units—on a pound of beef, a quart of milk, a bushel of grain, etc. Farm bookkeeping is a matter of adapting simple methods to the farmer's needs. It is not a question of forms or having the accounts on the right side of the page or of having them balanced in a certain way; it is a question of a correct knowledge of principles, a knowledge that will lead to an understanding of the facts as they exist on the particular farm in question.

Supplementary Records.—A possible fourth group could be added to Table 135 to cover the keeping of supplementary farm records, not particularly necessary to the financial accounts or accounts of happenings, yet of value in keeping track of details. Such supplementary records are illustrated by the timebook, breeding records, individual cow records of milk yield, egg records of pens, number of meals served, pasturage records, records of hired teams, etc.

The Annual Summary as a Means of Determining What Records to Keep.—Since the information ultimately desired will determine the kind of records to be kept, the character of the final summary or annual statement should early receive attention. The following presents a graphic outline⁸⁸ for determining the financial status of a farm business.

TABLE 136.—GRAPHIC OUTLINE OF FARM SUMMARY OR ANNUAL STATEMENT

	Item	Total
Investment*		
Real estate.....		
Work stock.....		
Live stock.....		
Machinery and equipment.....		
Feed and supplies.....		
Cash to run farm.....		
Total.....		
Farm receipts		
Sales: crops, live stock, or stock products.....		
Other sources.....		
Feed and supplies accumulated during the year over the amount on hand at the first of the year.....		
Total.....		
Farm expenses		
Operating.....		
Unpaid family labor.....		
Depreciation.....		
Decrease in feed and supplies taking place during the year over the amount on hand at the first of the year..		
Total.....		
Farm income.....		
Interest on investment at per cent (a).....		
Labor income.....		
Value operator's labor.....		
Per cent return on investment (b).....		
Value items for family use.....		

* Use average investment or that of beginning of year, whichever more nearly represents the true capital invested in the year's business.

(a) Use current rate of interest on well-secured farm loans.

(b) After deducting value of operator's labor from farm income.

ANNUAL STATEMENT OF NET WORTH

	Beginning of farm year	End of farm year
Resources (a)		
All cash on hand.....		
Real estate.....		
Live stock.....		
Machinery.....		
Feed and supplies.....		
Household equipment.....		
Automobile.....		
Other tangible property.....		
Accounts owing to you.....		
Notes owing to you.....		
Mortgages owing to you.....		
Bonds and stock owned.....		
Interest due you or accrued on notes, mortgages, and bonds.....		
Total resources.....		
Liabilities (b)		
Accounts owed by you.....		
Notes owed by you.....		
Mortgages owed by you.....		
Interest due or accrued and owed by you.....		
Total liabilities.....		
Total net worth (c).....		
Increase or decrease in net worth (d).....		

(a) Includes all property owned by you and owing to you.

(b) Includes all amounts which are owed by you to some one else.

(c) Subtract total liabilities from total resources.

(d) If total net worth at the end of the year is greater than at the beginning of the year the difference is an increase; if less, a decrease.

Time Element in Keeping Accounts.—The time required in keeping accounts depends on the number of records carried and the size of the farm. A simple system of records for the ordinary family-size farm does not commonly require more than 10 or 15 minutes a day for making entries and a few hours at the end of the year for summarizing. Perhaps 2 or 3 hours or a half-day is needed at the time of starting the books. Cost accounting requires more time—probably at least double these estimates. From this the time element will increase with the magnitude and diversity of the farm business and the data expected, until a point is reached where the continual service of one or more bookkeepers is required. This is well shown by some of the large enterprises, as corporations farming large tracts to cattle, sugar beets, cotton, wheat, and to other crops and live stock.

Technical Training Unnecessary.—Technical bookkeeping training or knowledge is not necessary in keeping farm accounts. Methods of procedure are not especially difficult for the average man to master, and once the desired data are clearly mapped, its recording offers no unsurmountable difficulties.

Simplifying Accounts.—Some of the difficulties experienced by beginners in starting a set of farm books will be simplified if the following suggestions are accepted:

1. *Treat Farm Business as a Complete Unit.*—Consider the business as entirely separate from the individual owning the business. That is, in all relations between it and its owner the records should be handled exactly as if business and owner were two persons. The necessity of this relation is fully recognized in the commercial world, and lack of comprehension of it is one of the causes that prevent many farmers from fully understanding the principles of accounting. The merchant rarely takes goods from his store for his personal use without charging them to his own personal account, just as though they were sold to any other customer. He is usually fully aware that otherwise it would be impossible for him to know the actual state of his business affairs. On the other hand, the farmer only too often devotes the property of his business to a considerable extent to his own personal use without a thought as to the accounting consequences, and as a result may get a false idea of the results of his farming operations when he balances his accounts.

On the farm, where the personal affairs of the owner and his household, and the farm affairs proper, are interwoven, this point of view is admittedly difficult to acquire, but it is none the less necessary to attain.

In order to carry out this idea it is a good plan to consider the general funds received for farm products as belonging to the farm, and for the owner to maintain a separate purse for his personal requirements, refilling it from time to time from the farm funds, and charging his personal account on the farm books with the amounts so used. This idea may be carried a step further by establishing a separate purse for the household expenses, allowing the housekeeper a certain amount weekly or monthly on which to run the house. Such practices give a man a good perspective of the relations existing between the finances of the farm, the household, and himself, and are more generally satisfactory to all concerned than the common practice of having a single purse for all these purposes.⁸¹

2. *Application of Double-entry Principle.*—Double-entry is based on the fact that every business transaction has, for each party involved, two distinct sides. One value is *acquired*, another is *surrendered*. For instance, a person selling a horse acquires cash value and surrenders horse value. If the horse is sold on credit to John Smith, account value (the fact that John Smith owes this value) is acquired instead

of cash value. When he pays for the horse, cash value is acquired and account value (he no longer owes anything) is surrendered. If the records do not take account of both sides of each transaction they will not show the facts.

Violations of this principle are common. A good but too common example is that of carrying the value of manure as a credit to the cattle account and not charging this same value to the crop accounts. No matter what the transaction, the principle holds good and should never be violated.

In the case of cash transactions where a cash book is used, the double-entry principle is automatically followed. Entering the money received and giving the description of what was sold for it, charges the cash account with the value on the one hand, while the crediting of the proper account with the value of the thing sold completes the "double-entry."

Rules for Determining Charges and Credits.—As a usual thing it will not be found difficult to determine for each transaction which account to charge and which to credit. The general rule may be briefly stated thus:

Charge that account which acquires the value.

Credit that account which surrenders the value.

A more difficult problem comes up in determining when to charge an expenditure of cash to expense and when to investment (purchase) accounts. Also it is sometimes hard to tell when to credit a receipt to an income and when to an investment account. The rules in his regard are almost as simple as the foregoing, and may be stated briefly as follows:

1. Charge to expense accounts all those things which will be consumed as soon as used. Such as seed, twine, feeds, wages, etc., parts for machinery, building repairs.
2. Charge to investment accounts those things which will be used over and over again in the course of the farm business or which are bought for resale in the regular course of the business, such as work stock, cows for the dairy herd, breeding animals, machines, drain tile, fencing, etc., and animals bought for fattening and resale.
3. Credit to investment accounts receipts from sales of articles which have formed part of the farm equipment or permanent plant, such as old machinery and machinery junk, old lumber, work stock, animals from the permanent herds, etc.
4. Credit to income accounts all receipts for products of the farm or for things incidental to production, such as milk, eggs, crops raised and sold, market live stock, etc., and receipts for labor and machine work done by farm labor.
5. Credit to expense accounts all receipts from expense rebates and for things previously charged to expense accounts, such as, feed bags; surplus purchased feed, seed, and twine; spare machine parts sold; etc.

While the foregoing rules will doubtless assist in analyzing transactions to determine the proper charges and credits, transactions will sometimes occur that seem to fall within what may be called the "twilight zone" between the two rules. In such cases good judgment alone must be relied on, as no set of rules will cover all cases.

3. Use of "Debit" and "Credit."—The term debit refers to receipts or incomes and means that in keeping accounts the *account receiving* is to be debited—*i.e.*, it is debtor for the sum received.

For example if *A* pays \$25 to *B*, *B* is debtor to *A* for this sum and *A* is *B*'s creditor for it. Thus credit *A* (cash paid out) and debit *B* (as cash received). In the same manner if you are keeping an account for the dairy you will debit it with money received from milk (receipts) and credit it with money spent for concentrates or labor (payments). Two columns are used to show the transactions thus:

TABLE 137.—ENTERING DEBITS AND CREDITS

Date	Item	Dr. (receipts)	Date	Item	Cr. (payments)
May 31	Monthly sale of milk . . .	90.00	May 31	Concentrates	27.00
June 30	Monthly sale of milk . . .	85.00			
	Sale of 3 calves	18.00			

OR

Date	Item	Dr. (receipts)	Cr. (payments)
May 31	Monthly sale of milk	90.00	27.00
	Concentrates . . . . .	.....
June 30	Monthly sale of milk	85.00	
	Sale of 3 calves	18.00	

As a matter of form debits are entered on the left-hand column or page—usually marked with abbreviation "Dr." and credit on right-hand column or page, abbreviated as "Cr."

Interpretation and Use of Results.—The mere keeping of accounts does not have any influence on profits. Farm accounts are only a mirror to reflect existing conditions. Picturing a situation, they draw attention to the need or lack of need of a corrective. Farm accounting is not in itself a means of increasing profits, nor a direct producer of wealth. Its value lies in pointing the way to better or different practices. Farmers who find, on keeping detailed records for the first time, that they are not making as much money as they thought they were, sometimes blame the books for the loss, instead of taking home the lesson that the records teach.

In making deductions from cost records, hasty conclusions should be avoided. Sometimes a positive decrease in a year's profits will ensue if an enterprise be dropped because, taken alone, it has failed to pay. Cows may not be showing a high net profit, yet if they are sold, there may be no other profitable way of using roughage, and hence a loss in

the crop producing it. Labor devoted night and morning to milking and feeding cows, and charged to them, might be entirely wasted if the cows were sold with no available substitute use for such labor. Any changes if made, should be brought about gradually and the indicated effects noted in their relation to all other farm activities.

Discussion of Records

Definition of Inventory.—The term “farm inventory” is used to designate lists taken at stated intervals, of property, with values affixed, including supplies and produce on hand, together with a statement of the amount of cash on hand and money owing to or owed by the farmer.

Value of Inventory.—Such lists or “inventories” are conceded to be the most important of all farm records. They constitute the foundation for all financial studies.

Use of an Inventory.—The uses of an inventory are important and varied. Taken alone it will show the farmer exactly what he is worth and will be a guarantee of solvency and an aid in securing credits and loans in times of need. Comparisons made of inventories taken a year apart will show the rate of progress or retrogression during the year, and definitely measure the degree of change. Taken in conjunction with a cash account for the year the inventory shows how much has been made by farming and to what extent this has been offset by household and personal expenses. The inventory, either alone or with cash accounts, will not, however, show what crops or what animals are responsible for profits or losses. Furthermore, the inventory taken alone shows only the personal gain or loss. It does not differentiate between the farmer’s standing and the farm standing. Increase in personal expenses will reduce the profit showing; conversely, frugality in personal expenses may show undue farm profits.

The inventory tends both to check undue expenditure and to allay pessimism. If extra cash on hand tempts to free spending, the inventory may hoist the danger signal and show that the surplus money comes from selling short on some class of live stock or other farm property. On the other hand, money may be less plentiful than usual and so induce a feeling of discouragement which is not warranted if the inventory shows a healthy increase in crops and stock on hand or a justifiable increase in equipment.

Taking an Inventory.—The mechanics of inventory taking are simple. The actual taking requires but a few hours time for the usual family-size farm. For convenience the inventory is ordinarily divided into groups to show:

1. Real estate.
2. Live stock.
3. Machinery and tools.

FARM BOOKKEEPING

1st Quantity - Dec 1, 1917				1st Quantity (Continued)			
Name of Stock	Vol. in	Vol. out	Balance	Name of Stock	Vol. in	Vol. out	Balance
Apple Stock	100		100	Apple Stock			100
Orange Stock	50		50	Orange Stock			50
...
Total	150	150	150	Total	150	150	150

FIG. 68.

2nd Quantity - Dec 1, 1917				2nd Quantity (Contd)			
Name of Stock	Vol. in	Vol. out	Balance	Name of Stock	Vol. in	Vol. out	Balance
Apple Stock	100		100	Apple Stock			100
Orange Stock	50		50	Orange Stock			50
...
Total	150	150	150	Total	150	150	150

FIG. 69.

Example of Inventory on Three-column Journal Ruling. Taken one Year Apart.

4. Feed, produce, and supplies.
5. Cash.
6. Bills receivable.
7. Bills payable.

Real Estate.—Under real estate are placed the land and the buildings. Each building is listed and valued separately. The land together with its permanent improvements—drainage and irrigation ditches, bridges, roads, fences—is valued on an acreage basis. It is usually desirable to distinguish between different sorts of land, *e.g.*, tilled fields, pasture, wood lots.

Live stock covers horses, cattle, sheep, hogs, poultry, etc., listed by groups and itemized so far as practicable. Horses and dairy cows are listed by name or number and age; other classes are separated into a few outstanding groups for easy valuing.

Machinery, implements, wagons, and tools usually contain the largest number of items, as farm equipment tends to be varied and manifold. In taking the inventory of these items it is important not to overlook any items and to exercise care in placing values.

If it is carefully taken and each item listed separately, a machinery and small-tool inventory on a farm will fill several pages. If such detail is not desired, the minor tools of the value of less than \$1 each may be grouped into a class together and a lump valuation given, but such a course is not advisable. It is surprising what a large number of these small tools there are on a farm and, furthermore, what a number are misplaced during the year. A carefully itemized inventory once a year is a help in locating the minor tools, and inventory day is a convenient time to call in all loaned tools—they have a habit of changing owners if they remain too long away from home. All farmers know how easy it is to lose a hammer or an ax, but an old wagon never disappears. It is time well spent to go through the buildings each year and make a list of the machines and tools, using the best judgment possible in placing values on different articles.

Feed and supplies include all feed purchased or produced, all farm products reserved for feed or for sale, all seed, and all supplies such as oil, sacks, binding twine, fruit boxes, lumber, cement, etc. Weight or careful measurement data should be used. It is sometimes difficult to estimate closely the amount of feed and supplies of various kinds on hand and to determine the proper value for same. Yet this is important in that much of the income of the farm may be in the form of grain or roughage held for feed. When the total of these items is more at the end of the year than at the beginning it represents a gain and is counted as a receipt; when less at the end of the year, an expense. Care must be used in listing the items to include all farm supplies, such as binding twine, fertilizers, machine oil, lumber, etc.

Cash to Run the Business.—A certain amount of money is necessary for carrying on the farm business. This amount will vary widely on different farms, according to whether the farm receipts are distributed throughout the year or received at one time. It should represent the average amount of money that the farmer has on hand at all times during the year for the purpose of paying current farm expenses. Money on hand and in bank should be listed separately. This group should be accurate in every detail.

Bills receivable carries the value of all bills due the farm from others. The face value should be used until the account is settled or proven worthless.

Bills payable contains the value of all bills owed by the farm to others, including store bills, loans, mortgages, etc.

The first six divisions constitute the total value of the farm property, while the deducting of division 7 will result in a figure giving the *net worth* of the farmer.

Household Goods, Etc.—In the farm inventory no mention is made of the household furnishings or personal effects, as only the farm and its accessories are to be considered. However, the dwelling is included in the value of the farm, as it is a part of the real estate and would be included if the place were sold.

The time of taking will vary in different communities. In the northern and eastern States perhaps the best date is March 1 or April 1. In the corn belt and central States, March 1 is favored. In the Western States November 1 is usually selected. In the South January 1, or February 1 is satisfactory. The most satisfactory time is the season that best combines slackness of work demands and small amount of stuff on hand to be listed.

Form for Inventory-taking.—No particular form is needed in taking an inventory. A blank book, blank sheets of paper, or the so-called stationer's ordinary 3-column journal ruling will do. Provision is needed for (1) a wide space in which to give a description the various items, and (2) additional columns to cover the number, rate, and total value. In the illustration prepared for the text, still another column could well be added, to carry a statement of the original cost of purchased items. This helps in setting valuation and depreciation rates.

The inventory used for closing the accounts of a given year also serves as a starting point for the next succeeding year, so that the work once done serves two purposes.

Determining Inventory Values.—In fixing values for the inventory actual market values are assigned to be based on the condition of the various items and an estimate of market demands.

This work calls for considerable judgment, especially in valuing the real estate.⁸⁹

TABLE 138.—SAMPLE FARM INVENTORY ⁸¹

Divisions and items of property	April 1, 1918			April 1, 1919		
	Quantity	Value per unit	Valuation	Quantity	Value per unit	Valuation
Real estate:						
Land and improvements, acres.....	120	\$ 80.00	\$ 9,600.00	120	\$ 80.00	\$ 9,600.00
Live stock:						
Cows, dry and in milk.....	1	125.00	125.00	1	100.00	100.00
Heifers.....	1	40.00	40.00	2	60.00	120.00
Calves.....	2	30.00	60.00	4	25.00	100.00
Steers.....	1	115.00	115.00			
Total cattle.....	..	..	340.00	..	..	320.00
Horses:						
Jim, 12 years old.....	..	..	200.00	..	..	175.00
Jack, 14 years old.....	..	..	175.00	..	..	160.00
Jen, 8 years old.....	..	..	225.00	..	..	225.00
Jess, 20 years old.....	..	..	35.00	..	..	Died
Total horses.....	..	..	635.00	..	..	560.00
Swine:						
Brood sows.....	1	75.00	75.00	7	60.00	420.00
Boar.....	..	..	..	1	45.00	45.00
Pigs.....	3	20.00	60.00	24	6.00	144.00
Total swine.....	..	..	135.00	..	..	609.00
Poultry.....	50	1.50	75.00	62	2.00	124.00
Total live stock.....	..	..	1,185.00	..	..	1,498.25
Machinery and tools:						
Plows, walking, 12-in.....	2	10.00	20.00	2	8.00	16.00
Plows, sulky, 16-in.....	2	75.00	150.00	1	65.00	65.00
Disc harrow, double, 8-ft.....	1	20.00	20.00	1	17.00	17.00
(All items should be listed, although not shown here)						
			1,633.50	..	..	1,498.25
Farm produce						
Barley, bushels.....	32	2.00	64.00	124	1.50	186.00
Oats, bushels.....	284	1.00	284.00	302	0.80	241.60
Corn, ear, bushels.....	30	1.00	30.00	50	0.75	37.50
Buckwheat, bushels.....	17	1.00	17.00	20½	1.50	30.75
Hay, tons.....	11	23.00	253.00	15	20.00	300.00
Total farm produce.....	..	..	648.00	..	..	795.60
Purchased feeds and supplies:						
Bran, pounds.....	100	0.03½	3.50	250	0.03½	8.75
Shorts, pounds.....	50	0.03½	1.88	..	..	..
Lime, tons.....	..	..	..	5	6.00	30.00
Fence posts.....	..	..	..	50	0.35	17.50
Grain bags.....	20	0.10	2.20	12	0.10	1.20
Total feed and supplies.....	..	..	7.58	..	..	57.45
Notes and accounts:						
Harry Smith note for cow.....	..	..	100.00	..	..	68.00
George Jones, for corn.....	..	..	42.00	..	..	195.49
John Williams, for corn.....	..	..	..	..	..	63.00
Henry Robinson for work.....	..	..	..	..	..	5.00
Total notes and accounts.....	..	..	142.00	..	..	68.00
Cash on hand and in bank.....	..	..	256.35	..	..	195.49
Total value of "assets" (property owned).....	..	..	13,472.43	..	..	13,827.79
Notes and accounts owing:						
Farm mortgage.....	..	..	4,000.00	..	..	4,000.00
Samuel Grey for hogs.....	..	..	..	..	..	200.00
Total liabilities (amounts owed).....	..	..	4,000.00	..	..	4,200.00
Summary:						
Total assets.....	..	..	13,472.43	..	..	13,827.79
Total liabilities.....	..	..	4,000.00	..	..	4,200.00
Balance or "net worth".....	..	..	9,472.43	..	..	9,627.79
Increase \$155.35 for the year.....	..	..	..	..	..	..

Valuing Lands for Inventory Purposes.—In valuing land for inventory purposes, strict adherence to whatever principle is adopted should be continued so as to eliminate all fluctuations due to variations in method

used. The three objects of valuing physical property for inventory purposes are, generally speaking, threefold: (1) to establish a basis for determining financial worth at recurrent periods, thus reflecting increases or decreases in net worth; (2) to ascertain the distribution of capital invested; that is, the amount of money tied up in each class of property; (3) to serve as a basis in farm cost accounts for charging depreciation and interest on investment.

Bases of Land Valuing.—In the valuation of land there are at least three bases that may be considered: (1) cost; (2) sale or market value; (3) capitalized rent.

Cost Value of Lands.—The difficulty with the cost basis in appraising farm lands is that it fails to fulfill completely any one of the three objects of valuation as hereinbefore specified. This is partly because of the personal element present in farm accounting, so that if the land value be based on cost it will certainly not reflect the farmer's present net worth. In many cases the land, when obtained, cost so little that to use the cost figure, under present day conditions, would not be in line with actual conditions. Again, many farms have been inherited, thus costing their present owners nothing. For these reasons, generally speaking, the cost basis is not acceptable in land valuations for farm inventory purposes. Where the land has recently been purchased, however, cost is the best appraisal basis.

Market Value of Lands.—The sale or market-value basis will doubtless prove the most practical in the majority of cases, but certain precautions are necessary in applying it. If this method is adopted the land should be appraised as nearly as possible at a figure representative of the current price in the neighborhood of the same kind and quality of land. By current price is not meant a forced sale price, nor yet a fancy suburban lot valuation, but such a price as the more recent sales to farmers have shown to be the real market value of land in the locality. Almost every farm will include areas of different value per acre. These should be separately priced in accordance with their values, and, to facilitate future appraisals, each field or parcel of land may be designated by a letter or number for purposes of identification. The number of acres in each kind of land, multiplied by its appraised value per acre, will give, when footed up, the total appraised value of the land.

It is sometimes rather difficult to judge of the actual market value of farm land. Especially is this true in regions where there is great activity in the land market, and also in those sections of the country where there is little or no buying and selling of farm lands. In the former case the element of speculation and in the latter the scarcity of sales prevent the taking of sales prices as a guide.

Rent Value of Lands.—The third basis, capitalized rent, is probably the best index of the intrinsic value of land. Where this method can be

applied it is probably the most accurate one that can be used from an economic standpoint. Its main difficulty from the standpoint of farm inventorying is its application where the land is being farmed by its owner. The earnings are produced by the entire farm property, land, buildings, stock, equipment, together with the labor employed, and the difficulty lies in allocating to each of these factors of production its true share of the earnings. Another practical difficulty lies in the fact that crops are not uniformly productive, neither are seasons, and the net rent would be more variable and inconstant, both up and down, than the market value basis, which usually follows a general trend, either upwards or downwards.

Thus while it is undoubtedly true that the net rent over a period of years is an excellent if not the best index of its actual value, there are practical difficulties of application that render its use for farm inventory purpose unavailable in the majority of cases.

Valuing Lands of Varying Values Separately.—In appraising the farm land, especially if cost accounts are to be carried, it is desirable that each kind of land (as crop land, permanent pasture, woodland, etc.) be valued as nearly as possible at its relative value as compared with the other kinds. In some cases it has been found expedient to go still further and assign to each separate piece of land on the farm its own value per acre. The value per acre of each kind of land multiplied by its area will thus give the total land value as appraised by this method.

This method is a good one to follow, for on practically all farms there are found areas of different value per acre. Thus some tillable land may be high in fertility and easily worked, being for this reason worth considerably more per acre than other tillable land of lower fertility or less desirable physical characteristics. Again, many farms include areas unfit for tillage by reason of swampy, rocky, or very hilly topography. Woodland and brushy areas are found in nearly all agricultural regions. In some cases the woodland is worth more, in others less, than the best tillable land, depending on the section of the country and the quality of the timber. To appraise all these at a uniform rate per acre would not be in accordance with the facts, and it is the facts that are desired when making an inventory.

Valuing Orchards and Semi-permanent Plantings.—The appraisal of orchards and similar semi-permanent crops, such as asparagus beds, berry plantations, etc., is best made as one with the land they occupy. They are, strictly speaking, a part of the makeup of the land value, for, if the land be sold, they are legally a part of the sale and go with the land. In appraising land carrying such crops the value should not be over-estimated on the basis of expected returns, however certain it may appear they will be. Conservative judgment should be used. The common basis for valuing land may be employed or, if the costs of bringing the

crop to bearing age are known, they may be added to the value of the bare land for the period which must elapse from time of planting until self sustaining age is reached. The full value should be maintained during the prime productive life, and then, as productivity wanes, the value should be gradually decreased until, when the fruitfulness of the crop ceases, it is again reduced to the value of the bare land.

Valuing Implements, Machinery, and Tools.—Some difficulty is occasionally experienced in placing a proper value on machinery and tools. The usual tendency is to place these values too low. Farmers generally consider a machine worth what it would bring at a public auction. There are two reasons why machines, on the average, go for less than they are worth when sold at public sale. First, an auction is a forced sale. Usually there are many articles that are not needed by any of the buyers, yet they are sold, but obviously at a sacrifice. This, of course, has a tendency to cause all articles to bring a little less than they are worth. Second, a person in buying at a public auction always assumes the risk that things are not exactly as represented, or that the whole truth is not always told. This risk has to be paid for and the result is a lower price. Probably the best way to place the value on a machine is to estimate as carefully as possible the number of years of life remaining; then by considering the age and cost of the machine, a fairly correct value can be assigned.

Valuing Farm Animals.—In placing values on animals, the farm value should be recorded rather than the market value. The farm value is the market value less costs of hauling or driving to market and selling. These costs will vary with the distance to market, the size of the load, the character of the road, and the selling method.

Valuing Field Crops.—In the case also of grain, hay, and similar field crops, the value assigned should be the farm value. With wheat, for instance, where the haul is not excessive and the roads fairly good, the cost of hauling may run from 4 to 6 ¢ per bushel. Under such conditions when inventorying for this particular farm the value should be placed at from 4 to 6 ¢ below the market price.

Effects of Appreciation and Depreciation upon Values.—In fixing values, the judgment of one taking an inventory will be helped out if he recalls that the older stock, or machinery, or buildings becomes, the less they are worth. Depreciation is constantly occurring.

Appreciation of Land.—It often happens that the increase in land values from year to year will more than offset the depreciation in buildings and other improvements. If this increase in land values is at a moderate rate it may be safe to assume that there has been no net loss on real estate through depreciation for that particular year. Furthermore, on well-managed farms the amount spent for repairs and for the maintenance of the buildings and fences is sufficient to keep them in nearly as good condition as they were at the beginning of the year. In other words,

as soon as one stops repairing or keeping up buildings and fences the rate of depreciation is greatly accelerated. In the case of tile drains, which are a part of the farm, the depreciation largely depends upon the quality of the tile and the care used in laying them and in keeping the outlets open. On farms in regions where the land values are not advancing, if there is a wood lot the annual increase in the growth of timber may offset any loss through depreciation.

Depreciation of Machinery.—A machine depreciates in market value rapidly the first year used, or even the first few months used. That is, a mowing machine may sell new for \$85, but let it be used a month, thereby making it second hand, it may be difficult to obtain \$50 for it. This is even more marked with other kinds of tools. The farmer buying new equipment during the year will find the market value of that equipment at the end of the year much less than the original cost. For the second and third year's use the market value of the machine may not appreciably decrease. In other words, a mower that has been in use three years will sell for almost as much as one that has been in use three months. The rate of depreciation on machinery has been variously estimated at from 6 to 10 per cent. This rate, however, is affected by a large number of factors. Some farmers, who take care of their machinery, will make an implement last twice as long as others; on some farms the rate of depreciation must necessarily be high.

Depreciation of Dairy Cows

Pennsylvania Studies of Dairy Cows.—Studies in Pennsylvania⁷ provide data to show the rate of depreciation of dairy cows and work stock.

TABLE 139.—DEPRECIATION OF DAIRY COWS (STUDIED ON 378 FARMS OPERATED BY OWNERS, CHESTER COUNTY, PENNSYLVANIA)

	Number	Value per herd	Total value
First inventory.....	4,196	\$56.10	\$235,400.00
Cows purchased.....	589	63.84	37,605.00
Cows raised.....	345	63.84	22,025.00
Total.....			295,030.00
Second inventory.....	4,164	57.01	237,430.00
Cows sold and slaughtered.....	895	37.36	33,437.00
Total.....			270,867.00
Difference.....			24,163.00
Increase at end of year in value.....		0.91	3,789.00
Total loss.....			27,952.00
Average investment.....			236,415.00
Rate of depreciation per cent.....			11.82

The results of the calculation are surprisingly large, and the figures for different regions vary widely. Thus for this area the average annual loss on dairy cows from depreciation in value is 11.82 per cent of the average of the inventory values for the beginning and the end of the year.

Michigan Studies of Depreciation of Dairy Cows.—The following table gives a similar calculation for a survey in an important dairy center in southern Michigan (Lenawee County), in which the corresponding rate is only 4.07 per cent.

TABLE 140.—DEPRECIATION OF DAIRY COWS (STUDIED ON 300 FARMS, LENAWEE COUNTY, MICHIGAN)¹⁹

	Number	Value per head	Total value
First inventory.....	2,291	\$53.23	\$121,942.00
Cows purchased.....	184	48.48	8,921.00
Cows raised.....	236	48.48	11,441.00
Total.....			142,304.00
Second inventory.....	2,215	51.90	114,967.00
Cows sold and slaughtered.....	466	42.00	19,572.00
Total.....			134,539.00
Loss (including decrease in value at end of year)...			7,765.00
Decrease in value at end of year.....		1.33	2,946.00
Total loss.....			4,819.00
Average investment.....			118,454.00
Rate of depreciation per cent.....			4.07

Appreciation and Depreciation of Work Horses. *Appreciation and Depreciation of Work Horses—Illinois, Ohio and New York.*—The average

TABLE 141.—APPRECIATION AND DEPRECIATION OF HORSES—ILLINOIS, OHIO, NEW YORK

State and number of horses	Percentage of horses that showed		Number of deaths	Number bought	Number sold	Number colts bought	Number colts sold	Number colts fed
	Appreciation, per cent	No appreciation, per cent						
Illinois (154 horses).....	18.75	81.25	3	21	21	2	..	43
Ohio (72 horses).....	21.95	78.05	..	9	17	2	1	7
New York (90 horses).....	4.95	95.05	6	6	3	1	2	18
The three states (316 horses)....	15.60	84.40	9	36	41	5	3	68

net depreciation, based on 316 horses in Illinois, Ohio, and New York, was found to be \$4.50 per horse.¹²² Of this amount \$2.70 per horse was due to the death of nine horses, valued at \$855. Depreciation varied from \$11.60 per horse in New York to an appreciation of \$2.10 per horse in Ohio. The table shows the percentage of horses that appreciated in value, the percentage that did not, and the factors influencing the aggregate depreciation or appreciation by States.

On the Illinois and New York farms, colts became work horses when from 2½ to 4 years of age. The age of work horses that depreciated in value varied considerably, depending on their usage and care. The average of those that neither appreciated nor depreciated in value was about 8 years, and the average age of those that depreciated in value was about 11 years. In Ohio data showing the age of all the horses studied were not obtained; however, the data that were obtained along this line showed about the same results as those in Illinois and New York.

Depreciation of Horses—Pennsylvania.—The average annual depreciation of horses on 378 farms studied in Chester County, Pennsylvania,⁷ was found to be \$7 per head.

Here horse depreciation amounted to:

TABLE 142.—DEPRECIATION OF HORSES (STUDIED ON 378 FARMS OPERATED BY OWNERS, CHESTER COUNTY, PENNSYLVANIA)⁷

	Number	Value per head	Total value
Value at first inventory.....	1,369	\$135.98	\$186,183.00
Value of horses purchased.....	103	157.36	16,208.00
Value of horses raised.....	8	157.36	1,259.00
Total.....			203,650.00
Value at second inventory.....	1,367	138.95	189,947.00
Value of horses sold.....	64	128.02	8,193.00
Total.....			198,140.00
Loss.....			5,510.00
Increase in price during year.....		2.97	4,060.00
Total loss.....			9,570.00
Average investment.....			188,065.00
Rate of depreciation per cent.....			5.09

Depreciation of Horses—Michigan.—On 300 farms studied in Lenawee County, Michigan, the average rate of horse depreciation was found to amount to \$7.10 per head.¹⁹ These figures were determined largely

by the practice of farmers in disposing of horses while they were still salable at a fairly satisfactory price, and would undoubtedly have been much greater if all farm horses were kept until their usefulness was at an end.

TABLE 143.—DEPRECIATION OF HORSES (STUDIED ON 300 OWNER FARMS, LENA WEE COUNTY, MICHIGAN)¹⁹

	Total number	Value per head	Total value
Horses at beginning of year*	1,027	\$126.50	\$129,912.00
Horses purchased	90	161.31	14,518.00
Horses raised	37	161.31	5,968.00
Total			150,398.00
Horses at end of year	1,033	132.91	137,299.00
Horses sold	87	142.63	12,409.00
Total			149,708.00
Loss			690.00
Increase in price during year		6.41	6,621.00
Total loss			7,311.00
Average investment			150,053.00
Rate of depreciation			4.87

*Does not include three stallions valued at \$1,100 apiece.

Depreciation of Horses—New York.—Cornell found the average annual depreciation of horses on 14 New York farms for the year 1912, and on 31 New York farms for 1913, to be \$14.03 and \$12.10 per horse unit, respectively.¹¹⁵ Of the 40 farms studied, 12 showed an appreciation of horses.

Depreciation of Horses—Minnesota.—Minnesota from a 4 years' study (1904 to 1907, inclusive) gives figures for farms in three different counties. In Rice County depreciation varied from \$0.98 in 1905 to \$15.48 in 1904, averaging for the 4 years, \$5.56 per head. In Lyon County depreciation varied from \$4.20 in 1905 to \$9.86 in 1904, averaging per year \$6.94 per head. In Norman County depreciation varied from \$2.60 in 1907 to \$7.37 in 1904, averaging per year \$5.82 per head.

It is pointed out in the text that depreciation of the horse is an expensive item to farmers who are not able to control this expense by means of clever selling methods and by the use of young horses. Shrewd selling, however, does not affect the general principle of depreciation, since thus the loss is passed on to the buyer.

Minnesota Experiment Station *Bulletin* 145 gives results of a further study of horse depreciation in the above-mentioned counties. Records for Rice County for the period 1908 to 1912, inclusive, show a variation in depreciation from \$0.28 in 1910 to \$5.10 in 1909, and an average per year of \$3.05 per head. In Lyon County the study covers a period of 3 years, 1908 to 1910, inclusive. The depreciation varied from \$1.47 in 1910 to \$5.60 in 1909, averaging per year \$3.06 per head. In Norman County the work covered a period of 4 years, 1908 to 1911, inclusive. The depreciation varied from \$0.51 in 1910 to \$3.42 in 1911, averaging per year \$1.48 per head. It is pointed out in this bulletin that the annual depreciation as shown above is not high enough to represent a proper average charge through a long term of years. Abnormal conditions in the Minnesota horse market were largely responsible for the low depreciation charge.

Depreciation of Horses—Texas.—In Ellis County, Texas, depreciation was found to amount to but 5 per cent annually.⁹

Depreciation of Horses—Missouri.—A Missouri study¹²¹ resulted in finding that as a general rule 8 to 10 per cent depreciation on work horses over a period of 10 years is figured. This is on the basis that a horse begins work as a 3-year-old and lives to the age of 13 or 14 years. In figuring the cost to himself of keeping his horses, however, the farmer is likely to find this figure inapplicable. The average depreciation of 10 per cent while applying to any one horse over a period of 10 years, is not a cost to the farmer in that proportion unless the farmer follows the practice of keeping his horses to about the age mentioned. Any variation from this practice, though not affecting the rate of depreciation on any one horse, does affect the depreciation cost that falls to any one owner. In order to study the rate of depreciation on work horses at different ages, a number of horses on which there were complete data were grouped according to age, and the average price per head determined. It was found that from 1 year to 2 years of age the increase in value averaged \$41 or 57 per cent; from 2 years to 3 years the increase averaged \$16 or 14.2 per cent on the previous value; from 3 to 4 years the increase was \$25 or 19.4 per cent; from 4 to 5 years the increase in value averaged \$11 or 7.2 per cent. After the fifth year there was a decrease in value. From 5 to 6 years the depreciation averaged \$12 or 7.3 per cent, which about equalled the gain of the year before; from 6 to 7 years the depreciation was \$9 or 5.9 per cent; between 7 and 8 years there was no appreciable depreciation; between 8 and 9 years the depreciation was \$3 or 2.1 per cent of the previous year's value; between 9 and 10 years the depreciation was negligible; between 10 and 11 years the depreciation averaged \$18 or 12.8; between 11 and 12 years the depreciation averaged \$28 or 22.8 per cent. It will be seen from this that the heavy rate of depreciation starts after the age of 10 years is reached.

From a study of these work-horses, averaging five to six head per farm, it was found that the net depreciation on the total number was usually very small because the appreciation on young stock tended to offset the depreciation on the older stock. This is brought about by the farmer's practice of usually keeping a young team or two and disposing of the older horses when they are at the high figure or shortly afterward.

Depreciation of Farm Equipment. *Depreciation of Farm Equipment, Minnesota, 1902-7.*—Parker and Cooper report for Minnesota⁹⁴ findings covering average depreciation as follows:

TABLE 144.—ANNUAL DEPRECIATION OF FARM MACHINERY,—MINNESOTA

	AVERAGE
Grain binders.....	\$7.91
Grain drills and seeders.....	6.75
Thrashing outfit.....	12.00
Corn binders.....	10.03
Corn planters.....	7.15
Corn cultivators.....	7.25
Mowers.....	7.80
Hay tedders.....	4.84
Hay loaders.....	11.78
Hay rakes.....	7.80
Gang plows.....	7.40
Sulky plows.....	8.42
Walking plows.....	6.09
Wagons.....	4.89
Harrows.....	8.72
Discs.....	5.19
Manure spreaders.....	11.67
Hay racks.....	7.76
Reapers.....	8.13
Grain tanks.....	3.47
Sleds.....	5.81
Fanning mills.....	4.58
Horse weeders.....	5.71
Harness (heavy).....	6.17
Gasoline engines.....	7.35

California Studies of Depreciation of Farm Equipment.—In California, the average life of buildings is estimated at 20 years, the length of service depending a good deal, of course, on use, construction, and attention in the way of painting and repairs. In general, then, for each \$100 put into buildings in the state, \$5 or 5 per cent must be subtracted each year.

Dairy cows are at their prime for 8 years; for each \$100 invested one must therefore deduct \$12 per year or 12 per cent. They are, however, today worth fully 50 per cent for beef when too old for milk, so that the actual rate of depreciation is 4 per cent ($\$75 - 50 = \$25 = 33\frac{1}{3}$ per cent of cost; divide $33\frac{1}{3}$ by 8 for annual percentage of depreciation).

Implements and machinery wear with the amount of use. For instance where a lot of development work is being done Fresno scrapers may last only 2 years, while for general use they will last three times as long. Plows in gravel soil will wear out more quickly than when used in loam soils. Cultivators in beet work will not last as long as those in corn. In general, however, implements are considered as good for 10 years, or 10 per cent depreciation a year.

Work horses and mules are good for 10 years on an average. Depreciation must therefore be charged at 10 per cent a year.

Depreciation on other live stock such as poultry, swine, and sheep takes into account not only the term of productivity but the value as food at the end of the profitable period of breeding.

Sheep are good for 4 years and depreciation would therefore be 25 per cent on the producing powers. They are worth 75 per cent of first value as mutton, however, so the depreciation would be but one-fourth of 25 per cent, or 6 per cent.

In the same way breeding hogs for slaughter purposes are worth 50 per cent of mature values at end of 6 years of service—or depreciation is 50 per cent divided by 6 or about 9 per cent.

Poultry are estimated as good for 2 years of laying life and are worth 50 per cent of first value for meat. Depreciation is therefore 50 per cent divided by 2, or 25 per cent.

To these figures of depreciation must be added the normal death rate in animals after reaching full value. This, in general, may be taken at 2 per cent for cattle and horses, 8 per cent for swine, 2 per cent for sheep, 10 per cent for fowls.

These figures are based on stockmen's estimates, and may be only approximate.

If, however, these are accepted as about right, figures of depreciation (covering decrease in value and mortality) therefore amount to: stock cattle 6 per cent, dairy cows 6 per cent, work stock 12 per cent, swine 17 per cent, sheep 8 per cent, poultry 35 per cent. See "Miscellaneous Costs," Chapter XIX for further data on depreciation of equipment.

The Cash Book

Description of the Cash Book.—The simplest form of cash book consists of a record of cash outlay and income, showing day by day what is sold or purchased, the rate received or paid, and the total value involved in the transaction. These items are entered in the cash book, using either two columns for the totals, or two connecting pages. Whenever money is received, the amount is placed in the column or on the page set aside for the recording of all receipts; conversely, when money is paid out it is entered in the space reserved for all records of expenditures. The usual

practice is to use the left-hand column or the left-hand page for receipts and the right-hand spaces for expenditures. In farm bookkeeping less confusion follows the use of the terms "receipts" and "expenses" than "debits" and "credits," although the latter is entirely in keeping with business practice. Under the common method it is the practice to enter "receipts" on one page and "expenditures" on another. Under one head place all items sold, as stock, crops, and other products.

Cash Book and Diary **Cash Book by Diary (cont.)**

Date	Description	Debit	Credit	
1917				
Dec. 1	Bought 100 lbs. of potatoes	1.00		
	Bought 2 tons of hay	44.00		
	Bought 1 cow to J. Brown	77.50		
	Bought 30 dozen eggs	12.00		
	Bought 3 bu. seed potatoes	4.50		
1918				
Dec. 15	Bought 100 lbs. of potatoes	1.00		
Dec. 17	Bought 2 tons of hay	44.00		
Dec. 18	Bought 1 cow to J. Brown	77.50		
Dec. 19	Bought 30 dozen eggs	12.00		
Dec. 20	Bought 3 bu. seed potatoes	4.50		
Above are illustrative of Cash Book and Diary Items should be entered daily for entire year at end of Year see totals				
Total by year		\$200.00	\$100.00	
Balance			\$100.00	

FIG. 70.—Example of diary and cashbook on three-column journal ruling.

Example of Simple Cash Book.—One method of keeping cash receipts and expenditures⁸¹ is illustrated below.

TABLE 145.—EXAMPLE OF SIMPLE CASH BOOK

RECEIPTS (to go on left-hand page)		
(year)		
April 2	20 bu. potatoes at \$.90.....	\$18.00
2	18 dozen eggs at \$.41.....	7.38
7	2 tons hay at \$22.00.....	44.00
7	1 cow to J. Brown.....	77.50
7	30 dozen eggs at \$.40.....	12.00
7	3 bu. seed potatoes at \$1.50.....	4.50
		\$163.38

FARM MANAGEMENT

EXPENDITURES (to go on right-hand page)

(year)			
April 2	1 ton cotton seed meal for dairy.....	\$55.00	
2	Strap for work harness.....	0.35	
2	Personal.....	2.25	
2	Household.....	1.60	
7	Garden seeds.....	8.00	
7	Express on seeds.....	0.85	
7	2 milk pails.....	2.00	
7	Household.....	0.86	
7	Repairing plow.....	1.20	\$72.11

For a simple, easy scheme of bookkeeping such a record is very satisfactory, and if followed out to the end of the year will give all business transactions. But if one wishes to know the aggregate income from any separate enterprise, it is necessary to go through the records and pick all items which apply and add them. While this record gives the total receipts it does not classify them.

Cash-book Items Recorded by Enterprises.—To avoid recopying and to provide an ever-ready record, the recommendation is often made to open a separate account for each enterprise for which data are desired, and therein enter all debits or credits (*i.e.*, sales or purchases) directly to the account concerned.

The so-called "daybook" or "journal" will serve as a cash book for this purpose. The requirements are that there be a place for dates on left-hand side, a broad space for recording details, and columns ruled for dollars and cents on the right.

Cash items are entered directly in their respective accounts.

TABLE 146.—EXAMPLE OF CASH-BOOK RECORD BY ENTERPRISES

.....(year)	Dairy	Received	
April 9	2 cows to C. Brown.....	\$ 88.00	
9	1 yearling to Smith.....	19.00	
15	Milk and cream.....	114.25	\$221.25
.....(year)	Dairy	Paid	
April 2	1 ton cottonseed meal.....	\$ 35.00	
2	2 milk pails.....	2.00	
10	1 cow from A. Johnson.....	57.50	
10	One-half ton bran.....	15.50	\$110.00

Form illustrating special-column cash book; items entered direct to separate accounts.

RECEIPTS

.....(year)	Item	Dairy	Poultry	Crops	General
April 2	2 yearlings to Jones.....	\$35.00			
3	2 tons of hay to Brown.....	.....	.....	\$32.00	
4	14 dozen eggs, at 25¢.....		\$3.50		

EXPENDITURES

.....(year)	Item	Dairy	Poultry	Crops	General
April 2	1 ton wheat bran.....	\$28.00			
2	10 bu. seed oats, at \$1.....	.....	.....	\$10.00	
7	2 bags chicken wheat.....	2.50			

The Use of a Bank Book as a Cash Record.—Another cash-book system is the “bank-book” or “check” method. By this method all farm funds are passed through the bank account. When funds are deposited in the bank a duplicate deposit slip is made out, on the back of which is recorded the articles for which the cash is received. Likewise when checks are drawn the articles for which the money is expended are noted on the check-book stub, or upon special checks bearing on their face a notation of the object for which drawn. This is a very simple scheme and has much to recommend it.

The duplicate deposit slips and check stubs, carefully preserved, form a complete financial record, and the records automatically agree with the cash balance. There is one inconvenience encountered in this method. There are many expenditures of a few cents here and there, and it is both impracticable and unbusinesslike to draw a check for each of these petty amounts. There are several means of overcoming this difficulty. One is to open an account at the store for these petty items and draw a check periodically to pay for them. The items can then be classified on the check stub. Another means is to adopt what is known as the “petty-cash” method. A small sum of money is set aside to pay these minor items and charged to a petty cash account. From this the little expenses are paid, and when the sum is depleted a check is drawn to cover the total of items paid out of it, the items being classified on its stub, and the check is then cashed and the money put back in the petty cash fund.

The Farm Diary Method of Records.—The method known as “the farm dairy method” consists of using a book with a separate page for the records of each day throughout the year. The main objection to it is

that the records must be "posted" as described in the discussion of the first method given, but it has the considerable advantage of providing a definite system for the recording of all the miscellaneous happenings which are of interest and value.

The farm diary provides a simple and concise way of recording happenings. In the course of time this will constitute a history of the farm. The records should be written in day by day, giving ample information and memoranda which may prove valuable for future reference.

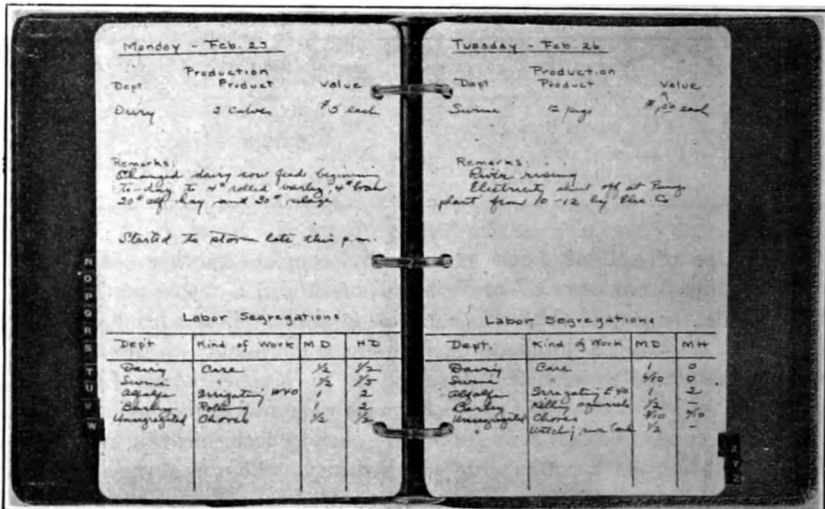


FIG. 71.—Example of loose leaf system with home ruled sheets for combined diary and labor account. In this form, cash accounts could replace labor segregation, or the double page used to record in addition, cash transactions, materials and feeds records.

Condition of the weather, time of planting, breeding, division of fields, sales, purchases, loans, attendance at conventions, valuable recipes, etc. are proper subjects for entry.

Most diaries contain a page for each day, the upper half providing space for a record of the daily labor, the lower a place to record cash transaction, while other items of a personal or historic interest may be added. Inventories and blanks for further records are provided. This form of recording requires rather more labor in summarizing the year's records, but this is not usually considered a serious objection because the time of closing the books ordinarily comes at a slack period of the farm year.

A diary is adapted to keeping cost accounting records when information is wanted on only a few enterprises. In writing up the diary each

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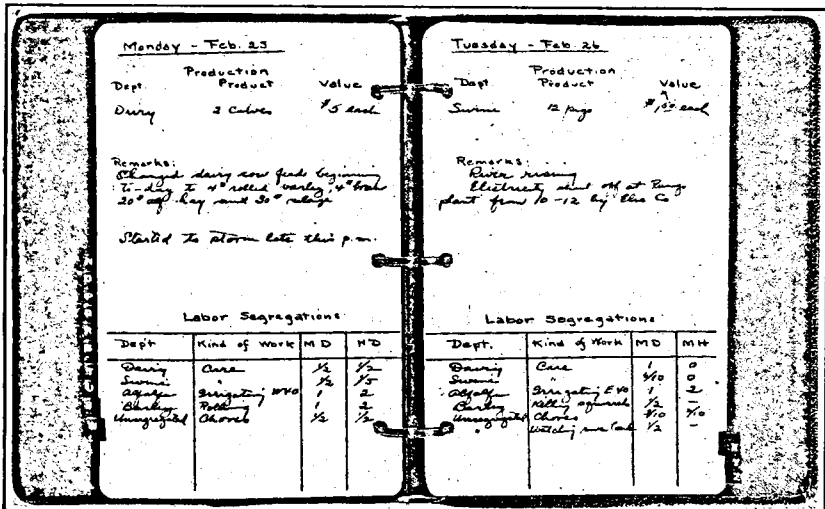


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A diary is adapted to keeping cost accounting records when information is wanted on only a few enterprises. In writing up the diary each

day it will take only a little additional time and effort to enter the hours and minutes spent in work on the crop or stock enterprise under consideration and the amount and value of seed, fertilizer, feed sacks, boxes, etc. used in producing the product. The possibilities of a diary as a cost accounting system are limited, however, and while it may serve as a starting point it is likely to be eventually replaced by a better method.

Thursday, Sept. 14,

	Plan.		Notes.	
	Hours	Plan	Hours	Plan
Cloudy South road Rain in evening				
Final chulling wheat in south field	9		12	
Used 18 bushels good and 2000¢ commercial fertilizer				
At town in P.M. Arranged for renewal of insurance on building and for \$500.00 on taxes				
Embarked				
Rob and Tom helped South Drive with silo filling				
Financial Account				
	Received		Paid Out	
6 doz eggs @ 34¢	2.04			
2 bus. apples @ 80¢	1.60			
Paid Andrews & Co. for seed wheat				
24 bushels @ 1.25			30.00	
2 bags wheat bran @ 1.40			2.80	
Shop for lamp			.20	

FIG. 72.—The use of a diary for recording cashbook items.

Example of Diary Items.—The diary has an added value if the records give a personal touch. Note the human interest in diary entries such as these:

- May 3—River pumping plant suction pipe collapsed.
- May 4—Sold 100 175 lb. shoats and 110 100 lb. shoats to W. Pattison at 16¢.
- May 11—Cholera has broken out in the unvaccinated 30-lb. pigs (167 in lot). About 45 deaths. First diagnosed by veterinarians as pneumonia.

Grain filling and if cool for a week prospects are for a good crop.

- May 19—Stemmed cholera 167 lot—100 gone first however.

Apricots beginning to color.

Suggestion: Try 20 acres Mariout barley next year.

June 23—Apricot harvest is on.

Had to serve notice to Richmond to vacate cottage and not later than June 30.

Next year harvest all grain when in hard dough stage account (1) danger floods (2) weeds bad in late ripening grain (3) sand makes hard pulling (4) high cost of harvest (Heading \$3.00 per acre) (5) broken heads when grain is dead ripe, especially during high winds of August.

Expect 4,000 sacks barley and 700 wheat.

Aug. 9—Hereafter bull calves are to be kept only when feed is plentiful, otherwise vealed. Heifer calves to be raised. Hereford bull is getting so heavy must be sold and a lighter weight animal obtained.

Aug. 30—Growth of sunflowers, and weeds after grain harvest, with resulting drain on moisture indicated wisdom of working land immediately after harvest. Receipts from stubble would be more than offset by greater grain crops from better and earlier preparation and saving of moisture. The Island is a sea of yellow sunflowers 6 ft. high, while the 91-acre piece is another bower. (Make good dove hunting in fall).

Sept. 10—Order blue mare killed. Badly cut by wire in stifle and is no good for breeding.

Nov. 8—This year teaches us need of more green feed Nov. 1 to Mar. 1. Concentrate on starting foxtail, early, and growing pumpkins and silage.

Nov. 26—On return from trip to city, superintendent served notice had a better job.

Dec. 5—Succeeded in getting new superintendent.

Dec. 26—Changed superintendents.

Feb. 10—Place in upheaval due to flu. Harland, fine chap, died at 9:45. Saw him at 3:30, cheerful, willing, all round worker. Too bad. Force played out nursing. Many sick.

Feb. 26—Things once more coming on in great shape.

The Annual Statement

Description of the Annual Statement.—The annual statement is a bringing together and summing up of the year's business, to exhibit what has been accomplished in a financial way. It shows the resources and liabilities, the cash receipts and expenditures, the profits and losses, the net profit or loss, and the net worth. It enables the proprietor to analyze his business with considerable accuracy and to trace the sources of profits and losses.

The simplest statement follows the use of cash book and inventory: the more complicated, the use of detailed accounts for each department.

The information obtainable from cash book and inventory is indicated in the following example:

TABLE 147.—ANNUAL STATEMENT MADE UP FROM INVENTORY TOTALS AND CASH ACCOUNT¹

Inventories (physical or tangible only)

	Value			
	April 1, 1918	April 1, 1919	Increase	Decrease
Real estate.....	\$ 9,600.00	\$ 9,600.00		
Live stock.....	1,185.00	1,613.00	\$428.00	
Machinery and tools.....	1,633.60	1,498.25		\$135.25
Farm produce.....	648.00	795.60	147.60	
Purchased feeds and supplies.....	7.58	57.45	49.87	
Totals.....	\$13,074.08	\$13,564.30	\$625.47	\$135.25
Subtracting the lesser.....		\$13,074.08	135.25	
Balance, net increase (a farm receipt)...		\$ 490.22	\$ 490.22	

Farm Receipts

Financial receipts.....		
Cash receipts.....	\$2,235.40	
Add value of current year sales not yet received in cash (see financial inventory)...	68.00	
	<u>2,303.40</u>	
Subtract payment of last year's bills included in cash receipts	142.00	
	<u>2,161.40</u>	
Net financial receipts applicable to this year...		2,161.40
Property receipts:		
Net increase in inventory (a property receipt).	490.22	
Personal benefit receipts:		
Value of food supplies furnished family.....	439.74	
Value of fuel furnished family.....	58.00	
Renting value of farm dwelling.....	180.00	
	<u>677.74</u>	
Total personal benefit receipts.....		677.74
Total farm receipts.....		<u>3,329.36</u>

Farm Expenditures

Financial expenditures:		
Cash expenditures.....	1,703.41	
Add amount of current year purchases not yet paid in cash.....	200.00	
	<u>1,903.41</u>	
Total financial expenditures.....		1,903.41
Property expenditures: (none, there was a net inventory increase; not a decrease)		

Personally furnished expenditures:		
Value of family labor on farm work.....	110.00	
Value of board furnished laborers.....	60.00	
Total personally furnished expenditures....	170.00	
Total farm expenditures.....		2,073.41
Net farm income.....		1,255.95
Income earned by capital and labor:		
Interest at 5 per cent on total value of physical inventory, April 1, 1918.....	653.70	
Deduct interest paid on mortgage.....	200.00	
Value of farmer's labor (estimated).....	453.70	
	600.00	
Total deduction for use of capital and labor..		1,053.70
Net farm profit.....		\$ 202.25

Determining Inventory Changes.—The first step is to determine the net inventory increase or decrease, which is then carried below as a property receipt or a property expenditure, accordingly as it is found to be an increase or a decrease.

It will be noticed that in arriving at the inventory increase Table 147 does not include the accounts receivable, accounts payable; or cash on hand. This is because the money which is owed the farm has been added to the cash receipts, that which is owed by the farm to the cash expenditures, and the difference in cash on hand is reflected in the difference between cash receipts and expenditures. Thus, while, the complete inventory is properly used when there is no other record, only the physical inventory is used when figuring farm income and profit. The accounts payable and receivable are added to the receipts and expenditures because they really are such, and actually pertain to the year for which the statement is prepared. These points must be thoroughly grasped, and they are worthy of study.

Adjusting Cash Items.—To determine the financial receipts and expenditures properly belonging to the year in question, an adjustment of the cash receipts and expenditures must be made by taking out all items included among them but not rightly pertaining to this year, and by adding in all items of the year's business not yet settled for.

One item of this adjustment will require some explanation, namely, the deducting of \$200 interest paid on mortgage. This is done to prevent duplication, for if interest on the entire value of the physical property is deducted in ascertaining the net farm profit, and, in addition, the interest actually paid on the mortgage covering a part of the same property, a double interest charge is made on the part covered by the

mortgage. The interest paid on the mortgage has already been included as a deduction from income, as it appears in the total farm expenditures.

This duplication is avoided, as shown in Table 147, by deducting the amount of interest actually paid from the interest as calculated on the value of the physical assets. This process closely follows the facts, as the capital, in this case, on which interest charges should be figured is not the total value of the property, but the remainder, or "equity" as it is sometimes called, after the amount of the mortgage is deducted.

Determining Labor Income.—While the term "labor income" is of value to the economist in studying the relative profitableness of different farms, it is not generally used in farm bookkeeping, since only a single farm is being studied by its operator. If it is desired to compare one's labor income with those in published data on farm economics, it can be determined by figuring the net farm income left after allowing for interest on the investment. This labor income can readily be gotten from a statement like Table 147 by adding the estimate of the value of the farmer's services (\$600) to the net farm profit (\$202.25). If there should be a net farm loss, instead of a profit, the amount of the loss should be deducted from the estimated value of the farmer's services. If the loss is larger than this estimate, the latter should be deducted from this loss. In this case there would be what is termed a "minus labor income," which means that the year's results have not even paid the proper interest on the investment by the amount of the minus labor income.

Steps in Making up an Annual Statement.—From the preceding, it should be evident that to make up an annual statement from the cash book and inventory involves determinations as follows:

1. The year's gain as shown by the inventory.
2. The total personal and household expenses as shown by the cash book.
3. Payments for interest and outside investments, as shown by the cash book.
4. Value of house and supplies furnished by the farm.

The resultant total from these four steps constitutes *farm income*.

If from the figure so obtained is deducted interest on the average investment at the general prevailing rate, the difference will be *family income*.

To find out the farmer's *labor income* there must be deducted from this family income the value of any unpaid family labor other than that of the operator.

To find out percentage *returns on the investment*, from farm income, the estimated value of the farmer's work is deducted. Any sum remaining is then calculated as so many per cent returns on the average farm investment.

CHAPTER XVII

FARM COST ACCOUNTING⁹⁰

The system described in the last chapter aims to show the status of a farm business as a whole. Such a system is entirely satisfactory when one is first starting to keep books. But as familiarity develops there usually comes with it a desire to know more of what the different departments are doing—to keep account of some particular crop or class of live stock.

Function of Farm Cost Accounting.—The function of farm cost accounting is to supply information to the business farmer who wishes to know how much he is making or losing upon his operations each year, and how much the gains or losses amount to for each crop or class of live stock, so that increase in profits may be obtained through intelligent reorganization of the farm activities.

Accounts by Departments.—Whereas farm bookkeeping considers the farm as a whole, and takes no cognizance of receipts or expenditures as affecting any particular part of the business, cost accounting keeps separate accounts for each part of the business. That is, each industry is considered as a business by itself.

Thus a farm devoted to whole milk production, raising and fattening of hogs, growing of grain for farm use with a surplus for sale, and production of alfalfa, will consider the dairy, swine, grain, and alfalfa as four separate businesses, charging each with expenditures and placing to the credit of each all of its production. Or a farmer specializing in fruit of two or three varieties like peaches, apples, and pears, with poultry, and truck crops such as tomatoes, cabbages, and potatoes, would follow the affairs of each department by itself throughout the year and note what demands and what receipts fell to the peach, apple, pear, poultry, and truck departments.

Accounts by Operations.—The keeping of accounts may be for a somewhat different purpose, as for example a desire to investigate the costs of the various operations involved in producing the product. A grower of fruit may (and many do) desire to determine where his various expenses occur. The orange growers, for instance, of southern California, make a special effort to keep track of the various costs of picking, packing, marketing, fumigating, manuring, cultivating, and all charges entering into the growing and disposing of the crop.

Farm Cost Accounting Similar to Commercial Cost Accounting.—Cost accounting for the farm is exactly parallel to what large manufacturing companies do in order to learn whether they are making profits on their different products. The farmer wants to know whether his

wheat pays, whether his cows pay, or his orchard. These are some of the questions a set of farm cost accounts will settle.

Cost Accounting Introduces Estimates.—No cost accounting can be absolutely exact. Commercial cost accounting and farm cost accounting are precisely alike in this respect. Both are based partly on estimates and partly on ascertainable facts, and both approach exactitude in proportion to the accuracy of these estimates. It is therefore important to make the estimates as accurate as possible rather than be satisfied with rough approximations. As the work is carried on year by year and experience is gained, greater precision in estimating is attained, with correspondingly nearer correctness in the results of the cost accounts.

On the other hand it is not wise to spend much time with refinements in methods of bookkeeping that are designed to check to the last cent. In fact, attempts to find insignificant errors often disgust inexperienced persons with the whole question of accounting.

A Favorable Time to Start Accounts.—Accounts may be started any time after the last crop is harvested in the fall and before the first crop operations are started in the spring. They should be begun on the first work day of some month, but the exact date will depend upon the geographical location of the farm and the nature of the business or type of farming in practice. The time should be as late as possible in order that there may be the smallest quantities of last year's crops on hand to be inventoried. However, the date should be early enough to allow sufficient time to close the year's accounts, work out results, plan the next year's business, and open the new accounts before the spring crop work begins. In a large majority of cases the best date will fall between January 1 and April 1. For a tenant the date of taking an inventory and opening the accounts will, of course, correspond to the date of his lease.

Classes of Records Needed for a Complete Set of Farm Cost Accounts. In order to have a complete set of farm cost accounts four classes of records are necessary:

1. An inventory at the beginning and end of the year.
2. An account of all money paid out or received, and of all purchases or sales on credit.
3. Records of feeds consumed, crop supplies used, and crop yields.
4. Records of all work done by men, horses, tractor, or other power during the year.

Present Status of Crops.—The items to be considered in keeping track of any crop must cover all previous work done up to the time the account is started, and the value of all materials used, such as seed, manure, or fertilizer. From the time the account is opened, careful record must be kept of all labor expended upon the crop, whether horse or man, all seed, fertilizer, spray, or other material required, use of implements, buildings, and management, a fair charge for the use of land, any other costs incident

to the production of the crop, and interest on operating capital and value of crop until utilized. The crop is to be credited with everything it produces at market, or farm, value, if it has such, or at cost if there is no readily obtainable market price, including any manure values remaining.

Present Status of Live Stock.—In the stock departments a full inventory of the stock on hand, together with feed, is taken. After the account is opened, future items will cover all expenditures for feed, including pasture, bedding, additional stock, labor (horse and man, including supervision), use of buildings and special equipment, insurance, interest on the investment, interest on the operating capital, and depreciation. Credits will consist of all products yielded, whether sold or used, determined in the same way as for crops.

Items to be Covered in Crop Cost Accounting.—The items to be considered in a cost account with a crop can be summarized as follows:

Charges

Inventory of amount of work, seed, etc., if any, previous to beginning the account.

Part of manure charge from previous crops.

Value of manure applied for this crop.

Commercial fertilizers, all or part to this crop.

Seed, twine, crates, chemicals, etc.

All man labor, including supervision.

All horse labor.

Use of machinery.

Use of buildings for storage of crops.

Use of land.

Overhead.

Other miscellaneous costs.

Credits to Crop

All products sold, used by the family, fed on the farm, saved for seed, or used for bedding.

Probable value of manure left in soil but charged to crop.

Inventory, or amount on hand at end of year.

Items to be Covered in Live-stock Cost Accounting.—The items to consider in a cost-accounting record of live stock are as follows:

Charges

Inventory, or total value of stock at beginning of year.

Live stock purchased.

Feed and bedding used.
Milk fed to stock.
Pasture.
Interest on investment in live stock.
All man labor, including supervision.
All horse labor.
Use of machinery.
Use of buildings, for shelter.
Overhead.
Miscellaneous costs, insurance, etc.

Credits

Sale of live stock and live-stock products.
Skim milk, etc., fed to other stock.
Products used by the family.
Value of manure.
Inventory at end of the year.

Inventories in Cost Accounting.—The inventory record is handled similarly to the method already described for "Farm Bookkeeping."

In cost accounting, items carried in a general cash book, such as described in the preceding chapter, are transferred to the various department accounts. Some systems, in order to avoid this so-called "posting," make the entries direct to the account involved.

The Cash Book in Cost Accounting.—For these records, a book called by stationers a "broad day book" or "journal" can be used. The requirements are that there be a place for a date on the left-hand side of the page, a broad space in the middle of the page in which to write explanations, and columns ruled for dollars and cents at the right. Two pages facing each other are taken for each account. The name of the account is written at the top of the page. The left-hand page is marked "Receipts" and is used only to record credits to the account. The right-hand page is marked "Expenses" and is used only for charges against the account. At the end of the year this book becomes the complete account book, for in it at that time are entered the items from the other two record books as described later.

A separate account is kept with real estate, each crop grown, each class of animals, machinery, labor, interest, each person dealt with on credit, and such other headings as may be found necessary or convenient.

The following classification of account headings will give some idea of the number and kinds of accounts it may be necessary to keep:

TABLE 148.—CLASSIFICATION OF ACCOUNTS IN COST KEEPING

CROP ACCOUNTS	LABOR ACCOUNTS	LIVE STOCK ACCOUNTS
Corn	Man labor	Cows
Oats	Horses	Hogs
Peas	Equipment	Poultry
Hay	Tractor	Pasture
Potatoes	Truck	
Orchard		
Buckwheat		
Rye		
Wheat		
		NEXT YEAR'S CROP
GENERAL ACCOUNTS		Wheat, etc.
Real estate		
Feed and supplies		
Interest		
Manure		
Loss and gain		
Personal		
Household		
Commissary		
Office		

To these are often added accounts with each firm or person with whom credit dealings are carried on.

Properly Classifying Items.—Care must be given to classifying items in their proper accounts. Such matters for instance as repairing buildings, building fences, constructing irrigation gates, purchase of tools and implements, should be charged to one general account and not to any special industry or operation. They may be included in the record of permanent improvements, or else of general expense, of equipment expense, of investment, or in some similar account. This is particularly necessary if the operator is just starting in business, as the first inventory might show only lands and buildings. Purchase of work stock, implements, etc., should then be entered in a general account under some such name as those suggested. Other accounts which might be carried on are family expenses, which will cover meats, groceries, clothing, amusement, travel, etc.

How the Cash-book Entries Are Made.—At the end of each day, or as often as time permits or necessity requires, all moneys received or paid out since the last entries were made should be entered to the various accounts, *crediting* all money received and *charging* all money paid out.

Thus if a farmer makes a trip to town on March 4 and sells 10 dozen eggs at 40¢ per dozen and 7 lb. of butter at 50¢ per pound, and if on the same trip he purchases a sack of flour for \$2.50, a milk pail for \$1.00, and a pair of overalls for \$2.50, he will, on the evening of that day, record these items, in the following manner: First, the poultry account is turned to, and in the left-hand column and page the following entry

is made: March 4, 10 dozen eggs at 40¢, \$4.00. Next, the dairy account is opened and on the left-hand space is recorded: March 4, 7 lb. butter at 50¢, \$3.50. On the right-hand space of this account will also be recorded: March 4, one milk pail, \$1.00. The household account is next turned to, and in the right-hand space, the entry is made: March 4, one sack flour, \$2.50. Finally the personal account is turned to and the entry made: March 4, one pair overalls, \$2.50. These records when so made are there for all time and need never be copied or transferred. At the end of the year it will take only a short time to add up the figures on both sides of each account, and the result will be the total receipts and expenditures for each enterprise, and likewise for household and personal expense.

Indexing Accounts.—Finding the account wanted is made easier by indexing the books in the following manner: A piece of adhesive tape about $1\frac{1}{2}$ in. long is bent double and stuck on the edge of the page in such a manner that it projects about $\frac{1}{2}$ in. On this projection is written the name of the account kept on that page. A piece of tape is put on each account, arranged one below the other along the edge of the book so that all may be seen at the same time. Prepared paper tabs, suitable for this purpose, can be purchased from most stationers. Mending tape is much better than ordinary adhesive tape.

Feed Records in Cost Accounting.—Feed records are for the purpose of recording the use made of either farm-raised or purchased feeds by the different enterprises, so that proper charges may be made for use or proper credits for production. A careful estimate based on weighing feeds one day in a month is usually sufficient to give a satisfactory idea of what is being consumed.

Feed records should be clear and concise with a minimum of recording and a maximum of ease in finding totals.

A suggestion or two is given in the following:

Charging Feed Purchases.—All feed bought is charged directly against the accounts of the animals for which it was secured, the same as any other cash item. If the hog feed should run out some day and a bag of cow feed taken for the hogs, the entries should be made in the record book just as if the cows had sold this feed and the hogs had bought it.

The value of all home-grown feeds consumed must be charged to the live stock accounts and credited to the crop producing them. This can be done at convenient stated periods, as each week or each month. As home-grown crops are fed out an estimate must be made of the quantities fed to horses, cows, and other stock, and their accounts charged with the values thereof, credit being given the crop accounts. A day's rations may be weighed or estimated once a month or oftener and the proper proportion of the total feed consumed, based on these weighings and the number of days fed, may then be duly charged and credited. This method will give a reasonable approach to accuracy if weights are taken fairly often. When the different classes of animals are fed from separate grain bins and haymows there will be no difficulty in keeping the

feed accounts separate, if a record is kept of the quantities put in each at harvest time and fed out from each thereafter.

Where concentrates are purchased in large quantities to be fed to several classes of animals, the charge may be made to "Feed and Supplies" account and a record kept in the feed room of the quantities fed to each class of animals. Proper charges can be made on the basis of this record and the "Feed and Supplies" account credited.

Crediting Production.—At the time of thrashing or at the close of harvesting a crop, the total yield may be entered as a memorandum on the receipts side of the proper crop account, but the values are not yet to be carried to the money column. Yields of hay, straw, etc., can be estimated with fair approximation by measuring bins and haymows or by counting the number of loads drawn and estimating the actual weight. In all cases allowance for shrinkage should be made. The money values are to be entered as the crop is sold or transferred to the animals. Quantities sold will be known from the weighing bills or otherwise.

Manure Accounts.—When barnyard manure is hauled out to the fields it should not at that time be charged directly to the crop accounts and credited to the stock account. A "Manure" account is provided to carry all manure charges until the end of the season. The entries in this account should give the crop to which applied, the kind of manure, the number of tons or loads hauled out each day, where produced, stock to be credited, and the value of the manure. At the end of the year the manure account is closed by charging each crop account in a single item for its proportion of the total value of the manure applied thereon, together with the cost of applying, as explained hereafter, and likewise crediting the proper stock accounts.

Labor Records for Cost Accounts.—Work records as used in cost accounting are for the purpose of recording the amount of work spent in carrying on any enterprise and the time when the work is done. It is usually of minor importance who does the work. Labor records designed to show work segregations are rather varied. Two or three are shown below. They are self-explanatory.

Determining Ratio.—In converting hours to money, the rate is based on the total spent for wages, board, lodging, and other privileges, divided by the total number of hours worked.

To determine the cost of horse labor, one must know the approximate cost of keeping the horse during different periods of the year. Cost-accounting records show that the cost of horse labor varies from 6 to 16¢ an hour. The rate depends on the number of horses kept, the cost of keeping them, and the average number of hours work done per day. On most farms the amount of work done by horses is much greater at some seasons than at others. In such cases the cost per hour of horse

labor varies greatly from month to month. The best plan is to determine the average for the year and use the result in figuring costs.

Care in Making Required.—Labor records require some care as they must cover the various activities of the day, such operations not directly chargeable as chores or building fence or repairing windmill, and time for both horses and men. There are several methods of keeping records, depending on the kind of business, but the same essentials are incident to all, *i.e.*, a place to note total hours spent on each enterprise daily, and, if desired, a supplementary statement covering the character of the operations performed.

Terms of Reporting Labor.—All labor records should be in terms of hours, since during the year length of a working day varies.

Convenient Form for Recording.—For the Work Record a book like the Financial Record book is convenient, although any form is satisfactory that will serve to convey the desired information in a concise and advantageous way. There must be two double columns at the right of the page. This book must be indexed in the manner already described, with one or more pages headed to cover the crop, field, or department for which the account is kept, including a general or chores page for items not possible of immediate segregation. The number of the latter items should be held down to as few as possible. In this book no separate pages are used for charges and credits and no entries made in terms of dollars and cents. In the first double column at the right-hand side of the page are entered hours and minutes of man labor, and in the second are entered hours and minutes of horse labor. These headings are placed at the top of each double column. This book is to receive simply a record of the work done on the farm during the year, classified according to the enterprise for which it was done, while it also gives the date and number of hours for each operation. Where a tractor is in use, the tractor hours may be carried in the narrow space immediately preceding the man-labor columns.

How the Work Record Entries Are Made.—The method of making entries in the Work Record will be understood from the following example: The date is May 1. The work done this day is, aside from chores, drilling oats 6 hr. with two horses; plowing for corn 8 hr. with three horses; repairing plow 2 hr. The entries are made as follows: The "oats" account is found, May 1 is written in the left-hand column, the single word "drilling" written in the broad space in the middle of the page, and the figure 6 entered under man-hours. Since two horses were used for 6 hr., the figure 12 should be entered under horse-hours. In the same way, on turning to the "Corn" accounts, "May 1, plowing 8 (under man-hours) 24 (under horse-hours)" is entered. Turning to the "Machinery" accounts, "May 1, repairing plow, 2 "(under man-hours)

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MONTHLY WORK REPORT																					
Month of <u>June 1911</u>																					
	Corn		Wheat		Oats		Potatoes		Hay		Horses		Cattle		Hogs		Misc		Total		
	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	Man	Horse	
1	5	10					20	40				1½	5½	1						33	50
2	10	20					10	20				2	8	2½		2	2			34½	44
3	9	18					9½	19				1½	6½	1		4½	1			32	38
Sunday	4											3½	5½	1½		4				10½	4
5																					
6																					
7																					
8																					
9																					
29																					
30																					
31																					
Total																					

FIG. 73.—Form for recording daily and monthly labor expended for different departments.

Labor Record — Man and Horse																		
MD=Man days HD=Horse days Month of _____ 19__																		
Day of Mo	Total Time		Charge to Acc't															
	MD	HD	Entry			Swine			Allklla			MD			HD			
			ME	HD	XT	HD	MD	HD	MD	HD	MD	HD	MD	HD	MD	HD	MD	
1	8	20	10	0	2	0	5	10	etc									
2	6	10	8	0	4	4	10	14										
3	8	20	12	2	4	8	12	12										
4	8	18	10	0	2	0	5	10										
5	6	10	10	0	2	0	0	0										
6	etc	etc	etc	etc	etc	etc	etc	etc										
7																		
8																		
9																		
28																		
29																		
30																		
31																		
Total	2100	790	150	100	30	60	70	120	etc									
Cost per Man day									Cost per Horse day									
Pay roll	\$3000			Cost per day	Feed	\$125			Cost per day	Board and Lodging	\$400			Repairs	8			Per day
Extras	100			\$2.14	Veterinary	—			Extras	—			—	—			\$17.76	
Total	\$4500				Total	\$141												

FIG. 74.—Home-made labor record showing daily and monthly totals and unit costs.

is entered. When this has been done the work entry for the day is complete, it will never have to be "posted" or written again.

Method of Recording Routine Work or "Chores."—For chores special pages are to be ruled in the front or back of the Work Record as follows:

ROUTINE WORK ESTIMATES IN MAN HOURS

Date	Horses		Cows		Poultry		Hogs	
	Hours	Min-utes	Hours	Min-utes	Hours	Min-utes	Hours	Min-utes
1918								
May 1.....	2	20	4	15		30	1	10
May 15.....	2	40	5	5	1		1	30
Average for May.....	2	30	4	40		45	1	20
Total for May 31 days	77	30	144	40	23	15	41	20

NOTE.—If horses are used in the chore work, extra columns must be ruled under each heading where they are used to provide a place for the hours and minutes of horse labor.

Reporting Chores.—It may be somewhat more satisfactory to enter the time spent in chores every day, but, if chore time is fairly uniform, estimates made two or three times a month will be all that is required. If the time spent on chores changes greatly at any time, for instance when the cows are turned out on pasture in the spring, or when additional stock is purchased, entries should be made so that these changes may be taken into account. On the basis of the estimates of chore labor the total time for the month is figured under each heading. The monthly totals may be charged to the proper accounts once a month, or the total time for the year may be found and charged as a single item just before the books are closed at the end of the year. When any special work is done on live stock accounts, as for instance when sick animals are cared for, it should be charged direct to the proper account, no attempt being made to allow for it in the chore estimates.

Recording Labor.—A sheet a month serves to record the labor, when the following system is used. Spaces are provided for the different enterprises, columns for both man-hours and horse-hours, and for summaries. This record is easy to keep and useful. (See Fig. 75.)

The next form illustrates a method by which the labor records are carried out to the utmost detail. It combines the record of each laborer with the enterprise concerned. Usually a statement of the work done is of more value than the record of who does it, unless considerable variation in rates occurs. (See Fig. 76.)

Foreman's Weekly Report of Work Done.—This form is used by a corporation employing 2,000 farm hands, to keep track of work being done. Its inauguration resulted in reducing the payroll 10 per cent, in encouraging competition among foremen, and in enhancing feeling that good work would be known and appreciated.

Supplementary Records.—*Materials Record* serves to record the use of various supplies and materials used by the various enterprises. This record is needed only when supplies are drawn from a common source.

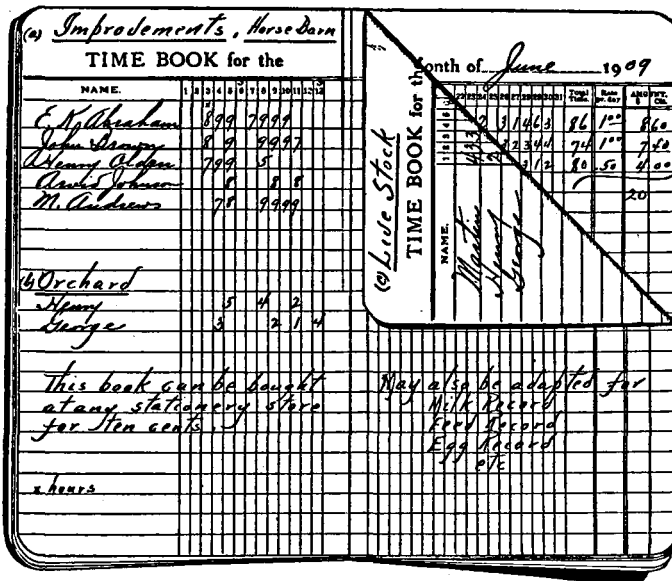


FIG. 75.—Example of a time book. Can be segregated by accounts or by individual workers.

Purchases solely for a department are covered in the cash book, but lumber, or salt, or feed, drawn from bulk purchases, must be taken care of, and the materials record is for the purpose of preventing the overlooking of such items. Figure 78 is suggestive:

Production Records are necessary in keeping track of output from various crop or stock enterprises. No special form is needed. The amount of detail desired will govern the kind of record to keep.

A simple record is illustrated in Fig. 79.

The Time Book is a record of the various men on the payroll, showing periods worked, rates, totals due, payments made. It is a personal record. Sometimes the time book carries data for use in cost accounting, by listing operations as well as time worked. (See Fig. 80.)

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<u>Record of Materials Used Other than Feed</u>				(Do not include cash purchases unless taken from unsegregated amounts).	
Month of <i>March</i> 19 <i>17</i>					
Date	Department	Kind of Material	Amount	Value	
<i>5</i>	<i>Barley</i>	<i>Seed</i>	<i>100 sks</i>	<i>\$115</i>	—
<i>25</i>	<i>Potatoes</i>	<i>"</i>	<i>120 "</i>	<i>120</i>	—
Totals					
<u>Remarks</u>					

Fig. 78.—Example of a materials record.

<u>Statement of Production</u>					
Month of <i>Sept</i> 19 <i>17</i>					
Date	Dept. Producing	Kind of Product	Amount	Value	
<i>31</i>	<i>Dairy</i>	<i>Cream</i>	<i>500⁺ lbs fat</i>	<i>\$90</i>	—
	<i>"</i>	<i>Skim milk</i>	<i>7000⁺</i>	<i>14</i>	—
	<i>"</i>	<i>3 Calves</i>	<i>3</i>	<i>18</i>	—
	<i>Barley</i>	<i>Pasture on stubbl.</i>	<i>50 acres</i>	<i>25</i>	—
	<i>Swine</i>	<i>Fork</i>	<i>3000⁺ @ 8¢</i>	<i>240</i>	—
	<i>Potatoes</i>	<i>Spuds</i>	<i>1000 sks @ \$1</i>	<i>1000</i>	—
Totals				<i>\$1435</i>	
<u>Remarks</u>					

Fig. 79.—Example of a production record.

Household Accounts are sometimes kept, to segregate items which properly belong to the care of the family. If the accounts have been completely kept, the household expenses are easily assembled from the cash record, inventory, and record of supplies used. These accounts often total to a considerable figure.

An example of a household account is given in figures 81 and 82.

Production per Animal.—Under miscellaneous records may be included the detailed stock-production records, as illustrated by daily production records per cow or trap nest records for fowls.

43	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total Time	Rate p. day	Amount \$ Cts	
	Occupation																																	
44	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total Time	Rate p. day	Amount \$ Cts	
	Occupation																																	
45	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Total Time	Rate p. day	Amount \$ Cts	
	Occupation																																	

Fig. 80.—Typical time-book page with spaces for three workers and some segregation of work done.

Other Miscellaneous Records.—Other miscellaneous records occasionally found in farm offices are: breeding records, stock records, sales records, and accounts with others. Use of such records is determined by the needs of the individual business. (See Figs. 83 to 88.)

Supplementary Notes.—There are many supplementary notes which it is desirable to keep in the same books with the accounts. Sometimes they are written on the page of the special account to which they belong; at other times they are kept by themselves at the back of the book. Dates of "last killing frost in spring," "first killing frost in fall," "death of horse or cow," and "height of hay in mow or silage in silo at this (given) date" may be cited as valuable information so recorded.

FOR THE MONTH OF April 1921

DATE	RECEIPTS	TOTAL	PAYMENTS						BALANCE	REMARKS
			CASH	CHEQUE	AMOUNT	LIBRARY	OTHER	REMARKS		
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										
29										
30										
31										
TOTAL										

HOUSE HOLD ACCOUNTS

DATE	RECEIPTS	TOTAL	DATE	PAYMENTS	TOTAL	REMARKS
2			2			
3			3			
4			4			
5			5			
6			6			
7			7			
8			8			
9			9			
10			10			
11			11			
12			12			
13			13			
14			14			
15			15			
16			16			
17			17			
18			18			
19			19			
20			20			
21			21			
22			22			
23			23			
24			24			
25			25			
26			26			
27			27			
28			28			
29			29			
30			30			
31			31			
TOTAL			TOTAL			

Form 84 - Receipts of stamps from cashbook of household accounts.

There are other records that may be kept if desired, such as herd records, maps of ditches, maps of the farm showing crops grown each year, and yearly crop records showing fertilizer or manure applied and yields each year. These are not necessary to the success of the cost accounting but are useful at times and may be kept in the back of one of the books.

Account	1929 Jan	Feb	March	1930 April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Total
RECEIPTS													
Stocks	945	835	1110	1280	855	1065	1145	990	855	1045	1155	845	12100
Produce	535	340	280	525	420	645	580	605	520	460	380	475	5790
Cash	900	900	900	1050	900	900	900	900	900	900	900	900	10560
Total	1040	1075	1030	1235	1075	1075	1075	1075	1075	1075	1075	1075	27430
PAYMENTS													
Stocks													
Interest	140	240	545	245	530	370	240	105	300	115	320	115	4210
Trade Accts		100	300	300	160			320		200		520	1650
Personal	125	200	135	120	800	150	200	340	150	240	150	300	2595
Cash	50	500	1135	235	125	500	630	150	260	75	2	2140	6000
Light Fund	420	320	620	110	300	470	360	720		550	630	520	5320
Wages	375	140	205	665	470		335		75				930
Auto License	1300	1400	1730	1160	1250	1200	1520	1860	1340	1050	1120	1230	16290
Furniture		1800	760	2205	130		740		1300	320		960	8415
Utilities	1150	2000	2000	1685	730	2325	1320	750	840	2850	550	320	20460
Debt	550	550	720	650	450	600	510	610	445	555	625	465	6720
Produce	385	280	465	580	465	465	635	370	410	485	525	325	5600
Manure	630	520	1370	1180	1040	1130	1270	1150	830	720	620	1030	11480
Commissions	1235	1120	1275	1305	2530	1685	1930	1840	1535	1370	1970	1950	19325
SPECIAL ACCOUNTS													
Travel Exp		75	50	150			40		25		200	150	740
Telephone	150	150	150	150	175	150	300	150	150	125	150	200	1750
Machinery	500	500							500	500	500	500	2000
Insurance	500				2000	800		1200	500	1500	2000		8500
Balance													1290
Total	7100	10775	11260	11275	10115	9845	9920	9555	8910	10475	9060	15045	27430

SUMMARY OF HOUSEHOLD ACCOUNTS

FIG. 82.

Opening Cost Records at the Beginning of the Year.—The opening of the books is not difficult if the inventory is complete and properly prepared. First, an account is opened in the financial record with each class of property as shown by the inventory, such as "Real Estate," "Horses," "Cows," "Machinery," "Feed and Supplies" and other forms of property, and also with each individual or firm whose name appears in the lists of "Accounts Receivable" and "Accounts Payable."

Ledger Accounts		Balance		Debit		Credit	
National Bank of America, N.Y. (N.Y. City)							
1911	Balance	1000					
1912	Balance	1000					
1913	Balance	1000					
1914	Balance	1000					
1915	Balance	1000					
1916	Balance	1000					
1917	Balance	1000					
1918	Balance	1000					
1919	Balance	1000					
1920	Balance	1000					
Farmers Loan and Trust Co. (N.Y. City)							
1911	Balance	1000					
1912	Balance	1000					
1913	Balance	1000					
1914	Balance	1000					
1915	Balance	1000					
1916	Balance	1000					
1917	Balance	1000					
1918	Balance	1000					
1919	Balance	1000					
1920	Balance	1000					
Business Factory, Inc. (N.Y. City)							
1911	Balance	1000					
1912	Balance	1000					
1913	Balance	1000					
1914	Balance	1000					
1915	Balance	1000					
1916	Balance	1000					
1917	Balance	1000					
1918	Balance	1000					
1919	Balance	1000					
1920	Balance	1000					

Fig. 83.—Ledger accounts. A record of bills owing to or owed by the farm.

FEED RECORD												
Kind of Stock <i>Dairy Cows</i>										Week Ending <i>May 31</i> 19 <i>10</i>		
	H	G	S									
800 Kate	4 64	4 63	3 62	4 65	4 66	4 67	4 68	4 69	4 70	4 71	4 72	4 73
975 Authia	8 80	8 80	8 80	8 80	8 80	8 80	8 80	8 80	8 80	8 80	8 80	8 80
1460 Deptt	6 92	6 92	6 92	6 92	6 92	6 92	6 92	6 92	6 92	6 92	6 92	6 92
1880 Lady	8 90	8 90	8 90	8 90	8 90	8 90	8 90	8 90	8 90	8 90	8 90	8 90
839 Beauty	4 63	4 63	4 63	4 63	4 63	4 63	4 63	4 63	4 63	4 63	4 63	4 63
1440 Glencoe	7 110	6 100	7 110	7 110	6 100	7 110	7 110	6 100	7 110	7 110	6 100	7 110
950 Pat	7 10	7 80	7 80	7 80	7 83	7 83	7 83	7 83	7 83	7 83	7 83	7 83
1000 Bess	6 86	6 86	6 86	6 86	6 86	6 86	6 86	6 86	6 86	6 86	6 86	6 86
1270 Cynthia	9 100	9 100	9 100	9 100	9 100	9 100	9 100	9 100	9 100	9 100	9 100	9 100
850 May	5 65	5 65	5 65	5 65	5 65	5 65	5 65	5 65	5 65	5 65	5 65	5 65
900 Gertrude	6 70	6 70	6 70	6 70	6 70	6 70	6 70	6 70	6 70	6 70	6 70	6 70
1375 Alta	8 100	8 100	8 100	8 100	8 100	8 100	8 100	8 100	8 100	8 100	8 100	8 100
1060 Rube	24 4 42	25 4 43	23 5 45	24 4 44	25 4 45	25 4 45	25 4 45	25 4 45	25 4 45	25 4 45	25 4 45	25 4 45
1360 Pauline	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45	27 6 45
1350 Princess	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48	30 7 48
* Pounds												

H = Hay.
G = Grain.
S = Soiling.

Fig. 84.—Example of a feed record in conjunction with a dairy.

When these accounts have been opened the inventory amounts under under each head are carried to their respective accounts. All "asset" items are entered on the left-hand page of the accounts under "Receipts," and the "Charges" on the right-hand page. When all the entries as shown by the inventory have been made, the books are said to have

Record of Feed Used				(Do not include cash purchases unless unsegregated when bought.)	
Month of <u>January</u> 1927					
Date	Department	Kind of Feed	Amount	Value	
20	Dairy	Alfalfa hay	20 t.	\$100	—
22	"	Barley	2 t.	52	—
	Swine	"	1 t.	22	—
29	Dairy	Pasture	10 A. for 8 wks	20	—
Totals				\$254	
Remarks					

Fig. 85.—A feed consumption record for all departments of a diversified farm business.

HORSE AND MULE PASTURE																	
Ranch No. _____												Month Ending _____					
Alfalfa Pasture				Grass Pasture				Stable Pasture				Bost Top Pasture					
Horses	Mares	Colts	Total	Horses	Mares	Colts	Total	Horses	Mares	Colts	Total	Horses	Mares	Colts	Total		
Loaf	No	Loaf	No	Loaf	No	Loaf	No	Loaf	No	Loaf	No	Loaf	No	Loaf	No		
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
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28																	
29																	
30																	

Fig. 86.—Monthly pasture record.

been "opened." Each year, after the books have been finally closed and the results drawn off, the foregoing process is repeated for the accounts of the new year. Other accounts are afterwards opened throughout the year as items occur to be charged or credited to them.

Closing Cost Accounts at the End of the Year.—Although considerable time may be required to close a set of accounts, it usually comes at

FARM MANAGEMENT

LIVE STOCK															
Ranch No. _____								Month Ending _____							
Additions								Deductions							
Stallions	H & M	Sg	1Y	2Y	Mul	Jen	Total	Stallions	H & M	Sg	1Y	2Y	Mul	Jen	Total
On Hand															

- S & J = Stallions and jacks.
- H & M = Horses and mares.
- Sg = Suckling colts.
- 1Y = One year old colts.
- 2Y = Two year old colts.
- Mul = Mules.
- Jen = Jennies.

Fig. 87.—Monthly record of livestock on hand.

<u>Memorandum of Capital Account</u>							
Year of 1911		Ranch _____					
Statement of Capital at Beginning of Business Year							
Operator's Investment							
(a) In ranch and equipment		\$ _____					
(b) As cash on hand for running expenses		\$ _____					
Total Operator's Investment		\$ _____					
Borrowed Investment (Mortgage or Note)							
(a) In ranch and equipment		\$ _____					
(b) As cash on hand for running expenses		\$ _____					
Total Borrowed Investment		\$ _____					
Grand Total Invested in Business (Operator's and Borrowed Money)		\$ _____					
Record of Money Borrowed for Investment							
Loan No.	Borrowed from	Date of Loan	Period of Loan	Rate of Interest	When Due	Amount of Principal	
1							
2							
3							
4							
Statement of Changes in Capital During Business Year							
Borrowings							
Loan No.	Borrowed from	Date of Loan	Period of Loan	Rate of Interest	When Due	Amount of Principal	
5							
6							
7							
8							
Record of Payments							
Date	Repaid to	On Acc ^t of Loan No.	Total Payment	Amount of Interest	Amount of Principal	Balance Remaining Unpaid	

Fig. 88.—Record of borrowings and repayments, with spaces for a statement of financial standing.

a season when other work is not pressing and weather conditions are more favorable to working indoors than out. A definite order of procedure should be adhered to in closing the accounts. The following order has proved satisfactory.⁸²

1. Take a second inventory of the entire farm.
2. Itemized statements should be requested from all dealers from whom goods are regularly bought on credit. These should all be inspected and any items thereon which have not yet been entered on the books should be entered at once. Memoranda should be made of amounts due the hired men or any other persons. All accrued income and expense of every nature, pertaining to the old year and not yet entered on the books, should be charged or credited in the proper columns.
3. Accounts receivable should be inspected and handled in the same manner.
4. The "Feed" records are next figured up to date and the corresponding entries made charging the animal accounts and crediting the crop accounts, or "Feed and Supplies," as the case may be.
5. The various live stock accounts should be credited with the value of any feed charged to them at harvest or time of purchase and not yet consumed. Such surplus feeds will be so valued also in the final inventory after the books are closed. The animal accounts for the new year should be charged in like amounts in opening the books, the values of these being thus deducted from the expenses of the year in which purchased and being charged against the year in which they were consumed. This is sound accounting practice, and is known as "reversing the entries."
6. The value of pasture utilized by the animals during the year should be charged to their respective accounts and "Pasture" account credited in like amount. The rate charged for pasture should be as near as possible the price for which pasture rents in the region. Pasture accounts should, of course, be charged with all the expenses of pasture maintenance, as well as for the use of land in pasture as hereafter described.
7. The value of farm produce used in the home, if not entered before, should be attended to next. Included in this would be estimates of the quantities of milk, butter, eggs, potatoes, apples, etc., used by the farmer and his household. Personal account should be charged with these values and the proper animal or crop accounts credited.
8. The value of the board, produce, or other allowances, furnished the farm laborers should be estimated and the amount charged against "Labor" account, crediting "Personal" account with the value of the board and the crop or other accounts for the value of the produce or other allowances.
9. The value of the unpaid farm labor done by the farmer and members of his family who are not being paid regular wages should next be estimated and entered. "Labor" account should be charged and "Personal" account credited.
10. The animals should be credited with the value of the manure produced by them during the year and the total value of manure charged against the "Manure" account. These data can be secured from the "Manure" account in the Work Record if the latter has been properly kept.
11. Estimates of proper amounts for the use of the farm buildings for the year should be made. Each crop or class of animals, the "Personal" account, and the accounts with machinery and man labor should receive a charge proportionate to its use of the buildings and the total amount so charged should be credited to the "Real Estate" accounts. The use of other kinds of buildings is estimated, and when all have been so handled the total "use of buildings" cost is found and charged to each account. As a general rule it is safe to charge 8 to 10 per cent of the current value of ordinary

frame farm buildings as annual use cost or rent. Brick, stone, tile, and concrete buildings should take a somewhat lower rate.

12. The Work Record should next be reviewed and the hours and minutes of man labor charged to each account should be added up. The various totals should then be added together and the total hours of man labor found for the year.

13. The total net cost of the "Man Labor" account in the Financial record should then be found by subtracting from the total of the charges the total of any credits. This net cost should then be divided by the total hours of man labor for the year. This gives the man-hours rate. It should be worked out in terms of cents and mills per man-hour.

14. The total hours of man labor, including chores, found against each account in the Work Record should be carried over to the charge page of the same accounts in the Financial Record. The hours should then be multiplied in each case by the man-hour rate and the cost in dollars and cents carried to the money columns, crediting "Man labor" account, item by item, with the same. When this has been completed, the "Man labor" account will balance within a small amount.

15. The total hours and minutes of horse labor are next found in exactly the same manner as the man labor. Before the net cost of horse labor can be found, interest (at current rates for secured loans) must be charged and the final inventory value of the horses must be credited to their account. After this has been done the net cost of horse labor and the horse-hour rate are determined exactly as for man labor.

16. The total hours of horse labor against each account in the Work Record are next charged against the same accounts in the Financial Record, the values found by multiplying by the horse-hour rate and extended to the money columns of the various accounts, and the sum total credited to the "Horse Labor" account exactly similarly to the method of handling the man labor.

17. The distribution of the annual cost of using machinery is the next step, and it is handled just as were the man and horse labor cost, with a few important exceptions. The inventory value of machinery and any machinery parts on hand at the end of the year are first credited to the "Machinery" account in the Financial Record, interest charged, and the net cost for the year ascertained. To distribute this cost is now the problem. There is no record of machinery hours, but such a record can be dug out of the various accounts in the Work Record if desired, and an hour rate worked out for each important machine and group of minor tools. This is the most accurate manner in which this cost can be distributed, but while valuable results to the student and investigator would be obtained, it is doubtful whether the practical farmer would find them useful enough to pay for the long process of figuring involved. A shorter method is available, if it be assumed that for every hour a horse is worked machinery is also used, and therefore each account should have charged against it the same number of machinery hours as horse-hours. Machinery cost may then be distributed on the basis of horse-hours. There is only one hitch here. Horse-hours have been charged to "Machinery" account, and therefore if this basis is used machinery will have recharged against it a certain proportion of its own cost. This can be obviated by first deducting from the total horse-hours the number of horse-hours charged to "Machinery" account and using the remainder as the basis for distributing the entire machinery cost. This should now be done, proceeding with the distribution exactly as explained for the man-labor cost.

Assembling and Distributing Machine Cost and Overhead Cost.—The Office of Farm Management of the United States Department of Agriculture, in its cost accounting work, assembles and distributes machine cost and overhead according to the following memorandum prepared by Mr. J. S. Ball.*

*Especially prepared Jan. 29, 1919, for the author, when acting chief of the U. S. Department of Agriculture Office of Farm Management.

Table 149 illustrates the methods of assembling the annual costs of farm implements as made up of their depreciation, repairs and upkeep (both labor and cash), building charges, taxes, and insurance. Each implement used for a definite purpose is considered a unit in assembling the costs. If there are more than one of identically similar implements the two are combined as one unit. After a table is completed showing the costs for the year of each separate implement unit, the cost for minor tools is added thereto to get the grand total of implement costs for the year. Table 150 illustrates how the annual charges when determined are distributed to the cost accounts of the various farm enterprises.

Each implement is distributed on the acreage basis. Implements which may cover the ground a number of times, depending upon conditions and time limits, are thought to have their cost distributed pro rata on the basis of the total hours to each enterprise for use of the majority of implements.

The tables presented have been somewhat abridged, as the actual list of all tools and implements on even a small farm and the actual distribution of the cost of all the farm enterprises would make unwieldy tables.

The value of this method is two fold: not only is the machinery charge distributed on an accurate basis, but data are provided which enable studies to be made of the costs of individual implements and classes of implements.

TABLE 149.—ILLUSTRATING A METHOD OF ASSEMBLING ANNUAL COSTS OF FARM IMPLEMENTS

Name of implement	Number on farm	Initial inventory value	Annual costs							Total
			Depreciation	Interest	Repairs and upkeep			Building charge	Taxes and insurance	
					Labor	Cash	Total			
Walking plows.....	2	\$ 30.00	\$ 5.00	\$ 1.37	\$1.04	\$0.50	\$1.54	\$0.21	\$0.15	\$ 8.27
Disk harrow.....	1	18.00	3.00	0.82	0.38	.....	0.38	0.14	0.09	4.43
Spike harrow.....	1	12.00	2.00	0.55	.....	.....	.....	0.09	0.06	2.70
Land roller.....	1	5.00	.....	0.25	0.21	.....	0.21	0.04	0.02	0.52
Cultivators.....	1	20.00	5.00	0.88	1.25	.....	1.25	0.15	0.10	7.38
Corn planter.....	1	15.00	.....	0.75	1.10	.....	1.10	0.13	0.07	2.05
Corn binder.....	1	60.00	.....	3.00	0.70	0.65	1.35	0.50	0.30	5.15
Mower.....	1	20.00	.....	1.00	0.38	0.40	0.78	0.17	0.10	2.05
Hay rake.....	1	10.00	.....	0.50	0.82	.....	0.82	0.08	0.05	1.45
Totals.....	..	190.00	15.00	9.12	5.88	1.55	7.43	1.51	0.94	34.00
Minor crop tools.....	..	22.27	2.72	1.05	0.77	1.05	1.82	.....	0.11	5.70
Grand totals.....	..	\$202.27	\$17.72	\$10.17	\$6.65	\$2.60	\$9.25	\$1.51	\$1.05	\$39.70

Annual charge for minor tools is 16.75 per cent of that for major implements.

TABLE 150.—ILLUSTRATING A METHOD OF DISTRIBUTING THE ANNUAL COSTS OF FARM IMPLEMENTS

Name of implement	Total annual cost	Unit of distribution	Total units	Cost per unit	Distribution							
					Corn		Potatoes		Millet		Hay	
					Units	Cost	Units	Cost	Units	Cost	Units	Cost
Walking plows.....	\$ 8.27	acres plowed	37.18	\$0.222	33.36	\$ 7.42	1.50	\$0.33	2.32	\$0.52		
Disk Harrow.....	4.43	hours used	31.75	0.139	24.25	3.38	3.00	0.42	4.25	0.63		
Spike harrow.....	2.70	hours used	70.00	0.039	59.50	2.30	4.50	0.17	6.00	0.23		
Land roller.....	0.52	hours used	15.00	0.035	14.00	0.49	1.00	0.03				
Cultivators.....	7.38	hours used	234.50	0.032	224.00	7.05	10.50	0.33				
Corn planter.....	2.05	acres covered	33.36	0.061	33.36	2.05						
Corn binder.....	5.15	acres covered	33.36	0.154	33.36	5.15						
Mower.....	2.05	acres covered	18.82	0.109	.....	.....	.....	.....	2.32	0.25	16.50	1.80
Hay rake.....	1.45	hours used	7.00	0.207	.....	.....	.....	.....	1.50	0.31	5.50	1.14
Totals.....	34.00				.....	27.84	.....	1.28	.....	1.94	.....	2.94
Minor crop tools.....	5.70	(16.75 per cent of cost of major implements)			.....	4.67	.....	0.21	.....	0.33	.....	0.49
Total implement charges.....	39.70				.....	32.51	.....	1.49	.....	2.27	.....	3.43
Cost per acre.....					.....	0.975	.....	0.994	.....	0.979	.....	0.208

Amount of Annual Equipment Costs.—The make-up of annual charge for the use of mechanical equipment (machinery, tools, implements, wagons, etc.), expressed in terms of percentages of initial annual inventory plus the cost of new equipment purchased, was found by Ball* to be for certain farms as follows:

TABLE 151.—AMOUNT OF ANNUAL EQUIPMENT COSTS

State	Number years, records	Depreciation, per cent	Rate of interest on average inventory value, per cent	Repairs and upkeep, per cent	Building charge, per cent	Taxes and insurance, per cent	Total annual charges, per cent
New York.....	6(1910-15)	10.2	4.2	4.9	3.9	0.6	24.1
New York.....	4(1911-14)	14.2	4.5	6.6	5.4	0.5	31.2
New York.....	3(1911-13)	9.5	4.3	4.4	0.9	0.6	19.7
New York.....	3(1912-14)	11.2	4.4	3.5	1.8	0.8	21.7
Illinois (5 farms).....	1(1912)	11.0	4.3	6.0	0.2	*	21.5
Iowa.....	2(1911-12)	10.8	4.4	4.5	0.3	*	20.0
Pennsylvania.....	1(1911)	7.8	4.5	6.4	*	*	18.7
North Carolina.....	1(1911)	10.3	4.8	3.0	*	*	18.1
Wisconsin.....	1(1910)	7.8	4.5	14.3	*	*	26.6
		10.3	4.4	6.0	2.1	0.6	23.4

*Not apportioned to equipment costs.

18. Any other accounts of convenience, like "Manure," "Feed and Supplies," "General Expense," etc., should now be distributed and these accounts closed.

19. All other values in the final inventory, not already credited, should be carried to their respective accounts and credited on the right-hand pages thereof.

20. Interest, based on the average inventories of each account (except "Horses," and "Machinery," which have already been charged), should be charged thereto and "Interest" account credited with the total. The rate should be the same as that already used in the two accounts specified.

21. A proper charge to crops and pasture should now be made for the use of the land, the total credited to "Real Estate" account. The rate per acre should be high enough to cover interest and taxes but not so high as to make "Real Estate" account show any great profit. In fact the "Real Estate" account should be, if possible, made to balance, by the credit for use of land. This can be done by finding the net balance of the "Real Estate" account and dividing by the number of acres to be charged with rent. This will give a rate per acre which can then be handled exactly like that of "Man labor," "Horse," and "Machinery" accounts, and any small balance remaining can be handled in the same way. A point to remember is that if the final inventory value of the real estate has been increased over that at the beginning of the year to keep pace with actual advances in real estate values in the locality, such advanced values should not be used in making the above distribution, but the amount of such advance should be first taken out of the account and carried to "Loss and Gain" account as a separate, distinct gain.

22. Both sides of the crop, live stock pasture, and any other enterprise accounts should now be footed up and the lesser total subtracted from the greater to obtain the balance as shown by each account. These balances are now to be closed to "Loss

*J. S. Ball in memorandum to the author, date Feb. 4, 1919.

and Gain" account. If the charge side is greater in an account, the excess represents a loss and should be carried accordingly to the credit side of the "Loss and Gain" account.

23. Both sides of the "Loss and Gain" account should now be footed up, the lesser subtracted from the greater, and thus the net gain or loss for the year determined.

Increased Land Values.—In making up a statement of farm profits and losses, increase in land values should be shown as a separate item outside of inventory values. It may be included under some such heading as "Increase in the value of investment due to increase in land value." The reason for not including the item is based on the belief that it is a profit due to influences outside the scope of the operator, and is not a direct farm profit traceable to the business. Usually it is a fluctuation in security values traceable to a rising and falling stock market, and, with only limited exception, not traceable to any single individual's managing influence.

Determining Overhead.—The use of a catch-all or general account is not acceptable in best cost accounting work, and where it can be avoided the desired results will be easier of attainment. In certain instances, however, a general account is provided to contain such things as taxes, work on roads, cleaning ditches, repairing buildings, constructing fences, office supplies, insurance, and upkeep and depreciation of horses, implements, and equipment kept for general use. When such an account is maintained, it becomes necessary at the end of the year to determine the overhead charges which the business must meet and to prorate a share to each of the departments constituting the earning plant.

The overhead is determined by making up from the inventory those things not taken care of by the separate departments at both the beginning and ending of the year, and charging interest at 6 per cent.

Illustrating Method of Determining Overhead.—Table 152 illustrates the method of assembling overhead expense items to make the total for the year, and indicates the class of items that compose such a charge. When the total overhead expense of a farm for a given year is determined, the question arises how shall it be distributed. The method adopted here is similar to that used in factory accounting. It is to distribute overhead expense on the basis of the costs for direct labor and direct cash and materials charged to the farm enterprises. In Table 152 the total amount of charges on which overhead distribution is based is given for each of the two farms illustrated, and the rate of overhead charge follows in each case.

TABLE 152.—ILLUSTRATION OF DETERMINING AND PROBATING THE CLASS OF ITEMS ENTERING INTO OVERHEAD EXPENSE

(From the Summarized Records of Three Illinois Farms)

Items	Beekman 1912	Man- chester 1912	Miles 1912
Cash items:			
Telephone rental.....	\$ 7.25	\$ 0.10	\$15.30
Stationery and postage.....	1.15	6.90	
Farm papers.....		5.68	
Interest paid on borrowed money.....	51.98	32.00	8.05
No-hunting notices.....	1.00		
Undistributable taxes.....	3.31	3.49	
Total cash items.....	\$64.69	\$48.17	\$23.35
Labor items:			
Maintenance of fences.....	\$17.02	\$22.50	\$7.56
Maintenance of hedges.....	4.26		3.40
Maintenance of farm roads.....	2.20	6.52	2.85
Maintenance of farm ditches.....	6.72	8.50	0.86
Cutting weeds.....	49.00	27.56	25.44
Undistributable labor.....	17.78	12.93	6.55
Total labor items.....	\$96.98	\$78.01	\$46.66
Total overhead expense.....	\$161.67	\$126.18	\$70.01
Total basis of distribution.....	\$3,240.45	\$1,496.17	\$642.12
(Sum of direct labor cost and direct cash and materials costs charged to farm enterprises)...			
Rate of overhead charge, per cent.....	5.0	8.4	10.9

Final Test of Value of Cost Accounts.—The test of the value of accounts comes when the final summary is made. But there are certain little items that perplex. It is a simple matter to charge the cost of seed, fertilizer, and hours of labor to a crop, and credit it with the amount of the yield. It doesn't take long to sum up the amount paid for a bunch of steers, charge them with the feed eaten in the feed lot, and credit them with the total price which they brought in the market; but such totals do not make for accuracy.

The troublesome items to handle are the charges for shelter, rent of land, cost of pasture, value of manure produced, and their share in overhead cost. The only way to get these charges distributed properly is to proceed in a certain orderly way to close the books.

Example of Annual Statement Compiled from Costs Records.—Where cost records have been properly carried throughout the year, all costs distributed, and the summarizing done, the final statement will show the

Barley Department Account

Date	Description	Cost	Chgo.	Prd.	Inv.	Sal.	Exp.	Net	Gain	Loss
1918	Jan 1 Balance									
Mar 15	Seed	24	24							
Mar 15	Harvest	49		30						
Mar 15	Seed	15								
Apr 15	Harvest	8		9						
May 10	Rolling			11						
June 15	Harvest	44		37						
July 15	Harvest			44						
Aug 15	Seed - 100 @ 15¢	15								
Aug 15	Harvest - 100 @ 15¢			15						
Oct 15	Harvest - 100 @ 15¢			15						
Nov 15	Harvest - 100 @ 15¢			15						
Dec 15	Harvest - 100 @ 15¢			15						
1919	Jan 1 Balance	171	139	242	242					
1919	Jan 1 Balance									
Department Statement										
Department										
On above basis		718								
Total Production		718								
Expenses										
On above basis		718								
Total of cost		718								
Total expense		718								
Net gain		0								
Loss on above		0								

FIG. 89.

Barley Department Account

Date	Description	Cost	Chgo.	Prd.	Inv.	Sal.	Exp.	Net	Gain	Loss
1918	Jan 1 Balance									
Mar 1	Seed	24	24							
Mar 15	Harvest	49		30						
Mar 15	Seed	15								
Apr 15	Harvest	8		9						
May 10	Rolling			11						
June 15	Harvest	44		37						
July 15	Harvest			44						
Aug 15	Seed - 100 @ 15¢	15								
Aug 15	Harvest - 100 @ 15¢			15						
Oct 15	Harvest - 100 @ 15¢			15						
Nov 15	Harvest - 100 @ 15¢			15						
Dec 15	Harvest - 100 @ 15¢			15						
1919	Jan 1 Balance	171	139	242	242					
1919	Jan 1 Balance									
Department Statement										
Department										
On above basis		618								
Total Production		618								
Expenses										
On above basis		618								
Total of cost		618								
Total expense		618								
Net gain		0								
Loss on above		0								

FIG. 90.

Examples of department cost accounting. On trial balance ruling paper.

costs involved in each crop and stock product, the total income obtained, and the resulting profit or loss.

The figures show the approximate price which must be realized on each commodity in order to avoid a loss. Such figures for a series of years will be increasingly valuable.

The following table shows how cost accounts on an eastern North Carolina farm were utilized to show whether each farm department made a profit or a loss and how much.¹²⁷

TABLE 153.—EXAMPLE OF ANNUAL STATEMENT COMPILED FROM COSTS RECORDS

Farm enterprise	Income	Cost	Profit	Loss
Tobacco.....	\$1,039.25	\$ 388.83	\$ 650.42	
Corn for grain.....	145.25	355.01		\$209.76
Corn silage.....	337.50	362.44		24.94
Oats.....	65.00	90.54		25.54
Hay:				
Clover.....	90.00	43.03	46.97	
Cowpea.....	120.00	88.33	31.67	
Rye.....	30.00	47.40		17.40
Truck crops.....	170.02	122.12	47.90	
Dairy herd.....	2,185.24	2,604.17		418.93
Hogs.....	227.50	145.30	82.20	
Poultry.....	193.05	76.54	116.51	
Sand pit.....	74.50	33.26	41.24	
Wood lot.....	358.00	265.82	92.18	
Outside labor.....	68.74	65.38	3.36	
Total.....	\$5,104.05	\$4,688.17	\$1,112.45	\$696.57
Deducting loss.....			696.57	
Net farm profit.....			\$ 415.88	

Where losses are sustained, the study of the facts for past years when profits were made may show why the losses occur, and encourage the farmer to strive to overcome, in the future, the conditions that caused them.

Example of a Crop Enterprise Costs Record.—An example showing the details of 5 years cost data covering the growing of potatoes on a western New York farm is presented below:¹²⁷

TABLE 154.—COST RECORD COVERING 5 YEARS OF POTATOES ON A NEW YORK FARM

	1910	1911	1912	1913	1914	Five-year average
Acres grown	20.5	17.2	20.7	19.3	16.7	18.88
Per acre costs:						
Labor in growing:						
Man.....	\$ 7.61	\$ 7.36	\$ 7.82	\$ 8.10	\$ 5.78	\$ 7.33
Horse.....	10.67	8.50	9.65	8.41	6.76	8.80
Labor in harvesting:						
Man.....	5.46	5.29	4.36	4.22	4.93	4.85
Horse.....	4.65	4.92	3.74	3.20	3.17	3.94
Total labor cost:						
In growing.....	18.28	15.86	17.47	16.51	12.54	16.13
In harvesting.....	10.11	10.21	8.10	7.42	8.16	8.79
Materials used:						
Manure.....	2.76	9.13	9.00	1.23	8.59	6.14
Seed.....	3.20	7.18	17.78	8.18	10.57	9.38
Fertilizer.....	8.13	13.10	9.14	10.32	10.04	10.15
Lime for spraying.....	0.48	0.41	0.44	0.54	0.15	0.40
Arsenate of lead.....	1.70	1.40	1.17	1.34	1.26	1.38
Sulphate of copper.....	1.48	2.97	2.53	3.45	2.43	2.57
Total cost of materials.....	17.75	34.19	40.06	25.06	33.04	30.02
Indirect costs:						
Implement cost.....	4.39	7.10	8.37	6.50	8.13	6.90
Interest and taxes.....	2.96	3.75	3.57	5.43	5.40	4.22
Overhead expense.....	3.30	5.23	6.59	4.87	5.70	5.14
Total indirect cost.....	10.65	16.08	18.53	16.80	19.23	16.26
Total, all costs.....	56.79	76.34	84.16	65.79	72.91	71.20
Per bushel costs:						
Labor to grow.....	0.09	0.08	0.08	0.10	0.06	0.08
Labor to harvest.....	0.05	0.05	0.04	0.04	0.04	0.04
Total labor cost.....	0.14	0.13	0.12	0.14	0.10	0.12
Materials.....	0.09	0.16	0.19	0.15	0.15	0.15
Indirect cost.....	0.05	0.08	0.09	0.10	0.09	0.08
Total cost per bushel.....	0.28	0.37	0.40	0.39	0.34	\$0.35
Yield per acre bushels.....	201.00	208.0	208.0	168.0	217.00	200.6
Selling price per bushel.....	0.40	0.55	0.49	0.60	0.28	0.464
Seed per acre bushels.....	12.8	14.5	15.5	16.1	14.1	14.6
Seed cost per bushel, dollars.....	0.25	0.49	1.15	0.51	0.75	0.63
Fertilizer per acre, pounds.....	643.0	872.0	700.0	767.0	713.0	739.0
Cost per ton, dollars.....	25.32	30.02	26.18	26.93	28.20	\$27.31

	1910	1911	1912	1913	1914	Five-year average
Acres grown.....	20.5	17.2	20.7	19.3	16.7	18.88
	Per acre	Per acre	Per acre	Per acre	Per acre	Per acre
Rates per hour:						
Man labor.....	\$ 0.153	\$ 0.141	\$ 0.156	\$ 0.171	\$ 0.169	\$ 0.158
Horse labor.....	0.177	0.143	0.148	0.120	0.130	0.144
Man-hours per acre:						
To grow.....	49.74	52.22	50.08	47.37	34.22	46.73
To harvest.....	35.68	37.55	27.95	24.72	29.16	31.01
Total.....	85.42	89.77	78.03	72.09	63.38	77.74
Horse-hours per acre:						
To grow.....	60.28	59.46	65.15	70.08	52.02	61.40
To harvest.....	26.29	34.40	25.27	26.63	24.37	27.39
Total.....	86.57	93.86	90.42	96.71	76.39	88.76

Example of a Live Stock Enterprise Costs Record.—Records for a dairy herd are illustrated in the next example. The data as given in the table are an approximate yearly record on a Wisconsin dairy farm.⁸¹

TABLE 155.—COST RECORDS OF A DAIRY HERD

DATA	ITEM	SUBTOTAL	TOTAL
Inventory			
Jan. 1, 1910			
Live stock—47 cows, 3 bulls.....		\$2,725.00	
Equipment.....		409.30	
Total.....			\$3,134.30
Jan. 1, 1911			
Live stock—38 cows, 2 bulls.....		2,395.00	
Equipment.....		373.60	
Total.....			2,768.60
Difference (decrease).....			\$ 365.70
Receipts:			
Milk and cream (225,689.3 lb.).....	\$3,630.29		
Cows sold.....	1,521.60		
Bulls sold.....	117.60		
Calves sold (34).....	227.60		
Total receipts.....			\$5,497.09

Expenses:		
Mixed hay, 26.5 tons	212.00	
Alfalfa hay, 10.71 tons	128.57	
Silage, 168.28 tons	673.14	
Grain, 34.38 tons	835.12	
Pasture, 7 months	275.86	
	<hr/>	
Total feed cost		2,124.70
Man labor, 8,819½ hr., at 12¢	1,058.34	
Horse labor, 1,443½ hr., at 10¢	155.35	
	<hr/>	
Total labor cost		1,202.69
Feed for bulls	80.33	
New equipment	5.23	
Repairs on equipment	1.31	
Salt	13.70	
Advertisements	22.50	
Miscellaneous (general expense, etc.)	49.05	
Decrease in inventory	365.70	
	<hr/>	
Total miscellaneous expenses		537.82
		<hr/>
Total expenses		3,865.21
Difference between receipts and expenses		1,631.88
Interest at 5 per cent on average investment in cattle and equipment	147.56	
Building charge, \$6 per cow per year	255.00	402.56
	<hr/>	<hr/>
Balance		1,229.32
Add estimated value of manure		641.05
		<hr/>
Profit		\$1,870.37

Study and Interpretation of Results.—Unless studied, farm accounts are of little use to help make business more profitable in the future. It is just as important to study the different items of cost and returns in an account as to know whether or not it pays. Weather conditions, crop conditions, and market conditions for the year, as compared with an average year, must be considered. For instance potatoes in a given year may show heavy losses on many farms because of low prices or losses by rot. By studying the potato account to find the factors of production, and by considering normal yield and price for the locality, conclusions could be reached as to whether ordinarily it would or would not be profitable to raise potatoes again.

The potato account in Table 154 when studied, yields the following figures:

Total acreage.....	14.88
Total yield (bushels).....	3,775
Total cost.....	\$1,344.26
Total value.....	\$1,751.60
Total profit.....	\$ 407.34
Yield per acre (bushels).....	200.6
Cost per acre.....	\$ 71.20
Value per acre.....	\$ 93.08
Profit per acre.....	\$ 21.88
Man-hours per acre.....	77.74
Horse-hours per acre.....	88.76
Labor cost per acre.....	\$ 24.07
Cost per bushel.....	\$ 0.35
Value per bushel.....	\$ 0.464
Profit per bushel.....	\$ 0.114
Net return per hour of man labor.....	\$ 0.438

Besides the satisfaction of knowing which crops or enterprises have paid and how much, there are many other ways in which the accounts may be useful. They may be used to study the seasonal distribution of the labor on the farm as a whole and on certain enterprises, disclosing just where the rush seasons occur and what causes them. They may be used to compare results with neighbors, or with published cost records in newspapers and bulletins. The results of such comparisons should be to learn methods by which labor can be saved, thus cheapening production and correspondingly increasing the chances of a good profit.

From keeping cost accounts an idea of the value of labor will be gained, it is soon discovered that time represents money, and that it is as important to save one as the other. The results set forth by the accounts will give a farmer many surprises. Sometimes it is found that the enterprises which he thinks are the best and to which he devotes most of his time do not show up so well financially as the enterprises that get little attention.

Cost accounts, carefully and consistently kept, year after year, are certain to develop both the business of farming and the farmer's power of analyzing the causes and effects involved in his operations.

CHAPTER XVIII

COSTS OF PRODUCING CROPS

A prime essential for a good farm manager is a knowledge of "What it costs."

A producer can not place a reasonable price on his goods, or from the prevailing market determine his possible profit upon production, unless he knows the various items of cost entering into the article.

Knowledge of costs means fewer mistakes in judgment and better earning ability.

Value of Costs of Production Data.—Collection and utilization of cost data show the relative costs of maintaining different industries, as well as the different departments of the same industry. It shows whether or not certain operations are being run at too great expense in comparison with the usual cost of such work. Accurate cost data are an invaluable help in analyzing Farm Accounts (with which they are closely associated) to show not only where leaks have reduced profit, but to indicate the paying branches of the industry, thus giving a general guide for planning future development.

Cost data will also establish a standard rate for farm operations, by indicating what, in general practice, constitutes a normal output per man, per implement, and per horse.

Studying Costs of Production.—Given the items of what constitutes cost as outlined above, together with a list of seed, feed, fertilizer, sacks, boxes, taxes, and the items in the following tables showing what in general are the labor requirements, the task of determining cost of production is well under way.

From the farm manager's viewpoint, the cost of producing crops, animals, or crop or animal products can best be studied by working out details for the individual problem, rather than by accepting averages unless it is clearly proven that the average applies to the particular case. Under a knowledge of the methods in use, the amount of work accomplished, at the cost of materials used, and under a realization of all the the items which should be taken into account, the calculations do not present any insurmountable difficulties.

Items Entering Into Cost of Production.—In relation to costs of producing farm crops and animal products, difference of opinion prevails as to just what items enter into cost determinations and as to what method shall be used in gathering the basic data.

One view considers that acceptable cost data are obtainable from calculations covering the cost of man and horse labor, seed, expenditures for materials, taxes, insurance, interest on the investment, a sum for management, proration of depreciation and overhead charges, taking each item by itself and in the computations using the going rates. Another view insists that the total expense of running the entire project must be carefully determined and then prorated over each individual enterprise.

For instance, a man farming 160 acres of wheat would, in the first case, charge each acre the going rate for man and horse (or tractor) labor, charge use of implement for each farm operation, and add cost of seed, taxes, and insurance, cost of harvest, sacks (if used), hauling, warehousing, and selling. The cost per bushel or per sack would thus be based on an estimate per acre for all items. In the second case, the total feed bills, man labor, and depreciation of equipment would be computed for a year's time and the rate per bushel or sack would be deduced from the total yield and total expense.

As to ways of collecting average cost data for groups of farms, views on acceptable methods range through the collecting of data by means of carefully prepared questionnaires, by monthly visits and estimates of costs, by continuous cost accounting records, by tabulating farmer's estimates, and by basing findings on personal impressions following visits to a reasonable number of individual enterprises.

The object sought will largely determine the items to be included and the method of collection. Lack of time or lack of funds may make the questionnaire or the farmer's estimate method the only feasible one. Need for very careful data may necessitate careful farm to farm cost accounting methods and several years' lapse prior to the drawing of final conclusions.

Objects Sought in Cost of Production Studies.—Cost of production studies are conducted from one or more of four points of view. The items that enter, their manner of collection, and the method of analysis, will depend on the object sought, the money available for the work, and the time available. Briefly, the four objects are:

1. To determine the profitableness of different methods or different enterprises of a given farm business.
2. To determine the profitableness of different farm businesses compared as wholes.
3. The actual cost of production.
4. The collection of data to serve as a basis for price fixing.

The Farm Manager's Interest.—The farm manager is primarily interested in item (1). He is directly interested in the results of item (2) in so far as the findings will serve to influence his present methods of procedure. Item (3) from either the farm manager's or the broader farm economics standpoint, is of only very limited application; for general purposes it may be ignored. There are special cases, however, when actual

costs are desired. A beet sugar company, for instance, will obtain actual costs of production in comparing the results from different holdings, and in determining whether beets shall be raised by the company on new lands at perhaps a higher cost than ordinary, or the difference be paid farmers to stimulate increase of production. Item (4) is of greatest interest to price fixing commissions and to students of State and national welfare. In so far as the reaction of price fixing affects the farm manager, he is interested in the collection of data and its proper interpretation. It is, however, only an indirect interest. The items that together constitute the costs of production are generally agreed upon by farm managers and agricultural economists; methods of collecting data while not concurred in so universally, offer no very difficult obstacles; but methods of calculating the various data are not so easy of determination.

Cost of Production Studies Should Start on Single Industry Farm.—In introducing cost of production studies, first attempts are best made on single industry farms. Here can be most easily obtained the basic determinations of charges for labor, machinery, supervision, overhead, depreciation, and the other items entering into cost of production. From the simpler story of collecting and computing data is furnished by single industry farms, the studies may then go forward into the complex, more difficult, diversified farm types.

A further advantage of first studying the specialized or single enterprise farm lies in the fact that in utilizing farm-kept books the data of the simpler farm businesses are more generally in usable shape.

Average Cost Data Are an Unsafe Guide for All Conditions.—A little thought will indicate the danger of using average figures as a basis for figuring costs of operation for a specific farm.

In irrigation, for instance, the cost depends upon such factors as—whether water is delivered by gravity or pumped; size of pumping equipment; if pumped, total lift, kind of motive power used, and length of continuous run; character of ditches, quantity of water used, number of irrigations given, method of applying, *i.e.*, furrows or flooding, etc.; character of soil in field, whether sandy, clayey, hardpan, or quicksand subsoil.

Even in preparing the soil, cost differences will arise—according to motive power used, whether steam, gasoline, or stock; number of men required; condition of the soil, *i.e.*, sod, fallow, or virgin; kind of soil, *i.e.*, sandy, gravelly, loamy, clay, or adobe; amount of growth present; amount of moisture; topography and character, whether hilly, level, rolling, rocky, or swampy.

Harvest costs vary, particularly with the size of the crop, *larger crops* costing more per acre to handle than small crops, even though the *unit* cost of production (*i.e.*, per bushel, per ton, per hundredweight, etc.) is less for large than for small crops. With grain there are more sacks and

twine to be purchased and more hauling to be done. With fruit, additional trays, lug boxes, dipping vats, etc., must be provided. In the case of sugar beets, potatoes, beans, and other field crops, there is increased expense in plowing out or cutting off, collecting, sorting, and hauling.

Hauling, too, varies with the distance to the point of delivery and with the kinds of road to be traversed. The expense may vary according to whether trucks are used, or horses. Then, if the railroad is concerned in the delivery, the item of freight is a very variable one since schedules are based not only upon the distance traversed, but also upon the character and quantity of the goods.

Range of Costs Illustrated.—Costs of production vary within wide extremes. A corporation farming 20,000 acres in one of the western states* has practiced very careful farm cost accounting. For a single given year their books show a striking range in yields and costs:

TABLE 156.—SHOWING RANGE IN ACRE COSTS OF PRODUCING BARLEY

Acreage	Yield hundredweight	Cost of production per acre	Cost per hundred-weight
761	9.83	\$ 4.41	\$0.45
40	51.81	15.95	0.31
1,600	17.00	6.83	0.40
64	30.47	12.55	0.41
273	10.96	5.34	0.49
1,150	10.43	4.21	0.40
3,888	21.77	\$ 8.21	\$0.39 totals and averages

For six grain fields, totaling 3,888 acres, varying in size from 40 to 1,600 acres, the range in carefully kept costs of the various operations amounted to:

TABLE 157.—SHOWING RANGE IN OPERATION COSTS OF PRODUCING BARLEY

Operations	Range in Cost	Average Cost
Preparing land by plowing and cultivating.....	\$0.86 to \$2.90	\$1.78
Seed, sowing, and harrowing in.....	0.91 to 2.13	1.37
Heading.....	0.67 to 2.23	1.09
Threshing.....	1.40 to 5.09	2.80
Hauling.....	0.15 to 5.25	1.10
Sundries, as weeding.....	0.03 to 1.34	0.56

* California.

Methods of Procedure in Making Cost of Production Studies.—Widespread interest in cost of producing farm products resulted in a calling together by the U. S. D. A. of representative investigators in farm management and farm economics.⁹¹ The conference was held in Washington, D. C., February 20–26, 1919, and resulted in a recommended plan⁹² to be used in conducting cost of production studies.

As this report probably represents the best of its kind, the outline is given in full.

COST OF PRODUCTION STUDIES

Purpose of Cost of Production Studies

From the standpoint of the individual farmer the primary purposes are:

1. To record the details of the farm business for reference.
2. To give an insight into the elements and interrelations of the different farm activities.
3. To furnish information that may enable the farmer to reduce costs, or otherwise increase profits.
4. To make possible a comparison of the profitableness of the different enterprises and combinations of enterprises.

The records secured by cost of production studies give data for analyzing the farm business, and thus are of fundamental importance in the whole program of agricultural research and education. The results of such studies on a number of farms where a given type of farming is practised are useful not only to the farmers from whose farms the results were obtained, but are of value in showing other farmers how to improve their methods.

From the standpoint of the public, cost of production studies provide the facts which give a basis for intelligent judgment upon the probable effects of any given legislation or other public activity upon the farmer as a producer and as a citizen. Cost of production studies are therefore one of the means of providing the basic facts needed by legislators and price commissioners in comparing the profits of competing lines of production and estimating necessary values.

Methods of Cost Investigation

There are three ways of obtaining cost data—cost accounting, survey method, questionnaire sent by mail. The accounting method is based on complete records of all farm work and business transactions. Arrangements are made with farmers to keep detailed records of all operations and transactions in connection with the farm business. The work is supervised by personal visits to the farm. It is desirable that cost accounts be kept to obtain basic data. Cumulative results of such work become increasingly valuable.

By the survey method the necessary data are obtained from farmers by trained investigators. Some of the data are taken from the farmer's books and the books of persons to whom the farmer sells and from whom he buys; some from his bin, silo, and building capacities; and some of the data are based on estimates made by the farmer.

Some of the advantages of the survey method are, (1) it is a relatively inexpensive method of securing records from large numbers of farms, (2) records are obtained from all classes of farms, and (3) records are obtained after the close of the farm year, so that, when desired, areas more representative of normal conditions may be chosen. By the survey method it is sometimes difficult to determine the amount of general expense and miscellaneous labor, and the proper basis for apportioning such items to

different enterprises. Unless the investigator is thoroughly experienced in the subject that he is studying, some items of importance may be omitted.

Both methods are useful and reliable when the work is carefully conducted. Either method may be used, but preferably both should be used. The detailed cost accounts serve as a check on the survey work, and the survey work shows the relationship of the farms on which cost accounts are kept to the average farm.

The questionnaire sent by mail can be used to advantage in securing supplementary data from a large number of farmers. To secure the best results the questionnaire should cover only a limited number of cost items and the questions should be direct and clear.

Cost Items

The items to be considered in cost of production studies will depend upon the enterprise under consideration. When the survey method is used it is essential that the list be complete enough so that no items will be omitted by either the farmer or the investigator. When the accounting method is used a classification that is broad enough to include all charges is needed, but the cost items will be developed in the working out of the records and will vary with the enterprise.

The following grouping is suggested for farm cost accounting work:

Farm Enterprise Costs

Direct charges to farm enterprise accounts:

Labor

- Man labor (including labor of men, women, and children)
- Animal labor
- Mechanical labor (tractor and truck)

Materials

Crop materials

- Seed
- Fertilizer
- Twine
- Sprays

Stock materials

- Feed
- Bedding

Cash

- Selling
- Insurance
- Taxes
- Threshing
- Veterinary
- Breeding fees

Investment

- Depreciation of investment in live stock
- Interest on investment in live stock

Indirect charges to farm enterprise accounts (consisting of labor, material, cash, and investment costs that can not be charged as such to enterprise accounts, but which may be assembled under definite headings and distributed on the basis of use).

Use of mechanical equipment; labor, materials, cash, and investment charges pertaining to mechanical equipment.

Use of buildings (and similar improvements); labor, materials, cash, and investment charges pertaining to buildings.

Use of land and land improvements; labor, materials, cash and investment charges pertaining to land and land improvements.

Special charges; manure, lime, breeding males, perennial crops.

General expenses or overhead; labor, materials, cash, and investment charges that can not be charged direct or assembled under the other indirect cost headings.

Man Labor.—The rate for man labor charges should be determined by computing the cost of wages, board, and other perquisites for both monthly and daily labor, including the services of the farmer for labor and supervision at the rate for which another man could be hired to take his place. The total sum divided by the total number of hours gives the rate. Family labor should be charged at the amount it would cost to have the same work done by hired help.

In the case of crops or enterprises in which a large amount of labor is hired at a rate considerably higher or lower than the average rate, such labor should be charged at the actual rate paid rather than the average rate of all labor for the year.

AUTHOR'S NOTE.—Use of an average rate based on all yearly labor requirements—monthly and daily—does away with any question of distribution of labor over crops. In the case of potato and apple harvests on the same farm confliction might result in the monthly men being put at potato digging while the day men are given the apple picking work. The rates for day men are greater than the monthly rate because of the premium asked for the short time jobs and because the demand is usually greater when extra labor is needed so that if each class of labor were charged directly the apples must bear a higher cost, even though the monthly men might be fully qualified to do the apple work. To avoid this difficulty a flat average rate is used. Objection to this method will occur when specially trained men are employed to do work that the regular hands can not handle equally successfully. In the event of employing specially skilled fruit packers, for instance, the extra cost should be charged directly against the crop concerned and not against the entire enterprise.

Horse Labor.—Horse labor charges should be based on hourly rates, computed for an entire year for the work stock, by determining and adding care; feed; bedding; blacksmith; veterinary; direct cash expenditures not otherwise enumerated; interest; depreciation and upkeep of shelter; interest and depreciation on stock; less credits, as for appreciation, manure, and occasional outside work. If outside work is an important enterprise or if colts are raised, separate accounts should be kept.

Purchased Supplies.—Purchased supplies should be charged at cash cost including freight. The farm labor cost of handling and preparation for use should be charged to the proper labor account.

Supplies Produced on the Farm.—For supplies produced on the farm more or less arbitrary figures must be used.

Farm Seeds.—Farm-grown products used for seed should be charged at the prices at which the crops from which they were taken are credited. Any additional labor costs of handling or preparing them for use should be charged to the proper labor account.

Stock Feeds.—Purchased feed should be charged cash cost including any freight. The farm cost of hauling should be charged to the proper labor account. Home-grown feeds that are readily marketable, when they enter into the production of another farm product, should be charged at the farm sale value; the farm sale value should ordinarily be based upon the average price during the period of feeding.

Crops grown solely for animal feed and having no market value should be charged at cost of production.

Either one or the other of the above principles, according to circumstances, should govern in determining the charge for silage.

Charge on permanent pasture should be in accordance with the principle used in determining land charge.

Home-grown products, such as straw, stover, beet tops, pasture of growing grain, etc., should be charged at market value, if there be such; if the number of sales in the community is not sufficient to establish market prices, they should be charged at their appraised value.

Selling.—Selling expenses covering actual payments should be charged directly to the department involved.

Insurance.—Insurance premiums should be charged directly to the department involved, at the annual rate paid.

Taxes.—Taxes should be charged directly to the enterprise or department involved.

Implements.—The annual cost of each implement or group of implements should be based on a determination giving the yearly sum covering the expenses, as repairs, fuels, lubricants, labor of upkeep, depreciation, interest, and insurance, less credits as for machinery hired out. This charge is then to be apportioned to each enterprise on the basis of use, which may be stated in hours, acres, or other suitable base unit.

AUTHOR'S NOTE.—Some farm managers lump all machinery charges into a single sum and apportion to the various enterprises according to the hours of productive horse labor. This is the method used in Farm Survey work by the U. S. D. A. It constitutes a short cut in handling the rather difficult task of apportioning. Obviously, prorating according to actual use is generally preferable. It is better to charge the use of potato planter and potato digger directly to that crop, the broadcaster and the binder to the wheat crop, than to lump the total charges and prorate a portion of the potato implements to the wheat crop and *vice versa*. Use of the lump method and division according to horse hours is, however, entirely feasible when the class of crops is such that the equipment is generally used for all, or in single phase farming when one primary crop or product constitutes the entire farming enterprise.

For situations not permitting individual calculations of machinery charges and cost of horse labor, present and future tables compiled over sufficient ground to give an insight into general terms may be used, but such should be accepted with caution and only after considerable study to determine their applicability to the specific case. It is hoped that the future may bring about compilations of this sort for use under conditions not permitting individual determinations. This thought applies especially to costs of horse labor and proper charges for machinery use.

Farm Improvements.—The charge for the use of farm improvements, including buildings, water systems, etc., consists of interest on investment, depreciation, maintenance, repairs, taxes, and insurance. The sum of these annual charges on each building and improvement should be distributed as a cost item on the basis of the use made of the improvements. The annual charge for the use of a building intended for a specific purpose which has been abandoned should be carried as a cost against such other enterprise as may utilize it at its value for that purpose. If no use is made of the building, the annual charge should go directly to the profit and loss account.

Land and Land Improvements.—Land charge covers the value of the use of the land, including drains, fences, and irrigation systems. The charge is made up of interest on investment, taxes, upkeep of drains, etc.

In determining the interest item, both land value and interest rate are involved. Prevailing local prices of land, exclusive of buildings, should be taken as the land value, and the prevailing rate of interest at which money may be borrowed on well-secured farm loans as the interest rate. In localities where such influences as speculation or discovery of oil or use for town lots has affected the price of land, the rental value may be taken into consideration in determining a fair charge for the use of the land. When dealing with the farm as a whole, this method applies to farms operated under any and all forms of tenure. In determining costs and returns to tenant and landlord, the

actual terms of the contract should be considered. It is desirable on tenant farms that the records be so kept as to show separate statements for landlord and tenant and a combined statement for the entire farm.

Manure should be charged at a value indicated by the farmer's experience based on increased crop profits, or market values.

Green Manure.—Green-manure crops should be charged at the cost of production.

Perennial Crops.—In general the cost of establishing a crop or bringing it to bearing age should be charged annually over the probable productive life of the crop.

General expense or overhead may be defined as the sum of those expenses which can not be charged directly or apportioned on the basis of use, but which must be apportioned by arbitrary means.

No charges should be included in general expense or overhead that can be distributed by any other method. General expense or overhead should be distributed to the farm enterprise on the basis of direct costs (labor, materials, and cash cost) or on the basis which offers the best measure of its use.

Interest.—The interest charge for investment in live stock, machinery, and other equipment, including cash working capital, should be at the actual rate paid for money borrowed, or at the prevailing rate of interest at which money may be borrowed on well-secured farm loans.

Residual Values.—With materials having a residual value (as manures, fertilizers, lime, etc.), the entire cost of application should be distributed to the crops of that year in proportion to the benefits derived from the general fertilizer practice on the farm in question. Where the farm is operated on a definite plan, this proportion is to be determined by the investigator.

Example with manure:

In a 4-year rotation on retentive clay soil, the proportions might be 40-30-20-10.

In a 4-year rotation on open sandy soil, the proportions might be 50-40-10-0.

Where the farming is not according to a definite plan, a part of the cost proportional to the residual effect may be charged against the crops of succeeding years.

Business Risks

There are many classes of business risks, such as risk from fire, floods, drought, hail, disease, pests, employers' liability. When insurance is carried it is usually not for the full value, so that the farm carries the balance of the risk.

When insurance is paid for any business risk it should be charged to the proper account. If not paid, no charge is made, but the profits of the industry should be sufficient to cover uninsured business risks.

Interpretation of Results

Various points of view are held by accountants as to the place in the accounts for interest, the charge for the operator's labor, and as to the methods of charging farm-produced supplies. These differences in method have arisen because of the different purposes for which accounts are kept. Some public accountants omit interest and a charge for the operator's labor as cost items and include them as allowances, and produced supplies are often charged at cost.

In farm cost accounting it is desirable that the time of the farmer, the value of the farm-grown products, and the charge for the use of capital, all be included as cost, in order that comparisons may be made between different farm enterprises. The statement of results, however, should show the details of these and all other charges so that the exact amount of the cost due to each item may be seen. The facts can then be arranged by anyone in accordance with the form in which he desires to express the data.

Examples of Costs of Producing Field Crops

Unless one is fully acquainted with the items making up costs and the conditions under which they were collected, the data are likely to be of but limited use. During the past few years an increasing number of publications primarily concerned with cost of production data have appeared, and references to cost data and to the inclusion of cost figures are as numerous as ways of producing crop and handling animals.

Reporting Items in Terms of Time or Quantity.—Since labor rates—both horse and man—are subject to wide fluctuations not only in various parts of the country but from year to year, costs given in dollars are rather unsafe guides to follow. Where the measure of time or quantity is used, the resulting data are of far more value, as it is an easy matter to ascribe existing values at the going rate and determine a figure for prevailing conditions.

For instance, knowledge that winter-pruning a 12-year old apple orchard averages 55½ man-hours per acre; or that arsenate of lead spraying at 5 lb. per 100 gal., requires 6 gal. per tree for 15-year pears per application and takes 7½ man-hours and 5½ horse-hours for each spraying; is of more real value for future use than a statement that the cost is \$12.30 and \$2.10 respectively.

Costs should be given in terms of time and quantity whenever possible.

Continued changing rates for man and horse labor and changing costs of materials used in production make statements of costs when given in dollars and cents of minor value. They do, however, present an idea of the comparative costs when comparable products are discussed.

Costs of Producing Field Crops

Nebraska Costs: Corn, Wheat, Oats, Hay: 1909-10.—Studies in the cost of producing corn, wheat, oats and hay in Nebraska from data gathered by correspondence with farmers during 1909 and 1910, included operating costs of production, 5 per cent on the market value of the land, and taxes, but did not take into consideration the marketing of the crop. The detailed and total costs amounted to:⁹³

TABLE 158.—DETAILED COSTS OF PRODUCING CORN—NEBRASKA
AVERAGE 344 FARMS,
1909-10

Interest and taxes (or rent).....	\$ 4.938
Plowing.....	1.276
Harrowing.....	0.324
Discing.....	0.444
Seed.....	0.282
Planting.....	0.401
Cultivating.....	1.459
Harvesting.....	1.559
Interest and depreciation on machinery.....	0.342
Miscellaneous.....	0.602
Total cost per acre.....	\$11.627
Yield per acre.....	39.3 bu.
Cost per bushel.....	29.6¢

TABLE 159.—DETAILED COSTS OF PRODUCING WHEAT—NEBRASKA

	AVERAGE 289 FARMS, 1909-10
Interest and taxes (or rent).....	\$4.780
Plowing.....	1.272
Harrowing.....	0.282
Disking.....	0.423
Seed.....	1.401
Seeding.....	0.421
Harvesting.....	2.283
Interest and depreciation on machinery.....	0.595
Miscellaneous.....	0.731
Total cost per acre.....	\$12.188
Yield per acre.....	22.2 bu.
Cost per bushel.....	54.9¢

TABLE 160.—SUMMARY OF COSTS OF PRODUCING CROPS—NEBRASKA, AVERAGE,
1909 AND 1910

	Yield per acre	Cost per acre	Cost per bushel or per ton
Corn.....	39.3 bu.	\$11.627	\$0.926 per bushel
Wheat.....	22.2 bu.	12.188	0.549 per bushel
Oats.....	35.0 bu.	11.385	0.325 per bushel
Wild hay.....	1.25 tons	6.722	5.37 per ton
Clover.....	2.04 tons	8.538	4.18 per ton
Alfalfa.....	3.33 tons	10.330	3.10 per ton

Minnesota Costs: Barley, Clover, Corn, Ensilage, Flaxseed, Hay, Hemp, Mangels, Potatoes: 1902-1907.—Cost of producing Minnesota crops on the State Experiment Station farm, studied during 1902-1907,⁹⁴ were found to be:

TABLE 161.—DETAILED COSTS OF PRODUCING FALL PLOWED BARLEY—MINNESOTA

	COST PER ACRE
Seed.....	\$0.685
Cleaning seed.....	0.049
Plowing.....	1.130
Dragging.....	0.312
Seeding.....	0.293
Cutting.....	0.364
Twine.....	0.232
Shocking.....	0.156
Stacking.....	0.511
Stack threshing (labor).....	0.320
Threshing, cash cost.....	0.480
Machinery cost.....	0.371
Land rental.....	2.100
Total.....	\$7.003

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TABLE 162.—DETAILED COSTS OF PRODUCING CORN—HUSKED FROM STANDING STALKS—MINNESOTA

Item	Northfield (Rice County)	Marshall (Lyon County)
	Cost per acre	Cost per acre
Seed.....	\$0.226	\$0.190
Shelling seed.....	0.026	0.025
Plowing.....	1.311	1.171
Dragging.....	0.544	0.439
Planting (horse planter).....	0.240	0.255
Cultivating.....	1.806	1.453
Weeding.....		0.119
Husking.....	3.456	2.473
Machinery cost.....	0.549	0.537
Land rental.....	3.500	3.000
Total.....	\$11.658	\$9.662

TABLE 163.—DETAILED COSTS OF PRODUCING ENSILAGE—MINNESOTA AGRICULTURAL EXPERIMENT STATION, 1905-1907

Item	Cost per acre	Item	Cost per acre
Seed.....	\$0.436	Value consumed in ensilage cutter.....	\$0.666
Plowing.....	1.311	Interest on silo investment.....	0.533
Dragging.....	0.531	Silo depreciation (150 ton).....	1.333
Planting.....	0.295	Farm machinery cost.....	1.748
Cultivating.....	1.218	Land rental.....	3.500
Cutting (corn binder).....	0.662	Total.....	\$19.187
Twine (714 lb.).....	0.589		
Hauling from field.....	2.606		
Loading, feeding, packing.....	1.632		
Coal (19,898 lb.).....	0.499		
Rental, power machinery 23½ days.....	1.628		

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TABLE 164.—DETAILED COSTS OF PRODUCING TIMOTHY AND CLOVER HAY—
MINNESOTA
FIRST CROP

Item	Northfield (Rice County)	Marshall (Lyon County)	Halstad (Nor- man County)
	Cost per acre	Cost per acre	Cost per acre
Seed.....	\$0.293	\$0.293	\$0.293
Mowing.....	0.368	0.328	0.363
Raking.....	0.178	0.213	0.248
Cocking and spreading.....	0.199		
Hauling in.....	1.099		
Hauling in and stacking.....		1.242	1.273
Machinery cost.....	0.548	0.477	0.290
Land rental.....	3.500	3.000	2.100
Total first crop.....	\$6.185	\$5.553	\$4.567

SECOND CROP

Item	Northfield (Rice County)
	Cost per acre
Mowing.....	\$0.264
Raking.....	0.115
Cocking and spreading.....	0.150
Hauling in.....	0.464
Total second crop.....	0.993
Total cost of two cuttings at Northfield.....	\$7.178

TABLE 165.—DETAILED COSTS OF PRODUCING POTATOES ON FERTILIZED SOIL—
MINNESOTA

Item	Cost per acre	Item	Cost per acre
Spring plowing.....	\$1.017	Paris green.....	} \$1.833
Harrowing (4 times).....	0.765	Lime.....	
Cost of seed (3,360 bu.).....	8.472	Bluestone.....	
Cutting seed.....	0.376	Digging.....	1.810
Treating seed.....	0.120	Picking up 38,300 bu.....	6.362
Corrosive sublimate.....	0.277	Wages and board.....	3.317
Planting.....	0.689	Hauling, sorting, and storing.....	.596
Fertilizers (25 tons).....	6.500	Machinery cost.....	3.000
Weeding.....	0.327	Land rental.....	
Cultivating (3 times).....	1.814		
Spraying (4 times).....	0.446	Total.....	\$37.721

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South Carolina Costs: Cotton, Corn, Oats, Hay, Cowpea Seed, Wheat: 1914-15.—A study in Anderson County, South Carolina, resulted in findings as to cost of production and farm value as follows:⁷⁴

TABLE 166.—COSTS COMPARED WITH FARM VALUES OF CROPS—SOUTH CAROLINA

Item	Cotton per pound gross lint	Corn per bushel	Oats per bushel	Oat hay per ton	Cowpea hay per ton	Cowpea seed per bushel	Wheat per bushel
Cost.....	\$0.1089	\$1.001	\$0.433	\$13.88	\$14.10	\$2.95	\$1.34
Farm value.....	0.1150	0.983	0.657	23.97	19.17	1.98	1.29

Five-sixths of the cotton, four-fifths of the corn, and seven-eighths of the oats and oat hay were grown either by the owners of the land or under their immediate supervision.

TABLE 167.—ITEMIZED DISTRIBUTION OF COSTS SUMMARIZED IN TABLE 166

Itemized costs	Gross lint cotton per pound	Corn per bushel	Oats per bushel	Oat hay per ton	Cowpea hay per ton	Cowpea seed per bushel	Wheat per bushel
Rent.....	\$0.0154	\$0.210	\$0.075	\$2.86	\$3.08	\$0.42	\$0.25
Man labor.....	0.0448	0.305	0.094	3.25	3.31	1.61	0.31
Interest on working.....	0.0015	0.011	0.004	0.16	0.13	0.05	0.02
Mule labor.....	0.0220	0.242	0.082	2.85	3.61	0.54	0.30
Implement cost..	0.0031	0.036	0.016	0.47	0.58	0.09	0.04
Seed.....	0.0017	0.008	0.050	1.66	2.91	0.21	0.13
Fertilizer.....	0.0174	0.189	0.091	2.56			0.21
Miscellaneous....	0.0030		0.021	0.07	0.06	0.03	0.08
Total.....	\$0.1089	\$1.001	\$0.433	\$13.88	\$13.68	\$2.95	\$1.34

Texas Costs: Cotton, Corn, Oats, Hay, Sorghums: 1914.—Costs on 114 farms in Ellis County, Texas, were found to average:⁹

TABLE 168.—PER ACRE COST, VALUE, AND YIELD OF VARIOUS CROPS (114 FARMS, ELLIS COUNTY, TEXAS)

Crop	Cost per acre	Value per acre	Yield per acre
Cotton.....	\$22.65	\$30.60	241.0 lb.
Corn.....	14.92	20.76	25.6 bu.
Oats.....	10.44	9.91	19.7 bu.
Oat hay.....	13.12	12.59	0.94 tons
Sorghum.....	20.77	33.03	2.8 tons
Alfalfa.....	26.80	38.57	2.51 tons

Kentucky Costs : Tobacco, Stock, Dairy, Mixed : 1913.—Costs in Kentucky were found to run:⁷³

TABLE 169.—COSTS OF KENTUCKY CROPS

Type of farm	Corn, per bushel		Tobacco, per pound		Wheat, per bushel		Rye, per bushel		Meadow hay, per ton	
	Cost	Value	Cost	Value	Cost	Value	Cost	Value	Cost	Value
Tobacco.....	\$0.76	\$0.76	\$0.113	\$0.118	\$0.73	\$0.98	\$1.33	\$0.84	\$16.67	\$16.06
Tobacco stock.....	0.71	0.76	0.123	0.119	0.88	0.98	1.04	0.84	16.00	16.06
General mixed.....	0.73	0.76	0.130	0.116	0.75	0.98	1.01	0.84	15.27	16.06
Stock with tobacco.....	0.65	0.76	0.120	0.117	0.84	0.98	1.01	0.84	18.94	16.06
Stock with no tobacco.....	0.64	0.76	.....	.....	0.98	0.98	1.22	0.84	22.50	16.06
Dairy.....	0.81	0.76	0.127	0.104	0.68	0.98	.....	0.84	18.16	16.06
Average of all.....	\$0.68	\$0.76	\$0.127	\$0.118	\$0.80	\$0.98	\$1.05	\$0.84	\$17.75	\$16.06

Georgia Costs : Corn, Oats, Sugar Cane, Potatoes, Watermelons : 1914.—Investigations into cost of growing crops in Brooks County, Georgia²⁶ resulted in findings as follows:

TABLE 170.—COSTS OF GEORGIA CROPS

Crop	Land rent	Man labor	Mule labor	Implement cost	Interest on cash	Seed	Fertilizer	Special costs	Total
Corn.....	\$2.86	\$ 4.10	\$ 3.14	\$0.63	\$0.07	\$ 0.11	\$ 1.88	.....	\$12.79
Oats.....	2.00	1.91	1.86	0.38	0.03	0.84	0.33	\$1.14	8.71
Sugar cane.....	3.45	36.39	14.12	2.88	0.70	10.91	7.12	7.35	85.92
Irish potatoes.....	5.00	6.76	4.73	1.26	0.20	8.22	10.58	0.62	37.37
Watermelons.....	2.93	7.22	4.92	0.98	0.15	0.55	7.73	0.87	25.35

Missouri Costs : Corn, Oats, Wheat, Rye, Clover, Timothy and Alfalfa Hay, Soy Beans, and Cowpea Hay.—From studies conducted in Missouri from 1910–1917 and published in 1919, Johnson and Green⁹⁵ worked out some of the factors causing variations in cost figures and the average costs of producing corn, oats, wheat, rye, clover hay, timothy hay, alfalfa hay, soy beans and cowpea hay. The figures, taken from cost-account records, give the costs averaged for the years 1910–11–12–13, and then exhibited yearly for 1914–15–16–17, with an average for the total 8 years. The findings show the following:

TABLE 171.—COSTS OF MISSOURI CROPS

Crop	Average yield	Unit of measure	Range in costs years 1910-11-12-13 averaged; years 1914-15-16-17 individually	Average	Crop paid net for each 10 hours*
Corn in farm crib...	27.8 bu.	Per acre Per bushel	\$13.64-\$22.20 0.47- 0.83	\$15.98 0.57	\$2.26
Oats in farm bin....	26.18 bu.	Per acre Per bushel	9.45- 15.12 0.35- 0.51	11.11 0.42	1.17
Wheat in sack at farm.....	12.5 bu.	Per acre Per bushel	11.51- 17.06 0.78- 1.54	13.31 1.06	1.06
Rye at farm.....	13 bu.	Per acre Per bushel	9.37- 12.46 0.74- 1.07	10.67 0.82	4.05
Clover hay loose in stack.....	89 tons	Per acre Per ton	5.93- 8.80 6.62- 8.80	7.22 8.11	4.48
Timothy hay loose in stack.....	99 tons	Per acre Per ton	5.28- 8.06 6.07- 8.58	6.71 6.79	7.59
Alfalfa hay loose in stack.....	2.12 tons	Per acre Per ton	16.96- 27.94 6.61- 12.35	19.80 9.34	4.92
Soybeans.....	6.20 bu.	Per acre Per bushel	12.39- 16.83 1.82- 3.34	14.28 2.30	
Cowpea hay.....	1.40 tons	Per acre Per ton	11.53- 16.64 8.32- 13.29	13.53 9.66	

* Per day of man labor spent upon it.

The bulletin records details of rent, horse labor, man labor, equipment, fertilizers, seed, yields, and returns for each 10 hours of labor spent in producing, measured when possible in terms of quantity as well as cash.

Costs of Producing Sugar Beets.—In a manuscript prepared by members of the Office of Farm Management, U. S. D. A., for the annual meeting of the sugar beet interests held during January, 1919, comprehensive data are presented relating to the cost of producing sugar beets, obtained by the survey method from 1,025 farms in 13 important districts located in six states. Of the records collected, 284 apply to the 1914 crop, 660 to the 1915 crop, and 81 to the 1916 crop. This paper, written by L. A. Moorehouse and T. H. Summers, utilized the data from U. S. D. A. *Bulletins* 693, 726, and 748, joint contributions from the office of Farm

Management and the Bureau of Plant Industry, dated respectively, July 16, 1918, Dec. 14, 1918 and Jan. 28, 1919, each the joint work of four authors, the names of L. A. Moorehouse, T. H. Summers, and R. S. Washburn being common to all, while J. W. Jones, S. B. Nickols, and C. O. Townsend each contributed to one.

The money values apply only to the crop years 1914 and 1915; the factors of man labor, horse labor, seed, fertilizer, manure, etc., can be applied to any farm year.

The items of cost are grouped under three major headings: Labor, Materials, and Other Costs. The first group includes all the labor, man and horse, expended on the crop; the second embraces seed, manure, commercial fertilizers, and irrigation water; the last takes in insurance, taxes, interest, machinery, rent, and miscellaneous. This last item covers all other charges against the crop and is referred to as overhead. No allowance has been made for supervision. The operator has been allowed hired man's wages for his time expended on the crop.

Table No 172 gives the items which enter into the cost of producing an acre of beets. In so far as possible these items are expressed in quantities, such as hours of labor, pounds of seed, tons of manure, and pounds of commercial fertilizer. The remaining items are given in money values.

The various items represent the cost per acre for every acre of sugar beets produced, the result being the total cost divided by the number of acres grown. For example, in the Greeley area of Colorado the application of manure per acre covered was 18.6 tons. However, only 46.8 per cent of the sugar beet acreage received this application. When the total amount is distributed over the entire acreage, only 8.52 tons per acre are chargeable against the crop.

An estimate was obtained from each grower of the acres covered with manure, while the rate of application and the value of the manure in the barnyard were also obtained from him. From these the cost of the manure per acre, exclusive of the labor of applying it to the land, was arrived at. The proportion of this charge against the beet crop depended on whether the application was on the beet crop or whether 1 or 2 years had elapsed since the land in beets had received manure. In the first instance 50 per cent of the value of the manure was charged, in the second 30 per cent, and in the third 20 per cent. It was assumed that the effect of the manure would practically disappear in 3 years.

Commercial fertilizers were used only in the Michigan and Ohio areas. The actual application per acre treated varied from 130 to 170 lb. When charged against the total number of acres of sugar beets produced, the charge per acre was from 58 to 102 lb. •

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TABLE 172.—COST OF PRODUCING AN ACRE OF SUGAR BEETS AND THE TOTAL COST PER ACRE AND PER TON

Segregation of costs										
Locality	Labor		Materials				Other costs			
	Man hours	Horse hours	Seed,* pounds	Manure, tons	Commercial fertilizer, pounds	Irrigation, water	Insurance and taxes	Interest and rent	Machinery	Miscellaneous
Caro, Mich.....	105.5	80.0	15.6	2.18	90	.....	\$1.00	\$ 6.65	\$2.07	\$1.10
Alma, Mich.....	114.8	95.3	15.5	2.73	63	.....	0.80	11.69	2.45	1.24
Grand Rapids, Mich..	111.3	93.9	14.2	2.89	102	.....	0.92	8.25	2.45	1.21
Northwestern Ohio....	113.4	79.1	15.2	0.79	58	.....	0.91	13.79	2.45	1.12
Greeley, Colo.....	123.9	104.5	18.0	8.52	...	\$0.51	0.85	21.21	2.06	1.41
Fort Morgan, Colo....	118.1	103.0	21.1	6.71	...	0.57	1.05	16.65	2.85	1.29
Rocky Ford, Colo....	117.3	132.7	21.7	4.39	...	0.50	0.74	16.87	2.00	1.32
Provo, Utah.....	130.8	117.1	14.9	7.70	...	0.49	1.95	17.77	3.49	1.35
Garland, Utah.....	133.3	98.5	14.7	6.40	...	0.93	1.16	16.09	3.41	1.43
Idaho Falls, Idaho....	119.4	79.3	14.5	6.40	...	1.47	1.67	13.28	4.00	1.27
Los Angeles, Cal.....	87.7	109.3	20.7	0.83	...	0.55	1.98	26.66	2.80	1.04
Oxnard, Cal.....	79.5	111.5	16.6	0.96	...	.....	1.97	17.85	2.50	0.95
Salinas, Cal.....	101.2	124.3	14.6	0.27	...	1.50	1.04	21.22	3.25	1.19

* Includes seed for replanting if charged to the growers.

TOTAL COSTS PER ACRE

	Number of records	Acres in sugar beets	Yield per acre	Total costs	
				Per acre	Per ton
Caro, Michigan.....	134	2,018	9.72	\$47.65	\$5.62
Alma, Michigan.....	53	506	11.40	57.42	5.04
Grand Rapids, Michigan.....	36	231	10.16	53.05	5.21
Northwestern Ohio.....	97	1,525	13.17	56.04	4.26
Greeley, Colorado.....	195	5,028	15.57	72.53	4.66
Fort Morgan, Colorado.....	66	2,456	13.65	65.00	4.76
Rocky Ford, Colorado.....	106	2,429	12.99	64.87	4.99
Provo, Utah.....	58	833	14.96	69.59	4.65
Garland, Utah.....	79	1,461	14.85	69.03	4.65
Idaho Falls, Idaho.....	36	735	13.62	62.68	4.60
Los Angeles, California.....	81	7,712	14.52	67.11	4.62
Oxnard, California.....	45	2,811	9.53	54.88	5.76
Salinas, California.....	39	3,616	15.59	66.45	4.26

The lowest individual cost of production was \$2.54 per ton, the highest cost was \$18.16 a ton, while the average cost per ton for all districts was \$4.70. Seventy-three and five-tenths per cent of the growers had a cost of from \$4.00 to \$6.00 per ton, while the three groups from \$4.00 to \$5.00 represented 54.5 per cent of the growers interviewed.

TABLE 173.—RATES USED IN COMPUTING CERTAIN COST ITEMS IN SUGAR BEET PRODUCTION

Areas		Farm year	Man labor rate	Horse labor rate	Land value and interest rate			Cost of seed per pound
					Value of best land per acre	Interest on land	Interest on money	
Michigan and Ohio	Caro, Mich.....	1914	\$0.16	\$0.10	\$103	6	This is the interest on money borrowed to pay the beet help, and an individual rate was used for each farm.	\$0.15
	Caro, Mich.....	1915	0.20	0.10	103	6		0.15
	Alma, Mich.....	1915	0.20	0.10	132	6		0.15
	Grand Rapids, Mich..	1915	0.20	0.10	106	6		0.15
	Northwestern Ohio..	1915	0.20	0.10	168	6		0.15
Colorado.....	Greeley.....	1914	0.19	0.11	186	7½		0.10
	Greeley.....	1915	0.19	0.11	186	7½		0.10
	Fort Morgan.....	1915	0.20	0.10	142	7½		0.10
	Rocky Ford.....	1914	0.18	0.10	193	9		0.10
	Rocky Ford.....	1915	0.18	0.10	193	9		0.10
Utah and Idaho...	Provo, Utah.....	1914	0.19	0.10	211	8		0.15
	Provo, Utah.....	1915	0.19	0.10	211	8		0.15
	Garland, Utah.....	1914	0.20	0.09	203	8		0.15
	Garland, Utah.....	1915	0.20	0.09	203	8		0.15
	Idaho Falls, Idaho...	1915	0.20	0.10	147	8		0.15
California.....	Los Angeles.....	1915	0.20	0.10	494	7		0.12
	Los Angeles.....	1916	0.20	0.10	494	7		0.12
	Oxnard.....	1915	0.21	0.10	294	7		0.12
	Oxnard.....	1916	0.21	0.10	294	7		0.12
	Salinas.....	1916	0.21	0.10	328	7		0.16

Costs of Producing Cotton. *Georgia, Alabama, South Carolina, Texas:* 1918.—In what was published first as a mimeographed report and later as a *Bulletin*⁹⁶ on the cost of producing cotton during 1918, based on 842 records collected in May and June of 1919 from selected counties of Georgia, Alabama, South Carolina, and Texas, the United States Department of Agriculture, Office of Farm Management, outlines its findings for the items of the operator's labor, family labor, wage labor, contract labor, mule and horse labor; the value of seed, fertilizer, manure baskets, sheets and sacks used in picking cotton, and cash costs for ginning, bags, and ties. Charges were also made for use of land, use of machinery, insurance, taxes, and overhead expense. Information was secured concerning the receipts from cotton and from other crop and live stock enterprises on each farm. It was found that the receipts from

cotton lint and seed constituted from 75 to 95 per cent of the total farm receipts in nine of the districts visited. In one area the receipts from lint and seed formed only 45 per cent of the total farm receipts. The peanut ranked second as a source of income in the latter district.

It was found that the average yield of lint cotton for all districts was 227 lb. per acre. It should be observed that there was a variation in yield from 78 lb. of lint cotton per acre for the lowest-producing ten farms, to 481 lb. of lint cotton per acre for the highest-producing ten farms. The yield of lint cotton per acre has a very important relation to the cost per pound. An operator producing 300 lb. of lint cotton per acre and having a cost of \$60 per acre would have a decided advantage over his neighbor who produced only 150 lb. of lint at a cost of \$45 per acre. In these two cases costs of 20 and 30¢ per pound respectively are represented.

TABLE 174.—COSTS OF PRODUCING COTTON—VARIOUS STATES

Locality	Number farms	Acreage represented	Range in cost per pound	Average cost for group, cents per pound	Range yield, pounds	Average yield, pounds
Greene Co., Ga.....	78	4,147.5	\$0.08 to 0.41	22	133 to 450	260
Lawrence Co., Ga.....	85	3,968.0	0.10 to 0.40	21	105 to 560	277
Sumter Co., Ga.....	80	4,188.5	0.11 to 0.38	20	112 to 469	244
Dale Co., Ala.....	108	.....	0.08 to 0.93	28	69 to 467	194
Marshall Co., Ala.....	98	.....	0.11 to 0.62	33	125 to 457	227*
Tallapoosa Co., Ala.....	113	.....	0.11 to 1.07	36	73 to 375	172*
Anderson Co., S. C.....	92	.....	0.08 to 0.51	26	150 to 417	248†
Barnwell Co., S. C.....	91	3,935.5	0.12 to 0.47	24	120 to 462	268
Ellis Co., Tex.....	75	8,148.0	0.14 to 0.34	20½	100 to 288	176
Rusk Co., Tex.....	75	2,568.0	0.12 to 0.52	....	80 to 321	185

* Averaged for 90 farms.

† Averaged for 89 farms.

Georgia Cotton Costs: 1913-14.—From a study of 160 farms in Sumter County, Georgia,¹⁸ operated by white owners, cost of producing an acre of cotton averaged \$30.74, or a cost per pound of lint of \$0.1095. These costs were distributed over:

	PER CENT
Labor.....	48.4
Use of land.....	21.7
Fertilizer.....	17.8
Miscellaneous.....	12.1

In Brooks County, Ga., the cost was found to be \$34.51 per acre²⁹ divided among:

Land rent.....	\$ 3.05
Man labor.....	17.70
Mule labor.....	5.53
Implement cost.....	1.07
Interest on cash.....	0.35
Seed.....	0.43
Fertilizer.....	4.76
Ginning, bagging, and ties.....	1.62
	\$34.51

Costs of Producing Wheat. *Kansas, Missouri, Nebraska, Minnesota, South Dakota, North Dakota:* 1919.—In a mimeographed preliminary report of cost of producing wheat, covering findings on 481 farms for 1919, the U. S. D. A. Office of Farm Management collected data from 14 representative areas and interviewed at least 30 wheat growers in each of these areas. Nine of these districts were located in the winter wheat states of Kansas, Nebraska, and Missouri. The remaining five districts included three states in the spring wheat belt, namely, Minnesota, North Dakota, and South Dakota. The report is therefore based upon 284 records from farms producing winter wheat and 197 records from farms growing spring wheat.

In this survey 43,940 acres seeded to winter wheat and yielding 635,124 bushels were used as a basis for computing costs, together with spring wheat records embracing 44,218 acres seeded, with a total production of 362,047 bushels.

For the 481 farms covered in both the winter and the spring wheat areas, the average cost was found to be \$2.15 per bushel, but ranged from \$1.00 to \$5.00, with the exception of 18 farms which recorded a cost in excess of \$5.00. Three hundred fifty-four ranged from \$1.30 to \$2.80 per bushel.

Production cost in the winter wheat area averaged \$1.87 per bushel but ranged from \$1.00 to \$8.20. Two hundred thirty-four farms of the 284 total fell within the limits of \$1.40 and \$2.70 per bushel, inclusive. Only 14 farms showed a cost above \$3.30.

Cost records by states and counties showed for winter wheat:

TABLE 175.—COSTS OF PRODUCING WINTER WHEAT—VARIOUS STATES

County and state	Number farms reporting	Range in cost per bushel	Average cost per bushel
Ford County, Kansas.....	32	\$1.00 to \$3.20	\$1.82
Pawnee County, Kansas.....	32	1.10 to 3.60	1.85
McPherson County, Kansas.....	35	1.70 to 3.90	2.38
Jasper County, Missouri.....	30	1.40 to 2.20	1.80
St. Charles County, Missouri.....	38	1.20 to 2.40	1.74
Saline County, Missouri.....	29	1.20 to 5.20	2.17
Phelps County, Nebraska.....	30	1.60 to 3.50	2.20
Keith County, Nebraska.....	23	1.00 to 3.10	1.57
Saline County, Nebraska.....	35	1.40 to 3.60	2.19

Data covering acreage harvested and production in bushels are furnished so that a comparison of yields and the influence of yield upon cost can be calculated. Yields range from a low of 2 bu. plus to a high of 25 bu. per acre.

Production costs of the spring wheat averaged \$2.65 per bushel, but ranged from \$1.10 to \$14.40. One hundred forty-five farms of the 197 total fell within the limits of \$1.90 and \$3.90 per bushel, inclusive. Thirty-nine farms showed a cost above \$4.00; the remaining 13 recording a cost below \$1.90.

Cost records by states and counties showed for spring wheat:

TABLE 176.—COSTS OF PRODUCING SPRING WHEAT—VARIOUS STATES

County and state	Number farms reporting	Range in cost per bushel	Average cost per bushel
Clay County, Minnesota.....	38	\$1.90 to \$ 5.00	\$2.82
Traverse County, Minnesota.....	42	1.90 to 4.90	2.80
Grand Forks County, North Dakota.....	39	1.30 to 6.10	2.24
Morton County, North Dakota.....	39	1.60 to 14.40	4.26
Spink County, South Dakota.....	39	1.10 to 4.50	2.40

Data are given showing acreage harvested and production in bushels for spring wheat region so that comparisons can be made showing influence of yield upon cost, and the marginal price necessary to maintain production. Yields range from a low of one bushel to a high of 20 bu. plus per acre.

The general averages for the records show:

TABLE 177.—COSTS OF PRODUCING WHEAT—VARIOUS STATES

	Winter wheat, area	Spring wheat, area	All areas
Number of records.....	284	197	481
Average yield (bushels).....	14.90	8.40	11.70
Acres seeded.....	43,940.00	44,218.00	88,158.00
Acres harvested.....	42,714.00	42,847.00	85,561.00
Total production (bushels).....	635,124.00	362,047.00	997,171.00
Net cost:			
Per acre, dollars.....	27.80	22.40	25.10
Per bushel, dollars.....	1.87	2.65	2.15

Costs of Producing California Field Crops: 1915 and 1919.—As a means of furnishing data to newcomers or to beginners so that they could possess a better understanding of the capital requirements involved in the growing of California crops, figures covering 36 field, fruit, and truck crops were collected for the years 1915 (representative of pre-war conditions) and 1919 (representing the first post-war year). Only the expenses are included that cover labor—horse and man, material (such as market packages, sprays, fertilizers), taxes, insurance, and selling expense. Interest on investment, and depreciation, are not covered by the figures.

Detailed Statement.—A will statement of commercial methods in use accompanying the cost data serves to acquaint the reader with the conditions surrounding the costs. A sample follows:

TABLE 178.—DETAILED OPERATING COSTS OF PRODUCING ALFALFA—CALIFORNIA

	Basic data usual, normal, or pre-war prices (1915)	Abnormal, unusually high, and war figures (1919)
Market prices for land, per acre:		
Unplanted land:		
Best land.....		\$300.00
Fair land.....		200.00
Planted— good stand:		
Best land.....	\$300.00	400.00
Good land.....	200.00	250.00
Fair land.....	125.00	150.00
Costs of planting, per acre:		
Irrigating system or water right included in price of land:		
Leveling, checking and ditching.....	30.00	50.00
Plowing, working down and preparing seed bed.....	5.00	9.00
Seed.....	3.00	7.25
Planting, either:		
Drilling.....	0.40	0.70
Broadcasting, and brushing or harrowing in.....	0.45	0.75
Costs of growing—first year, per acre:		
Two mowings.....	1.00	1.60
Two rakings.....	0.40	0.70
Hauling off two crops and stacking.....	3.00	7.00
Irrigating, water and labor, two crops.....	10.00	14.00
Taxes and insurance.....	1.50	1.75
Costs of growing after maturity annually:		
Upkeep of ditches and checks.....	1.00	1.75
Irrigating, per acre:		
Water.....	7.00	8.00
Labor.....	8.00	12.00
Mowing, per acre, per cutting.....	0.50	0.80
Raking, per acre, per cutting.....	0.20	0.35
Shocking, per acre, per cutting.....	0.30	0.50
Stacking, per ton.....	0.60	1.00
Baling, per ton.....	1.75	4.00
Hauling to cars, if baled (5 miles) per ton.....	1.50	2.50
Taxes and insurance, per acre:		
Best land.....	3.00	3.25
Good land.....	2.00	2.25
Fair land.....	1.00	1.25
Farm returns for product, baled and f.o.b. per ton:		
First cutting:		
High.....	10.00	16.00
Low.....	5.00	8.00
Usual.....	8.00	12.00
Second, and subsequent cuttings:		
High.....	15.00	28.00
Low.....	6.00	12.00
Usual.....	10.00	18.00

Both usual and good yields are shown. Of 100 commercial growers from 30 to 50 will obtain usual yields, while 8 to 12 receive good yields. The rest receive either less than usual or more than good.

A summary of the costs for the field crops follows. Fruit and truck crops are shown in subsequent sections set aside for such cost data.⁹⁷

TABLE 179.—SUMMARY OF OPERATING COSTS IN PRODUCING CALIFORNIA FIELD CROPS

Crop	Usual yields			Good yields		
	Yield per acre	Cost per acre, 1915	Cost per acre, 1919	Yield per acre	Cost per acre, 1915	Cost per acre, 1919
Alfalfa.....	5 tons	\$39.00	\$ 53.00	8 tons	\$65.00	\$ 90.00
Asparagus.....	4,000 lb.	55.00	111.00	5,000 lb.	65.00	132.00
Barley.....	1,200 lb.	8.00	13.00	2,000 lb.	10.00	17.00
Beans, dry.....	1,000 lb.	15.00	26.00	1,500 lb.	19.00	31.00
Corn, Indian (grain).....	1,000 lb.	18.00	32.00	2,000 lb.	23.00	51.00
Cotton, medium staple, lint..	400 lb.	42.00	75.00	750 lb.	60.00	109.00
Hay, grain.....	1 ton	8.00	16.00	2 tons	12.00	21.00
Hops.....	1,400 lb.	60.00	144.00	2,000 lb.	68.00	185.00
Oats.....	900 lb.	7.00	14.00	1,500 lb.	11.00	18.00
Peas, dry.....	800 lb.	44.00	63.00	1,200 lb.	57.00	87.00
Potato.....	6,000 lb.	42.00	78.00	15,000 lb.	60.00	113.00
Rice.....	2,500 lb.	41.00	73.00	3,500 lb.	45.00	82.00
Sorghum (grain).....	1,200 lb.	18.00	22.00	2,500 lb.	24.00	29.00
Sugar beets.....	10 tons	39.00	61.00	15 tons	42.00	66.00
Wheat.....	700 lb.	7.00	12.00	1,000 lb.	7.00	12.00
Average cost per acre.....	.....	\$29.53	\$ 52.87	.....	\$37.87	\$ 69.53
Percentage increase in costs 1919 over 1915.....	.....	80 per cent		.....	84 per cent	

These data are instructive in showing (a) the variation in expense of producing different crops, (b) the variation in receipts, (c) the sums available for uses other than operating expense, (d) the change in costs and receipts 1915 to 1919, (e) capital requirements.

Values of these same crops are shown in the chapter on profits.

Costs of Producing Fruit Crops

Costs of Producing Apples: Washington, Colorado, Oregon, Idaho: 1914-15.—The cost of producing apples has been studied by the federal Office of Farm Management in various apple growing districts of the United States. The findings of these studies are now appearing, the first six publications being by S. M. Thomson and G. H. Miller, covering the following:

TABLE 180.—COSTS OF PRODUCING APPLES (FIVE STATES)

District	U. S. D. A. Office of Farm Management, <i>Bulletin</i> number	Date of issue
Wenatchee Valley, Washington.....	446	Jan. 10, 1917
Western Colorado.....	500	Mar. 14, 1917
Hood River Valley, Oregon.....	518	Mar. 17, 1917
Yakima Valley, Washington.....	614	Apr. 20, 1918
Payette Valley, Idaho.....	638	May 10, 1918
Western New York.....	851	July 30, 1920

The publications are unusually detailed in reporting sizes of orchards, kinds of operations, land values, labor requirements, material and fixed costs, and yields. In brief, the findings show the costs, for the year when the study was made, to be:

TABLE 181.—SUMMARY OF APPLE PRODUCTION COST DATA FROM FIVE STATES

District	Year studied	Number orchards studied	Average yield packed boxes	Total average cost	
				Per acre	Per packed box
Wenatchee Valley, Wash.....	1914	87	593.0	\$469.73	\$0.79
Western Colorado.....	1914-15	125	284.0	239.79	0.84
Hood River Valley, Ore.....	1915	54	222.0	226.96	1.02
Yakima Valley, Wash.....	1915	120	432.0	345.68	0.80
Payette Valley, Idaho.....	1915	38	337.0	239.65	0.71
Western New York.....	1914-16	218	84.1 bbl.	118.78	1.41 per barrel

Estimations of cost include:

Labor		Costs other than labor	
Maintenance	Handling the crop	Material costs	Fixed costs
Manuring	Hauling box shooks	Box shook	Taxes
Pruning	Making boxes	Nails	Insurance
Disposing of brush	Picking	Paper	Water rent
Plowing	Hauling boxes to	Labels	Equipment charge
Cultivating	and from orchard	Spray materials	Machine hire
Irrigating	Sorting	Manure	Interest
Thinning	Packing	Gasoline, oil, etc.	Building charge
Spraying	Hauling packed		
Propping	boxes		
Cover crops	Picking up and		
Miscellaneous	hauling culls		

A condensed table showing labor for an average acre of fruit in five commercial apple growing sections is obtainable from the data. To the unit factors of labor indicated here, must be added the money costs of materials and fixed charges, to obtain the total cost given above. Full details of these items can be obtained in the publications.

TABLE 182.—DETAILED COSTS OF PRODUCING APPLES—DATA FROM FIVE STATES

Item	Wentachee Valley, Wash.		Western Colorado		Hood River Valley, Ore		Yakima Valley, Wash.		Payette Valley, Idaho	
	Man-hours	Horse-hours	Man-hours	Horse-hours	Man-hours	Horse-hours	Man-hours	Horse-hours	Man-hours	Horse-hours
Yields in boxes	593		284		222		432		337	
Manuring.....	4.32	7.92	4.84	9.21	*	.....	7.40	13.00	3.78	7.32
Pruning.....	40.31	.....	53.67	.....	24.36	.....	52.55	.....	47.41	.....
Disposing of brush.....	11.86	14.46	8.72	10.64	*	.....	11.46	11.35	.....	.....
Cultivating and furrowing for irrigating.....	28.52	50.82	15.97	31.36	13.60	27.20	26.67	45.83	23.92	47.84
Irrigating.....	34.37	.....	13.74	.....	25.16	.....	17.52	.....	9.34	.....
Thinning.....	53.29	.....	17.71	.....	24.63	.....	49.39	.....	47.36	.....
Spraying.....	28.12	18.87	30.29	21.87	25.71	20.48	36.69	25.08	31.71	22.92
Propping.....	19.01	10.73	.....	.....	14.23	13.56	4.06	3.69	6.00	8.15
Cover cropping.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous.....	9.06	.....	20.29	2.84	*	.....	9.65	0.72	7.00	.....
Total maintenance.....	228.86	102.80	165.23	75.92	142.19	81.63	215.39	99.67	156.52	86.23
<i>Handling the crops:</i>										
Hauling shook.....	3.81	7.18	2.44	4.87	1.80	3.35	*	*	.....	.....
Making boxes.....	17.80	.....	11.36	.....	.....	.....	.....	.....	.....	.....
Picking.....	119.24	.....	73.95	.....	56.00	.....	105.50	76.59	.....	.....
Hauling to and from orchard.....	17.95	35.90	8.79	16.65	7.05	12.82	*	*	.....	.....
Packing house labor.....	*	.....	81.87	.....	111.26	.....	.....	*	.....	.....
Hauling to ship.....	15.96	31.92	12.92	25.82	11.73	23.46	.....	.....	.....	.....
Total handling.....	174.76	75.00	191.33	47.34	187.84	39.63	No total given	No total given	.....	.....
Grand total of both maintenance and handling.....	403.62	177.80	356.56	123.26	330.03	121.26	.....	.....	.....	.....

* Reported in money.

Indiana Apple Costs: 1911-12.—Costs for pruning, cultivation, fertilizing, spraying, and incidental work, studied during 1911 and 1912 in eight districts of Indiana,⁹⁸ gave for apple production a total average per acre of \$56.68, with average yield of 234.4 bu. The average cost of handling the orchard was therefore at the rate of 44.7 ¢ per bushel, to which must be added the sum of \$34.61 cost of harvesting and packing, making a total cost of 57.7¢ per bushel. Items do not include interest, depreciation, taxes, insurance, or risk.

West Virginia Peach Costs: 1912.—Arnold, in reporting results of a study in West Virginia, figures the cost of an average acre of peaches brought to four years of age, that is bearing age, at \$187.10 for smooth land, and \$281.50 for "chert" land. The units of cost include man labor at \$30.00 and perquisites for monthly men, and 12½ to 15¢ per hour for transient help; horse labor at 50 to 75¢ per day; care of orchard and fruit, interest on investment and current expenses, taxes, depreciation of work stock, repairs, incidental expenses, and management. The total cash cost amounts to \$52.23 per acre on smooth land and \$61.29 on chert land. Estimating the yield at 130 baskets per acre, the cost per basket ranges from 40 to 47¢.

Nebraska Spraying Costs: 1913-14-15.—Accurate accounts by the University of Nebraska were kept of all the labor and materials used in spraying apples throughout the three seasons of 1913-1914-1915. In computing costs of spraying, averages were made for each type of machine, for all Bordeaux schedules, for lime sulphur schedules, and for the mist and penetration schedules. In computing the cost of lime sulphur the 1½-2-50 formula was used, the cost of poison being included. In computing the cost of Bordeaux and arsenate of lead the 3-4-2-50 formula was used.

The cost was found to range from 24¢ to 30¢ per tree for four sprayings, or a general total average of 27¢ per tree, or 7¢ per spray. 5 gallons of spray per tree per time was required. The 7¢ cost was divided thus:

38 per cent for Man labor
14 per cent for Horse labor
28 per cent for Fungicide
20 per cent for Insecticide

Costs of California Fruits: 1915 and 1919.—Certain selected California fruit crops under conditions as outlined for California field crops (page 426) were found for usual and good crops, to be:⁹⁷

TABLE 183.—PER ACRE OPERATING COSTS OF PRODUCING FRUIT IN CALIFORNIA

Crop	Usual yields			Good yields		
	Yield per acre	Cost per acre 1915	Cost per acre 1919	Yield per acre	Cost per acre 1915	Cost per acre 1919
Almond.....	700 lb.	\$ 52.00	\$ 72.00	1,200 lb.	\$ 84.00	\$116.00
Apple.....	150 packed boxes	120.00	217.00	400 packed boxes	188.00	365.00
Apricot.....	4 tons	89.00	173.00	8 tons	119.00	214.00
Cherry.....	2 tons	118.00	252.00	4 tons	210.00	464.00
Fig.....	2 tons	48.00	85.00	2½ tons	55.00	99.00
Grape (raisin)....	1 ton dried product	41.00	75.00	1½ tons dried product	52.00	90.00
Grape (table)....	4 tons	41.00	69.00	7 tons	55.00	93.00
Lemon.....	150 packed boxes	264.00	346.00	300 packed boxes	467.00	542.00
Olive.....	1½ tons	62.00	123.00	2 tons	74.00	150.00
Orange.....	125 packed boxes	178.00	230.00	250 packed boxes	250.00	325.00
Peach.....	6 tons	70.00	124.00	8 tons	78.00	136.00
Pear.....	5 tons	81.00	143.00	10 tons	101.00	181.00
Plum.....	3½ tons	130.00	206.00	6 tons	196.00	312.00
Prune.....	2 tons	81.00	139.00	3 tons	97.00	172.00
Walnut.....	½ ton	79.00	95.00	¾ ton	105.00	123.00
Average cost per acre.....		\$ 96.93	\$156.60		\$142.07	\$225.47
Percentage increase in acreage costs 1919 over 1915.....		60 per cent			59 per cent	

Crop values of these same crops are shown in chapter on profits.

California Citrus Costs: 1913-14-15-16.—Levi Chubbuck of the U. S. D. A. (Office of Farm Management) from figures of cost from California citrus groves, collected during 1913-14, 1914-15, 1915-16, 1916-17, and grouped according to the cultural and fertilizer costs, found:

COSTS OF PRODUCING CROPS

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TABLE 184.—CALIFORNIA CITRUS COSTS

Details of Cultural Costs—(to nearest dollar, hence totals may not check with details)
Groups of 10 farms each

Group No.	Average number acres	Yield boxes per acre	Cultural cost per acre	Cultivation	Irrigation	Water	Pruning	Fumigation and spray	Other tree costs	Taxes	Fertilizers crop	Gross net returns at \$1.13 per box
1	16.1	147	\$ 52	\$15	\$ 5	\$ 6	\$ 3	\$ 2	\$ 5	\$ 8	\$ 8	\$166
2	14.7	160	71	15	5	10	5	7	5	10	14	181
3	15.8	150	86	19	7	10	7	5	5	9	22	170
4	17.6	185	99	19	7	11	5	11	5	12	29	209
5	12.8	204	110	10	6	12	7	15	8	12	29	230
6	12.3	201	124	23	7	14	8	11	8	14	40	227
7	18.0	244	139	24	9	13	7	12	17	14	43	275
8	13.1	351	159	24	10	16	10	19	17	17	47	396
9	12.7	307	183	32	11	17	11	16	25	17	48	347
10	18.7	345	231	34	16	23	13	30	41	21	52	390
Average for 10 groups	15.2	229	\$125	\$22	\$ 8	\$13	\$ 8	\$13	\$13	\$13	\$33	\$259

Costs of Producing Vegetables and Truck Crops

California Vegetable Costs.—In a set of five circulars by Rogers,¹⁰⁰⁻¹⁰⁵ the cost in California of producing tomatoes, lettuce, cabbage, onions, and spinach is shown to be:

TABLE 185.—CALIFORNIA VEGETABLES COSTS

Crop	Yield	Average cost per acre	Year
Cabbage.....	12 tons	\$77.65	1915
Tomatoes.....	10 to 12 tons	32 to 40	1916
Lettuce.....	2,000 dozens	73.20	1917
Spinach.....	4 tons	25 to 35	1918
Onions.....	10 to 15 tons	84	1919

Summarized findings for certain California crops, collected as described under costs of California field crops (page 426), were found to be for usual and good yields:

TABLE 186.—OPERATING COSTS PER ACRE OF VEGETABLES—CALIFORNIA

Crop	Usual yield			Good yield		
	Yield per acre	Cost per acre 1915	Cost per acre 1919	Yield per acre	Cost per acre 1915	Cost per acre 1919
Cabbage.....	10 tons	\$ 93.00	\$140.00	15 tons	\$106	\$159.00
Onion.....	7½ tons	106.00	206.00	15 tons	142	280.00
Sweet potato.....	3 tons	48.00	91.00	5 tons	63	121.00
Tomato.....	10 tons	111.00	167.00	20 tons	209	310.00
Average cost per acre.....		\$ 89.50	\$150.80	.....	\$130	\$217.50
Percentage increase in acreage costs 1919 over 1915.....		68 per cent			67 per cent	

Values for these same crops are shown in chapter on profits.

Utah Tomato Costs.—The cost of producing an acre of tomatoes averaged for three Utah irrigated farms was found to be \$98.13²⁰ divided among:

Horse and man labor.....	\$61.02
Manure.....	0.93
Plants.....	10.18
Crates.....	1.95
Water.....	3.26
Interest and taxes.....	16.88
Equipment.....	3.91

CHAPTER XIX

COSTS OF PRODUCING LIVE STOCK AND STOCK PRODUCTS: MISCELLANEOUS COSTS

Costs of Producing Live Stock¹⁰⁵

Method of Figuring Costs of Producing Beef.¹⁰⁶—An example of the way stock men figure the cost of producing, or raising, a calf is shown in the following table taken from data collected during the years 1913–1917 inclusive.

TABLE 187.—METHOD OF DETERMINING COSTS OF CALVES AND BEEF

<i>Calves.</i> —Cost of keeping 100 cows (valued at \$55 a head) a year:	
Interest 6 per cent.	\$440.00
Death loss estimated, at 3 per cent,.....	165.00
Pasture (rental rate or 8 per cent on valuation).....	726.28
Feed (cost delivered).....	381.59
Labor (wages, board, bunkhouse, etc.).....	122.74
Ranch expenses (interest and depreciation of equipment, cattle association dues, killing prairie dogs).....	278.43
Administration (manager and offices).....	71.49
Bull service (7.1 bulls valued at \$90)	
Interest.....	\$51.12
Death loss estimated, at 3 per cent.....	19.17
Feed and pasture.....	78.66
Labor and other expenses.....	33.56
	182.51
	\$2,368.04
Calf drop 46.3 per cent on foot at 8 months of age.	
Cost of calf at weaning time.....	\$51.15
<i>Steers.</i> —Cost of producing a 20-months-old steer:	
Cost of 100 calves at \$51.15.....	\$5115.00
Cost of keeping:	
Interest at 8 per cent.....	409.20
Death loss 4 per cent.....	204.60
Pasture.....	726.28
Feed.....	381.59
Labor.....	122.74
Ranch expenses.....	278.43
Administration.....	71.49
Cost of steers at 20 months.....	\$7,309.33
Cost of marketing.....	400.00
Total marketed.....	\$7,709.33
Cost per steer.....	77.09

Cost of Producing a 3-year-old Steer:

Cost of 100 20-month-old steers at \$73.09.....	\$7,309.00
Cost for one year—	
Interest, loss, feed, pasture, labor and other expenses. Same as above.....	2,457.61
Cost of 100 steers at 32 months.....	\$9,766.94
Marketing expenses.....	400.00
Cost of 100, 32-month-old steers.....	\$10,166.94
Cost per steer.....	\$101.67

Costs of Producing Beef. Iowa, Missouri, Nebraska, Kansas: 1914-15-16.—Studies into the cost of raising a beef calf to weaning time (6-8 months) made in Iowa, Missouri, Nebraska, and Kansas resulted in averages as follows:

TABLE 188.—COST OF BEEF CALVES—DATA FROM FOUR STATES

Year	Cow charge	Bull charge	Incidental	Total
1916	\$32.64	\$2.21	\$0.02	\$34.87
1915	34.81	2.19	0.01	37.01
1914	36.09	2.25	0.00	38.42
3 years average.....	\$34.47	\$2.25	\$0.01	\$36.73

The cost of producing a yearling from weaning time to 12 months—for the same studies shown in the previous table was found to be:

TABLE 189.—COST OF PRODUCING BEEF YEARLINGS—DATA FROM FOUR STATES

Year	Number of farms	Number calves	Cost at weaning time	Feed	Labor	Equipment	Interest	Other charges, risk, insurance, taxes, veterinary
1916	106	2,595	\$34.43	\$ 9.87	\$2.03	\$0.83	\$1.18	\$0.52
1915	99	2,721	37.09	11.98	2.18	0.73	1.33	0.42
1914	91	1,920	39.41	12.68	2.21	0.62	1.40	0.35
Total and average for 3 years.....	296	7,236	\$36.85	\$11.44	\$2.13	\$0.73	\$1.30	\$0.44

Year	Gross cost	Manure credit	Net cost
1916	\$48.86	\$1.58	\$47.28
1915	53.73	1.61	52.12
1914	56.67	1.59	55.08
Average.....	\$52.89	\$1.60	\$51.29

Costs of Producing Beef: Illinois, Indiana, Minnesota, Iowa, Missouri, South Dakota, Nebraska and Kansas: 1914.—The following from 900 records referring to 23,258 cows, taken in Illinois, Indiana, Minnesota, Iowa, Missouri, South Dakota, Nebraska, and Kansas, show an 85 per cent calf drop, which, when based on beef raising, cost:

TABLE 190.—COSTS OF PRODUCING BEEF, CALVES, AND YEARLINGS—DATA FROM EIGHT STATES

Gross cost of maintaining cow, average.....	\$35.00
Less credit for manure and milk, net cost.....	30.00
Bull charge.....	2.25
Cost of raising a yearling. Average 296 farms.	
Cost at weaning time.....	36.85
Winter feed.....	11.44
Other charges.....	4.60
Gross cost.....	\$52.89
Credits.....	1.60
Net cost.....	\$51.29

Costs of Producing Beef: Oklahoma and Texas: 1913-1917.—Summary of eight western ranches in Oklahoma and Texas from cost data taken from ranch books for the years 1913-1917, show the average cost to range as follows:

TABLE 191.—COSTS OF PRODUCING BEEF, CALVES, YEARLINGS, TWOS AND THREES (OKLAHOMA AND TEXAS)

For period	Ranches	Average cost
Cost of calf to weaning time (8 months).....	2	\$35.00
	1	38.00
	1	44.00
	1	46.00
	1	47.00
	1	51.00
20-month-old steer.....	1	52.00
	1	55.00
	1	57.00
	1	63.00
	1	77.00
32-month-old steer.....	1	68.00
	1	74.00
3-year-old steer.....	1	77.00
	1	85.00
	1	89.00
	1	102.00

Cost of Fattening Beef. *Cost of Fattening Beef, Illinois: 1912-1917.*—From a 5-year study of fattening costs in Illinois, covering the year 1912-1917, the range and average cost were determined. The table shows the analysis of average costs covering the entire 5 years.

TABLE 192.—ILLINOIS COSTS OF FATTENING BEEF

Years, 1912-1917	Range	Average
Purchase weight, pounds.....	923-1,146	1,027
Sales weight, pounds.....	1,212-1,327	1,226
Days on feed.....	105- 204	151
Average gain, pounds.....	1.31- 1.72	1.6

Costs	Range	Average
Cost laid down.....	\$56.89-\$ 86.44	\$ 71.69
Feed.....	32.43- 50.31	40.60
Labor.....	2.18- 3.90	3.04
Equipment.....	0.16- 0.42	0.27
Interest.....	1.24- 3.11	2.32
Risk.....	0.31- 1.31	0.62
General farm expense.....	0.87- 1.62	1.36
Marketing.....	1.70- 3.09	2.06
Gross cost.....	110.22- 131.82	122.46
Credits—pork and manure.....	7.27- 14.48	10.79
Net cost.....	100.82- 121.22	111.67
Sales price.....	102.49- 135.01	115.21
Profit.....	-8.19 +16.40	3.54
Margin.....		2.16
Necessary margin.....		1.87

Costs of Fattening Beef: Missouri, Kansas and Nebraska: 1913-1916.—Twenty farm records taken from Missouri, Kansas, and Nebraska during the years 1913-1917, resulted in costs as shown in the following table:

TABLE 193.—COSTS OF FATTENING BEEF—MISSOURI, KANSAS, AND NEBRASKA

	Missouri	Kansas	Nebraska
Cost laid down.....	\$56.39	\$72.04	\$68.19
Feed.....	28.15	42.56	38.04
Labor.....	1.91	1.60	2.04
Equipment.....	0.84	2.90	2.24
Interest.....	1.60	2.93	2.01
Risk.....	0.16	0.13	0.25
General farm expense veterinary, insurance, tax, administration.....	0.56	0.72	0.68
Marketing.....	3.39	2.83	3.14
Gross cost.....	\$93.14	\$126.16	\$119.85
Credits.....	4.26	4.93	7.50
Net cost.....	\$88.88	\$121.23	\$112.35
Sales price.....	83.97	127.81	110.52
Profit.....		\$6.58	
Loss.....	\$4.91		\$1.83

Summary of Costs of Producing Beef.—By bringing together and analyzing the various costs entering into the fattening of cattle, the distribution and percentages, the following results are found to hold for selected localities:

TABLE 194.—SUMMARIZED COSTS OF FATTENING BEEF

Cost items	1,122 calves in corn belt	1,551 year-lings, Nebraska, Iowa and Missouri	2-year-old cattle, Nebraska, Iowa and Missouri	3-year-old cattle Illinois	3-year-old cattle, Nebraska, Kansas and Missouri
Purchase, per cent.	38	43	51	59.0	58.0
Feed, per cent.	51	47	40	33.0	33.0
Labor, per cent.	3	3	2	2.5	1.7
Interest, per cent.	3	2	2	2.0	2.0
Equipment, per cent.	2	2	2	0.2	2.0
Marketing, per cent.	2	2	2	2.0	2.6
Risk, per cent.				0.5	0.1
Miscellaneous, veterinary, insurance, taxes, per cent.	1	1	1	0.8	0.6
Value of credits (manure and pork) equal on total gross cost, per cent.	8	10	8	9	
Initial weight.	452	691	938	1027	
Average number of days fed.	212	218	184	151	
Average gain per head per day.	1.6	1.6	1.6	1.6	

Cost of Producing Hogs. *Cost of Producing Hogs: Nebraska, Missouri, Wisconsin, Iowa: 1918.*—A study by the survey method of 231 farms in Nebraska, Minnesota, Missouri, Wisconsin, and Iowa to note the cost of producing hogs in 1918, resulted in findings, based on 100 lb. of pork, that the feed cost including pasturage averaged 85 per cent of the cost of production, ranging from 80 to 89 per cent. Pasture and forage crops were found to equal 2.1 to 7.8 per cent of the feed cost or a general average of 5 per cent. The feed was mostly corn helped out by mill feeds, oil cake, tankage, skimmed milk, plus pasture of blue grass, clover, alfalfa or oats, and peas.

The bedding charge ranged from 3 to 12¢ per 100 lb. of hog, with an average of 6½¢. The charge of hog lot, fences, shelter, and other equipment totaled 2.3 per cent.

Labor per 100 lb. of pork amounted to:

	Range	Average
Amount of man-hours.	2¾-6½	4
Amount of horse-hours.	¾-1½	¾
Per cent labor to cost of production.	4.8-12.7	7½

Cost of Producing Hogs: Georgia: 1915 and 1917.—Haskell⁴⁴ from a study of pork production collected during a farm management survey of Brooks County, Georgia, and later by personal visits to 218 farms in southwestern Georgia, found the total feed cost to be 79.6 per cent of the gross cost of production, or 84.5 per cent of the net cost after deducting the value of the manure. Man labor amounted to 8.8 per cent, mule labor 1.1 per cent, interest 4.1 per cent, buildings and equipment 3.4 per cent, veterinary and serum 1.9 per cent, dips, minerals, and medicine 1 per cent, taxes on hogs 0.1 per cent. The credits to be deducted (manure credit and a very few receipts from breeding fees) amounted to 5.9 per cent of the gross cost. On the average farm 55.4 days of man labor and 7.8 days of mule labor were spent on the hogs. This amounted to slightly less than one-half of a man per day for every 100 lb. of live stock grown. The item of interest totaled to somewhat less than half as much as the labor charge. It consisted principally of the interest (at 8 per cent) on the value of the stock hogs carried over from one year to the next, but included also the proportional share of the interest on the cash to run the farm business. This is a considerable item and one often overlooked.

The annual cost of buildings and equipment was a little less than the interest charge, or \$25.85 per farm. This includes the depreciation, repairs, and interest on the investment in fences, hog houses, shelters, watering systems, dipping vats, troughs, and other miscellaneous equipment, or the share of these that was properly chargeable to the hogs. The climate here is so mild that but few, simple, and inexpensive buildings are required. Much the greater part of this charge is due to fences. Most of the farms are fenced with high woven wire or woven wire and one or two barbed wires. These fences, at pre-war prices, cost from \$150 to \$175 per mile to build new. The annual charge to cover interest, repairs, and depreciation of wire and posts on this type of fence amounts to about 15 per cent of the value. The hogs were charged with only the amount of the fence maintained in addition to that which would have been needed if hogs had not been kept. On most of the farms this amounted to from one-fourth to one-half of the total farm fence, or an average of about 1 mile of fence per farm.

The payments for veterinary services and anti-hog cholera serum averaged \$14.26 per farm, or about 2 per cent of the cost of production. The serum accounted for nearly all of this item. Many of the farmers, however, did not use serum, hence their average cost was only about one-half as large as the cost where it was used. Under normal conditions, about 30¢ per hog or pig will be found a minimum allowance to cover the cash outlay when the farmer does the inoculating himself. When it is considered how large and widespread the losses from cholera have been each year, the cost of inoculation will be found to be cheap insurance

against such losses. Dips, minerals, medicines, and tonics amounted to about half as much as the serum cost. The largest items under this heading were crude oil applied to kill lice; and copperas, charcoal, and salt used as tonics. Taxes on hogs and cash expense for breeding fees together amounted to less than \$1 per farm.

The actual cost of the pork per 100 lb. live weight grouped:

NUMBER OF SOWS KEPT	COST PER HUNDREDWEIGHT
Three or less.....	\$5.93
Eight or nine.....	5.66
Thirteen to twenty.....	5.89
More than twenty.....	6.27

Data from 55 Brooks County, Georgia farms raising hogs indicated cost as follows²⁶ for 1914:

TABLE 195.—COST OF SWINE PRODUCTION (BROOKS COUNTY, GEORGIA)

	Cost per farm	Cost per 100 lb. live weight	Per cent of gross cost
Total pasture cost*.....	375.65	\$3.40	\$62.2
Corn (173 bu.).....	129.40	1.17	21.4
Watermelons, fed.....	8.43	0.08	1.4
Total feed cost.....	513.48	4.65	85.0
Man labor (41 days).....	58.60	0.53	9.7
Mule labor (5.1 days).....	5.02	0.05	0.8
Equipment.....	1.13	0.01	0.2
Veterinary, serum, dips, medicine.....	5.50	0.05	0.9
Interest.....	19.62	0.18	3.3
Taxes.....	0.82	0.01	0.1
Gross cost.....	604.17	\$5.48	100.0
Manure credit.....	40.85	0.37	6.8
Net cost.....	\$563.32	\$5.11	
Net cost on 45 farms with no losses from cholera....		4.73	

* Charged at cost of production.

It will be seen by the table that of the gross cost of producing hogs, one-half is accounted for by the cost of peanuts pastured, two-thirds by all crops pastured, and 85 per cent by all classes of feeds. The peanuts, oats, rye, and sweet potatoes fed were all pasture crops of production. All other pasture is entered at the estimated renting value. Corn is charged at the farm price.

Costs of Raising Dairy Heifers. *Ohio*.—Ohio has reported¹⁰⁶ the costs of various factors entering into the raising of dairy calves. Rates are

here given so that readjustments may be made with local or more recent figures.

TABLE 196.—COSTS OF RAISING DAIRY HEIFERS—OHIO

Items	First year (calf to yearling)	Second year (yearling to 2 year old)	Total
Value at birth.....	\$5.00		
Cost of labor at 15¢ per hour.....	6.50	\$5.00	\$4.50
Bedding, flat charge.....	2.00	2.50	
Service fees, based on bull cost of \$50 for 30 to 35 cows.....		1.50	
Tools, veterinary, flat charge.....	1.00	0.50	1.50
Housing, flat rate.....	2.00	2.00	4.00
Interest and taxes at 6 per cent.....			
Feeds..... per hundredweight			
Whole milk..... \$1.50			
Skim milk..... 0.20			
Concentrates			
Average..... 1.25			
Hay, average..... 14.00 per ton			
Corn silage..... 4.00 per ton			
Pasture... 30¢ per month, first year 90¢ per month, second year			
Total feed cost.....	28.53	28.34	56.87
Total cost.....	\$46.32	\$43.23	\$89.55
Credit by manure.....	3.00	6.00	9.00
Net cost.....	\$43.32	\$37.23	\$80.55

Costs of Raising Pullets. *Indiana: 1916-17.*—A Purdue University bulletin¹⁰⁷ reports the cost of the items involved in producing and rearing White Plymouth Rock broilers, roosters, capons, and pullets, based on 1916 and 1917 data to be:

2-lb. broiler, 9-10 weeks old.....	{ 4.8 to 5.6 lb. grain 6.5 to 8.5 lb. skim milk
6½-lb. rooster, 24 weeks.....	{ 24 to 27 lb. of feed 22 lb. skim milk
Pullet, 28 weeks.....	{ 27 to 30 lb. of feed 22 to 37 lb. skim milk
6½-lb. capon, 41 weeks.....	{ 64 to 67 lb. feed 62 to 79 lb. skim milk

Total cost of hatching one chick averaged 6.8¢ on basis of 50 per cent hatch, and eggs at 2 and 2.5¢ each.

With prices prevailing at the time the net and gross cost in dollars per pullet amounted to:

	1916	1917
Gross cost per pullet.....	\$1.15	\$1.39
Net cost per pullet raised.....	0.43	0.70

California (Average Figures).—Tables of financial items collected under conditions of 1915 (pre-war) and 1919 (post-war) provide a basis for computing costs of production under California conditions.

TABLE 197.—COST DATA OF POULTRY BUSINESS—CALIFORNIA

	Rates as of	
	1915 (pre-war)	1919 (post-war)
Market price for lands suitable for poultry, per acre (not including fences, buildings nor improvements)		
In poultry centers.....	\$600.00	\$700.00
Near large towns.....	600.00	700.00
Back country.....	250.00	250.00
Cost of stocking (white leghorns)		
Day-old chicks.....	0.08	0.12
3-month-old pullets.....	0.60	1.25
Mature fowls.....	1.00	2.00
Labor costs, per month, wages.....	30.00	60.00
and found.....	18.00	30.00
Per fowl, per month		
Laying, 10 months.....	0.06½	0.10
Moulting, 2 months.....	0.05	0.07½
Per chick, for period		
First 3 months.....	0.08	0.12
Second 3 months.....	0.12	0.18
Feeding costs		
Per fowl, per month		
Laying.....	0.12	0.20
Moulting.....	0.10	0.17
Feeding costs		
Per chick, per month		
First month.....	0.03	0.05
Second month.....	0.05	0.08
Third month.....	0.07	0.11
Fourth month.....	0.08	0.14
Fifth month.....	0.09	0.17
Total for period.....	\$ 0.32	\$ 0.55
Farm returns for products		
Eggs, per dozen, extras*.....	0.31	0.55
Young fowls, per pound.....	0.18	0.39
Aged fowls, per pound.....	0.12	0.35

* 80 per cent of output.

Costs of Fattening Lambs.—Costs of feeding lambs are subject to wide variations. A study during 1916 and 1917, of 82 bunches fattened in open yards in Colorado and Nebraska, showed a distribution of cost percentages. These are further amplified with data from Missouri, Michigan, Indiana, and New York.

TABLE 198.—COSTS OF FATTENING LAMBS—SIX STATES

Cost item	Open yards, Colorado and Nebraska, 1916-17	Field fat- tening, Mis- souri, 1917- 18	Barn fatten- ing, Michi- gan and Indi- ana, 1916-18	Barn fatten- ing, New York, 1917- 18	
Initial cost.....	52%	73%	57	65	
Feed.....	34	20	31	26.5	
Labor.....	4	0.5	3	1.5	
Equipment.....	1	0.3	3.7	3	
Interest.....	2	1.5	1.8	1.3	
Risk.....	1	2.3	1	2.5	
Miscellaneous (veterinary, insurance, taxes, incident- als).....	1	0.2	0.5	0.2	
Marketing.....	5	2.2	2		
Gross cost in dollars.....	\$9.59	\$15.09	\$14.27	\$16.17	\$7.01
Giving a gross cost of which credits (wool and manure) amount to, per cent.....	1	1.8	4.6	2.3	1.3
Initial weight.....	55-60	63½	61½	59	60
Days fed.....	5½-6 months	92 days	119 days	138 days	101 days
Average pounds monthly gain.....	10	6.6	6.0	6.7	5.9

California Cost Data: Beef, Sheep and Swine.—Tables of financial items collected under conditions of 1915 (pre-war) and 1919 (post-war), provide a basis for computing costs of handling stock under California conditions.

Financial Items of California Beef Business (Average Figures).—

TABLE 199.—COST DATA OF BEEF BUSINESS—CALIFORNIA

	Rates as	
	1915 (pre-war)	1919 (post-war)
Market prices for land, per acre (fenced but not including buildings)		
Valley range.....	\$ 30.00	\$ 40.00
Hill range.....	8.00	10.00
Costs of stocking (usual quality)		
Grade cows.....	60.00	85.00
Pure bred cows.....	125.00	200.00
Pure bred bulls.....	250.00	250.00
Yearlings.....	25.00	45.00
Twos.....	50.00	70.00
Labor costs		
Range riders, per month, wages.....	40.00	70.00
and found.....	15.00	30.00
Fence crews per day		
Wages.....	1.50	2.50
and found.....	.50	1.00
Feed costs		
Alfalfa hay, in stack, per ton.....	8.00	16.00
Barley, per hundredweight.....	1.10	2.50
Egyptian corn, per hundredweight.....	1.30	3.00
Barley stubble, per acre.....	.25	1.00
Wheat stubble, per acre.....	.20	.75
Farm returns for product		
Fat beef, per pound		
Steers.....	0.07	0.10
Heifers.....	0.06	0.09
Old cows, per pound.....	0.04	0.05
Hides No. 1-30-60 lb. (per pound).....	0.16	0.34
No. 2-30-60 lb.....	0.15	0.30
Wet salted, kips 15-30 lb.....	0.16	0.38
Wet salted, calf 5-15 lb.....	0.16	0.60
Dry 16 lb. up.....	0.26	0.45

Financial Items of California Sheep Business (Average Figures).—

TABLE 200.—COST DATA OF SHEEP BUSINESS—CALIFORNIA

	Rates as of	
	1915 (pre-war)	1919 (war)
Land values		
Fenced range, price per acre		
If leased, per year.....	\$ 2.00	\$2.00
If purchased		
Unimproved.....	12.00	14.00
Improved.....	15.00	20.00
Costs of stocking		
Registered bucks.....	50.00	100.00
Grade bucks.....	15.00	25.00
Registered ewes.....	20.00	30.00
Grade ewes.....	6.00	12.00
Herding costs		
Open range		
One man to 1,000 sheep		
Wages, per month.....	40.00	85.00
Found.....	12.00	20.00
Extra help, lambing time		
Wages, per day.....	2.00	3.50
Found.....	0.50	1.00
Fenced range		
General ranch help		
Wages, per month.....	35.00	60.00
Found.....	15.00	30.00
Shearing costs, per time		
Ewes, once a year.....	0.10	0.20
Ewes, twice a year, per time.....	0.07	0.15
Lambs.....	0.07	0.10
Bucks.....	0.10	0.20
Wool sacks, each.....	0.14	1.00
Twine, per sack.....	0.03	0.05
Farm returns for product		
Wool		
Lamb, grease wool.....	0.10	0.40
Sheep, grease wool.....	0.16	0.60
Meat		
Lamb.....	....	0.12
Wethers.....	....	0.10
Aged ewes.....	....	0.06
Ewes, medium, good and choice.....	....	0.08

Financial Items of California Swine Business (Average Figures).—

TABLE 201.—COST DATA OF SWINE BUSINESS—CALIFORNIA

	Rates as of	
	1915 (pre-war)	1919 (war)
Market prices for land, per acre		
Same as for alfalfa or grain		
Costs of stocking (usual quality)		
Grade sows.....	\$20.00	\$ 40.00
Pure bred sows.....	30.00	100.00
Pure bred boars, mature.....	75.00	150.00
Grade gilts.....	18.00	40.00
Pure bred gilts.....	25.00	100.00
Labor costs		
Hogmen, per month, wages.....	60.00	100.00
and found.....	18.00	30.00
Fence builders, per day		
wages.....	1.10	2.50
found.....	0.50	1.00
Feed costs per ton		
Rolled barley.....	28.00	56.00
Bran.....	30.00	42.00
Dried beet pulp.....	26.00	46.00
Middlings.....	40.00	48.00
Shorts.....	32.00	45.00
Alfalfa meal.....	16.00	32.00
Alfalfa hay.....	10.00	18.00
Mill run.....	26.00	42.00
Pumpkins, per ton.....	4.00	5.00
Farm returns for products		
Fat hogs per pound		
Best.....	0.07	0.16
Good.....	0.06½	0.15
Fair.....	0.06	0.14
Feeders average 1 to 3¢ less than fat prices		

Cost Data of California Dairying Business (Average Figures).—

Tables of financial items collected under conditions of 1915 (pre-war) and 1919 (post-war) provide a basis for computing costs of production under California conditions.

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TABLE 202.—COST DATA OF DAIRY BUSINESS—CALIFORNIA

	Rates as of	
	1915 (pre-war)	1919 (war)
Market prices for land, per acre (no buildings or fences)		
Alfalfa, pasture or hay.....	\$200.00	\$250.00
Level wildgrass pasture.....	100.00	125.00
Hill wildgrass pasture.....	20.00	25.00
Costs of stocking (usual quality)		
Grade cows.....	85.00	120.00
Pure bred cows.....	110.00	175.00
Pure bred bulls.....	250.00	250.00
Yearlings.....	40.00	60.00
Twos.....	60.00	80.00
Labor costs		
Milkers, per month.....	50.00	100.00
found.....	18.00	30.00
Hay hands and feeders, per day.....	2.00	3.00
found.....	0.50	1.00
Feed costs, per ton		
Rolled barley.....	28.00	56.00
Bran.....	30.00	42.00
Dried beet pulp.....	26.00	46.00
Middlings.....	40.00	48.00
Shorts.....	32.00	45.00
Alfalfa meal.....	16.00	32.00
Alfalfa hay.....	10.00	18.00
Mill run.....	26.00	42.00
Farm returns for product		
Milk		
Southern California per 100 lb.....	2.10	4.12
Northern California per gallon.....	0.16	0.28
Butterfat		
Southern California.....	0.38	0.59
Northern California.....	0.31	0.65
Meat		
Newborn calves.....	5.00	10.00
3-week calves.....	10.00	15.00
2-4-month calves.....	15.00	20.00
Old cows, 50 per cent of beef prices.....	35.00	50.00
Skim milk		
5 lb. equivalent to 1 lb. of grain, hence per hundredweight.....	0.20	0.50

Costs of Producing Milk. *Milk Production Costs: Michigan: 1914-1915.*—The Michigan Agricultural College in *Bulletin 227* by A. C. Anderson and F. T. Riddell, issued Dec., 1916, reports the net cost of producing milk on 29 farms studied by cost accounting methods in 1914 and 1915, to be 15.9¢ and 15.39¢ per gallon, respectively, with prevailing rates of the period for labor, feed, and material to cover man and horse labor; feed; cash sundries; veterinary services and drugs; taxes, interest, and depreciation of herd; taxes, insurance, interest, repairs, and depreciation on buildings; depreciation on equipment; risk of business; and cost of sire. From these items of expense were credited milk, manure, and calves.

Michigan found that labor constituted 30 per cent of the expense, feed 45 per cent and other charges 25 per cent, giving a total gross cost of keeping close to \$150 per cow per year for an average of over 400 cows in the 29 dairies, and yielding an average of 6,928 lb. of milk in 1914 and 7,156 in 1915, studied for from 4 to 7 years by cost accounting methods.

Average yearly food requirements per cow were found to be:

Succulents (mostly silage).....	7,729 lb.
Dry roughage, including bedding.....	3,321
Grain.....	(provided but amount not stated)
Pasture.....	(provided but amount not stated)

In a later report, Michigan, giving the cost of milk production of 50 herds, totaling 1,970 cows, studied for 2 and 3 years, outlines the items entering into the cost, and shows the unit expenses.¹⁰⁸ These were summarized into:

TABLE 203.—DETAILED COSTS OF PRODUCING MILK PER 100 POUNDS—MICHIGAN

Seasons	Winter period	Summer period	Yearly
Home grown grains, pounds.....	12.1	4.0	9.4
Commercial feeds, pounds.....	16.5	6.8	13.3
Hay, pounds.....	49.2	10.5	36.3
Other dry roughage, pounds.....	21.4	2.5	15.1
Silage, pounds.....	147.2	21.1	105.1
Soiling crops and other succulent feeds, pounds.....	3.5	9.6	5.5
Pasture, days.....		6.9	2.4
Bedding, pounds.....	17.9	2.9	12.9
Labor performed by owner or operator, hours.....	1.01	0.96	0.99
Labor performed by hired help, hours.....	0.99	1.00	1.00
Horse labor, hours.....	0.11	0.05	0.09
Hauling milk, cost per hundredweight:			
Corrective factor*.....	0.2183	0.4499	0.2750

*The overhead costs are determined by multiplying the value of all other items by the connective factor.

Milk Production Costs: Wisconsin, Michigan, Pennsylvania, North Carolina: 1908-1914.—A study into the net cost of producing milk on four dairy farms located in different states reported⁶⁴ by the authors, reads:

	Per gallon, cents	Average annual pounds of milk produced per cow
Wisconsin.....	12.6	5,240
Michigan.....	13.3	6,284
Pennsylvania.....	14.9	5,348
North Carolina.....	17.9	5,032

Cost items cover feed and bedding; labor; use of buildings, equipment, and bull; interest; depreciation; miscellaneous items; and overhead. The yearly cost of keeping a cow was found to range from \$101.62 to \$127.76. Of the various cost items, the proportions ranged:

	PER CENT
Feed.....	48.5 to 57.2
Labor.....	22.8 to 31.7
All other charges for an average production.....	17.2 to 24.0

Feed factors in milk production for these dairy farms were found to be:

Farm	Annual quantity of feed per cow				Total feed cost
	Concentrates pounds	Dry roughage pounds	Silage pounds	Pasture	
Wisconsin.....	1,605	1,907	7,081	\$6.84	\$49.18
Michigan.....	2,855	2,663	11,638	1.69	71.72
Pennsylvania.....	1,423	2,308	8,311	4.30	51.30
North Carolina.....	2,320	4,298	3,867	3.77	62.62

Items of credit amounted to from \$12.27 to \$20.32 for manure, calves, hides, bull service, feed, sacks, and premiums:

Vermont Milk Production Costs: 1916-1917.—Story and Tubbs in a report¹⁰⁹ of 212 Vermont dairy farms studied during the year of May 1, 1916, to April 30, 1917, found the net cost per gallon, f.o.b. station, to be 19.1¢. The average feed amounted to:

	POUNDS
Grain.....	1,240
Silage.....	5,440
Other succulents.....	400
Hay.....	3,500
Pasturage.....	(provided, but amount not stated)

Average production of 5,328 lb.

Total gross cost per cow per year amounted to \$136.11, to which could be credited increased inventory value, manure, calves, hides, and feed bags, totaling \$24.25. The gross costs were divided into:

	PER CENT
Feed.....	49
Labor.....	26
Overhead.....	25

A blank for use in studying cost of milk production is included.

California Milk Production Costs: 1916-17.—Summaries of estimates furnished by 36 California dairymen supplying milk to the cities around San Francisco Bay, reported by Elwood Mead in Circular 175 (Oct., 1917) by the California Agricultural Experiment Station, indicates a cost per gallon delivered of

16.23¢ in 1916
22.7 ¢ in 1917

Some of the increase is shown in the increased costs of feeds which average 38.2 per cent greater in 1917 than in 1916.

Findings for southern and central California show a range in costs of from 16 to 21¢ per gallon in 1917.

Minnesota Milk Production Costs: 1908-1917.—Peck and Boss in a 36-page bulletin¹¹⁰ outline the factors of cost entering into the production of milk, and report findings on a total of 1,304 cows studied by means of three statistical routes in Minnesota covering periods from 1908 to 1916.

Their findings show the net cost of milk to be:

Locality	Net cost per gallon, cents	Pounds of milk pro- duced annually per cow
Northfield.....	20.8	5,540
Halstead.....	21.7	4,849
Cokato.....	20.9	4,944

The total gross cost per cow and the percentage of feed, labor, and other items was found to be:

Locality	Gross cost per cow	Percentage of gross cost			Value of credits
		Feed	Labor	Other costs	
Northfield.....	\$159.43	47	26	27	\$25.00
Halstead.....	147.83	51	23	26	25.00
Cokato.....	145.43	48	25	27	25.00

The amount of animal labor to care for a cow was found to be:

Locality	Annually	
	Man-hours	Horse-hours
Northfield.....	145	40
Halstead.....	160	17
Cokato.....	132	34

The feed requirements per cow were found to be:

	Northfield	Halstead	Cokato
Grain, pounds.....	1,058	866	1,119
Roughage, pounds.....	3,917	4,843	3,972
Silage, pounds.....	4,020	2,993	177
Pasture, days.....	167	139	4,944

Missouri Milk Production Costs: 1916-17-18.—As a result of studying Missouri dairy farms in furnishing milk, 49 to St. Louis, 23 to St. Joseph, and 29 to Kansas City, the net cost per gallon of milk was reported¹¹¹ to be:

Area	Number cows	Period covered by study	Net cost per gallon, cents	Average product per cow, pounds
St. Louis.....	1,045	Dec. 1, 1916 to Dec. 1, 1917	31.99	5,380
St. Joseph.....	749	Jan. 1, 1917 to Jan. 1, 1918	35.42	5,950
Kansas City.....	780	Jan. 1, 1917 to Jan. 1, 1918	25.50	5,625

Total gross costs of keeping a cow were found to be:

Area	Gross annual cost of keeping a cow	Percentages of cost			Amount of annual credit
		Feed	Labor	Other items	
St. Louis.....	\$208.99	46	21	33	\$12.13
St. Joseph.....	230.88	53	26	21	12.33
Kansas City.....	175.43	52	28	20	17.39

Feeds required to keep a cow a year amounted to:

Feed	Area		
	St. Louis	St. Joseph	Kansas City
Grain, pounds.....	1,607	4,369	
Roughage, pounds.....	2,480	4,000	1,627 (a)
Silage, pounds.....	17,120	3,900	3,400 (a)
Fodder.....	5 shocks	1 shock	5,560
Pasture.....	Stated in money values		

(a) Calculated from other data.

The amount of labor per cow per year:

Area	Man-hours	Horse-hours
St. Louis.....	166	97
St. Joseph.....	246	140
Kansas City.....	200	68

For delivering milk direct to St. Louis customers, an average of nine dairies, totaling 141 cows, resulted in annual labor requirements of 20,674 man-hours and 23,959 horse-hours.

The figures of gross cost are based upon the working herd, for costs of feed at market prices minus the cost of hauling; labor; purchases of cattle; death of cattle; veterinary fees; breeding fees, if paid; bedding, interest, taxes and insurance on cattle, real estate, equipment; depreciation of real estate and equipment; rent; repairs; ice; salt and stock food; feed grinding; power and fuel; express. Miscellaneous credits consist of manure, cattle sold, feed sacks, hides, increase in inventory. Ten per cent of net cost is added for managerial ability and risk.

Cost of Keeping Dairy Cows: New Hampshire, Massachusetts, Connecticut.—The annual gross cost of keeping a cow, the value of credits other than milk, and the calculated cost per gallon of milk, were found to be:

Area	Year	Annual gross cost of keeping cow	Value of credits	Net cost per gallon of milk, cents
New Hampshire ¹¹³	1913	\$150.02	\$15.00	17
Massachusetts ¹¹³	1913	162.39	17.00	20
Connecticut ¹¹⁴	1912	147.73	18.00	16.7

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New York Milk Production Costs: 1912-1913.—New York investigators found¹¹⁵ the cost of keeping dairy cows during 1912 and 1913 to total:

	Per cattle unit	
	1912	1913
Grade herds.....	\$81.69	\$130.90
Pure bred herds.....	92.01	139.90

On segregating and averaging the various costs, the percentages were worked out as follows:

	PER CENT
Forage.....	16
Bedding.....	2
Silage.....	14
Grain.....	26
Pasture.....	4
Veterinary.....	*
Man labor.....	20
Horse labor.....	3.5
Equipment labor.....	*
Use of buildings.....	3.5
Interest.....	6
Miscellaneous.....	4

*Less than 1 per cent.

The average quantities of feed given the herds, the amount of labor required for their care, and the amount of milk produced were found to be:

TABLE 204.—AVERAGE FEED USED, LABOR REQUIRED, AND MILK PRODUCED, DAIRYING—NEW YORK

	1912		1913	
	Grade cows	Pure-breds	Grade cows	Pure-bred
Pounds of straw for feed and bedding per cattle unit.....	617	160	779	798
Pounds of silage per cattle unit.....	6,152 (a)	10,320	6,737	6,791
Pounds of other forage per cattle unit.....	1,865	2,800	3,190	3,216
Pounds of grain per cattle unit.....	1,313	2,660	1,551	2,339
Man hours per cattle unit.....	117	130	116	161
Horse hours per cattle unit.....	13	19	19	23
Pounds of milk per cow.....			7,926 (b)	8,222 (c)

(a) One farm did not feed silage and was omitted from this average.

(b) Average for 13 of 17 herds.

(c) Average for two out of five herds.

Indiana Milk Production Costs: 1915-1917.—A 2-year study of the cost of milk production, undertaken cooperatively by the United States Dairy Division and Purdue University, on a number of dairy farms in northwestern Indiana, resulted in figures on the requirements for producing 100 lb. of milk in winter and likewise in summer. To give permanent value to the results, these requirements were determined in pounds of feed, hours of labor, etc.

In the summer months the requirements for 100 lb. of milk were found to be: Concentrates, 20 lb.; dry roughage, 27.4 lb.; silage and other succulent roughage, 60.1 lb.; hauling and grinding concentrates, \$0.014; pasture, 0.04 acres; human labor, 2.2 hr.; horse labor, 0.2 hr.; overhead and other costs, \$0.393.

In the winter months the requirements for production amounted to: Concentrates, 38.6 lb.; dry roughage, 66.8 lb.; silage and other succulent roughage, 147.6 lb.; hauling and grinding concentrates, \$0.03; bedding, 20.3 lb.; human labor, 2.5 hr.; horse labor, 0.3 hr.; overhead and other costs, \$0.385.

While the gross cost of producing milk is shown to be considerably higher in winter than in summer, the figures obtained in this investigation show that the *net* cost of producing 100 lb. of milk from November to April was only 1.8 per cent higher than the cost from May to October, inclusive, and that the total cost varied only slightly from month to month within each of these seasons. This small difference between net winter cost and net summer cost was found to be largely due to the greater credit allowed for manure during the winter season.

The price received for the milk, however, fluctuated sharply from month to month.

Further details on requirements for milk production, including such factors as cost of keeping a cow for one year, cost of keeping a bull, proportion of work performed by each class of labor, percentage relation of various factors in the cost of production, etc., are presented.¹¹⁶

Illinois Milk Production Studies: 1914-16.—Data collected by detailed cost accounting based on 18 farms producing wholesale market milk, for the years 1914-15, 1915-16, cover 407 cows, 19 bulls, and 234 young stock. The findings¹¹⁷ show the average cost of producing 100 lb. of milk to be \$1.71 for the year, \$2.00 for the 6 winter months, and \$1.30 for the 6 summer months. The monthly variation ranged from 94¢ to 2.14¢. The study emphasizes the importance of ample pasture and suggests a fluctuating price for the year adjusted to farmers' costs of production.

Given in terms of quantity it was found that the cow cost of 100 lb. of milk produced amounted to:

	AVERAGE FOR YEAR
Man labor	2.29 hr.
Feed	
Grain	32.4 lb.
Hay	36.5 lb.
Other forage.....	25.9 lb.
Silage.....	154.0 lb.
Percentage that feed and labor form of net cost	77.8 per cent.

Reference to Outline for Conducting Cost of Milk Production Studies.

A set of carefully prepared forms with directions for use in determining the farm cost of producing milk can be found in a publication of Cornell University, entitled "Calculating the Cost of Milk Production."¹¹⁸ The publication discusses charges or costs segregated into feed, concentrates, succulents, dry forage, pasture; bedding; labor—man and horse; use of buildings; use of equipment; depreciation of cows; interest; bull service; miscellaneous charges, with methods of determining. Credits or returns involve milk and its products used and sold, calves, hides, manure, and miscellaneous returns. Details of analyzing the records and certain tables of data complete a presentation for value indetermining or checking up figures and methods having to do with costs of milk production.

Miscellaneous Costs

Costs of Clearing Land: Minnesota, Michigan, Wisconsin: Reported 1914.—With labor at \$1.75 to \$2.00 the cost of clearing land originally forested in the Lake States of Minnesota, Michigan, and Wisconsin, ranged from \$5.99 to \$86.00 per acre, although mostly about \$25.00 per acre, the cost being influenced by the number and variety of the stumps, the soil, the method used, and the efficiency of the men and equipment. The cost per stump ranged from 25 to 86¢ although usually running from 35¢ to 70¢.¹¹⁹

Cost of Tile Drainage: Ohio: 1910-11.—An Ohio circular¹²⁰ gives an idea of the cost of tile draining. Rates are here omitted where quantities are given. Figures are averaged for the 3 years reported.

TABLE 205.—COSTS OF TILE DRAINAGE—OHIO

Per rod	Man labor hours	Horse labor hours	Money figures
Hauling tile.....	0.05	0.11	0.019
Trenching and laying tile by hand.	1.5		0.376
Filling ditches.....	0.12	0.12	0.030
Other equipment costs.....			0.004
Cost of tile.....			0.217
Overhead charges.....			0.023
Surveying and plotting drains.....			0.016
			0.685

Labor Requirements in Connection With Live Stock.—Studies conducted in different parts of the country give findings as shown in the next table concerning man and horse labor necessary to care of live stock:

TABLE 206.—LABOR REQUIREMENTS IN CONNECTION WITH LIVE STOCK

Kind of stock	Labor requirements annually	
	Man-days	Horse-days
Stallion or jack.....	15.0	1.0
Brood mare or jennet.....	5.0	0.2
Dairy cow.....	11.0	2.0
Cattle, colts, horses, or mules running loose— each.....	2.0	0.1
Ewes—each.....	0.5	0.03
Brood sows, pigs to weaning, per litter.....	3.0	0.5
Shoats, each.....	0.5	0.1

Labor Requirements of Dairy Cows.—A number of studies have been conducted to note the amount of labor required annually in caring for dairy cows.

Missouri¹¹¹ found the annual labor per cow for dairies in the vicinity of St. Louis to amount to:

	St. Louis	
	Man-hours	Horse-hours
Milking and feeding.....	97	
Handling milk.....	17	12
Hauling milk.....	32	45
Miscellaneous dairy work.....	20	40
Total.....	166	97

Minnesota¹¹⁰ found hours of man and horse labor to be annually per cow:

Locality	Man-hours	Horse-hours
Northfield.....	145	40
Halstad.....	160	17
Cokato.....	132	34

The United States Department of Agriculture studying four farms⁵⁴ determined the annual labor requirements per cow to average over a period of 6 years:

Locality	Man-hours	Horse-hours
Wisconsin.....	214	33
Michigan.....	230	32
Pennsylvania.....	170	21
North Carolina.....	262	55

Labor Requirements of Work Horses.—*Missouri*¹²¹ found the labor requirements to care for a work horse annually to be:

Year	Man-hours	Horse-hours
1912-13	71.0	6.3
1914	81.7	12.4
1915	79.5	4.1
Average.....	78.4	7.6

Labor Requirements of Work Horses, Illinois, Ohio and New York: 1909. The United States Department of Agriculture¹²² in a study of costs of keeping farm horses determined the annual labor requirements to be for selected Illinois, Ohio and New York farms per horse:

Locality	Man-hours	Horse-hours
Illinois.....	85.2	13.1
Ohio.....	164.6	8.2
New York.....	127.3	8.5

A study of the 316 horses on these 27 farms resulted in an itemized summary of average annual costs and credits per horse as follows:

TABLE 207.—COST OF KEEPING WORK HORSES—ILLINOIS, OHIO AND NEW YORK
(gross costs)

Item	Illinois (154 horses)		Ohio (72 horses)		New York (90 horses)	
	Cost	Per cent	Cost	Per cent	Cost	Per cent
Feed and bedding*.....	\$ 68.75	65.0	\$ 76.86	58.8	\$ 91.25	57.1
Labor.....	13.99	13.2	27.48	21.0	22.09	13.8
Interest.....	7.90	7.4	8.66	6.6	9.43	5.9
Stabling.....	4.95	4.7	7.18	5.5	12.98	8.1
Use of equipment.....	3.82	3.6	5.00	3.8	5.85	3.7
Shoeing.....	0.86	0.8	2.35	1.8	4.56	2.9
Depreciation.....	3.46	3.3	.....	.....	11.56	7.2
Net loss on colts.....	0.04	.....	1.24	1.0	.....	.....
Miscellaneous.....	2.12	2.0	1.90	1.5	2.09	1.3
Total.....	\$105.89	100.0	\$130.67	100.0	\$159.81	100.0

*The item of bedding is included with feed, because on many farms straw was used as a feed and as bedding, and owing to the fact that refuse from the manure was used for bedding, it was contrary to actual practice to attempt to make bedding a separate item.

CREDITS

Manure.....	\$5.24	\$ 8.20	\$13.36
Horse appreciation.....		2.10	
Colt profit.....			1.43
Total.....	\$5.24	\$10.30	\$14.79

NET COST

Cost of keeping, less credits.....	\$100.65	\$120.37	\$145.02
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The feed factor in costs of keeping work horses was divided into three classes, namely grain, roughage, and pasture. By states, these amounted to, in this study:¹²²

TABLE 208.—THE FEED FACTOR IN COSTS OF KEEPING WORK HORSES—ILLINOIS, OHIO AND NEW YORK

Kind of feed	Illinois (15 horses)		Ohio (72 horses)		New York (90 horses)	
	Average quantity per horse	Average cost per horse	Average quantity per horse	Average cost per horse	Average quantity per horse	Average per horse
Grain, pounds.....	4,500	\$44.93	3,347	\$40.71	2,691	\$38.55
Roughage (1), pounds.....	4,224	16.13	6,660	32.65	9,513	51.20
Pasture, days.....	148	7.69	68	3.50	34	1.50
Total.....		\$68.75		\$76.86		\$91.25

Labor costs amounted to:

	Man labor		Horse labor		Total cost
	Cost per hour, cents	Total cost	Cost per hour, cents	Total cost	
Illinois.....	15.0	\$12.74	13.0	\$1.25	\$13.99
Ohio.....	16.0	26.34	13.9	1.14	27.48
New York.....	16.4	20.88	14.2	1.21	22.09

The greatest item of cost in keeping a farm work horse is feed. The farmer who gets the maximum of work out of his horses, and at the same time has a low feed cost, is reasonably sure of obtaining horse labor at a low cost per hour. An illustration of this fact is brought out in the next table.

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TABLE 209.—RELATION OF WORK DONE TO THE TOTAL FEED COST OF WORK HORSES (27 farms, 316 horses)

	Illinois (154 horses average hours worked 1,053)			Ohio (72 horses average hours worked 867)			New York (90 horses average hours worked 1,020)		
	Average hours worked per horse	Average feed cost per horse	Average feed cost per hour	Average hours worked per horse	Average feed cost per horse	Average feed cost per hour	Average hours worked per horse	Average feed cost per horse	Average feed cost per hour
Above the average.....	1,200	\$75.20	\$0.063	1,055	\$89.00	\$0.084	1,172	\$97.30	\$0.084
Below the average.....	880	67.30	0.077	723	67.30	0.093	863	85.00	0.098
Difference.....	320	\$ 7.90	\$0.014	332	\$21.70	\$0.009	309	\$12.30	\$0.014

The cost per hour in these States was found to be:

TABLE 210.—COST OF HORSE LABOR PER HOUR

State	Average hours worked			Average net cost per horse	Average cost per hour worked
	Per year	Per week day	Per Sunday		
Illinois (154 horses).....	1,053	3.30	0.40	\$100.65	9.56
Ohio (72 horses).....	866	2.70	0.46	120.37	13.90
New York (90 horses)...	1,020	3.24	0.13	145.02	14.22

Cost of Work Horses, Missouri: 1912-15.—A Missouri study¹²¹ covering a total of 320 work horses on 59 farms studied during the years 1912-15 inclusive resulted in these findings:

AVERAGE ANNUAL COST OF KEEP OF A FARM WORK HORSE BASED ON THE FOUR-YEAR PERIOD, 1912-13-14-15

Number horses	Labor cost per head	Feed cost per head	Miscellaneous cost per head	Total cost per head (not including depreciation)
320	\$11.03 12.1 per cent	\$65.65 72.0 per cent	\$14.54 15.9 per cent	\$ 91.22 100.0 per cent

Classification of miscellaneous costs in caring for a work horse was:

	PER CENT
Building charge.....	28.1
Interest on investment.....	49.3
Taxes.....	4.2
Veterinary expert.....	3.2
Shoeing.....	4.6
Equipment charge.....	1.4
Incidentals.....	9.2
Total.....	100.0

Depreciation was not included in this study for the stated reason that this factor vary greatly.

This study showed average annual amount of labor per horse to be for 1912-13, 1,165 hr.; 1914, 1,164 hr., and 1915, 1,127 hr. The conclusion is drawn that from the viewpoint of economy in managing horse labor, experience on the farms studied, seems to warrant keeping sufficient work stock on a general farm of this region so that each horse will not have more than an average of 1,400 or 1,500 hr. of work, but it will not warrant a large enough supply to make the average amount of labor per horse less than 800 hr.

Costs of Work Horses, Minnesota: 1904.—Parker and Cooper,⁹⁴ studying the cost of producing Minnesota farm products, reported the cost of keeping work horses for the years 1904-1907. Their group findings are condensed in the table immediately below:

TABLE 211.—AVERAGE ANNUAL COST OF MAINTAINING A FARM WORK HORSE (MINNESOTA)

Item	Range in money costs	Average money costs	Per cent of each to entire cost
Interest on investment.....	\$ 3.24- 6.74	\$ 5.12	6.1
Depreciation.....	0.98-15.48	6.10	7.2
Harness.....	0.32- 3.64	1.70	2
Feed.....	37.69-75.03	54.84	65.3
Shoeing.....	0.10- 1.55	0.68	0.8
Labor.....	9.65-22.73	15.20	18.1
Miscellaneous expenses.....	0.18- 1.64	0.50	0.6
Totals.....		\$84.14	100.0

Costs of Work Horses, New York: 1912 and 1913.—Investigators¹¹⁵ find the cost of keeping a horse unit one year to be:

TABLE 212.—COSTS OF WORK HORSES—NEW YORK, 1912 AND 1913
(73.8 horse units in 1912, 189.8 horse units in 1913)

Item	1912		1913	
	Average cost per horse unit	Per cent of total cost	Average cost per horse unit	Per cent of total cost
Forage and bedding.....	\$42.96	27	\$40.90	28
Grain.....	57.72	36	46.39	32
Shoeing.....	4.24	3	4.87	3
Veterinary and medicine.....	2.00	1	0.69	1
Man labor.....	23.55	15	22.97	16
Equipment labor.....	0.82	1	0.67	1
Use of buildings.....	5.75	3	5.92	4
Interest.....	8.77	5	7.82	5
Miscellaneous.....	0.38		2.63	2
Depreciation.....	14.03	9	12.10	8
Total cost.....	\$160.22		\$144.96	
Manure.....	12.34		12.63	
Miscellaneous receipts.....	0.28		3.33	
Total manure and miscellaneous..	\$12.62		\$ 15.96	
Net cost.....	\$147.60		\$129.00	

Costs of Work Horses, Texas: 1914.—In Ellis County, Texas, the average annual cost of keeping work stock per head was found to be \$101.37.⁹ This cost was made up of feed, 82.2 per cent; interest, 10.6 per cent (at 8 per cent on an average valuation of \$135 per head); depreciation, 6 per cent; shoeing, 1 per cent and veterinary cost 2 per cent. No labor in caring for stock is included.

Cost of Work Horses, Colorado: 1910-13.—Colorado reports¹²⁴ the cost of maintaining horse labor averaged for the years 1910-13.

The costs were subdivided, showing the interest and depreciation on harness and on the barn in which the horses were quartered; the man labor performed for or on the horses; the horse labor for horses; hay, grain straw, grinding feed; chores; miscellaneous barn supplies; interest and depreciation on the horses themselves. Where the progeny increased in value this increase was deducted from the total of the itemized costs.

TABLE 213.—COSTS OF HORSE LABOR—COLORADO, 1910-13

Item	1910	1911	1912	1913	4-year Average
	Cost	Cost	Cost	Cost	
Interest and depreciation on harness.....	\$ 79.02	\$ 51.78	\$ 69.04	\$ 58.76	\$ 64.65
Interest and depreciation on horse barn.....	400.00	400.00	400.00	400.00	400.00
Man labor.....	97.60	82.11	90.80	126.60	99.28
Horse labor.....	23.40	17.60	30.28	38.11	27.35
Hay.....	734.84	825.57	620.04	688.08	717.13
Grain.....	808.90	1,108.70	803.87	916.59	909.51
Straw.....	71.21	62.26	84.14	93.50	77.78
Grinding.....	0.50	2.65	5.43		2.86
Chores.....	106.85	127.94	150.50	75.10	115.10
Supplies.....	326.55	108.55	202.90	300.45	234.61
Interest and depreciation on horses.....	446.00	446.00	382.00	386.00	415.00
Total cost per year.....	\$3,094.87	\$3,233.16	\$2,839.00	\$3,083.19	\$3,063.27
Less value of progeny increase.....					368.00
Net cost per year.....					\$2,695.27
Average number horse-hours.....					30,258
Cost per horse-hour.....					\$0.088

Machinery Costs. *Machinery Costs, Ohio: 1909.*—Studies in 1909 of 21 Ohio farms resulted in determination of machinery costs per acre and per year, as tabulated below:²³

TABLE 214.—COST PER ACRE AND PER YEAR OF MACHINERY ON OHIO FARMS

Kind of machine	Years in use	Depreciation		Repairs per year	Interest per year	Total cost per year	Acres worked per year
		Per year	Per cent				
Walking plow.....	9.6	\$0.69	5.1	\$0.71	\$0.53	\$1.93	27.1
Riding or gang plow.....	5.6	2.54	5.4	0.96	2.01	5.25	28.8
Harrow, spike.....	8.3	0.68	5.5	0.29	0.50	1.47	79.2
Harrow, spring.....	9.0	1.03	6.0	0.21	0.64	1.89	38.8
Harrow, disc.....	7.4	1.62	6.0	0.27	1.08	2.97	60.4
Roller.....	11.3	0.75	3.3	0.03	0.93	1.71	84.2
Planker or drag.....	6.5	0.24	8.0		0.11	0.35	45.4
Weeder.....	7.2	0.70	6.5		0.41	1.11	34.4
Manure spreader.....	3.2	9.30	8.3	1.58	5.11	16.29	
Corn planter.....	7.8	2.20	6.2	0.47	1.40	4.07	50.1
Cultivator, 1-horse.....	8.5	0.26	6.3	0.07	0.19	0.52	12.1
Cultivator, 2- or 3-horse....	7.9	1.57	6.3	0.34	0.95	2.86	69.7
Corn binder.....	6.3	8.48	8.0	1.60	4.14	14.26	38.5
Corn shocker.....	4.0	12.92	10.7	0.79	5.07	18.78	22.3
Grain binder.....	8.6	8.13	7.0	1.10	4.31	13.54	51.1
Grain drill.....	8.7	2.81	4.7	0.33	2.44	5.58	43.0
Fanning mill.....	9.3	0.76	3.7		0.88	1.64	
Hay loader.....	7.9	3.47	6.0	0.65	2.89	7.01	28.3
Mowing machine.....	7.8	2.56	6.1	0.93	1.65	5.14	49.1
Hay rake.....	8.5	1.11	5.8	0.26	0.75	2.12	38.8
Hay tedder.....	8.0	1.63	5.2	0.40	1.30	3.73	22.5
Wagon.....	11.5	3.00	4.8	1.20	2.35	6.55	
Corn shredder.....	3.0	43.17	9.1	0.98	21.56	65.71	
Ensilage cutter.....	6.3	6.32	5.7	0.83	4.72	11.87	
Corn sheller.....	11.5	0.38	3.9	0.04	0.39	0.81	-

Machinery Costs, New York: 1912-13.—Important special machinery costs were found to be for New York¹¹⁵ for horse implements, including harnesses and small tools:

TABLE 215.—MACHINERY COSTS—NEW YORK, 1912-13

Year	Number of farms	Investment in equipment per farm	Investment per crop acre	Annual cost	Per cent of average investment in annual cost	Cost per crop acre	Cost per horse-hour
1912	13	\$981.46	\$9.80	\$249.62	25.4	\$2.49	\$0.0503
1913	31	922.93	8.28	271.56	29.4	2.44	0.0513

The annual cost was distributed over:

TABLE 216.—DETAILS OF MACHINERY COSTS—NEW YORK, 1912-13

	1912	1913
	Per cent of total cost	Per cent of total cost
Depreciation.....	39	45
Cash repairs.....	16	14
Oil.....	1	1
Use of buildings.....	12	13
Interest.....	19	17
Man labor.....	8	7
Horse labor.....	2	1
Miscellaneous.....	3	2

Machinery Costs, New York: 1916.—Machinery costs in western New York were investigated by Mowry and reported in a Department of Agriculture bulletin.¹²⁵ The items of depreciation and repairs are here reduced to percentages, since costs are variable. Interest is omitted.

TABLE 217.—MACHINERY COSTS—NEW YORK—1916

Implement	Average days work per year	Life of implement		Acres covered		Average annual percentage of first cost for	
		Days of work	Years	Per year	Total	Depreciation	Repairs
Walking plow.....	19.2	224	11.7	32.9	384.9	8.6	20.4
Sulky plow.....	14.7	119	8.1	30.9	250.2	12.4	37.0
Spring-tooth harrow.....	6.6	73	11.0	71.1	782.1	9.2	50.0
Spike-tooth harrow.....	3.1	43	14.0	48.3	676.2	7.7	3.4
Disc harrow.....	4.2	54	13.0	35.2	457.6	7.0	1.4
Land roller.....	4.7	75	16.0	65.9	1054.4	6.6	2.0
Grain drill.....	4.6	76	16.4	46.3	759.3	6.0	1.4
Corn planter, 1-row.....	0.9	10	11.7	4.1	48.0	8.2	6.0
Corn planter, 2-row.....	0.8	9	11.0	8.2	91.3	8.2	4.1
Cultivator, 1-row.....	4.1	58	14.0	16.9	236.6	6.8	5.0
Cultivator, 2-row.....	5.6	70	12.5	39.3	491.3	7.9	3.1
Cabbage transplanter.....	3.4	43	12.8	12.5	160.0	6.3	2.5
Mower.....	3.1	46	14.8	28.0	414.4	5.6	4.2
Hay rake.....	2.6	37	14.5	43.0	623.5	4.3	1.3
Hay tedder.....	1.5	21	14.0	21.6	302.4	6.5	1.1
Bean harvester.....	2.3	29	12.9	16.9	218.0	6.8	4.1
Grain binder.....	3.4	53	15.4	35.2	542.1	7.0	1.4
Corn binder.....	3.7	40	10.8	21.1	227.9	8.4	1.7

Cost of Machinery, Texas: 1914.—In Ellis County, Texas, depreciation of machinery was found to be at the rate of 14 per cent.⁹

Cost of Machinery, Colorado: 1910-13.—In Colorado machine costs during 1910-1913 averaged in cost per acre of use:¹²⁴

TABLE 218.—MACHINERY COSTS—COLORADO

	Annual use, acres	Cost per acre
Plows and eveners.....	105	\$0.40
Drill.....	120	0.18
Harrows.....	172	0.02
Discs.....	31	0.26
Mowers.....	156	0.17
Wagons.....	258	0.01
Manure spreaders.....	64	2.20
Binders.....	85	0.96
Rakes.....	155	0.17
Cultivators.....	12	0.07

Machinery Costs, Minnesota: 1902-7.—Based on cash values of the time (1902-1907), Parker and Cooper found⁹⁴ the acreage cost of Minnesota machinery when made up of depreciation, and repairs, and interest on the average annual investment, divided by a figure of the amount of use, to be:

TABLE 219.—MACHINERY COSTS—MINNESOTA

Machinery	Average
Grain machinery:	
Binders.....	\$0.181
Reapers.....	0.171
Drills, seeders.....	0.075
Fanning mills.....	0.010
Grain tanks.....	0.011
Wagons, sleds, and racks.....	0.034
Corn machinery:	
Binders.....	0.826
Planters.....	0.087
Cultivators.....	0.155
Wagons, sleds, and racks.....	0.158
Hay machinery:	
Mowers.....	0.206
Rakes.....	0.085
Tedders.....	0.113
Loaders.....	0.151
Ropes, forks, etc.....	0.120
Wagons, sleds, and racks.....	0.059
All crop machinery:	
Plows.....	0.087
Harrows.....	0.017
Discs.....	0.089
Thrashing outfit.....	0.335

U. S. Hauling Costs: 1905-6.—Hauling costs vary with distance, commodity, size of load, size of team, time consumed in loading and unloading. Certain data¹²⁶ are available indicating something of the various factors. Details for various states may be consulted in the original source, as only summaries of selected items are extracted.

TABLE 220.—HAULING COSTS IN UNITED STATES—1905-06

Product	Miles to shipping point	Days for round trip	Average size of load
Apples.....	9.6	0.9	2,300
Barley.....	8.8	0.7	3,970
Beans.....	9.0	0.8	3,172
Corn.....	7.4	0.6	2,696
Cotton.....	11.8	1.0	1,702
Fruit (other than apples).....	11.6	1.1	2,181
Hay.....	8.3	0.7	2,786
Hogs (live).....	7.9	0.7	1,941
Oats.....	7.3	0.6	2,772
Potatoes.....	8.2	0.7	2,679
Rice.....	7.5	0.8	2,407
Tobacco.....	9.8	0.8	2,248
Vegetable (other than potatoes)...	9.8	0.8	1,852
Wheat.....	9.4	0.8	3,323
Wool.....	39.8	5.6	4,869

CHAPTER XX

MARKETING METHODS

Marketing is the goal of production. Farm management is therefore concerned not only with the production of crops, stock, or stock products, but with their disposal when ready to market. In the proper selling of farm products rests much of the profit-getting ability of the producer. A knowledge of marketing is therefore essential. The field is so broad, however, that most men who are concerned with both production and selling tend to concentrate on certain phases of marketing rather than to attempt an intimate knowledge of the entire field. Some of the fundamentals are not particularly difficult to understand; some of the complex relations where various channels of distribution and many consumers are involved require concentrated, intensive, and prolonged study. If to the acquisition of the necessary information concerning marketing methods is added a well developed ability to direct selling in ways that will help the farm business, the resulting combination goes far to insure successful returns.

In the limited space here available for marketing discussion, attention will be drawn to the simpler elements affecting the farm manager in his efforts to make his activities profitable. One's interest, coupled with opportunity, should impel far deeper investigation and the acquisition of marketing knowledge whenever experience shows the need of keener individual understanding concerning the best disposal of farm products. Earnest inquiry into market methods and conditions soon leads the investigator to realize—and with appreciation—that marketing vitally affects consumer as well as producer. Markets are found to be influenced of course by world-wide conditions, but also even by quite minor factors affecting supply and demand. A strike of feather pluckers may cause a drop in prices to poultry producers. A local weather condition may lessen a demand, as when a spell of cold causes watermelon sales to slacken.

Any local condition—*e.g.*, transportation difficulties, lack of competition among buyers, etc.—may have no far reaching effect, yet may spoil a season for individual farmers.

The several phases of marketing here discussed do not by any means exhaust the field. They serve merely to introduce the field of marketing as it affects farm managers, and to suggest the need of additional

individual study. The old adage that "he who makes two blades of grass grow where one grew before is a public benefactor" gives way under the application of business principles to farming to the idea that he who makes two blades grow when there is a market only for one, or at a cost for the two that leaves no profit, hurts not only himself but the entire farming business.

Imports and Exports as Guides to Conditions.—The import and export trade of the United States indicates broadly the status of the farming industry. But deductions from such figures are not valuable for local conditions. For instance, it may be cheaper for the Pacific Coast to buy Australian products shipped over-seas than New England goods shipped by rail; and conversely for the same instance it may pay New England farmers to ship to Europe over-seas rather than to meet the high freight rates to the Pacific seaboard or even to less distant interior points.

In general, deductions worth while can be drawn only when the difference between the amount of any product brought in and that sent out is rather large. Gauged over a period of years, it is evident that, if the exports maintain a high figure, we are producing more than we need; conversely, if the imports are great, we are bringing in more than we are producing.

Since a country exports when there is a big home crop or over-production, and imports when there is a scanty crop or under-production, figures of imports and exports are of considerable interest.

Let us take, as enlightening, the imports and exports of certain goods for the years 1917-18-19—ending June 30, 1919, although in this instance the influences of war conditions are to be recognized. The swing of exports and imports is so changeable, that new data accumulate rapidly and compel the alteration of previous deductions.¹²⁷

Fruit.—An increasing export, offset by some imports. Average imports \$25,000,000, average exports \$33,000,000. It is noteworthy that the United States annually imports products capable of being raised in her own borders, like almonds, walnuts, lemons, grapes, olives, figs, oranges, and even raisins, up to the value of \$16,500,000. Walnuts and almonds make up \$11,000,000 of the total; figs nearly \$1,000,000; lemons \$2,000,000; olives \$1,500,000.

Butter.—Butter exports and imports fluctuate greatly. Averaging the years 1917-1919, the exports exceeded imports by nearly \$9,000,000 annually.

Milk.—Principally condensed milk, exports exceeded imports by average of \$70,000,000 annually.

Cheese.—Imports exceeded exports, \$7,000,000.

Cereals.—Corn, oats, and wheat fluctuate greatly based on home production; average annually, 1917-1919: imports \$43,000,000; exports, \$400,000,000.

Sheep.—Tendency to stability in imports and increase in export trade.

Hogs (live).—No importations of importance (\$400,000) while exports amounted only to \$700,000. Mostly breeding animals imported.

Hogs (packing house product).—A yearly average export of \$500,000,000. No imports to speak of—less than \$1,000,000.

Eggs.—Exports exceed imports—by 22,000,000 dozen annually (1917-19).

The Effect Upon Exports of World War Conditions.—The effect of war conditions upon foreign markets is indicated in the following:

TABLE 221.—UNITED STATES EXPORTS COMPARED FOR 1912-14 AND 1917-19

Exports of	Increase in exports, average	
	1912-14	1917-19
Fruit (fresh and dried).....	\$ 28,000,000	\$ 35,000,000
Dairy products.....	3,000,000	86,000,000
Grain and grain products.....	166,000,000	718,000,000
Packing house products.....	160,000,000	676,000,000
Oils (vegetable).....	22,000,000	55,000,000
Rice and rice products.....	1,000,000	13,000,000
Vegetable (fresh and dried).....	7,000,000	22,000,000

Effect of Exports Upon Prices.—In a discussion of the fluctuation in exports of food, the federal Bureau of Markets states:¹³³

“A downward trend of American export trade in foodstuffs and an upward trend in domestic consumption marked the decade from 1900 to 1909. This trend was pointed out by economists as indicating that the United States would become less self-supporting as the increase in population outstripped the production of the principal foodstuffs; in other words, that this country would be an importer of food rather than an exporter.

“A halt to this downward tendency was brought about by the abnormal demands of war, though an upward trend in the exports of breadstuffs began in the 5-year immediate prewar period. During the war the export trade in some cases reached new high points. The exportation of foodstuffs is still being made in large quantities. Producers are now asking the questions, does the trade which developed during the war indicate a new era in American foreign agricultural trade? Or is the condition merely temporary—simply a halting of the downward tide evident before the war?

“During the decade from 1900 to 1909 the exports of breadstuffs, meats, and dairy products showed a general downward trend. Exports of the principal breadstuffs declined steadily from a high of 25,800,000,000 lb. during the fiscal year ending June 30, 1900, to 8,600,000,000 lb. in 1905. With a large carryover from the bumper crops of the preceding year, shipments to foreign countries in 1906 nearly doubled those of 1905. During the subsequent three years the exports continued the downward tendency. During this period, wheat formed about half the trade in 1900 and 1901. With the exception of 1905 and 1906 wheat formed the greater part of the export of breadstuffs.

"Both meat and dairy products showed a similar trend, downward from 1900 to 1905, followed by a sharp rise in 1906, and another steady decline to 1909.

"The 5-year immediate pre-war period 1910-14 shows a decided change in the foreign trade in breadstuffs. Wheat, corn, oats, rye, barley, and their products were exported in increasingly large quantities, a reaction that can not be attributed to war demands. This is generally explained as due to the increased industrialization of Europe, and her increasing dependence on the Americans for agricultural products.

"The outstanding feature during this immediate pre-war period is the steady advance in the exports of breadstuffs, although no new high levels were reached. In the last 2 years of this period, 1913 and 1914, wheat exports amounted to nearly 20 per cent of our total production.

During the war an enormous export trade in foodstuffs was built up. The average yearly exports of principal foodstuffs from the United States during the 5 years 1915 to 1919 were approximately double the average for the pre-war period 1909-14.

"The exports of breadstuffs rose steadily, reaching in 1915 the high point of 24,981,000,000 lb., or approximately as great an amount as was exported during the best pre-war years 1900 and 1901. The submarine menace and low wheat yields in 1916 and 1917 caused a sudden decline to 21,712,000,000 and 18,823,000,000 lb., respectively. The upward trend came again in 1918 and continued through 1919.

"The first indications of a return to normal conditions have been noticed during the first half of 1920. The trend has not yet set in; only the first glimmerings are visible. Among these factors are:

1. Definite efforts of foreign Governments to stimulate home production and to limit imports.
2. Inability of foreign nations to finance the purchase of foodstuffs.
3. Imports of foodstuffs from foreign countries.
4. Recovery of agriculture in foreign countries.

"Under the first two heads may be noted the action of the British ministry of food in holding cold-storage meats at high prices. The Board of Trade expected that the normal consumption of meat would be reached in spite of the high prices. Nevertheless, the action had the effect of reducing the consumption and stimulating home production. Efforts were also made to increase the domestic production of wheat.

"Both France and Italy have restricted the imports of wheat, another indication that normal conditions are expected.

"The exportation of foreign foodstuffs to the United States during recent months, though small, indicates that Europe is beginning to pass its maximum demand.

"Several cargoes of butter and more than 100,000 sacks of potatoes have come from Denmark. Australian and New Zealand mutton has been diverted from British ports to the United States. Egyptian onions are being imported in pre-war quantities. Roumania is selling large quantities of grain to Italy and other European States.

"All indications point to a marked recovery of European agriculture, with the possible exception of some of the Balkan States and Russia. It is probable, therefore, that after the 1920 harvest Europe will be back almost to pre-war conditions, so far as the domestic production of foodstuffs is concerned.

"There need be no alarm as to the ability of the United States to hold its own in foreign trade in agricultural products. Even before the Great War the exports of breadstuffs were increasing each year. The progress of American agriculture during the war is but an indication of what can be done in the future, if prices of agricultural products are high enough to enable the American farmer to compete with other industries for labor."

Distribution Terms.—Various terms are employed to designate the different agencies through whose hands goods pass on their way from producer to consumer.

Commission Men.—The commission man acquires no title to the goods, but sells them for the account of the owner, who is called the consignor. The commission man usually attends to all the details of the sale, including the physical handling of the goods and the collection of payment for them. In most cases the price is left to his discretion, and no confirmation of sale is necessary.

The remuneration of the commission house is ordinarily an agreed percentage of the selling price. This varies from 2.5 to 10 per cent.

The Broker.—Is essentially a representative of the seller or of the buyer. Does not do business in his own name. He furnishes his principal with information as to market conditions. Often attends to collection of payments and negotiates the sale for a per cent of the sale—2.5 to 12 per cent of gross sales being usually charged as his commission. Brokers incline to deal in large quantities, in car lots or larger.

The Wholesale Merchant.—Is a middle man who buys outright in order to sell again. His profits depend on the difference between the buying and selling prices. He therefore assumes the speculative risks of the market. Much of his selling is to jobbers.

The Jobber.—The jobber is a merchant who deals directly with the retailer.

The Speculator.—The speculator might be regarded as a variety of merchant since he buys to sell again. However, he does not aid in the movement of goods but depends for his profits on a change in market conditions.

The terms which have just been defined relate to the form of dealing or method of doing business. There are a number of other terms that relate to the position of some of these dealers in the markets.

The Country Collector.—A dealer who visits farms, stores, etc., for the purpose of gathering a sufficient quantity of goods for shipment. Considerable amounts of supplies are handled in this way. Such a dealer is, however, of most importance to the small producer.

The Shipper.—A dealer an important part of whose business is the sending of goods from the growing district to the wholesale markets. He usually has the equipment for proper packing of goods, a large enough business to permit of carload lots, familiarity with the business methods of transportation companies, market connections, or knowledge of markets so that sales can readily be made.

The Receiver.—An agency of this sort is one that devotes a large part of its time and attention to handling goods sent in by distant shippers. Such concerns are generally large and number the smaller wholesale dealers among their customers.

Exchanges.—There are two kinds of exchanges. One of these serves as a connection between local growers and dealers in distant markets; the other is an association of dealers in a market city which furnishes facilities for carrying on trade and serves its members in various other ways, but does not itself engage in trading.

Packers.—Packers is a term used to designate almost any concern a large part of whose business is to put up food products in packages; canneries, dried fruit packing houses, etc.

Distributors.—The primary function of the distributor is to direct the shipment of products from the growing districts to the best markets. This is handled by associations, dealers, etc., but in all cases it requires a full knowledge of marketing conditions.

Market Trend.—A dealer may handle goods on more than one basis, and in fact does so very frequently. The commission houses now trade to a greater extent as merchants than as commission men; indeed, the trend of business seems to be in this direction.

One of the reasons for the decline in the commission business and for its unpopularity among dealers is the fact that the consignors are only too likely to suspect that they have been victims of unfair dealing when results are not satisfactory. Some of the dealers who voice this feeling frankly admit that the practices of the business have made grounds for such suspicions.

Probably the chief reason for the development of the merchant at the expense of the commission man is that the former represents a more logical and economical organization in marketing. Most producers favor selling for cash f.o.b. point of shipment, for when this is done the matter is settled. They say that they prefer to avoid the risk attendant upon consigning to the commission man or upon shipping to the merchant subject to inspection at destination. However, the number of producers who send their products to the merchant subject to inspection is greater than that of the producers sending in on commission.

Dealers who are doing business on both bases often refuse to buy, so that the producer still has the option of consigning on commission.

The commission men claim that much of the talk against them is due to the ignorance of the shippers of marketing conditions.

Where commission men buy on their own account goods consigned to them, there is great risk of their not paying the highest price to the consignor. They will buy on a rising market only.

Again, if the goods are being sold from the car but not fast enough to avoid demurrage, then the dealer may himself purchase the remainder of the carload to save the expense of demurrage, and take the chance of selling without a loss. If he does sell for a loss he usually buys the next lot at a price that makes up for it. However, such buying up of small lots

remaining makes it possible for the commission man to make remittance earlier to the consignor.

Commission men as well as others state that one may not do both a commission business and a merchandise business properly, because if for example a dealer buys a consignment of lettuce and receives another consignment on commission, he naturally tries to sell his own first, while if any loss occurs it will be some of the consigned goods at the cost of the producer.

How Farm Products are Marketed

An understanding of how a given farm product is marketed is a first step in becoming acquainted with the marketing end of the farming business. This information should cover not only the various wholesale and retail methods but, as well, familiarity with consumers' demands, with transportation facilities, and with ordinary business procedure covering insurance, responsibility, and laws governing the distribution and disposal of farm products. Examples of influences are given below.

Influence of Buyers.—The demand by buyers for a 150- to 225-lb. hog is traceable to a need for a porker which, when placed on the retail butcher's block, will cut up into sizes and shapes suitable for the retail trade; the desire for small packages of fruit in certain markets reflects a lack of storage room in the living quarters of consumers; insistence that wheat be free from sweet clover reflects the refusal by consumers to use flour possessing the characteristic pungent odor which so few as a dozen seeds of sweet clover in 100 lb. of wheat are capable of imparting.

Influence of Transportation.—To be posted about transportation means studying the economy of routing by water as compared with rail, the use of motor trucks, the relative profitableness of different markets after deducting costs of transportation, handling charges, and spoilage.

Influence of Legal Restrictions.—The legal aspect is well illustrated by municipal statutes governing the conditions under which market milk shall be produced, transported, and distributed; State laws defining market containers, especially those used in the handling of fresh fruit; laws controlling the shipping in of products from States known to be infested with dangerous fungi or insect pests or contagious animal diseases.

Study the Important Products First.—Gaining acquaintance with marketing methods should begin with a study of those products of greatest importance to the investigator. There are so many farm products, and so wide a range in local practices, that individual study can best start with a limited number of products and of markets.

Marketing Methods Vary.—Methods of marketing widely differing products for given localities are illustrated below. Their chief value lies in showing something of the scope that a study of markets should cover.

Examples of Marketing Methods. Marketing Live Stock via the Stockyards¹²⁹
as an Example of Live stock Marketing Methods.—Stockyards are simply clearing houses for the transfer of live stock from producers to consumers. They are trade mechanisms of great efficiency, and have become an important factor in the growth of the live stock industry in the United States. Under the stockyard system the producer loads his stock on cars, ships to the stockyards, and offers it for sale. Here it is purchased by some firm or butcher, and a bill of sale, with commission deducted, is sent to the shipper.

Founding.—Prior to 1865, Chicago had several stock yards of minor importance and located in different sections of the city. In 1865, a certain John B. Sherman organized the Union Stock Yard and Transit Co., which purchased 320 acres in the city and opened the present Union Stock Yards, thus laying the basis for a greater live stock trade at Chicago. In 1876 the Union Stock Yards comprised 476 cattle yards, 675 covered hog and sheep pens, 375 chutes, 15 corn cribs, and 10 hay barns. The company owned and operated 20 miles of railway, put down several miles of macadamized streets and alleys, and installed a drainage system. The market could then accommodate at one time 20,000 cattle, 100,000 hogs, 15,000 sheep, and 1,000 horses—in all 136,000. About 100 commission firms were then doing business.

To-day the Union Stock Yard and Transit Co. receives, unloads, yards, feeds, waters, weighs, and delivers or reships live stock, but neither buys, sells nor slaughters. It is a great transportation and marketing corporation, which connects all the 26 railroad systems entering Chicago with the Union Stock Yards, and provides unloading platforms, chutes, pens, buildings, and all necessary facilities for doing an immense daily business in handling live animals, but takes no part in the transactions of the market. The Chicago yards now occupy 500 acres, 450 of them paved, 25 miles of streets, 300 of railways. It embraces 13,000 pens, 8,500 double-decked and covered, 725 chutes, 25,000 gates, 25 miles of watering trough, 450 commission and other offices. The water system has a reservoir holding 10,000,000 gal., and the pumps have a daily capacity of 8,000,000 gal.

Separate accommodations are provided for each class of animal; sheep and hogs are kept in pens of two or more stories each, cattle occupy open pens holding from one to several carloads. These yards would hold at one time 75,000 cattle, 125,000 sheep, 50,000 hogs, and 6,000 horses and mules. Fifty thousand people earn a living at stock yards and packing plants, and 250,000 of Chicago's population are more or less dependent on the live stock industry. When unloaded, the stock is taken in charge by some one of the many commission firms who sell to the packer, shipper, speculator, or feeder, and remit the proceeds to the consignor. Prices established on this leading market form the basis of values for live stock at other markets and throughout the country.

Federal Inspection.—Federal inspection is rigid and includes live animals, carcasses, and packing house products. Nothing has done more to instill confidence in packers' meats than has the rigid government inspection. Packers' losses are frequently heavy due because of this inspection, mainly on account of tuberculosis.

Cost.—Yardage at Chicago is 30¢ per head for cattle, 20¢ for calves. Hay is \$40 per ton. Commission charges for selling cattle at Chicago are as follows: Cattle in car lots, 70¢ per head; minimum per car \$14, maximum \$18. Calves in car lots 30¢ per head; single-deck cars, minimum \$14, maximum \$18; double-deck, minimum \$20, maximum \$23; less than 15 cattle in one car, \$1 per head; less than 23 calves in one car, 50¢ per head.

Marketing Hogs in Illinois¹³⁰ as a Second Example of Live Stock Marketing Methods.—There are two distinct methods of marketing hogs in the State of Illinois—through local shippers and through cooperative live stock shipping associations.

Under the former method—a practice that has prevailed over a long period—the local stock buyer goes direct to the farm and purchases the hogs. The hogs may

be weighed on the farm of the seller and pass directly into the hands of the buyer, or the seller may take the hogs to a local shipping point for weighing and delivery to the buyer. The seller severs all claims of ownership and absolves himself from all risks and responsibility upon receipt of payment.

The buyer or shipper then consigns the hogs to a commission firm in the central market. The commission firm directs the sale of the shipment, receives all the money therefor, and pays the same to the shipper less its commission and all other expenses incurred.

The disadvantages of this system of marketing from the producer's standpoint are that the price received for the hogs is oftentimes determined quite as much by the bargaining ability of the buyer as by the quality of the hogs, while the buyer purchases on as wide a margin as possible, to protect himself as far as he can against market fluctuations, shrinkage, etc.

Obviously the buyer should be compensated for the risks he takes, but oftentimes the margin asked and frequently obtained is too wide. Evidences of this fact have prompted producers to seek remedial measures. And out of this situation has developed the second method of marketing hogs, namely, cooperative shipping associations.

These organizations, as the name denotes, are cooperative in character and the membership is composed of producers who bind themselves together under a constitution and by-laws to do their own marketing in a collective way. Right to membership carries with it usually the payment of a small membership fee of from one to two dollars.

The management of the association is under the control of a board of directors elected from the membership, which has the power to do all things necessary for the welfare of the association. The association elects a president, a vice-president, a secretary-treasurer, and a manager to look after the shipments.

The most responsible positions in the association are those of secretary-treasurer and of manager. The secretary-treasurer keeps a record of all the proceedings of the association and of the board of directors. He acts as correspondent for the association in such matters as pertain to its business not otherwise assigned to the manager. As treasurer he keeps a record of all the membership dues, receives and holds all funds coming to the association and disburses or invests such money under direction of the board of directors. Records and accounts of the association are open at all times to the inspection of the members.

The duties of the manager are rather heavy. All who desire to ship stock in the association report to the manager the kind of stock, number, and approximate weight of each. When the stock is ready for shipment the manager orders a car, notifies each party having stock listed, and designates the time and place for loading. He is at the yard on the day of shipment, receives the stock brought in by the farmers, weighs, marks, and loads the same on the car. The usual practice followed in marking is to use either paint or clippers or both, and as a rule the stock of the member having the largest shipment is not marked.

In addition to the preceding duties, the manager directs the sale of all shipments, receives all moneys therefor, and pays the same to the shippers less his commission and all other expenses incurred in making the shipment. He furnishes a statement to each shipper, showing net weights, prices received, and expenses of shipment. He keeps on file a complete statement of settlement together with returns from the commission firms selling the live stock for the association.

As compensation for his services the manager usually receives 8¢ per 100 lb. of stock sold by him, taking net weights at the central market as a basis of settlement. The amount of this compensation is determined by the board of directors and varies according to the plan of the association. There are two general types of these asso-

ciations, those organized on the community or local basis and those on the county basis. In case the local shipper makes the shipment, the county manager receives approximately one-fourth of the usual commission, or 2¢ per 100 lb. of stock.

There is an additional charge of from 1 to 2¢ per 100 lb. set aside as a sinking fund to cover office and overhead expense; also another 3 to 5¢ as insurance against loss of animals either crippled or killed in shipment. The amounts of these additional charges may be lowered or raised at the discretion of the board of directors.

The other expenses, such as commission for selling, freight, yardage, etc. are prorated among the shippers. This expense, of course, varies with distance to market, etc., but in this state usually runs from 50 to 75¢ per 100 lb.

This system of marketing narrows the margin between market price and farm price and insures the producer a larger share of the consumer's dollar. It is growing rapidly in popularity and gives promise of replacing the other system altogether.

*Marketing Corn in the Corn Belt as an Example of Field Crop Marketing Methods.*¹³⁰ When the corn is first husked it is placed in slatted cribs. The corn at husking time ordinarily contains a rather high per cent of moisture and must have good ventilation in order that it may dry out.

The best type of slatted crib is commonly known as the double crib. That is, the cribs are built in pairs, usually about 10 ft. wide, with a driveway 8 or 10 ft. wide between them. The most common length is 32 ft., and they are ordinarily 10 ft. high from sill to eaves.

If 2½ cu. ft. of space is allowed per bushel, which is about right for corn before it is settled, then a pair of such cribs will hold approximately 2,500 bu. This is sufficient crib space for the average quarter-section farm. If there is a surplus of corn, it is piled on the ground for immediate use. Sometimes such piles are enclosed with woven wire or slat fencing. The fact that they are uncovered makes little difference during the winter months, as most of the snow will blow off. They should, however, be emptied before the spring rains come.

The major portion of the surplus corn is marketed during the winter months. It is run directly from the sheller into a box wagon, hauled to the local elevator, and dumped. Some of the country elevators make some effort to clean any surplus of chaff and dust from the corn before sending into the terminal markets. From the elevator, the corn is run directly into a box car and shipped to the terminals, as Kansas City or Omaha.

Many farmers use cooperative local elevators. By "cooperative" is meant that the stock holders are limited to one vote per man or as near to that as State Constitutions permit, that interest on stock is limited to current interest rate, and that the earnings of the company are paid out as patronage dividends to the men who furnish the grain that makes the profit possible.

All grain is bought outright by the elevator company at a reasonable margin and shipped to the terminal. The farmers use their own judgment as to the time when each will sell his grain. The price paid is of course regulated by the terminal market price.

In addition to the cooperative elevators there are many line elevators, that is, elevators operated along some line of railroad and owned either by some large company having central offices in one of the terminal markets, or by individuals.

*Marketing North Dakota Wheat*¹³¹ as a Second Example of Field Crop Marketing Methods.—The North Dakota farmer has several channels for marketing wheat. The largest amount of wheat is marketed at the local mill, because (a) the mill offers 1¢ more per bushel when sold in 500 bu. lots, (b) the mill does not figure dockage and grade as closely as do many elevators, since the average grade of wheat grown in that region is superior in milling qualities to that of the United States as a whole, and (c) the local mill frequently pays a few cents premium on extra good grades.

The cooperative elevators and the privately owned elevators receive a considerable amount of wheat, especially in years when the grade of wheat is poor. At other times wheat is exchanged at the cooperative elevator for coal, since the elevator is often the principal coal distributing agency of the district.

The local elevators have several routes of marketing wheat. A great deal is marketed at local mills, when there is but a limited amount of grain coming in and at times when the terminal markets are filled.

Grain shipped out all goes to the markets at Minneapolis, Duluth, or Superior. It makes no essential difference since the freight is the same and their market prices usually range pretty nearly even. Minneapolis receives the bulk of the shipments of hard wheats, probably due to the momentum of habit because it is the largest market. Duluth receives the bulk of the durum wheats, which are mostly shipped by way of the Great Lakes to Spain or Italy to be used in the manufacture of macaroni. Minneapolis at times has durum quotations above those of Duluth, but this affects only the highest grades of durum wheat which are in demand for the manufacture of cereal breakfast foods by the Minneapolis manufacturers. This deceives a good many inexperienced shippers, so that the Minneapolis market receives some criticism not really deserved.

The grading of grain at the local elevators is a comparatively simple process on account of the small quantities in which it is brought. Each load is sampled before it is dumped. The sampling is done either by means of a probe or by catching samples in a pan while it is dumped. The sample is then cleaned by a small machine and the dockage determined. A standard measure of the clean grain is then weighed and the test weight per bushel determined.

At the terminal markets a much different system is used on account of the volume of business and the need for much more scientific work. The samples are taken by a sampler at a point some distance from the terminal market. The sampler is a government official who has the right to break the seal of the car. A sample is made up by taking small quantities of grain from different parts of the car and mixing these into a composite from which a small representative amount is drawn and expressed into the terminal market. The car is then resealed and sent on its way. The sample thus arrives ahead of the car. The sample is graded and usually sold even before the car is in the yards. This saves a good deal of time and congestion at the terminal market as the car can be immediately dumped or shipped on to some other point of consignment.

The sample on arriving is taken to a commission firm, and placed in a pan alongside of others on a long table. Each pan contains a card bearing the name of the shipper and the number of the car, and later the grade is placed upon it. This room is always lighted by windows on the north side, as direct sunlight affects determination of color, etc. The inspector, who is a government official and is not interested in the welfare of either buyer or shipper, then comes along and grades the grain. The buyers are then permitted to inspect the samples and make their bids, which are handled by the commission men. Until the federal inspection was begun, buying was done altogether on sample, the buyers basing their bids entirely upon their own judgment as to the quality of the different samples. During the war, with the set prices, there was always a variation of a few cents on the different grades, due to the differences in milling qualities which the grading system is finely graduated enough to cover. Hence, the present system, although it prevents the payment of less than the set price according to grade set by the inspector, can not prevent the paying of premiums on the various grades. The trade will probably eventually go back to the old buying-on-sample method, since it is just as fair; for under this method the grain always stands on its own merits, while the grading, being in the hands of several experienced buyers and handlers, is less liable to error than under inspection by one man no matter how efficient he is.

The cost of marketing wheat is very difficult to calculate definitely, since the variations for different times and localities are so great. The following table will show the total spread in marketing wheat from Valley City, North Dakota, to Minneapolis, Minnesota, giving the various charges and commissions throughout the process. It was taken from market prices on Feb. 25, 1919, and statistics received from J. H. Thompson, manager of the Farmers' Cooperative Elevator at Valley City.

COST OF MARKETING WHEAT PER BUSHEL

Price at Valley City	Freight	Weighing	Inspection	Com- mission	Margin at local elevator	Prices at Minne- apolis
\$2.09	\$0.102	\$0.01	\$0.01	\$0.015	\$0.018	\$2.235

If can be seen from the foregoing table that the total spread from Valley City to Minneapolis is 14.5¢.

Marketing California Oranges as an Example of Fruit Marketing Methods.—Proper marketing of citrus fruit begins with the picking. Oranges are carefully picked into a bag, carried by a broad strap over the shoulder. When filled, these bags, opening at the bottom to permit dumping without bruising, are gently emptied into 80-lb. lug boxes and these are stacked until a shipment is ready for delivery to a packing house. Care in handling is rigidly enforced, since bruises and abrasions will result in decay even from such apparently minor causes as cuts by picking clippers, stem punctures, fingernail scratches, gravel dents, or holes made by nails in boxes or by tree thorns.

At the packing house the fruit is weighed in and stacked, and the record credited to the grower. The fruit is cleaned of dust by passing through a series of fast revolving roller brushes, either with a spray of water directed upon the fruit or else dry cleaned. If smut is present, it is washed off by hand and the fruit then dried on racks, or else run through an air-blast drier.

Sorting follows cleaning, sizes being automatically determined by mechanical graders, while culls, off colored, irregular shaped, rough, or blemished fruit, are removed by expert sorters. The marketable grades—usually Fancy, Choice, and Standard—are then weighed on automatic machines where the proper proportion of each grade is credited to the owner. From here on the grower's identity is lost as the fruit now enters a general pool. Storage bins receive the fruit until packing commences. Packing is done by hand, into standard boxes having outside measurements of 12 by 12 by 26 in., divided by a partition into two parts, holding (according to grade) from 96 to 360 fruits, or usually 200 to 250, and weighing when packed about 73 lb. The boxes are packed over full so that it is necessary to force on the cover. A fancy label is then added to the end of the box, together with stencilled data giving variety, size of fruit, and packer's number. For shipping by freight the boxes are placed on end, two deep, seven tiers wide and 33 tiers long, making 642 boxes in a standard car. The car is then precooled by cold air, iced, taken to a central assembling point where trainloads are made up, and started for market. In cold weather the cars are lined with heavy paper prior to loading, and in hot weather re-iced en route if this becomes necessary.

Citrus growers avail themselves of three methods of marketing. Of the total lemon and orange output, 5 per cent is sold by independent methods of marketing by large growers able to put up packing houses of their own and sell according to their

own ideas. About 15 per cent is sold directly to retail merchants, hotels, speculators, etc. The remaining 82 per cent is sold by associations of growers organized for mutual benefit. In California, by far the most important channel for citrus distribution is the association known as the California Fruit Growers' Exchange, organized in 1895 to establish and maintain distributing and marketing facilities. This single agency handles 62 per cent of the total citrus output.

Thus, California growers utilizing present marketing facilities, have at hand the advantages of stabilized prices, standard pack, increased demand, and nearly uniform supply, the most satisfactory of modern transportation facilities, and an extraordinarily wide knowledge of market conditions.

Growers primarily interested in production usually leave their marketing to a local exchange which, operating first through the district exchange and finally through the central exchange (*i.e.*, the California Fruit Grower's Exchange), takes charge not only of finding markets, shipping, selling, collecting, making returns, but also, if requested, will assume the responsibility of picking the grower's fruit and of acting as buying agent for such supplies as sprays, fertilizers, fumigating materials, etc.

Marketing Agencies

Changing conditions bring new methods and means of marketing. Sometimes the change is in line with federal and state measures to assist farmers in the distribution of their products, as by the outright purchase of certain staples (*i.e.*, wheat, wool), by the establishing of markets, by extension of financial backing to reduce the need of hasty selling, or by spreading information concerning market conditions. Other times the change is traceable to farmers organizing for mutual benefit, or to their keeping more regularly in touch with market conditions, or to a change in kinds and amounts of production, or to a change in consumers' demands or to the introduction of substitutes (as coconut oil for butterfat).

Local and new conditions result in so many agencies for the marketing of farm products that a general presentation of what is available is valuable more to point out what to look for rather than for its completeness.

Ways of Marketing.—One or more of the agencies available to the individual producer are (1) commission men or dealers in market centers, to whom farmers can ship consignments direct; (2) itinerant representatives, on the one hand, of city dealers and commission men, who buy outright, usually on commission themselves, and ship on to their principals, and, on the other hand, local buyers who either give their whole time to the business—as for example, warehousemen, storekeepers, butchers, etc.—make buying from farmers a side issue; (3) farmers' markets—often being the so-called "free" or municipal markets, and usually being located in centers of population—where farmers can take their goods at stated hours to reserved locations and there retail them direct to consumers; (4) the main centers where farmers can personally deliver or dispose of their products to wholesale dealers for resale, or to wholesale buyers; (5) farmers' marketing associations supported by the producers and manned by officials answerable to the farmers. Some

of the associations are founded on the interest held in common by producers of a specialized product—*e.g.*, apples, hops, walnuts, prunes, alfalfa hay, dairy products, cotton—while others have their inception in the Farm Bureau or in the sharing by producers of a feeling of need for mutual support and aid. To continue the list, there are: (6) parcel post method of marketing direct to consumer; (7) intermediary agencies primarily engaged in putting unfinished farm products into shape for first sales by farmers, such as the cotton gins that separate lint from seed and bales for shipment, the fruit packing houses, the grain and bean cleaners, the wool scourers, the tanners (who may also be in a position to consummate sales of products put in shape for the farmer); (8) direct sales by and between farmers, as hay to dairymen, grain to poultrymen, horse feeds to truck gardeners and orchardmen, select seed to growers, pure bred stock to stockmen; (9) farm sales by farmers to consumers from stands erected along the road, or advertising for buyers, or casual inquiries of travelers, or creating a demand on the part of regular customers—this method being confined very largely to sale of poultry products, fruits, nuts, vegetables, and flowers, with an occasional exception in the cases of dairy products, meats, firewood, and bread or other kitchen products; (10) developing of individually owned or controlled ways of preparing farm products for sale to the ultimate consumer such as the packing of fruits in attractive and practical containers, the putting up of honey in combs or jars for immediate sale, or more elaborate means like establishing abattoirs, butcher shops, and butter and egg stalls or stores in the local market; (11) advance sale of products to be grown under contract for the buyer, as in raising of beets or cane for a sugar mill, growing seed crops for seedsmen, producing eggs for hatcheries, incubating chicks for poultry-men, raising fruit or vegetables for canneries, driers, and packing houses, planting long-staple cotton for tire manufacturers; (12) sales to local stores—grocery, meat shop, soda fountain, etc.

Choosing the Marketing Method.—Experience in marketing through the various agencies backed by adequate information and intelligent analysis of the advantages of and objections to the different methods available, is about the only way to work out a final choice. Some of the elements helping to a decision must rest on findings concerning (1) the degree of honesty of local or remote buyers,¹ (2) the extent of check upon consignments to brokers or commission men, (3) the strength of farmers' marketing organizations, (4) the shrewdness, business ability, and capacity of the producer, (5) the time and attention that the producer can give to the marketing end.

Farmers who are deficient in marketing knowledge or are easily influenced by the wiles of canny buyers, who lack the time to market properly, or who in any way feel a sense of incompetency in marketing,

had better select an established firm of good reputation, or rely upon a local representative possessing a name for fair dealing, or join a farmers' association, and so permit someone else to carry the responsibility of disposing of the product.

Farmers who have the time and qualifications to insure success in marketing will be rewarded by a part of the profits incident to the selling of their products, and will find much to interest them in carrying their output as far as possible on the way to the ultimate consumer.

The relative desirability of each of the various marketing methods in any community will depend on its (1) reliability, (2) facilities for caring for and disposing of products, (3) accessibility, (4) capacity for making cash advance or speedy returns, (5) marketing standards, gauged from the viewpoints of individual producer.

Inventory Method of Testing Marketing Agencies.—Using the inventory method of charting the advantages and objections of three or four different methods, as viewed by the producer, and presenting them merely for illustrative purposes, since local conditions must materially affect general statements, we find:

LOCAL BUYERS

Advantages

Close contact with purchaser.
Usually several buyers available, which creates competition.
Product can be kept on the farm if the price offered is not acceptable.
No expense for freight or commissions and other similar items if no sale is made.
Buyer takes risk of a market break.
Provides an idea of what market demands and how prices are going.
Closer culling at source means fewer rejections and discounts.

Objections

Reputation for close and sometimes dishonest dealing.
Question as to financial standing.
Possibility of buyers' limiting prices by mutual agreement among themselves.
Shyness of buyers to bid on a falling market.
Insistence of buyers sometimes a considerable bother to producer before product is ready if prices are climbing.
Loss of increased price if the market strengthens while product is en route.

MUNICIPAL OR FREE MARKETS

Advantages

Direct contact with consumers.
Somewhat higher prices obtainable.
An outlet for surplus product.
A way to utilize time to advantage which otherwise might be wasted.

Objections

Necessity of being located near large centers of population.
Time and expense involved in getting to and from market and in retailing goods.
Equipment needed for small sales, e.g., scales, bags, paper, twine.
Necessity of getting license, often involving small fee.
Time limits when markets are open.
Some customers unpleasant to serve.
Spoilage during hot weather.
Sacrifice sales when competition is heavy.
Difficulty of getting to market when roads are heavy.

PARCEL POST

Advantages

Cheap method of transporting.
Top prices to the producer.
Ready market for either a steady output or an unexpected surplus.
Appreciation of buyers.
Clean method of handling.
Freedom from bother with middleman.

Objections

Trouble in working up a market and getting orders.
Lack of uniformity in quantity and quality of product during different seasons resulting in an over-supply or under-supply at times and so necessitating explanation to buyers.
Time and energy required to obtain packages, prepare for shipping, and deliver when wanted.
Amount of correspondence entailed.
Necessity of maintaining high standards in all products put out.
Confined to a relatively small amount of farm products, e.g., eggs, butter, fruit, nuts, hence of limited value.



FIG. 91.—Typical municipal free market where farmers sell direct to townspeople, Fresno, California.

FARMERS' MARKETING ASSOCIATIONS

Advantages

Relegation of marketing duties to men directly responsible to the producer.
 Wholesale handling of products gives access to more and larger markets and permits diversion of carload lots en route.
 Reduction in operating expense because of elimination of duplication, volume of business, capacity loading of cars, etc.
 Opportunity to purchase supplies in wholesale quantities through same organization, thus affecting substantial savings.
 Ability to provide better facilities for the care of products, such as packing houses, warehouses.
 Financing of producers needing temporary help.
 Checking up on quality of output, *e.g.*, sugar beets, wheat, wool; and on weights and measurements.
 Grading and branding of products to conform to more uniform standards.
 Relieving the grower of certain responsibilities as of obtaining help in periods of stress and supplying efficient equipment (sprayers, harvesters, etc.). Obtaining of community backing, with its attendant moral, personal and financial support.
 Employment of expert salesmen possessing or able to establish reputation.
 Higher net returns.
 Relief from marketing responsibilities, thus permitting closer attention to farm operations.
 Less care and worry.
 Extension of markets by combined advertising.

Objections

Delay in making final returns to farmers.
 Difficulty in getting unselfish, unbiased support from producers.
 Difficult to find good managers.
 Attempts by independents to man the organization and to kill off young organizations.
 Complete or partial failure mutually to agree concerning policies between the working members and the directors.
 Danger of inability (1) to secure large enough percentage of the output to insure sufficient control, (2) to meet financial obligations on time, (3) obtain loyalty from employees, (4) to hold farmers in line.

Similar Tests of Other Agencies.—Setting forth the advantages of and objections to other marketing agencies or methods in the same way, to reflect local conditions and the individual producer's point of view, will help substantially to crystallize one's ideas concerning the relative desirability of each available outlet for one's products.

Present System of Marketing Is Sound.—In the writer's opinion, the present system of marketing farm products is essentially sound. It doesn't need to be torn all to pieces because in certain and perhaps even in numerous instances, there may be, and often is, ample room to improve details. An apparent objection to the present system is sometimes advanced to the effect that there is an enormous number of middlemen, and yet study is likely to show that the system, even though complicated, is actually required because there is a place for specialization in handling farm products on account of producers' needs and consumers' demands. Especially should beginners in marketing be careful not to put too much faith in cooperative associations, since in many instances the handling of marketing details by producers means simply a transferring of the expense of marketing rather than its elimination. Such procedure may under present conditions effect substantial savings and for this reason alone be entirely justified. In the long run any increased returns are equivalent to the net profits of former agencies which have been replaced, so that cooperative marketing by producers does not operate to eliminate all costs of distributing farm products. There are enough instances where cooperation has resulted in bettering ways of handling and standardization, and of actual saving, to warrant serious consideration and possible use of the method wherever conditions are favorable for associations.

Visiting the Markets

As much information as possible should be collected concerning the channels through which one's goods pass on their way to market, whether the crops be non-perishable staples like grain or hay or stock or the more perishable such as truck, fresh fruits, dairy and poultry products. For instance, it is good information to know how the grain exchanges are conducted, how grading is done, what rules govern Board members, how samples are shown, how quotations are determined, and to find out the place of "futures" and the bad features of manipulation of the market.

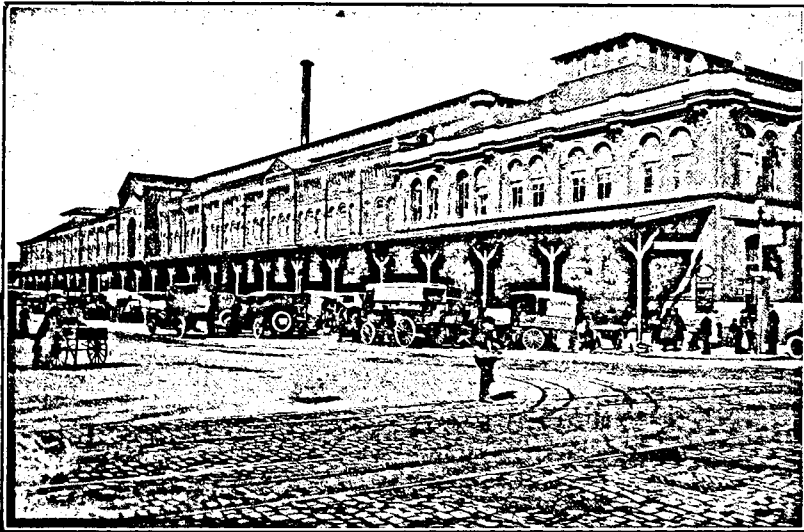


FIG. 92.—Center Market—Washington, D. C.

It is well worth while for the producer of butter, cheese, or eggs to visit personally his nearest Dairy Exchange, see it in action, and learn how it functions. It is not only worth while but even vital to visit the markets to which one is shipping perishable goods and is relying upon a commission man or broker to look out for the selling end. Altogether too few producers make it their business to visit their salesmen regularly and evince interest in the disposal of products.

Value of Visiting the Markets. *Selecting a Representative.*—From such a visit can come a better idea as to what firm shall be selected to act as local representative. If one sees goods bearing the name of shippers, known to be hardheaded and conservative, handled by a certain firm, it stamps that firm with a certain degree of reliability. If one finds that a firm has been in business for many years and that its books carry names

of clients who have dealt with it continuously for many years, one is safe in assuming that reasonably satisfactory service has been rendered. Inquiry, carefully and properly conducted, will bring to light the reputation and standing of any given firm in the community.

Studying Local Demands.—Frequent visits, well timed to see the markets when busiest, aid in showing the producer what the local demand calls for in the way of quality. A keen observer will soon find out whom the buyers represent when picking up stuff for push-cart or peddler trade, for retail stores in the poorer sections, for the better class of stores, restaurants, and hotels. A knowledge of quality based on wholesale market receipts is far more valuable than that based on information limited to what one's community or neighbors are doing.

Studying Facilities.—The visitor can learn how goods are received and delivered. He will see for himself the enormous investment in warehouse and shipping facilities, delivery wagons, and get a idea of the amount of capital required to carry growers. He can obtain data regarding commissions charged. He can find out to whom the successful growers are shipping. He can note the variations in packages, the packages most in demand, and those which best stand transportation and handling. He can determine what the market demands in quality and quantity; what constitutes over-ripeness or under-ripeness at the time of reaching the market; what constitutes good packing. He can size up the possibility of replacing distributing agencies.

Effect of Quality.—A trip through a fruit packing house or a cannery shows the influence of quality of crop on prices offered. The presence of unsorted sizes, of speckled, off color, immature, or overmature fruit, adds much to the hard work of grading, sorting, and packing. Such fruit is worth less.

Presence of burs, stones, weed seeds and the like, which must be hand-picked from peas or beans for canning, adds to costs and thus decreases the value of the product as purchased from the grower.

The producer visiting the market will find that the farmer's stuff is not always sent in in perfect condition. Deceit in packing is still prevalent. Time and time again dealers report such conditions as wilted lettuce, woody carrots, wormy potatoes, small scrubby product in the middle of a package with No. 1 stuff in sight, raised bottoms to berry boxes, nicely faced packages with poor fruit beneath, and scantily filled packages.

Shipping Receptacles.—Some receptacles are not packed tightly enough to ship well; others are packed scantily. Some shippers apparently reason that twelve baskets of peaches two-thirds full will sell better and for more money than eight well filled. And this in spite of the fact that when poor stuff goes out both commission man and farmer lose money. The farmer is ultimately paid by the consumer—not by the commission man. A poor grade of fruit or other product not satisfactory

to the consumer, or at a price too high, will partially or totally destroy a market, and then the farmer's returns are indicated in red ink.

Deceit in Quality or Quantity.—Anyone who fails to put forth good produce hurts the trade. If one goes on the assumption that the consumer must buy, he fools himself. The consumer can find a way out by purchasing brands of canned fruits and vegetables which experience has taught him are put up with scrupulous care into uniform packages, or he will buy in small quantities where every item going into his purchase can be inspected. And he will substitute. If he is disappointed in peaches he'll turn to some other fruit; if in new peas, he may go back to corned beef and cabbage. And lastly, the housewife, rather than serve fresh fruit, will buy second rate stuff to be made into puddings, pies, and desserts.

Canners are Competitors in Open Markets.—The work of the canners is worthy of close study by farmers who desire to improve their marketing methods. The use of canned vegetables and fruits has progressed not alone because they are not perishable and are more easily portable, but rather because the purchaser knows he can count on uniform quality, at least in standard brands. Canned stuff is not as attractive as fresh, but there is a good deal of satisfaction in knowing that one can of tomatoes will be like another, that the percentage of sirup will be the same in each can of peaches of the same brand. The canneries deserve a lot of credit for the far-sighted wisdom that has resulted in this policy. They are today important competitors of the farmer. Those who buy in the open market are too familiar with the varying differences to be found in the usual run of farmers' fresh goods. Better standardization is important if the fresh market is to be maintained.

Personal Marketing by Farmers.—Whenever a farmer or producer, as a result of his inquiries, contemplates directly marketing his own products or plans to give considerable time to supervising distribution of his output, he will do well to compare the expenses, in time and money, of doing this work with the additional returns to be expected. Only increased returns will meet—and thus justify—increased selling costs.

Few Growers Visit Their Markets.—Far too few growers and producers recognize the full value of first hand information concerning the demands of their markets and the necessity of being constantly in close touch with the selling agents located at these points. One big commission house estimates that only 1 in 40 of their shippers ever visits them, and the visits of those who come average not more than one a year. Another firm doing \$150,000 annual business estimates that not over 10 of their clients call during the year. Complaints of taking advantage of shippers would certainly be reduced in frequency if shippers would, when they are able, give closer personal attention to their selling agencies.

Influence of Weather Upon Sales.—A producer visiting his market can also study the effect of weather changes upon purchasing and upon the quality of his goods. He will find that local changes in weather conditions are often responsible for increase or decrease in sales of fresh products. The average middle class, because of its vast buying powers, really regulates the market, rather than the excessively rich who pay no attention to prices, or if the very poor who are governed by their lack of means. The tastes of this huge buying public are largely determined by weather conditions. For instance, during cold weather, the tendency is to a greater demand for carrots, beets, parsnips, and other substantial vegetables, rather than toward fruits. Three or four days of hot weather will decrease the demand for vegetables and markedly increase the call for watermelons, cantaloupes, peaches, and other fruits. The same thing holds well of meats. During cold weather pork, beef, and mutton are much in demand, while during warm weather the sales of meats will fall off, to be replaced with fish and fowl. A sudden change in the weather will therefore influence returns to farmers as reflecting buyers' tastes. Returns will be further affected for the more perishable fruits and vegetables sent during hot weather due to greater amount of spoilage. Two or three days of warm weather with fruit displayed in stalls or in boxes, will greatly increase the percentage of spoiling, hence high prices may be secured but not necessarily high total returns to the farmer.

Packages and Containers Vary.—Different markets desire different styles of packages. A producer shipping apples to Boston or New York will find the barrel in favor, while apples shipped to San Francisco or Los Angeles are desired in the standard apple box of the Pacific Coast, a box having outside dimensions 10 by 11 by 21 inches and constructed of $\frac{5}{8}$ -inch stuff for ends, and $\frac{1}{4}$ -inch for sides, top, and bottom.

A visit to any market will show a multitude of types of package. One will see common styles and sizes from many sections, *e.g.*, the Georgia peach basket, the Oregon apple box, the Florida orange box, the Louisiana rice sack, the New York apple barrel, the New England butter firkin, and the grain sack of the West. These will vie with various boxes, baskets, hampers, crates, odd tubs, and barrels of different kinds, for local or distance shipments of celery, cauliflower, lettuce, strawberries, cantaloupes, fresh peaches, pears, apples, grapes, and so on down the list of such containers of farm produce as the Baltimore vegetable box, the bushel and 2-bu. hamper of the south, the 40-, 50-, or 60-lb. lugbox of the Pacific Coast, the slatted vegetable barrel of the south, and various more or less locally used containers—there are almost as many sorts as there are of farm products and farming districts. The variation in size is also interesting. The hampers of the south and the barrels of New England are especially variable, being of many sizes. Then there are the

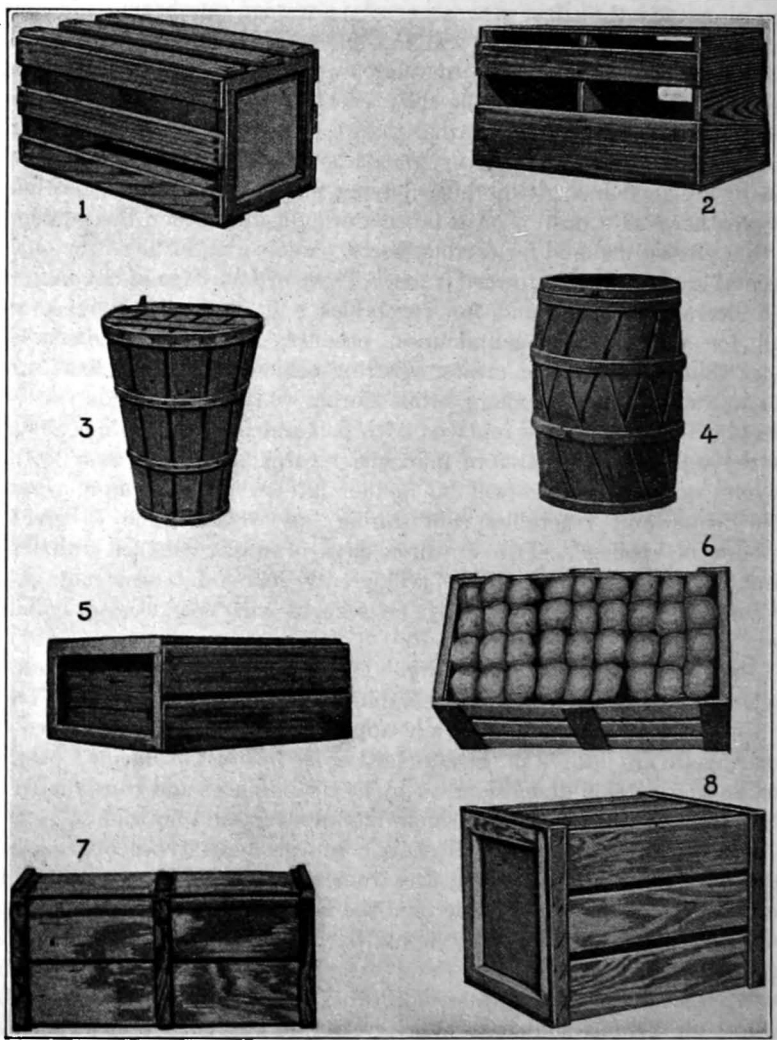


FIG. 93.—Types of containers for farm products.

- | | |
|--|----------------------------|
| 1. Florida cantaloupe and melon crate. | 5. Celery crate. |
| 2. Asparagus crate. | 6. 6 basket Georgia crate. |
| 3. 1 1/4 bushel lettuce hamper. | 7. Citrus fruit crate. |
| 4. Basket vegetable barrel. | 8. Standard bushel crate. |

From *Country Gentleman*, issue of Jan, 25, 1919.

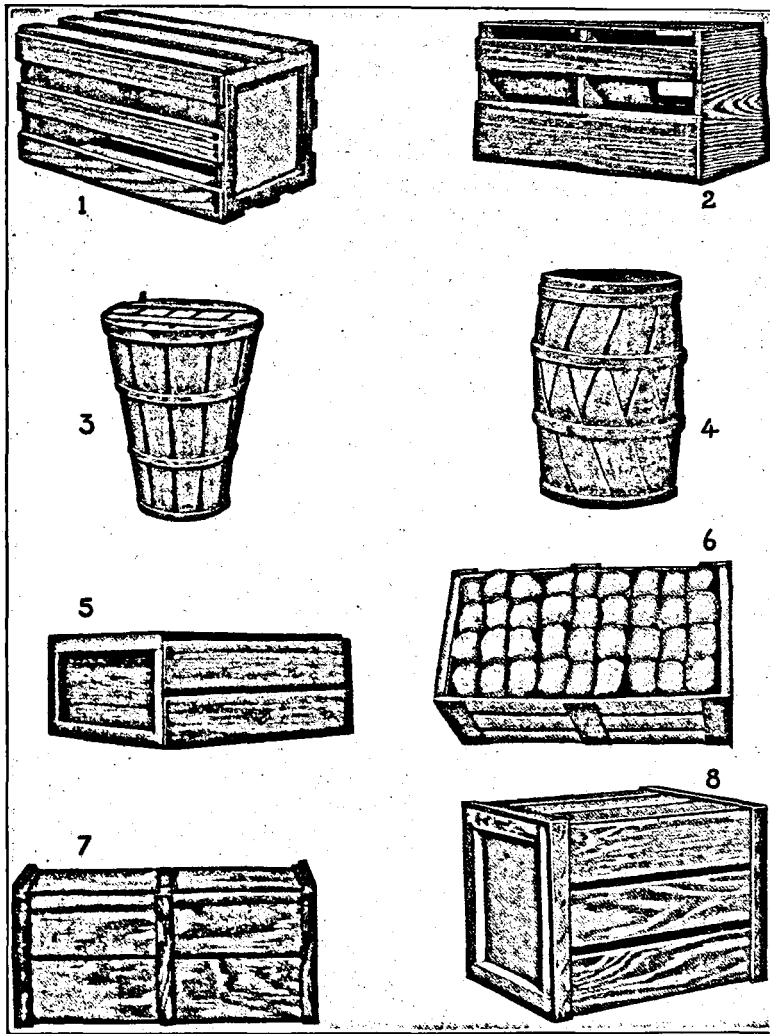


FIG. 93.—Types of containers for farm products.

- | | |
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| 1. Florida cantaloupe and melon crate. | 5. Celery crate. |
| 2. Asparagus crate. | 6. 6 basket Georgia crate. |
| 3. $1\frac{1}{4}$ bushel lettuce hamper. | 7. Citrus fruit crate. |
| 4. Basket vegetable barrel. | 8. Standard bushel crate. |

From *Country Gentleman*, issue of Jan, 25, 1919.

containers doing secondary duty as market packages, such as cement, flour, and sugar barrels reused to ship farm products. The prevailing package for each farm product is the outcome of conditions or kind of transportation, length of haul, roughness of handling, available materials for making, and custom.

Western markets incline largely to the rectangular container—to lugboxes, fruit crates, vegetable boxes, poultry crates; Eastern markets admit many barrels of odd sizes, hampers, and various sorts of boxes; the Southern markets are more noticeable for the frail fruit packages and the large number of baskets and hampers made of splints.

Studying Types of Containers.—Study of market packages shows (a) containers shipped in from a distance, with methods of packing and grades of product, (b) local packages, with methods of preparing for shipment, and quality of output. Data concerning shipments from outside territory are largely matters of information and for possible use by the investigator. The data covering shipments in competition with one's own products serve to show what is being done and to indicate what changes may be instituted to advantage.

Examples of Market Containers and Packages.—Types and sizes of market containers and packages which are more or less common are:

Name of container	Used mostly for	Description	Dimensions
Baltimore vegetable box	Vegetables	A stoutly made wooden box, of 1-in. material, with slanting sides	12 by 18 in. on top; 9 by 14 in. on bottom, with 12-in. sides
Pepper and egg-plant crate	Peppers and egg-plants	Rectangular box with 5 slats on sides, solid ends top and bottom, reinforced with cross slats, heavily nailed	11¾ by 14 by 22 in. inside measure containing 3,465 cu. in.
Florida melon crate	Cantaloupes and melons	A slatted rectangular box, 3 slides on sides, top and bottom with solid ends	12 by 12 by 22 in. inside measure; containing 3,168 cu. in.
One and one-half bushel hamper	Lettuce and other vegetables	A round hamper of ¾-in. slat construction, larger on top than on base, filled with solid bottom	Diameter of top 16¾ in., of bottom 9 in., vertical depth 25½ in., all inside measurements; capacity 48 dry quarts
Celery crate.....	Celery	A rectangular box of slatted sides top and bottom with either slatted or solid ends.	10 by 20 by 22 in. inside measurements, containing 4,400 cu. in.
Citrus crate.....	Oranges, lemons, grape fruit	A rectangular box of slatted sides, top and bottom with solid ends, and one cross-partition	12 by 12 by 24 in., or 11¾ by 11¾ by 25 in.
Standard bushel crate	Vegetables	A rectangular box of triple slatted top, sides, and bottom, with solid ends, reinforced with battens along edges of ends	12 by 12 by 15 in. inside measure capacity 2,160 cu. in.

Name of container	Used mostly for	Description	Dimensions
Bushel basket.....	Vegetables	A rounded basket made of $\frac{3}{8}$ -in. slats; open on top	16 in. across top, 10 in. across bottom, 18-in. tall
Barrel.....	Apples	A closely built barrel of fitted staves and strengthened with hoops, having solid round top and bottom	Variable, although usually 18 in. across top, and 30 in. high
Barley sack.....	Onions, potatoes, grain, turnips, carrots, etc.	Brown woven jute, averaging about 1 lb. in weight	21 by 35 in. or 21 by 36 in.
Alameda lug.....	Unpacked fruit and vegetables	A rectangular box, open top, solid sides, bottom and ends built of 1-in. stuff for ends, balance $\frac{1}{2}$ -in. net contents 40 to 50 lb., weight 8 lb.	$6\frac{1}{2}$ by 14 by 21 in. outside measure
River lug.....	Unpacked fruit and vegetables	Same as lug, except net contents averages 60 to 70 lb., weight 10 lb.	$8\frac{1}{2}$ by 14 by 22 in. outside measure
Crate or barrel crate	Cabbage and other vegetables	A rectangular box of $\frac{1}{4}$ by 4-in. slats, 3 on a side and 2 on top and bottom, with either solid or slatted ends across partition divides the box into two compartments	12 by 18 by 33 in. inside measure; containing 7,128 cu. in.
Asparagus crate	Asparagus	A rectangular box with solid ends and cross partition, solid bottom, two slats on top and two on each side, the side slats consisting of one wide slat at base and one narrow slat near top	$19\frac{1}{2}$ in. long, 11 in. high, $10\frac{1}{4}$ in. wide on bottom and $9\frac{1}{2}$ in. wide at top; containing 2,145 cu. in.
Basket vegetable barrel	Vegetable,	Made of crossed slats, interwoven and reinforced with staves	Diameter of heads $17\frac{1}{2}$ in. distance between heads 26 in.; length of stave $28\frac{1}{2}$ in.; circumference of bulge 64 in. outside; contents 7,056 cu. in.
Six basket crate; Georgia Carrier	Fruits, tomatoes and similar perishable vegetables	A rectangular box of slatted sides top and bottom, solid ends, containing six four-quart baskets	10 by $11\frac{1}{4}$ by 22 in.; capacity 24 qt.
Lettuce crate.....	Lettuce	A rectangular box, of three slats on top, sides, and bottom, solid ends all reinforced with strips	$7\frac{1}{2}$ by 18 by 22 in. inside measure; capacity 2,970 cu. in.
Potato sack.....	Potatoes	Loosely woven coarse jute, average weight 1 to 2 lb., gross weight filled 110 to 124 lb.	24 by 33 in.

Name of container	Used mostly for	Description	Dimensions
Berry chest.....	Strawberries, raspberries, blackberries, dewberries, loganberries	A heavily constructed crate with slatted front and back, solid top and bottom, and containing partitions subdividing space to contain 20 drawers, arranged in tiers 5 deep. Drawers to contain 2 or 6 baskets each. Gross weight when filled 50 to 70 lb.	Berry drawers 14 by 8 by 1½ in. of ¼-in. ends and ¼-in. sides and bottoms. Dimensions of chest outside measure 39¼ in. long, and 16½ in. high, and 17½ in. wide. Tops, ends and partitions, both horizontal and vertical of ¼-in. stuff; sides of ¾-in. material
Cherry and fig box..	Cherries, figs	A rectangular box to hold loose or faced fruit, or eight paper cartons; a cross partition divides the space equally; gross 9 to 11 lb., net 8 to 10 lb.; package approximately 1 lb.	2¾ by 9 by 19¼ in. outside measure, sides and partition of ½-in. stuff, sides of ¾-in. material

The Best Container.—The best market package has the following qualities:

- (a) Sufficient strength to insure safe arrival at destination and to withstand all ordinary handling.
- (b) Convenient size and form for ease of handling in loading, in transporting, and on arrival.
- (c) Lightness consistent with strength, to cut down freight costs and to reduce likelihood of rough handling.
- (d) Construction to insure any necessary ventilation between packages during transporting.
- (e) Economy in cost.
- (f) A convenient size and type to help buyers in computing amount of contents.
- (g) Cement-coated fasteners of a kind which will neither slip nor draw.
- (h) Solid tops, rather than burlap or cloth covers, to insure strength of package and protection of contents.

Shipping Carload Lots

When car-lot shipments are possible, there results a saving in transportation rates and in handling at the terminal. Car-lots call for rather large outputs, however, as shown by the figures of what normally constitute a carload (sign for which is C/L).

FRUITS AND VEGETABLES—CAR LOAD LOTS

Product	Usual size of car	Size of container	Amount constituting a carload
Peaches.....	33 ft. 2¾ in. long* 8 ft. 2¾ in. wide 7 ft. 7¼ in. or 7 ft. 5½ in. high	4 by 12 by 20 in. size of container.—20 lb. net each box. Two layers in a box wrapped in paper	1,200 to 1,500 boxes
Cherries.....	ditto	Drawers containing 10 lb. net	2,500 to 3,000 drawers
Apricots.....	ditto	4 basket crates containing 5 lb. net—each basket	1,200 to 1,500 crates
Grapes.....	ditto	4 basket crates, each basket containing 5 lb. net	1,200 to 1,500 crates
Lemons.....	ditto	80 to 90 lb.	About 375 boxes to a carload
Grapefruit.....	Same as lemons	60 to 75 lb.	Same as lemons
Apples.....	Local shipments sometimes box cars. Long distance Pacific Fruit Express cars	38 to 45 lb. Size of box 10 x 11 x 22 in. 3½-4 and 4½ tiers in box	600 to 800 boxes in car
Pears.....	ditto	40-45 lb. 9 x 11 x 22 in. size of box, 4 and 5 tiers in box	600 to 800 boxes in car
Plums.....	ditto	Packed in crates containing 4 baskets of 5 lb. each	1,200 to 1,500 crates a car
Cantaloupe.....	Same as peach.....	3 sizes. Special crates, 12 to 15 melons Pony, 54-in. standard 45 melons	500 to 700 standard crates to car
Watermelons.....	Box car, or Pacific Fruit Express cars	Weigh from 5 to 25 lb. each	1,200 to 2,000 melons in car
Tomatoes.....	Same as peach	Crates of 4 baskets. Each basket weighs 5 lb. only fancy kind wrapped in paper	1,200 to 1,500 crates
Cucumbers.....	ditto	Packed in boxes, 4 x 12 x 20 in. containing 2½ to 3 dozen	1,200 to 1,500 boxes
Peas, green.....	ditto	Packed in drums containing 80 lb. net	300 drums
Beans, green.....	ditto	Packed in drums containing 80 lb. net	300 drums
Grapes.....	ditto	28 lb. crates	28,000 lb. In 34 ft. car probably about one more tier than in 32 ft. About 1,000 boxes
Oranges.....	ditto	70 to 80 lb.	About 375 boxes to a car

* Pacific Fruit Express Cars.

MARKETING METHODS

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REFRIGERATOR FRUITS

Product	Size of car	Size of container	Amount constituting a carload
Lemons.....	32 ft. 6 in. long, 8 ft. 2½ in. wide 7 ft. 2½ in. high or 34 ft. 4½ in. long 8 ft. 2½ in. wide, 7 ft. 3 in. high	75 to 80 lb.	32,000 lb., 400 to 420 boxes in a car
Oranges.....	ditto	70 to 72 lb.	32,000 lb., 444 to 457 boxes
Apples.....	ditto	50 lb. boxes	28,000 lb., 560 boxes to car
Pears.....	ditto	ditto	ditto
Plums.....	ditto	26 lb. crates	28,000 lb., 1,076 boxes in car

POULTRY AND DAIRY PRODUCTS

Product	Size of car	Size of container	Amount constituting a carload
Butter.....	Same as lemon	68 lb.	24,000 lb.
Eggs.....	ditto	53 lb. cases	400 cases which is just 21,200 lb.
Cheese.....	ditto	75 lb. to cases	375 to 400 cases or 28,125 lb. to 30,000 lb.
Chickens.....	36 ft. long 9 ft. 9 in. between eaves	140 lb. to coop. 36 to 42 chickens in each coop. 128 coops, but varies greatly	18,000 lb.

LIVE STOCK

Product	Size of standard car	Method of loading	Amount constituting a carload	
			36 ft. car	40 ft. car
Sheep.....	36 ft. 6 in. long or 40 ft. 6 in. long 8 ft. $\frac{3}{4}$ in. wide or 8 ft. 6 in. wide 8 ft. $\frac{3}{4}$ in. high or 8 ft. high	Either in single or double deck car	125 to 150 to the deck	140 to 175 to the deck
Hogs.....	ditto	Either in single or double deck car, but not as many double deck as sheep	75 to 85 to the deck	85 to 95 to the deck
Cows.....	ditto	Single deck car	25 to 28 to a car	27 to 30 to a car
Calves.....	ditto	Single deck cars	75 to 85 to a car	80 to 90 to a car
Goats.....	ditto	Either single or double deck cars	140 to 150 to the deck	150 to 170 to the deck
Horses and mules	ditto	Single deck car	18 to 20 in a car	20 to 22 in a car

HAY AND GRAIN—CARLOAD LOTS

Product	Size of car	Size of container	Amount contained in car		
			36 ft.	40 ft.	50 ft.
Wheat.....	36 ft. long	90 to 100-lb. sacks	400 to 500 sacks or 40,000 to 50,000 lb.	600 to 700 sacks or 60,000 to 70,000 lb.	950 to 1,000 sacks or 95,000 to 100,000 lb.
Corn.....	8 ft. 2 $\frac{1}{4}$ in. wide				
Oats.....	6 ft. 7 $\frac{1}{2}$ in. high				
Rye.....					
Barley.....	50 ft. long, 9 ft. 2 in. wide,				
Feedstuffs.....	10 ft. high				
Hay	ditto	200 to 300-lb. bales	8 tons	12 tons	17 tons
Alfalfa	ditto	200 to 250-lb. bales	8 tons	12 tons	17 tons
Straw	ditto	100 to 200-lb. bales	5 tons	7 tons	10 tons

CHAPTER XXI

MARKET QUOTATIONS

To read regularly the daily or weekly market quotations is to learn the tendencies of prices. The resulting information is a basis for making selling plans, and deciding where to market if a choice is possible. Such quotations are not an infallible guide to what the producer should obtain; but they are valuable aids to forecasting the rise and fall of prices, for in these quotations are mirrored the best obtainable data on the probable course of price changes. "Future" prices for corn or wheat or barley—as "May" or "December"—reflect the best guesses of experienced traders who are in the market for wholesale sales or purchases; the way these quotations swing furnishes a means of predicting whether the market is likely to rise or to fall.

Reasons Why Market Quotations are Fallible.—The reasons that market quotations are not certain guides are that (1) they are sometimes based on quantities far in excess of the usual farmer's offerings; (2) they may reflect prices between broker and jobber or jobber and retailer, thus carrying the costs and profits of handling beyond the original consignee to whom the farmer has shipped or the original buyer of the farmer's output; (3) they are sometimes based upon an insufficient number of reports so that there may be a chance for the reporting firms to use the publications as a means to further private ends; (4) from the quotations must be deducted costs of freight, commission or middle man's profits, unloading, drayage, insurance, warehousing, sometimes repacking or resorting before the farmer's return can be determined.

Even though quotations are not absolutely applicable, their value to the producer is great enough to warrant their constant and regular use.

Quotations of Different Markets Should Be Studied.—If more than one market is available to the producer, he should keep posted concerning prices in all centers to which he can ship. If a difference exists in the quality or quantity demands of these markets, a producer is in a better position to decide where he shall ship. Sometimes the net receipts obtainable in one market when two or more are available to a shipper, are sufficiently higher to justify selling there even though freight and commissions may be somewhat higher.

Usually interest should be confined to but a few products, selecting those of immediate importance to the producer or else those the prices of which reflect a condition likely to be eventually felt by products of the reader.

There is sufficient relationship between various markets so that unusual offerings or buying demands are felt in all localities, although not commonly to an equal extent. Therefore the prices of beef or hogs or sheep at Chicago, Omaha, or Kansas City, the price of cotton on the southern exchanges, the price of wheat in Liverpool, the prices of other commodities in their respective centers, are indices to fluctuating markets, and reports covering conditions in these centers should be sought and read.

Quotations Indicate Market Demands.—The quotations are a guide to the kind of product most in demand in a given market. For instance, the desired weight of hogs or beef is shown by the higher quotations for certain sizes; the quality of lamb or mutton or fruit or field crops most sought after is gauged by the respective quotations.

Sources of Market Quotations.—A farmer may find his best source of information to be trade journals catering to his subject—such as poultry papers, or dairy reviews, or live stock papers. The agricultural press serves the needs of a great many farmers. The daily press is of value for early advices of changes, and reflection of conditions, in the local markets which it covers.

The following paragraphs are therefore not offered as final choices but rather as suggestive sources.

The Daily Press is valuable (a) for the speed with which changes in market conditions are set forth, (b) the accompanying news items of farming conditions, (c) the briefs, often profitably condensed, of federal, state, or association reports of crop, stock, and market conditions. The value of its quotations is occasionally reduced, in some instances, by the limitations of the consulting sources, as already pointed out, which may tend to hasty or biased conclusions.

Trade Journals, Including the Agricultural Press, confine their attention to the products of their special lines, but tend to present their findings after careful collection and mature analysis. Their value may be somewhat restricted by the delay in getting out their findings, particularly if the publication comes out only at relatively long intervals, as monthly or semi-monthly.

Crop Estimates.—Since price fluctuations depend somewhat upon crop conditions, one should keep posted concerning the outlook for production. Two sources are especially valuable in this connection, both being publications of the United States Department of Agriculture. These are the monthly mimeographed reports of State conditions put out by local offices of the Crop Reporting Board of the Bureau of Crop Estimates, U. S. D. A., and the printed monthly "Crop Reporter" distributed from Washington.

The mimeographed sheets give a page or two of condensed reports of the principal field, truck and fruit crops in the area covered by the

local office, compared with United States conditions, to show effect of weather upon production prospects, estimates of acreages, probable yields, and estimates of production following harvests. A few excerpts from sample sheets are illustrative of the kind of information conveyed.

RELEASE WHEN RECEIVED

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF CROP ESTIMATES
SAN FRANCISCO, CALIF.

Office of Agricultural Statisticians.

The Crop Reporting Board of the Bureau of Crop Estimates, United States Department of Agriculture, makes the following estimates of crop conditions in California and the United States as of (date).....

CALIFORNIA FIELD CROPS

Weather Conditions.—The weather during June was freakish; with several very hot days, many days of hot desiccating wind, and a few cool nights, plus rain in some sections. These mixed conditions certainly did not improve the outlook for field crops, which, generally speaking, are far below normal.

Corn, Indian.—The acreage to this crop in California shows an increase of 4 per cent, making a total of 90,500 acres. The condition is 89 per cent of normal. On these figures we forecast a production of 3,141,000 bu.

Rice.—The acreage planted this year is variously estimated to be between 160,000 and 175,000 acres. In our opinion about 465,000 acres have been sown, the condition of which is 90 per cent of normal as against 94 per cent at this date last year. If, by reason of shortage of water, none of this acreage is abandoned our forecast is for a production of 9,652,500 bu.

Wool.—The season has been favorable for our sheep growers, and the average weight of fleeces has been a little better than last year—7.65 lb. compared with 7 lb.

Pears are a very spotted crop, making a forecast very difficult. The condition is 72 per cent of a normal, compared to 90 1 year ago and a 10 year average of 79. The probable production will be about 79,000 tons as against 110,000 last year. The pear crop of the United States is forecast at 13,634,000 bu. or about 340,000 tons.

Cherries suffered damage from the rainfall, June 14–15, the fruit cracking badly in some localities. The production this year is estimated to be about 87 per cent of a normal crop.

Winter Wheat.—This crop, taken as a whole throughout our State, has made a steady decline since the last report, as of May 1. It is spoken of as being "spotted." Unfortunately the poor spots are large, many of them will not be harvested for grain, and many of the better spots show a low condition figure. Many days of north wind and a few days of unusually hot weather sapped the vitality from the plants and prematurely ripened the grain. The result is seen in the low condition figure of 66 per cent of a normal, as compared with 80 on May 1, 85 1 year ago, and a 10-year average of 80. On the basis of present condition, the forecast for this year's crop is 9,118,000 bu. from 656,000 acres. Last year the production was estimated to be 16,335,000 bu. from 990,000 acres.

In the United States the condition of winter wheat on June 1 was 78.2 per cent of a normal, 94.9 last year and a 10-year average of 82.0. The acreage to be harvested is about 34,165,000, and forecast of production 503,996,000 bu. The area planted to spring wheat is estimated at 19,487,000 acres, and the condition 89.1 per cent of a

normal, indicating a production of 276,547,000 bu. providing average conditions are maintained until harvest time.

REVIEW OF CROP CONDITIONS—(DATE)

The composite condition of all crops in California on June 1 was about 3.6 per cent below their 10-year average condition on that date. Last year the June 1 condition of all crops was 5 per cent above the average, 2 per cent below the average in 1918.

The condition of the various crops on June 1, expressed in percentage of their 10-year averages (not the normal) was as follows:

Peaches.....	106.1	Alfalfa.....	95.7	Pasture.....	88.4
Lemons.....	103.3	Berries.....	95.7	Apples.....	88.0
Oranges.....	102.2	Oats.....	94.5	Pears.....	86.4
Sugar Beets.....	102.2	Watermelons.....	94.4	Cantaloupes.....	83.3
Olives.....	102.2	Cotton.....	93.5	Almonds.....	83.3
Prunes.....	97.4	Barley.....	91.5	Wheat.....	82.5
Hay.....	93.5	Walnuts.....	90.9	Apricots.....	77.5
Average of all.....					96.4

REVIEW OF CALIFORNIA CROP CONDITIONS (DATE)

The composite condition of all crops in California on July 1 was about 95.4 or 4.6 per cent below their 10-year average condition on that date. Last year the July 1 condition of all crops was 1.8 per cent above the average; 5.8 per cent below the average in 1918.

The local mimeographed reports are regularly obtainable on request to the nearest office of the Bureau of Crop Estimates that one's name be placed on the mailing list.

The *Monthly Crop Reporter* consists of a six or eight-page printed pamphlet, issued monthly, showing the United States summary of conditions for such crops as corn, wheat, oats, barley, rye, buckwheat, potatoes, flaxseed, rice, tobacco, hay, cotton, apples, cranberries, peaches, pears, seed, beans, sorghums, sugar beets, and hops. Tables are included showing conditions of crops by States, comparisons with former periods, amounts of production; special reports being inserted for crops of immediate interest as onions, sugar beets, wheat, seed production, etc. Additional data present findings concerning the status of world agriculture or special censuses, and items of agricultural importance as weights of grain per measured bushel, trend of production, live stock changes on farms, trend of prices, sales by farmers, increase in cost of living, percentage of cotton ginned, cost of producing corn-fed cattle, etc.

The *Monthly Crop Reporter*, for others than persons actively cooperating with the U. S. D. A., can be received by paying a yearly subscription charge of 25¢ for domestic addresses, or 40¢ for foreign addresses. Request is to be made to the Superintendent of Documents, Washington, D. C.

The Bureau of Markets Report.—The Bureau of Markets, of the United States Department of Agriculture, publishes a weekly, *The Market*

Reporter, an eight-page printed document, containing information of market conditions, changes, and trends in the United States, as reflected by receipts, sales, and purchases at the principal market points of such staples as live stock, grain, fruit, vegetables, hay, butter, cheese, feed-stuffs, and cotton. Discussions of world market conditions, charts of statistics of output and prices, graphs showing the trend of prices, influences of factors affecting prices, and similar data, are here recorded.

The publication is continuously obtainable on request to the U. S. D. A. Bureau of Markets, Washington, D. C. that one's name be placed on the regular mailing list.

Examples of Quotations.—The best and most reliable quotations are found in trade journals devoted to special industries, such as publications dealing with beans or rice or wool or cotton or dairy products. The quickest reports are found in the daily press. Conservative business summaries covering most of the important products of interest in the territory covered by the publication carrying them are found in the agricultural weekly publications. These quotations are set aside in a financial section of the publication and are easy to find.

How Quotations Are Obtained.—Fully to understand quotations and to know how much to discount for one's environment, it is necessary to find out how quotations are obtained. If the source is the daily newspapers, this is of more importance than when one is using the weekly summaries of the agricultural press. Different newspapers use different methods of collection and consult different sources for their information. Common sources in use are:

Butter, Cheese and Egg Prices.—The Dairy Exchange, where commission men or brokers, members of the exchange, dispose of their surplus or purchase to cover deficiencies, the last sales establishing the prices for the day and furnishing the data published by the press.

Barley, Wheat, Oats, Corn Prices.—The Grain Exchange, where immediate sales and bids, or prices offered or asked for future deliveries, all being transactions between members, are posted on blackboards.

Produce and Fresh Fruit Prices.—Melons, cantaloupes, potatoes, onions, truck, apples, oranges, grapes, etc.: By personal visit or telephone call by reporter or press representative to established firms dealing in one or more of these commodities. Prices are usually jobber prices to retailer.

Hay Prices.—Exchange rates between wholesale dealers at points of arrival, free on board cars or boats.

Meat Prices.—Quotations offered by wholesale butchers or packers to producers for stock delivered at receiving centers.

Bean Prices.—Wholesale prices to jobbers from sales on exchanges, or prices furnished reporters by leading bean brokers.

Symbols or Terms Used in Market Quotations.—Certain trade abbreviations and terms are commonly used in reporting quotations. These serve materially to shorten explanation and to reduce the amount

of reading needed to grasp the market situation. Typical ones are given immediately below.

Examples of Symbols Used in Market Quotations:

1. The sign "@" means to and indicates the ranges, as barley quoted "\$1.30 @ \$1.60" shows the variation in price for the period covered by the report.

COMMENTS.
There are 125,000 tons on sale in Chicago and 1,000,000 tons on sale in California that were shipped here to enter this market of the deficit of leaf cuttings. The local market is weak on all grades and grades; \$11 to \$11.50 per hundred will buy the top store in Southern California at country shipping point.
Rice continues firm.
Fifteen hundred tons from California are being daily received and today in Chicago for \$18 per hundred, the local market for rice is becoming quiet as improvement in both the quality of the receipts and in prices obtained for them. Weathers and even are steady.

Produce Dealers Face Increased Drayage Charges

Another little addition to the high cost of living will go into effect next Monday with the new schedule of charges by the Draymen's Association of San Francisco. Charges for hauling fruits and vegetables from the docks to the commission houses and vice versa are almost double the previous rates.
The drayage charge to commission houses for a chest of 20 drawers of berries will be 35c a chest. The new rate on apples is 5c a box; Oranges 5c box; Cantaloupes 5c a crate or lug box.
Following is a part of the new drayage schedule that will go into effect next Monday:
To Commission Houses:
Fruit (per crate).....4c
Fruit (per lug box).....4c
Potatoes (sacks, crates).....7 1/2c
Pears (boxes).....4 1/2c
Vegetables (sacks).....7 1/2c
Watermelons (per load).....\$7.50
Watermelons (per case).....\$25.50
Lemons (boxes).....15c
Celery (large crates).....12 1/2c
Lettuce (lug box).....5c
Eggplants (crates).....15c
Currants (chest).....30c
The new charge on poultry will be 50c a coop. All vegetables will cost 7 1/2c a sack. A charge of 1/2c will be made for returning empty boxes.

PRODUCE NOTES

CALIFORNIA HERB LOWER.
Poultry dealers today reported 80c as average price for California hens. Sales of fryers were made at 85c per pound.
FOOTBALL PRICES INCREASE.
Raising potatoes is not such a poor business this season, with the present prices of \$2.50 to \$3 per cental for Sacramento stock on the dock in San Francisco. Wholesale dealers have been forced to raise their prices on new potatoes to \$3 and a trifle lower. Onions continue high, but are a trifle lower than at the first of the week. Sweet sales were made today at \$4.50 and \$4.75 per cental.
GOOD GREEN CORN HIGH.
There was a wide range in prices for green corn today as a result of the difference in quality. Good quality legs stock brought up to \$4.75 per sack, but the smaller offerings sold down to \$3.75. The general price range, however, was \$4 to \$4.25.
FRESH 1919 ALMONDS HERE.
D. H. Part & Co. have dried fruit merchants have received a small shipment of 1210 of almonds from their ranch at Elipson. This is the first shipment of the new crop to arrive in the San Francisco market. The crop variety sold at 32c a pound.
APPLE PRICES DROP OFF.
The unusually high prices that apples started out with the first of the season are not proving so favorable now. The local market has weakened considerably, and still the demand is very slow. The B grade of Orvis steins are about 25c a bushel, the last week. Alexanders have also dropped and the Red June variety is at 22 and 24 a bushel.
STRAWBERRIES LOWERED.
Strawberries sold generally at \$10 to \$11 a chest today, with only a few sales reported at \$12. Raspberries held firm at \$15 and \$17. A few chests of new quality red raspberries are here and sold here at \$19 1/2.

WINTER WHEAT GRAIN FORECAST

Prospective Production Bigger by 63,000,000 Bushels.

Department of Agriculture Issues April Figures.

Condition in All States but California 100 Per Cent.

BY A. F. NIGHT STER.
WASHINGTON, May 11.—Winter wheat production this year will be 809,915,000 bushels, an increase during April of 63,000,000 bushels, the Department of Agriculture announced today in its forecast based on conditions existing May 1, which was 100.5 per cent. of a normal, and upon the estimate of the crop to be harvested, which was placed at 46,925,000 acres, an abundance of 1.1 per cent. from the area sown last autumn.
Production of rice was forecast at 127,948,000 bushels, based on the May 1 conditions, which was 98.3 per cent. of a normal.
Winter wheat production, based on April 1 conditions, was estimated at 877,000,000 bushels, and the production of 107,000,000 bushels, which had this winter wheat crop was 501,467,000 bushels, and the 778 was 105,000,000 bushels.
Conditions of winter wheat compare 99.8 per cent. of a normal on April 1 this year, 98.4 on May 1 last year and 88.4 the last year May 1 average.

HOGS GO HIGHER IN CHICAGO.
CHICAGO, July 11.—Hogs at a new record-breaking figure of 122 per hundred pounds by Saturday was assured, said packers when the livestock market opened today with hogs at \$12.95. Later the price went to \$23.95.

Almond Growers Expect \$3,000,000 Crop This Year

The first cartload of new-crop almonds was shipped from the warehouse of the California Almond Growers' Exchange, Chico, on August 12. It consisted of 500 bags of Nonpareil almonds and was sold to a New York purchaser. The exchange expects to move almond cashes daily from now on.
The California almond crop for 1919 is estimated at about \$3,000,000. The quality this season is exceptionally fine, due to the favorable climatic conditions.

Fig. 95.—Samples of news items from financial pages of the daily press.

- The term "quiet" or "nominal" means that there is little activity in the particular products referred to, so little at times that no quotations are possible.
- A "strong" or "firm" market is one showing signs of higher prices; a "weak" market is the reverse—a tendency to "break" to lower price levels.
- A "future" is an immediate transaction in products for future delivery, a "bid" being the price offered, a "sale" reporting the price paid. Futures are for selected months; e.g. (wheat), "May, \$2.10 bid; \$2.12 asked." "Dec., \$2.00 bid; \$2.02 asked," means offers by purchasers for wheat to be delivered in May were at the rate of \$2.10 while sellers asked \$2.12; for Dec. delivery buyers offered \$2.00,

sellers were asking \$2.02. Future sales serve to show the present feeling as to what prices will be during the months involved.

5. "Spot" sales are cash sales for immediate delivery, the word signifying a sale "made on the spot." Spot sales are best indications of daily prices.

6. "Steady" means no change in market.

7. "Steady to strong" means sales at same or better prices than previous quotations: "in spots lighter" means occasional sales somewhat below the general average.

8. Quotations "on track" cover products en route or on siding ready for unloading; a qualifying phrase as "10-day shipment" designates the interval to elapse before arrival.

9. "l.c.l." means less than carload lots.

10. "f.o.b." means free on board (car or boat).

11. "f.a.l." means free alongside (boat).

12. "f.a.g." means fair average quality.

In addition to the general terms there are specific trade names attaching to many products.

Quotations vary somewhat in their presentation. Some quote live stock on a pound basis, others on a 100-lb. basis. Some quote grain at so much per bushel; others at so much per 100 lb., per cental. Usually western quotations are on the 100-lb. basis while eastern quotations are on the bushel basis.

Examples of Measures Used in Market Quotations.—

Eggs—dozen

Butter—pound

Cheese—pound

Hay—ton

Poultry—pound or per dozen

Barley, oats, corn, milo, Egyptian corn, kafir, wheat—bushel; hundredweight.

Hogs, beef—pound, hundredweight.

Ewes, wethers, lambs—pound, hundredweight.

(Often abbreviated to read: doz.—dozen, lb.—pound, cwt.—hundredweight, bu.—bushel.)

Past Quotations a Guide to Selling.—Suggestions regarding the best time of year to sell (based on the price differences of farm products as between periods of high and periods of low prices) and regarding the possibility of profit-making by holding products for higher prices not withstanding the increased costs involved, are obtainable from a study of past quotations. Findings resulting from the collection and tabulation of past quotations can not be accepted as sure guides to selling, for changing conditions make changes in market demands; yet for the purpose of providing a starting point in marketing, a knowledge of what has occurred is of distinct advantage.

Five-year Periods to be Used in Studying Past Quotations.—Some judgment must be exercised in selecting the period from which the quotations are to be taken. A sufficient period of years should be chosen to insure reasonably safe averages, and yet not enough to cause the inclusion

of obsolete data. Quotations should be selected often enough to reflect changes as soon as they occur. Ordinarily in the author's personal experience, the 5 years immediately past are sufficient to serve the purposes of the study, with weekly quotations compiled throughout the year, taking mid-week figures in order to avoid the heavy sales prior to Sundays and the lack of supplies likely to occur immediately after the week-ends. The figures are then arranged to show the 5-year average quotations by each week and each month throughout the calendar year. Tabulating or plotting the findings aids in clearness of presentation and ease in analyzing. Such a study is valuable in pointing out (a) the variation in yearly averages, (b) the variation in monthly averages, (c) the rise and fall of prices when averaged for five years, (d) the period of lowest prices, (e) the period of highest prices, (f) the difference in selling price for the period of low prices, contrasted with the period of high prices.

Examples of Past Quotations as a Guide to Selling.—An example or two will serve to illustrate the use of past quotations as a guide to selling.

Past Quotations of Barley As a Guide to Selling.—A study of barley prices taken by weeks and averaged by months resulted thus:

TABLE 222.—VARIATIONS IN MARKET QUOTATIONS OF FEED BARLEY AVERAGED BY MONTHS; FIVE-YEAR PERIOD 1915-19 (SAN FRANCISCO QUOTATIONS)
IN DOLLARS PER HUNDREDWEIGHT

	1915	1916	1917	1918	1919
January.....	\$1.41	\$1.31	\$2.23	\$2.88	\$2.23
February.....	1.56	1.37	2.27	3.18	2.13
March.....	1.41	1.35	2.29	3.63	2.06
April.....	1.29	1.35	2.72	3.63	2.37
May.....	1.24	1.33	2.88	3.26	2.58
June.....	1.07	1.31	2.19	2.80	2.64
July.....	1.10	1.39	2.11	2.51	3.01
August.....	1.25	1.58	2.38	2.43	3.16
September.....	1.18	1.69	2.40	2.37	3.03
October.....	1.22	1.79	2.51	2.13	2.95
November.....	1.28	2.06	2.41	2.13	3.23
December.....	1.30	2.25	2.67	2.21	3.57

Averaged by years the variation amounted to:

YEAR	AVERAGE PRICE BY YEARS
1915	1.28
1916	1.57
1917	2.42
1918	2.76
1919	2.74

Averaged by *months* for the years 1915-1919 the variation amounted to:

MONTH	AVERAGE QUOTATIONS
January.....	\$2.01
February.....	2.10
March.....	2.15
April.....	2.27
May.....	2.26
June.....	2.00
July.....	2.02
August.....	2.16
September.....	2.13
October.....	2.12
November.....	2.22
December.....	2.40

From the table of monthly averages low prices, are recorded for the three consecutive months of Jan., Feb., and March, and June, July and August. High prices occurred during Oct., Nov., and Dec., and March, April and May.

Reference to the variations by months and years brings further enlightenment, thus:

Three consecutive months of lowest and highest prices									
Of lowest prices					Of highest prices				
1915	1916	1917	1918	1919	1915	1916	1917	1918	1919
May	Apr.	June	Oct.	Jan.	Jan.	Oct.	Oct.	Mar.	Oct.
June	May	July	Nov.	Feb.	Feb.	Nov.	Nov.	Apr.	Nov.
July	June	Aug.	Dec.	Mar.	Mar.	Dec.	Dec.	May	Dec.

These data result in a belief that *May, June, and July* are the months of lowest prices, and that *Oct., Nov., and Dec.* being the months of highest prices.

Past Quotations of Eggs as a Guide in Selling.—A study, similarly conducted, covering egg quotations, both by averages and by years, will a uniformly regular period of lowest prices during the three consecutive months of March, April, May (except in 1917 and 1919 when February is a low month), and of highest prices in Oct., Nov., and Dec. (with no exceptions).

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TABLE 223.—MARKET QUOTATIONS PER DOZEN ON "EXTRA" EGGS, AVERAGED BY DAYS TO NEAREST CENT, AND SHOWN BY MONTHS AND YEARS 1915-16-17-18-19 (SAN FRANCISCO DAIRY EXCHANGE)

Month of	For year					Average by months—5 years
	1915	1916	1917	1918	1919	
	Cents	Cents	Cents	Cents	Cents	Cents
January.....	31	33	37	61	51	43
February.....	23	27	26	48	39	33
March.....	21	20	26	39	38	29
April.....	22	22	31	39	44	32
May.....	23	23	34	40	47	33
June.....	23	25	31	42	47	34
July.....	25	27	34	48	48	36
August.....	30	32	45	54	54	43
September.....	37	38	47	62	61	49
October.....	46	45	52	73	70	57
November.....	53	51	57	83	79	65
December.....	41	42	52	81	75	58
Average by years.....	31	32	39	56	54	42

Regular and Irregular Fluctuations.—Studies of rise and fall in price show that farm goods fall into two general classes. One class includes those things which year in and year out fluctuate with more or less regularity, such for instance as eggs and butter, while the other class includes less perishable goods, subject to irregular fluctuations, that is, changes coming at different seasons of the year and in varying degree. Such things as beans, wheat, barley, oats, and hay make up this second class.

The Natural Market Course.—The natural market course, according to the United States Department of Agriculture is somewhat as follows:

It starts high with active movement even for inferior stock because the demand has the sharp edge of novelty and appetite. The price gradually declines and poor stock becomes harder to sell as the supply increases. Lowest prices arrive soon after the heaviest shipments begin, and a glut may occur, especially if many sections are shipping at once and there is much poor stock. Then, with a decreasing supply, prices advance, sometimes recovering much of the early declines but usually not reaching the opening prices because demand is far less keen at the end of a long season. If the last of the shipments are inferior, as happens frequently with many perishable crops, the season may close at or near bottom prices.

The common or natural market developments do not always take place as might be expected. Quite frequently superior quality of the main crop or absence of general competition will bring higher prices in mid-season. Unexpected shortage may cause the reserve stock in storage to sell at high prices at the close of the season, especially the less perishable crops like potatoes, onions, apples, cabbage, etc. Careful study of crops (shortage, supply, and shipment) should enable a fairly good judgment

to be made of the outcome. However, quickly perishable short season crops like strawberries or melons are very irregular, so it is difficult to form a reliable market judgment of them.

Periods of High and Low Prices for Various Farm Products on Different Markets.—From studies made of past quotations—results of which should be rechecked for local conditions or later years—findings for certain selected farm products were found to range lowest and highest during the periods indicated in the subjoined table.

TABLE 224.—PERIODS OF HIGH AND LOW PRICES FOR SELECTED FARM PRODUCTS ON DIFFERENT MARKETS (PRE-WAR CONDITIONS) 5-YEAR AVERAGE

Market	Product	Period of high prices	Period of low prices
New York.....	Butter	Nov., Dec., Jan.	May, June, July
	Eggs, fresh	Oct., Nov., Dec.	Apr. May, June
	Corn	July, Aug., Sept.	Dec., Jan., Feb.
	Red winter wheat No. 2	Apr., May, June	Aug., Sept., Oct.
	No. 1 timothy hay, baled	May, June, July	Jan., Feb., Mar.
St. Louis.....	Corn	July, Aug., Sept.	Dec., Jan., Feb.
	Hogs	July, Aug., Sept.	Dec., Jan., Feb.
	Red winter wheat No. 2	Mar., Apr., May	July, Aug., Sept.
	Eggs, fresh	Nov., Dec., Jan.	May, June, July
	No. 1 timothy hay, baled	May, June, July	Jan., Feb., Mar.
Chicago.....	Cattle	Oct., Nov., Dec.	Apr., May, June
	Hogs	Aug., Sept., Oct.	Dec., Jan., Feb.
	Beans	June, July, Aug.	Dec., Jan., Feb.
	Eggs, fresh	Nov., Dec., Jan.	May, June, July
	Northern spring wheat, No. 1	May, June, July	Oct., Nov., Dec.

Holding Products for High Prices.—Whether or not farmers are justified in holding for higher prices depends on the probable amount of increase likely to take place when compared with the increased costs and risks incident to holding, and the financial status of the farmer. A comparison of the percentage increase in prices between the averages of periods of high prices and those of low prices, made from the last table shows differences in percentage based upon the low average, as follows:

NEW YORK MARKET		PER CENT
Butter.....		25
Eggs, fresh.....		91
Corn.....		12
Red winter wheat No. 2.....		12
Timothy hay, baled No. 1.....		13

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ST. LOUIS MARKET

	PER CENT
Corn.....	18
Hogs.....	13
Red winter wheat No. 2.....	12
Eggs, fresh.....	67
Timothy hay, baled, No. 1.....	13

CHICAGO MARKET

	PER CENT.
Cattle.....	15
Hogs.....	14
Beans.....	7
Eggs, fresh.....	65
Northern Spring Wheat No. 1.....	10

Producing for Periods of High Prices.—From studies such as these producers will note that for certain products extra effort is worth while to have them for sale during the periods of high prices as in the case of eggs, butter, cheese and, at times, certain live stock. How far one can justify increased expense of production for sale at high market levels, will be determined by the amount of price increase likely to be obtained. In the same way conclusions can be made as to the profits likely to accrue if one holds his product for the times of increased demand, after deducting the necessary changes for storage, spoilage, shrinkage, loss of interest, etc.

It is obvious that perishables are sold most profitably as soon as they are ready for the market. There are products that justify the exercise of some judgment and foresight in finishing them for market when they are least likely to meet with competition—especially the competition of fellow-farmers forced to sell in order to obtain operating capital. But analyses such as these here presented result in the dictum that in general the best interest of most farmers is served by selling whenever their products are ready for the market. This seems to be true even of such imperishables as wheat, oats, barley, hay, cattle, swine, and sheep, since the sum available at time of peak prices, to cover increased charges, is relatively small. For the products and markets already discussed, the range in money amounts only to:

Money Difference in Periods of High and Low Prices

NEW YORK MARKET

Butter.....	7¢ per pound
Eggs, fresh.....	21¢ per dozen
Corn.....	8¢ per bushel
Red winter wheat, No. 2.....	13¢ per bushel
Timothy hay, baled, No. 1.....	\$2.87 per ton

ST. LOUIS MARKET

Corn.....	10¢ per bushel
Hogs.....	\$1.03 per hundredweight
Red winter wheat, No. 2.....	13¢ per bushel
Eggs, fresh.....	11¢ per dozen
Timothy, hay, baled.....	\$2.55 per ton

CHICAGO MARKET

Cattle.....	\$1.22 per hundredweight
Hogs.....	1.07 per hundredweight
Beans.....	15¢ per hundredweight
Eggs, fresh.....	11¢ per dozen
Northern spring wheat, No. 1.....	10¢ per bushel

Use of Past Quotations as a Normal in Reporting Prices.—Past history of prices as a means of judging the price of any product based on its normal relationships is now being made use of in reporting general price outlooks.¹³⁶ By use of this method prices for any given month are compared with the average of the past 10 corresponding months.

Example of Reporting Prices Based on Past Quotations.—Corn averaged \$1.08 for the 10 Julys from 1910 to 1919. In July, 1920 it was \$1.53, or 142 per cent of the 10-year average. Hogs averaged, for the same 10 Julys, \$11.17. In July, 1920, at \$14.65, they were 131 per cent of the 10-year average.

Use of such data may well be accompanied by a business index of conditions (Bradstreet's or Dunn's) to show whether or not farm products are maintaining a level corresponding to general business conditions throughout the country.

Prorating the Consumer's Dollar

Prorating Money Spent for Oranges.—The California Fruit Growers' Exchange shows that of each dollar paid by the consumer for oranges the farmer receives about 33¢. The remainder is taken up by:

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TABLE 225.—DIVIDING THE CONSUMERS' ORANGE DOLLAR

	Average of 4 years, 1914-1917							
	Per box				Per cent			
	1914	1915	1916	1917	1914	1915	1916	1917
Fruit on tree (all varieties)	\$1.150	\$1.705	\$1.978	\$1.621	25.9	34.6	38.9	33.2
Picking and hauling.....	0.106	0.106	0.106	0.106	2.4	2.2	2.1	2.2
Packing.....	0.325	0.325	0.325	0.325	7.3	6.6	6.4	6.6
Selling.....	0.052	0.057	0.064	0.061	1.2	1.2	1.2	1.2
F.o.b. California.....	1.633	2.193	2.473	2.113	36.8	44.6	48.6	43.2
Freight and refrigeration.	0.927	0.937	0.937	0.937	21.0	19.0	18.5	19.2
F.o.b. market.....	2.56	3.13	3.41	3.05	57.8	63.6	67.1	62.4
Jobber's gross margin....	0.39	0.41	0.40	0.41	8.8	8.3	7.9	8.4
Jobber's selling price....	2.95	3.54	3.81	3.46	66.6	71.9	75.0	70.8
Retailer's gross margin...	1.48	1.38	1.27	1.43	33.4	28.1	25.0	29.2
Consumer paid.....	4.43	4.92	5.08	4.89	100.0	100.0	100.0	100.0

Prorating Money Spent for Apples.—A study of Oregon apples resulted in findings to the effect that for each dollar paid by the New York consumer the farmer receives 34¢ for the large fruit and 47¢ for the medium-sized fruit. The table shows the details.

TABLE 226.—DIVIDING THE CONSUMERS' APPLE DOLLAR

	Spitzenberg, retailing at 75¢ per dozen, 96 to the box		Johnathan, retailing at 25¢ per dozen, 120 or more to the box	
	Average in cents per box	Percentage of retail price	Average in cents per box	Percentage of retail price
Grower receives, f.o.b. orchard.....	\$1.85	33.6	\$1.40	46.7
Freight.....	0.50	9.1	0.50	16.7
Refrigeration.....	0.10	1.8	none	none
Broker's profit.....	0.15	2.7	0.15	5.0
Cartage from dock.....	0.05	0.9	0.05	1.7
Wholesaler's profit.....	0.25	4.5	0.15	5.0
Retailer's expenses.....	1.65	30.0		
Retailer's net profit.....	0.95	17.3	0.75	25.0
Gross retail price.....	\$5.50		\$3.00	

Proration of Money Spent for Onions.—The division of the consumers' dollar when applied to onions delivered during 1919 to the San Francisco market was found on the basis of 100 lb. of Australian brown onions to be:¹⁸⁴

TABLE 227.—DIVIDING THE CONSUMERS' ONION DOLLAR

Proportion to:	Per 100 lb.	
	In cents	In percentage
Grower.....	\$1.51	36
Container.....	0.16	4
Jobber.....	0.87	20
Retailer.....	1.66	40
Gross retail cost.....	\$4.20	

Comparison of Retail Prices and Farmers' Receipts.—In 1919 a California study of retail store prices and farmers' receipts resulted thus:

TABLE 228.—COMPARISON OF RETAIL PRICES AND FARMERS RECEIPTS

	What farmer receives (average) cents	What consumer pays (average) cents
Pink beans.....	5	12½
Small white beans.....	5	12½
Lima beans.....	10	15
Prunes, size 50-60s to the lb.....	12	18
Dried apricots.....	25	35
Dried peaches.....	14	20
Dried raisins.....	10½	15
Dried pears.....	14	25
Walnuts.....	31	45
Almonds.....	24	35
California rice.....	5½	12½
Potatoes.....	2¼	8

Other studies appearing from time to time illustrate the fact that in general the farmer receives only a portion—sometimes a small portion—of the money paid by the ultimate consumer.

Reasons for Price Spread Between Producer and Consumer.—There are reasons why farmers can not expect to receive all of what buyers pay. A few of these may be summed up as:

(a) The waste from spoiling, breakage, and leakage from the time goods leave the farmer's hands until they reach the customer.

(b) The desire, oftentimes the necessity, of farmers marketing for cash as soon as their goods are ready. As this means dumping goods on a market unable to resell immediately to customers, extensive investments in warehouses, refrigerating plants, and other vast means for holding goods over are required to insure sufficient supplies to feed the people and to prevent the bottom dropping out of prices.

(c) There are, too, the customer's tastes in buying, educated too often to expensive views. The average housekeeper prefers to buy the same meats, vegetables, eggs, butter, milk, and other farm products over marble counters, from glass cases, from attractive stands.

The retailer must meet such things as telephone costs, automobile deliveries, small packages, labor required to put up small orders, marble tops, plate glass windows, fancy labels, and the hundred and one things which up-to-date trade has taught the consumer to demand. All of these things cost money which the consumer must pay, and are items in which the farmer cannot expect to share.

(d) The credit demanded by customers or offered by stores.

(e) The necessity of working-over farm products before they are ready for sale, *e.g.*, the removal of smut from grain, which costs \$3.00 to \$4.00 per ton (pre-war prices); the removal of weed seeds or of burs, stones, discolored or off-sized specimens and other trash which must be hand picked from vegetables to be canned or retailed; the re-handling and grading of eggs. The presence of unassorted sizes, speckled, off-color, immature, or over-mature fruit, adds much to the work of grading, sorting and packing.

All these things involve extra expense in preparing crops for market, following any work which may be done by the farmer, and necessitate items of cost and facilities which, at the present time, cannot be successfully met or provided by the farmer. These items total a sum often large enough to account fully for a wide difference between the customer's payments and the farmer's receipts.

Even at that, though the middleman (in one form or another), as already pointed out, can never, in the author's opinion, be entirely eliminated, the investigator will soon find that there is room for great improvement in marketing methods by curtailing waste, avoiding duplication, and disseminating data concerning market conditions. It is a duty of the farm manager to find, and use, those channels which are least liable to carry an overhead of extravagance, of inefficiency, and possibly of dishonesty.

Conclusion

The marketing problem is at best a hard one, since for the bulk of his production the farmer plants, grows or breeds, rears, and fattens, puts in a whole season, or, as in the case of orchards or stock, several years, before he can tell with any accuracy what is to be his financial reward.

In view of this uncertainty, which can not be wholly done away with, especially as world-wide influences have their effects upon most markets, the best information that one can gather as to demands, and the furthest one can go in perfecting his marketing method, will still leave much to be desired; yet, with conditions as they are, the farm manager can not in justice fail to inform himself and to exert his influence in bringing about improvements wherever possible.

Partial List of References to Literature upon Marketing

From the farm management standpoint there is a great shortage of literature on marketing. This chapter gives merely an idea of what is needed, *e.g.*, the specific requirements of given markets, time of under- or over-supply, best sizes of packages, grade requirements, ways of reducing cost of distribution, limitations of distance on shipments, value of product, perishability, transportation rates.

In discussing marketing data past tendencies have been toward generalities rather than toward specific information utilizable by the farmers and farm managers. The future holds promise of supplying something in the way of real help. In reporting the work of the Office of Markets and Rural Organization of the U. S. D. A., Brand says:¹³⁵

"It is believed that effective and economical methods for distributing and marketing farm products should go hand in hand with scientific methods of production, as it profits little to improve the quality and increase the quantity of our crops if we can not learn when, where, and how they may be sold to advantage. To provide for a study of the problems involved, Congress during the spring of 1913 appropriated funds for the establishment and operation of the Office of Markets. The Office of Rural Organization was established a year later in order to determine the possibilities and encourage the use of organized cooperative effort in improving rural conditions. These two offices were combined on July 1, 1914, and the combined unit is known as the Office of Markets and Rural Organization."

Some of the lines of investigation of the federal Bureau of Markets cover: Reasons for success or failure of (a) farmers' cooperative purchasing and marketing; (b) business office practices in use by farmers' marketing, distributing, and purchasing organizations, to determine best methods; (c) market surveys—methods and costs—to bring about better distribution of unusually large crops; (d) the practicability of a market news service to promote distribution of farm products; (e) a study of present methods of gathering, handling, grading, packing, and shipping of farm products; (f) a study of commercial methods of distributing and marketing foodstuffs in cities in order to work out ways to avoid gluts and under-supplies; (g) a study of transportation and storage, to aid in solving problems connected with these factors of distribution; (h) parcel post as a means of direct dealing between producer and consumer; (i) a study of marketing live stock, meat, and animal by-products, to note efficiency

of different methods and the equitability of prevailing rates and customs; (j) marketing dairy products under various systems of selling cream, butter, milk; costs of grading and milk distribution; prices; (k) handling, marketing, and utilization of cotton and its products; (l) cotton standards and cotton testing.

Several publications of distinct farm management value, although sometimes of purely local importance, have already come forth, while others are promised. The scope of this material can be gathered from the titles and a brief review of the subject matter.

Publications Concerned with Fruits.—U. S. D. A. *Bulletin* 298, dated August 31, 1915, by Wells A. Sherman, Houston F. Walker and L. Herbert Martin describes the peach supply in the U. S. and its distribution in 1914. The presentation describes methods of marketing peaches, areas of production, shipping seasons, and amount of shipment. 15 pages and chart.

U. S. D. A. *Bulletin* 320, dated Sept. 15, 1915, by Clarence M. Moomaw and M. M. Stewart, reports apple market investigations of 1914-15 conducted in selected apple producing areas and city markets east of the Mississippi River. The investigations covered the tracing of shipments, retail methods and costs, market preferences, grades, effect of inferior grades, shipment under ventilation and refrigeration, grade and package laws, cold-storage holdings and movement, Pacific Northwest apples via the Panama Canal, and export markets. 22 pages and charts.

U. S. D. A. *Markets Doc.* 13, issued July 15, 1918, by H. J. Ramsey, describes the methods of shipping and the effect of heavy loading of freight cars in the transportation of northwestern apples upon temperature, ventilation, condition, breakage, and distribution during the season of 1917-18. 23 pages.

Publications Concerned with Vegetables.—U. S. D. A. *Bulletin* 290, dated Aug. 30, 1915 by Wells A. Sherman, Paul Frochlich and Houston F. Walker, describes rail shipments and distribution of fresh tomatoes throughout the U. S. in 1914. The presentation covers field methods, areas of production, rate of shipments by states, shipping periods. 12 pages.

Four bulletins are of interest to cantaloupe or muskmelon growers. These are U. S. D. A. *Bulletin* 315, Oct. 23, 1915 by Wells A. Sherman, A. Dextor Gail, Jr. and Faith L. Yeaw, *Farmers' Bulletin* 707, Feb. 2, 1916 by C. T. More and G. V. Branch; U. S. D. A. *Bulletin* 401, Oct. 31, 1916 by O. W. Schleussner and C. W. Kitcher; U. S. D. A. *Doc.* 10, June 1918 by A. W. McKay.

Bulletin 315 discusses cantaloupe marketing in the larger cities east of the Mississippi River, during 1914, showing systems of distribution within cities, factors influencing prices, amount of shipment by States and districts, and shipping dates. 19 pages and chart.

Farmers' Bulletin 707 describes the commercial grading, packing grading and shipping, 23 pages.

Bulletin 401 reports investigations of 1915 on: into the history, marketing arrangements, quality, and distribution of the cantaloupe districts of Imperial Valley and Turlock, California; Salt River Valley, Arizona; Moapa, Nevada; and Colorado. 38 pages and several charts.

Market Doc. 10 presents five findings in connection with loading and transporting of western cantaloupes, including considerations of mixed loading on refrigeration, temperatures in transit, floor racks, car construction, and insulation; use of salt in refrigeration; and handling of ventilators in transit. 16 pages.

U. S. D. A. *Farmers' Bulletin* 753, dated Nov. 1, 1916, by C. T. More and C. R.

Dorland, discusses the commercial handling, grading and marketing of potatoes throughout the United States, including both early and late crops, standardization, digging, picking, grading and packing, containers, brands, loading, marketing, shrinkage and weighing. 40 pages and chart.

Publications Concerned with Grain.—U. S. D. A. *Bulletin* 558, dated July 28, 1917 by Geo. Livingston and K. B. Seeds, takes up findings in connection with the marketing of grain at country points, with discussions of methods of purchase and sale, prices, contracts, storage, weighing, and place, costs, hazards, and supply of country elevators. Of general application throughout the United States. 44 pages, price 5¢.

U. S. D. A. *Bulletin* 456, dated Feb. 5, 1917, by Roy C. Potts and H. F. Meyer, on the marketing of creamery butter, discusses importance of quality, kinds of packages, brands and trade-marks, methods of wholesale distribution, grading inspection, storage, quotations, advertising, and salesmanship. Of general interest. 37 pages, 10¢.

U. S. D. A. *Bulletin* 690, dated July 23, 1918, by Roy C. Potts, discusses, in the interest of dairymen, creamerymen, and consumers, marketing practices of Wisconsin and Minnesota creameries; to show factors influencing marketing, buying policies and methods, transporting, weighing, and distributing. 15 pages.

Publications Concerned with Methods.—U. S. D. A. *Bulletin* 266, dated Aug. 16, 1915, by J. W. Fisher, Jr., J. G. Collins and Wells A. Sherman, presents definite information on finding a market, use of quotations, advertising, business responsibility; primary outlets for producers such as cooperative associations, direct sales to consumers, sales through middle men; and general sales practices and terms. A presentation of how commodities are marketed, where to find a market, how to ship, and how the producer can protect himself. 27 pages.

U. S. D. A. *Bulletin* 267, dated Aug. 16, 1915, by J. H. Collins, J. W. Fisher, Jr. and Wells A. Sherman, presents details of the present methods of wholesale distribution of fruits and vegetables on large markets by reviewing necessity for distributing agencies, methods of receiving products, terminal distribution, and sales methods. Of general interest in studying present market conditions. 27 pages.

The parcel post as a means of marketing farm products is discussed in U. S. D. A. *Farmers' Bulletin* 703, Jan. 14, 1916, by Lewis B. Flohr, and C. T. More. An information bulletin for seller and buyer, with suggestions on the use of this method of marketing, 19 pages.

U. S. D. A. *Farmers' Bulletin* 830, Aug., 1917, by Lewis B. Flohr, on marketing eggs by parcel post. 23 pages.

U. S. D. A. *Farmers' Bulletin* 922, Feb. 1918, by C. C. Hawbaker and John W. Law, on business methods in connection with marketing by parcel post, 19 pages.

U. S. D. A. *Bulletin* 688, May 18, 1918, by C. C. Hawbaker and Charles A. Burmeister on the use of parcel post for marketing berries and cherries. 17 pages.

State inquiries into marketing have thus far not resulted in any extensive output of literature, although many Agricultural Colleges and Universities have worked on the problem, and, according to a report of the federal Office of Markets and Rural Organization, certain states have official marketing departments created by legislative act, and especially charged with regulating or investigational duties in connection with the marketing of farm products. At the time of the report* these states were Alabama, California, Idaho, Maryland, Michigan, New Jersey, New York, North Carolina, Texas, Vermont, Virginia and West Virginia. Massachusetts and Oklahoma may possibly now be added to the list.

*For details and description of scope and duties see *Market Document* 3 of the Federal Office of Markets and Rural Organization issued June 5, 1916.

CHAPTER XXII

FARM LABOR

In the scheme of agricultural endeavor proper organization of the farm work is very important. Given good soil, fine growing conditions, a receptive market, nevertheless if the work is not organized these will amount to little. Organization extends first to the farm work to be done, and, second, to the men who are to do the work. On a small place—so small that only one man is required to carry it on—organization of work is easy to understand and to accomplish. In many industries the work is automatically regulated by the demands of the crops or the stock. In the dairy, for instance, milking must be done at uniform and proper intervals, while feeding must be regular in point of time and suitable in character. These point out the need for organizing the work; or to put it another way, the yield of milk will decrease if the cows are subjected to irregular treatment; thus proving the necessity for organization.

Usually this simple form of organization requires no particular concern on the part of the man doing the work.

The organization of men, however, is a different and difficult matter. Upon this one point alone hinges much of the success or failure of most men, especially salaried men who are managing properties.

Each man can do but a certain amount of daily work, whether it be mental or physical. Beyond this he must call in others to help him; and if his be the guiding hand, his success in getting the work done will be in direct proportion to his ability to get the best from his men.

The Farm Management Aspect of Farm Labor.—Farm management is concerned with the supply of farm labor and the sources of this supply; wages and methods of payment; housing and boarding; laborers' privileges, such as the use of horses and vehicles, holidays, trips to town, access to papers and books; and with the social status and welfare of farm laborers from the standpoint of securing continued service from desirable men.

It is important that the manager have accurate knowledge of the standards of farm labor. If both manager and laborer understand this matter, the management of labor is greatly simplified. Hence, in the management of labor it is well not only for the manager to inform himself on this subject but to make use of such data on the subject as are available as a means of educating his laborers themselves concerning what may fairly be expected of them. No one has a moral right to demand that

the laborers under his direction shall work at a rate that will impair working power, but with this limitation the manager has a right to expect the best service the laborer can give.

Interest in Labor Depends on Viewpoint.—The intermingling of social and business relations involved in the hiring out to work or the employing of men for farm work has resulted in well defined points of view concerning the rights of labor and of employer. Occasionally a difference of opinion arises as to what constitutes the respective rights of each group, and then clashes occur. The situation sometimes results in efforts by employers to combine for the purpose of setting wage scales, or by workers to organize for their common good; sometimes the result sought is extreme, like the objective point of the Industrial Workers of the World; sometimes the end is only of minor importance, such as mutual agreement by employees upon a wage rate, or a standard of housing or board or social recognition.

This difference in outlook makes difficult at times a clear understanding of how farmers and others view the labor situation. A farm manager soon finds some trouble in properly appraising all points of view. His problem will be clarified somewhat if he recognizes that personal interest is largely responsible for the individual's point of view.

Five Points of View Concerning Farm Labor.—It is possible to recognize at least five points of view, depending on the contact of the individual:

1. That of the large farm operator who hires all his farming done and makes his profit from the men that he employs. His business desire is to obtain plenty of labor and as cheaply as is consistent with the maintenance of prices for farm products. From his point of view, competition among laborers is desirable in so far as it results in greater ease in procuring men when wanted, less necessity for providing accommodations, and a reduction in the wage scale.

2. That of the working farmer who does all his own work, and whose product, when placed on the market, comes into competition with products of other farmers who, if they employ cheap labor, are able to sell at reduced prices and thus tend to reduce the income of the working farmer.

3. That of the working farmer who, at times, is an employer, and as such occupies the complex position of desiring to get as much for his own labor as he can, and to hire at a price which will return to him as generous profit on the work of others as he is able to secure.

4. That of the farm worker, whose main interests—wages, hours, board, housing, and supervision—are directly affected by an market increase or decrease in the total supply of or demand for farm labor.

5. That of the members of the community, only indirectly in touch with the farm labor situation, other than as it affects the cost of living, but rather directly concerned with the influence of the type, numbers, and

ideals of a group the size of the farm labor group, in its relation to general public welfare.

Conflicting Ideas Result from Different Viewpoints.—These views tend to summarize into three outstanding classifications which at times are rather definitely in conflict, (1) the worker's interest in his own welfare, (2) the profits to be made from labor—the private pocketbook point of view, and (3) the social welfare idea, including maintenance of American standards and ideals.

Around these views are grouped the advocates and opponents of admission of labor from foreign countries—Europe, the Orient, Mexico; of I. W. W.'ism; of anti-loafing or conscription legislation; of better distribution and utilization of labor; and of better housing of labor.

The Farm Manager's Responsibility and Viewpoint.—The true farm manager occupies a somewhat difficult position. He must recognize the need not only of maintaining American standards but of continually striving for greater improvement; he must take proper care of his men without either smothering independence or furthering the spirit of taking advantage; he must show a profit for his year's operations, which is determined, to some extent, by his costs for man labor.

To meet best these varied responsibilities, the gaining of an understanding of the worker's requirements and a knowledge of how successful employers handle their men will constitute his first steps.

Classes of Farm Labor

In the paragraphs to follow, an attempt has been made to indicate the laborer's more outstanding social or class traits—good and bad. In considering this presentation it should be borne in mind that the views are individually the author's, largely drawn from personal experiences and contacts, and that the gauges of measure are (1) desirability for farm work and (2) the American standards of living and working.

White Laborers.—The best general laborers the farmer can get are the Irish, Swedes, Norwegians, Danes, Germans, Poles, and Austrians, when the natives or descendants of these nationalities come from good old farming stock. The men are as a rule steady, reliable, kind to stock, and familiar with farm operations.

Unfortunately for the employer, perhaps, these men go into business for themselves as soon as they secure a little stake.

Hobo or Tramp Laborers.—Hobo or tramp laborers, white, constitute a kind of labor upon which many farmers must rely when extra hands are needed. Usually such laborers are troublesome and unreliable. The men as a rule are drifters, seldom stay in one place for any length of time, are often trouble-makers, and usually feel themselves above their work.

Characteristics of Hobo or Tramp Laborers.—The majority falling into this category seem to be men who have descended to their homeless condition by reason of bad habits, improper living, or misfortune. Most of them are intelligent, a good many educated, and they do not as a rule take kindly to farm work, or to work of any kind, for that matter. At the best they are unstable, staying only a limited length of time, or until the spirit moves them and they are off.

When the wanderlust is coming on, they are fidgety, fault-finding, and surly.

Within this group not all men are equally capable. In fact, among the latter are many who may correctly be classed as "unemployables"—mentally defective or physically weak. Many of these men are incapable of doing a reasonable day's work on any farm. It is these that largely make up the crowds hanging around poolrooms, saloons, and employment agencies, at least during times when help is scarce. This condition often leads to the belief that there is plenty of help. Experience in such instances has frequently proved, however, that only a small percentage of the men care to consider a farm job, many of them hanging around for something calling for but two or three hours' work at a small wage, while of those who will consider farm work only a few can be used to advantage.

Handling Hobo or Tramp Laborers.—These men should be provided with a reasonably warm, dry place to sleep, but as a rule no special housing is needed for them. They are satisfied to furnish their own bedding and sleep on a pile of hay, and to get plain food such as meat, beans, bread, potatoes, pie, plain cake, prunes, and boiled raisins, if ample in quantity and well cooked.

As a class they are easily disgusted with poor machinery, and if an implement continually breaks, they are likely to quit without notice.

Two or three weeks constitutes the average stay of the typical hobo, and ranches using this class of labor are subjected to a heavy turn-over which is seldom traceable to any fault of the ranch management. These men will not stand crowding or pressing. If any attempt is made to drive them they will quit. Yet they can be held to the daily quitting time, although if over-time or extra work is attempted, a clear understanding must be had and extra money be paid.

A good way is to give them a good idea of just what is wanted, and then to let them work it out in their own fashion. Ordinarily they are well acquainted with the kind of work they hire out to do, and can accomplish more if allowed to select the method.

This statement is not to be construed as suggesting that the men are to be left entirely alone. The foreman or operator should certainly drop around once in awhile and see how things are going.

Sunday work is usually taboo with the real hobo.

One cannot afford to allow poker playing or gambling of any kind, or tolerate radical talk or preaching by discontented individuals.

Italian and Portuguese Laborers.—In general these men exhibit more or less of traits in common when employed in agricultural pursuits. They make some of the best ranch help now available. They are pretty fair in handling stock, and seem to have an inborn love of farming.

Characteristics of Italian and Portuguese Laborers.—As a rule they are rather sensitive and inclined to be emphatic in their likes and dislikes. They won't tolerate abusive treatment. When a new foreman is placed over them, they are likely to line up, look him over, and if the decision is adverse, to walk off in a body.

Once the employer secures their respect and esteem, they will work well and steadily. They will answer emergency calls to lend a hand either day or night. They require careful handling, and not every foreman is so gifted that he can make a success with them.

It is interesting to view the expanding of immigrants of these races. First of all they are entirely happy just to be alive and out in the open. They will work with crowbar, shovel, or pitch fork. Then they want to drive a horse—as in the barn dump cart, then they want a pair, until finally with eight or more head strung out in front of them, they feel themselves duly accredited citizens.

Negro Laborers.—The colored man—the mainstay of southern farming—is characterized as home-loving, peaceable, easy going, gregarious, sometimes shiftless, always good natured and affable. Negro labor characteristics are pretty generally the same throughout the South, although they vary greatly as to individuals. Men, women, and children all work, many of the men being exceptionally well developed physically. Greatest success is attained in the use of this labor when they are in sufficient numbers to insure companionship and to justify cabins separate from the main farm buildings. These people are good hand workers, *e.g.*, in hoeing, planting, weeding, clearing land. They take readily to handling horses and mules. Their best work is done in the warmer sections, as they dislike the colder climates and higher altitudes. They are careless about store accounts, are inveterate “borrowers,” and are neither frugal nor saving—a few dollars being a sufficient excuse for knocking off work until the accumulation is spent. Employers strive to prevent too long periods of inactivity by systemically encouraging spending for good food, fine clothes, phonographs, automobiles, and jewelry, utilizing the part payment plan for the more expensive items.

Handling Negro Laborers.—Negroes are not difficult to handle by men who are used to them and their ways.

Northern men occasionally acquire the knack of handling the typical Southern negro, but to learn it calls for 2 or 3 years experience and possibly costs the one who attempts it some money. The negro of the northern

and western States is easier to deal with. But all require much patience, as they are careless in reporting broken machinery, are notorious prevaricators, and constantly annex to themselves such minor things as chickens, lines from harness, axes, shovels, etc. Yet they can be absolutely trusted when sent on a definite errand, even though large sums of money are involved. To a man who gains his confidence the negro is faithful and loyal in the extreme. They are keen, shrewd students of human nature and always find the weak points in their employer's make-up.

Elements of success in handling are to: (a) have very little to do with the men other than to outline the work and see that it is carried out; (b) assign a stated amount of work for the day and when completed call it a day, letting the worker have any extra hour or two to himself, for the negro works better for this "tasking" him, or setting a job, than by set hours; (c) bluntly criticize unsatisfactory work; (d) be not over-appreciative, although an occasional word of commendation is desirable; (e) keep faith at all times. Being erratic, irregular workers, they require time off now and then to garden and raise chickens for themselves, or to go to funerals and festivities. The negro will also be faithful to his employer's "kin folks." Many of them are slow and inclined to loaf, but for people raised with them, or who understand them, they are good workers when kept under proper supervision.

Mexican Laborers.—The common Mexican peon or laborer is usually a peaceful, somewhat childish, rather lazy, unambitious, fairly faithful person. He occasionally needs to be stirred up to get him to work, but if treated fairly he will work faithfully.

Mexican labor is limited to the warmer sections. In the southwest Mexicans are extensively relied upon to supply cheap hand labor. The Mexicans are as a rule a clannish, self-effacing people. When held in not too large numbers or worked in competition with other races, they prove willing and fairly reliable help.

Of the two classes, resident and transient, the former is more desirable for farm work. Mexicans as a race can do practically anything, as thinning sugar beets, teaming, range riding, pick and shovel work, fruit picking and handling, cutting corn, etc. They are fairly good with machines but are not particularly adept at milking or handling complicated machinery.

Handling Mexican Laborers.—Mexicans should be kept in living quarters by themselves apart from other workers. If the men are single, or not accompanied by their families, one big room can be provided where they can all eat, visit, and sleep.

Unless one is able to speak their language, it is usually necessary to use one of their countrymen as a working foreman. If the men are handled in gangs, they should be accompanied by a pace-maker or strawboss at all times. In making decisions and in giving orders, the man in charge

of Mexicans must be courteous, but positive and firm; the Mexican, is like the Latin races, in that he appreciates courtesy.

Success in dealing with Mexicans involves (a) patience—with them and their work; (b) encouraging marriage; (c) letting them live on the farm or in the neighborhood where they can fix up little homes of their own, given them for nominal rent, including the use of enough land for garden, chickens, and cow; (d) showing no partiality; (e) refraining from intimacy and unnecessary visiting, though an occasional pleasant word helps if given without creating familiarity; (f) recognizing that if one is discharged, the rest of the crew are likely to walk off in a body; (g) working men individually as much as possible, rather than in gangs; (h) arranging for contract or piece work when practicable and if understood by the men, rather than by day labor.

Indian Laborers.—As a general rule Indians are satisfactory teamsters and harvest hands. They are much sought after where available. The number is, however, limited. The full-blood Indians are usually to be preferred to the halfbreeds.

Indians as a rule are not particularly steady, but given a manager they like, they will prove to be faithful, loyal, and willing.

Japanese Laborers.—The Japanese are good hand workers, especially at squat labor such as cutting asparagus, truck gardening, berry growing, sugar beet thinning and topping, melon picking, gathering walnuts, and for picking, sorting, and packing of various deciduous and citrus fruits.

They are not mechanically inclined, and only occasionally satisfactory as teamsters. Japanese are seldom found in dairies, or on beef or sheep ranges, and only occasionally in the production of such field crops as barley, wheat, oats, cotton and alfalfa.

Their specialty runs largely to the production of fruits, melons, rice, sugar beets, beans, corn, potatoes and truck crops.

As a class they are ambitious, studious (often studying deep into the night after a hard day), cleanly, self-effacing, and law abiding.

The business standards of the Japanese differ considerably from those of Americans. Hence, the Japanese does not feel compelled to respect his agreements if able to force a change more advantageous to himself. From American standpoints they are therefore sometimes tricky in regard to contracts, as for example in failing to remove stumps under a wood-cutting contract, or in seeking to fulfill the terms of an agreement with scant weights or measures. Where Japanese of both sexes are present in numbers, their personal habits are likely to be open to American criticism.

Handling Japanese Laborers.—The first essential of success in handling Japanese is clean quarters, not necessarily elaborate but where they can be by themselves. Such quarters should furnish facilities for cooking and living, and for heating water for tub bathing. They should be allowed

to prepare their food in their own way and by one of their people of their choice. The men can be worked individually or in gangs, but best results follow the practice of paying for their labor by piece work or contract, rather than by the day. As a guarantee to insure faithful performance of the entire contract, provision should be made when starting a piece of work to hold back a portion of their pay pending the completion of the job.

Unless the men understand English it is necessary to deal with them through a Japanese foreman, to whom orders are given for the entire crew. The American almost never understands their language and so is at a disadvantage if he tries to deal directly with individuals of a large crew, since many of them can not, or will not, understand orders given in English.

Japanese work best in their own way and if they know how to do certain work, they should be given an opportunity to do it by whatever method they are used to pursuing.

Hindu Laborers.—Hindu laborers—of whom there are several sorts—do not appeal as overly desirable help. By Hindus is here implied any native of British India. In their lean, lanky, enervated condition they lack muscle, will power, and energy. They seem willing, try fairly hard, and under present labor conditions are useful in beet, celery, rice, and other work where hand labor is needed in abundance.

The squalid and dirty living arrangements of the Hindus are particularly open to objection.

When a choice is possible, the Mohammedans are preferred to the other natives of India.

Chinese Laborers.—Chinese labor is now largely a thing of the past. A few old men still work in the potato and sugar beet fields and at vegetable gardening, but they are fast dying off. The young native born Chinese prefer the store or the kitchen. Chinese labor is no longer a factor with the American farmer, outside of a few cooks, gardeners, and houseboys.

Chinese labor as a rule is slow in motion, but very reliable and trustworthy. The Chinese takes a pride in his work and in fulfilling his contracts. He is set in his ways, however, and when taught a certain way to do a thing will continue to follow the method ever after.

Handling Chinese Laborers.—The Chinese are content with much to do and little to say. They work well in groups. The Chinese respect seniority among themselves, and the oldest Chinese is looked up to by the younger as guide and advisor, so that it is well to put this man in charge of a crew and to give orders only through him, letting him split the crew and assign jobs as he sees fit. Usually, if working in pairs, men of about the same ages work together—never a young man and an old one in the same team. For the sake of reducing friction, and possibly worse,

Chinese crews should be composed of men belonging to the same "tong" or to friendly tongs.

Kind of Help Needed by Farmers

The kind of help needed by the individual farmer depends on the character of his operations.

The general farmer needs steady, year-round men willing and able to do the variety of work incident to the production of stock and crops, to be supplemented in times of harvest or other "peak load" needs by additional hands for temporary use. The farmer tending toward specialization, like dairying, fruit raising, sugar beet production, or field crops such as grain or hay or beans, requires a type of labor able to do just the kind of work necessary to successful production in his particular industry.

A dairyman wants men all the year who are able and willing to be on hand twice a day at 12-hr. intervals, milk 20 to 30 cows, and possibly feed in the barns and clean out the milking sheds. An alfalfa hay producer wants husky men during the harvest season who can handle teams in mowing and raking, lend a hand at cocking, hauling, and stacking, and irrigate between cuttings. A grain grower requires men for the definite periods of putting in a crop. He then has an interval with no work until the hay or grain harvest starts. If harvesting is done by contract, the grower's interest in labor ceases with the hauling off of the crop and its safe delivery to car or warehouse. The fruit grower needs additional help for any work he can not do himself. On small acreages, this means extra help only at harvest—to gather the fruit and prepare it for sale or for drying—and in some cases at pruning time. The man operating an extensive acreage of fruit does little more than supervise the work, and in addition to harvest hands needs men to prune, spray, cultivate, and irrigate. Even among the fruit men a difference exists in the kinds of usable labor. For picking up prunes or walnuts, any labor can be utilized and so school children, Indians, and whole families of unskilled and inexperienced people are found to be satisfactory. For picking pears, or apples, or peaches, to be prepared for shipment, only experienced, skilled help is profitable. Spraying can be done with any good worker, but pruning demands men who understand the principles involved. Irrigating requires men who know how to apply water properly; it can not be done to advantage by inexperienced hands. The poultry man wants help that understands poultry feeding, sanitation, breeding, and preparation of poultry products for marketing. This work consists of much detail and requires a man who not only can do the work but is quiet and gentle with the fowls. The sugar beet grower requires men able to do the hard, monotonous, back-breaking work of thinning the growing plants, and pulling and topping the mature crop to prepare it for shipment.

All this shows what a great variety of men is needed to meet all farm needs. Agriculture as it stands today represents the cosmopolitan effort of representatives of many nations, so many in fact that to list them would include almost all that have experienced much emigration—China, France, Germany, India, Italy, Japan, Mexico, Portugal, Russia, Sweden, and on around the globe.

Classification of Farmers' Labor Needs.—Farmers' needs, although diverse in the extreme to meet individual requirements, tend to fall into three general classes:

1. *Experienced Unskilled Help.*—Experienced unskilled men needed for the hard, tedious, back-breaking work which Americans can not

generally be obtained to do under prevailing wages and other conditions; *e.g.*, asparagus cutting, onion work, sugar beet thinning and topping, hoeing beans, digging potatoes, and cotton and cantaloupe picking.

2. *Experienced Skilled Help*.—Experienced skilled men able to do farm work without special direction, such as milking, handling teams, running machinery (*e.g.*, mowers, binders, harvesters, tractors, engines), range riding, heavy work as bucking sacks and stacking hay, and special work like pruning and spraying trees, building fences, and picking certain fruits requiring judgment.

3. *Unskilled, Inexperienced Help*.—Unskilled inexperienced people suited to some of the more simple operations such as picking up prunes and walnuts, hoeing weeds, cultivating growing crops, and picking certain fruits, work that requires little or no judgment.

In times of stress or scarcity of farm help, the greatest difficulty lies in meeting the need of the first class, and the least in taking care of the work that the third class can do.

Transient and Seasonal Labor Needs.—A farm manager operating with specialized crops, requiring large numbers of men, must give special thought and effort to insure a sufficient supply of labor at the time when it is needed. A study of seasonal needs and available supplies should early take place.

Periods of Seasonal Labor Needs.—Examples of seasonal needs are easy to find. For instance, the following table shows the period of greatest need for selected industries (California):¹³⁶

TABLE 229.—PERIODS OF SEASONAL LABOR NEEDS, CALIFORNIA

Industry	Locality	Greatest period of needs
Grain planting.....	Central California	December–January
Grain harvest.....	Central California	June 15–August 15
Cutting asparagus.....	Stockton delta	May 15–July 1
Cantaloupe harvest.....	Imperial Valley	May and June
Sugar beet thinning.....	Southern California	February and March
Sugar beet harvest.....	Southern California	August and September
Sugar beet thinning.....	Northern California	March and April
Sugar beet harvest.....	Northern California	September
Cotton chopping.....	Imperial Valley	May
Cotton picking.....	Imperial Valley	November and December
Egyptian corn harvest.....	San Joaquin and Sacramento Valley	September
Alfalfa hay harvest.....	San Joaquin and Sacramento Valley	April to October inc.
Pruning fruit trees (deciduous).....	.....	January and February
Harvesting fruit crops (deciduous).....	.....	August and September

Amount of Seasonal Labor Needs.—The following table shows something of the variable need. This need can not be accurately predicted in advance, because no one can foretell the influence of drought, rain, or hot or cold weather advancing or retarding the period harvest.

TABLE 230.—AMOUNTS OF SEASONAL LABOR NEEDS

Industry	Acreage	Number men required	Length of season in normal year for given field
Hops.....	100	200-300	3-4 weeks
Asparagus.....	100	20-30	6-8 weeks
Sugar beet thinning.....	100	20-30	2-3 weeks
Sugar beet harvest.....	100	10-20	3-4 weeks
Picking up prunes (3 pickings).....	100	7-10	4-6 weeks
Picking pears.....	100	30-100	2-3 weeks
Picking raisin grapes.....	100	8-20	3-4 weeks
Cutting Egyptian corn.....	100	7-12	2-4 weeks
Picking cotton.....	100	10-15	2-3 months
Digging potatoes.....	100	6-35	3-8 weeks

The Worker's Viewpoint

To handle farm labor successfully, one must understand the worker's state of mind toward the conditions under which he is to labor. Usually six factors are vital to the farmhand, and the length of time that he remains, and the faithfulness with which he performs his duties, are in direct ratio to the degree of perfection attained in providing these six. They are (1) working conditions such as heat, dust, rains, isolation, cold weather, snows, remoteness, risk, kind of work stock and implements, etc., (2) working hours, (3) board, (4) lodging, (5) wages, (6) treatment by foreman or farmer. No attempt has been made to give these in order of their relative importance, as the listing varies considerably with the individual. A seventh—opportunity for advancement—is becoming more and more vital, and, if good men are to be retained on the farms, this factor must receive more attention in the immediate future. Young men of ambition may consider wages and advancement as first in importance; hoboos consider board and hours as paramount; negroes and Mexicans place treatment by foremen well to the front; married men center on housing and wages.

Of late years, because of shortage of farm labor and need of increased food production, considerable attention has been drawn to these requirements.

Student Experiences Indicate the Worker's Viewpoint.—To see how it works in any State, an investigation might follow the plan of the author,

who, by means of classes in farm management, has drawn for several years upon the California experiences of students employed in farm and ranch work. To these young men, intelligent, of impressionable age, reasonably unbiased, quick to observe, and keen to judge, were put questions concerning working hours, board, housing, wages, and supervision as they had found them.

Student Experiences as Farm Laborers.—A recent California compilation resulted in enough data to give a good cross-section of conditions in this State. They summed up as follows:

TABLE 231.—STUDENT FINDINGS AS FARM LABORERS

		PERCENTAGE FINDING SATISFACTORY
Working hours:		
Satisfactory.....	57	}88
Too long.....	8	
Too short.....	0	
Board:		
Satisfactory.....	40	}55
Fair.....	17	
Poor.....	16	
Housing:		
Satisfactory.....	28	}39
Fair.....	16	
Poor.....	28	
Supervision:		
Satisfactory.....	48	}66½
Fair.....	12	
Poor.....	12	
Wages:		
Satisfactory.....	27	}59
Fair.....	13	
Too low.....	6	

This table certainly shows that there are grounds for improvement where these students went. And yet many statements, frequently made by uninformed or misinformed people, are not founded on facts, as the oft repeated sentiment to the effect that if farmers would pay living wages or provide decent living or proper board they would have no trouble in getting men. There are grounds for complaint concerning treatment of men, but a sweeping statement is a distortion of fact. That there is room for a clearer sense of individual responsibility on the part of the farmer towards labor is apparently offset by the need for a feeling of responsibility towards his work on the part of the laborer.

Student Adverse Comments.—Sometimes humorous, always interesting, certain student accounts of bad conditions may serve to point the desirability of a little study of local conditions to find out what can be done in the way of bettering them.*

* These portray California experiences.

Student Adverse Comments on Board.—CASE I.—“The food was exceedingly plain and served only in moderate amounts and with very little variety.”

CASE II.—“The food was very inferior. The milk was skimmed, flavored mainly by the drowned flies contained therein. Steaks were the cook’s specialty. If they were placed on the railroad track, they would wreck the fastest train known. They were certainly first-class material for making saddles. Every time I think of Hing Loo, I lose my appetite.”

CASE III.—“Food was at times very bad. There was always plenty but the cooking was often very bad. The cook would become very lazy at regular intervals and the food would be correspondingly bad. Every now and then, the man in charge of the cookhouse would go after the cook and for a short time the meals would be good. However, as a rule, the food was very poorly cooked and at times not fit for hogs to eat.”

CASE IV.—“Food was not very good, that is, not well cooked and was too small in quantity. If you sometimes came late to the table you might, many times, not get enough to eat.”

CASE V.—“The board on the first ranch was none too good, the food sometimes half cooked and often too dirty to enjoy eating. The main objection or complaint was the food taken to the men in the field that were working too far to come to camp. This always consisted of a dry piece of meat left from the day before and some dry bread, a piece of pie; all of which was usually flavored with coffee which had been tipped over in the pail.”

Student Adverse Comments on Working Hours. CASE I.—“Working hours were long. Feed and harness team between 5 and 6 in the morning, going to the field at 6.30 or 7, leaving the field at 12 for noon and starting back at 1, then leaving field at 6 and take care of team after reaching the barn. The distance to and from work made the day longer than hours as given indicate.”

CASE II.—“I was milking a string of cows besides doing a good day’s work picking apricots.”

CASE III.—“The day’s work was the usual 8-hr. day of the farmer, (in baling hay), namely 8 hr. in the forenoon and 8 hr. in the afternoon.”

CASE IV.—“I struck a wonderful working proposition one fine July. The most conspicuous thing about the job was the hours, for the twentieth century, arising at 4.45 a.m., milking cows and separating the milk, breakfast, working in hay until noon, then more hay work from 1 to 6 p.m. The boss milked the cows at night.”

CASE V.—“The hours were very long, beginning at 3.45 a.m. and finishing at 6 p.m.”

Student Adverse Comments on Living Conditions. CASE I.—“The living quarters were rather poor and the beds had bedbugs. I slept in an old wagon filled with straw, using a couple of my own blankets.”

CASE II.—“A ‘berth in the Pullman’ consisted of a four-posted arrangement filled with straw, bedbugs and fleas, mostly bedbugs. They would hide in the stalks by day and crawl out of their shell per p.m. and attack their most beloved enemy.”

CASE III.—“Upon our arrival in the evening we were shown the bunk-house and told that the ‘feathers were in the barn.’ We were told to come in to supper with the men at 6 o’clock.

“Living quarters were very disreputable—dirty, dusty, and full of fleas and bedbugs, etc. Another man and I came to work at the same time and after one superficial glance at the sleeping quarters we decided to sleep outside under a tree on a pile of hay. Within a week, nine other men had moved out of the bunk-house and followed our example of sleeping under the stars.”

CASE IV.—“The living quarters were a fright. They were low, dingy old shacks full of dirt, old shoes and clothes, and specked with chicken droppings where the

chickens had roamed or roosted. The place seemed alive with insects and germs. I immediately asked permission to sleep on a haystack nearby, since I had my own blankets together with my belongings, which were wrapped in a large red handkerchief. This I called home except when a thunder shower came along, when the haywagon furnished some covering."

Student Adverse Comments on Supervision. CASE I.—"In my opinion, the men on the ranch were not handled very well and, although we were all driven, we didn't give as much as we would under a more congenial management. The way this foreman handled us sure showed that men can't be driven and I believe more could have been received from the men had he been a little more 'one of us' and not been such a 'slave driver.'"

CASE II.—"The foreman was very severe and overbearing, but I ignored him, since all that I wanted was experience, and, believe me, I got it. I was sent down well-pits, 100 ft. in depth, in mud up to my waist, to examine leaks. On windy days, I was sent to the top of old windmills about 50 ft. in height to dismantle the uppermost machinery. He never had a word of encouragement or a smile upon his countenance."

CASE III.—"No one ever interfered with the men when they were at work. The work was never found fault with nor was the work ever commended. A man might work extra hard in order to finish a job up in a hurry or else take extra pains with the work. However, neither the foreman nor the superintendent would ever say a word about the work to anyone. The same applies to work done carefully, as well as work done in a sloppy and careless manner. His orders were usually very short and indefinite. He would seem to take it for granted that the workman could read his mind and could tell exactly where and what was to be done from a very few indefinite orders."

CASE IV.—"When I first landed on the job, the farmer walked about the place with me, talking incessantly and telling me he had changed the place from a desert to its present state. From that time on, he never acted as friendly except on days when he had been 'in town.'"

"He generally set us to work on new jobs in the morning after breakfast. His directions were brief but usually very indefinite, so that we often worked quite a while without being sure that we were doing the work to suit him, as for instance: 'You fellows can go to work on that ditch on the last forty. Take four mules with you. It's the old ditch running past the potato patch.' With that he was off with a bang, and seldom spoke of the work until we came in with the implements. He never tried to hurry us and even when the work was piling up he seemed to have all the time in the world."

CASE V.—"On this ranch of about 800 acres in fruit there is one foreman who is both superintendent and foreman. There is not a regular bookkeeper so he has that to do. You see that from the start mismanagement is the cause of the trouble."

"I know that half the time he will send a man out with a team to do some work and never come near him during the day or maybe not at all while he is doing the whole job. I have seen men on the ranch lay down in the shade and sleep an hour or two in the forenoon and come back and do the same thing in the afternoon. The men never make another round after 11 o'clock or after 5 o'clock in the evening. It is no wonder that they do not complain of hours or wages."

"The whole trouble I think lies with the two owners who think it pays to try to get something done for nothing and from what I have seen of this place I have come to the conclusion that it is the most expensive in the long run."

What Constitutes Good Working Conditions?

In holding and handling help, and making a profit therefrom, so much depends upon proper provision of board and lodging, payment of fair wages, right length of working day, and manner of supervision, that a discussion of what is being done, or can be done, may not be out of place.

Working Hours.—Statistics, compiled by the U. S. D. A. Bureau of Statistics, averaged for the United States, show the average farm work day for the different seasons to be:

UNITED STATES	HOURS	MINUTES
Spring.....	9	54
Summer.....	10	54
Fall.....	9	52
Winter.....	8	33
Yearly average.....	9	48

The hours of farm labor range very close to 10 per day. The length of the day varies of course with the season. Rush work means longer hours, while winter means less daylight and hence shorter working days.

The average ranch day—10 hr.—is neither too short nor too long for the variety and kind of field work to be done on the farm. Research has unearthed nothing to show what is the ideal length of day for the greatest efficiency, but with the kind of labor available, accustomed to a given pace, there is no need to suggest a change in the average farm day. While general practice indicates the 10-hr. day as a limit, it can not absolutely be so, since the very nature of farm work, quite apart from seasonal changes that necessitate a great rush at certain times (*e.g.*, premature ripening of fruit or threatening weather in hay making) forbids rigid regulations. The big farms and ranches are about equally divided between 9 hr. and 10 hr. as constituting a standard day; on the small farms, the hours are not definite or so nearly standardized. There is more danger of the working owner's trying to crowd his labor unfairly than where paid foremen direct the men.

Apparently a logical plan is to arise at 6, go to work at 7, provide an hour off at noon, and quit at 6 (or at dark during the winter months). This arrangement means that the evening meal is over by 7. Two or three hours still remain for recreation, card playing, reading and writing, leaving 8 hr. for sleep.

No Sunday labor should be demanded other than that absolutely necessary.

Boarding the Men.—A good deal of confusion exists in the minds of many farm managers as to how well they must feed their men and how well they can afford to feed them. The matter, however, can be easily determined for any place, no matter whether a few or many men are employed. Since the men's board must be considered a portion of the

wages paid, any reduction in the character of the board will be equivalent to a reduction in the men's wages. One will find out pretty quickly that this is the way the men view the matter.

Plain Cooking.—The men prefer plain cooking, but they want clean food and plenty of it. A little experience in this line is worth more than a whole lot of advice.

Catering and Tastes.—Different classes of men desire different kinds of food.

The Italian, for instance, is satisfied with plenty of soup, bread, macaroni, spaghetti, and green vegetables, especially onions. The American wants plenty of meat, potatoes, desserts, tea, and coffee. The Mexican is very fond of green vegetables, beans, bread, and salads. The cooking should therefore appeal to the class of men employed.

Cost of Meat.—Of the different kinds of food stuffs, meat is the most expensive. For 2,600 men worked by one concern, the monthly meat bill was between \$12,000 and \$14,000. No single item runs into money so fast as meat. And yet meat is necessary to secure best results from men.

Substitutes for Meat.—Possible substitutes for meat are milk, butter, and eggs. Eggs at certain times of the year may prove cheaper than meat, while milk should be supplied in quantity sufficient for drinking. The use of butter, while a costly item of food, helps to vary the diet.

Another substitute for fresh meat is available in packing-house by-products. The men welcome an occasional change to sausage, head cheese, and pickled pigs-feet, salt pork, lambs' tongue, hog jowls, corned beef, and the like.

Use of Vegetables.—Vegetables should be served in abundance and variety, both cooked and as salads. If it is not possible to grow them, they should be purchased. They possess certain necessary conditioning properties and provide also the kind of food materials necessary for hard work.

Use of Fresh Fruits.—Fresh fruits are not generally eaten to any great extent by working men. Cantaloupes and watermelons are perhaps an exception. It pays, however, to give them all they will eat.

Cooked fruits such as baked apples, apple sauce, dried prunes, apricots, peaches, apples are appreciated and should be supplied twice a day.

Use of Preserved Fruits.—It does not pay to preserve fruits for the men except to be given as occasional delicacies or on state occasions.

Good Board Necessary.—It pays to give good substantial board. Hard work calls for plenty of nourishing, wholesome, *well-prepared* food in variety sufficient to guard against cloyed appetites. A well-fed man is usually a contented man and therefore a man easier to handle.

Kitchen Economies.—Many savings are possible in the kitchen by a little planning. Stewed meat is cheaper than roasts or fries. Careful saving of drippings from fat meats will cut down the lard and compound bills. Bread cut for the table means less waste than when put on in loaves. Pies cut before going on the table insure fairer distribution. Soups, hashes, and puddings utilize left-overs to good advantage.

The board should be such as the men are used to. Foreign flavors and unfamiliar dishes should be avoided.

Meals should be served at regular hours and promptly on time.

The dining room should be kept free from flies, and all table covers, syrup holders, sugar bowls, etc. kept strictly clean and free from stickiness and dirt.

The various foods should be served in large dishes, from which men are to help themselves.

If the quality and quantity of the board doesn't suffer because of separation, men prefer a table, or better a room, by themselves. Family arguments and quarrels, and family discussions, are of little interest to outsiders. An arrangement by which the family is kept by itself is usually more satisfactory from all standpoints.

When cattle or sheep outfits are in for camps, supply fruits, vegetables, etc., with caution, otherwise men may be discontented when such things must be again cut off.

In general, the matter of boarding men is well worth all the study one can give to it, especially as the possibility of leaks is nowhere greater, in proportion to the expense involved, than in the kitchen.

Example of Kitchen Supplies.—A western concern engaged in farming and stock raising, and having a monthly payroll averaging about 2,500 men, has worked out four lists of supplies which will be furnished on requisition to the camp and ranch foremen. These lists represent about the minimum and should be interesting for comparison and suggestion.

TABLE 232.—LIST OF SUPPLIES ISSUED TO RANCH CAMPS—CATTLE, SHEEP, HOG, PLOW, SCRAPER, WOOD, ETC., AND LABORERS' TABLES

Bacon (ranch) only when fresh meat supply is not available
 Baking powder
 Beans—pink
 Beans—white
 Beans—bayo
 Canned tomatoes (for soups only)
 Chili powder
 Codfish
 Coffee
 Compound (in small quantities)
 Corn meal
 Corn starch
 Cottonseed oil

TABLE 232.—(Continued).

Cured meats, such as pure pork, pigs feet, tongue, hog jowls, and corned beef
 Dried fruit, in variety, *i.e.*, apples, pears, apricots, peaches, prunes
 Extracts—lemon and vanilla
 Flour
 Garlic
 Ginger
 Hominy
 Macaroni
 Mustard
 Oats (rolled)
 Onions
 Pearl barley
 Pepper
 Pickles
 Pork (salt)
 Potatoes
 Raisins (small quantities)
 Rice
 Sage
 Sago
 Salt
 Soda (baking)
 Spaghetti
 Sugar
 Syrup
 Tapioca
 Tea
 Vinegar
 Yeast

TABLE 233.—LIST NO. 2: SUPPLIES ISSUED FOR FOREMENS' TABLES, CONSTRUCTION AND SURVEY CAMPS

The following additions to LIST No. 1 will be allowed:
 Butter (to be made on ranch, not purchased)
 Canned tomatoes
 Catsup
 Cocoanut
 Compound
 Corn starch
 Crackers
 Eggs (to be obtained on ranch, not purchased)
 Ham
 Milk (canned, where cows are not kept)

TABLE 234.—LIST NO. 3: SUPPLIES ISSUED FOR SUPERINTENDENTS' AND CLERKS' TABLES

The following may be allowed in addition to Lists 1 and 2.
 Canned corn (in winter)
 Canned milk
 Canned tomatoes
 Chocolate—cooking

TABLE 234.—(Continued)

Eggs
 Fruits in season (when supplied from ranches)
 Bacon
 Jello
 Jelly
 Lard
 Maple syrup
 Olive oil
 Oysters (canned)
 Sugar—lump
 Sugar powdered
 Worcestershire sauce
 (Purchase of canned fruits and canned vegetables other than those specified will not be allowed.)
 (Canned fruits should be put up on the ranches. Vegetables are to be grown on the ranches.)

LIST No. 4

Supplies issued to men traveling with cattle, horses, or other stock, from place to place:

In addition to the articles in LIST No. 1 which can be transported, add:

Bacon
 Canned corn
 Canned milk
 Canned tomatoes
 Cheese
 Ham
 Pickles

Cost of Boarding Men.—Comparison of wages with and without board shows that the value of the board in money is, in general, equal to 43 per cent of the wages paid for labor without board to regular men and 22 per cent to transient labor, based on periods of work other than harvest.* The value of board supplied to workers should, then, reach this figure. It is commonly safe to figure at from 75¢ to \$1.50 per day per man. This limit determines what one can afford to serve. It will eliminate such things as eggs in winter, butter for cooking purposes, chickens, and the fancier kinds of tinned stuff. It will, however, be sufficient to give the men a good variety of wholesome food, if properly prepared.

The smaller the number of men to be fed, the greater will be the pro-rata cost, especially if it is necessary to hire a cook. As a rule, a man cook will handle up to 15 men without a helper, and up to 25 or 30 men with a "boy" to help him. The wages will be \$75 to \$125 and \$60 to \$100 per month for each. For 20 men or less, it is sometimes possible to hire a married couple, the woman to cook and the man to work as a stableman, as a hand, or even as a straw boss or foreman. Such couples command from \$100 to \$175 a month for the two, although experience indicates that the cheaper couples are less desirable. Best results follow paying

* See table, page 540.

the man wages for his work, and his wife extra for her cooking. The amount of wages a woman is entitled to depends on the number of men she cooks for, and this in turn depends entirely on her ability. There is no set rule. Some women can cook for only four or five men, others can handle a dozen. One basis is that service costs \$7 per man. The first woman is then worth but \$35, while the latter will work for \$85.

On the other hand, if one must keep a cook it is evident that considerable thought should be given to planning the work so that the cook will work to the best advantage at all times. That is, if a job can be handled as advantageously with 20 men as with 12, service will be cheaper by keeping as many men as the cook can handle. Or, on the other hand, if the work will stand some prolonging, it may pay to cut down the crew to a point where they can be boarded at less expense.

Keeping Track of Kitchen Costs and Practices.—Whatever system of boarding is followed, it is desirable to keep track of kitchen costs. This should be done by keeping a record of the cost of the food, whether supplied by the farm or purchased, the wages of the kitchen help, and the number of meals served. Then, in addition, frequent inspections should be made of the kitchen methods. The refuse barrel should be carefully watched, to check any extravagance on the part of the cook. A wasteful cook can equal his wages in throwing away things capable of being worked up into hash, stews, puddings, etc.

Examples of Cost of Boarding Help. *Studies of Cost of Board in 10 States.*—In a study in 10 typical States, the cost of board and lodging was found to be¹³⁷ for the year 1913:

TABLE 236.—AVERAGE ANNUAL COST OF FOOD, FUEL, OIL, HOUSE RENT, AND HOUSE LABOR FOR EACH PERSON IN THE FARM FAMILY

State	Value of					Total cost of board and lodging	
	Food	Fuel	Oil	House rent	House labor	Annual	Average per month
North Carolina.....	\$ 89.32	\$ 9.68	\$0.69	\$12	\$34	\$146	\$12.18
Georgia.....	88.92	9.56	0.96	17	25	141	11.75
Texas.....	92.30	6.91	1.43	16	41	158	13.17
Kansas.....	99.97	6.89	1.60	26	58	192	16.00
Iowa.....	105.67	14.23	1.31	36	64	221	18.42
Wisconsin.....	80.16	13.53	1.65	31	54	180	15.00
Ohio.....	91.07	13.71	1.19	42	49	197	16.41
Pennsylvania.....	75.40	8.83	1.21	31	41	157	13.17
New York.....	94.08	17.70	1.45	47	56	216	18.00
Vermont.....	75.34	13.83	0.96	19	38	147	12.25
Average.....	\$89.23	\$11.49	\$1.25	\$28	\$46	\$176	\$14.64

Cost of Board—Minnesota.—A study covering 9 years (1905–1914) in Minnesota⁸⁸ showed:

TABLE 237.—YEARLY COST OF BOARD—MINNESOTA
Yearly Cost per Person

Year	Food	Labor	Equip- ment	Fuel	Total without rent	Rent	Total cost
1905	\$78.42	\$44.85	\$ 9.60	\$11.20	\$144.07	\$21.36	\$165.43
1906	73.83	47.83	9.32	11.12	142.12	21.36	163.48
1907	90.16	54.02	10.92	12.19	167.29	21.36	188.65
1908	77.61	45.73	7.94	10.31	141.59	21.36	162.95
1909	77.33	44.89	7.58	13.54	143.34	21.36	164.70
1910	84.44	49.22	8.16	13.98	155.80	21.36	177.16
1911	63.52	47.04	6.47	10.75	127.78	21.36	149.14
1912	66.25	44.38	6.17	8.81	125.61	21.36	146.97
1913	54.77	46.89	5.56	6.12	113.34	21.36	134.70
1914	61.85	47.36	6.17	6.72	122.10	21.36	143.46
Average.....	\$74.96	\$46.62	\$ 8.17	\$11.01	\$140.76	\$21.36	\$162.12

Housing Farm Help.—A better class of men can be secured and retained if the housing facilities are good.

Housing Depends on Help Employed.—The type of bunk-house or rooming quarters depends on the kind of labor being employed. Good American laborers (including agricultural college students) are worthy of well constructed, separate rooms, clean showers and toilets, a reading room.

Hoboes, on the other hand, are best cared for with some cheap shelter where they can “flop.” They are not particular as long as they keep dry and reasonably warm.

Quarters provided for coolie, Oriental, negro, or Mexican labor are generally not suitable for men demanding American standards of living. This fact is especially worthy of attention in times of scarcity of labor whenever it becomes necessary and advisable to utilize men from cities or towns who, used to sanitary conveniences, some privacy, and reasonable facilities for recreation during hours off duty, will not submit to herding in common quarters.

Putting many men together in one big room will work fairly well with foreign labor, as with Italians and some classes of native labor (*e.g.*, hoboes or men temporarily out of funds), but it is not conducive to securing or holding the best class of farm labor. Mexicans, negroes, Japanese, and labor of similar requirements, prefer little shacks or humble cottages off by themselves where they can bring their families and perfect their own living arrangements.

Use of Separate Rooms.—Where it can be done, the best arrangement consists in giving the men separate rooms, or at least putting not over two men in a room. This method necessitates more building accommodation, but it pays in the long run. Men in a bunk-house consisting of one room used both for sleeping and recreation have no privacy. It is natural for the men to want to get together for amusement or sociability, and they should have a well ventilated, properly lighted room, with facilities for heating, where they can assemble. But the sleeping quarters had better be separated, where the men can retire early without being disturbed by others, or where they can read, shave, or write without disturbance. In hot countries, the use of summer sleeping porches is advisable.

Condemn Poor Quarters.—There is no justification for the dirty, unsanitary, poorly lighted, hot-in-summer, cold-in-winter shack hidden away back of the barn or beside the manure pile.

Investigations tend to show that in many sections the housing of farm hands is unsatisfactory. This inadequacy is particularly well known to all those acquainted with western ranch life.

Money spent in fixing up a comfortable, attractive place—based on the demands of the labor being employed—is well worth while.

Limitations of Small Employer.—It should be recognized, however, that it is not always possible for the small employer to keep pace with the large employer in providing proper quarters. Fluctuating need of men, combined with the short period when rooming and cooking quarters are in use on many farms, explains why satisfactory living conditions, readily provided where labor is employed a large part of the year, are not feasible when a large army of help is needed for but a few days. Yet improvement even under these circumstances has been found possible, as for example by the cooperative maintenance of a central camp by several neighboring farmers or by a community.

One must recognize, too, that the present housing and sanitary conditions in many communities are due to the kind of labor to be housed. Migratory labor has in the past been careless and even downright unappreciative of attempts to provide more livable surroundings. Yet, if a better class of labor is to be attracted to many districts, more attention to good housing is imperative. A farmer must exert himself to differentiate between classes of labor and to provide conditions which will attract and hold the class wanted.

Selection of Beds.—The matter of beds is important. For this purpose, the iron cot bed with woven wire springs, costing at wholesale about \$3 or \$4 each, is very desirable. They are easy to clean, long-lived, and neat in appearance.

If bedding is furnished, mattresses costing not less than \$2 each wholesale should be furnished. Where the men furnish bedding, they should

also provide their own mattresses, since one man usually objects to sleeping on a mattress that has been used by some predecessor; or else ticking can be supplied, sewed to shape, but so made that it can be emptied readily, washed, and refilled with straw or excelsior. Who shall supply the bedding is to be decided for each individual case, since it depends to a large extent upon the kind of man employed.

If men are to do continuous hard work, they need good rest at night. Quiet, privacy, and a comfortable bed with ample bed clothes, will go far towards keeping an organization up to a high degree of efficiency, and, by keeping men contented, will tend to keep the men from going to town at night.

Providing Lights.—Good lights should be provided for the living room especially during the winter months, for the men who like to read and write.

Providing Lockers.—Lockers or clothes receptacles, each provided with a lock, if more than one man occupies the room, are necessary to the room equipment.

Ventilation of Sleeping Quarters.—Ample ventilation of sleeping quarters should be insured by means of windows and eaves or gable openings. All windows, doors, and ventilator openings should be well screened.

Washing Facilities.—Clean and sanitary facilities for washing, bathing, and cleaning clothes must be provided, and, if possible, hot water should be available on certain days or at stated hours.

Showers with good drainage rather than bath tubs are preferred.

During rainy or winter seasons, a suitable place for drying clothes is needed.

Improving Quarters Helps Individual Employer.—It should be borne in mind, though, that improvement of quarters does not to any extent augment the available supply of labor. It merely aids the individual making the improvement to obtain and hold help in competition with other employers. Neither will it entirely eliminate the trouble of holding men under difficult conditions of dust, heat, isolation, or unattractive work.

Better housing does not, as a rule, necessitate extensive or expensive alterations. Satisfactory structures can be erected for a very reasonable sum, and this expenditure is usually well worth while, especially with help ready to respond to good accommodations.

Supervision of Farm Help.—Supervision refers to the directing and controlling of labor by the farmer, foreman, superintendent, or whoever comes in actual contact with the men. Successful supervision calls for more than passing attention. The subject is discussed at length in the sections "Classes of Farm Labor," and "Handling Labor."

Wages Paid to Farm Help in United States.—The trend of wages in the United States is shown in the following table:²³⁸

TABLE 238.—WAGES OF HIRED MALE FARM LABOR—UNITED STATES, 1866-1919

	By the month		Day labor at harvest		Day labor not harvest	
	With board	Without board	With board	Without board	With board	Without board
1919	\$39.82	\$56.29	\$3.15	\$3.83	\$2.45	\$3.12
1918	34.92	47.07	2.65	3.22	2.07	2.63
1917	28.87	40.43	2.08	2.54	1.56	2.02
1916	23.25	32.83	1.69	2.07	1.26	1.62
1915	21.26	20.15	1.56	1.92	1.13	1.47
1914	21.05	29.88	1.55	1.91	1.13	1.45
1913	21.38	30.31	1.57	1.94	1.16	1.50
1912	20.81	29.58	1.54	1.87	1.14	1.47
1911	20.18	28.77	1.49	1.85	1.09	1.42
1910	19.21	27.50	1.45	1.82	1.06	1.38
1902	16.40	22.14	1.34	1.53	0.89	1.13
1899	14.07	20.23	1.12	1.37	0.77	1.01
1898	13.43	19.38	1.05	1.30	0.72	0.96
1895	12.02	17.69	0.92	1.14	0.62	0.81
1894	12.16	17.74	0.93	1.13	0.63	0.81
1893	13.29	19.10	1.03	1.24	0.69	0.89
1892	12.54	18.60	1.02	1.30	0.67	0.92
1890	12.45	18.33	1.02	1.30	0.68	0.92
1888	12.36	18.24	1.02	1.31	0.67	0.92
1885	12.34	17.97	1.10	1.40	0.67	0.91
1882	12.41	18.94	1.15	1.48	0.67	0.93
1879	10.43	16.42	1.00	1.30	0.59	0.81
1875	12.72	19.87	1.35	1.70	0.78	1.08
1869	16.55	25.92	1.74	2.20	1.02	1.41
1866	17.45	26.87	1.74	2.20	1.08	1.49

Sectional Variations in Wage Scales.—The influence of locality upon the rate is illustrated in the next table. Different sections possess different wage scales, depending on the type of agriculture and the demand for and supply of labor. No special comments are necessary, other than to point out the rather striking range between the relatively low schedules of the southern states and the relatively high rates of the western states, and the fact that the figures tend to prove that farmers, for their own protection, are obliged to adjust their wage scales to meet those in force in other industries which draw upon the same reservoir of labor. The data are from U. S. D. A. Bureau of Statistics studies.

TABLE 239.—MONTHLY RATES FOR MALE LABOR, SHOWING SECTIONAL VARIATION IN WAGE SCALES, WITHOUT BOARD AND TO NEAREST DOLLAR¹³⁹

Year	1890	1910	1919
North Atlantic States.....	\$25	\$33	\$63
South Atlantic States.....	14	18	44
North Central States east of Mississippi River.....	23	32	59
North Central States west of Mississippi River.....	23	35	68
South Central States.....	17	22	46
Far Western States.....	35	46	87

Value of Board as a Part of Wages.—The value of the board can be calculated from the difference in the monthly rates with and without board. Averaged for 1890, 1902, 1910, 1912, and 1919¹⁴⁰ the difference amounted to:

FOR UNITED STATES

Wages without board, per month.....	\$30.76
Wages with board, per month.....	21.56
Value of board.....	\$9.20
Per cent decrease in cash wages when board is furnished.....	43
Wages without board, per day, harvest.....	\$2.06
Wages with board, per day, harvest.....	1.68
Value of board.....	\$0.38
Per cent decrease in cash wages when board is furnished.....	22

What Constitutes a Satisfactory Wage Scale.—A satisfactory wage scale combines (a) the going wage—coupled with recognition that board and lodging should be suitable, since, as has already been pointed out, these constitute a part of the men's wages, (b) bonus for length of stay, (c) additional pay for overtime, (d) additional pay for unusually hard or extra hazardous jobs, (e) prompt payment on regular pay days, (f) advancement of small sums against wages already earned when needed by men for current expenses.

Paying the Men.—Local regulations and practices govern the method of paying men. Some states require (at least in the law), semi-monthly payments, or otherwise attempt to safe-guard the men. Some states also provide labor commissions empowered to intervene in behalf of employees. Such state legislation or provision usually operates entirely in favor of the working man, since it is practically impossible to enforce contracts with laboring men having nothing to lose if sued and who cannot be jailed.

Prompt Payment of Wage Should Rule.—In general, prompt payment of wages when due is important. If it is the policy to withhold part of the wages, both parties should definitely understand the arrangement in advance (and preferably draw up the stipulations in writing). Some operators practice holding out time on their men, in an attempt to insure greater regularity in attendance; this, however, involve serious danger of causing discontent and distrust, which in the long run will react upon the employer by causing him increasing difficulty in obtaining and holding good men.

Use of Bonuses or Premiums.—The use of the bonus or premium plan, by which good men are offered special inducements to stay with an employer, is a movement gaining in strength. The method of subsidizing takes different forms. It may be an increase in rates for length of service, providing family living quarters, allotting a cow or garden patch, permitting the raising of chickens, furnishing a horse, arranging for weekly or bi-weekly trips to town, supplying of phonograph or magazines, better living quarters, etc. Attempts thus far are too new and too scattered to allow the drawing of deductions, but the results are apparently well worth while and justify attention to this method of getting and holding good men.

Handling Labor

Success in handling men depends in no small degree upon one's knowledge of the characteristics—racial and individual—of the men employed. There are, for instance, certain characteristics peculiar to the middle-aged, transient, itinerant, floating "hobo," "blanket-stiff," "bindle-stiff," or "bum" as he is variously called. His standard of living is radically less exacting than that of the clean-cut American youth who is looking to farm work as a means of business advancement. Foreign nationalities have their own particular racial traits—as for example the volatile temper and impulsiveness of the Latin, the stoicism and steadiness of the Pole, the studiousness and cleanliness of the Japanese, the mysticism and reticence of the Hindu. Successfully to handle any group necessitates a comprehension of their desires, ideals, and aims, so that proper provision can be made, especially for their housing, boarding, and supervision. When foreigners are employed, a knowledge of their language is very desirable, especially in dealing directly with such men as Italians, Greeks, or Mexicans.

Farmer's Part in Getting Good Farm Labor.—If a good class of farm labor is wanted, it can be obtained whenever farmers are ready and financially able to go to some little effort to encourage good workers to stay on the farms and to provide for their proper accommodation. While it is not profitable to go to extremes in furnishing facilities for common labor,

yet, when a good, likely young fellow comes along, he should be given decent quarters and food, and some effort should be made to teach him such farm operations as may be unfamiliar to him. Given steady employment, proper care, some recreation, and an outlook for reasonable advancement, agriculture can compete successfully in any labor market. This means, as a corollary, that farm prices must be sufficient to warrant these additional costs, production must be diminished, or the contributing workers must accept a lower plane of living and advancement.

Selection of Good Foremen Essential.—The bigger the business, the more men an employer will fail to reach personally, until finally a point is reached where foremen are needed to come in direct touch with the men. When an organization reaches such a state, extreme care must be exercised in selecting these foremen. Whether one will choose older men of wide actual experience, or young, virile fellows who may be stronger in theory than in actual practice, depends largely on the proposition one has to handle. Personally, from a pretty strenuous experience, the author has come to the conclusion that the younger men are to be preferred. The older men have had their opportunities and their pace is set: only the exceptional man can rise higher. Older minds are not pliant. They tend to resent new methods and new ideas. Yet a real knowledge of how to do things is a mighty valuable asset, especially in aiding a new man who is taking hold of an old project. On the whole the younger men pay greater attention to detail, are anxious to make a showing, have the grit, the enthusiasm, the courage, the vitality. They make more mistakes than the older men, but if fitted by general experience and knowledge for their work, they will show greater advancement at the year's end than the majority of the older men.

Personal Qualities Necessary to the Successful Handling of Men.—There is no one quality that insures success in handling men; and, unfortunately, the lacking one is not always an achievable quality. The chief trait counting for success seems to be personal magnetism, a trait hard to define and harder to acquire. A forceful personality is another factor, ranking, in fact, close to magnetism. This is not intended to conjure up the blustering, swearing, bully type of overseer, exercising his authority largely through a display of physical strength, but rather the quiet man who inspires his associates through his innate power to do things, and who, by the very energy he radiates, brings others to higher standards of efficiency.

All this implies that a man to handle men, whether as strawboss, foreman, superintendent, or general manager, must gain the respect of his men. This will come most quickly when his men realize that he is fair, and at all times ready and anxious to give them a square deal.

Personal Relation of Employer to Men.—It is not wise to chum with the men to such an extent that they become familiar. They should be kept firmly, although not coldly, at respectful distance. Too much talk over trivial matters, too much idle conversation, should be studiously avoided, one's remarks being confined to the matter in hand. The time of day can be passed pleasantly whenever it is logical to do so, inquiry made as to a man's health if he is apparently ill or is recovering from a wound or an ailment, and attention given to the man seeking advice. Advice is to be given if in a position to do so, otherwise a frank statement should be made of one's inability to help. Orders should be given clearly and concisely, gauging the language to fit the comprehension of the men, and care especially taken to avoid talking over their heads. An employer must never joke at or with the men. American humor isn't understandable except by Americans. Usually it provokes even Americans.

Discouraging Tattling.—When one man starts to talk about another the cause lies in a desire on the part of the man so doing either to ingratiate himself with his listener or to promote some scheme of private revenge. In case one listens, he sells himself cheap if the first is the object sought; if the second, there may be sufficient plausibility in the tale to cause one momentarily to forget the rule of fairness. Should one thus make his estimates of his men, he is no judge of human nature and certainly he is not taking the proper course to become one.

Swearing at the Men.—Do not swear at the men, no matter how great the provocation. They may stand for it, but it won't strengthen their loyalty.

Posting Men Concerning Risks.—Do not ask any man to undertake a risk or expose himself to danger unless he understands what he is doing.

Employer's Shortcomings to be Avoided.—Avoid hasty temper.

Avoid sensitiveness—a common characteristic of highly trained men. Most laboring men have little patience with a sensitive man; they look upon sensitiveness as a sign of possible weakness, a lack of vitality perhaps, and a dislike to mix with the rougher sides of life. One soon finds it best to forget the finer æsthetic feelings and to pitch into the game of life with a vim—for working for a living is one of the most exciting sports a man may tackle. And, it may be added, the busier one is with his own problems and the fuller the crowds every minute with thought of what he himself has to work out, the less time will be spent in contemplating one's own dignity or in fussing about the possibility that someone is encroaching upon one's authority.

If wrong in judgment as to commands given, bear the responsibility in person. Never try to shift blame to another. And, furthermore, protect the men from unnecessary abuse or unfair treatment at the hands of others.

Develop Individual Capacity of Worker.—Conscientious effort should at all times be made to place a man where he can work to the best advantage; it is better to make each worker responsible for certain duties than to use men indiscriminately for all kinds of work. The ignorant laborer should be given a chance to learn the business. Encourage interest on the part of the men by giving them, when qualified, a chance to offer suggestions or comments upon the carrying on of the work. Provide some recreation (depending on type of men), such as saddle horses, or transportation to town or to dances.

Requiring a Day's Work.—Know what a day's work amounts to and expect it.

Eliminate Petty Vice.—Keep down gambling, carousing, laziness; discourage disturbers, faultfinders; discharge men who are unfair in their dealings. Avoid taking in such men, so far as possible, by questioning each applicant concerning his past work and try to size him up; let him distinctly know that you are demanding a better class of men than what satisfies the ordinary employer.

Prevent Conflicting Orders.—Be careful not to have confusion in orders if two partners or more than one foreman or superintendent are covering the same job.

Provide Gentle Workstock.—Keep gentle workstock—or pay more for handling half wild, poorly broken stock.

Good Harness.—Keep harness and implements in repair, to encourage men to do good work.

Planning the Work.—Plan the day's work in a way to prevent loss of time and doubling up of men on a job.

Use of Mechanical Equipment.—Substitute mechanical equipment for hand labor wherever and whenever possible.

Supplying Laborers' Cottages.—Study the possibilities of supplying homes for steady workers, even to the extent of permitting purchase under a long time system of small payments.

Stealing Men.—Abstain from enticing or stealing away the men from a neighbor, no matter how great may be the provocation because of labor scarcity or the discovery of extra desirable workers.

Liability Insurance.—Carry insurance to protect yourself, and your men, in case of injury. Where state insurance is in force its attractiveness is worth looking into. Insurance—state or private—protects the rights of the injured and tends to relieve the employer of heavy financial obligations should a serious accident occur.

A Normal Day's Work

The employer should know what constitutes a fair day's work for men, crews, workstock, and implements. Ignorance of this is too often

the cause of injustice to men, of demoralized crews, and—so swift are Rumor's wings—of difficulty in securing help of any sort.

Conditions Affecting a Day's Work.—Tables follow, to indicate the usual output for an average working day. Output will vary with the working conditions. The quantity and quality of work accomplished will differ with soil; amount, speed, and stamina of motive power; size and shape of fields; period of daylight; size of crew; experience of operator. Variations may be as high as 50 per cent for extreme conditions—good or bad.

Working heavy ground with light horses means less area covered than in working sandy soil with big stock. Rate of work of crews in putting up hay, harvesting grain, or loading cars will vary with the kinds of farm labor used, and the length of the working day. Grain harvest crews on the large ranch work especially long days—at times from 5 a.m. to 8 p.m. Rates of work of individuals will vary with the heat of the day, the heaviness of the job, the individual's personal attitude towards work, and the nature and amount of supervision.

In the picking of fruit, the rate depends on size of trees, size of fruit, frequency of moving ladders; on whether the fruit is borne high or low; whether trees are open or close pruned; on rapidity of ripening; on whether land is level, rolling, or hilly. Rate of pitching and stacking hay depends on yields, length of stalk, length of haul, size of stack, size of crew. In hoeing, heavy weed growth will slow down progress and reduce the area covered. Very hot days are not conducive to a big day's work. Lack of supervision with some workers tends to lessen maximum endeavor. Crop yields have a very important effect in setting rates of work, low yields naturally slowing down output, high yields increasing rate of work.

An inexperienced worker can accomplish only approximately 50 per cent of the work of experienced hands.

For purposes of study and comparison the tabulated data following are of prime value to a farm manager. In general the averages are derived from poor to best conditions, and so represent what may reasonably be expected for under mean conditions.

The average horse walks $1\frac{1}{2}$ miles on loose ground per hour, $1\frac{3}{4}$ miles on hard ground doing heavy work, 2 miles doing light work, and $2\frac{1}{8}$ miles on road.

PART I

TABLE 240.—DAILY DUTY OF FARM IMPLEMENTS AND MACHINES WITH SIZES OF CREW AND REQUIRED NUMBERS OF HORSES

Kind of machine	Usual size	Number men required	Number horses required	Acreage covered in 10-hr. day
Bean cutter.....	2-row	1	2	10
Broadcasting barley.....		1-2	2	60
Binding small grain.....	6 ft.	1	3-4	10
Binding small grain.....	7 ft.	1	3-4	14
Binding small grain.....	8 ft.	1	4-5	18.
Binding corn.....	1-row	1	3	7
Cultivating crops:				
Covering 24 in. of space.....		1	1	4
Covering 30 in. of space.....		1	1	5
Covering 42 in. of space.....		1	2	6½
Covering 48 in. of space.....		1	2	7½
Covering 66 in. of space.....		1	2	10
Covering 84 in. of space.....		1	2	12
Cultivating land in preparing for crops.....	5 ft.	1	5-6	8
Cultivating land in preparing for crops.....	6 ft.	1	6-8	10
Drilling alfalfa.....	8 ft.	1	2	14
Drilling small grain, 6-8 ft.....	12 tube	1	2	10
Drilling small grain, 8-10 ft.....	16 tube	1	3	15
Drilling small grain, 10-12 ft.....	20 tube	1	4-6	20
Harrow, disc (not lapped).....	4 ft.	1	4	5
Harrow, disc (not lapped).....	6 ft.	1	6	9
Harrow, disc (not lapped).....	8 ft.	1	8	14
Harrow, spike (not lapped).....	8 ft.	1	2-3	10
Harrow, spike (not lapped).....	16 ft.	1	4	30
Harrow, spike (not lapped).....	24 ft.	1	6	40
Harrow, spike (not lapped).....	32 ft.	1	8	60.
Harrow, spring tooth (not lapped)...	6 ft.	1	3	9
Harrow, spring tooth (not lapped)...	8 ft.	1	4	12
Heading small grain.....	10 ft.	5-6	6	20
Heading small grain.....	12 ft.	5-6	6	24
Lister.....		1	3	5
Manure (machine) spreader.....	75 bu.	1	2	12 loads
Marking for planting.....	12 ft.	1	2	25
Mowing.....	5 ft.	1	2	10
Planking or dragging or floating land..	6 ft.	1	2	10
Planking or dragging or floating land..	12 ft.	1	4	20
Planting beets.....	4-22 in.-rows	1	2	12
Planting corn.....	1-42 in.-rows	1	1	8
Planting corn.....	2-42 in.-rows	1	2	12
Planting cotton.....	2-36 in.-rows	1	2-4	8
Planting beans.....	4-28 in.-rows	1	2-4	18
Planting potatoes.....	1-36 in.-rows	1	2	3½
Planting potatoes.....	2-36 in.-rows	2	3	8
Plowing, walking plow.....	12 in.	1	2	1.6
Plowing, gang plow.....	14 in.	1	3	2.3
Plowing, sulky.....	14 in.	1	3-4	2.5
Plowing, gang.....	2-14 in.-bottoms	1	4-6	5.2
Plowing, gang.....	2-12 in.-bottoms	1	3-6	4.0
Plowing, gang.....	3-12 in.-bottoms	1	5-8	6.6
Plowing, gang.....	2-8 in.-bottoms	1	2-3	2.8
Plowing, gang.....	3-8 in.-bottoms	1	3-4	4.2

TABLE 240.—Continued

Kind of machine	Usual size	Number men required	Number horses required	Acreage covered in 10-hr. day
Plowing, gang.....	4-8 in.-bottoms	1	4	5.6
Plowing, gang.....	5-8 in.-bottoms	1	6-10	8.0
Plowing, engine gang.....	4-14 in.-bottoms	2	14-18(a)	8
Plowing, engine gang.....	4-14 in.-bottoms	2	20-25(a)	12
Plowing, engine gang.....	8-14 in.-bottoms	2	25-30(a)	16
Plowing, deep tillage.....	2-20 in.-disks	1	6	2.5
Potato digger.....	1-row	1	2	3
Potato digger (elevator).....	1-row	1	4	3½
Rake (self dump).....	12 ft.	1	2	20
Rake (side delivery).....	6 ft.	1	2	10
Ring rolling.....	6 ft.	1	6	6
Ring rolling.....	8 ft.	1	8	8
Roller (land).....	12 ft.-roll	1	2	20
Shredder and husker, corn.....	4 ft.-roll	2-3	10-12	350 bu.
Shredder and husker, corn.....	6 ft.-roll	2	15-20	600 bu.
Shredder and husker, corn.....	8 ft.-roll	2	25	800 bu.
Spreading lime (drill).....	10 ft.	1	2	11
Spreading fertiliser (drill).....	10 in.	1	3	13
Tedder.....	6 ft.	1	2	10
Weed cutting.....	6 ft.	1	2	10
Fresno scrape; checking land.....	5 ft.	1	4	½

Kind of machine	Size	Number of men to operate	Horse-power required	Number revolutions per min.	Capacity per 10-hr. day
Ensilage cutter.....	42 in.-fly wheel	1(b)	15-20	.....	120 tons
Ensilage cutter.....	36 in.-fly wheel	1	12-15	.....	100 tons
Ensilage cutter.....	30 in.-fly wheel	1	8-12	.....	70 tons
Threshing:					
Separator (pea and bean).....	12 in.	6	2-4	300-350	5,500 lb.
Separator (pea and bean).....	20 by 32 in.	9	6-8	300-350	22,000 lb.
Separator (wheat).....	18 by 36 in.	12(c)	15-18	1,050-1,150	36,000 lb.
Separator (wheat).....	36 by 58 in.	15(d)	50-60	1,050-1,150	96,000 lb.
Separator (oats and barley).....	18 by 36 in.	15(c)	15-18	1,050-1,150	2,200 bu.
Separator (oats and barley).....	28 by 50 in.	16(d)	30-40	750-800	2,750 bu.
Separator (oats and barley).....	36 by 58 in.	18(d)	50-60	750-800	3,500 bu.

(a) Tractor equivalent.

(b) Hauling in addition.

(c) Six horses for forks, bucking straw, and roustabouting.

(d) Eight horses for forks, bucking straw, and roustabouting.

PART II

TABLE 241.—RULES FOR DETERMINING WORK OF IMPLEMENTS

The usual daily duty per foot of width is:

- 2.0 acres for plows
- 1.7 acres for spike tooth harrows
- 1.5 acres for spring tooth harrows
- 1.4 acres for disc harrows
- 1.6 acres for drills
- 1.6 acres for mowers
- 1.5 acres for rakes
- 2.0 acres for grain binders

PART III

TABLE 242.—WORK CAPACITY OF STOCK

The usual width of implement per horse is:

- .46 ft. of plows
- 3.9 ft. of spike tooth harrows
- 2.4 ft. of spring tooth harrows
- 2.4 ft. of disc harrows
- 2.4 ft. of drills
- 2.5 ft. of mowers
- 6.0 ft. of rakes
- 2.0 ft. of grain binders

PART IV

TABLE 243.—DAY'S WORK OF MAN OR CREW, SELECTED OPERATIONS

Field Crops

Alfalfa:

Cocking	1 Man	10 tons
Capping	1 Man, 1 Horse	20 acres
Stacking		

Hauling to stack, 10-12 loads per wagon

Hand pitching and hand unloading into barn

SIZE OF CREW	AVERAGE PER DAY
3 men, 2 horses.....	5 tons
4-5 men, 4 horses.....	8 tons

Hand pitching and hand unloading at stack

2 men, 2-4 horses.....	8 tons
4 men, 4-6 horses.....	15 tons
6 men, 6 horses.....	20 tons

Hand pitching and unloading with horse fork at stack or barn

2 men, 2-4 horses.....	10 tons
4 men, 4-6 horses.....	20 tons
6-8 men, 6-8 horses.....	30 tons
19 men, 15 horses.....	60 tons

SIZE OF CREW	AVERAGE PER DAY
Buckraking and stacking with horse fork	
2 men, 2-4 horses.....	15 tons
4 men, 4-6 horses.....	25 tons
6 men, 6-8 horses.....	30 tons

Rate of stacking varies with kind of hay, rate of yield, distance of haul, etc.

Baling

Size of crew	Tons per 10-hr. day	
	Range	Average
From stack		
7-9 men, 10-14 horses*.....	20-45 tons	30 tons
From field		
6-8 men, 6-10 horses.....	15-30	22 tons
10-11 men, 12-14 horses.....	30-50	40 tons

* Engine equivalent, if power press.

Beans.

	AVERAGE
Hoeing and planting misses.....	½ acre
Weeding after planting.....	5 acres
Shocking (piling) in field for curing.....	3 acres
Picking green beans.....	1,500 lb.

Corn:

Marking land	
2-row marker—1 man, 2 horses.....	10½ acres
Planting by hand, per man.....	4 acres
Hoeing, per man.....	1 acre
Suckering, per man.....	2 acres
Platform harvester 2 men, 1 horse.....	5 acres
Cutting and shocking per man.....	1½ acres
Setting up corn after binder, per man.....	3 acres
Hauling grain, 1 man, 2 horses.....	2.2 acres
Hauling grain, 2 men, 2 horses.....	2 acres
Hauling stalks, 2 men, 2 horses.....	5 acres
Husking, per man.....	36 bu.
Filling silo	
Cutting by hand and loading, per man.....	12 tons
Hauling to cutter, 1 man, 2 horses.....	15 tons
Feeding cutter, 1 man.....	60 tons
Storing in silo, 2 men.....	60 tons
By crew: Cutting corn and filling silos	
Size of crew	
1 man, 3 horses, cutting	
2 men loading	
3 men, 6 horses hauling	
1 man feed and run engine	
1 man tramping	
—	
Total 8 men, 9 horses	
Size of load, average 1 ton	
Tonnage per day, 44 tons	
Size of engine, 12 hp.	
Length of cutter, 16 in.	

Cotton:

Listing, 1 man, 3 horses.....	5 acres
Cultivating toward plants ("wrap") 1 man, 3 horses.....	12 acres
Chopping.....	2 acres
Hoeing.....	2 acres
Weeding.....	5 acres
Picking	
Short staple.....	200 lb.
Long staple.....	125 lb.
Ginning, 5 men.....	40 bales of 500 lb.

Flax:

	AVERAGE
Harvesting, 1 man, 4 horses.....	15 acres

Grain:

Shocking, after binder, per man.....	6 acres
Stacking wheat, 2 men, 2-4 horses.....	8 acres
Turning bound grain, per man.....	10 acres
Cradling wheat, per man.....	2 acres
Bucking sacked grain behind harvester and piling in field	
Barley.....	600 sacks
Wheat.....	500 sacks
Stacking grain hay (see alfalfa).	
Heading, 12 ft., 5-6 men, 10-14 horses.....	24 acres
14 ft., 6-8 men, 12-14 horses.....	28 acres

Stationary Thrashers (from Stack)†

Crop	Size of crew*		Range, tons	Average, tons
	Men	Horses		
Wheat.....	7-10	2-4	12-20	18
	11-13	2-6	20-30	27
	14-18	4-8	25-45	32
Barley or oats.....	7-10	2-4	15-25	20
	11-13	2-6	25-35	30
	14-18	4-8	30-55	35
Non-saccharine sorghums.....	7-9	2-6	20-45	30
Beans or peas.....	6	2	2-3	2½
	10	6	5-10	7½
	19	12	15-25	20

Engine, in addition, to run separator.

* Size of separator varies through many sizes from 18 by 34 in. to 30 by 50 in. Size of crew is only a rough guide to size of machine.

† Thrashing from field requires 20 per cent more men and enough more horses to supply wagons for hauling.

Harvesting with combine:

Cut	Usual size of crew*		Range in Average† acres	Average, acreage
	Men	Horses		
7 foot	2-3	8	8-15	10
9	2-3	10-20	10-20	12
12	4	22	15-25	18
14	5	24	20-30	22
16	5	28	20-35	25
20	5-6	32	30-50	35
24	5-6	36	30-60	40

*Horses often replaced by tractor. Auxiliary engine sometimes used on separator. Average crew consists of engineer, header tender, separator tender, sack tender, sack sewer.

†Rate depends on yield of grain and amount of lodging.

Hops:

	AVERAGE
Picking per man	250 lb.

Potatoes:

Cutting seed by hand, per man	15 bu.
Cutting seed by machine, per man	28 bu.
Planting, plowed in, 3 men, 2 horses	2½ acres
Spraying (4 rows at once) 1 man, 2 horses	15 acres
Picking up and bagging after ordinary plow	
After ordinary plow	
75 bu. crop	60 bu.
125 bu. crop	75 bu.
200 bu. crop	100 bu.
After elevator digger	
75 bu. crop	80 bu.
125 bu. crop	100 bu.
Digging and picking up by hand	
75 bu. crop	30 bu.
150 bu. crop	40 bu.
Sorting and bagging in shed, per man	100 bu.

Sorghums (non-saccharine):

Cutting heads by hand, per man	¾ acres
Hauling heads to stack, 1 man, 2 horses	5 acres

Stock Beets:

Weeding and thinning, per man	¼ acre
Hoeing, per man	½ acre
Pulling and loading, per man	¼ acre

Sugar Beets:

For seed	
Planting steckling, 3 by 3 ft., per man	½ acre
For roots	
Thinning, per man	½ acre
Hoeing, per man	1 acre
Pulling, topping and loading (12-15 tons yield), per man	6 tons
Plowing out, 1 man	2½ acres

Sweet Peas (for seed):

Planting 2-28 in. rows, 1 man, 2 horses	6 acres
Cultivating—Single row, 1 man, 2 horses	3 acres
Cultivating—Two rows, 1 man, 2 horses	6 acres
Rogueing, per man	½ acre
Hand piling, per man	1 acre
Carrying to drying sheds, per man	1 acre
Turning, per man	2 acres
Threshing (engine), 1 man, 2 horses	2½ acres
Threshing (horse power), 7 men, 4 horses	5 acres
First cleaning, per man	1½ acres

*Selected Operations in Producing Fruit**Orchard Cultivation:*

	AVERAGE
Plowing, 12 in. plow	1.5 acres
Disking 5 ft. disk	5.5 acres
Harrow, 6 ft. spring tooth	6.0 acres
Harrow, 7 ft. spike tooth	8.5 acres

Cultivator, 6 ft.	7 acres
Furrowing for irrigation.....	10 acres
Floating or planking, 10-14 ft.....	8 acres
Spreading manure.....	10 loads

Orchard Spraying:

- (a) 50-gal. barrel hand pump—5 gal. per tree, ¼ mile haul, 2 men, 2 horses..... 125 trees per day
- (b) 150 gal. Duplex Power Pump—5 gal. per tree, ½ mile haul, 2 men, 2 horses..... 200 trees per day
- (c) Double Acting Horizontal Power Pump 5 gal. a tree, ½ mile haul 2 men 2 horses..... 200 trees per day
- (d) 200 gal. Horizontal Power Pump—5¾ gal. per tree, ½ mile haul, 3 men, 2 horses..... 300 trees per day

On an average when trees are in leaf 3 men and 2 horse crew will spray:

300 trees per day if 12 ft. or less in height

175 trees per day if 12 ft.-20 ft.

125 trees per day if over 20 ft.

Using from 4 to 6 gal. per tree and two leads of hose.

Apples:

	AVERAGE
Picking per man.....	3000 lb.
Pruning per man.....	20 trees
Removing brush, 1 man, 2 horses.....	1 acre
Thinning, per man.....	20 trees
Propping, per man.....	200 trees
Sorting and packing per man.....	75 boxes
Nailing boxes, per man.....	300 boxes
Nailing and waiting, per man.....	175 boxes

Apricots:

Setting trees, heavy soil, per man.....	100 trees
Setting trees, light soil, per man.....	150 trees
Picking, per man.....	30 boxes of 40 lb.
Pruning, large trees, per man.....	25 trees
Pruning, small trees, per man.....	40 trees

Berries:

Picking blackberries, per man.....	25 trays of 6 baskets each (Total 5 lb. per tray)
Picking loganberries, per man.....	20 trays as above
Hoeing berries, per man.....	¾ acre
Pruning and thinning wood, per man.....	⅓ acre

Cherries:

	AVERAGE
Picking	150 acres
Packing in 10 lb. boxes facing one side (per girl).	10 boxes

Currants:

Planting per man.....	½ acre per day
Sulfuring, 1 man.....	2 acres per day
Hoeing, 1 man.....	¼ acre per day
Pruning, 1 man.....	¼-1 acre per day
Picking, 1 man.....	10 boxes of 10 lb. each

Grapes:

Setting rooted grape vines, per man.....	200
Setting cuttings, per men.....	1,000

Sulfuring, per man.....	12 acres
Tying young vines, per man.....	1,000 vines
Picking for shipment, per man.....	2,000 lb.
<i>Olives:</i>	
Picking (for pickling), per man.....	200 lb.
Picking (for oil), per man.....	400
<i>Pears:</i>	
Picking for cannery, per man.....	1 ton
Picking for drying, per man.....	1½ tons
Pruning 3 year old trees, heavy with brush, 12-20 cuts per tree, per man.....	425
Pruning 4 year old trees, heavy with brush, 12-20 cuts per tree, per man.....	215
Pruning trees, 12-14 ft. high, per man.....	15
Hauling brush, 1 man, 2 horses.....	2 acres
Spraying, 3 men, 2 horses.....	250 trees
Cutting for drying (50 lb. lugs), per man.....	40
Packing pears (45 lb. boxes), per man.....	60
<i>Prunes:</i>	
Picking up, per man.....	1,000 lb. of green fruit
Hauling brush, 1 man, 2 horses.....	2 acres
Spraying, 3 men, 2 horses.....	150 trees
Pruning, per man.....	20 acres
<i>Peaches:</i>	
Pruning, per man.....	20 trees
Hauling brush, 1 man, 2 horses.....	1¼ acres
Picking,, per man.....	600 lb.
<i>Strawberries:</i>	
Leveling, 1 man, 4 horses.....	1 acre
Ridging for planting, 1 man, 1 horse.....	4 acre
Smoothing beds, per man.....	1/15 acre
Planting, per man.....	1/20 acre
Hoeing and weeding, per man.....	1/40 acre
Hand cultivating, per man.....	1/6 acre
Irrigation, per man.....	1/10 acre
Bedding in runners, per man.....	1/20 acre
Cutting off stops, per man.....	1/15 acre
Picking, per man.....	2 chests
<i>Walnuts:</i>	
Picking up, per man.....	200 lb.

Selected Operations in Producing Vegetables

<i>Asparagus:</i>	AVERAGE
Cutting,	
White grass, per man.....	400 lb.
Green grass, per man.....	600 lb.
<i>Cabbage:</i>	PER DAY
Setting out by machine, 1 man, 2 horses.....	4 acres
Setting out by hand, per man.....	¾ acre
Cutting, sorting, 2 men, 2 horses.....	5 tons
Trimming and packing, 4 men, 2-4 horses.....	10 tons

Cantaloupes:

Marking 7 by 7 feet, 1 man, 2 horses	30 acres
Ridging for planting, 1 man 2 horses.....	1 acre
Planting, 1 man, 2 horses.....	10 acres
Vining up, per man.....	2 acres
Picking, per man.....	1 ton
Carrying out, per man.....	6 tons
Sorting, per man.....	12 tons
Packing, per man.....	225 crates of 70 lb. each

Onions:

Planting seed, per man	1 acre
Cultivating, hand cultivator per man.....	$\frac{3}{4}$ acre
Pulling per man.....	$\frac{1}{2}$ acre
Cutting tops, per man.....	1 acre
Sacking, 2 men,.....	1 acre
Planting out onion sets in field per man.....	$\frac{1}{20}$ acre

Peas:

Planting (2 row), 1 man, 2 horses.....	6 acres
Cultivating, 1 man, 2 horses.....	7 acres
Hoeing, per man.....	$\frac{1}{2}$ acres

Green

Picking, per man.....	250 lb.
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Cannery

Turning, (2 men).....	$3\frac{1}{2}$ acres
Loading, 1 man.....	6 tons
Picking up waste peas, 1 man, 2 horses.....	6 acres

Rhubarb:

Marking ($2\frac{1}{2}$ by 5 ft.), 1 man, 2 horses.....	15 acres
Furrowing for planting, 1 man, 2 horses.....	5 acres
Plowing for planting, 1 man, 2 horses.....	4 acres
Dividing for planting, per man, enough for.....	1 acre
Planting, per man.....	$\frac{3}{4}$ acre
Hoeing, per man.....	$\frac{1}{2}$ acre
Picking, washing, and packing.....	12 boxes

String Beans:

Picking, per man.....	400 lb.
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Sweet Potatoes:

Setting in field, 1 man, 2 horses.....	10,000 sets
Digging by hand, per man.....	3,000 lb.
Digging by machine, 1 man, 2 horses.....	7,000 lb.

Tomatoes:

Marking, 1 man, 2 horses.....	15 acres
Planting per man.....	2,500 plants
Picking, per man.....	1 ton

Selected Operations in Caring for Stock

Dairying

Milking only—With machine.....	
Stripping by hand.....	60 cows
Milking only—By hand.....	26 cows
Milking only—By hand per hour.....	8 cows

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Milking, feeding, cleaning, and total care, per man.....	12 cows
Time required per cow for milking	
By hand.....	7 min.
By machine.....	4-5 min.
<i>Poultry</i> —(2,000 laying fowl plant, with 2,000 chicks to be raised annually):	
Feeding.....	7½ hr. with chicks
Feeding.....	4 hr. without chicks
Collecting eggs.....	2 hr.
Cleaning houses.....	4 hr.
Raising green feed.....	½ hr.
<i>Sheep:</i>	
Herding, on range 1 or 2 men.....	2,000 herd
Dry feeding, 1 man, 2 horses.....	300-400 herd
With self feeders, 1 man, 2 horses.....	1,000-2,000 herd
Shearing	
Once a year.....	33 per day by hand
Twice a year.....	75 per day by hand
Twice a year.....	88 per day with clippers

Selected Miscellaneous Operations

Building Construction:

	RANGE	AVERAGE
Shingling.....	2,000-3,000 shingles (8-12 bldls.).....	2,500

Fencing:

Rods of fence that two men can build in a day, both when setting the posts and when driving them, and when they are spaced at various distances.

Kind of fence	Day's work		
	Distance of posts		
	12 ft.	16 ft.	24 ft.
Barbed wire			
3 Strands			
Posts driven.....	64.0	89.1	116.4
Posts set.....	43.7	58.7	68.3
4 Strands			
Posts driven.....	76.6	83.2	92.4
Posts set.....	39.3	47.9	50.6
6 Strands			
Posts driven.....	29.5	56.7	67.5
Posts set.....	19.4	26.4	32.0
Narrow woven wire with 2 or more barbed wires:			
Posts driven.....	48.7	53.0	74.1
Posts set.....	26.3	33.0	37.9
Wide woven wire without barbed wire:			
Posts driven.....	61.3	65.4	80.2
Posts set.....	30.6	39.0	45.8

The fence that can be constructed in a day naturally varies with soil conditions, the depth to which posts are set or driven, the ability of the men doing the work, the topography of the ground, and, distance apart of corner, end, and gate posts. Posts are set at an average depth of 32 inches, the corner and end posts are placed approximately 40 rods apart. With long, straight stretches of fencing and with other conditions favorable, two men could build more fence than the figures in the table indicate.

Hauling:

Various commodities

Distance

1 mile.....	1 man, 2 horses	9 loads in 2 days
2 mile.....	1 man, 2 horses	7 loads in 2 days
3 mile.....	1 man, 2 horses	5 loads in 2 days
5 mile.....	1 man, 2 horses	2 loads in 1 day

Potatoes from field

Size of load

40 bu.....	1 man, 2 horses	225 bu. per day
60 bu.....	1 man, 2 horses	350 bu. per day
70 bu.....	1 man, 2 horses	450 bu. per day

Baled hay.....

¾ tons per horse

Irrigating:

Per man..... ½-10 acres

No average as rate depends on method of applying (i.e., by slip joint pipe or from ditch or by subirrigating or by concrete pipe; whether furrowed or flooded; head of water; lay of land; amount of water wanted; extent of crop covering ground; and porosity of soil.

Poisoning Gophers:

1 man per 300-1,000 acres, average 640 (depends on method used, kind of crop and prevalence of rodents)

Sawing Wood:

2 cuts per stick.....	1½ cords (4 by 4 by 48 ft.)
3 cuts per stick.....	1 cord (4 by 4 by 48 ft.)

Tiling:

	LINEAR FEET
Digging 3 ft. ditch, per man.....	100
Digging 3½ ft. ditch, per man.....	90
Digging 4 ft. ditch, per man.....	80
Laying 4-6 in. tile, per man.....	1,800-2,000

Providing Equipment for Farm Help.—The conviction is spreading that American farms are best conducted when labor-saving machinery is used wherever possible. Hand labor does not appeal to a nation of strongly marked mechanical genius, and the monotony of often repeated routine operations does not commend itself to Americans. Specialized farming is particularly liable to monotony of work, and so is often difficult of accomplishment without constant replenishment of labor able and willing to put up with the tedious work connected with

various phases in the production of certain fruits and of sugar beets, hops, cotton, fiber, and other field crops. Obviously, one of the immediate ways of meeting the labor needs is a greater use of implements and machinery when practicable and possible.

Efficient Use of Equipment.—As a result of the unusual shortage of man power in 1917 and 1918, the agricultural press gave a good deal of attention to recommendations covering greater use of equipment and work stock in place of men. As examples, attention may be called to three publications of the U. S. D. A. Office of Farm Management,¹⁴⁶ wherein is presented in a striking pictorial manner, (a) use of better methods, management, and implements in haymaking, (b) the increase of man power by using bigger teams and more machinery in such operations as plowing, harrowing, disking, hauling manure, planting corn, cultivating, harvesting grain, cutting corn, husking corn, and digging potatoes, (c) saving labor by harvesting crops with hogs, calves, sheep, and cattle.

Locating Labor Supplies.—The average farm laborer is only fairly well posted concerning labor need. When he wants a job he goes to the locality where he desires work or where he thinks work is to be had. Each locality has some place where laborers congregates, and to this place the experienced employer goes. Some laborers are obtained through representatives who handle all the business details, such as the so-called "labor contractor" of the Japanese and the Hindus, or the more loosely connected "mayordomo" of the Mexicans. This contractor is fully recognized by both employer and employee—the employer paying him a fee for all the men he obtains. An unofficial go-between is often used when Portuguese, Greeks, Italians, Swiss, and similar classes, are approached. Being gregarious, these men are usually located at some boarding house or other meeting place; and here the arrangements between employee and employer are perfected either directly or through a third party in the person of a boarding house keeper, a merchant, or a livery stable keeper. Other classes of labor, such as Americans, Englishmen, and Scandinavians, conduct their negotiations without an intermediary. Such men when out of employment can usually be located at some central point where they tend to congregate, as at some boarding house, or cigar stand, or pool room, or by inquiring at livery stables, or at private, state, or federal employment agencies. Beginners in agriculture or newcomers to a section should early learn where the labor haunts are, and should promptly get acquainted with influential men who are in touch with labor and are possibly able to supply men for all reasonable needs.

CHAPTER XXIII

FARM TENANCY

The ideal sequence for a beginner in agriculture to follow is through successive stages of farm hand, tenant, owner. In the first stage, he gains an actual intimate working knowledge of farming; in the second, he can try out his capabilities as a farmer; while in the third he can gain the freedom and independence of a land owner. Since the third stage can best be planned and most reliably carried out because of experience gained in the second stage, it is with this second stage—the tenancy period—that we are now concerned.

Interest in tenancy from the farm management point of view centers in the opportunities it gives to young men who are seeking experience, and in the means it affords of promoting incomes from farm investments. The farm manager is especially concerned with the capital requirements of tenants, their labor incomes, the usual methods of leasing, and the character of the contract which should govern the relationship between tenant and landlord. Capital requirements and labor incomes are taken up in the chapters on "Capital" and "Farm Profits." We are therefore here confronted with leasing methods and the nature of the contract.

In one of his interesting articles Spillman,¹⁴² from census figures covering the United States, shows that while 76 per cent of farmers under 25 years of age are tenants, the figure is 55 per cent for the 25 to 34 aged group, and with each successive ten year age group, drops to 37 per cent, 27 per cent, 21 per cent, and 15 per cent.

Definitions Used in Farm Tenancy.—Tenancy is the leasing or renting of farm lands, together with improvements and sometimes equipment, by non-owners for the purpose of occupying and operating.

A tenant is a non-owner who takes possession of farm property, under consent of the owner, for the purposes of occupying and farming. If operating under a lease, the tenant is called a "lessee;" if under a verbal contract, a "renter."

A lease is a written document setting forth the terms under which a given property is conveyed by the owner(s) and accepted by the tenant(s). Farm property in some States can be rented for a year's time without a written conveyance if the terms are verbally outlined by owner(s) to tenant(s) and accepted by tenant(s) in the presence of a disinterested person as witness.

"The party of the first part" is a term used in a farm lease to designate the owner or owners of the property under conveyance; "the party of the second part" refers to the tenant or tenants.

The lessee is one to whom a lease is given: the taker of a lease. The lessor is one who leases out land: the giver of a lease.

The terms "tenant," "renter," and "lessee," in actual practice, are used rather loosely and interchangeably, as are the terms "landlord," "owner," "lessor."

A "cropper" is a renter who furnishes little other than labor, and is paid with a share of whatever he produces from the land.

"Cash rent" describes a method of renting or leasing lands for a predetermined sum, to be paid in money by the tenant at specified times or under definite conditions.

"Share renting" is the method of sharing gross or net proceeds resulting from the tenant's activities upon the owner's property, in accordance with terms settled at the time of making out the lease, payment to be made under specified conditions following the production or sale of crops, stock, or stock products, or the annulling or completing of the lease.

"Cash-share rent" means payment partly in cash, with the balance of the rent satisfied by sharing all crops or products produced.

While the three forms of cash, share, and cash-share rent include the majority of arrangements for the payment of rent, there are others occasionally met. Some of these are touched upon elsewhere in this chapter.

"Tenantry" means a body of tenants or lessees.

Utilization of Tenancy.—Tenancy of land offers a well defined method for relieving non-resident owners of many direct management responsibilities; it gives an outlet to better use of land for operators who possess greater acreage than they can personally handle to advantage; it offers a means to start on limited capital, or to gain experience in new or unfamiliar territory, or to test out one's farming inclinations, or to try out a farm prior to purchase. In the individual determination of whether or not leasing shall be practiced, little attention is paid to the broad national question of how increasing tenancy affects the country as a whole. Within the very limited knowledge now available concerning land tenancy, alarm is often expressed over the steady upward trend in percentage of tenancy. Whether this view will prove well-founded when all the facts are known and given their relative importance, remains to be seen. This is a question for the economist, however, not for the farm manager. The farm manager, present or prospective, must take conditions as he finds them, and with this as a basis work out the relative benefits of tenancy and ownership. The personal element is as big a factor in tenancy as in ownership, and from the farm management viewpoint, necessitates a careful study of a proposed plan in the light of the mental, physical, and

financial equipment of the operator, his present training and experience, and the ambitions, desires, and wishes of himself and family.

Testing Proposed Tenancy Plans.—As in testing proposed plans from the standpoint of ownership, so, in the case of tenancy, must careful inquiry be conducted into the necessary income required, the probable expenses which must be met, the capital requirements, the living and working conditions, the developed or inherent possibilities of a given plan or a given proposition. Too much preliminary study cannot precede actual embarkation.

Tenancy as a Means of Getting Started in Farming.—From the personal standpoint, men who start in as tenants usually have very little capital and are limited in the size of farm business they can select. After a few years of work, they have enough teams and equipment to rent a larger farm which will pay them increased returns for their year's labor. The changing of tenants from one place to another is thus frequently a transitory step made by young men seeking to become farm owners. If one, for instance, were compelled to start on a small place and stay there for a long term of years, his chances of eventually becoming an owner would be much slimmer than if he selected a farm which would use his capital in meeting operating expenses. The income that a tenant receives through a working capital of \$4,000 to \$6,000 is decidedly greater, naturally, than if he used it in purchasing a farm at the outset.

Tenancy Provides a Test of the Attractiveness of Farming.—Tenancy offers a means of trying out one's liking for farming in general or one's preferences for certain lines in particular. Under tenancy, the beginner or newcomer is not tied down to any one location. If acreage, soil, water, or market proves inadequate, a new start can be made with less difficulty since it is not necessary to sell.

Tenancy Provides a Preliminary Test Prior to Purchasing Farm Lands.—As a test for purchase, tenantry for a season is desirable. The contract should be made with a provision that purchase is optional at the expiration of the season. One cannot perhaps get the most favorable renting terms under this arrangement, but it is better to sustain a small loss from the proportion of crops to be utilized as rental rather than to buy too hastily and repent at considerable leisure.

Greater familiarity with a given piece of land may develop unforeseen conditions, such as noxious weeds, insects, or fungi. The acreage may prove too small; water supply inadequate; community uncongenial; or climate unhealthful.

The Principal Kinds of Tenure ¹⁴³

Farm tenure falls into a few main classes according to the method of rent payment, namely, cash, standing rent, share, share-cash, and stock share.

Cash Rent Tenure.—In cash renting, the landlord furnishes only the real estate, usually paying taxes and at least the money costs of upkeep. The tenant furnishes working capital, bears all operating expenses, and receives all the income after paying a fixed amount of cash as rent. The landlord does not assume any of the risks of farm operation, and usually undertakes no responsibility for management except such supervision as may be necessary to see that the land and improvements are not abused.

Standing Rent Tenure.—Standing rent—sometimes called “lint rent”—is a modified form of cash rent. The tenant agrees to pay so many bushels of grain or so many bales of ginned cotton for the use of the farm. The landlord gets the same amount no matter how large or how small the crop. Consequently he is freed from the risk of loss due to bad seasons or bad management, and therefore from the necessity of assuming responsibility for the management of the farm. Unlike true cash rent, however, the actual rent received by the landlord in the system of standing rent is subject to variation due to changes in the prices of the products received as rent.

Share Rent Tenure.—In share renting, the landlord receives a share or fraction of all or of certain crops and sometimes also of live stock products and increase of live stock. More generally than in renting for cash or for a standing rent, he also pays some of the expenses of production. There are numerous variations in different parts of the country and under different types of farming with regard to the contributions and receipts of the respective parties.

Share-cash Rent Tenure.—A modified form of share renting is the share-cash system. This consists of sharing the more important crops or stock products, the tenant paying cash rent for pasture and occasionally for buildings, use of garden, or other special privileges. The system often has an advantage in that the landlord, because of the cash rent feature, is more willing that the tenant should increase the acreage in pasture and consequently engage in live stock farming to a greater extent than would be the case if the landlord received only a share of the crops and nothing for use of pasture.

Cropping Rent Tenure.—A form of share renting commonly known as “cropping” or the “cropper system” in cotton and tobacco-producing regions, superficially resembles the system of share renting in that the cropper pays the landlord a share of the crop. However, the cropper usually contributes nothing but human labor to the enterprise, and under the laws of a number of States is considered a laborer rather than a tenant. The majority of croppers are subject to supervision by the landlord and are dependent on him not only for the capital needed for putting in the crop, but also for living expenses while the crop is being produced.

Preferences for Either Share or Cash Rent.—For purposes of comparing cash and share rent, the reasons of preference are indicated below:

I. Reasons Given for Preferring Share Tenancy

(A) Landlords' reason:

1. It tends to be more profitable to the landowner because tenants are usually not willing to pay a cash rental which is equal to the full annual value of the land, for fear the crop will not be up to the average or for fear prices will fall.
2. Since the landlord helps in the management, he is better able to keep the land in condition and may be able to increase the total product so that both tenant and landlord will have larger incomes.
3. The landlord takes more interest in his farm when he receives a share of the crop.
4. The landlord shares the extra profits due to extra good crops, and gets something out of a poor one, whereas, in case he contracts for a fixed rent, the tenant gets all the advantage of an extra large crop, while in case of crop failure the tenant is often unable to pay the fixed rent and the landlord has to stand the losses of poor years without extra compensation when the crops are good.
5. Cash tenants do not usually put so much stock on the farm as share tenants operating under a land and stock lease where the landlord furnishes a part of the stock. Hence the land is not so well kept up.

(B) Tenants' reasons:

1. The risk is less than with cash rent, especially where crop failures are not unlikely.
2. The amount of capital required is less, thus lightening the tenant's investment.
3. The landlord is more willing to make permanent improvements which will increase the productiveness of the farm.
4. The landlord's experience can be turned to good advantage in the case of little experience in farming on the tenant's part.

II. Reasons Given for Preferring Cash Tenancy

(A) Landlords' reasons:

1. Cash rent is less bother.
2. Landowners' mistrust of some tenants.
3. Landlords' fear of careless, slipshod farming.
4. Advantage of prearranged price.
5. Good tenants with capital to farm right prefer cash rental.
6. The cash lease is simpler, with less chance for controversy.

(B) Tenants' reasons:

1. Independence and freedom from owner's close supervision and inspection.
2. Desire to feel that the entire surplus product is their own to dispose of as seems best.
3. Cash tenancy is believed to be more profitable to the tenant.
4. Shifting of payment of taxes, depreciation, and upkeep to the landlord.
5. Tenant obtains all the benefit of superior tillage and management.
6. Greater latitude is allowed in cropping and farming the property.

But there will commonly be one outstanding feature overshadowing all others to influence the tenant or the landlord in his final choice of method.

Length of Tenure.—In most cases leases in America run for only one year, but with privilege of renewal upon one or two months notice, al-

though some leases provide for continuous operation from year to year unless due notice of intent to discontinue is served by either party.

Short Term Lease Favored.—The one-year lease is ordinarily favored by both tenant and owner because:

1. Changing conditions of crop yields, market prices, labor situation, necessitates revision of contract terms between landlord and tenant.
2. Sickness may necessitate withdrawing.
3. Each likes to reserve privilege of changing if he can better himself.

Period of Tenure.—The lease year occasionally corresponds with the calendar year but more commonly coincides with the crop year, *i.e.*, March 1 to March 1, November 1 to November 1.

Influence of Annual Leases on Changing of Tenants.—Contrary to natural expectation and popular belief, annual lease contracts may not mean more frequent moving of the tenant than do long-term contracts. In fact, investigations on Wisconsin and Illinois dairy farms show that tenants remain longer on the same farm under an annual renewable lease than under lease contracts of two, three, or five years duration. On Kansas grain farms, tenants often have remained 15 to 20 years on the same farm under an annual lease. Moreover, in some sections tenants have operated the same farm 25 to 50 years under annual leases, in the meantime buying farms which they in turn have leased to others.

Spillman¹⁴² shows that, based on 1910 census figures for the United States, type of tenure and length of residence are:

	Cash tenants, per cent	Share tenants, per cent
Less than 1 year.....	26.1	37.3
1 to 3 years.....	16.0	17.8
2 to 5 years.....	31.9	28.4
5 to 10 years.....	15.0	10.4
Over 10 years.....	11.0	6.1
Average years on same farm.....	3.8	2.6

Conditions When Long Term Leases are Favored.—Many tenants and some landowners prefer long-term leases, running 5 to 10 years. Replies to a questionnaire recently addressed to tenants on Kansas wheat farms show that in almost every case the tenant would prefer a contract longer than one year. In a survey of 143 tenant dairy farms in Wisconsin and Illinois, 76 per cent of the leases in Wisconsin and 66 per cent of those in Illinois were for 1 year, while 14 per cent of those in Illinois were for 5 years.

Under certain special conditions, a long-term lease is required for the successful fulfillment of a contract. When live stock is leased, it is cus-

tomary to make a contract for 5 to 10 years. Contracts with a tenant for clearing land commonly give the tenant 5 or 6 years to bring the land into condition and receive adequate returns for the labor of clearing.

This is particularly true when more than a single year is essential to the successful fulfillment of the contract, as in building up certain stock industries, in clearing land, in establishing perennial crops as alfalfa, in raising nursery stock.

Example of Long Term Leases.—In Kansas, stock share leases run for 3 to 5 years. In Missouri, over nine-tenths of the leases are for 1 year. Gray and Turner find¹⁴⁸ that in the case of long leases for cash rent, the actual cash rental value of the land may become out of line with the rent specified in the lease on account of changes in prices and other conditions. Such objection to long-term leases is overcome in part, if not entirely, when the rent is a share or a fixed amount of the crop. The landlord may be prevented from taking advantage of favorable opportunities to sell the land unless the lease contains a clause permitting sale. Such a clause, however, tends to nullify the long-term character of the lease unless accompanied by provisions for compensating the tenant substantially for termination by sale. Another objection to the long lease is that while it is binding on the landlord, it may have but slight restriction on the tenant who has little property.

Advantages of the Long Term Lease.—The long lease enables the tenant to undertake extensive improvements such as liming or tiling, and to engage in systems of rotation covering a considerable period of years, without fearing that the fruits of his labor will be lost through the termination of the lease. However, this advantage may be obtained under the short lease when the lease contains provisions for compensating the tenant for unexhausted improvements made by him.

Advantages of the Short Term Lease.—The short lease has great advantages for both parties because of its elasticity. Our country is one of rapid changes, and it is doubtful if any considerable number either of landlords or of tenants care to be bound by lease contracts of long duration. Moreover, short leases do not necessarily imply short tenures; and, as has already been remarked, such statistics as are now available appear to indicate that in the United States tenants under one-year leases have occupied the farms leased for a greater number of years than those whose leases were for longer periods.

Length of Lease Depends upon Circumstances.—Since the amount of the landlord's share depends largely on the efficiency of the tenant, the former is not likely to want to enter into a contract for a long period until he is sure of the tenant's efficiency. Moreover, because of the comparatively intimate relationship that usually exists between landlord and tenant in share farming, the success of the enterprise depends to a large extent on the personalities of the two parties and on their abilities to work

together harmoniously. Many of the younger tenants are compelled at first to rent inferior farms, and desire to retain them only until they can obtain better ones.

For these reasons it is probably wise to start with a one-year lease, but with a clause providing for renewal.

Whether the lease should be for one year or for a longer period is likely to be determined in part by circumstances. Thus, when the landlord furnishes all the operating capital, makes all the improvements at his own expense, and provides for the maintenance of fertility, there may be little reason for a lease running longer than one year. On the other hand, when the contract calls for the clearing of land by the tenant in return for the free use of it or for use at a nominal rent, a lease of at least 5 or 6 years may be necessary. Similarly, when the tenant is expected to plant a considerable acreage in fruit or in perennial crops, a term of several years may be desirable. In fact, any lease contract which requires a considerable investment of irremovable capital on the part of the tenant may necessitate either a lease of considerable duration or agreements for compensation at termination for unexhausted improvements made by the tenant. It should not be assumed, however, that either a long lease or provision of compensation for unexhausted improvements will alone induce good farming. While the absence of both arrangements may tend to discourage an efficient tenant from pursuing sound methods of agriculture, other provisions in the lease may be necessary to compel the inefficient and improvident tenant to employ such methods. Where such is the case, specific requirements concerning the system of farming should be accompanied by stipulations permitting careful supervision on the part of landlord.

Leasing Practices in the United States.—A summary of leasing practices common to the United States is included in an admirable study by Dr. E. V. Wilcox¹⁴⁴ of the distribution of investments, expenses, and income between the landlords and tenants.

Cash rents vary within wide limits and are rated at so much per farm or so much per acre; the demand for farms, the type of land and its crop producing power, the location and reputation of the farm, the condition of its buildings and other structures, and the amount of personal property, all affect the leasing rates. Range land varies from 10¢ to \$2.00 cash rent annually per acre; grain land from \$2 to \$15 per acre; land suitable for field crops of potatoes, sugar beets, corn, cotton, etc., ranges from \$6 to \$40; land in perennial hay crops, alfalfa, clover, blue grass ranges from \$8 to \$40; lands for truck crops from \$15 to \$60; fruit orchards from \$25 to \$100.

Under the share system of payment, the same factors affect the division as under cash rentals. Fractions range from half-and-half, one-third and two-thirds, one-fourth and three-fourths, two-fifths and

three-fifths, two-sevenths and five-sevenths, etc. Grain and grain hay land is usually leased one-third to owner and two-thirds to tenant, or one-fourth and three-fourths if tenant furnishes everything but land and buildings; two-fifth and three-fifths, or one-half and one-half if owner furnishes a part of the work stock and implements or meets a portion of the expense for seed and harvesting, or other operating expenses. For such crops as sugar beets, potatoes, corn, and beans, the fractions run from one-fifth to one-half to owner, remainder to tenant; fruit orchards, one-third to one-half to owner and remainder to tenant; dairies, one-fourth to one half to owner, remainder to tenant.

Summing up methods of renting, Wilcox¹⁴⁴ reports (briefed for our purposes):

Methods of Sharing Crops and Stock Products¹⁴⁴

Field Crops. Corn.—On general farms in the corn belt when the tenant furnishes working capital and hired labor, the landowner commonly receives one-half of the corn as well as of other crops. This is the prevailing custom in Indiana, Illinois, Iowa, Kansas, Missouri, Nebraska, North Dakota, South Dakota, Ohio, Pennsylvania, Maryland, Tennessee, Virginia, West Virginia, Wisconsin, and Minnesota. Considerable variation in the share of corn, however, is to be noted in these States. Sometimes the landlord receives only two-fifths, one-third, or even only one-fourth of the corn. On certain New Jersey farms where the landowner pays all expenses, including hired labor, he receives two-thirds of the corn. The same fraction for division of the corn is used on Ohio farms where the tenant receives a small guaranteed wage in addition to one-third of the corn. Occasionally in Virginia the tenant supplies three-fourths of the fertilizer on corn land and receives three-fourths of the corn. Share croppers on cotton farms, who furnish nothing but labor, commonly receive one-half of the corn or pay cash rent for corn land, while share renters who furnish the working capital and the labor, usually get two-thirds of the corn. In cases on Colorado farms where the tenant supplies tools and horses and pays all expenses, the landowner receives one-third of the corn. On general farms in Delaware, the landowner usually gets one-half of all crops, including corn.

Wheat and Other Grains.—Records of tenant wheat farms in Kansas, Nebraska, Minnesota, North Dakota, and Montana show that one-half the total number of landowners received one-third; for one-fourth the number share is one-half; while the others gets two-fifth of the wheat. On these farms, the tenant supplies working capital and hired labor. Occasionally other fractions, such as two-sevenths or five-twelfths, are used in dividing the wheat in the wheat States of the upper Mississippi valley. Through the corn belt, the tenant usually pays one-half of the wheat and other grains on share-rented farms. Very generally where several cereal grains are raised on the same farm, all of these grains are divided between landlord and tenant by the same fraction, the lease prescribing that the landowner shall receive either one-half or one third of all grain. The landowner's share of small cereal grains, as is the case with many other crops, is smaller in western States than in the corn belt. Frequently the landowner receives only one-third of the wheat and other grain, especially when the tenant pays thrashing expenses, as compared with one-half of the oats, the renter getting two-thirds. In Colorado, the landowner commonly receives one-third of the oats and less often one-half, while in the corn belt and various other States the landowner usually receives one-half of the oats or more rarely one-third or two-fifths. On some New Jersey farms, the landlord may pay all expenses and receive two-thirds of the oats and wheat, his share otherwise being one-half.

Hay and Fodder.—Almost universally on share rented farms, when the tenant furnishes working capital and hired labor, hay is divided half-and-half if sold at all. Otherwise the hay produced on the farm is used in feeding partnership stock, but if the landowner owns no stock the tenant may pay cash rent for hay land.

On dairy farms and stock farms throughout the country, it is frequently prescribed in the lease contract that hay and forage shall not be sold except with the permission of the landlord, but shall be fed to the stock on the farm. On grain farms, the tenant often pays a cash rent for hay land and has all the product to sell or to feed to his own stock. In general, when the hay is shared half-and-half the tenant is required to pay one-half of all expenses and to supply the necessary tools and work stock. In a few cases, however, the tenant receives three-fourths of the hay. In Alabama and elsewhere in the cotton belt, share croppers on cotton farms commonly receive one-half of the corn fodder, sorghum, and other forage produced on the farm. In Colorado when the tenant furnishes tools, horses, feed, labor, and thrashing expense, he usually receives one-half of the alfalfa, and less often one-third. The baling expenses are usually shared proportionately to the shares of the crop received by tenant and landlord. On such farms, the water assessment is commonly paid by the landlord, less often by the tenant, but sometimes is shared equally. In Kentucky, with all working capital and expense shared equally, the tenant's share of the alfalfa is one-half, while he may receive one-third of the timothy or, less often, three-fifths. Wide variations occur on Nebraska farms with reference to the fractional sharing of hay, the tenant receiving one-half or three-fifths or even two-thirds as his share.

It is frequently stipulated in the lease that straw shall not be burned or removed from the farm. In some cases, however, it is specified that the land owner shall receive one-half or three-fourths of the straw.

Cotton.—Cotton is commonly raised on tenant farms under one or the other of two systems known as share cropping and share renting, cash renting being a less common method. Under the share cropping system, the cotton crop is divided half-and-half. Some variations are noted in the customs prevailing in different States in regard to share croppers. In Alabama, the landlord commonly furnishes all machinery and work stock and one-half of the fertilizer; less frequently, he furnishes all the work stock and fertilizer, while the tenant furnishes all machinery and feed. The landlord commonly provides all seed and pays for one-half of the ginning. In Georgia, the landlord usually provides all working capital and pays all expenses except for ginning and fertilizer, which are shared equally. The same arrangement prevails in Louisiana, but the tenant may also get one-half of the corn or pay cash rent for corn land, as is frequently the case in other cotton States. In Mississippi, the tenant ordinarily supplies all labor and one-half the fertilizer, while the landlord provides cabin, garden, tools, mules, feed, seed, and fuel. The tenant may also pay cash rent for all land not planted in cotton. Occasionally in North Carolina, the landlord furnishes all of the fertilizer, in other instances the landlord furnishes one-half of the fertilizer and one-half of the seed, the tenant supplying the remainder. Similar arrangements are customary in South Carolina, Oklahoma, Arkansas, and Texas. Share croppers are essentially laborers under a system which gives them a personal interest in securing good yields.

Under the method of share renting, on the other hand, the tenant commonly furnishes mules, feed, tools, seed, and labor, while the landlord supplies land, cabin, garden, and fuel. For the most part, the expenses for fertilizer, ginning, and bagging are paid by each party in proportion to his share of the crop. The landlord receives one-fourth or one-third of the cotton, according to local conditions and fertility of the soil. The understood conditions for share renting are practically the same in all the cotton States. In Texas, a law has been passed prescribing that the landlord shall

not receive more than one-third of the grain and one-fourth of the cotton for land leased under these conditions.

Under the cash renting system, the tenant pays all expenses and the rent is paid in a specified number of bales of cotton. In Alabama, the tenant pays $1\frac{1}{2}$ to $2\frac{1}{2}$ bales of cotton per mule, but in Alabama and other cotton States the rent may be 2 to 3 bales per mule on more fertile land. Comparatively few tenants on cotton farms pay a fixed amount of money rent.

Potatoes.—In New Jersey, New York, Pennsylvania, and Maryland, potatoes are shared half-and-half where the tenant furnishes work stock, machinery, and hired labor. In the wheat States, the landowner more commonly receives one-third of the potatoes. In the Greeley potato district of Colorado, the common practice is for the landlord to receive one-third of the potatoes. In Delaware, when the landlord furnishes tools, machinery, work stock, and one-half of the potato seed, other expenses being shared equally, the crop is divided half-and-half. In a few instances in Indiana, the landlord accepts as his share one-half of the potatoes in the field before digging, or one-third "in the bushel" (dug and measured), at the option of the tenant. Frequently, however, the potato crop is shared half-and-half "in the bushel." A common custom in North Dakota and elsewhere is for the landlord to furnish one-half of the seed potatoes, receiving one-half of the crop.

Sugar Beets.—Tenants who farm land to sugar beets in Colorado invariably supply all tools, feed, work stock, and labor, while the landlord pays water assessments and land tax. Under this system the landlord receives one-fourth of the sugar beets. In a few instances, however, the landowner supplies tools, feed, supplies, horse labor, and twine, while the tenant provides all hand labor. The landowner receives two-thirds of the sugar beets under this arrangement, and all of the beet tops. Occasionally the landowner receives only one-fifth or one-sixth of the sugar beets. The prevailing fraction is one-fourth, and the present tendency is toward an even larger share. Moreover, in a few instances, the tenant pays one-half of the water assessment. In practically all cases, the tenant hauls the crop to market.

Orchard Fruits. Apples.—The prevailing custom in New York, Pennsylvania, Maryland, Indiana, Iowa, Nebraska, Colorado, and elsewhere is for the apple crop to be shared half-and-half between tenant and landlord. On New York farms, when the tenant provides only the labor, the landlord receives two-thirds of the apples, while, when all expenses, including apple storage and hired labor, are shared equally, the crop is divided half-and-half. In Pennsylvania, the landlord frequently pays two-thirds of the fertilizer bill for orchard crops on farms where the apples are shared half-and-half.

Peaches, Pears, Plums, and Cherries.—On farms where all expenses are shared equally, the crop of peaches, plums, and pears is divided half-and-half. On New York farms, where the tenant sometimes supplies nothing but labor, the landlord may receive two-fifths of the cherries and two-thirds of the apples and peaches. On Indiana farms, when the tenant supplies horses and tools, and when the cost of hired labor, marketing, and spraying is shared equally, the landlord receives one-half of the peaches. When the tenant furnishes only the labor on New York farms, the landlord may receive two-thirds of the peaches, and when the tenant provides two-thirds of the barrels and all labor, while the landlord provides all fertilizer, spraying material, and horses, the landlord's share is one-third of the peaches and pears.

Truck Crops. Onions.—In New Jersey, the landowner usually pays the taxes and fertilizer bills, while other expenses except labor are shared equally. The tenant supplies tools, machinery, and horses. On such farms, the landowner receives one-half of the onions, but when the tenant supplies only labor the landowner's share is two-thirds.

In Massachusetts, the tenant usually provides hand tools, hand labor, and seed, while the landowner furnishes all horse labor and fertilizer and pays the taxes. The cost of bags is for the most part shared equally, but in some cases is paid by the purchasers. Under these conditions, the landowner receives one-half the onions.

In New York, the tenant furnishes one-half the tools, fertilizer, and seed, and all hand labor, while the landowner supplies all horse labor and crates, and receives one-half of the onions.

Cabbage.—On New York cabbage farms, if the tenant provides the tools, horses, and all labor, while other expenses are shared equally, the crop is divided half-and-half. In Colorado, the tenant may furnish all tools, feed, supplies, and horse labor, and receive one-half the crop, or the landowner may furnish all tools, feed, supplies and horse labor, while the tenant provides all hand labor and 45 per cent of the seed. Under the latter condition, the tenant's share of the crop is 45 per cent.

Tomatoes.—In Delaware, if all expenses are shared equally except labor, which is furnished by the tenant, the landlord receives two-fifths of the tomatoes and one-half of the grain, but sometimes his share of the tomatoes is only one-fourth. In Maryland, in cases where the tenant supplies tools, horses, and all labor, and where all other expenses, including seed, baskets, and crates, are shared equally, the landlord receives one-half the tomatoes. The common custom in New Jersey is for the landlord and tenant to furnish hampers and spraying material jointly, while the landlord pays the taxes and fertilizer bills and receives one-half the tomatoes. Occasionally, the tenant furnishes only the labor, in which case the landlord's share of the tomatoes is two-thirds.

Cantaloupes.—In Maryland, the tenant supplies the tools, mules, and labor, while other expenses are shared equally and the crop is divided half-and-half.

Peas and Beans.—In Colorado, the landowner receives one-third of the beans as his share. Peas raised for canning purposes in Maryland are shared half-and-half when the tenant furnishes tools, work horses, and labor, other expenses being shared equally. In New York, when the tenant supplies tools and horses, and all expenses are shared equally, the landlord receives one-half of the beans. In a few instances when dry navy beans are marketed, the landlord receives one-half of the product, although he bears only 45 per cent of the expenses.

Live Stock and Stock Products. *Cows.*—In Arizona, a system has grown up under which cows are rented to farmers. Similar arrangements are noted occasionally elsewhere. A creamery owner may furnish cows to farmers for a portion of the cream returns each month or for a cash payment of 50¢ to \$1.50 per month. Under this system the owner of the cows also receives one-half of the increase in calves. Occasionally other owners of cows may rent them to farmers for one-half the increase, the calves to be divided when 6 months old and the farmer to have all of the milk.

Milk and Cream.—On dairy farms in all States where expenses are shared equally, the landowner receives either one-half the milk, whether it is sold as market milk or to a condenser, butter factory, or cheese factory, or one-half the cream. The landlord may furnish one-half the cows and sometimes one-half the tools and work horses. In some States, the landlord furnishes all of the cows, but the tenant must bear half of the expense of cows purchased to keep up the herd, and must replace cows that die. Sometimes, as in New Jersey and Delaware, the tenant furnishes only labor and one-third of the feed and fertilizer, receiving one-third of the milk proceeds.

Beef Cattle.—In several States where the production of beef cattle has become a large industry, as in Iowa, for example, the tenant may furnish tools and work horses, haul the milk, and pay the road taxes, while the landlord pays other real estate taxes and furnishes one-half the cows, beef cattle, and hogs. In cases of this sort, the cost of feed and seed is shared equally and the proceeds from cattle sold are divided half-and-half.

Colts.—Very commonly when work horses belonging to the tenant are allowed free pasture and are fed from undivided feed, the landlord pays stallion service fees and receives one-half of the colts.

Hogs.—On hog farms, as in Iowa and Oklahóma for example, the tenant may supply all the labor, tools, and horses, and one-half the hogs, the cost for feed being shared equally. Under these conditions, the proceeds from the hogs are divided half-and-half. Occasionally, a farmer rents sows with pig from a hog owner and cares for them until the pigs are weaned. The pigs are then divided equally and the hog owner receives a number of sows equal to that originally furnished. If the pigs are fattened, the owner of the stock must furnish one-half the feed.

Sheep.—On Indiana farms when the tenant supplies the tools, horses, and labor, and pays all the expenses, and the landlord furnishes all the sheep, the lambs and wool are divided in equal shares. At the termination of the lease, usually made for a 5-year period, the tenant must return to the landlord the number of sheep furnished by him at the start. In other instances, the landlord furnishes one-half the sheep and receives as his share of the proceeds one-half the wool. In Maryland, on general farms rented for one-half share, the tenant may supply the tools and work stock and take one-half the proceeds from the sheep.

Angora Goats.—In a few instances goat breeders have rented goats to farm owners for one-half the mohair and kids. In such cases, the farmer bears all expenses.

Poultry and Eggs.—On most rented farms, the tenant owns all the poultry, being allowed to keep 50 to 1,000 hens and occasionally a few ducks, geese, turkeys, and guinea fowl. Quite often, however, the tenant is prohibited from keeping any poultry except hens. In such cases, the returns from the poultry belong entirely to the tenant, but occasionally the landlord may specify for himself the privilege of receiving eggs and fowls for table use. Where poultry constitutes a more important enterprise in the operation of the farm, the fowls may be owned jointly. In such cases as, for instance, in Delaware on one-half share rented farms, the landlord receives half the eggs and increase. In a few instances on dairy farms, particularly in Indiana, the landowner receives two-thirds the eggs.

Methods of Sharing Pasture.—In the corn belt, the common practice on high-priced land is to require the tenant to pay a cash rent for pasture on crop farms, while in regions where land prices are low the tenant may receive the use of the pasture free as a perquisite. The cash rent for farm pasture ranges from \$1 to \$10 per acre, being usually \$4 to \$6 per acre. Such pasture land is commonly in a system of rotation, and it is considered as potentially crop land. The rent per acre, therefore, is fixed at about the same price as would be charged under a cash system for the crop area of the farm.

On general farms in Colorado, rented on shares with expenses shared equally, the tenant may receive one-half the proceeds from the use of pasture. These proceeds commonly come from fees for pasturing outside horses or other stock. In general, when the tenant has the free use of pasture for his work stock and a few cows and hogs, he is required to share equally with the landowner the colt and calf proceeds.

Dairy Farms.—On dairy farms, the landlord may provide one-half of the cows, while the tenant furnishes the other half of the cows and all of the horses and machinery and receives one-half of the proceeds. In other cases, the landlord may own all the cows while the tenant furnishes all other equipment and receives one-half the proceeds. In such cases, the tenant bears one-half the loss by death of the cows or one-half the cost of cows purchased to keep up the herd. In still other instances, the landlord may furnish everything except labor and receive two-thirds of the proceeds. In the first two systems, expenses are shared about equally, while in the third system expenses are borne in proportion to the shares of the landlord and

tenant in the proceeds. Occasionally, all equipment, including cows, hogs, poultry, work horses, tools, machinery, and other working capital, is shared equally, as well as all expenses of whatever nature. In this case, also, the proceeds are shared half-and-half.

Dairy Leasing Practices—Wisconsin and Illinois.—In the old established dairy sections as represented by Green County, Wisconsin, and Kane County, Illinois,¹⁴⁵ the most common system of share rent of dairy farms is the half-and-half. Under this system, the landlord furnishes land, buildings, half the productive stock, part of the seed, and sometimes part of the fertilizer. All stock on these farms is fed usually from the grain and hay owned in common, and if feed of any kind is bought its cost is shared equally between landlord and tenant. In general, each party pays the taxes on all property owned by him, including the farm read tax, though in many cases in the North Central States all the farm road tax is worked out by the tenant.

Under this system, the poultry frequently is owned exclusively, in limited numbers, by the tenant, he getting all the proceeds there from, but with this exception each party generally receives half the proceeds from farm sales of all products of whatever nature.

If the landlord furnishes all the cows, the tenant bears half of a loss by death. The landlord receives receipts for sales and meets all repurchases to keep up the herd. Occasionally, the tenant, instead of standing half the loss by death of a cow, gives the landlord a fixed amount, from \$5 to \$15 per head for each cow dying.

Less frequently dairy farms are share-rented on the one-third and two-third system. Under this system, the landlord supplies everything but the man labor, which is furnished by the tenant. The landlord, under this system, gets two-thirds of the sales of all products and the tenant one-third, and in case feed and concentrates are purchased, the tenant pays one-third their cost.

Stock Farms Leasing Practices.—On stock farms, the tenant commonly supplies tools and horses while the landlord furnishes half of the productive stock and receives half the proceeds. The landlord may provide all of the productive stock, though he may agree to other modifications of this system, permitting such adjustment as to make fair a half-and-half sharing of the income.

General Farms Leasing Practices.—In general farming, as well as in grain farming, the tenant may furnish the tools and horses and pay the landlord as rent one-half, two-fifths, one-third, two-sevenths, or one-fourth of the crops, according to the local conditions. In other instances, the landlord may furnish all of the equipment and take two-thirds of the crops or more rarely only one-half. On cotton farms where the tenant furnishes all equipment, he receives two-thirds or three-

fourths of the cotton, while if he supplies only the labor he receives one-half of the cotton.

These few cases may be taken to illustrate the types of share leasing systems in which the landlord receives a certain fractional part of all crops and products of a given farm rather than different fractions for different crops. A study of actual leases shows that, aside from large estates where a uniform contract is prescribed for all tenants on a given estate, there are rarely two lease contracts containing identical stipulations.

Leases vary in their main features and in almost innumerable less important details. They differ in the method of sharing equipment, expense, and proceeds. They show how greatly varied have been the attempts to balance one item of expense or equipment with another. They may specify a long list of items of expense, equipment, privileges, perquisites, restrictions, reservations, etc., which are not shared but are to be borne or enjoyed exclusively either by the landlord or by the tenant. The money value of these expenses and privileges cannot be known in advance, but only at the end of the year. These items may amount in the aggregate, however, to important sums for both parties.

In some cases, no items of expense or privileges are shared. In such leases, the items are merely divided between landlord and tenant in a manner which is supposed to be more or less fair. The landlord may pay for the fertilizer, lime, grass seed, twine, etc., while the tenant pays for thrashing, grain seed, blue vitriol, and fuel. Both the tenant and landlord may enjoy a large number of privileges of which the money value is not determined or even approximately estimated.

Leasing Practices in the Cotton Belt.—Throughout the cotton belt of the Southern States, interest in tenancy on the part of planters is for the purpose of securing a satisfactory supply of labor to grow cotton, and on the part of tenants to secure the best return for their ability to grow that crop. From the farm management standpoint, tenancy in the south is of more importance as a managerial problem than as a means of getting started, since the practice of letting small tracts to negro tenants does not tend to encourage white competition. In a publication giving something of conditions in the Yazoo-Mississippi Delta¹⁴⁶ based on 878 records taken in 1913 the methods of renting were found to be:

TABLE 244.—LEASING PRACTICES IN THE COTTON BELT

	Method of renting		
	Share cropping	Share renting	Cash renting
Landlord furnishes.....	Land House or cabin Tools Work stock Seed One-half of fertilizers Fuel	Land House or cabin Fuel One-fourth or one-third of fertilizers	Land House or cabin Fuel
Tenant furnishes.....	Labor One-half of fertilizers Three-fourths or two-thirds of fertilizers	Labor Work stock Feed for work stock Tools Seeds	Labor Work stock Feed for work stock Tools Seeds
Landlord receives.....	One-half of the crop	One-fourth or one-third of the crop	Fixed amount in cash or lint cotton
Tenant receives.....	One-half of the crop	Three-fourths or two-thirds of the crop	Entire crop less fixed amount

Fundamental Factors in Leasing Farm Lands.—Certain fundamentals have been pointed out as underlying the terms of leases.¹⁴⁴ These are:

The richer the farm, the larger the share going to the landlord.

The poorer the land, the more the landlord must provide in the way of equipment, or else he must be willing to meet a greater proportion of operating expenses or accept a smaller share of the product.

Increasing the distance from market decreases the landlord's share.

The landlord's share is reduced in crops of high labor requirements as compared with those of low labor requirements, else he must be willing to meet a greater share of the operating expenses to offset the labor requirements.

On average farms, labor offsets land; on other than average farms a division of investment in operating expense and equipment is necessary to balance the interests of both landlord and tenant.

On the same farm, the tenant's share varies with different crops.

CHAPTER XXIV
FARM LEASE FORMS

Since the great majority of lease contracts are for one year, and since the average period which the tenant remains on a farm is about three years, it is probable that each year about 2,000,000 lease contracts must be made or renewed. Consideration of the contract is thus important.

Throughout the United States the terms of lease contracts vary so much in accordance with differences in type of farming and other local conditions that it is impossible in a single chapter to furnish detailed instructions that will apply to all these varied conditions. The discussion of the leasing system suitable for a given type of farming—such as dairy farming, grain farming, cotton farming, or fruit farming—would require several pages.

The lease takes up in more or less detail the kinds of crops which are to be grown, the methods which are to be followed in producing, marketing, and disposing of the crop; the use of manure and fertilizers; the disposition of by-products; the number and kind of animals permitted on the land; the requirements as to ridding the land of weeds, squirrels, gophers, and the like; regulations covering the care of buildings, orchards, etc., and many other details which may be pertinent to the upkeep of the farm.

Examples of Common Cash and Share Leases.—Brief leases are illustrated herewith:

Sample of Simple Cash Lease

THIS INDENTURE, made this day of A.D.
BETWEEN..... and of the
County of, State of, the parties of the first part,
and, a corporation organized under the laws of the State of,
and having its principal place of business at (City),
..... (State)..... the party of the second part,.....

WITNESSETH: That the said parties of the first part, do by these presents lease and demise unto the said party of the second part, all those certain pieces or parcels of land situate in the County of, State of, described as follows, to wit:

The Northeast quarter (N. E. ¼) of section twenty four (24) in Township eight (8) South, Range seven (7) East, M. D. B. & M., being all of the land in said section owned by said parties of the first part.

With the appurtenances, for the term of Five (5) years, from, the first day of February, A.D. 1920, at the ANNUAL rent or sum of ONE THOUSAND AND NO/100 (1,000.00) Dollars, payable in Gold Coin of the United States of America, in advance, on the first day of each and every February, during said term, Five Hundred (500.00) dollars, to be paid to each of the aforesaid parties of the first part.

FARM MANAGEMENT

AND IT IS FURTHER AGREED, that if any rent shall be due and unpaid, or if default shall be made in any of the covenants herein contained, it shall be lawful for the said parties of the first part to re-enter the premises, and remove all persons therefrom. And the said party of the second part does hereby covenant, promise and agree to pay the said parties of the first part the said rent, in the manner hereinbefore specified, and not to let or underlet the whole or any part of the said premises nor assign this lease, voluntarily or involuntarily, without the written consent of the said parties of the first part.

And that, at the expiration of said term, the said party of the second part will quit and surrender the said premises in as good state and condition as reasonable use and wear thereof will permit (damage by the elements excepted).

IN WITNESS WHEREOF, the said parties to these presents have hereunto set their hands and seals, the day and year first above written.

Signed, Sealed and Delivered
in the Presence of

..... (Seal)
..... (Seal)
..... (Seal)

Example of Crop Share Lease

THIS INDENTURE, Made this day of October,, between the, the party of the first part, and, the party of the second part:

WITNESSETH: That the said party of the first part does hereby lease, demise and to farm let unto the said party of the second part the following described farm or parcel of land situated upon the ranch of the party of the first part in township, County of, State of, to wit:

(description of land)

TO HAVE AND TO HOLD the same for the term of one year, commencing on the 1st day of November,, and ending on the 31st day of October,

AND THE SAID party of the second part promises, covenants and agrees that he will not underlet any portion of said premises, nor assign this lease, without the written permission of the said party of the first part, its agent or attorney. That he will personally occupy and till said premises. That he will, during said term, keep all buildings, fences, corrals and other improvements now on said premises, or which may be put thereon during the term hereof by said party of the first part, in good repair, damage by fire excepted. That he will not commit or suffer waste to be committed thereon, and that the said party of the second part further covenants that he will till and cultivate said premises in a good, farmerlike manner. That he will, in due and proper season, sow said premises to wheat, oats, or barley, or proportions of each according to seasonal conditions, and will harvest the same at his own cost, charge and expense, as soon as the same is suitable for harvesting: That he will, immediately upon harvesting the same, thresh, clean and sack in good, new merchantable sacks, all the grain of every description raised on said premises, and, as threshed and sacked, divide in the field and pile the same separately in the proportion of 3 and 1, and that the latter part thereof for the party of the first part shall be piled as and for the yearly rental, and the said property of the party of the second part shall become the property of the party of the first part; but the party of the second part shall, upon request, haul the same to Santa Margarita Warehouse free of costs to the party of the first part. And all hay cut there on shall in like manner be delivered at the machine, as baled, and a like portion thereof set apart to the party of the first part, as their property, and be hauled, upon request, by the party of the second part, to Santa Margarita Warehouse without charge.

AND IT IS MUTUALLY COVENANTED and agreed that until such delivery be made in the fields, as aforesaid, the party of the first part shall have a lien and charge upon the entire crop of hay and grain sown, growing or harvested, to the amount of \$2,000 Gold Coin, estimated and fixed, and for the purpose of securing said party of the first part for the use and rental of said premises yearly and every year, as the value thereof, the party of the first part reserves the right to itself, agent, and attorney, to enter upon the premises at any time to make examination of the premises and crops. And, if they shall at any time deem themselves insecure and unsafe in the matter of the rental, they may take immediate possession of the leased premises to secure or harvest the crop, and may dispose of the same by sale or otherwise, accounting to the party of the second part for any excess actually realised by them over and above the rental of said premises, and all expenses incurred or paid to secure, harvest or make sale of crop.

IT IS FURTHER AGREED that the grain shall be harvested by a party to be agreed upon by the parties thereto, or that the sacksewer shall be a person named by the lessor and paid by the lessee, in order that no difficulty may arise as to the correctness of the count of sacks, or of crop.

IT IS FURTHER AGREED that the party of the second part shall use reasonable care and diligence in ridding the property of ground squirrels, the material for the purpose to be furnished by the party of the first part.

.....
WITNESS the hands and seals of the said parties the day and year first above written.

Signed, Sealed, and (Seal)
Delivered in the (Seal)
presence of (Seal)

.....
Notary Public

Example of Partnership Lease.—In addition to the more common types of crop and stock leases are those ranging through wide extremes of terms and conditions. Some are drawn in a more or less indefinite way and worded in uncertain terms. In case of legal contests such leases are subject to many interpretations. Leases of this nature are, however, usually drawn to permit use of land and equipment under very liberal terms, as between friend and friend, or relative and relative, executed in good faith, and never dragged into the legal arena. The example of such a lease, copied below, was drawn between friend and friend to perfect an arrangement whereby the owner would be relieved of further responsibility in directing and financing this particular farm.

Example of Partnership Lease

THIS AGREEMENT, made and entered into this day of, 19....., between of the City of and County of, State of hereinafter called the lessor, and of the County of State of, hereinafter called the lessee.

WITNESSETH: The lessor hereby leases to the lessee, and the lessee does hereby hire and take from the lessor, the Ranch comprising Section, and portions of Sections Township Range County State of, embracing acres, more or less, together with all buildings, pumping plants, farm equipment, tools, work-stock, dairy herd, hogs, hay, harvested grain, and any and all other personal property situate upon said Ranch, a particular inventory of which said property is hereto annexed and made a part hereof, for a term of years from and after the day of, 19....., and ending with the day of, 19....., upon the terms and conditions hereinafter stated.

The lessee agrees, during the term aforesaid, to cultivate and farm said land and to conduct the farming and hog and cattle raising and dairying operations upon said land, or ranch, in such manner as will, in his best judgment and discretion, insure the best possible results therefrom; and the lessor agrees that so long as the lessee diligently devotes his best knowledge, zeal, time and attention thereto, he will in no wise interfere with said operations.

The lessee further agrees not to assign this lease, or any interest therein, nor to sublet said land or any part thereof to any person or persons to occupy or improve the same or to conduct any of the ranch or dairying operations thereon, without first obtaining the written consent of the lessor to do so. The lessee further agrees not to commit any waste, strip, or damage upon said land, nor permit or suffer any to be done; that he will keep all equipment, hereunder demised, and all fences and buildings upon said land in good repair, reasonable use and wear thereof and damage by fire, act of God and the elements excepted; and that he will keep all equipment, implements, tools, stock, crops growing or harvested, insured against loss by fire.

The lessee further agrees to maintain the levees surrounding said land in good condition and repair and that he will keep the land hereunder demised, and the levees surrounding the same, free from mustard and weeds and that he will destroy and poison any squirrels and other vermin, if any, infesting the same.

Any and all expense incurred by the lessee in the performance of any of the matters or things aforesaid, and incurred by virtue of any agreement, covenant or understanding on his part heretofore con-

tained, shall be considered "Operating Expense" of said Ranch, and the lessee personally agrees to annually advance for such "operating expenses" all sums required therefor, for any of which sums so advanced he shall be repaid and reimbursed all as hereinafter provided.

The lessor agrees, during the term of this lease, to personally pay and discharge all taxes and assessments, reclamation or otherwise, levied upon said land, or lien thereon, and to personally discharge all premiums for insurance placed upon any of the improvements or buildings upon the demised land; and further agrees in the making of further improvements to said land, to advance, upon the request of the lessee for that purpose, such amounts as may be necessary for that purpose, not in excess of Two Thousand (2,000) Dollars.

Full discretion in the conduct, operation, and management of said ranch, and sale of its products, is hereby granted to the lessee; any and all proceeds, howsoever arising from any farming, hog or cattle raising, or dairying operations, shall be received by and deposited by the lessee with the of in the name of Trustee, which moneys so deposited the lessee is hereby authorized to use for the purpose of reimbursing himself to the extent of any and all moneys theretofore advanced by him for "operating expenses," and thereafter for "operating expenses" to the extent of Fifteen Thousand (15,000) Dollars, thereof, and no more; any and all balances of which said trust fund, upon and at the close of each year of the term hereof, shall be divided between the parties hereto, as hereinafter provided.

At the close of each year of the term hereunder created, viz: on the day of of each year, a financial statement shall be prepared showing the gross receipts from any and all operations of whatsoever kind or character conducted upon said ranch during said year and all amounts howsoever advanced, or expended, by the lessee for "operating expenses;" and the balance thereafter remaining shall be divided between the parties hereto in the following proportions; 25 % thereof unto the lessee and 75 % thereof unto the lessor, which said amounts the parties hereto respectively agree shall be in full to the lessee for any and all advances by him to be hereunder made and services rendered, and to the lessor for the rental of the real and personal property hereunder demised. Should, however, said statement show a deficit, that is to say, should the amount advanced by the lessee for operating expenses be in excess of the gross proceeds, any and all such deficit shall be borne by the lessee as a loss for the year then ending, without right or claim against the proceeds or profits flowing from the operations of any succeeding year.

The lessor further agrees that he will grant his consent to the sale by the lessee of any portion of the personal property hereunder demised if such sale be deemed desirable by the lessee either by reason of obsolescence or undesirability or unfitness of said personal property for any of the purposes for which the real and personal property hereunder demised being conducted and operated. The proceeds from any such sale may be applied by the lessee in the purchase of personal property either by way of replacement or substitution of that sold, or by way of addition thereto, in which events the property so acquired shall be considered as capital investment; and any and all balances remaining in the hands of the lessee, and not utilized or applied as aforesaid, shall be paid over by the lessee to the lessor.

At the expiration of the term hereunder created, unless extended by mutual consent, and then at the close of any such extended term, the lessee agrees to deliver and surrender possession of the real and personal property hereunder demised in the same condition as by him received, reasonable use and wear thereof, and damage by fire, the act of God or the elements alone excepted; and that he will return to the lessor the equivalent of harvested and outstanding crops, the equivalent of weight and quality of hogs and a dairy herd of like quality, all as delivered to him at the commencement of the term hereof, and as shown by the inventory to be taken at the commencement of said term and hereunto, or to be hereunto attached. The lessee, however, shall not be responsible for the loss of any work horses due from disease or natural causes.

The lessee agrees to keep full and complete books of account of any and all matters or things in any wise relating to the operation and conduct of said ranch, showing any and all proceeds derived from said operations and any and all expenses of whatsoever kind and character incurred in and about the same, which said books of account shall be open to the inspection and examination of the lessor or his duly accredited agent at any and all reasonable times. The lessee further agrees at least once a month to furnish unto the lessor, at his office in the City of County of a written financial statement showing detailedly any and all operations of whatsoever kind or character, in any wise relating to the operation, conduct and management of said Ranch.

Anything in this indenture of lease to the contrary hereinbefore contained notwithstanding, the lessor shall have the right to abbreviate the term of and to terminate this lease prior to the expiration thereof in the event of a bona fide sale or exchange of said Ranch upon the conditions following:

Upon the reimbursement by the lessor the lessee of any and all amounts theretofore advanced by the lessee for operating expenses and by the further payment by the lessor to the lessee, during the first six months of the first year of the term of this lease, of a sum equal to per month for each and every month elapsed; and during the second year of the original term of this lease, and during any year of any extended term thereof, of a sum equal to such portion of the profit earned by the lessee during the preceding year as the period elapsed bears to one year, but in no event at a rate less than per month for each and every month elapsed.

The lessee further agrees that the lessor, by his representative or agent, may enter in and upon the demised premises, any and all portions thereof, and buildings thereon, at all times during the term of this lease, and have free and unhindered access thereto for the purpose of ascertaining the condition of the lands and personality hereunder demised, and to satisfy himself of the due performance by the lessee all the covenants promises and undertakings on his part herein contained.

WITNESS the hands and seals of the parties hereto this day and year first above written.

Lessor
Lessee

Example of Stock-share Lease.—The following is a sample stock-share lease form for use on farms on which live stock is owned in common, as adopted by the landlord-tenant conference under the auspices of the Winnebago County Farm Improvement Association, held at Rockford, Ill., January 31, 1916. It does not contain a clause stating how the lease may be renewed, but otherwise is sufficiently detailed.

Sample Stock-Share Lease

THIS INDENTURE, made and entered into this day of, 19...., by and between party of the first part, lessor, and party of the second part, lessee, witnesseth:

DESCRIPTION OF THE LAND.—That the first party, in consideration of the agreements and stipulations hereinafter mentioned, to be kept and performed by party of the second part, has leased and does by these presents rent and lease unto the second party the following described real estate, situated in the district, county of, and the state of to wit: (Give exact location of the farm)

LENGTH OF TENURE.—To have and to hold the said premises unto said second party from the first day of, 19...., at 12 M., to the first day of, 19.... at 12 M., and from year to year thereafter, and unless and until either party hereto shall, on or before September first of the calendar year, give notice in writing to the other party of the purpose, desire and intention to terminate said lease on the first of March following, or unless this contract shall be earlier terminated under and pursuant to the provision thereof herein contained.

PLAN OF FARMING BUSINESS.—This leasing arrangement is known as a stock-share plan. The parties to this contract will cooperate fully according to the terms of this lease, in order that each may receive the largest returns consistent with a practical system of cropping and soil management, which shall maintain and even increase the fertility of the land, with the purpose that this farm shall not decrease in productiveness and value.

The type of farming agreed upon is live stock, dairying, potatoes, and production. The plan is to feed most of the crops grown on the farm, depending upon the sale of live stock, dairy products, potatoes, and as the principal source of income. No hay, straw, corn stover, roughage or manure may be sold from the farm unless by written consent of party of the first part.

(Outline of crop rotation)

There shall be sown by the lessee each year not less than acres to clover or alfalfa with not less than eight pounds of clover or alfalfa seed to the acre. There shall be on the farm at all times not less than acres of good hay seeding.

Lessee shall not sow more than acres of wheat or fall-sown grains during the fall previous to the termination of this lease or of this lease extended.

Live stock owned by outside parties shall not be pastured, stabled, or boarded except by written consent of lessor.

WHAT LESSOR FURNISHES.—The first party shall furnish the above farm, including the improvements thereon, and pay all taxes and insurance on said property. He shall furnish materials needed for improvements and repairs to real estate as needed, and shall furnish materials for other permanent fences and other permanent improvements as mutually agreed upon. He shall also furnish not less than one ton of fertilizer each year. Lessor also agrees to furnish cows with the farm.

WHAT LESSEE FURNISHES.—The second party shall furnish all work horses (not to exceed) to work the farm, shall furnish harnesses, implements, farm machinery, repairs on machinery and shoeing on horses, and labor necessary to do all work required to conduct properly this farming business as described in this agreement. He shall make all repairs and improvements where skilled labor is not required, except as herein specified. He shall haul from all feeds, fertilizers, building materials, tile, and all materials for repairing fences and buildings which may be

needed in the operation of the said farm. He shall haul from and spread on the land limestone (ground or burned), phosphates, and other fertilizers purchased by lessor for use on said farm, and he shall apply same in such places and in such manner as lessor may direct. He shall haul or drive to market all produce from the farm free to lessor. Lessee agrees to operate said farm in a workmanlike manner, and to do the necessary work in good season, and to care properly for the crops and live stock, preventing all unnecessary waste or loss or damage to lessor's property. He agrees to return all stock and personal property to lessor in as good condition as when received by him, ordinary aging and use and damage by fire, floods, wind or lightning excepted. He further agrees that he will not burn corn-stalks, straw or other vegetable matter grown upon said farm, but will spread all this material upon the land as manure when not fit as feed for live stock.

WHAT LESSOR AND LESSEE SHALL FURNISH JOINTLY.—Lessor and lessee shall furnish jointly all seed grain, grass seed, clover and alfalfa seed sown on said farm during the period of this lease; also all live stock other than work horses and cows hereinbefore mentioned; and feed, including hired pasture if such becomes necessary for the same, including lessee's horses. All live stock, including lessee's horses, are to be fed from undivided feed; it is understood, therefore, that lessee's horses while so fed shall be used only in the work of the farm. They shall furnish binder twine and all fuel for tank heater, threshing, corn shredding, silage cutting, clover hulling, and pay machine bills for the same. They shall pay jointly all veterinary fees and stallion service fees. Each party shall pay one-half of all taxes and insurance on all personal property owned in common; shall share equally in all proceeds from the sale of live stock, poultry, grain, and other produce raised on said farm. Butter used by either party shall not be obtained from the said farm dairy. Each party shall gather and keep his own share of the fruit. Buying and selling of materials, live stock and other farm produce shall be left largely with the lessee, but all sales and purchases of more than five dollars (\$5.00) shall be made with knowledge and consent of the lessor. All feeds on the said farm at the beginning of this lease shall be appraised by a committee of three, and one-half of the value of the same shall be paid to lessor by lessee, the committee to be made up of disinterested parties and appointed as follows: One man each by lessor and lessee and these to select a third one. All business in the way of payments and receipts shall be by checks and deposits through the Bank of

LESSEE'S SPECIAL PRIVILEGES.—Lessee may have potatoes, garden truck and such fruit as the farm affords, milk, poultry and eggs for family use only. Lessee shall not keep boarders other than those that are being employed for actual farm operations or employed in the making of improvements on the farm. Lessee is to have necessary fuel from fallen timber for house use, and if this be not sufficient lessor agrees that lessee may cut and use trees not fit for lumber that have been marked by lessor for cutting.

LESSOR'S SPECIAL PRIVILEGES.—No timber shall be sold by party of the second part, nor shall the receipts from the sale of timber be shared by party of the second part. Lessor may sell or contract to sell timber from the farm without consent of lessee, and the receipts from the same are not to be governed by this contract. Right-of-way to timber shall be given by lessee to lessor, his assigns or representatives, for the removal of timber.

LIVE STOCK.—Both lessor and lessee shall own in common, each an undivided one-half, all live stock, excepting as hereinbefore provided for, owned and produced upon said farm; and such of said stock as parties shall agree upon shall be sold at such time as may be satisfactory to both. All stock brought onto the farm that is to be owned jointly shall be appraised by a committee of three to be selected as follows: One man to be selected by each party and these to select a third one. Settlement for such live stock between lessor and lessee shall be made on the basis of such appraisal. Work horses owned by lessee shall be three years or more of age. Colts raised on the farm or brought onto the farm shall be owned in common, each an undivided one-half, until they are three years of age, at which time they shall be sold unless sold previous to that age. Lessee agrees that any or all of the cows furnished by lessor may be replaced at the discretion of lessor with young ones produced on said farm. The young cow is owned jointly until the cow she replaces is sold. The money received for the returned cow is to be divided equally between the parties. If none of the young cows reared on said farm suit lessor he may sell at any time any or all of the cows furnished or owned by him and receive all the receipts derived therefrom, in which case he must replace the aforesaid cows within sixty days. It is also agreed to keep a registered bull of the breed at the head of the herd, to be purchased and owned jointly, said bull to be mutually satisfactory to both parties; to maintain not less than cows on said farm and that the heifer calves from the best cows are to be raised each year so as to maintain or increase the size of the herd and improve its quality.

HOW MONEY IS TO BE DIVIDED OR INVESTED WHEN CROPS OR LIVE STOCK ARE SOLD.—Whenever any cattle, hogs, or any other products of said farm shall be sold, the proceeds shall be equally divided between the parties, or if agreed upon it may again be invested in other stock, grain or material for the common use and benefit of the parties. Settlement for all receipts and expenses that have been received and paid during any calendar month shall be settled for between the parties at the end of that month. Drafts or checks for the share of the lessor, together with signed statements by purchasers of all products sold, where a sale is in excess of two dollars, shall be rendered to the lessor. Receipts, also bills, for all purchases paid for by lessee during the calendar month shall accompany the statement of the month's settlement.

NOXIOUS WEEDS TO BE DESTROYED, AND WORKMANSHIP OF LESSEE.—Lessee further covenants and agrees that he will farm said land in good, farmerlike and workmanlike manner; that he will not commit any waste or suffer injury to be done to the premises; that he will allow no noxious weeds to go to seed on said premises, and that he will keep the weeds and grass cut along the road-sides adjoining the farm.

MANURE.—Lessee also agrees that he will draw out and scatter on said premises daily, or as frequently as weather and ordinary farm conditions will permit, all manure; that he will scatter it where most needed; and that the yards shall be cleaned up on or before December first of each year of all manure, and that in default of so drawing out and scattering of manure, he shall pay to lessor as penalty the sum of fifty dollars (\$50).

CARE OF THE PREMISES.—Lessee agrees that he will keep the buildings, fences, and other improvements on said premises in as good repair and condition as the same are in when he goes into possession or as good as they may be put in during said lease, loss by fire, inevitable accident, and ordinary wear excepted; that he will not assign this lease or sub-let any part of said premises without the written consent of lessor; that he will not bring mortgaged property upon said premises without consent of said lessor; that he will not undertake any operation that will injure said land.

SURRENDER OF POSSESSION.—That in case lessee shall, from any cause, neglect, refuse or be unable to properly prepare said land, sow, plant, harvest, or care for any and all crops to be raised on said land, said lessor, his agents, heirs, or assigns, may at option, upon twenty-four (24) hours' notice to lessee, enter upon said premises and take possession thereof, and of the crops growing or being grown hereon, and properly care for the same, and sell the same, and the proceeds remaining after the payment of the rents, cost and expense and damages, shall go to the lessee; that he will surrender the stubble land, for the purpose of plowing, in the fall preceding the termination of this lease, as soon as the crop has been removed from the same; that he will surrender possession of said premises at the end of the term, or sooner termination thereof; and if immediate possession be not given that he will pay lessor or assigns the sum of ten dollars (\$10.00) for each and every day possession is thus withheld as damages for nonsurrender.

LIEN ON PROPERTY OF LESSEE.—That a failure to keep and perform any of the agreements hereinbefore mentioned shall, at the option of said lessor or assigns, operate as a forfeiture of this lease, and terminate the term and said lessor may take possession of the premises at once, without process of law; or he may bring an action at law for possession, said lessee being, from the date of such forfeiture, a tenant holding over after the expiration of his term, and his continued occupancy of said premises thereafter shall be alone a tenancy at the will of the lessor and not otherwise; that in consideration of this lease, and the agreements herein contained on the part of the lessor, said lessee covenants and agrees to keep and perform the agreements hereinbefore set forth, hereby covenanting that moneys due from him to said lessor for plowing, or damages or otherwise, shall be and hereby are declared and made a perpetual lien on any and all crops, stock and other personal property of the lessee at any time kept, had, or used on said premises, whether the same are exempt from execution or not, such lien to attach from the commencement of this lease.

LESSOR'S RIGHT OF ENTRY.—Said lessor reserves the right of himself, his employes or assigns to enter upon said premises at any time, for the purpose of viewing the same or making repairs or improvements thereon, the same not to interfere with the occupancy of the lessee, and reserves the right of himself or agent to enter upon said premises for the purpose of plowing in the fall preceding the termination of this lease.

LESSEE'S REWARD FOR FARM IMPROVEMENTS.—It is understood and agreed by both parties that the lessee's reward for farm improvements which he is required to make according to the terms of this contract shall come in the increased yields and greater returns which should result, and which will be shared by the lessee if he continues to lease said farm. But in case this lease is terminated within five years after the improvement is made the lessee shall receive compensation for improvements, such as hauling and spreading rock phosphate and ground limestone, seeding clover and alfalfa, laying drainage tile, building fence and stump pulling, when made on written authority by lessor, as follows: If the lease is terminated before any crop is received following an application of rock phosphate or ground limestone lessee shall receive one dollar for each ton hauled and spread; if terminated after one crop has been received off the land, eighty cents; if a second crop has been taken off, sixty cents; if a third crop has been taken off; forty cents; if a fourth crop has been taken off, twenty cents; and if a fifth crop has been taken off no compensation at all; for seeding clover or alfalfa, one dollar per acre if no crop has been taken off; eighty cents if a second crop has been taken off; sixty cents if a third crop has been taken off; for building fences—fifteen cents per rod if the lease terminates within one year from the time the improvement has been made; twelve cents per rod if two years has elapsed; nine cents if three years has elapsed; six cents if four years has elapsed; and three cents if five years has elapsed. Lessee shall be compensated for other new, permanent improvements, that may be performed upon written authority of lessor, if correct account of the labor by days has been kept and a statement has been rendered to the lessor at the time of making the improvements as follows: If the lease is terminated within one year from the time that the improvement was made, the lessee shall be paid full value of the statement rendered; if within two years, four-fifths of the statement rendered; if within three years, two-fifths; and if within five years, one-fifth.

HOW DIVISION SHALL BE MADE AT END OF TERM.—At the end of the term of this lease an accounting shall be had between the respective parties hereto, and each kind of produce, stock, etc., upon said farm belonging jointly to lessor and lessee, shall be equally divided by lessee into two equal shares, as near as may be, the lessor to take his choice, and such choice to be final. And if proper settlement cannot be made in that way, all the parties hereto agree to have a public sale upon the premises for the purpose of effecting such settlement. Since silage is an article that is not salable to outside parties, lessor agrees that he will pay to lessee at the termination of this lease, for lessee's share of the silage at the rate of three dollars per ton.

CONCERNING VERBAL AGREEMENTS.—Verbal statements and agreements are not valid if contrary to this contract, and are never valid unless reduced to written form and signed by the party or parties making them.

LIABILITY OF EACH PARTY.—Neither party shall have the right to bind the other party by any contract outside the scope of this agreement, except with the consent of the other, unless hereinbefore provided for. Nor shall either party hereto have any authority, right or power to create any debt or obligation in the name or resting upon the other; and under no condition or circumstance shall the relation created by this instrument constitute or be interpreted as constituting a partnership, or other than that of lessor and lessee.

Signature blanks and notary's blank follow here.

What the Lease Should Contain.—In drawing up a lease it should be borne in mind that a lease is a contract, when duly signed and delivered, providing for the possession and income of designated lands for a stated period in consideration of value given.

Forms of leases vary, as already indicated, between wide extremes. Tichenor, in his book on "Farm Contracts between Landlord and Tenant" (published by the author, W. C. Tichenor, Lebanon, Ohio, 1916, revised 1919), presents 29 extremely different forms collected from ten north central states.

A lease should:

- (a) Be written.
- (b) Conform to state and federal statutes. This covers witnessing, recording, revenue stamps, etc.
- (c) Be as brief as consistent with presentation of all essential facts.
- (d) Be worded as simply and clearly as possible.

Form of the Lease.¹⁴⁷ *Lease Should Be Written.*—A written lease is more satisfactory than a verbal one, since, if one of the parties should die, a written contract protects the estate; a written lease is likely to be more carefully considered by both parties, and its terms defined with greater precision; it serves as a memorandum to both parties, so that the actual terms of the contract may not easily be forgotten. In practically all of the States the statutes provide that a lease for a period longer than that specified by statute (commonly 3 years) shall be considered as creating only an estate at will, unless the contract is in writing and unless it complies with the requirements specified with regard to signatures, witnesses, and other formalities.

Use of Printed Forms.—Standard printed forms for farm lease contracts may often be obtained from printing establishments, stationers, lawyers' offices, and banks. Such forms usually contain insufficient space for the numerous special conditions of a complicated farm lease. However, a standard lease form may be of assistance in providing legal ter-

minology and such legal specifications as may be peculiar to the laws of a given State. It is desirable that the landlord and tenant agree on the terms of the contract and then prepare a lease embodying these agreements. After the terms of the lease are agreed upon, an attorney may be consulted, if desired, to aid in giving the correct legal form.

Legal Requirements.—The legal essentials to the validity of a lease contract are definite agreements as to (a) the extent and bounds of the property leased; (b) the term of the lease; (c) rate of rent, together with specifications of time and method of payment. It is not usually necessary that a lease contract be recorded in order to be valid, but recording may have the advantage of serving notice to third parties of the existence of the contract. However, in probably a majority of the States the physical possession of the property by the tenant is held to constitute notice to third parties of his rights in the property.

Points to be Considered in the Farm Lease¹⁴⁷

The following is a list of items that should be considered in the making of the farm lease. While all possible points are not covered, the list does contain the more common and the more important considerations. Since cash renting is much simpler than renting on shares, there are many points in the list which do not apply to cash leases.

General Details.—

1. Date lease is made.
2. Names and formal designations of landlord and tenant.

In framing any legal contract it is important to designate accurately the respective parties. It is customary to use the terms "party of the first part" and "party of the second part" to designate the respective parties. If one of the parties comprises more than one person, the expression should be plural—as, for instance, "parties of the second part." In order to shorten and simplify the contract it may be well to define the meaning of these expressions at the beginning of the lease. Such a definition may read as follows:

This agreement, made this first day of March, 1920, between John Smith, party of the first part, hereafter called "the landlord," and Richard Brown, party of the second part, hereafter called "the tenant," witnesseth, etc.

3. Number of years lease is to run and dates of beginning and ending.

The date of beginning the lease year differs in various sections of the country, but is usually made to coincide with the time of year when the more important crops have been harvested and sold and before preparations for crops of the following harvest begin. In the Corn Belt, March 1 is the customary date; in the South, January 1; in regions where winter wheat is the principal crop, August 1.

4. Statement of manner by which the lease is to be terminated or renewed.

5. Brief description of the real estate leased, including name of farm, boundaries, and location with respect to State, county, township, and section.

6. Description of other property included with the real estate in the lease.

7. Types of farming to be followed.

Reservations.—

8. Right of entry by the landlord for purpose of inspecting buildings and other improvements, crops, and live stock, for making repairs and improvements, for work in connection with crops of the following harvest and for other purposes.

The landlord should reserve a right of entry, even when he does not participate in supervision of farm operations. Such reservation may be expressed as follows:

The landlord reserves the privilege of going upon said farm at any time and at all times to look after his interests, to do work and to have work done, either personally or by agent, employee or employees, without being liable in damages.

9. Reservation by the landlord of parts of buildings, granary space, corn cribs, mow space, and any other portion of the real estate the use of which it is agreed he shall reserve.

10. Reservations and restrictions with respect to the use of pasture, fruit, woods, timber, sand pits, gravel beds, fish, and game.

11. Reservation of the right to decide or direct farming operations.

12. Reservation of the right to buy or sell live stock, crops, produce, or supplies for farm use.

13. Limitations on the kind, amount, or value of property which may be bought or sold without informing the landlord and getting his consent.

14. Designation of a bank in which undivided funds are to be kept or deposited, with agreement as to the disposition or use of these funds.

15. On share rented farms, a statement denying, acknowledging, or limiting partnership relation.

The relationship of landlord and tenant is not ordinarily that of a partnership. The latter involves joint liability to an unlimited extent for all debts created by either party in the name of the firm, equal voice in the management of the business, and other conditions not characteristic of the relation of landlord and tenant. Because the terms of many lease contracts, especially the so-called stock share leases, are of such a character as to suggest the actual relationship to be a partnership, it is customary to include a clause in the lease disavowing the partnership.

A clause containing such a disavowal may read as follows:

"Said parties to this lease shall be in no sense partners. Neither shall bind the other to any obligations nor incur debts for the payment of which the other party might be liable without the written consent of that party."

16. Reservation of the right to sell the farm, with statement of adjustments to be made in case of sale.

If a lease is but for one year, it is probably unnecessary that it contain a sale clause, but in case of a lease for several years such a clause may be inserted. The following will illustrate this type of clause :

It is hereby agreed that, in case of sale of said premises during the occupancy of said second party, and in case the purchaser should desire possession, said second party

hereby agrees to give up to said purchaser said premises at once on payment to the said second party of a fair and reasonable compensation for such surrender, and if he and the purchaser can not agree as to the amount of such compensation it shall be left to three disinterested appraisers, of whom said second party shall choose one, the purchaser one, and the two so chosen shall choose a third one. Their decision shall be final as to the amount to be paid by the purchaser to said second party.

Assurances and Guaranties by the Tenant.—

17. To operate the farm in a good and farmerlike manner.

18. Not to sublet the farm.

The assignment of a lease contract by one tenant to another is a matter of considerable concern to the landlord, for on the personal honesty and efficiency of the tenant may depend the amount of rent (in case of share contracts), the security of the rent payment, and the care of the property intrusted to the tenant. Although the assignment of a lease by a landlord is not usually a matter of great concern to a tenant, it is as well to include in the contract a clause forbidding such an assignment without the consent of both parties, as follows:

Except in case of sale, as provided above, this lease shall not be assigned or transferred to anyone unless on written consent of both parties, and no one but the party of the second part, his family, and hired help shall occupy the premises or any part thereof during the term of this contract, nor shall the premises or any part thereof be sublet without the written consent of the first party.

19. To occupy the farm continuously throughout the lease period.

20. Not to attempt to operate outside land in addition; not to thrash for outsiders as a business; not to give preference to any other work over the operation of the farm.

21. Not to rent out work stock, implements, or other property owned by the landlord.

22. To work for the landlord if requested, at specified rates, when not engaged in work on the farm.

23. To commit no waste or damage, and suffer none to be committed; to protect and care for the buildings, fences, trees, and other property.

Whether the land is rented for cash or for share rent the landlord should be interested in insuring the care and preservation of his land and improvements. Nothing will serve to accomplish this result so much as careful supervision by the landlord or his representative. However, the landlord's position may be strengthened if provision is made in the contract requiring the tenant to take proper care of the property intrusted to him. Such provisions may be in general terms or detailed. If the latter, there may be great differences in the actual provisions according to the special circumstances and terms of the agreement.

The following is a general clause which provides against unnecessary waste or damage:

The party of the second part, the tenant, agrees that he will not commit or suffer to be committed any waste, damage, or strip of said premises, as, for instance, cutting wires, removing sections of fence, failing to oil pumps and windmills, or tearing down fences for purposes not required in the ordinary course of farming.

If the tenant is expected to keep buildings and fences in repair, as is generally the case, a clause such as the following may be written into the lease:

The party of the second part agrees to keep the buildings, fences, and other

improvements on said premises in as good repair and condition as the same are when he takes possession, or as good as they may be put in by the lessor during the term of the lease, ordinary wear, loss by fire, or unavoidable destruction excepted.

Among the details that may be specified with respect to care of the premises, are to keep the windmill and other pumping machinery properly oiled and cared for and to repair any damage to such machinery, except when damage is due to action of the elements; to take proper care of trees, ornamental vines, and shrubbery about the buildings, in the yard and garden, and to prevent injury to them; to cut all hedges at least twice each season and to burn the brush if of considerable amount; to keep open all necessary ditches; and to keep buildings and fences in good repair.

24. To make inventories at stated periods and to keep records of farm yields, acreage, purchases, sales, breeding of live stock, and to give the landlord access to these records.

25. To yield peaceable possession at the termination of the lease.

Assurance of peaceable possession at termination of the lease may be provided for as follows:

The second party covenants and agrees with the first party that at the expiration by this lease, by limitation or otherwise, he will yield up possession of said premises in as good condition as they are at the beginning of this lease, natural wear and damage excepted, and that he expressly waives any and all notice to terminate, except as herein specifically required, and upon demand of the first party will pay ten dollars for each day the premises are occupied after such expiration unless the written consent of the landlord for such continued occupancy shall have been given.

26. Not to bring on the premises mortgaged property that may have the effect of impairing the landlord's lien.

Assurances and Guaranties by the Landlord.—

27. To make concessions with respect to rent and other obligations of the tenant in the event of disaster to the farm operations as the result of fire, flood, drought, pestilence, or other conditions over which the tenant has no control.

28. To provide peaceable possession, or to protect the tenant's interests, in event of litigation or seizure of the landlord's title by a mortgage or other claimant.

29. To release to the tenant the residue of crops, live stock, and other products remaining after the rent or rent share is paid and the landlord's lien satisfied.

Agreements with Respect to Credit Furnished by the Landlord.—

30. Terms on which the landlord is to make advances of money or supplies to the tenant for the purpose of operating the farm.

31. Special and occasional credits to make possible the purchase of live stock and feed, or with respect to the feeding of crops to live stock.

32. Terms of loans on farm implements, work stock, productive stock, or other property of which the tenant is to be the nominal owner or part-owner.

Respective Contributions by each Party to Operating Capital.—

33. General farming machinery, running gear, small tools, and harness, with provision for replacement and repair.

34. Special farm machinery not commonly employed, such as manure spreader, lime or fertilizer distributor, spraying outfit, silage cutter and engine, milking machine, gasoline engine, thrashing machine, tractor and tractor equipment, with provision for replacement and repair.

35. Horses and other work stock.

36. Productive live stock, including cattle, hogs, sheep, and poultry.

Adjustments with Respect to Property Owned in Joint Account.—

37. Method of appraising the value of property of either party taken over for joint account.

38. Method of dividing property jointly owned at termination of lease.

39. Settlement for undivided crops, products, or supplies used by the tenant in his household, for his horses, or for other stock.

Respective Contributions by Each Party to Expenses.—

40. Contributions of labor and special services:

(a) Amount of labor to be contributed by each party to general farm work.

(b) Special arrangements with respect to the employment of members of the tenant's family.

(c) Arrangements with respect to extra hired labor and labor engaged in thrashing, silo filling, baling, shredding, clover hulling, and other operations involving the employment of machines not owned by the tenant.

(d) Responsibility of the respective parties with regard to hauling and delivery of crops, milk, and other farm products, hauling supplies for farm use, hauling tile, sand, lumber, fencing, and other materials used in making farm improvements.

(e) Furnishing of skilled labor or unskilled labor employed in fencing, tiling, repair or construction of buildings, drilling of wells, or other work of farm improvement.

(f) Contribution of labor employed in mowing, grubbing or pulling weeds and brush, cleaning ditches and drainage outlets.

(g) Contribution of labor employed in keeping up fences and in incidental patching and repairs to improvements.

(h) Arrangements for the board and lodging of outside labor, particularly of labor employed by the landlord on farm improvements.

41. Expenses on account of live stock:

(a) Use of feed purchased or produced on the farm. What stock may be fed from undivided feed and what stock may not be so fed. Limitations on the amount of undivided feed which may be used for different classes of stock or on the number of stock which may be fed.

(b) Breeding and veterinary fees; cow testing, registration, and exhibition fees; live stock insurance; horseshoeing and other incidental expenses in connection with productive live stock or work stock.

(c) Sharing of losses from injury, depreciation, or death of live stock.

42. Other expenses:

(a) For seed, including grass, clover, alfalfa, and cover crops, general farm crops and plants or trees used in the raising of truck crops, small fruits, orchards and woodlot plantings.

(b) For setting out or caring for fruit, ornamental trees, hedges, and woodlots.

- (c) For barrels, boxes, crates, bags, bagging, baskets, cans, and other containers.
- (d) Manure, lime, phosphates, and other fertilizers.
- (e) Spray material for field crops and fruit trees, material for treatment of seed and inoculation of soil for legumes.
- (f) Machine bills for threshing, ginning, shredding, baling, silo filling, clover hulling, and corn shelling.
- (g) For binder twine, coal, gasoline, and oil for farm use.
- (h) For telephone.
- (i) Storage, freight, buying, and marketing costs.
- (j) Insurance on farm crops, feed, supplies, and implements.

It is usually the custom for the landlord to pay the expense of insuring buildings. Since fire insurance contracts may become invalid through failure of the insured party to protect the property insured against unnecessary hazards, it may be necessary for the landlord to include in the lease contract a clause such as the following:

The party of the second party covenants and agrees not to do, suffer, or permit to be done any act in violation of any provisions of any policy of insurance upon any of the crops, buildings, or other property upon said premises or which shall increase the premium thereon.

(k) Taxes on property other than real estate, water assessments, and irrigation ditch upkeep.

The landlord usually assumes the responsibility for all real estate taxes, both in cash and share leases. Occasionally, however, the tenant agrees to work out the road tax. Taxes on operating equipment, live stock, and other property are usually paid by the owner of such capital, being shared when the property is jointly owned.

(l) Real estate insurance and taxes, including school taxes.

(m) Expenses for hiring additional pasture and other land outside of the regular farm area.

Payment of Rent.—

43. Cash rent for entire farm or portions thereof, with specifications as to amount, time, and place payable.

44. Rent payable in terms of a fixed quantity of a farm product, with specifications as to amount, quality, time and place payable.

45. Share rent of the various farm products, with specifications concerning time, place, method of division, and responsibility of tenant for delivery.

46. Specified quantities of milk, butter, eggs, firewood, feed, fruit, and other products for landlord's household use, and arrangements with respect to delivery of the same.

Privileges for Which Special Rent Is or Is Not To Be Paid.—

47. The farmhouse, habitation for laborers, and buildings for live stock, tools, and crops harvested.

48. Garden spot and pasturage for limited number of stock.

49. Use of small areas of land for raising special forage crops.

50. Use of fruit, firewood, milk, eggs, butter, and other products for tenant's household, or for laborers.

51. Use of undivided grain, hay, or other crops for live stock kept by the tenant for his personal advantage.

Specifications with Respect to the Care, Use, and Improvement of Real Estate and Arrangement for Labor and Materials or Needed for These Purposes.—

52. Fruit, shade trees, forest trees, and down timber.

53. Drains, ditches, bridges, and roads.

54. Time, frequency, and manner of mowing weeds and brush in pasture.

55. Windmill, engine, and pumps.

56. Buildings, fences, and gates.

Specifications with Respect to Farming Methods and Procedure.—

57. Specifications as to acreage, location, and rotation of various crops.

58. Enumeration of crops which may not be raised.

59. Special regulations with respect to the method of growing each crop, including the details with respect to preparation of the land, time and manner of planting, kind of seed, method of manuring or fertilization, subsequent care, harvesting, storage, and marketing, or time and manner of division.

60. Limitations or restrictions on the sale or removal of crops, on the pasturage of crops, and on the burning or removal of straw, fodder, manure, etc.

61. Number and kinds of live stock to be kept and the upper and lower limits of the same.

62. Regulations with regard to the number of stock which shall be allowed to run on pasture and times when pastures may or may not be used.

63. Provision for the ringing of hogs and prohibition of the keeping of breachy live stock.

Specifications respecting the methods of farming and the procedure to be followed may be made clearer if, in making them a part of the lease, they are accompanied by a map of the farm. Such a map may show such details as the use made of the land in past years, previous rotation systems, present use of the land, rotations to be followed in the future, the drainage system, past and present policies with respect to clearing, liming, manuring, and fertilizing.

Provision for Supervision.—

64. Provision with respect to kind and extent of supervision for which each party will be responsible.

Procedure at Termination of Lease.—

65. Disposition of crops growing, unfed or unsold, or of feed and supplies remaining on hand.

66. Disposition of farming equipment, work animals, and other live stock owned on joint account.

67. Specification of number of acres which must be left plowed, seeded down, planted in wheat or other crops, or in pasture.

68. Compensation for improvements made by the tenant, including construction of buildings and fences, digging of wells, drainage work, clearing of land, setting out trees and small fruits, planting of hops, asparagus, rhubarb, or other perennial plants.

69. Compensation for unexhausted additions made by the tenant to the fertility of the soil.

70. Authority for removal of improvements made by the tenant without assistance or compensation by the landlord, such as fences, hog houses, corn cribs, water troughs.

71. Settlement of outstanding indebtedness.

Enforcement of Contract.—

72. Provisions for enforcement.

It is desirable to include in a lease clauses providing methods for enforcing the contract. Enforcement clauses may deal specifically with (a) the performance of farm work, the making of repairs and other duties assumed by the tenant; (b) gross damage to the property rented through neglect or wilful injury; (c) the making of repairs, the furnishing of capital, the supplying of live stock and equipment, and other obligations assumed by the landlord; (d) the payment of rent. The first of these considerations is especially important in a share-rent contract.

Adjustment of Differences.—

73. Provision for the settlement of disputes and differences of opinion by arbitration or otherwise.

The above somewhat strict provisions for enforcing the terms of the contract should be regarded as safeguards to be applied only in last resort. Misunderstandings and litigation between landlord and tenant are likely to be very expensive to both parties. So far as possible, it is desirable to anticipate points of conflict and provide for them when the contract is made, for at that time both parties are anxious to agree. If both parties have the right spirit, any subsequent unforeseen difficulties can be adjusted by mutual agreement. However, there may be occasions when disputes arise which can not be so settled. Provision for adjusting such disputes may read as follows:

If the parties hereto are unable to agree upon any matter not definitely determined by this lease, each shall choose a referee, and they two shall choose a third, which three shall make a decision, and their decision shall be binding upon the parties hereto. None of said referees shall be related to either party or have any interest indirectly and directly, personally or otherwise, in the questions decided.

Provisions to Insure Enforcement.—

74. Provision for fulfillment of terms of the contract by heirs, executors, administrators, or assigns, in the event of death or disability of one or both parties.

75. Conditions that will constitute a forfeiture of the lease, and method of determining rights of landlord and of tenant in the event of termination by forfeiture.

76. Provision for penalty to be paid by either party according to a stated scale in the event of failure to perform certain agreements in the contract.

77. Right of the owner to have work which is neglected by the tenant performed at the tenant's expense.

78. Acknowledgment of the existence of a lien to secure to the landlord the payment of the rent and the performance of specified agreements.

Final Details.—

79. Signatures of the parties and their witnesses.

80. Sealing and recording.

Proposed Standard Contract Forms for Leases.—Recent agricultural bulletins, both State and Federal, contain contract forms for leases considered as satisfactory.

Benton, in a Minnesota publication¹⁴⁸ offers forms for each of three different kinds of leases:

1. A half-share crop lease.
2. A half-share crop and live stock lease.
3. A cash lease.

Johnson and Green offer¹⁴⁹ model forms for:

1. Cash-rent farm lease.
2. Share-rent farm lease.
3. Partnership-agreement farm lease.

Sample leases in force in Wisconsin are published in a Wisconsin Bulletin¹⁵⁰ to show typical leases covering:

1. Cash.
2. Half- and half-dairy.

Discussion of other forms follow, as, for instance, the:

1. Land-and-stock cash.
2. Landlord's cattle dairy lease.
3. One-half-all-stock lease.
4. One-third-stock lease.
5. Grain leases.
6. Mixed grain and stock.

**Suggested Division of Responsibility in Investment and Interest in
Income**

The Partnership Lease.—As a result of his studies, Dr. E. V. Wilcox¹⁴⁴ believes the fairest contract to be one into which all equipment, including tools, machinery, work stock, productive stock, and other working capital, is owned in equal partnership; all expenses, including hired labor and taxes, are shared equally; and the proceeds are divided half-and-half. All products taken for family use by either landlord or tenant are charged against the respective parties.

Such a contract provides a basis for the fair and equal sharing of all crops which may be grown on a farm, however unlike the amounts of labor required for their production; for if all expense for extra and hired labor is shared equally, it is obviously just that the proceeds from crops requiring extra labor should be shared on the same basis as those which

require little labor. Moreover, the unfairness of requiring the tenant to deliver crops to distant markets is obviated by sharing the expense of the labor thus involved.

Again, this plan is readily adaptable to cases in which the tenant and landlord furnish working capital in unequal shares. In such cases it is merely necessary to take out of the undivided farm income the interest on each one's share of the working capital, and also the operating expenses, after which the remainder is divided half-and-half. Many leases constructed on this plan are in operation.

Example of How a Partnership Lease Works.

TABLE 245.—ANALYSIS OF THE BUSINESS OF A \$25,000 FARM LEASED UNDER THE HALF-AND-HALF SYSTEM

Receipts:

Crops:

	Tenant	Owner	Farm
65 acres corn			
1,500 bu. sold.....	\$375	\$375	
800 bu. fed.....			
35 acres wheat, 1,000 bu. sold.....	500	500	
15 acres oats			
300 bu. sold.....	60	60	
300 bu. fed.....			
20 acres hay			
5 tons sold.....	25	25	
20 tons fed.....			

135 acres crops
20 acres rotation pasture.
5 acres waste.

Stock:

12 cows, cattle, milk, etc.....	350	350	
6 horses or mules.....	35	35	
Swine.....	250	250	
Poultry and eggs.....	5	5	

Total..... \$1,600 \$1,600 \$3,200

Expenses:

Hired labor and board.....	\$200	\$200	
Family labor.....	25	25	
Cash expense of operation and repair.....	300	300	
Depreciation of equipment, 14 per cent of \$500.....	35	35	
Depreciation of buildings, 6 per cent of \$2,000.....	60	60	
Interest on working capital, 6 per cent of \$2,500.....	75	75	
Taxes on real estate and equipment.....	80	80	
Total.....	\$775	\$775	\$1,550

Farm income.....	\$1,650
Reward for tenant's management and labor.....	825
Reward for use of real estate.....	825
Interest on real estate (per cent).....	3.3

The tenant receives \$825, half of the net profit, as a reward of his labor and management, also an allowance for half of the value of the family labor, and board of hired labor furnished, and the interest on his half of the working capital. His working capital is maintained at the same value at which he turned it into the partnership, or at which it is replaced.

The landowner receives, in addition to his \$825, an allowance of the interest on his half of the working capital, as well as having all taxes paid on his real estate and an allowance for depreciation.

Interest on working capital in the above example is charged at 6 per cent. The rate would be about 10 per cent if it included depreciation charges.

The Empirical Method.—Under some conditions the empirical method of prorating incomes has its advantages. By this method each item furnished by each party to the lease is given a fair valuation and the gross income then divided in accordance with the relative proportion that each party has invested.

In general, the safest and fairest basis of what constitutes the proper disbursement of farm receipts as between lessor and lessee is to repay each partner according to the share put into the business. The owner usually offers land, possibly buildings or other improvements, sometimes live stock, and occasionally feed. The tenant as a rule supplies labor, sometimes working equipment and operating capital.

Each is entitled to a reasonable rate of interest to the extent of his capital, to a sum for depreciation (reasonable wear and tear), and to replacement of any items the use of which exhaust capital, as seed, sacks, fertilizer and the like, and to reimbursement for labor.

Thus, an estimate of these items indicates the extent of each one's interest and gives a guide as to the ratio in each should share in the receipts.

In figuring out a given scheme care should be exercised that only correct data be used, and that due allowance be made for over-capitalization of land, labor, and all items necessary to the proper planning of the scheme.

In determining the proper division of profits or losses in cases of leased land, a clearer understanding of what each party is rightly entitled to will result if the various items entering into the deal are tabulated at correct figures, based upon careful estimates of forthcoming expense, or just valuation of present investments. The interest of each partner can then be determined therefrom.

Rights of Each Party to a Lease under the Empirical Method.—Each party is rightly entitled to—

- (a) Repayment of all labor—manual and supervisory.
- (b) Repayment of all moneys paid out for operating expenses,—sacks, twine, seed, fertilizer, marketing, etc.

(c) Interest on all moneys invested in land, improvements, stock, implements, based upon fair valuations and the going rate of interest.

(d) Interest on all moneys advanced for operating expense,—feed, material, labor, harvest, and the like.

(e) A sum to offset depreciation of the plant,—buildings, implements, stock, and the like.

(f) A sum to be set aside as a sinking fund for use in times of unusual needs.

It is true that some difficulty may arise in ascribing rates to some of the factors, as, for instance, a determination of what the land is really worth, or the right rate to allow for the tenant's labor and supervision. Failure to meet squarely such issues at the beginning of a lease is more than liable to mean an unsuccessful ultimate outcome. A better understanding of the various elements involved will prove of educational value to both tenant and owner, and eventually will assist in readjusting leasing conditions more in accordance with practices to preserve soil fertility and to keep up the farm in good condition, items for which no owner can expect a tenant to pay, and which, if they are to be done, should be clearly provided for in drawing up of the lease.

Example of Determining the Rights of Each Party to a Lease by the Empirical Method.—There is available a 40-acre farm having a 10-cow dairy, 10 brood sows, 35 acres of alfalfa, and full equipment to carry on the business. The farm is to be leased under terms as follows:

The owner agrees to furnish 40 acres of land worth \$9,020, buildings (\$1,270), fences (\$347), 35 acres of good alfalfa, 10 cows, 1 bull, 10 brood sows, 1 boar, \$530 worth of farm implements, and \$328 of miscellaneous equipment necessary to the carrying on of the business.

The tenant to supply work stock, labor, all purchased feed, seed, and operating expenses.

Owner will pay taxes (\$125) and insurance (\$15).

Proper division of income is sought.

Items involved:

From owner:

Land—35 acres good alfalfa }	\$9,020
5 acres farmstead }	
Buildings.....	1,270
Fences.....	347
Cows (10).....	850
Bull.....	100
Sows (10).....	200
Boar.....	30
Implements.....	530
Miscellaneous equipment.....	328
Taxes.....	125
Insurance.....	15

From tenant:

Work stock.....	300
Labor.....	108

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Feed—horses.....	12
Dairy.....	180
Hogs.....	474
Seed.....	21
Water.....	80
Other material.....	10
Rent, silo cutter.....	6
Contract work.....	142
Management.....	720
Office expenses.....	50
Incidentals.....	50

Assume basis figures are satisfactory and each is entitled to:

(a) Return of money spent outright, (b) 6 per cent interest on investment, (c) depreciation.

We should have:

1. For owner.

Outlay—taxes and insurance.....	\$140.00
Interest investment = \$12,675 at 6 per cent.....	760.50
Depreciation:	
5 per cent on buildings and fences.....	88.00
6 per cent on cows and bull.....	67.00
17 per cent on sows and boar.....	39.00
10 per cent on implements.....	53.00
25 per cent on \$116 special equipment.....	11.00
10 per cent on \$105 special equipment.....	29.00
10 per cent on tools.....	11.00

Total interest of owner in output..... **\$1,188.50**

2. For tenant.

Outlay:

Labor.....	\$108.00
Feed.....	666.00
Seed.....	21.00
Water.....	80.00
Material.....	10.00
Rent silo cutter.....	6.00
Contract work.....	142.00
Tenant's time.....	720.00
Office expenses.....	50.00
Incidentals.....	50.00

\$1,853.00

Interest on investment—\$1,000 (estimated) operating capital at 4 per cent.....	40.00
6 per cent on horses—\$300.....	18.00
Depreciation of horses at 12 per cent.....	36.00

Total interest of tenant in output..... **\$1,967.00**

Combined interest, \$3,128.95

Percentage interest of each in income

Owner, 38 per cent.

Tenant, 62 per cent.

Advocates of the Empirical Method.—Benton believes¹⁴⁶ that:

“The proper basis for a fair and equitable share lease is that each party share in the products of the farm in the proportion that he shares in the cost of production. He then shows by tabulated data the shares which landlord and tenant should bear in the cost of producing wheat, oats, barley, hay, and corn. He goes on to say:

“The proper division of expenses under a lease including live stock is, however, more difficult to secure. Under a half-share lease where the landlord furnishes all the dairy cows, he contributes less than one-half the cost of maintenance.

The relative amounts contributed by landlord and tenant to the cost of raising beef cattle, hogs, and sheep on a half-share basis cannot be easily calculated, but the furnishing of pasture by the landlord is considered but an offset to the labor furnished by the tenant. The landlord frequently feels he is contributing further by furnishing better housing facilities, which tend to increase his share of the cost.”

In writing concerning the amount of rent and time, and method of paying, Gray and Turner point out¹⁴⁷ that:

Great care should be used in defining carefully the method of dividing the products of the farm. It should be clearly indicated whether the division is to be made before certain expenses are deducted or after such deduction. This is especially important in the case of those share leases which are approximately economic partnerships. It should also be carefully stated what use of undivided products may be made by each party. Often, for instance, the tenant is allowed for family use milk, eggs, and other products, out of the joint product of the farm. In some instances, also, the landlord receives certain things for family use out of the undivided product. However, if it is desired to make an accurate and careful division, it is necessary to take account of all these minor items, and in this case the tenant or the landlord should be charged for all jointly owned products used by him. In any case, the lease should make clear the rights of the respective parties in regard to these matters.

It is also frequently customary to allow the tenant to feed work stock from undivided grain or hay, and sometimes to feed a few hogs in like manner. Very commonly the tenant is allowed to feed poultry out of the undivided grain. If these privileges are to be allowed, however, the contract should provide definitely the maximum number of each kind of stock that the tenant may keep in this manner. A more accurate method is either to require each party to feed all private stock out of his share or to charge him for all feed used out of undivided property.

When the share lease applies only to crops, and not to live stock, it is frequently customary to charge the tenant cash rent for the use of pasture, since the landlord receives no benefit from this use. Sometimes a small amount of pasture may be allowed free as a special inducement to the tenant, or it may be balanced by some special advantage to the landlord in the division of the crops. However, when the lease applies both to stock and crops, both parties benefit from the use of the pasture and no arrangement for pasture rent is necessary.

The landlord and tenant jointly make contributions to the business of production. Each should receive for his contributions what they are worth. If the total product of the farm, year after year, is not enough to pay the value of these contributions, the business must be regarded as unprofitable. As a matter of fact, however, the annual value of land may be considered a surplus above the other expenses of production. If some permanent change occurs to reduce the total average value of the product, in the long run the rental value of the land must fall because less will remain after paying the cost of the other factors of production. On the other hand, if a permanent change occurs to increase the average value of the product without increasing in the same proportion the other expenses, there will be a larger remainder that may be obtained by the landowner as rent.

This complexity in the relationship of landlord and tenant makes it difficult to determine the fair division of the product, especially when there is no system of accounting by which the relative values of the respective contributions of the two parties may be measured. The result has been that the actual systems of share leasing which have become customary in different parts of the country and in different types of farming are largely the product of a rough process of experiment. Different items are used to balance one another in a sort of rough and ready manner without the employment of any underlying and permanent principle of division. There is such a bewildering variety of privileges and obligations of uncertain money value that it may be practically impossible, even with a careful system of accounting, to determine the actual net shares of the respective parties. Such items as the twine bill, the thrashing bill, the furnishing of grass seed and horse feed, the fertilizer bills, hauling crops to market, and the use of pastures, are juggled back and forth in various combinations. The confusion is made greater by the yearly variation in the actual and relative value of the various factors of cost and by changes in crop acreages and farm practice.

It is important that this rough and ready method of adjustment, which was not seriously inaccurate in the pioneer days of our agriculture when the relative values involved were not nearly so large as at the present time and when fewer of our farmers were tenants, should give way to a simpler and more accurate method of bargaining under which it would be possible in advance for each party to balance with some degree of accuracy his prospective expenses and receipts. In formulating such a contract, it is necessary to classify the contributions of the respective parties. We may recognize the following main groups:

- (a) The use of real estate and expenses on account of real estate, including taxes, insurance on buildings, and repairs.
- (b) Ordinary farm labor.
- (c) Work stock.
- (d) Special skilled labor hired on special occasions.
- (e) Farm implements and operating equipment.
- (f) Animals other than work animals.
- (g) Miscellaneous expenses.

The landlord, of course, provides the real estate, and generally pays the expenses on account of real estate. However, it is frequently customary for the tenant to furnish the unskilled labor necessary for making repairs on buildings and fences, and in the case of long leases he may even furnish the unskilled labor for making some improvements.

If the use of the real estate is a factor which the landlord is best in a position to contribute, the labor needed to work the farm can best be contributed by the tenant. Other factors of production may be owned by one or the other of the parties and a practicable plan of leasing worked out, but seldom is a rented farm to be found on which the landlord furnishes any large share of the labor used to operate it. On the ordinary family-sized farm, the tenant who is a capable worker may need to hire practically no labor, especially if his children are old enough to help. If labor must be hired to assist in working the farm, the tenant should pay for it, as he is in the better position to control its cost and to get the most work for the money spent. His share of the returns should be so large that he will be amply rewarded for his willingness to do all he possibly can himself and for his ability to use labor effectively.

In regard to the work animals and equipment, there is more diversity of practice than there is in the furnishing of land or labor. In some parts of the country, especially in the south, the very poor tenants may furnish only the labor, while the landlord furnishes land, buildings, work animals, and equipment. On other southern farms, and usually in the north, the tenant farmer furnishes the labor to work the

farm as well as the work animals and equipment. The one who furnishes the work animals and equipment usually contributes the feed, upkeep, and replacement costs associated with use of these factors of production. However, on stock share farms, the tenant, although contributing the work animals and equipment, generally has the right to feed these animals from the undivided feed and supplies, and not uncommonly the landlord owns part or full interest in some of the equipment or in some of the horses.

The simplest kind of share contract would be one in which all expenses, including the value of the use of land, were shared in some definite proportion, as half-and-half, and all receipts were shared in the same proportion. This would be in the fullest sense an economic partnership. Since, however, it is customary and largely desirable that the landlord shall invariably furnish the use of real estate while the tenant shall furnish the farm labor and also usually the work stock and equipment, it is possible to make a simple and accurate adjustment as follows: First an estimate should be made of the fair value of the use of the land and of the value of ordinary farm labor, with additional estimates of the cost of horse labor and the annual cost of the use of the equipment. The value of each of these items may be determined with a fair degree of accuracy in advance. The ratio of the two values should be determined, and all other expenses and receipts should be borne in the same proportion.

It may be objected that this arrangement will not conform to the convenience of the two parties with respect to contributing to expenses. Thus the tenant may not have sufficient funds to bear the share of expenses allotted to him, or it may not be convenient for the landlord to furnish his designated share of expenses. It is clear, however, that the total expenses must be borne by one or both of the two parties in some proportion. Whichever party is lacking in the necessary funds to defray his share of the expense should borrow the necessary amount from the other party or from some other source of credit, paying interest on the loan until the end of the crop year, when the net receipts are divided and the loan may be repaid.

This method of simplifying the rental contract conforms in part to customary practice. In most parts of the country, a customary share has developed which is supposed to represent roughly the proportionate value of the invariable contributions of the respective parties. For instance, in the cotton belt it is customary for the tenant when furnishing work stock to pay the landlord one-fourth of the cotton and one-third of the grain. In the newer wheat regions, it is generally customary for the tenant to furnish work stock and implements and pay one-third of the grain. Where land is more valuable, the tenant will pay one-half of the grain. These customary shares, however, do not take into account the variation in value between individual farms, and consequently other items of expense such as the twine bill, the threshing bill, the fertilizer bill, the furnishing of the seed grain, and the amount of rent for special privileges payable in cash are employed as balances, resulting in an unduly complicated contract.

Hubbard and Black¹⁵⁰ offer two compromise plans:

1. Follow the custom so far as possible, and when not possible make allowances for it in some other part of the lease. For example, if free fire wood for the tenant is the custom, and the farm has no fire wood, the tenant can be given all the poultry, or a larger share of the poultry receipts. If a farm is too poor to rent well, the tenant can be given other advantages. Differences of this sort can, if necessary, be settled in actual cash at the end of the lease.
2. Count the tenant's labor and management, family labor and hired labor, and interest, taxes, depreciation and upkeep on his equipment, as equal to the landlord's management, interest, taxes, upkeep, and depreciation on real estate and equipment.

Divide the other expenses half-and-half, by estimating their amounts in advance, or by settlement afterward.

The great merit of any plan which would divide income on the basis of expenses, or expenses on the basis of income, would be that it would give the tenant the full benefit of all the extra labor he hired.

Objection to the Empirical Method.—Wilcox's objection to the empirical method is that lease contracts in which various items of expense and privilege are empirically adjusted and assigned to tenant or landlord are never, except by mere accident, strictly fair, but are always slightly in favor of either landlord or tenant. Any injustice of this sort may become a source of friction between landlord and tenant and may lead to more frequent moving on the part of the latter. Usually, however, the approximate value of all these items is generally known. Shrewd judgment and local experience enable the landowner and tenant to estimate closely what the thrashing, twine, feed, seed, and fertilizer bills will be.

Points to Observe in Taking a Diversified Enterprise.—In considering the lease of a diversified enterprise one may well examine the past, present, and prospective profits and expenditures, and capital needs, to see what can be done to improve quantity or quality of product, save expense, and cut down present operating expenses.

For instance, a certain run-down orchard may be improved by green manures and mineral fertilizers, proper pruning, spraying, and thinning of fruit; a dairy may contain several boarder cows which can be weeded out; an alfalfa farm, now yielding 3 tons of hay per acre, can, under irrigation, be made to produce 6 tons; a tract of run-out land can be improved by rotation with beans, cultivated crop, and summer fallow, to a point where it becomes economically well worth while; grain land if alternated with pasturing and improved by deeper plowing may have undeveloped profit-making possibilities.

Estimating Rental Rates for Farm Fully Equipped.—In determining the amount of rental to be paid for an established ranch where a full equipment of land, buildings, pumping plant, work stock, poultry, cows, pigs, and other live stock, and implements, is available the owner is entitled to interest on his money and a sum sufficient to offset depreciation. The proper rental rate may be reached by taking each main item and working out its value and rate of depreciation.

Another way to determine the amount one can afford to pay as rental where a mixed equipment is offered, such as mixed orchards, land variable in soil types, or where live stock is combined with crop production, is to figure about what sum the tenant would be entitled to as manager, if on a salary and running the farm as ordinarily handled by a manager who secures average yields and prices. Figure out gross profits of the ranch under such conditions, and a fair basis of rental can be determined. Addi-

tional income to be derived from work as a renter instead of a manager is to be sought in securing one or more of the following:

- (a) Greater productivity.
- (b) Better utilization of products, or by-products (as use of animals to convert feed).
- (c) Better selling price.
- (d) Reduction of operating expenses (as elimination of waste effort; better organizing of work, etc.).

The study of opportunities offers ample reward in increased profit, because (a) if the ranch is on a poor paying basis, the original rental rate will be low and there will be a good chance to improve it; while if (b) it is, on the other hand, a specially well paying proposition and well planned and organized, the tenant may allow a substantial sum to offset the manager's salary which can be commanded on such a proposition.

CHAPTER XXV

FARM LAW

No one expects the farm manager to be a lawyer, or even to be able to answer a large number of legal questions. An understanding of the law's scope, however, and of its method of working, along with some actual knowledge of the law as it affects his farming and business operations, should be considered an essential part of his equipment.

Nevertheless, when a need for detailed counsel arises in the daily work, it is usually necessary, and better, to consult a good lawyer. Such procedure in the long run is cheaper and more satisfactory than to attempt to handle a case solely by one's self.

What Law Is.—Green, in his text book on farm law,¹⁵¹ points out that the principles upon which all laws are founded are those of common sense. It is this truth which justifies the rule that ignorance of the law excuses no one, since it is in the power of every man by means of ordinary intelligent attention to the conduct of others to ascertain what are his own duties, and every sane man is able to conform his own conduct to the laws deducible from human habit. From the standpoint of use, laws may be considered as a body of rules to regulate and govern human conduct which are recognized and applied in a civilized state by courts of justice in deciding controversies among men. These laws fall into two groups, known as written and unwritten, or else as statutory and common.

Written Law.—Written law is broadly designated as statute law and is embodied in constitutions, Federal and State, in enactments of Congress and state legislatures, and in the by-laws and ordinances of municipal corporations and other local governmental bodies.

Unwritten Law.—Unwritten law comprises the bulk of our law. Unwritten law is composed of unwritten precepts and rules recognized and enforced by judicial tribunals irrespective of any legislative sanction. It is the outgrowth of established usage and long accepted and continued custom. This common law affords a guide in determining the merits of a controversy between individuals when there is no legislation pertinent to the subject. It is based on common sense and is, in short, the embodiment of broad and comprehensive principles inspired by natural reason and an innate sense of justice, and adopted by common consent to regulate and govern human affairs.

Farm Law.—Farm law is the portion of legal regulations, common or statute, concerned with the farmer and his possessions.

Classification of Farm Law.—The body of written and unwritten law may be further reclassified as being either (a) definitive, (b) restrictive, or (c) constructive.

Examples of definitive legislation are afforded by laws defining water rights, boundary lines, rights of way, grading of products, etc. Examples of restrictive legislation are such statutes as those prohibiting the keeping of cows or poultry near neighbors' dwelling, the pasturing of stock on right of way, the polluting of streams, the poisoning of cattle, the stealing of fruit; those requiring the fencing of stock; those regulating an individual's actions as to trespass. Examples of constructive regulation are to be found in legislation providing for state controlled land settlement, for financing of farmers' activities, for establishing the bases of mutual irrigation or drainage districts, for investigating, experimenting in, and teaching agricultural-sciences and practices, the latter including the Federal Smith-Lever Act creating the County Agent movement.

For purposes of convenience an inquiry into farm law as it affects a farmer's interests may be best conducted under some such grouping as

1. International regulations.
2. Federal regulations.
3. State regulations.
4. County regulations.
5. Municipal regulations.

Field so Extensive Necessary to Limit Discussion.—Because of the vast amount of legislation written upon the legal books of the country, some limiting of the field is necessary in this book.

Legislation—federal, state or community—is far-reaching, although local needs and conditions tend to emphasize different phases in different areas. A survey of the statute books shows a great range of laws covering such subjects as tenure of land, passing of title of ownership from one to another, mortgaging of property, legal rate of interest, weed eradication, control of infectious diseases, inspection of imported fruits, plants, and seeds for presence of injurious insects or diseases, regulation of common carriers, standard packages, protection of workers, housing of farm help, payment of wages, insurance of farm labor, abuse of animals, protection of crops from roving stock, impounding of stray animals, killing of wolves, coyotes, prairie dogs, ground squirrels and similar pests, shooting of game doing damage to crops, protection of insectivorous birds, contracting debts, etc., through a wide range.

Our Attention Confined to Regulative Legislation.—In this discussion, constructive and definitive legislation gives place to regulative, as of all three classes the restrictions placed upon the operator are likely to be of greatest personal interest, use, and value.

Because of the limitations of space which can be given over to the subject of law, little can be done beyond calling attention to the general field and pointing out the need of supplementing by individual study

what is given here. Such study can be started by procuring from the Secretary of State available copies of recent state legislation and by consulting local records of federal and municipal statutes.

Individual interest will usually rule in determining what phases are to be inquired into. Thus the man interested in dairying will find his best line of inquiry to be the laws governing the handling of dairies and dairy products. Municipal regulation is rather to the front where dairymen are concerned, because of the importance of raw milk as a food. The dairyman should therefore post himself on the regulations governing the keeping of diseased cows, the handling of manure, the separating of milking strings from horses, hogs, and sources of contamination, and the grading of milk; and should be up on housing requirements, inspection requirements, milk house regulations, and so on. The fruit man will find his interest lies in measures aiming to prevent introduction of serious pests, in standard package laws, in legal guarantee of content of commercial spray material, in transportation regulations. The stock man will center on laws governing the eradication of ticks or scab or poisonous weeds. The horseman will post himself on the laws requiring the registration of stallions, the control of glanders, etc.

Conceptions of the Law¹⁵¹

Throughout the United States there are certain generally recognized and accepted points of view which together form the groundwork of the legal structure. The following paragraphs are indicative.

Legal Definition of a Farmer.—If a man devotes himself wholly or chiefly to the tillage of the soil, he is in law a farmer, though he may call himself a horticulturist, a viticulturist, a gardener, or the like. A farmer is a cultivator of a considerable tract of land in some one or more of the customary and recognized ways of farming. It is not indispensable that he should till the ground in person, or that his operations should be limited to planting, sowing, and cultivating the soil. A farmer may cultivate all or only part of his land. He may grow wheat, corn, or other crops, he may breed, feed, and rear stock in connection therewith, whether he sows and reaps with his own hands or those of a tenant, a cropper, or a hired laborer. And yet the owner of a farm who simply makes it his legal residence and is much away from home, while all the farming is done by others, is not a farmer. But if he lives on his farm and makes farming his chief occupation, he is classed as a farmer before the law, although he is partly engaged with other occupations.

A farmer, when farming is his chief occupation, by the provisions of the National Bankruptcy Law, cannot be forced against this will into bankruptcy. This provision, together with application of tax and license laws and municipal regulations for farmers (as a peddler's license for

selling produce) makes it necessary to have a clear understanding as to what constitutes a farmer.

Legal Definition of a Farm.—Legally, a farm generally means an area of land under single ownership and devoted to agriculture—either to raising crops or for pasturage. It may consist of any number of acres, of one field or many fields, and it may be wholly in one township or county or in more than one with no necessary relation to political subdivisions. A farm is not necessarily enclosed land; a farm extends over earth surface fit for cultivation, and is circumscribed by its metes and bounds. Laterally, it extends to its boundary lines, and when one of these is a highway or an unnavigable stream, unless the deed has provided otherwise, and generally where the common law prevails, the farm extends to the middle of the road and to the thread of the stream. If the farm is on the seashore or is bordered by navigable waters in which the tides ebb and flow, it stops at the water's edge—high water mark, that is, where the common law prevails. The rule applies also to large rivers and great lakes. A farm, in the eye of the law extends from the center of the earth indefinitely above.

The term "land" is meant to embrace the surface of the earth and everything annexed to it—trees, grass, water, buildings, and fences. Gravel and sand in their native beds are real estate. Crops while they remain rooted in the ground, whether wild or cultivated, shrubs, trees, forests, and other plants, are all part of the soil. Any minerals lying underneath the farm, petroleum, natural gas, coal, or iron, belong to the owner and constitute a part of his land. Structures—dwellings, stables, barns, styled fixtures, are usually insisted upon as a part of the land.

Boundaries.—It is the rule of the common law attaching to the ownership of land, wherever man's private ownership in real property is admitted, that everyone's domain is enclosed by a boundary either visible or invisible—a material hedge, fence or wall or an ideal and unseen barrier. In locating lands described in a deed, it is a general rule that natural objects called for, such as mountains, lakes, rivers, rocks, etc., control artificial objects such as marked lines, stakes, blazed trees, stone piles, etc.; that these in turn control courses, courses control distances, and that, finally, both courses and distances control quantities.

To be inclosed, land must be shut in on all sides; thus it is inclosed when entirely surrounded by a fence. If stock break through or pass over a fence, the test is at the place where the break takes place, and the fact that it was not high enough at another place is of no consequence if it was all right at the place where the animals crossed it.

A division fence is a fence which separates contiguous lands of adjoining owners. The owners of adjoining lands divided by a fence which they mistakenly suppose to be upon the true line between them, who

claim title only up to the true division line wherever it may be, must conform to the true line when it is discovered and traced. All that a land owner is called upon to do regarding the keeping up of a common division line fence is to be as careful as prudent men generally are.

Trees standing on a boundary line belong to the respective owners of both sides as tenants in common, and it is generally held that neither owner has a right to lop off limbs and roots on his side close to the trunk without the consent of the other. A tree growing several feet from the boundary belongs to the owner upon whose land it is growing, and the neighbor does not own the fruit or the branches which overhang his land; he has no right to gather the fruit, but if the branches are a nuisance he may lop them off, especially after giving notice of his purpose to the owner of the tree. The overhanging limbs must in some sensible and practical way damage him by lessening his use or enjoyment of the underlying land.

In considering boundaries on non-navigable streams, the boundary runs to the thread (or channel) of the stream. Any islands lying in the stream will be included with the land in the stream between the channel and the bank. No matter on which side an accretion forms, the boundary will still remain in the middle of the channel.

Waters of the Farm.—The waters of the farm comprise all bodies of water great and small lying within the boundary lines of the farm, all streams flowing across it, every arm or inlet of sea and fresh water lake, every river and creek up to the middle or thread which constitutes the farm boundary. It includes all surface waters due to rains and snows; and all subsurface and percolating waters that feed the farm's wells, springs, and pools.

Land under the sea and the great navigable lakes and rivers belongs, in general, to the sovereign.

A water course is a channel or canal for conveying water, and it may be artificial or natural, provided it has a bed, a distinct channel, and defined banks. Mere gullies of running water fed by occasional rains or melting snows are not water courses.

Navigable streams are public, and are common highways which must not be obstructed, although if a man owns both sides of one such he has been considered as having the right to put a fence across it. Just what constitutes a navigable stream has not been entirely agreed upon by the courts. The U. S. Supreme Court has said that any sort of vessel that can float upon water, whether driven by steam, wind, or muscular power, may be an instrument of commerce and transportation, and if so used it makes the stream on which it plies navigable. Streams are generally considered navigable if they afford passage for boats and barges up and down for a goodly portion of the year, even though there may be times when they are too shallow to permit passage. A river not navigable in

its natural state cannot be converted into a navigable stream without compensation made to the riparian proprietors.

A stream not large enough and deep enough to be navigable in the technical sense, but which is of sufficient volume to float rafts or logs to market is termed a "floatable" stream, and if almost always deep enough or strong enough to float down logs it is a public stream and called navigable.

Riparian.—The word "riparian" is derived from the Latin word "ripa" which means the shore of a river. Strictly speaking, when applied to a landowner, it refers to the proprietor of the bank of an unnavigable stream, but, in actual practice, the word is used with reference to lands which have water flowing over or bordering them. The authorities generally limit the extent of the riparian land to the water shed of the stream and hold that upland beyond, although a part of a single tract under one ownership with the bank of the stream, cannot be riparian, although this is not the case in some states.

Water is the common and equal property of every one through whose land it flows, and the right of each landowner to use and consume it without destroying or unreasonably impairing the rights of others is the same. An owner of land bordering on a running stream has a right to have its waters flow naturally, and none can lawfully divert them without his consent. If a landowner uses the water of a stream in a reasonable and lawful way, without malice or negligence, and an injury results to his neighbor below, he is not answerable for damages. He may thus give his cattle access to the water, or bathe in the stream, even if the water is used below for municipal purposes.

But a riparian proprietor will not be allowed to pollute the stream on which his land borders by casting into it waste, chemicals, or foreign noxious and offensive matter from mills, mines, or factories to the damage of a lower owner, and a lower owner is entitled to an injunction against an upper one who persists in polluting the stream.

Surface waters are ordinarily defined as waters originating in falling rains, melting snows, or overflows of streams in times of freshets. They are waters that lie upon, overspread, or percolate the soil, and flow in no particular direction. Every owner of land has a natural easement to have the surface water upon his land turned from his land to his neighbors, and the neighbor has no remedy except to pass it on, and nobody is subject to an action for deflecting surface water from his own to lower lands, unless he is negligent or vindictive. This right, however, does not authorize the gathering of surface water in basins and discharging it as floods by artificial means. And, furthermore, if there are natural drains, as sloughs, ravines, or water courses, the surface water must be sent through these.

Underground Waters.—Water naturally percolating through the soil is a part of that soil, and percolating subsurface water which does not flow in a natural channel as a defined stream may be intercepted and diverted by a landowner under whose land it is found. A landowner has an unrestricted right to dig a well upon his own land for his own use, and he is not liable for damages if by so doing he drains away underground water from his neighbor; he is also entitled to make a reasonable use of a stream flowing beneath the surface of his land even though it supplies his neighbor's well, but he has no right to make merchandise of the water drawn from his well, if by so doing he deprive his neighbor's well of its supply.

Subterranean streams flowing in a defined channel are amenable to the same regulation as to diversion and pollution as surface streams.

Kinds of Title to Farm Lands.—The title to land is secured in three ways: 1st, by a grant from a previous owner; 2nd, by operation of law; 3rd, by the addition to land already owned of more land through the working of the forces of nature.

In the first case, the grant may take one of several forms. It may be a patent from the sovereign, or a deed of bargain and sale, gift, or quit claim from a living owner, or a devise by the last will and testament of one who died with land in his possession.

In the case of title by operation of law, the first is by descent to the heir of an owner who died intestate, the second through possession for a period of time prescribed by the local statute of limitations.

One who owns land upon the seashore, the margin of a lake, or the bank of a stream may acquire more land through the action of the waters in building up accretions, or in retreating and uncovering land hitherto submerged.

Title by Grant.—The best title to land is one showing a regular, legal chain of conveyance of the soil to the possessor from the sovereign. This then gives the reason for properly investigating title to land before purchasing, otherwise if there is not presumptive proof that the chain is complete an adverse claim may be established which will tend to destroy the validity of title if not actually to result in dispossessing the present owner.

Definition of a Deed.—A deed is a written instrument which transfers an interest in real estate from one owner to another. The execution of a deed consists in the signing and sealing (when seals are required) of the deed by the grantor and the delivery to the grantee; it is the consummation of the contract to convey, the effectual completion of the conveyance.

A deed takes effect only from the time it is delivered, and it therefore does not become operative until it is accepted by the grantee, for his acceptance is necessary to complete the delivery. No particular form or ceremony is requisite to effect the delivery of a deed; any words or

conduct manifesting an unconditional giving of it up are enough. The possession of a deed by the grantee is proof of its delivery, and this is further emphasized by the recording of a deed, or leaving it with the proper officer to be recorded, thus implying that the deed was delivered.

Delivery in Escrow.—A deed delivered in escrow means that the deed, duly executed, is delivered to a third person to be delivered to the grantee later upon the performance of some condition or the happening of some contingency, and it does not pass title until it is delivered to the grantee upon fulfillment of the specified terms.

Transfer of Land by Will.—Title of land passes from one living individual to another only by a deed, but a will is just as effective as a deed to pass title to land, only title does not pass until the death of the testator. He may revoke the device anytime before he dies—"device" being the proper word to denote the gift of real estate by will, while "descend" denotes the transmission of real estate by inheritance to a successor of the owner dying without leaving a will. In the case of devise, the title is similar to that given by a deed; whereas title by descent is a title vested by operation of law.

Title by Prescription.—Title by prescription is a right acquired by a person by possession of land during the time fixed by statute, even though entered upon at first without right. Nowadays, the statute of limitations is regarded as enough in itself to found a title by prescription, and though formerly regarded as harsh it is now considered beneficial because it tends to end disputes and prevent litigation. The object of the statute of limitations is to quiet title to possession, and its effect is to shut out all inquiry into the true title and to award a title to him who has had possession of the land for the length of time required by the statute. Such a title is a complete legal one conferred by law instead of being a contract for succession of ownership which could be put in writing and recorded. It is marketable.

Title by Accession.—Title by accession may be acquired by accretion and reliction. Accretion is the addition made to riparian lands (lands bordering on water) by the gradual deposit of sedimentary soil upon the shore or bank, the chief characteristic being that the increase must be of imperceptible growth. Land thus formed is termed alluvion or alluvial land, and attaches only to riparian ownership, being incapable of separate existence. Reliction is the term applied to land added to shore line or bank by the slow and imperceptible permanent retreat of overlying waters—ocean, lake or river, which, retreating, uncover land that their waters formerly overflowed. Land which is occasionally and temporarily made bare by the retreat of the waters of a lake or stream only to be covered again is not added to adjoining land by reliction. The owner of land bordered by waters acquires no title to land uncovered or built up artificially by human action, by filling in soil under water, or by uncovering land through public drainage.

Rights in Riparian Lands.—Alluvial additions to lands belonging to several owners are to be divided among the riparian proprietors by extending their side lines to the nearest river bank, so as to give each owner the accretion formed in front of his own tract. The extent of the old frontage upon the water is the most important factor in determining the new frontage, the bearings and courses of the side lines being of minor importance.

If an island forms in a navigable stream, the owner of the land opposite acquires no title to it, even if by accretion it reaches and unites with his land on the shore.

Title by Deed.—One who acquires a farm by the will or as the heir of one who died owning it, simply takes whatever title the testator or intestate owner had at the time of his death—no more, no less. The law takes care of and assures him all his rights. But one who purchases a farm from its living owner is obliged to look out for himself and make sure either that he gets that for which he bargained and paid, or if he does not, that he is insured against loss. Everyone who purchases a farm desires, of course, a perfect title, one which shows the absolute right of property and possession. It is the duty of one who sells real property to make the title good, since a good title is implied in every contract to sell land. A buyer who stipulates for a good title must be given one which is marketable, meaning that the title is not only valid, but must be acceptable as security for a loan, and one that is beyond and free from reasonable doubt. A title is not marketable where it is exposed to litigation to defend it, or where it is open to reasonable doubt as to its validity, such as a question in title depending on the statute of limitations.

An addition to or change in a deed does not make it void if made by consent of both parties. An erasure or interlineation made before its execution does not affect the validity of a deed, but if made after execution and delivery will make it void.

The Warranty Deed.—The covenant of warranty, or a warranty deed, is one in which the grantor warrants and undertakes to defend the title. It means protection or indemnity in case of disturbance. If the grant is ousted by a superior title, the grantor agrees to make compensation for the loss sustained by the failure of the title and undertakes to protect the premises conveyed against all lawful claims and demands existing at the time of the grant. He assures a permanent and undisturbed possession to the grantee. A warranty does not run against baseless attacks upon the title.

Since a general covenant of warranty is held not to embrace a covenant against encumbrances, these should be specifically covenanted against. An encumbrance upon land is a right or an interest to it subsisting in a third person and lessening its value. Any lien, encumbrance, or servitude resting upon land will come within the term "encumbrance."

No cause of action arises upon a covenant of warranty until an eviction, either actual or constructive, has taken place. To constitute an eviction, the occupant of land must be dispossessed by one who has the real title to the premises.

Rights of Way (Appurtenance).—The term “right of way” is used in farm law to describe a right belonging to a person—a mere intangible right to cross over a tract of land. It denotes a right or vested privilege of passage over the land of another. A conveyance of land carries an appurtenant right of way. The rights of the owner of a right of way are paramount to those of the owner of the servient land. If the way has defined limits, the owner of it has not only the right of free passage over the traveled part, but of every part within these limits. Although generally a right of way rests in a grant, yet it may be acquired by prescription by an adverse, exclusive, and uninterrupted use for the requisite length of time. Even if the grant is oral, although void under the statute of frauds, yet an unassailable right will be secured if the easement is enjoyed until the statute of limitations has expired.

Located Right of Way Fixed.—Once a right of way has been selected and located, it cannot be materially changed by either party without the other’s consent, but a temporary change in the course of the way made for the convenience of either of the landowners is not an abandonment of the original route. The owners of the land where the right of way is located are under no obligation to repair a way. The owner of the right of way is bound to keep up, maintain, and protect the way for use. But he has no right to inclose it by fences except where it lies along one side only of the servient land and fences are necessary to prevent passing live stock from trespassing on the adjoining land.

Naked Right of Way.—A naked grant of right of way will not preclude the grantor from putting up gates and bars at the ends of the way. The gates or bars must not, of course, interfere to an unreasonable extent with the proper use of the way. The mere putting up of gates or bars which can be opened and passed through by anybody at will, will not extinguish the easement, even if they are kept up for the whole statutory limitation period; but if the way is inclosed permanently in a field, and the ground over which it ran is plowed up and cultivated for the limitation period, the easement will be extinguished.

Retention of Rights of Way.—The owner of a right of way created by grant need not use it all the time nor even frequently in order to retain it—no presumption that the right has been abandoned arises from the fact that the way is not used continuously. Mere neglect to use the way for any length of time short of the statute of limitations will not work an extinguishment of the easement; the disuse must be accompanied by an intention to abandon the way. A way not used for twenty years is presumed to have been abandoned. An open and visible private

way across land at the time it is conveyed is notice to the new owner of the existence of a burdening easement; but if the way is obliterated through disuse so that the purchaser has no notice of it, the easement is said to be extinguished.

Farm Workers and Laborers. *Legal Relation of Farmer and His Workers.*—In the United States, all persons who work for others are classed in law as servants, no matter what the grade or character of their employment. The legal relation, then, between the farmer and his worker, is that of master and servant. That relation today rests upon a contract by which one person engages to serve another and the other to pay wages or other compensation for the service. The farmer's contracts for labor hired by him to begin the next day are valid for a year, although oral. If the work is not performed within a year, the contract must be in writing to be valid.

Right to Discharge.—When a farmer hires a person to work for him, if no definite time is set for employment to last, its continuance depends upon the will of either party, and the farmer may at any time, with or without reason, dismiss the worker. Or the contract will end if the laborer becomes permanently ill or too disabled to do his work. The servant may be discharged for a good cause, as, for instance, if the servant commits a crime, is guilty of immoralities with another servant in the household, or is absent without leave from his work when his employer's interests would suffer by his absence, for drunkenness, for dishonesty, carelessness, disrespect, or disobedience.

Right to Quit.—As the farmer has an absolute right to discharge a laborer hired for no definite length of time, so the laborer has the corresponding right to quit the service at his pleasure. A servant can not be required to labor an unreasonable number of hours every day, or in unlawful pursuits, or on Sundays beyond caring for live stock or in a case of urgent necessity. A servant can not be required to do a different work from that for which he was hired, yet he may be called upon in emergencies where his aid is necessary.

If a farmer provides his hired men with board and lodging, a man may quit if the one is not suitable and clean or the other not sound and wholesome.

A laborer discharged before his time is up, although for good cause, is entitled to his wages up to the time of his dismissal; and a servant employed for a definite time and discharged before it is up, without a sufficient cause, is entitled to compensation up to the end of the term for which he was engaged. Such compensation will be the agreed wages if the servant has diligently tried and failed to get other work, but if he earns anything before the end of the term it will be lessened by the sum earned. If a servant quits work without a valid excuse before his time is up or before the work he was hired to do is done, he will be entitled

to nothing. If no definite wages are agreed upon, the servant's compensation will be what his services are reasonably worth, and this generally will be the usual wages paid at the same time and place for services of the same kind.

Liabilities and Rights of the Farmer as a Master.—It is a long standing maxim of the law that whatever one does by an agent or servant is the same in effect as if he did it by himself, and a second legal maxim is that when one of two innocent persons must suffer, the loss shall fall upon him who put it in the power of a third person to cause it. A farmer carrying corn to mill has been held liable for damage to the miller's machinery by an iron bolt previously put there by the hired man, of which the farmer was ignorant and innocent. The owner of a cow known to be vicious to strangers has been held liable for injuries to a person engaged to milk the animal assuming that she was gentle.

In Massachusetts and New Hampshire, it has been held that a person who entices or persuades a servant away from other employment is liable in damages to the master.

An agreement to farm land on shares is a contract of service and not a lease. A cropper has no interest in the land. Such an agreement does not create the relation of landlord and tenant and constitutes a clear distinction.

Legal Status of Crops.—It is often of the highest importance to the farmer to know when the products of his farm are to be deemed real estate and a part of the land, and when they are personal property to be dealt with regardless of the ownership of the soil. The various relationships of purchasers, tenants, mortgagees, executors, heirs, and creditors are complex. In general, growing crops follow the title to the soil in which they are rooted. They are a part of the land on which they stand when both belong to the same owner. If not expressly reserved when the land is sold, growing crops will pass by the deed as an appurtenance to it. Ungarnered crops pass to the purchaser of the land on a mortgage foreclosure sale, but those that are harvested before the sale do not. If a crop is actually standing upon the land when it is sold on mortgage foreclosure, it will pass by the sale to the purchaser notwithstanding there has been a previous sale or mortgage of the crop made by the farmer to another person. To be good against a subsequent owner of the land, a grant of a right to gather fruit growing or to be grown must be in writing and recorded like a deed.

Effect of Severing Crops.—All crops cease to be real estate and become personal property as soon as they are severed from the land. Thus, a crop grown upon a farm which is exempt as a homestead, as long as it remains unharvested is exempt also, but it loses its immunity after it has been gathered.

Damages for the Loss or Destruction of Crops.—A farmer whose growing

crops are destroyed by the fault or negligence of another may recover their value from the careless or faulty one. The measure of damages when growing crops are injured or destroyed is their value at the time of the injury or destruction and not their value in the market when matured and harvested or during the selling season.

The cost of a growing crop up to the time of its destruction is not the measure.

Rights of Landlords and Tenants in the Crops.—In the ordinary case when a farm is leased for a fixed rent, whether payable in money or in produce, or in both, the crops grown and harvested during the tenancy belong to the tenant. In a number of states, however, there are statutes which give the landlord a lien for rent upon the crops grown upon the leased land. This lien for rent attaches to the crops as well when the rent is payable partly in produce, as when it is payable wholly in money.

An agreement between the landlord and another person that the latter shall occupy and cultivate a farm belonging to the former and that each shall furnish a part of the seed, implements, and stock, and divide the products, creates not a partnership but the relation of landlord and tenant. The owner and tenant of a farm leased for a term of years upon an agreement to divide the product equally, are tenants in common of the crops. When no time for dividing the crop is fixed, the division is due when the crop is harvested. A tenant's agreement to deliver to the landlord half of all the crops is not fully performed until the shares have been divided and set apart. A cropper's share is due only when the crop is harvested. A cropper has no interest in the growing crop that he can sell or mortgage, except in cases where the statute provides otherwise.

Considered as farm produce, crops and manure are essentially different. Manure, since it is never sold unless by a very thriftless husbandman, is returned to the land to enrich the soil. It is therefore seldom or never to be deemed personal property, but always as belonging to the land. Manure made upon a leased farm by the consumption of the product of the farm belongs to the landlord and not to the tenant. A tenant has no right to remove manure produced on leased land during his term unless it is produced by stock in excess of the number that the farm can support and which are fed by fodder procured elsewhere. When that is the case, the excess manure belongs to the tenant.

Laws Relating to Live Stock.—Penal statutes against cruelty to animals are now universal in civilized communities, and they need not be particularly cited since their general provisions are familiar. A criminal statute provides for the punishment of every person who maliciously disfigures any horse, cattle or other animal by injuries wantonly inflicted, whether slight or serious, temporary or permanent in effect.

Estrays.—An estray has been defined legally to be an animal found wandering unattended, the owner of which is unknown. It is a roving

beast, free from the care, control, or custody of its owner, or one unsought, unclaimed, or abandoned by him. A domestic animal that has temporarily escaped from the custody of its owner and strayed a short distance away, but is neither lost nor abandoned, is not properly classed as an estray. Every law which authorizes stray animals to be impounded and sold must be strictly complied with in every respect for the proceedings to be valid.

Animals are said to run at large when they are not under the control of any driver, shepherd, or herdsman, but are left to roam wheresoever they will. They are beasts wandering and feeding at will, not under the immediate supervision and control of anyone, whether on open or inclosed land. A horse or colt running at large in the highway contrary to law is classed as a nuisance. But cattle grazing in the highway in plain view of the owner's family are not running at large.

The liability of the owner of a domestic animal for an injury done by it depends in general upon his negligence, and that is measured by the consideration of whether or not he ought in reason to have anticipated that the brute would, if the opportunity offered, inflict such injury, and whether, if he ought to have expected this, he took or omitted proper steps to prevent occurrence. Thus the owner of the beast that did the injury was exonerated in the following cases:

Where hogs broke into an adjoining field and killed a cow and her newborn calf, where a turkey-cock strutting and gobbling in a highway frightened a horse into running away, where bees attacked and severely stung horses going along the highway, when for 7 years they had occupied the same place and behaved well, where a bull jumped a strong fence that had restrained him for a fortnight and gored a mare in the next field. And a number of other instances may be cited. The owner of an animal unknown to be vicious is ordinarily not liable for an injury it does in a place where it has a right to be, but it is otherwise if the animal is where it ought not to be when it does the damage.

The owner of diseased cattle is liable in damages if he allows them to run at large when he knows or has good reason to know that they have an infectious disease, if they infect other stock. But if the owner of scabby sheep keeps his flock confined in his own pasture, he is not liable in damages to his neighbor whose sheep in an adjoining field become infected. When anyone who owns a drove of hogs which he knows to have a dangerous and contagious disease sells the animals to a dealer in live stock, who in turn innocently and ignorantly sells them to a customer, the original owner is liable to such customer when the hogs purchased communicate the disease to his other healthy hogs. He who deceitfully sells a horse which he knows to be infected with glanders to a purchaser, who in caring for the beast, contracts and dies of the disease, is liable for injury.

Runaway Horses.—It is negligence to leave a horse loose and unattended in a public street, and its owner is liable for the injuries the animal by running away inflicts upon a person not himself in fault.

Agistus.—An agistus is a person who for hire takes the live stock of others to graze or pasture upon his land. He is not an insurer of the animals he takes to pasture, but is only liable for negligence. He is bound to exercise ordinary diligence in safeguarding the beasts entrusted to his care. An agistus is under an obligation to keep his pastures properly fenced, but such obligation rests upon him in order to prevent the animals from escaping and doing harm or trespassing to the injury of others, consequently he is not required to fence the bank of a navigable stream.

Progeny.—The offspring of all domestic animals belong to those who own the dams at the time when the births occur, unless otherwise stipulated by contract. An exception is the case where a dam has been hired out temporarily for a definite time, and her offspring is born during the term. Unless the progeny is expressly reserved to the owner of the animal, it goes to the lessee. But one who has possession to pasture is not entitled to progeny born in his custody.

Sales.—There is no subject of greater importance and magnitude in the law than that relating to the change of ownership of property from one to another person by contract of sale and delivery. And the questions covering sale and delivery of goods and chattels are constantly coming up—questions which are not only numerous, various, and weighty, but exceedingly puzzling.

Essentials of a Sale.—The essentials of a sale—a sale being defined as a transfer of absolute or general ownership in a thing for a price in money or other recompense of value—are the assent of both buyer and seller to the sale, a price and an agreement as to price, by persons legally competent to make the sale.

An offer to sell property imposes no obligation upon the owner until it is accepted according to its terms. Such an offer may be withdrawn any time before it is accepted. To make the offer binding, it must be accepted unconditionally.

Completing sales is accomplished by an actual or symbolical delivery of the thing sold. Any act which is done with the intention to transfer the ownership and which changes the dominion over the property from seller to buyer is a delivery.

Use of Warehouse Receipts.—Transferring a warehouse receipt is a common and well understood method of delivering personal property stored in a warehouse. It seems to be tacitly admitted that the delivery of a warehouse receipt representing, for instance, a certain number of bushels of wheat, a part of a great quantity in a grain elevator, operates as a constructive delivery and transfer of title to the wheat for which it stands.

Warranty in Sales.—A warranty in a sale of personal property is a contract by the seller that the article sold is what he states and represents it to be in respect of its quality and condition. It is always representative although every representation is not a warranty. No particular form of words is necessary in order to make a warranty. Any assertion by the seller concerning the quality of the subject of the sale which induces the buyer to purchase or on which he relies in buying, will amount to a warranty. The offer of personal property for sale by one in possession of it is an implied warranty of title.

There are express and implied warranties upon sales of seed and nursery stock. A nurseryman, for example, who sells peach trees, and represents that they will bear large white juicy peaches readily sold, warrants that they will produce such fruit and is liable for a breach of the warranty. A person advertising seed rice for sale representing the rice to be good rice, is liable to damages if it does not sprout when planted properly in due season. When a market gardener applies to a dealer for seed to produce the earliest possible crop of peas and is sold seed which the seller guarantees to "pick 4 or 5 days earlier than any other seed on the market" there is a warranty implied that such seed will produce an early and ample crop of its kind. When a shop keeper delivers wild mustard seed to a customer who asks for cabbage seed and does not know the difference, he is liable for a breach of warranty whether or not he himself knew what the seed was.

It is a general rule that in a sale of goods for human food there is an implied warranty that the articles are wholesome. Thus it has been decided that one who sells a heifer knowing that it is diseased and unfit for human food, is liable for damages. It is sound advice to the farmer to take no chances in selling animals for human food when he knows them to be unfit, even though he makes no misrepresentation to the buyer. He may escape the payment of damages, but he is almost certain to be put to the annoyance and expense of a lawsuit.

An oral warranty of horses made at the time the price is agreed upon but before the bill of sale is delivered binds the seller. Thus if one selling a horse merely says to the buyer before the bargain is struck, "this horse is sound," he warrants the animal to be sound. But after a horse has been actually sold and delivered, a statement to the buyer by the seller that the animal is sound is no warranty. One who sells a horse which he knows is unsound and represents it as sound and so misleads a purchaser unable by ordinary observation to perceive the brute's defects, is guilty of a fraud that nullifies the sale. A warranty that a horse is sound does not cover visible defects, observed and mentioned by the buyer in purchasing, nor yet defective eyes or lameness, when noticed by the buyer.

Factors or Commission Merchants.—A person to whom goods are consigned to sell for the consignor's account is known to the law as a factor. The factor is often called a commission merchant. A factor is an agent who has the actual or constructive possession of the property he is empowered to sell. Thus he may have the goods in his own warehouse, or he may hold a bill of lading from a carrier, or a warehouse receipt representing and entitling the holder to the delivery of the property. One who is employed to sell another's property and not put in possession of it is a broker, not a factor.

Unless hampered by instructions, a factor may sell the goods consigned to him at his discretion in the usual course of trade, without consulting his principal. He may sell the property in his own name, and he may sell on credit unless directed not to do so. If the purchaser is apparently responsible and the factor acts in good faith, he may accept a note for the price. A factor has full authority to collect and receive payment for property sold by him.

A factor must sell goods consigned him for sale in the market where he transacts his business generally. A factor who ships to another market than his own, goods consigned to him to sell, makes himself liable for the deficit if they fail to bring as high a price as that ruling in his home market at the time of sale.

The factor's employment is a personal one, he has no right to pass his agency on to another; it has been held that even his death will not authorize the representatives of his estate to dispose of the principal's goods.

A consignor is entitled to the exercise of all the skill, ability, and industry of his factor in selling the consigned property upon the best obtainable terms. It is the duty of a commission merchant to sell the property entrusted to him for sale for the highest procurable price, but he is only bound to use proper and diligent efforts to get it. A commission merchant does his whole duty when he sells the consigned property at the market price in his own market and within a reasonable time. It is the duty of a factor to keep correct accounts of sales and to have such accounts open to the inspection of his principals. It is his duty also to take such care of the goods consigned to him for sale as a reasonably prudent man would take of his own property similarly situated. The utmost good faith is demanded of an agent in all his transactions with his principal in everything relating to the subject of his employment. When goods are consigned to a factor for sale, the consignor has a right generally to control the sale according to his pleasure by instructions given at the outset or from time to time afterwards; and the factor, if he has made no advances or incurred no liabilities, is bound to obey orders, but a factor is not bound to obey instructions contrary to an express agreement he made at the beginning.

If a factor honestly and diligently does his best to get a good price for the property consigned to him to sell, he is not liable to the owner for selling it below the market value. If a factor returns to the consignor in a damaged condition property which he received sound, he is liable for the depreciation in its value unless he can prove that the damage occurred without his fault. A factor who reports sales for less than what he receives, and destroys his books and accounts while his employer is inspecting them, may be held liable for unauthorized assumption of ownership. A factor who fails to exercise reasonable care and prudence to sell to a responsible buyer, is liable for the loss if a loss follows. He is not liable for a loss from his refusal to sell the property on credit to a purchaser whose responsibility he honestly doubts, and he is not liable, if he is not negligent, for loss or damage of his principal's goods while in his custody.

The general interests of justice and the safety of those compelled to repose confidence in others, alike demand that courts inflexibly maintain that an agent employed to sell can not make himself the purchaser.

A factor's services in selling property consigned to him to sell are compensated for commonly by a commission on the sale, called in law books, "factorage." A factor has a lien upon the property intrusted to him to sell for his compensation and expenses. When a factor makes advances upon goods consigned to him for sale, there is an implied agreement by the consignor to repay him a deficit in case the goods fail to bring enough to cover the advances.

A delivery of goods to an agent to sell on commission is not a sale and the title remains with the consignor until sold to a bona fide purchaser

State Legislation

Each State has passed legislation affecting the agriculture within its borders, some regulatory, some beneficial, some penalizing.

An understanding of the variety in agricultural law can be readily gathered from the items which, for States listed below, have been selected as of outstanding interest. But here again the individual's interest or the needs of the moment may influence judgment, so that what one man considers vital may be listed as of only passing value by another.¹⁵²

Nebraska, among its laws as they affect farmers, finds helpful the law regulating the incorporation of cooperative companies, first passed in 1913 and amended two or three times since.

In substance, the law permitting the formation of cooperative companies is designed to allow 25 or more producers or consumers, or both, to associate and incorporate as a business organization of limited partnership. The field of cooperative endeavor must be stated, together with the name of the association, its principal place of business, conditions of memberships, maximum earnings of capital furnished by members, scope, names of the Board of Managers, basis of apportioning net profits or losses, and maximum liability of members.

Under the law, farmers can combine for mutual benefit to conduct legitimate business through the medium of associations, as cooperative credit associations and cooperative companies with certain limitations as defined in the statutes.

A state hail insurance law has served to automatically regulate premiums charged by commercial companies.

Under this law, the State Insurance Board is authorized and directed to create a branch department to handle hail insurance. For purposes of enforcing, the state is divided into zones. Insurance of growing grain—wheat, oats, barley, flax, corn, rye—against loss by hail is permitted to provide protection of either \$10 or \$15 per acre. Premium rates depend on the zone in which the grain is growing and range from 25¢ to 60¢ for \$10 worth of protection and from 40¢ to 90¢ for \$15. Details of informing farmers, collecting premiums, adjusting losses, etc. are a part of the act.

Very close to the top of the list are the state quarantine laws regulating in-coming shipment of live stock or plants infected with a serious disease or dangerous pest. The potato industry has been helped by a state law establishing grades and providing for inspection at shipping points. Benefits resulting from equality of freight rates and railroad service have accrued to farmers through the establishment of a State railway commission, even though this empowering act was not passed particularly as farmer legislation. Larger districts, better schools, and greater advantages to farmers' children are the products of a law designed to bring about the consolidation of rural schools.

New Jersey is on the threshold of new legislation deemed advantageous to farmers through the activities of its State Farm Bureau Federation. Present legislation of value centers around the organization, 4 years ago, of a Commission of Agriculture, with coordinated departments. A farmers' cooperative law to permit collective sale of products is mentioned as being important in the sale of farm products.

The New Jersey State Department of Agriculture was organized in 1916, consisting of bureaus of animal industry, lands, crops and markets, statistics, inspection. The department fell heir to former legislation having to do with the prevention of disease among live stock and the shutting out or control of injurious insects. In addition it took over the duties common to most State departments of this character, such as stallion registration, collection of crop and other agricultural statistics, use of lands for agricultural purposes, improvement of agricultural methods, improvement in transportation, establishment of market rates, irrigation, and drainage of lands.

The act providing for the formation and regulation of cooperative agricultural, dairy, or horticultural associations went into effect in 1920. Under its provisions, cooperation for mutual help, if conducted without capital stock and profit, is allowed for not less than five people engaged in agriculture. The act is rather specific in that it defines the scope of activities that such association, through its agent, may perform, these to be services "connected with the production, manufacture, preservation, drying, canning, storing, handling, utilization, marketing, or sale of agricultural, dairy, or horticultural products" produced by its members, or the purchase or hiring for or use by them of supplies, as live stock, machinery, and equipment, or the hiring of labor. A certificate of incorporation is to be provided for while full details regulate the conduct of business, limitations, membership liability and responsibility, etc.

Missouri has a law deemed of value permitting cooperative associations. A pure seed law is considered exceedingly good as it prevents dumping of impure seeds of any kind into the state. Laws regulating the control of hog cholera and the sale of commercial fertilizers are benefitting farmers.

The law authorizing the incorporation of agricultural cooperative associations provides for mutual buying, selling, manufacturing, storing, transporting, or other handling or dealing in or with agricultural, dairy, or similar products, and, under certain restrictions, the purchasing or selling of groceries, provisions, and other articles of merchandise to shareholders in such farmers' associations. At least 12 members are necessary in the formation of a cooperative association. The association must be incorporated and conducted in line with the regulation governing such organizations. Profit getting and sharing is possible under the Missouri empowering act.

The Missouri seed law is designed to protect purchasers from seed which is impure or not true to name by requiring proper labeling. It applies to practically all farm seeds (other than garden and truck crops), such as grasses, sorghums, clovers, peas, beans, vetches, forage plants, buckwheat, flax, rape, barley, field corn, broom corn, oats, rye, wheat and all other cereals. The law applies to sales of 10 lb. or more. and prescribes that each lot must bear a label stating (a) the common name, (b) approximate percentage by weight of purity, (c) approximate total percentage by weight of weed seeds, (d) the names of certain weed seeds or bulblets if present in more than stated amounts, (e) approximate percentage of germination including statement of year and month when tested, (f) full name and address of vendor, (g) name of state where seed was grown. Certain exceptions apply to farmers who are producing seed for local sale or for sale to be recleaned or otherwise prepared.

Minnesota established a State Department of Agriculture in 1919 which promises, once it is fully organized, to give considerable service to the farmers of that state. The department is charged with regulatory duties pertaining to marketing, and the securing of agricultural statistics. The same legislature also provided for control of feeds offered in the market by requiring proper labeling and providing for inspection, sample collection and analysis: A State-wide road program affording good truck roads for the state, and a law providing for a state entomologist and nursery inspection, are both of material help, the former, in particular, being a measure which promises much to agriculture.

Arizona.—Perhaps the most outstanding Arizona law affecting agriculture is a water code with provisions for establishing water rights that will tend to eliminate controversies.

Under the law, natural stream flows unappropriated or not used for 5 years revert to the public. For protection, a qualified State Water Commissioner is appointed, whose duties are to survey water resources and make recommendations for developing, to formulate and pass necessary rules and regulations concerning the appropriation and distribution of the waters of the state for domestic, municipal, irrigation, stock watering, water power, and mining uses. The act contains 62 sections and defines in much detail all rights, privileges, and concessions acknowledged or permitted there under.

New York.—Concerning New York state legislation which has been of value to its farming interests, emphasis is placed upon four acts which have been designed (a) to legalize cooperative stock companies, (b) to provide for cooperative membership associations for marketing purposes, (c) to employ state aid in the construction of township highways, (d) to require more rigid inspection of seeds, feeds, and fertilizers.

North Carolina has adopted a state act creating a new type of farmers' communities.* A law providing for the organization and regulation of a credit union has been enacted in the state. North Carolina has also adopted the Torrens system of land registration.

California has so many good laws for the protection of her agriculture that selection of those outstanding is rather difficult. Several distinctive types, each one of value, are therefore offered.

California State Market Commission Act.—Under this act, the State created a Commission to carry on the business of receiving from the producer, agricultural, fish, dairy, and farm products, and to sell and dispose of these on commission. The management of the work is invested in a Market Director, who is empowered to establish in all cities and towns which he considers suitable commission markets to handle these products, where producers can consign their product for sale and distribution.

The gathering and disseminating of information on subjects relating to the marketing of California products were by the act made a duty of the commission. Restrictions are so placed upon the Director that he can not engage in any other line of business during his term of office, so that his whole time and attention are devoted to the duties of the office. Neither can he hold any stock or other interest in any produce commission business. To insure the faithful performance of duty, the Director is bonded in the sum of \$50,000.

California Standards for Packing Fresh Fruit.—The California standards were established to regulate packs of fruits and to insure honesty of pack.

Under this act all fresh fruits (except oranges) when packed, shipped, or offered for sale, must be mature but not over-ripe, well colored for the variety and locality, virtually uniform in quality, virtually free from insect and fungus pests, rots, bruises, frost injury, sunburn, and other serious defect, and, except in cases of unpacked fruits and vegetables, shall be virtually uniform in size. All layers shall be approximately the same numerical count when packed in straight-sided containers. In sloping-sided containers, no layer below the top layer shall have a greater numerical count than the former.

The shipment must be of virtually uniform size, that is, peaches, pears, and quinces are not to vary more than $\frac{1}{4}$ in. (through cross section) and apricots, plums, prunes, cherries, berries, not more than $\frac{3}{8}$ in.

*For full account see "Rural Life" by J. C. Galpin.

Standard containers are provided for by law as follows:

TABLE 246.—LEGAL REQUIREMENT FOR MARKET CONTAINERS—CALIFORNIA

Standard containers are given as:	Depth inside, inches	Width inside, inches	Length outside, inches
Standard pear box.....	8½	11½	19¾
Half pear box.....	4½	11½	19¾
Standard peach box.....	4¼	11½	19¾
Standard peach box.....	4½	11½	19¾
Standard peach box.....	4¾	11½	19¾
Standard crate.....	4¼	16	17½
Standard crate.....	4½	16	17½
Standard crate.....	4¾	16	17½
Standard grape crate (with heavy cleat 1½ by 1½ in.).....	4¼	16	17½
Standard grape drum (containing 2,923 cu. in.).....	14	15½	
Standard grape keg (2,923 cu. in.).....			
Standard lug box.....	5¾	14	17½
Standard cherry lug.....	4½	11½	19¾
Standard cherry lug.....	4½	9	19¾
Standard cherry box.....	2¼	9	19¾

Standard apricot, plum, and grape basket—8 in. square on top; 6½ in. on bottom and 4 in. deep, inside measurements. Standard berry baskets—dry pint containing an interior capacity of approximately 33⅓₁₀ cu. in., and dry one half pint—approximately 16⅔₁₀ cu. in. Standard cantaloupe crates—12 by 12 by 22½ in., to be packed with 36 to 45 cantaloupes; 4 by 12 by 22½ in., to be packed with 12 to 15 cantaloupes; 11 by 11 by 22½ in., packed with 45-54; 13 by 13 by 22½ in. packed with 36-45; 4½ by 13 by 22½ in. packed with 12-15.

Table grapes must show sugar content of not less than 17 per cent (Balling Scale except Emperor, Gros Coleman, and Cornichon, which shall show not less than 16 per cent Balling Scale).

Oranges are deemed properly mature when juices contain soluble solids equal to or in excess of 8 parts to every part of acid contained in the juice. They must have attained 25 per cent yellow or orange color before picking; if have 70 per cent color at picking, deemed ready irrespective of analysis of juice. Shall be virtually free from insect and fungus diseases, and other serious defects. Unfit for shipment when frosted.

All boxes, crates, packages, when packed for transportation for sale, shall bear in plain letters the name of the orchard, if any, and name of those who first packed the fruit, with locality where the fruit is grown. Wilful violation of this Act shall be considered a misdemeanor.

California Land Colonization and Rural Credits Act.—Under date of May 18, 1915, an Act was approved by the Legislature empowering the governor to appoint, before September 1, 1915, a commission of five members, citizens of this State, to investigate and consider the question of land colonization and various forms of land banks; also cooperative credit units and other rural credit societies, with a special view to the needs of rural communities of this State.

California Workmen's Compensation Act.—The Workmen's Compensation, Insurance and Safety Act, as promulgated by a recent California legislature, is designed to protect all workmen, but excepts labor engaged in farm work or domestic service. It touches the farmer only when he employs non-agricultural or non-domestic labor. However, if a farmer so elects he may come under the act and include his farm laborers.

Under the act, a farmer may estimate and state his own wage value and that of the working members of his family, add the total to the payroll, and insure himself and his family against the consequences of injury.

The rate for compensation insurance applicable to farm and ranch operations, covering all employments incident thereto, including domestic service in the farmer's home, is \$1.50 on each \$100 paid out for labor during the year.

Sometimes the line drawn between farm labor and that which is not farm labor is, and has to be, more arbitrary than logical. For instance, if a farmer has a few stumps to blast out or a corner of his place to be cleared, his regular farm policy will cover him, but if he has any considerable tract to be cleared and made ready to become a farm the rate will be \$2.80. If considerable blasting has to be done, a full explanation of the operations in contemplation should be forwarded to the fund before the work begins, in order that the risk may be provided for understandingly and the insurance policy be made to cover the risk. It may be possible to have one man do all the blasting and handling of dynamite while all the other workers remain at a safe distance, in which case the rate will be \$25 on the \$100 of payroll for that man which, while it looks high, and probably is, need not figure out to a very large sum inasmuch as, if the work is made ready, the blasting for a large tract can be done in a very few days.

If a farmer desires to erect buildings, dig wells, install irrigation systems, all such employees are under the protection of the compensation act because they are not farm labor. The rate for well boring is \$2.62, but for well digging in the old-fashioned way it is \$12.25. For constructing buildings, the rate is \$3.32, for millwrights erecting or repairing machinery, it is \$3.50. The rate for constructing irrigation canals (no rock work, blasting, or steam shovel work) is \$3.60, and for laying irrigation pipes for distributing water it is \$3.76. All ordinary farm work in connection with irrigation systems and extensions of distributing ditches, when the work is done exclusively by farm laborers, in connection with their other farm duties, is covered by the regular farm policy at the \$1.50 rate.

County and municipal regulations are too variable to permit their inclusion here.

Conclusion to Farm Law.—As one studies the legal side of the farming business, he will find many acts upon the statute books. Some are useless, a few possibly vicious, a number dead issues, but, on the whole, they comprise a satisfactory series for the protection of producer, transporter, selling agent, consumer, and society as a whole.

PART III

INTRODUCTION TO PART III

Part III is inserted for a little discussion of the personal side of farm management, to touch upon the qualifications and requirements sought in those to whom properties are entrusted, and to outline something of the duties devolving upon a farm manager. Getting started is of importance to students about to step out of their classrooms into a busy, somewhat exacting, and occasionally none too sympathetic business world, hence the personal tone has been deliberately kept in line with the way the original material was prepared and delivered to college classes.

CHAPTER XXVI

THE FARM MANAGER

Selling Service : Duties : Qualifications : Outlook

Of the more than 7,000,000 farms in the United States, about 10 per cent are handled by managers, or roughly 1 in 10. Of these managers, some are self-made men, often elevated from the ranks, some are owners' relatives, while a goodly number are recruited from agricultural schools and colleges. Subdivision of large holdings (in the west), change to intensive farming methods, retirement of active farmers, non-resident investment in farm lands, and development of estates, are factors tending to increase the demand for managers. As the number of agricultural college graduates who enter the field increases, their influence is seen in their selection of other trained men to work for or with them, thus introducing a tendency to replace the so-called practical men with college-trained men. How fast this replacement can take place depends on the degree of success attending the efforts of graduates to prove their ability in a given section.

Definition and Status of the Farm Manager.—A farm manager may be defined as a man in charge of an agricultural enterprise large enough to necessitate use of his full time in supervision and business details, who does none of the actual labor of production but who is charged with the selection of crops and products, the organizing of the work, its proper execution, the care of labor, the selling of the product, the keeping of records and farm books, the handling of all funds and financial transactions, and the observance of legal regulations.

A farmer is, under this definition, not necessarily a farm manager, since the latter is charged with business details surrounding determination of policy, plans for establishing and conducting operations, and disposition of the final product. A farm manager therefore stands relatively high in the scale of farm personnel. A graphic illustration may serve to indicate the relative position of the salaried personnel of a farm organization.

Employer

As capitalist, investor, board of directors, stockholders.

General Manager

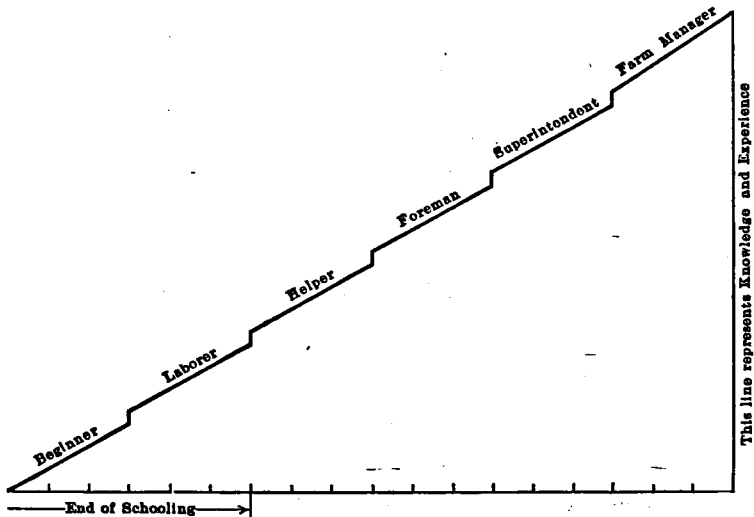
Usually not in residence upon a farm, employed for enterprises involving more than farming; determines policies and guards the broader issues; answerable to the employer.

Farm Manager

In charge of planning, organizing, and executing the business details of a farming enterprise, which may consist of one or more farms, contiguous or separate; occasionally not in residence upon the farm; answerable to the general manager or directly to the employer, and responsible for work of superintendents employed under him.

Superintendent

Always in residence upon a farm, in charge of planning and executing the work on the farm(s) under his charge, responsible for the proper conduct of the foremen employed under him and the safe-guarding of the property entrusted to him; answerable to the employer, the general manager, or the farm manager, according to the type of organization.



Each space on this line represents one year of time. An average of four to six years is required for beginner and laborer period.

FIG. 96.—Graphic presentation of the status of the farm manager.

Foreman

In residence upon farm and immediately responsible for the conduct of the farming operations, the men employed under him, and the safe-guarding of equipment belonging to the lands placed under his charge; answerable to superintendent or manager according to type of organization.

Strawboss

In residence; a man who is placed in charge of small working groups, often as a working leader or pace-maker, and who is held responsible for the conduct of the men and stock during working hours; answerable to the foreman.

Skilled Farm Laborers

As tractor drivers, long line teamsters, harvester men, machinists, stockmen, etc. Answerable for the quality and quantity of their work to the straw-boss or foreman.

Semi-skilled Farm Laborers

As fruit tree pruners, irrigators, mowing machine men, two-horse teamsters, milkers, etc. Responsibility same as for skilled farm laborers.

Unskilled Farm Laborers

As cotton pickers, pick and shovel men, hay pitchers, certain types of fruit pickers, etc.; responsibility same as for skilled farm labor.

Each successive stage in the progress from unskilled labor up the organization ladder calls for the lapse of time so that training, experience, and personal capacity can be united to serve the requirements made upon the men in their different stages of responsibility. Van Norman¹⁵⁸ uses the graphic method of illustrating this.

Selling Service

"Selling service," "getting a job," "obtaining a start," or however the initial embarking into agriculture may be styled, with a view to qualifying for a farm managership, is important to all who must work for wages or on salary. Students in agriculture, especially, frequently ask the question "How should a man go about it to get a job? In other words, when we are through with college (and presumably have obtained our diplomas) how shall we sell our knowledge?"

The difficulty often attached to securing a position warrants some consideration of the problem.

At the outset, one should distinguish between the demand for *qualifications* (i.e., personal characteristics), and for *duties* (i.e., expected performance). An employer usually hires a man upon an estimate of his qualifications; he pays for performance.

To have the matter squarely before us, let us consider (1) what an employer seeks in an employee, and (2) what a college trained man has to offer.

What Does an Employer Desire in an Employee?—Taking up the first proposition, the whole situation may be summed up in the words "the ability to make money honestly." For some men, the word "honestly" can be omitted, but the proportion falling into this category is relatively small.

A man new to a position may think that greater stress is placed on other factors than the ability to make money. Some employers try to expect excessive deference in their employees, others favor pleasant companionship, still others frown upon certain personal traits such,

for instance, as the use of tobacco or indulging in card playing or Sunday baseball. But, unless a man has ability to make money, he will usually find that his fulfillment of the other requirements will avail him little. Other men who have the money-getting ability but exercise less effort to curry favor in minor things and apparently enjoy less favoritism are more likely to succeed in the long run.

The insertion of the word "honestly" may warrant some additional explanation. While there are men who will wink at transactions pretty close to the line between honesty and dishonesty, provided they work out successfully, the majority of employers are decidedly against countenancing this sort of thing. They figure, and rightly, that a man who will utilize such tactics *for* them would not hesitate to utilize the same tactics *against* them if an opportunity were offered. This does not always follow, however, and there are instances of dishonest work done by employees for their superiors purely from motives of blind devotion and loyalty. In general, however, since the business of the country is about 95 per cent based on credit and confidence in one another, clear-headed business men see too much danger in encouraging dishonesty. Taken all in all, general experience shows that temptations will assail every man, and he who will employ crooked practices for his employer is in danger later of sacrificing his employer to his own personal private gain.

What Has a College Trained Man to Offer?—At the very outset in discussing "What has a college trained man to offer?" it is apparent that few college graduates have had a chance to demonstrate their abilities to earn money. They are selected and employed for other reasons. These cannot be so simple as the answer concerning what the employer desires. The first factor is a belief that a trained mind is a valuable instrument in developing a man. It isn't wholly the array of facts which one is able to collect, valuable as these are, which makes a college career of greatest worth, but rather the ability acquired to think, to use one's brain. Employers therefore find that the college man is good material to develop. But it is worthy of note, he does not take a man for what he is on graduation, but rather for the possibilities he contains. Secondly, a college is a kind of winnowing machine, and those that graduate (the question of finances not being considered) are the wheat from the chaff of the total grist which enters, and the man who is looking for good assistants finds the first elimination already done for him.

The third consideration which helps the college man is the scarcity of good men at the top. As long as this condition exists, college men will be given first chance since their training, combined with a very desirable admixture of enthusiasm, brightness, energy, and polish, especially fits them to succeed.

We may say then that the college man has to offer the employer a partly trained mind and practically unlimited possibilities. He usually lacks experience, often tact, and has not as a rule had a chance to show his earning capacity.

A College Education.—The United States Department of Education is authority for the following statement: "Less than 1 per cent of American men are college graduates, and yet this 1 per cent has furnished 50 per cent of the constitutional conventions, 55 per cent of all the presidents, 36 per cent of all the members of congress, 47 per cent of all the speakers of the house of representatives, 54 per cent of all the vice-presidents, 62 per cent of all the secretaries of state, 50 per cent of the secretaries of the treasury, 67 per cent of the attorneys-general, 69 per cent of the justices of the supreme court."

It is not intended to hold up public office as the highest form of success; but the fact that the 1 per cent of college graduates have had such a conspicuous part in our public activities indicative of the value of college education. If the truth could be determined, the value of this education would be demonstrated with the same force in most other lines of activity. It is estimated that the man who has had no schooling has about one chance in 150,000 of performing distinguished service. The man who has an elementary education has four times the chance of the man who has no schooling. The high school graduate has 87 times the chance of the uneducated man, and the college man has 400 times the chance. And this proportion will apply with just as much force to farming as to any other line of activity.

Looking for a Position.—The foregoing should furnish some ideas as to what procedure should be followed in looking for a position. Unless one can offer an employer experience sufficient to convince him of one's ability to assume immediate responsibility, it is wiser to look for something where the owner is either so public spirited, or needs a man so badly that he is willing to make considerable personal effort to start a man out right.

Once one knows what he wishes to do, his next move will be to find the opening. A great variety of ways to do this present themselves. In many localities personal contact counts for a great deal. That is, one man will recommend another or one will inform another of an opening. For this reason, it is a good thing for everyone to state what he is looking for in a frank manner to those he thinks can help him. These may be friends of the family, friends made at college, one's college faculty, or, perhaps, some firm or employment bureau with which an application has been filed.

Summed up in a general way, without much regard to order of greatest value since this is a rather difficult thing to judge, positions may be sought through the following channels:

(a) By inquiring of friends or acquaintances personally or by letter as to knowledge of openings, including those members of your college faculty who are personally acquainted with you.

(b) By writing letters of application to firms who are constantly seeking new men.

(c) By using the lists on file with your college or university which consist of

1. Applications from employers for men, and

2. Lists of students offering their services, stating experience and starting salary.

(d) By filing an application with a reputable agency.

(e) By watching the advertising columns of the agricultural press and daily newspapers for men wanted.

(f) By advertising your services in the papers.

Choosing the Employer.—There enters into the questions surrounding the obtaining or accepting of employment a need for estimating the employer. One should beware of the type of employer who jumps from one hobby to another, or who follows a vacillating policy, or who fails to recognize the value of loyalty, or seeks immediate results, or considers an upheaval a preface to a change, or is a persistent fault finder, or fails to live up to his promises, or orders practices bordering closely upon dishonesty. One should seek further, and accept the employer who is willing and able to use to advantage such knowledge and experience as the applicant is able to offer, who will give a beginner or a newcomer a chance to prove himself, who is reasonably charitable toward ordinary or occasional mistakes, who has the opportunity and the desire to advance men into broader fields when promotion is justified.

There are two especially prominent factors involved in the successful carrying out of any employment proposition. One is the employee, of whom much has been written; the other is the employer. No employer can reasonably be expected to entrust important operations or heavy investments to another without sufficient proof that his interest will be safeguarded in every way. But no employer should attempt or desire to take advantage of conscientious, hard-working, loyal employees who are striving to serve and protect the employer's interests. There are enough instances to warrant drawing attention to this and warning against accepting employment under faithless or over-exacting employers.

As acquisition of farm property becomes more difficult, men will find in farm management an opportunity to engage in farming on a reasonably large scale. Some men prefer to work with other men's dollars rather than with their own pennies, and, as every man should do the best that is in him, it is sometimes entirely justifiable to forego working for one's self on a tiny scale and to take over duties for a corporation, cooperative concern, or individual with large assets. In so doing, however, the change in occupation should not involve less of public service or diminish a spirit of ambition.

Western agriculture is today in a transitory stage. With the cutting up of the large holdings into smaller units, and the intensifying of a former

generally extensive agriculture, openings for men are increasing. The opportunities, however, must be sought. There is no common source of information covering openings. Much of the advancing of men is done by personal effort. A family friend hears of an opening and recommends you for trial. A business man learns of you from an acquaintance of yours and suggests you for an open or pending position.

Unless other things more than compensate, it is not always wise for a \$5,000 man to run a \$600 business—even for himself. A man should utilize his best resources to the fullest extent. This, however, will ordinarily be best accomplished when operating one's own affairs—even though you may work with your own dollars rather than the other man's thousands.

Application.—Let us consider the next step to be taken after you have found something which seems to appeal to you, and you are ready to make personal application. This will be done either by letter or in person, circumstances determining the best method to follow. If a friend of yours recommends you first, he will probably make an appointment at the time and no letter will be needed. In fact, as a general rule, a personal interview is so much more satisfactory that it is clearly advisable unless the prospective employer insists on an application by letter, because he is too busy to see everyone, or else the distance is too great to warrant traveling expense without some assurance of securing an opening. Thus, each individual case must be decided by itself.

Applying by Letter.—Considering application by letter first: formerly, a good deal of stress was placed upon a man's handwriting, and applications were almost invariably sent in written by the applicant. Today, however, greater stress is placed on correct business methods, so that unless your source of information regarding a position states that your application should be in longhand, typewritten. Standard letter, type-writer paper, 8½ by 11 in. is convenient for filing and easy to handle.

In writing, do not attempt to give your life history, prospects, desires, or family affairs unless these bear directly upon the position. Leave something for an interview. Confine your statements to plain business and give only such information as will tend to bring you a hearing.

Since your practical experience upon graduating from college will usually be negligible, you must approach your man from a different angle. Your best chance will lie along the lines of getting a trial and a chance to learn the details of any business. You must prove yourself worth the time and trouble to break you in. Your best course will then be to find a good firm and enter a general application, stating what branch of work you wish to follow up, what you have done to train yourself, and asking the privilege of an interview. Nine times out of ten, if a firm thinks they can use you either then or at some time in the future, you will be given a fair hearing. In this connection, it is undesirable to state salary de-

mands. Make this secondary until you prove to the firm's satisfaction, as well as your own, that you are really of some value. As a general rule, a college graduate is of mighty little value in an earning capacity—handling ranches—until he has been out of college 2 years. A few reach it sooner, while others take longer. A few never attain it. It is a curious fact that such great differences exist in men. An occasional man seems born to succeed, and no matter what business he enters brings to bear the right amount of energy, brain power, and tact to insure its profitable outcome. Another man fails properly to balance the various factors, is either lazy, or misdirect his energy to such an extent that he seems to be always marking time—he cannot get ahead. With such a man, a change is sooner or later not only advisable but imminent.

Examples of Letters of Application.—Answers to the following “ad” placed once in a Sunday newspaper will indicate the necessity of a clean-cut answer and the driving home of essential facts.

“*Wanted:* man to handle 1,000 acres in San Joaquin given over to barley, alfalfa, dairy, hogs, and small acreage of fruit. State experience, salary expected and ability. Box 20,898, Oakland Examiner.”

The Results:

Number of letters received—76.

Second reading given—11

Accorded interview,—6

The two best of the 76 are given below, yet these are not exceptionally meritorious.

No. 45

Marysville, Cal., Aug. 6, 1916.

DEAR SIR:

I wish to apply for the position you advertise in the S. F. Examiner, Aug. 6. Have had plenty of experience in all the lines you mention, having been superintendent for three different companies. I can refer you to Mr. T. H. Means, S. F. Agricultural Engineers. Also Mr. R. L. Adams of the University of California. And T. H. Ramsey, Pres. of First National Bank, Red Bluff.

I would expect a salary of \$100 per month and everything furnished.

I am acquainted with the San Joaquin valley from one end to the other.

Am 32 years old, married and have two children.

Have had 10 years, experience in charge of ranches.

If you wish an interview, I will make a trip to your ranch any time.

Yours truly,

Aug. 7, 1916.

Box 20,898 Examiner,
Oakland, Calif.

DEAR SIR:

I have noticed your advertisement in Examiner as above, and beg herewith to offer you my services in stated capacity, my qualifications being as follows:

Education.—Grammar school, high school, and agricultural college. Agricultural training in soils, crops, animal husbandry, dairying, and horticulture, covering a five-year period.

Experience.—Raised on a farm devoted to general products, namely, grain, alfalfa, hogs, and prunes. Worked out on ranches and farms in different localities. Was connected with the dairy on Stanford Ranch at Vina; with the E. Clemens Horst Co., at Los Molinos; with Howard and Hedgers at Wrens, Oregon; and with the Sycamore Ranch, Los Molinos, superintending same at the present time. Have been with this ranch—Mrs. Mary ——— estate of 2,200 acres—for about three years but wish for a change to a position paying a better salary. \$100 and board and lodging is the value I place on my services per month.

I am acquainted with office work and bookkeeping necessary to conducting a ranch successfully; handling finances, correspondence, shipping, and everything that enters into the business side of farming, which is just as important, if not more so, than the management of field work, to my mind.

I feel capable of handling your business, which is very similar to the one I am handling at present with barley, alfalfa, hogs, and fruit—prunes. My experience in milk-and-butter-fat-production, and training therein fits me further to your proposition.

Trusting that we can come to some agreement, and that I can be of service to you, Sir, I am

Yours very truly,

Note that there were 76 replies from one insertion of 4-line "ad," hence applicant must be specific, give ample detail for quick decision, and leave decision to employer. A well-written letter, clearly legible, helps.

Example of Successful Letter of Application.—The following letter, written by a student in the University of California, and directed to 17 names suggested by men who knew the student resulted in 12 or 13 answers coming back, of which six or seven were good for positions.

His letter read:

"At the suggestion of Professor, ——— I am writing to inquire if there will be an opportunity for me to obtain employment with you after May next. I am at present a student in the University of California, and have specialized in Fruit Growing. I will graduate next May, when I will be twenty-five years of age.

"My practical experience has been as follows:

"1. General Horticultural Work: Eight months, during which time I was a shed foreman in an asparagus packing shed and a field boss for Japanese laborers. I also laid out and planted a ten-acre apricot orchard, and did general horticultural work such as pruning, spraying, teaming, picking, and the like. I have also done considerable pruning at various other times so understand this phase of the orchard business. I am also familiar with the common orchard pests and diseases and their control, and with the preparation of spray materials.

"2. Gas Engines: I have had experience with gas engines, having worked for three years in a Berkeley garage while attending college. I am handy with tools, and can handle most repair jobs that may come up in ranch work.

"3. Surveying: I have had fifteen months of surveying experience, and this may be of value to me in handling any irrigation or orchard planting that may come up in orchard work.

"4. Office Work: I have had about seven months' experience in office work for a lumber company, and have been a shift boss in a mill for about two months. Although not connected with farming, this has been good experience for me in handling men.

"If there will be any opening, I will be glad to have you grant me an interview

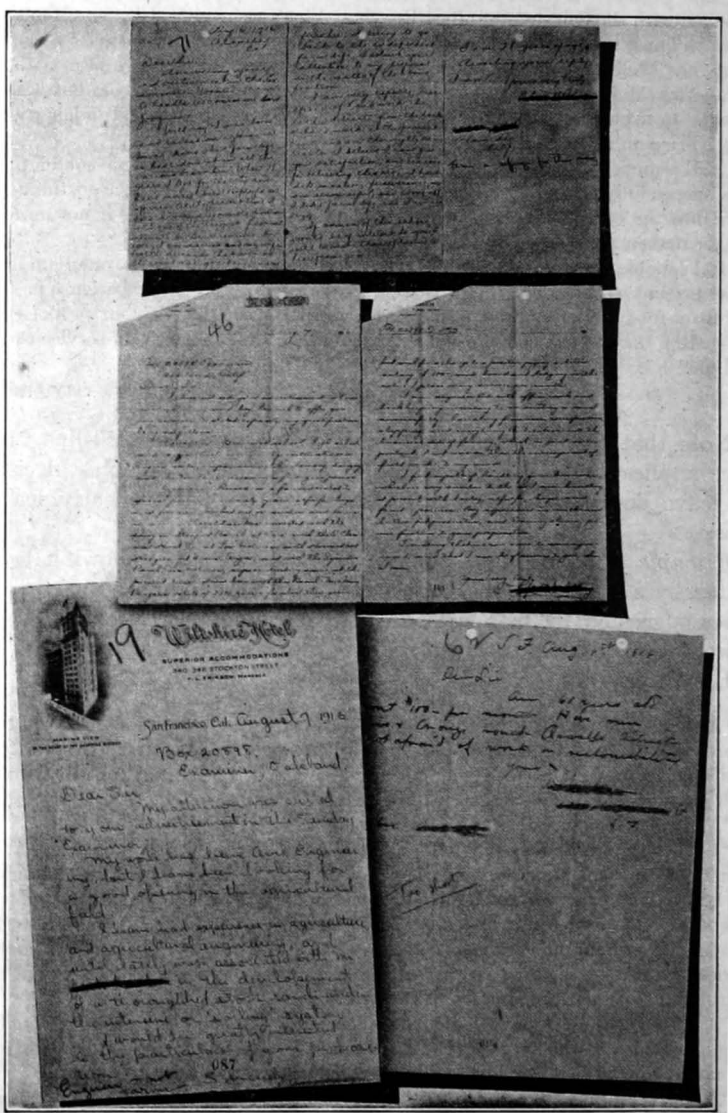


FIG. 97.—Types of letters good, bad and indifferent, written in answer to the advertisement for a farm superintendent given in the text.

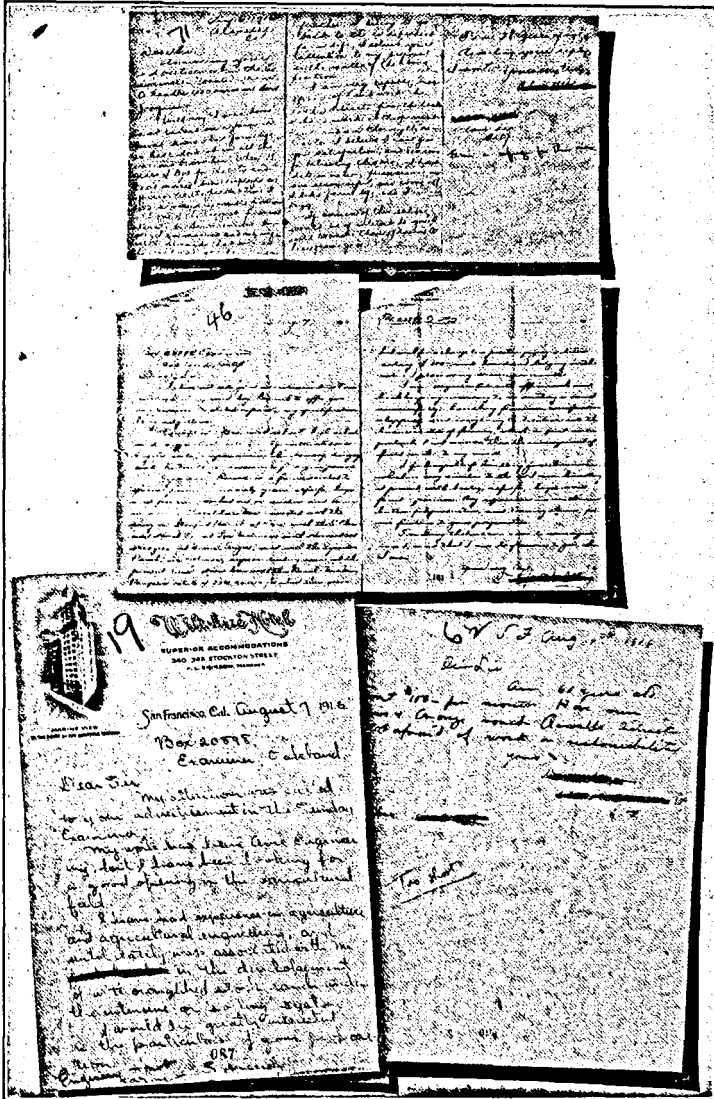


FIG. 97.—Types of letters good, bad and indifferent, written in answer to the advertisement for a farm superintendent given in the text.

at your office at any time you wish, preferably on a Saturday, so I can arrange the trip. If you desire references, I will send you the names of the people that I have worked for.

"Thanking you for any consideration that you may give this matter, I remain
Very truly yours,"

As samples of extracts from answers, note the following:

Letter No. 1.—You have evidently had some valuable experience preparing for the business of fruit growing, and if any inquiries should come to this office regarding a trained horticulturist, I shall gladly notify you of such.

Letter No. 2.—Replying to yours of the 2nd, we are not in a position at this time to say whether we shall have anything to offer you. However, some Monday at your convenience, you might arrange to call on the writer at this office. Better telephone in advance so that you will not miss catching him.

Letter No. 3.—Your valued favor of the 29th ult. is received, and I have carefully noticed your experience in different lines of work. It is difficult for me to say at this time whether I can use your services or not; particularly as you do not wish to engage in any outside work until next May. I understand, of course, that the reason for this is that you will not graduate until that time.

If you will correspond with me next April, or if you prefer, a little earlier than this, I may be in a position at that time to advise you whether we can use you or not. I consider from the practical experience you have had in different lines we could use your services to a good advantage.

Letter No. 4.—In acknowledgment of yours of the 4th inst., I have to advise that if you will bring this matter to my attention next spring, I do not think there will be any difficulty in securing a position for you, the exact location of which I am not at present able to say, but, on account of the wide experience you have had in orchard work, I would consider that you would be of valuable assistance to some of our large shippers during the busy season.

Letter No. 5.—If you are willing to commence on the ground floor in our business, we will give you an opportunity to work up. We could not at first put you in charge of any department of our work until you thoroughly understand the same, so you would know when the work was being done properly and when a man was doing a good day's work.

Following a laboratory exercise in which students were asked to apply for a position through a sample advertisement, the attached letters were received. In general, from about forty letters the following objectionable things were noted:

1. Two or three wrote on both sides of the paper.
2. Several letters were too long, the writers evidently figuring the reader's time of no value.
3. Some of the letters were rambling. The writers were too long coming to the point. Men thought on paper rather than preliminary to writing.
4. Not a man stated that he was single.
5. A general tendency to state what men thought they could do rather, than what they had done, leaving the final judgment to the advertiser. Such expressions were common—"I am sure that I can handle your work to your entire satisfaction;" "I feel that I am capable of handling your ranch successfully," etc.
6. A few wrote letters too short, being so abrupt as to give the impression of surliness.
7. A considerable number of words were spelled wrong which would not help a man with an employer who must be represented in a business way—such words as "diarying," "experence," "advertizement," "referrences," "forman," "aplicant," "handeling," "salery," "posetion."

8. Too many used stereotyped phrases, such as—"Hoping to receive a favorable reply," "Hoping to hear from you soon," "Having seen your advertisement in," "Thanking you in advance," etc.

9. Too many wrote general statements as to experience, and in not enough detail, An employer would have trouble to know just how to place the man. Such relative terms appeared as "considerable experience," "some experience," "quite a lot," "two years' ranch experience."

Personal Interview.—In talking over this matter of obtaining a situation with a student, he asked the writer—"When you do get a man's ear, what should you say?"—meaning, how should one direct the conversation. The answer to this is to let the other man do both talking and asking of questions. Confine yourself to answers. If, at the conclusion of the interview, you think you have a chance to secure a trial and want to know what the position is, seek only enough information to locate the job and then make your inquiries on the outside. Employers are often sensitive to cross-examination, and a man may spoil his chances by too many detailed inquiries, although otherwise he may have made an agreeable impression. To my mind, two words will cover all one needs to bear in mind when approaching an employer for a position of any kind. These are *inspire confidence*. Here again your study of the man you are to meet, both by questioning others as to his traits, likes, and dislikes and by a close quick estimate when you meet, will go far to determine your bearing. Some men wish full accounts, others condensed summaries, some men want a quiet demeanor and calm bearing, others a bit of bluster and "jolly." Hence the only way to express it is to advise you so to conduct yourself that you inspire confidence in yourself on the part of the man who must eventually rely upon you as a factor in carrying on his business affairs.

And this confidence must be continued. A student once asked me—"How should a student use his knowledge gained here? Should he put it into immediate use?" Here again, it is wise to observe the views of your "boss." If he believes in the new order of things and has hired you because he thinks you can successfully install them, then "go to it." If, on the other hand, he is apparently satisfied with the old methods, you had better go pretty slow in suggesting improvements or changes. For one thing, you may find local conditions which necessitate the present order, or for certain reasons you can't utilize the best scientific teachings. Better to accept things as they are until by quiet trial on a small scale, or from exhaustive investigation, you feel that you have a better way. As a general rule, with most men, no decided changes should be recommended under a year's residence on the work. There are of course some exceptions. Another thing, be very careful of the making suggestions which do not actually improve. Your knowledge may show, for instance that the buildings are poorly planned, but unless you are pretty sure of

your ground, it wouldn't be wise to recommend their replacement in their entirety. *But*, when new buildings are to be put up, you can then figure on a correct ground plan. You may find, however, opportunities for shortening steps and lightening work entailing little change or expense. Such demonstrations will go far to prove the soundness of your ideas.

References and Testimonials.—References and testimonials do not occupy very high places in the business world, although they are used to a certain extent. When there are no mutual acquaintances between employer and an applicant for a position, references are used to create a common basis of understanding.

The references most valuable to a business man are those by former employers, by mutual friends or acquaintances, or by men having intimate knowledge of the applicant's work. Testimonials as to character are worth something, but as these cover but one of the common requirements, too much stress must not be placed upon them. Two or three reliable men given as references are worth a dozen nobodies. Men given as references should be as prominent in business as possible. Teachers, ministers, friendly neighbors, and the like are not considered first-class references, except within certain limits.

The reason why references are not held in very high regard is not far to seek. Most men believe in the inherent right of every man to make a living, and the reference may not feel like assuming any responsibility for keeping a man out of a job. Then other elements enter in giving a reference, such as sympathy for the man or his family, or a desire to get rid of a man easily, a belief that under different circumstances he might make a better showing.

The open letter given a man is the poorest kind of reference. Far better is the permission given you to use a man as reference. The correspondence is then not only private in nature so that each man feels free to express a frank opinion, but the investigator can ask specific questions bearing directly upon the position in mind, and thus eliminate much of the general information conveyed in an open letter.

Selling Ability Paramount in Business.—This covers in a fairly thorough manner a few suggestions regarding the securing of a position. There are, however, one or two additional thoughts.

The first concerns the phases of his ability which a man should develop. It would seem that of all the different aspects concerned with agricultural confidence matters, the ability to sell stands paramount. This can not stand alone of course, for without production, for instance, there would be nothing to sell. And further in agricultural work the methods of selling are fairly well defined. Most farmers are poor salesmen. And, as the proper disposal of a crop will go far to determine success or failure, the selling end deserves much thought. In this connection, it is not so much a study of methods of selling as of the developing of the human

aspects so that you will be able to meet men in a manner successfully. A course in salesmanship is one of the biggest assets a young man can have, for the development of qualifications which fit a man to sell goods will fit him personally to "make good" in any line. It need merely be mentioned that a good salesman must be tactful, affable, keen, mentally alert, able to speak concisely and to the point; he must possess a full knowledge of the thing he is selling and the conditions which surround its acceptance and use. There is no room for jealousy, sensitiveness, half-information, or laggardness in good salesmanship.

The next point is in connection with specializing. One should not specialize too closely. It is well always to have a second "shot in the barrel." For, although this is called the "age of specialization," the business world is rapidly swinging around to the broadly trained man.

Further, employers are not entirely satisfied with men trained on the outside as specialists. They prefer to develop their own men. This may be good for the employer, but it is doubtful if it is good for the man. Trained to do but one thing, he is then at the mercy of the firms who desire men of his stamp, and as he ages or marries and finds an increasing family making demands upon his income, he tends toward a dread of losing his job. Employers may not take advantage, but such an employee lives under a more or less constant fear that they may. And, since many business corporations are run for profit and not for humanitarian ends, when a better man can be found, or a man capable of doing the same work for less money, family circumstances or personal needs are not apt to carry much weight. It's a pitiful picture, and, unfortunately, only too common a one.

A last thought is that if one can make money for others, he should be able to make money for himself. Once one starts in on his own hook, he'll have the greater reward of personal independence. It can not be gainsaid, however, that this won't do for all men. With ability, but without capital, they find greater pleasure in working for some one other than themselves. But good positions are scarce and a man grows grey early in the service. As a general thing, a young man should start out for himself. Either choice is a hard road, but the latter leads to surest independence.

Estate Administration

Thus far, the management of estates is but a small factor in American agriculture. Unless involved in litigation or retained for sentimental reasons, American lands which can not be operated personally by some member of the family, by tenanting or by a manager chosen by mutual consent of the interested parties, are usually sold and pass on to other and active farmers.

There is a small field for estate managers desiring to handle the execu-

tive work of holdings reserved for hunting purposes, for country residences, for out-of-town houses, for the consummation of some owner's life-long ambition, and sometimes, unfortunately, merely for the gratification of some one's passing inconsequential whim. Demands upon managers vary with different owners. They range from the maintenance of game parks or hunting lodges, the preservation of a bit of wild wood or a substantial forest, the breeding and rearing of blooded stock, the desire to obtain fresh eggs, fruits, milk, vegetables, berries, and meat sufficient for the immediate family and friends.

To make an estate pay is commonly a secondary consideration. Attainment of the specific aim of the owner usually does not carry with it a paramount wish to make it self supporting. Funds come from sources other than the sale of farm products.

To qualify successfully as an estate manager necessitates two things: (a) knowledge and ability to bring about the specific object for which a manager is hired; (b) personal capacity to please the employer and his guests. But while the list of requirements is short, the demands upon the individual are by no means slight. Some managers are expected to join in entertaining guests; a spirit of servility is expected of others. Some places offer a man-sized job; others are little better than a lackey position.

Usually the right man can command a salary as estate manager somewhat above that of the ordinary farm manager, but, to offset it, the future in the business is usually restricted and somewhat narrowing.

Young men considering employment of this nature may well spend a little time in studying the entire situation and then go slow in arriving at a final decision. A brief probationary trial will often prove a very desirable starting point.

Reviewing Going Concerns

There is a growing demand for specialists able to inspect and review going concerns. Increasing acquisition of farm lands by non-resident owners for investment or for future homes, and greater control of estates by non-agricultural attorneys and real estate men, are creating a need for the kind of service a consulting farm manager can give. Work of this sort is sometimes handled as a side issue by progressive farm managers, and by members of many agricultural college staffs—as, for instance, the Extension Service men.

To serve intelligently in a consultative capacity necessitates first of all a thorough grounding in general and local farming methods, practices, and theories—business, agronomic, zootechnic,—obtained from practical experience and class room training. To this must be added the ability to meet men—employer and employee, to observe accurately

existing conditions, and to make the necessary deductions and recommendations therefrom.

Not all men are equipped to do this kind of work. And a few poor guesses or unworkable recommendations quickly destroy the chances of entering what otherwise could be a very profitable and legitimate field for specialization.

Of all farm management work, investigating and reviewing operating concerns offers, to my mind, the highest possible goal. It calls (1) for the acquiring and exercising of a wide knowledge, (2) for incisive and clear powers of observation and deduction, (3) for likable personal qualities, and (4) for a good business sense.

Properly qualified consulting farm managers are of real value in advising and directing the operation of estates, in law suits, in developing new agricultural projects, in reorganizing old businesses, in valuing farm properties, in installing proper bookkeeping systems, and in other ways for which their training especially fits and commends them.

This profession is a specially attractive field because of the variety of work it offers.

Consulting farm managers usually work on a per diem fee or else under a yearly retainer. The rate naturally varies with the reputation of the farm manager, the distance to the job, and its kind and size.

Plans for 10,000 acres to be subdivided and developed properly call for a high degree of knowledge, the use of much time, and the employment of additional assistance. A lawsuit often means submission to "bully-ragging" of lawyers and temper-provoking cross-examinations. As nearly as a general scale can be given, possibly the majority of consulting farm managers figure on \$25 per day and expenses, a few ask and obtain \$50, and a very few \$100 or more. Rates are occasionally limited to \$20 per day or even less.

As such compensations may appear high, it is well to bear in mind that the men fitted to be good consulting farm managers are few, and as in the cases of the doctor or lawyer, a long period of training and probation is necessary before ability is attained; while occasional dull periods are liable to reduce very materially the annual income.

There is really a lot of excitement resulting from going over the work of an incompetent foreman and straightening him out in relation to the peculations of his subordinates, in resurrecting a dying business, in turning a non-profitable business into a profitable one, in hunting leaks, in determining sources of profit, in reorganizing personnels, and in the thousand and one other things the consulting farm manager may find confronting him.

In China, it is said, there are instances where doctors are paid while the patient is well. Payment ceases with appearance of disease. The reverse is true in this country. It is doubtful whether the Chinese

system would work better in our country than the one we use, but it is probable that large savings would follow the employment of a consulting farm manager before starting a new agricultural project, rather than to wait until troubles, which usually could have been foreseen and provided against, necessitate the calling in of a specialist. One may wonder if such a condition will ever come?

Salaries

The matter of salaries is of much interest to the prospective farm manager. There is no rule for determining a farm manager's salary. The need of the employing concern, their desire to secure some specific man, the size of the business, the responsibilities, the number of stockholders, the degree of control by a board of directors, the penuriousness of the head man, the nerve of the prospective farm manager himself and the choice of men, all influence different businesses in different ways. Only a rough rule can be given. The firm usually furnishes a house or ample living quarters, any farm products raised such as vegetables, eggs, fowls, milk, butter and fruit, use of automobile or other vehicle, sometimes a cook, maid, or other servants, but at any rate good living conditions. Cash salaries for managers (not foremen) range from \$100 to \$125 per month for the smaller or less responsible positions to \$10,000 to \$15,000 or more per year for positions requiring broad-gauge, high-caliber men. Between these extremes are all conceivable variations. It therefore behooves a man seeking a farm management position to keep in touch with every source of information that may lead to an opening. This is particularly true in connection with positions on estates run for the pleasure of the owner rather than for financial profit, with large subdivision outfits, and with new land and development investments.

Profit Sharing for Managers.—There is increasing recognition of the fact that best returns follow when the man in charge is given an interest in the profits. Various schemes for sharing in the earnings are being tried out. The attempts are still in the infancy stage, and no well-defined plan has been, or perhaps ever can be, worked out. Some difficulty attends the working out of a satisfactory profit sharing scheme. But the idea is sound, and wherever it is being carried out in practice, under some plan of determining the manager's share in the responsibility for profit or loss, the results are gratifying.

Bonuses.—Sometimes a flat sum is given as a bonus at the end of a successful season or at Christmas time. A new automobile, improvement of the manager's living quarters, the addition of a piano or of furniture for the house, a trip for pleasure and rest, etc., are other forms of bonus. These all savor somewhat of charity and do not prove as satisfactory as

a predetermined schedule under the operation of which the manager shall definitely receive a given proportion of the earnings. Just what shall constitute profit is sometimes difficult to determine. Always, though, when a bonus plan is to be tried out, the preliminary discussion must be thorough and the arrangement fully understood by all parties. Otherwise, the question bobs up at the time of dividing earnings and becomes entangled in consideration of such things as interest on the investment, depreciation, taxes, interest on borrowed money, and losses due to floods, fires, hail and frost.

Utilization of Salary.—In connection with salaries, a study by Manning¹⁵⁴ into the living cost of city families averaging two adults and two children is of interest. He found the division of income, based on the amount, should be as scheduled:

TABLE 247.—PRORATION OF FAMILY INCOMES

Yearly Income	Food		Shelter		Clothes		Operating expenses		Advance-ment		Insurance and savings	
	A- mount	Per- cent	A- mount	Per- cent	A- mount	Per- cent	A- mount	Per- cent	A- mount	Per- cent	A- mount	Per- cent
\$1,200	\$330	27.5	\$300	25	\$150	12.5	\$150	12.5	\$100	8.3	\$170	14.2
2,500	500	20.0	400	16	250	10.0	450	18.0	450	18.0	450	18.0
4,000	675	16.9	600	15	500	12.5	625	15.6	600	15.0	1,000	25.0

The headings cover:

Food: Groceries, meat and fish, man's lunches.

Operating Expenses: Servant's wages, telephone, laundry, fuel and ice, light, household equipment, fire insurance, incidentals, carfare.

Rent: Rent, taxes, interest on mortgages, repairs and upkeep.

Clothes: Anything to wear.

Advancement: Charity, tuition, books and magazines, vacations, music, travel, social clubs, amusements, lectures, doctor bills, medicine, gifts, automobile, loans.

Insurance and savings: Investments, savings, life insurance, accident insurance, health insurance, mortgage payments.

For families with more than two children, the item "Insurance and Savings" will be diminished somewhat; the items "Food," "Clothes," and "Operating Expenses" being correspondingly increased. Where there are no children or fewer than two, the item "Insurance and Savings" should be increased proportionally. Children up to 12 years are usually considered about six-tenths of one adult; those over 18 an adult.

IN CONCLUSION

Recognition that farming is a business is not new in many sections where farm management principles are not only well understood but have long been actively employed by farmers and producers in carrying forward their agriculture. The most successful farmers—be they engaged in horticulture, in stock raising, in crop production—are primarily business men. The more prosperous producers early learned the need of business methods if they are successfully to enter distant markets, obtain necessary labor, insure satisfactory transportation, protect themselves from foreign competition, and successfully carry crop forward from time of planting to harvest—efforts which often have to be expended over a long period of years, particularly in the fruit industries.

Men who handle their farming operations primarily as a business are obliged to keep constantly abreast of the times; a few—the most successful—must keep several paces ahead, since, as in any business, the problems of tomorrow usually tend to be somewhat different from the problems of today. Farm managers, therefore, still have big tasks ahead of them which must be worked out either by individual effort or in conjunction with state and federal departments. They are facing such momentous issues as the necessity for the maintenance, and often for the increase, of the crop producing power of the land, whether this be by addition of plant foods, incorporation of organic matter, provision for irrigation or drainage, leveling, removal of alkali, neutralizing acid condition, or by the recognition and combating of pests within and without the state boundaries—insect, fungus, rodent, and weed.

They must help in working out such questions as:

1. A better knowledge of costs of production to justify price fixing, if prices can successfully be fixed except through the traditional give and take of the market, and to educate consumer and producer. This means, as a corollary, more extensive use of farm bookkeeping.
2. A determination of how far tenanting of farm lands should be promoted and whether in such tenancy a place can be found for the growing generation to obtain a foothold in farming and a start toward ownership and independence.
3. A stabilizing of the farm labor supply. This is important to indicate what direction future agricultural investments should take.
4. Sound means for financing young men who desire, and are qualified, to enter into farm enterprises.
5. Reduction of speculation in farm lands and a means for fairly valuing farm enterprises.
6. Absorption, amalgamation, or exclusion of foreigners so that these United States may be a nation of real homes, productive of sturdy, patriotic citizens.
7. Improved methods of transportation and marketing.

As time goes on, there will be new problems to solve, new conditions to sustain or reject, new methods to incorporate, because American agri-

culture is in a mobile state and today's matters which are under discussion or under way may be materially different from those of tomorrow.

It is the duty of the true farm manager to keep abreast of the topics of the day and to lend his influence and effort toward bringing about the best possible agriculture in its relation to Nation, State, community, family, and individual. Verily, the higher one goes up the agricultural ladder, the more responsibility he will meet and should accept.

CHAPTER XXVII

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- Professor Frank App, New Jersey Experiment Station.
- Professor O. R. Johnson, University of Missouri.
- Professor Andrew Boss, University of Minnesota.
- Professor G. E. Thompson, University of Arizona.
- Professor H. E. Babcock, Cornell University.
- Doctor C. L. Goodrich, Federal Office of Farm Management and Farm Economics.

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THE FARM MANAGER

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