# Management Factors That Influence Farm Profits in Southwest Illinois

**A study based on records from more than a hundred farms in the wheat and dairy area neighboring St. Louis.**

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# Management Factors That Influence Farm Profits in Southwest Illinois

By R. H. Wilcox, C. W. Crickman, and R. G. Trummel[1]

## INTRODUCTION

SYSTEMS of farming found in different parts of Illinois differ rather markedly. The soils, climate, markets, and other physical and economic factors influence the kinds of crops and livestock products that can be grown in each of these areas. There are areas in which beef-cattle and hog feeding predominate, others in which grain crops form the principal source of receipts, and others characterized by the predominance of dairy production. Seven counties in southwest Illinois constitute one of these farming-type areas. It is known as the wheat and dairy area, or Illinois farming-type Area 7 (Fig. 1).

The acreage of a typical farm of this area is somewhat less than the state average, while the productive limitations of the soil make the size of the farm business considerably smaller than is found on most farms of the state. The farms are operated without requiring much hired labor, dependence being placed largely on family labor.

### Object and Nature of Study

On these small, family-sized farms located in the same area, operated under the same weather, soil, and price conditions, earnings vary widely (Fig. 2). This bulletin aims to analyze and measure the important management factors that cause these differences in earnings, and to indicate what many farmers of the area may do to increase their earnings.

In this connection certain definite principles of good farm management that have already been recognized and stated are repeated here: namely,

1. Good yields tend to reduce the unit cost of producing farm crops.
2. A large percentage of land in higher profit crops means larger profits.

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3. Livestock production as a means of marketing crops makes for larger farm incomes.

4. Efficient feeding and handling of livestock materially reduces the cost of production.

5. A large volume of business is necessary for most profitable farming.

6. A well-organized system of crop and livestock production helps use available man labor advantageously.

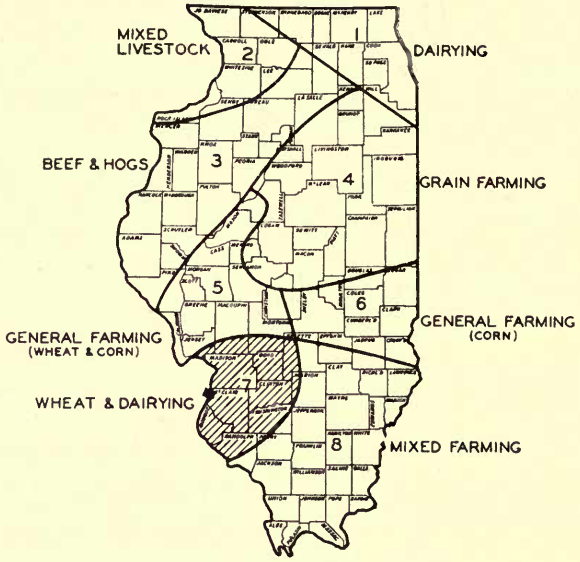


FIG. 1.—LOCATION OF WINTER WHEAT AND DAIRY SECTION OF ILLINOIS, KNOWN AS AREA 7

Area 7 includes the greater part of seven counties: Madison, Bond, Clinton, St. Clair, Washington, Monroe, and Randolph.

7. Costs are reduced when the supply of horse and mechanical power fits the farm needs and is economically handled.

8. Buildings, machinery, and other equipment expense must be kept under control if low production costs are to be obtained.

9. A good farm layout and a well-developed farmstead make for economical operation.

10. Diversity of crop production helps to insure long-time profits.

11. Production planned in accordance with market demands makes for a larger margin of profit.

The relative importance of these various principles to Illinois agriculture varies, of course, according to the type of farming followed, but each, it will readily be seen, has a very definite influence over earn-

ings. The data in this bulletin measure the influence that certain of these principles[1] had on a group of farms in southwest Illinois.

## Description of Area

**The Soils.**[2] The soils in Area 7 vary a good deal both in structure and in productive capacity. (Fig. 3). Dark-colored bottom lands skirt the area on the west. These bottom-land soils and the soils with a noncalcareous subsoil having good surface drainage and fair underdrainage form a large portion of this area. These groups have possibilities for greatly increased yields. Probably no other soils of the district can be built up so economically as these if fair underdrainage is provided. Legumes can readily be grown following the application of limestone. Altho the yellow soils are somewhat more acid and lower in available plant food, yet when they are limed and sweet clover is

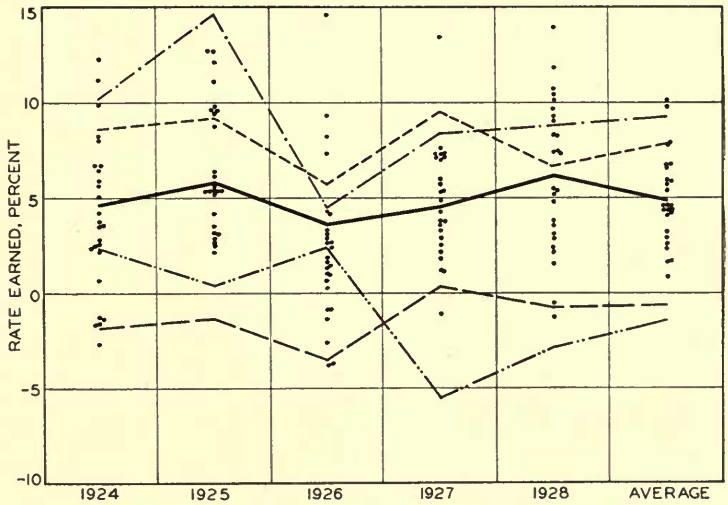


FIG. 2.—EARNINGS OVER FIVE SUCCESSIVE YEARS ON THE SAME 30 CLINTON COUNTY FARMS

Each dot represents a farm and is so placed as to show the rate of interest earned each year on the farm capital. The heavy unbroken line near the middle connects the average rate earned by all farms each year; the lighter lines connect certain individual farms. Some farms have a tendency to keep above the average, other farms continue below it.

[1]For a more complete statement and discussion of these principles, see Bulletin 329 of this Station, "Organizing the Corn-Belt Farm for Profitable Production."

[2]The statements made here are based largely on information given in Circular 356 of this Station, pages 27-41.

turned under, they are adapted to general cropping and may be expected to produce fair yields.

The soils having impervious subsoils that prevent good drainage present a far more difficult problem of improvement. It is not uncom-

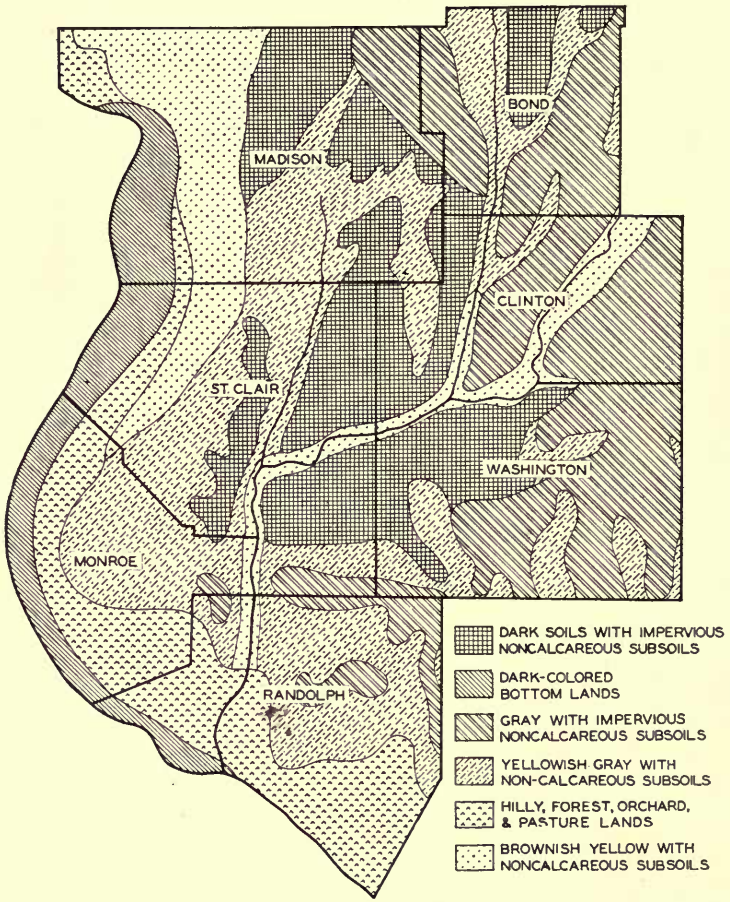


FIG. 3.—SOIL TYPES IN FARMING TYPE AREA 7

mon to find slick spots scattered thruout soils of this type. Tile drainage is effective in only very limited sections where the tight subsoil is covered with enough surface soil to carry tile well below ground. Alfalfa can be successfully grown on these soils where they have been treated with limestone or where sweet clover has been grown. Because

of the relatively thin surface soil, grain crops spring-sown on these areas are very sensitive to weather conditions during the hot summer months. Sweet clover, however, sends its roots deep into the subsoil and helps loosen it.

**Products.** The two principal sources of farm income in this area are winter wheat and dairy products. In recent years winter wheat

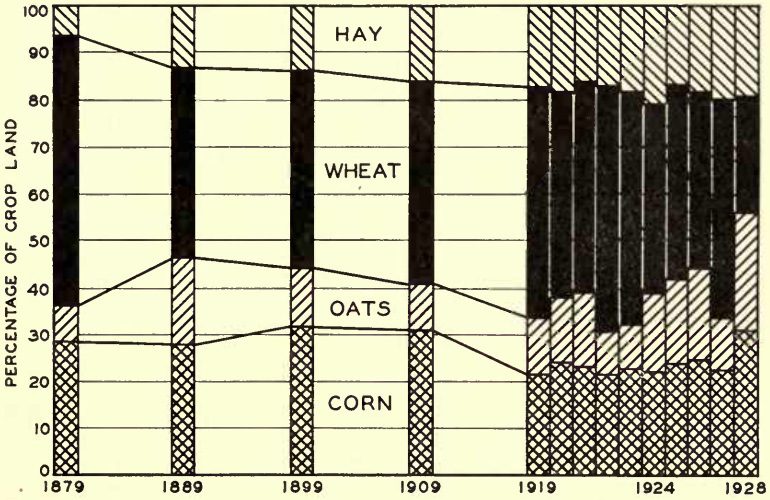


FIG. 4.—CHANGES IN CHOICE OF CROPS IN AREA 7

The increase in use of limestone and legumes is beginning to show in more crop land devoted to hay crops. Since 1918 wheat production has gradually declined in importance. The sharp decline in 1928 was due to the fact that on many farms wheat did not live thru the winter. (Graph based on data from Illinois Crop and Livestock Statistics).

has occupied approximately 40 percent of the crop land (Fig. 4). Soil, climate, and rainfall make this section of the state better adapted to winter wheat than to other grain crops. The wide belts of timber soil found on the uplands along the Kaskaskia river and its tributaries are for the most part well adapted to winter wheat.

Corn, the crop of next importance, occupies only 20 percent of the crop land altho there is a good demand in the area for corn as feed for livestock, especially for dairy cows.

The upland back of the Mississippi bluffs is mostly level to undulating and is suitable for general cropping. Considerable erosion, however, has been caused by the small tributary streams and as a result the upland adjacent to streams is usually cut into hills and valleys suited only to permanent bluegrass pasture.

Both the bottom and upland soils are strongly acid until limestone is applied. With the growing practice of liming the soil, and especially with the introduction of sweet clover and alfalfa, the acreage of hay has increased in the past ten years. The area occupied by alfalfa in these seven counties in 1928 was 16,800 acres; sweet clover occupied 79,500 acres. Sweet clover has been gaining in acreage rapidly in each of the seven counties except in Madison, which has been growing more alfalfa than any other county in the area.

Dairying has displaced hog and sheep production to quite an extent as the demand for fluid milk in St. Louis has increased. Approximately 80 percent of the whole milk used in St. Louis is produced in Illinois and most of it within this area. The total milk production in the area has just about doubled during the past twenty-five years.

Dairying is carried on most extensively in Bond, Madison, and Clinton counties. In Bond county in 1924 15,000 gallons of milk were produced per square mile of farm area (Table 1). Clinton and Mad-

TABLE 1.—NUMBERS OF COWS MILKED AND THE PRODUCTION OF MILK IN AREA 7, 1924
(According to the 1925 U. S. Census)

| County | Average size of farm | Cows milked per farm | Cows milked per sq. mile of area in farms | Average yearly production per cow | Production per sq. mile of area in farms | Milk sold per sq. mile of area in farms |
|---|---|---|---|---|---|---|
| | *acres* | | | *gals.* | *gals.* | *gals.* |
| Bond | 126 | 5.2 | 27 | 565 | 15 000 | 12 090 |
| Clinton | 147 | 6.2 | 27 | 509 | 13 800 | 11 950 |
| Madison | 113 | 5.0 | 28 | 502 | 14 300 | 10 900 |
| Washington | 138 | 4.6 | 21 | 400 | 8 690 | 6 340 |
| St. Clair | 112 | 3.9 | 18 | 423 | 7 560 | 2 588 |
| Randolph | 140 | 3.5 | 16 | 392 | 7 300 | 1 140 |
| Monroe | 147 | 2.9 | 13 | 397 | 5 000 | 1 870 |

ison counties averaged only slightly less. Fewer cows are kept farther south, where production per square mile of farm land averages only about half that in the northern portion of this area. There are certain parts of Monroe and Randolph counties, however, in which dairying is quite concentrated. Very little livestock is kept on the Mississippi bottoms and on the bluffs belt. The bottoms are often too damp to carry livestock satisfactorily and the bluffs belt in these two counties is too rough to permit growing the necessary feed.

Much of the milk produced in St. Clair, Randolph, and Monroe counties is sold either as butter or butterfat rather than as fluid milk. Considerable butter is made in St. Clair and Randolph counties.

The poultry enterprise is a major source of farm income and is being expanded. Clinton county farmers, according to the 1930 Census,

carried an average flock of 193 chickens, the highest county average in the state. The income per farm from poultry and eggs in Area 7 is likewise higher than in other farming-type areas of the state. The importance of poultry production may be attributed to the comparative mildness of the climate, to the fact that in this enterprise the amount of feed required is small in proportion to the amount of farm labor

FIG. 5.—INCREASED NITROGEN CONTENT IS AN ALMOST UNIVERSAL NEED OF THE SOILS OF AREA 7

This man sowed sweet clover on his farm principally to increase the available nitrogen content. The sweet clover was pastured, but not with enough cows to keep the growth down.

that may be utilized, and to the fact that this area has a good market, St. Louis being near by.

Most of the farms raise very little livestock in addition to milk cows and poultry. Seventy-seven percent of the cattle kept (or 10 out of 13 head) are dairy cows. Most farms that raise hogs have only one or two sows. The pigs are fattened and used mostly for meat on the farm or for sale to neighbors for butchering.

**Size of Farms.** The average-sized farm in this area, according to the 1930 Census, was 130 acres. Farms in Bond, Madison, and St. Clair counties averaged somewhat smaller in number of acres operated than farms in the other four counties. About 70 percent of the farm area was cropped in each of the seven counties. Bond was lowest, with 62 percent, and Clinton highest, with 75 percent.

The average value of land and buildings, not including St. Clair and Madison counties, ranged from $43 an acre in Bond county to $59 an acre in Monroe county, according to the 1930 Census. Values in St. Clair and Madison counties averaged higher because of the inclusion of many farms near East St. Louis. Total farm investments

thruout the seven counties averaged around $17,500, according to the 1925 Census.

Farms in this section usually require the labor equivalent of two men. On many farms the family supplies all the labor needed in addition to that of the operator. In Clinton county two-thirds of the help, besides that of the operator, is available in the family. Thruout the area more than half the labor used in addition to that of the operator is family labor.

### Records on Which Study Is Based

Since 1918 a number of farmers in this Area 7 have kept records of their businesses and have developed plans for their farm operations thru the use of the "Illinois Farm Account Book." This book, prepared by the Department of Farm Organization and Management of the University of Illinois, furnishes a rather simple system of recording farm inventories, all receipts and expenditures, the production of crops and livestock, and feeding records on livestock. These account books, at the end of the fiscal year, are brought to the University and summarized and analyzed. Each book is then returned to its owner, accompanied by reports, based on the entire group of farms, that supply certain standards by which each operator can evaluate his own accomplishments. Approximately 700 farm records, each covering a year's operations, have been kept in Area 7 since 1918, this method of financial recording and analysis having expanded in this area from 10 farms in 1918 to 135 in 1928.

It is to be noted that the men keeping these accounts earn incomes larger than most of the farmers in their communities. In 1926 a financial survey was made covering nearly every farm in one township in Bond county on the northern Clinton county line. The average capital investment per farm was $11,195, and the average rate which this capital earned was 1.86 percent. Fifty-six Clinton county farms, using the Illinois Farm Account Book, earned in the same year 3.49 percent on an average capital investment of $18,604. Thus where accounts were kept, the rate earned was 1.5 to 2 percent of the investment higher than where they were not kept. This difference may be credited partly to the fact that men who will keep accounts are men who do many other things the ordinary farmer does not do, but there is no doubt that it is due very largely to the fact that such records as these show a farmer where his opportunities for improvement lie.

Another type of study called a "detailed cost-accounting study" was started in Clinton county in 1926 and carried on for three years. From 18 to 20 farms not only kept a complete financial record but

with the assistance of a route man, sent the University a daily record of every quarter-hour of man and horse labor performed on the farm, the field it was performed in, and the make and size of all machinery and equipment used. Labor on livestock, the feed used, and other livestock expenses were recorded by these farmers daily, collected by the route man, classified, and summarized by the University. From these and other records the cost of producing crops and livestock products was determined. These figures made it possible also to study the use that different crop and livestock systems make of man labor and horse labor; to analyze seasonal demands for labor, power, and capital; to determine rather accurately the cost of the many overhead expenses; and to ascertain the crop or livestock enterprise for which such expenses were incurred.

## WIDE VARIATIONS IN EARNINGS AMONG FARMS IN AREA

The 114 farms in Area 7 on which farm account books were kept and which are included in this study earned an average of 3.3, 4.3, 2.1, 3.9, and 3.5 percent respectively on their capital investment each year from 1924 thru 1928. The farm capital included real estate, livestock, machinery, and all feed and supplies on hand at the beginning of the calendar year and amounted to $115 an acre.

In 1927, a normal crop year, these 114 account-keeping farmers earned 3.9 percent on an average investment of $17,678. Stated in another way, they had $426 for their own labor and management after charging 5 percent on their capital. The one-fifth with the highest incomes earned an average of 9.4 percent on an average farm investment of $19,430; or they had left an average of $1,463 for their labor and management after paying all expenses and allowing 5 percent interest for the capital in their farms. The one-fifth with the lowest earnings fell 2.6 percent short of returning anything on their capital. This means that if it had been necessary for them to pay 5 percent interest on their capital, they would have fallen $538 short of paying interest and other expenses and would have had nothing left for their labor and management that year (Table 2).

As the farms in the most profitable and least profitable groups were not of the same size, their gross receipts are compared on an acre basis. The total farm receipts on the 23 most profitable farms were $24.39 an acre; on the 23 least profitable farms, $8.24. Altho the gross receipts on the most profitable farms were thus $16.15 an acre above those on the least profitable, the farm expenses of the most profitable

group were only $2.05 greater, leaving net receipts of $11.87 an acre as against a loss of $2.23 an acre on the least profitable farms.

A difference of 12.1 percent earned on farm capital, or of $2,001 in "labor and management wage," or of $2,206 in "net income from investment and management" between the farms with the highest earnings and those with lowest would indicate that there are wide variations in the organization and operation of these farms. It would seem that if there are definite principles of good farm management, the farmers in the highest-income group would be found adhering more closely to them than those in the lowest-income group. The following analysis bears out the truth of this assumption.

TABLE 2.—EARNINGS ON 114 FARMS IN AREA 7, SOUTHWEST ILLINOIS, 1927

| | Average of 114 farms | 23 *most* profitable farms | 23 *least* profitable farms |
|---|---|---|---|
| Rate earned[1] | 3.9 | 9.4 | − 2.6 |
| Labor and management wage[2] | $426 | $1 463 | $ −538 |
| Average size of farm, acres | 165.4 | 154.5 | 166.7 |
| Total capital invested per farm | $17 678 | $19 430 | $14 474 |
| Gross farm receipts | 2 490 | 3 768 | 1 374 |
| Gross receipts per acre | 15.05 | 24.39 | 8.24 |
| Total expenses per acre | 10.89 | 12.52 | 10.47 |
| Net receipts per acre | 4.16 | 11.87 | − 2.23 |
| Net income from investment and management[3] | 686.41 | 1 833.91 | −371.74 |

[1]The *rate earned* upon capital invested in the farm business is determined by adding increases in farm inventory to the cash receipts; then subtracting from this figure the total of inventory decreases, cash expenditures, estimated value of the operator's labor and family labor, and dividing the balance by the total capital invested in the farm business.

[2]*Labor and management wage* is determined by subtracting inventory decreases and cash expenses from inventory increases and cash receipts, and deducting from this balance the value of unpaid family labor and 5 percent on the capital invested in the farm business.

[3]*Net income from investment and management* is determined by subtracting inventory decreases and cash expenses from inventory increases and cash receipts, and deducting from this balance an allowance for operator's and family labor.

## HOW GOOD MANAGEMENT CONTRIBUTES TO BETTER EARNINGS

### Large Volume of Business Reduces Proportion of Overhead

One of the strong points of the most profitable farms was the large size of the gross receipts. On an average area of 154.5 acres the combined sales and increases in inventories in 1927 on the 23 farms in this group amounted to $3,768; while the sales and increases in inventories on the 23 least profitable farms, with 12.2 acres more per farm, averaged only a little more than one-third as much, $1,374 (Table 2).

Every farm has certain overhead expenses that remain practically the same regardless of the number of acres or the total amount of sales. As size of business increases, the margin of profit therefore increases.

Every farm, for instance, has to carry the expense of idle land in the farmstead, of upkeep and depreciation of buildings and of machinery whether the machinery is used to capacity or used only on short jobs because the farm is small. These burdens fall heavily on small farms and on large farms doing a small volume of business.

The influence of volume of business is well illustrated by comparing the 1927 accounts of three of the 114 farms (Table 3). Farms 1 and 2 are alike in most respects except in quantity of production. Both

TABLE 3.—COMPARISON OF THREE FARMS DIFFERING IN VOLUME OF BUSINESS, SOUTHWEST ILLINOIS, 1927

| Farm No. | 1 | 2 | 3 |
|---|---|---|---|
| Size of farm, acres | 154 | 90 | 102 |
| Investment per acre | $152 | $140 | $165 |
| Gross receipts per farm | $3 308 | $1 701 | $2 872 |
| Crop acres | 137 | 83 | 78 |
| Number of cows | 9.5 | 7.3 | 9.5 |
| Pounds of pork produced | 4 695 | 1 748 | 2 708 |
| Number of hens | 450 | 134 | 320 |
| Hours of labor performed yearly | 4 231 | 3 555 | 5 045 |
| Crop yields | | | |
| Corn, bushels | 25 | 21 | 48 |
| Wheat, bushels | 15 | 14 | 21 |
| Oats, bushels | 35 | 9 | 39 |
| Pounds of milk per cow | 6 307 | 5 731 | 5 894 |
| Returns per $100 feed fed, all livestock | $162 | $181 | $152 |
| Livestock income per acre | $ 18 | $ 17 | $ 21 |
| Gross receipts per acre | $ 22 | $ 19 | $ 28 |
| Total expense per acre | $ 12 | $ 14 | $ 18 |
| Net receipts per acre | $ 10 | $ 5 | $ 10 |
| Rate earned | 3.9% | 3.8% | 6.9% |
| Labor and management wage | $1 268 | $ 425 | $1 092 |

farms earned practically the same rate of interest on their capital,[1] which fact would indicate that they were about equal in operating efficiency. Owing to the small volume of business, however, on the 90-acre farm, the labor and management wage was only one-third as large as on the 154-acre farm. That a satisfactory volume of business can be obtained without a large acreage is illustrated by a comparison of Farm 3, a 102-acre farm, with Farm 1, a 154-acre farm. Largely as a result of better than average yields and the raising of livestock of high quality, the smaller farm had a volume of business and a labor and management wage about equal to the larger farm.

There is a limit, of course, to the extent to which receipts can be increased by increasing yields, but ordinarily the keeping of more livestock and the growing of feed crops rather than cash crops offers an

[1]For explanation of the method of determining rate earned on capital, see footnote to Table 2, page 420.

opportunity to build up the volume of business without increasing expenses beyond the point of profitable return. It is evident that Farm 3 in getting crop yields more than double those on Farm 2 was obtaining them profitably. Gross receipts were $9 an acre higher on Farm 3 than on Farm 2 (Table 3), and this larger income was obtained at a cost only $4 higher than on Farm 2. The result was that Farm 3 had net receipts of $10 an acre; Farm 2, only $5 an acre.

If the full benefits of a large business are to be secured, farm expenses must be kept down. That expenses can be kept down is further illustrated by the 1927 records of the most profitable farms. With only 11 percent more expense, these farms handled 174 percent more business than the least profitable farms. In the end, of course, it is this difference between returns from the added volume of business and the cost of getting the added business that is important.

Increasing the volume of business is a problem of special importance in southwest Illinois, where farms frequently contain less than 100 acres, and where the soil is not naturally highly productive. Under present systems of farming, operators of small farms are in many cases limited to a comparatively low income unless they rent or buy additional land. With better management, however, the land already in the farm should yield more income. How the operators of the most profitable farms increased the volume of their business and thereby increased their income is shown by an analysis of their farms. They obtained high crop yields; they planted a large percentage of the crop land in crops that could be fed on the farm; they carried more livestock; they kept livestock of high productivity; and those successful in handling livestock profitably increased their livestock enterprise even tho they had to purchase grain feeds in years of short crops. Some of them also rented or bought additional land.

### Good Yields Tend to Lower Crop Costs

Differences in crop yields were one of the important reasons for the wide variations in farm incomes from the most profitable and the least profitable farms. Wheat on the 23 most profitable farms, for example, yielded in 1927 6.8 bushels more an acre than on the 23 low-profit farms (Table 4). Corn yields on the most profitable farms were 19.3 bushels higher, oat yields 5 bushels higher, and hay yields .6 ton (1,200 pounds) higher than the same crops on the low-profit farms. If the low-profit farms had obtained the same acre-yields as the most profitable farms and had grown the same acreages of the same crops, the net income of the low-profit group would have averaged $943 more per farm than it did. (Fig. 17, page 452).

TABLE 4.—CROP YIELDS PER ACRE ON 114 FARMS IN SOUTHWEST ILLINOIS, 1927

| | Average of 114 farms | 23 *most* profitable farms | 23 *least* profitable farms |
|---|---|---|---|
| | *bu.* | *bu.* | *bu.* |
| Corn | 31.5 | 39.3 | 20.0 |
| Oats | 10.8 | 13.9 | 8.9 |
| Wheat | 11.9 | 15.9 | 9.1 |
| | *tons* | *tons* | *tons* |
| Hay | 1.3 | 1.7 | 1.1 |

The larger items of cost in growing ordinary farm crops are plowing, preparing the seed bed, seeding, and caring for the crop up to the time of harvest. These expenses are determined mainly by the number of acres of the crop grown, regardless of the size of the yield. It is not unusual to find farms in the same community with practically the same cost of growing an acre of wheat but with widely varying yields. Of course the cost per bushel or per ton will decline as the yield increases, at least up to a certain point; but the point at which increases fail to yield a profit is seldom reached on Illinois farms.

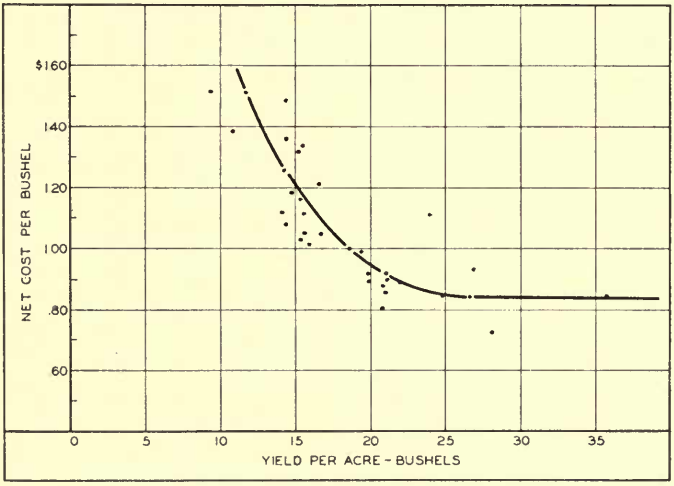


FIG. 6.—THE UNIT COST OF PRODUCTION TENDS TO DECLINE AS YIELD PER ACRE INCREASES

Each dot on this chart represents the cost of producing a bushel of wheat on a Clinton county farm. The curve shows the general tendency that costs took as yields varied. Note how sharply costs decline as the yield increases from 10 bushels to 25. After this point the curve begins to flatten out, indicating that there is little to be gained by further increases in yields.

The cost of producing wheat on 17 Clinton county farms during 1926 and 1927 varied from 72 cents on the farm with the lowest cost of production to $1.53 on the one with the highest cost. Since the average acre-costs for the whole group of farms were nearly the same for both years, this difference in bushel-costs cannot be attributed to a change in character of costs from one year to the other, but to the fact that as yield increased, the cost per bushel had a tendency to decline (Fig. 6).

On three Clinton county farms in 1927 the net cost of growing wheat to harvest time was $11.59, $11.92, and $11.83 an acre respectively (Table 5). There was thus less than 50 cents an acre difference

TABLE 5.—INFLUENCE OF YIELD UPON COST OF PRODUCING WHEAT ON THREE OF EIGHTEEN COST-ACCOUNTING FARMS IN CLINTON COUNTY, 1927

| Farm No. | 1 | 2 | 3 |
|---|---|---|---|
| Cost per acre | | | |
| Growing | $11.59 | $11.92 | $11.83 |
| Harvesting | 4.88 | 3.87 | 2.78 |
| Taxes on land | .70 | 1.22 | .64 |
| Interest on land at 5% | 3.66 | 3.65 | 4.00 |
| Total | $20.83 | $20.66 | $19.25 |
| Total income | $29.40 | $20.15 | $16.60 |
| Net profit | 8.57 | − .51 | −2.65 |
| Yield per acre, bushels | 20.7 | 15.1 | 11.8 |
| Cost per bushel[1] | $ .87 | $ 1.32 | $ 1.53 |

[1]After allowing some credit for straw and stubble pasture.

between the farms in this respect. Adding harvesting costs and a land charge to these growing costs makes totals that do not vary more than $1.58 an acre. Yields were 20.7, 15.1, and 11.8 bushels respectively, the farm with the slightly higher acre-cost having the best acre-yields and having a bushel-cost of only 87 cents as compared with $1.32 and $1.53 on the two other farms. The farm with the highest yield had a profit of $8.57 an acre from the crop, the second farm lost 51 cents an acre, and the third, which had the lowest yield, lost $2.65 an acre.

These farms illustrate also the opportunity to increase yields by improving the soil. Altho the type of soil on the three farms is very much the same, yet the fertility and physical condition of the land in the farm yielding 20.7 bushels of wheat an acre was superior to that of the other two farms, having been improved over a period of years by applications of limestone and a crop rotation that included sweet clover and other legumes. These soil-building measures increased the acre-costs in previous years as compared with 1927, but taking the soil-building period as a whole the costs of soil building were more than met by increases in crop yields.

In southwest Illinois the soils are the outstanding handicap to better farming. With dairying the most profitable enterprise, the most important problem in successful farming becomes that of increasing the capacity of the soil to grow dairy feeds. While the purchase of feed for livestock may prove profitable, yet when dependence is placed mainly upon purchased feed year after year, it is seldom possible to develop successful farming systems. A definite plan of improvement of the soil is therefore basic to good farming in this area.

Altho the soils are naturally well adapted to wheat, cropping for practically a century has reduced their fertility until many fields now return only low yields. Surface drainage and the use of lime and legumes are the most important needs of the upland soils. A number of progressive farmers, recognizing soil fertility as their major problem, have established definite programs of soil improvement based on lime and legumes. Five who began their improvement programs in 1920 had in 1927 pushed their corn yields 3.9 bushels above the yields of 50 other record-keeping farmers in the community, their oat yields 8.2 bushels above the others, and their wheat yields 3.9 bushels above

TABLE 6.—EFFECT OF LIMESTONE, LEGUMES, AND DEFINITE ROTATION OF CROPS ON YIELDS OF CORN, OATS, AND WHEAT ON CLINTON COUNTY FARMS, 1927

| Crop | Five farms covered with limestone, definite rotations, legumes | 18 cost-accounting farms, partly covered with limestone, some definite rotations | 50 record keepers, some using limestone and legumes | All farms in county |
|---|---|---|---|---|
| | *bu.* | *bu.* | *bu.* | *bu.* |
| Corn | 30.1 | 27.9 | 26.2 | 26 |
| Oats | 31.5 | 26.6 | 23.3 | 23 |
| Wheat | 16.2 | 13.4 | 12.3 | 11 |

(Table 6). These farmers find that the growing of legumes and the turning under of a crop of sweet clover once in each rotation not only increases the plant food available for higher yields, but makes the crops grow more vigorously and thus enables them to better withstand short periods of unfavorable weather and attacks of diseases and insects.

## Larger Proportion of Higher-Profit Crops Increases Income

The most profitable rotations are the ones that include the maximum-profit crop or crops from each of three crop groups—cultivated crops, small grain crops, and hay and pasture crops.

Field crops are classified into these three groups because they differ from each other in their feeding habits, some being deep-rooted, others

TABLE 7.—COST OF PRODUCING CROPS ON 17 TO 19 CLINTON COUNTY FARMS, 1926-1928

| | Corn | | | Wheat | | | Oats | | | Timothy 3 yrs. | Red clover 2 yrs.[1] | Alfalfa 3 yrs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1926 | 1927 | 1928 | 1926 | 1927 | 1928 | 1926 | 1927 | 1928 | | | |
| Growing costs per acre | | | | | | | | | | | | |
| Man labor | $3.28 | $3.28 | $2.50 | $1.28 | $1.33 | $1.34 | $1.31 | $1.41 | $1.06 | $1.87 | $2.18 | $3.02 |
| Horse labor | 3.98 | 3.60 | 2.86 | 2.48 | 1.88 | 1.83 | 2.18 | 2.24 | 1.52 | 1.20 | 1.38 | 1.92 |
| Tractor | .50 | .58 | .75 | .44 | .33 | .50 | .25 | .11 | .50 | .... | .03 | .... |
| Machinery | 1.03 | 1.25 | .87 | .63 | .41 | .41 | .44 | .43 | .41 | .76 | 2.60 | 1.33 |
| Seed and seeding | .15 | .40 | .28 | 2.20 | 1.85 | 1.81 | 1.31 | 1.52 | 1.51 | .68 | .85 | 1.82 |
| Manure | 2.09 | 2.89 | 2.90 | 1.90 | 2.06 | 1.83 | 1.82 | 1.95 | 1.78 | .73 | .95 | .94 |
| Limestone and phosphate | .24 | .81 | .58 | .78 | 1.14 | .92 | .74 | .56 | .70 | .20 | 1.03 | 1.05 |
| General farm expense | 1.64 | 2.31 | 1.83 | .93 | .99 | .73 | .85 | 1.07 | 1.07 | .80 | .94 | 1.38 |
| Miscellaneous | .45 | .13 | .51 | .... | .... | .... | .... | .... | .... | .11 | .46 | .... |
| Total growing costs | $13.36 | $15.25 | $13.08 | $10.64 | $9.99 | $9.37 | $8.90 | $9.29 | $8.55 | .... | .... | .... |
| Harvesting costs per acre | | | | | | | | | | | | |
| Man labor | $1.56 | $2.10 | $1.92 | $1.59 | $1.26 | $ .55 | $1.05 | $1.25 | $1.39 | .... | .... | .... |
| Horse labor | .95 | 1.33 | 1.47 | .94 | .71 | .35 | .76 | .73 | .74 | .... | .... | .... |
| Tractor | .... | .... | .... | .03 | .02 | .... | .... | .... | .15 | .... | .... | .... |
| Twine | .... | .... | .... | .30 | .29 | .08 | .19 | .27 | .28 | .... | .... | .... |
| Threshing, fuel | .... | .... | .... | 1.45 | 1.14 | .33 | .97 | .83 | 1.62 | .... | .... | .... |
| Machinery | .... | .... | .... | .25 | .25 | .18 | .27 | .30 | .34 | .... | .... | .... |
| Total harvesting costs | $2.51 | $3.43 | $3.39 | $4.56 | $3.67 | $1.49 | $3.24 | $3.38 | $4.52 | .... | .... | .... |
| Total growing and harvesting costs | $15.87 | $18.68 | $16.47 | $15.20 | $13.66 | $10.86 | $12.14 | $12.67 | $13.07 | $ 6.35 | $10.42 | $11.46 |
| Taxes | $ .75 | $ .65 | $ .77 | $ .72 | $ .70 | $ .71 | $ .83 | $ .73 | $ .78 | $ .70 | $ .72 | $ .76 |
| Interest on land | 3.27 | 3.85 | 3.73 | 4.13 | 3.96 | 4.18 | 4.02 | 3.96 | 3.90 | 3.49 | 4.16 | 4.04 |
| Total cost | $19.89 | $23.18 | $20.97 | $20.05 | $18.32 | $15.75 | $16.99 | $17.36 | $17.75 | $10.54 | $15.30 | $16.26 |
| Income per acre | | | | | | | | | | | | |
| Grain | $8.49 | $19.27 | $25.03 | $26.72 | $19.80 | $ 6.24 | $10.22 | $ 9.12 | $15.17 | $..... | $ 2.42 | $..... |
| Pasture or roughage | .91 | .74 | .35 | .81 | 1.57 | .92 | 1.91 | 1.41 | 1.39 | 20.06 | 20.16 | 34.74 |
| Total income | $ 9.40 | $20.01 | $25.38 | $27.53 | $21.37 | $ 7.16 | $12.13 | $10.53 | $16.56 | $20.06 | $22.58 | $34.74 |
| Net profit or loss per acre | $-10.49 | $−3.17 | $ 4.41 | $ 7.48 | $ 3.05 | $−8.59 | $−4.86 | $−6.83 | $−1.19 | $ 9.52 | $ 7.28 | $18.48 |
| Efficiency factors | | | | | | | | | | | | |
| Net cost per bushel | 1.09 | $ .74 | $ .57 | $ .97 | $ 1.07 | $ 3.21 | $ .69 | $ .88 | $ .41 | $ 9.23 | $12.63 | $ 8.36 |
| Farm price at harvest 1926-1928 | .49 | .64 | .70 | 1.34 | 1.27 | 1.35 | .47 | .50 | .38 | 17[2] | 16 | 18 |
| Yield in bushels or (tons) | 17.45 | 30.31 | 35.93 | 19.93 | 15.63 | 4.62 | 21.75 | 18.17 | 39.92 | (1.18) | (1.01) | (1.93) |
| Man labor per acre, hours | 19.53 | 24.08 | 22.21 | 12.00 | 13.29 | 8.84 | 9.41 | 11.95 | 11.38 | 8.47 | 8.49 | 13.32 |
| Horse labor per acre, hours | 39.51 | 44.73 | 37.96 | 25.93 | 23.06 | 22.93 | 22.47 | 26.06 | 20.04 | 6.34 | 11.14 | 17.03 |
| Tractor use per acre, hours | .47 | .64 | .79 | .33 | .40 | .52 | .21 | .09 | .77 | .... | ..... | ..... |
| Average acres per farm | 20.66 | 15.41 | 27.80 | 37.00 | 49.98 | 17.80 | 21.79 | 13.76 | 31.14 | 4.05 | 14.04 | 8.69 |

[1]Yield of red clover in 1926 was so far below normal that it was not averaged with the other two years. [2]As many still let the St. Louis price influence their judgment of the value of timothy, the price they place on the crop at haying time has had a tendency to show timothy as a more profitable crop than it really is.

shallow-rooted; they differ in the place they fill in the rotation, some requiring cultivation, which helps rid the land of weeds, and others acting as nurse crops; and they also differ in their capacity as soil builders, some being especially fitted for that purpose. Further, they contribute different kinds of feed for livestock. Because of these differences rotations are generally composed of one or more crops out of each group.

One crop within each of these groups is usually more profitable than the others (Table 7). It is often possible to pick the maximum-profit crop within a group on the basis of net money returns. Sometimes, however, part of the value of the crop is indirect and hard to measure; for instance some of it may come from feeding more livestock, or from supplying a better-balanced ration, or from the effect on future crops.

Altho the maximum-profit crop from one group may not bring as high a return as the maximum-profit crop in another group, at least one crop from each group is required in a well-balanced rotation. The number of acres sown to each crop, then, should be determined by a consideration of two factors—the relative profitableness of the crop and the way in which it fits into the farm organization.

**Cultivated Crops.** *Corn* is the maximum-profit cultivated crop in Illinois. Thirty-two percent of the crop area in the 23 most profitable farms was in this crop as contrasted with 20 percent on the 23 least profitable farms (Table 8).

While during the period of this study corn did not prove as profitable in Area 7 as some of the small grain or hay crops, still it was the most profitable of the cultivated crops and a cultivated crop must be included in a satisfactory rotation. It furnishes more feed for livestock than any other cultivated crop, and it is of value also because as silage it supplies a succulent feed for the dairy ration. These are further reasons why corn is likely to become of increasing importance in southwest Illinois if yields can be kept at 30 to 35 bushels an acre. This large a yield is clearly necessary when one considers the cost of growing corn in this area (Table 7).

**Small Grain Crops.** *Winter wheat* is the most profitable small-grain crop in southwest Illinois; it also fits well into the labor program, provides a means of starting the legume crop, furnishes straw for livestock, and may be a source of cash income. One cash crop is advisable even in a livestock area because it adds another source from which to derive income. During the period of this study an acre-yield of 15 bushels of wheat at average prices was required to return the

cost of production (Table 7). Merely increasing the proportion of wheat in the rotation is not sufficient to insure an increase in the farm income. This is shown by the records of the 23 most profitable and the 23 least profitable farms in this study (Table 8). It was the least profitable farms that had the largest proportion of wheat in the rotation, but their low yields per acre, 9.1 bushels, destroyed any benefit they might otherwise have reaped from this arrangement. Even at present (1931) low prices, the value of wheat as a livestock feed may justify its continuance in the rotation.

The severe spring of 1928 resulted in a complete wheat failure on most of the farms in this part of the state. Altho it is hard to determine how often a complete failure in the winter wheat crop can be expected, yet available information would indicate that a failure such as that of the winter of 1927-28 might not occur oftener than every thirteen to fifteen years.

*Soybeans* are beginning to be substituted in the dairy ration for the concentrated protein feeds now purchased in large quantities. About one-third of the farms in 1926 upon which records are available raised soybeans. The wet fall that year made it practically impossible to harvest and thresh the beans; the result was a high cost on those saved. Because many farmers, after this heavy loss, were discouraged from growing the crop, only a few cost and income figures for soybeans in Area 7 were available in 1927 and 1928. Data from 26 Montgomery and Macoupin county farms, just north of Area 7, were, however, obtained in 1928. The farmers who cut their beans with the binder, as is the customary practice in Clinton county, had an average cost of $18.34 an acre. This cost approximated rather closely the costs on the few Clinton county fields grown in 1927 and 1928.

Considering what it has cost to produce beans and the commercial price received for them during the past few years, it is evident that if

TABLE 8.—CROP ACREAGES ON 114 FARMS IN SOUTHWEST ILLINOIS, 1927

| | Average of 114 farms | | 23 *most* profitable farms | | 23 *least* profitable farms | |
|---|---|---|---|---|---|---|
| | Acres | Percent of crop area | Acres | Percent of crop area | Acres | Percent of crop area |
| Size of farm | 165.4 | ... | 154.5 | ... | 166.7 | ... |
| Total crop area | 111.0 | 100 | 112.4 | 100 | 107.8 | 100 |
| Acres in | | | | | | |
| Wheat | 41.8 | 37 | 38.7 | 35 | 39.9 | 37 |
| Corn | 26.4 | 24 | 35.8 | 32 | 22.3 | 20 |
| Oats | 14.2 | 13 | 12.5 | 11 | 15.8 | 15 |
| Soybeans | 3.3 | 3 | 4.5 | 4 | 1.8 | 2 |
| Timothy | 5.0 | 5 | 1.1 | 1 | 9.2 | 9 |
| Alfalfa | 4.8 | 4 | 6.0 | 5 | 2.8 | 3 |
| Red clover | 6.4 | 6 | 6.6 | 6 | 6.8 | 6 |
| Other crops | 9.1 | 8 | 7.2 | 6 | 9.2 | 8 |

they are to be grown profitably, either as feed for livestock or for sale, yields better than 15 bushels an acre are necessary. However, there are other advantages in growing the crop besides profit from feeding or selling the beans—the physical and chemical condition of the soil is benefited, and the straw is of use. Furthermore soybean hay is the best substitute hay crop in this area. But the extent to which these "by-product" advantages should be considered depends upon the need for them on each individual farm.

*Oats* are the least profitable of the small-grain crops of the area. On the 23 least profitable farms 15 percent of the crop area was in oats, while on the 23 most profitable farms only 11 percent was in oats (Table 8). When charged with man and horse labor at the same rate used for other crops, oats show a loss during all three of the years covered by the cost studies (Table 7). They continue to hold a place in the rotation, however, because they fit well into the labor program. They follow corn very easily, the corn crop being out of the way when the oats have to go in; they furnish a nurse crop for legumes whenever necessary; they provide the straw needed for dairy cows; and finally they furnish an important part of the dairy ration.

**Hay and Pasture Crops.** The best hay crop for any livestock area, and especially for Area 7, is one that will yield large amounts of the kind of cured hay needed in the livestock ration, and one that will at the same time help to maintain soil fertility. The rapid expansion in the acreage of legume hays in Illinois can no doubt be attributed to the fact that, in addition to supplying protein for the ration, they furnish a good means of increasing the humus and nitrogen of the soil.

*Alfalfa hay* stands out among all of the hay crops because of its high yields, its high percentage of easily digestible leaves and stalk and low percentage of indigestible stalk, its palatability, its deep-rooting characteristic, and its soil-building ability. For these reasons it is the most profitable of all crops grown in Area 7 (Table 7). The 23 most profitable farms had 5 percent of their crop area in alfalfa; the 23 least profitable had 3 percent in alfalfa (Table 8).

The average yield of alfalfa in 1926 to 1928 was 1.93 tons an acre on the farms keeping cost records. With an average price of $18 a ton, the crop showed a net profit of $18.48 an acre. On the most profitable farms in 1929 the yield of alfalfa hay was 2.3 tons an acre. In this section, where the need for dairy feed is so important, dairymen are well repaid for liming the soil to make it sweet enough to raise alfalfa, provided other soil conditions are suited to the crop.

Alfalfa is used primarily as a feed crop rather than to add nitrogen and humus to the soil. When included in a regular rotation, it may be

used as a biennial like red clover or allowed to remain down on the same field for several years, not being plowed into the soil as often as the clovers are. However, the manure that results from the feeding of

FIG. 7.—WITH PLENTY OF ROUGH LAND FOR PASTURE, THE SOIL VALUE OF SWEET CLOVER CAN BE REALIZED WITHOUT LETTING THE CROP STAND A WHOLE YEAR

Sweet clover sown in small grain, to be plowed under the following spring, often adds from a ton to a ton and a half of plant growth to the soil. This fact is of interest to all farmers in Area 7, where the low nitrogen content of the soil limits crop yields. It is of particular interest to those whose farms include plenty of rough pasture land.

alfalfa furnishes the soil with a large amount of nitrogen and humus. Furthermore a well-established field of alfalfa relieves the farm, for a time at least, of the risk connected with attempts to get an annual catch of a legume seeding.

*Timothy hay.* When timothy hay was grown for the St. Louis market, there was some justification for including it in the rotation. Now practically no hay is shipped out; it is used primarily for feed on the farm where it is grown. As timothy yields little forage and does not have the high protein content needed in the dairy ration, there would seem to be no justification for continuing it in this area.

The least profitable farms had more of their area in timothy than in any other hay crop (Table 8), in spite of the fact that the crop was yielding only 1.1 tons an acre.

*Red clover* is more generally grown in southwest Illinois than is any other legume crop, probably because of the fact that after repeated attempts to get stands of a legume of some kind on soils that are still somewhat acid, it has been found that red clover will give a light catch.

Consequently many farmers have allowed their red clover to stand over in the hope that in time it will thoroly inoculate the soil and make it easier to grow clover in the future. The farms in both the most and the least profitable groups had 6 percent of their crop acreage in this legume (Table 8).

That red clover will do fairly well where alfalfa has difficulty making a crop is shown by results obtained with these two crops on the low-profit farms. On these farms, 28 percent of the alfalfa meadows were not good enough to cut for hay, and those fields that were cut gave an average yield of only a ton an acre. The average yield of red clover on these same farms was 1.3 tons. The most profitable farms, on the other hand, showed no abandonment of alfalfa land, yet they cut an average yield of 2.3 tons of alfalfa hay an acre. Red clover did not yield any better on these farms than on the low-profit group. This was no doubt due partly to the practice of using for alfalfa only the land that had been well limed and using for clover hay the larger fields of the regular rotation before all of them had received limestone.

An outstanding advantage of red clover is that it fits readily into any rotation, not being on the land more than one year; whereas alfalfa, which is usually held in one field for several years until it has passed the height of production, interferes with the rotation of the other crops. Regardless of the relative advantages and disadvantages of these two crops, farms that can grow either of them cannot afford to grow timothy, for the legumes are far superior to timothy as a feed for milk production and at the same time they fit into the labor schedules just as easily as timothy.

*Pastures* of one kind or another occupied 33 percent of the total area of the 114 farms, or 54.4 acres per farm. About two-fifths of the land in pasture was plowable, the rest was timber land, low land, or land too rough to plow without danger of heavy leaching and loss from surface washing. The livestock-carrying capacity of the permanent pasture here is low at best, especially is this true of the bluegrass pastures on the upland tillable soils. Sweet clover is the most profitable pasture to include in the rotation. Altho a sweet soil is needed to insure a good stand, this legume produces more total weight of forage than any other. Sweet-clover forage, when too coarse for livestock to eat, can be plowed down for soil improvement.

### Feed Marketed Thru Livestock Brings Better Returns

Farms that normally sell feed grains instead of keeping more livestock are foregoing an opportunity to increase their incomes. Some cash-grain farmers in this area can, under exceptionally favorable cir-

cumstances, make a profit, but as a rule the grain farmer would increase his earnings by adding livestock provided conditions are not distinctly unfavorable, as they are in the lowlands along the Mississippi river.

The 23 most profitable of the 114 farms studied sold $1,275 more livestock and livestock products than the 23 least profitable farms (Table 9). Part of this difference in livestock income was due to the fact that the most profitable farms had 26.2 percent more productive

TABLE 9.—AMOUNT AND SOURCES OF FARM INCOME ON 114 FARMS IN SOUTHWEST ILLINOIS, 1927

| | Average of 114 farms | 23 *most* profitable farms | 23 *least* profitable farms |
|---|---|---|---|
| Total receipts and net increases[1] | $2 490 | $3 768 | $1 374 |
| Feed and grain | 496 | 1 060 | ..... |
| Miscellaneous | 104 | 134 | 75 |
| Livestock, total | 1 890 | 2 574 | 1 299 |
| Horses | ... | ... | 5 |
| Cattle | 286 | 316 | 251 |
| Hogs | 381 | 844 | 186 |
| Sheep | 33 | 50 | 35 |
| Poultry | 110 | 122 | 77 |
| Egg sales | 248 | 250 | 223 |
| Dairy products, sales | 831 | 992 | 519 |
| Bees | 1 | ... | 3 |

[1]To the total farm receipts have been added net increases in inventory values.

livestock,[1] or in terms of productive animal units,[2] the more profitable group had a total of 15.4 while the least profitable group had only 12.2 (Table 13). Or in terms of value, the more profitable farms had an investment of $9.50 an acre in productive livestock, whereas the low group had $5.76 an acre.

The average receipts per farm among the 114 farms were $2,490. Of this, slightly more than two-thirds came from livestock. Dairy sales (cattle and dairy products) were of first importance, averaging $1,117 a farm; hogs came second with $381 a farm; and poultry and eggs combined were a close third with $358 a farm (Table 9).

Livestock adds to the net farm income because it utilizes available labor; because it makes profitable use of legumes needed for soil building and maintenance; because it utilizes considerable of the roughage obtained as a by-product of grain production; and because it utilizes pasturage from rough land that is good for nothing but pasture. The total weight of this roughage is usually greater than the weight of salable grain.

The proportion of roughage to salable grain harvested in a good

[1]Livestock other than horses. [2]An animal unit is a cow, horse, or mature steer, or its equivalent in other animals.

rotation may be illustrated by the yields from a typical all-tillable farm where soil building with limestone, legumes, and crop rotation started in 1920. By 1926 six fields of approximately equal size carried a rotation of corn, oats, wheat, red clover, wheat, and sweet-clover pasture

FIG. 8.—HOGS RANK SECOND AMONG LIVESTOCK AS A SOURCE OF FARM INCOME IN AREA 7

Some of the successful farmers in Area 7 give their spring pigs a good start by putting them on an early growth of mixed clover pasture. In the fall, after the pigs are thru with the pasture, there is still a heavy growth to plow under.

(Fig. 16). The yields of grain and roughage for three years (1926-1928) are available for all crops in the rotation with the exception of sweet clover; and it was conservatively estimated that the acre-yield of sweet clover was at least equal to that of red clover cut as hay. With yields of 46 bushels of corn, 32 bushels of oats, 21 bushels of wheat, and 1.1 tons of hay and of sweet-clover pasture, a composite crop-acre of this farm produced approximately 1,025 pounds of grain and 1,844 pounds of roughage yearly, or a ratio of 100 pounds of grain to 180 of roughage. This farm, however, grew two years of wheat in the rotation, so that when the wheat was sold, there were left 599 pounds of feed grains and 1,844 pounds of roughage an acre, a ratio of 100 pounds of feed grain to 308 of roughage.

The above figures are from an all-tillable farm. On most farms there are roughages from untillable pasture to be considered also, so that the difference between roughage and grain becomes even larger. The only profitable solution to the excess-roughage problem is to convert this otherwise waste product into livestock and livestock products. The more successful farms were doing this by buying concentrated feeds to work into the ration with roughage. During 1927 the 23 most profitable of the 114 account-keeping farms purchased $167 more of concentrates than the 23 low-profit group.

The five kinds of productive livestock most common on Illinois farms vary greatly in the use they can make of roughage. Information concerning the extent to which they vary will be helpful to farmers of this area in choosing livestock that will make the best use of the crops grown. This kind of information is given in Table 10. Milk production comes first as an enterprise in which the largest use is made of

TABLE 10.—ROUGHAGE REQUIRED IN VARIOUS KINDS OF LIVESTOCK PRODUCTION IN ILLINOIS

(The various units of production indicated require approximately the same total amounts of grain and concentrates)

| Feeds | For 2,500 pounds milk, Clinton county | For 9 hens, Clinton county | For 100 pounds beef, DeKalb county | For 140 pounds pork, McLean and Woodford counties | For 1 mature sheep 1 year, Knox county |
|---|---|---|---|---|---|
| | *lbs.* | *lbs.* | *lbs.* | *lbs.* | *lbs.* |
| Grain | 482[1] | 504 | 590 | 600 | 601 |
| Protein concentrates | 160 | 150 | 48 | 34 | 1 |
| Total concentrates | 642 | 654 | 638 | 634 | 602 |
| Alfalfa and clover hays | 1 162 | ... | 126 | 2 | 537 |
| Other hay | 50 | ... | 130 | ... | ... |
| Stover and straw | 1 030 | 39 | 128 | ... | 47 |
| Silage | 2 412 | ... | 1 612 | ... | ... |
| Skim milk | ... | 23 | ... | 55 | ... |
| Pasture days per animal unit[2] | 62 | ... | 11 | 2.9 | 6.6 |
| Total dry roughage[3] | 4 799 | 41 | 1 180 | 95 | 782 |
| Pounds dry roughage for each 100 pounds concentrates | 748 | 6 | 185 | 15 | 130 |
| | *hrs.* | *hrs.* | *hrs.* | *hrs.* | *hrs.* |
| Man labor | 48.2 | 17.3 | 4.9 | 2.0 | 8.1 |
| Horse labor | .8 | 8.1 | 2.8 | .4 | 1.3 |

[1]Including 58 pounds of commercial dairy feed. [2]For definition of "animal unit" see footnote page 432. [3]Silage has been converted to corn-fodder equivalent by considering it as 26.3 percent dry matter and corn fodder 91 percent dry matter. Skim milk was considered 9.9 percent dry matter. An animal-unit day of pasturage was considered equivalent to 30 pounds of dry roughage.

roughage in proportion to the amount of grain and protein concentrates; then beef cattle, sheep, pork, and poultry.

The value of the dairy and poultry enterprises on 14 Clinton county farms is indicated by the fact that these two classes of livestock gave much larger returns than the others for each $100 worth of feed consumed (Table 11).

A circumstance favoring these two enterprises in this area is the fact that the farmers have the necessary labor for them. While dairy production calls for the largest total amount of labor for every $100 worth of feed consumed, this labor is spread over the the entire year and frequently a very large part of it is performed by members of the family. The farm labor supply for the handling of a dairy in this area is often more of a factor in determining the number of cows to keep than is the feed supply; so it would seem that if the labor is available,

TABLE 11.—VALUE OF FEED USED FOR DIFFERENT KINDS OF LIVESTOCK ON 14 FARMS IN CLINTON COUNTY, ILLINOIS, OVER THREE-YEAR PERIOD, 1926-1928, AND INCOME RECEIVED FROM LIVESTOCK

| | Feed | Income | Returns for $100 of feed |
|---|---|---|---|
| Dairy cattle | $38 870 | $63 773 | 164 |
| Young dairy stock | 10 197 | 14 008 | 137 |
| Swine | 12 816 | 18 850 | 147 |
| Poultry | 15 097 | 25 890 | 171 |
| Totals and average | $76 980 | $122 521 | $159 |

farmers here might well purchase grain feeds. Area 7 lies close enough to the intensive grain-producing region of the country so that the dairyman in this area has an advantage over the dairyman in the eastern states in lower freight charges on purchased feed.

Poultry ranks next to dairy cattle in the amount of labor it requires for each $100 worth of feed consumed and, as with the dairy, the amount of family labor available may well determine the size of the enterprise. If the labor is on hand to take care of the flock, it might well be productively employed even tho feed must be purchased.

While beef-cattle feeding and sheep feeding make heavy demands for labor in the winter and seldom interfere with the growing of crops, still these classes of livestock are not so well adapted to an area like this, where feed is a limiting factor.

The amount of fixed capital and of operating expenses other than those for feed and labor, needed by each class of livestock, vary also. The data in Table 12, based on a study of several groups of farms in selected areas in Illinois, are of interest in this connection. An interest charge of 5 percent on the investment varied from $17.51 for sheep

TABLE 12.—COSTS ACCOMPANYING $100 WORTH OF FEED FED TO DIFFERENT CLASSES OF PRODUCTIVE LIVESTOCK IN ILLINOIS COUNTIES WHERE COST STUDIES HAVE BEEN MADE

| | Dairy cow, Clinton county 1927, 18 farms | Poultry, Clinton county 1927, 18 farms | Beef steers, DeKalb county 1923, 93 farms | Hogs, Woodford county 1925, 37 farms | Sheep,[1] Knox county 1924, 8 farms |
|---|---|---|---|---|---|
| Feed | $100.00 | $100.00 | $100.00 | $100.00 | $100.00 |
| Man labor | 33.44 | 31.46 | 6.70 | 6.93 | 22.09 |
| Horse labor | .32 | .93 | 1.90 | .... | .35 |
| Depreciation | 4.33 | .93 | .... | .... | ..... |
| Interest on investment at 5% | 14.04 | 3.89 | 7.89 | 2.93 | 17.51 |
| Buildings and equipment | 5.33 | 9.74 | 4.09 | 3.39 | .76 |
| All other | 5.52 | 15.93 | 2.54 | 5.70 | 16.02 |
| Total | $162.98 | $162.88 | $123.12 | $118.95 | $156.73 |
| Price of corn | $ .75 | $ .75 | $ .64 | $ .63 | $ .90 |
| Percentage feed cost is of total cost | 61.4 | 61.3 | 81.2 | 84.1 | 63.8 |

[1]Farm flocks. Two farms produced purebred sheep for sale as breeding stock.

(Knox county, 1924) to $2.93 for hogs (Woodford county, 1925). Taking $100 worth of feed as a unit, the annual building and equipment cost for poultry was $9.74 (Clinton county, 1927), or more than for any other class of livestock. The dairy cow required $5.33 in buildings and equipment (Clinton county, 1927). Beef steers required $4.09 (DeKalb, 1923). For sheep the building and equipment expense is noticeably low, being only 76 cents with each $100 worth of feed used.

In addition to the possible profit in marketing grain, farm roughage, and labor thru livestock, a further benefit comes indirectly thru the production of large amounts of manure and the increased crop yields that come from its intelligent use.

### Better Grades of Livestock Produce More Economically

There is no profit in keeping low-producing or inefficient livestock in any area in Illinois, and especially in this area. This is shown by the returns from the livestock on the most profitable farms and on the least profitable farms. The livestock on the most profitable farms returned $167 per animal unit,[1] while the livestock on the least profitable farms returned only $106 (Table 13).

TABLE 13.—INVESTMENT IN PRODUCTIVE LIVESTOCK AND RETURNS PER $100 INVESTED IN LIVESTOCK ON 114 FARMS IN SOUTHWEST ILLINOIS, 1927

| | Average of 114 farms | 23 *most* profitable farms | 23 *least* profitable farms |
|---|---|---|---|
| Productive animal units per farm | 14.8 | 15.4 | 12.2 |
| Investment in productive livestock[1] per acre | $ 7.30 | $ 9.50 | $ 5.76 |
| Income from productive livestock, per acre | 11.43 | 16.66 | 7.79 |
| Investment in livestock per productive animal unit | 110 | 118 | 108 |
| Returns per productive animal unit | 128 | 167 | 106 |
| Returns per $100 invested in productive livestock | 153 | 176 | 133 |
| Per $100 invested in cattle | 150 | 168 | 128 |
| Per $100 invested in hogs | 153 | 200 | 116 |
| Per $100 invested in poultry | 173 | 191 | 170 |

[1]Productive livestock includes all farm animals except horses.

The influence of amount and quality of livestock on income may be shown in another way. The most profitable farms in 1927 carried $9.50 worth of productive livestock an acre; from these they obtained an income of $16.66 an acre (Table 13). The least profitable farms carried $5.76 worth of productive livestock an acre, from which they realized only $7.79.

The returns for every $100 invested in livestock is another way to measure the relative efficiency of livestock (Table 13). When this measure is applied to the livestock on the most profitable and least

[1]For definition of an "animal unit," see footnote on page 432.

profitable farms, one of the most important causes for the difference in farm incomes between the two groups is apparent. For every $100 invested in all kinds of livestock, the most profitable farms sold $43 more livestock and livestock products than the least profitable group.

FIG. 9.—COWS WITH THE ABILITY TO MAKE GOOD USE OF FEED ARE ESPECIALLY NEEDED IN AREA 7, WHERE FEED IS LIMITED

The breed is not so important as individual producing ability. A herd can be built up by saving only those heifers that show early in their productive life that they can turn feed into milk efficiently.

The returns from the cattle units are of more significance than those from the other classes of livestock because more than half the total livestock investment on these farms is in cattle. And so while the most profitable farms took in $84 more from hogs for every $100 invested in them and $21 more from poultry than the least profitable farms, the important fact, so far as total income is concerned, is that the returns on the most profitable farms were $40 more for each $100 invested in cattle than the returns on the least profitable farms.

With an average inventory at the beginning of 1927 of 8 milking cows and the accompanying young stock, the most profitable farms realized during the year $316 from cattle sales and increases in value of young stock (Table 9). The least profitable farms, with 6 milk cows and their accompanying young stock, showed $251 from cattle sales and increases in inventory. The important difference in dairy receipts, however, came thru the sale of milk. Milk sales amounted to $992

per farm in the high group and only $519 per farm in the low group. The most profitable farms sold 5,890 pounds of milk per cow, which, added to the whole milk used on the farm, gave an average milk production per cow of approximately 6,100 pounds. The least profitable farms sold 4,120 pounds of milk per cow, which, added to what these farms used in the household, totaled about 4,530 pounds of milk as the average production per cow.

On the basis of the data obtained, it cannot be said that all the difference in livestock income between the high and low groups is to be attributed entirely to differences in quality of animals; some of it may have been due to differences in care and handling. Investment in buildings and livestock equipment, which is some evidence at least of the interest of the operators in their livestock, was, however, the same in both groups.

### Carefully Selected Crop and Livestock Enterprises Utilize Labor to Better Advantage

The average total cash expense, depreciation, and labor used in operating these 114 farms in 1927 was $1,802, of which 56.2 percent, or $1,024, represented the value of man labor. The 23 most profitable farms averaged more per acre for labor than the 23 least profitable ($6.48 as compared with $5.53), but they put their labor to much better use. For every $100 of income they averaged a cost of $27 for hired and family labor; the 23 least profitable farms used $67 for every $100 income. The most profitable farms produced approximately 50 percent more feed, including wheat, and cared for 10 percent more livestock per man than the least profitable farms. (Data not shown in tables.)

The amount of work accomplished per man is partly a problem of organization. In order to handle large acreages of crops with the man labor available, the rotation must be so arranged as to provide a good seasonal distribution of labor. Likewise, the livestock program needs to be planned so as to distribute the demand for labor rather evenly thru the year. Since on many farms in southwest Illinois one or more members of the family in addition to the operator are available for productive work, it is important that the plan of farming be such as to use this labor to advantage.

What one farmer in the area accomplished in 1927 illustrates what can be done to distribute labor fairly uniformly thruout the year (Fig. 10). In the first place, this man had a farm large enough to use the available labor—that of 2.6 men, including himself—to its fullest capacity. Then he adopted a crop rotation that permitted a fairly uni-

form distribution of labor thruout the crop season; he combined livestock and crop production so as to utilize labor in both winter and summer; and he planned ahead to utilize rainy days and slack periods for jobs that did not have to be done at a particular season of the year.

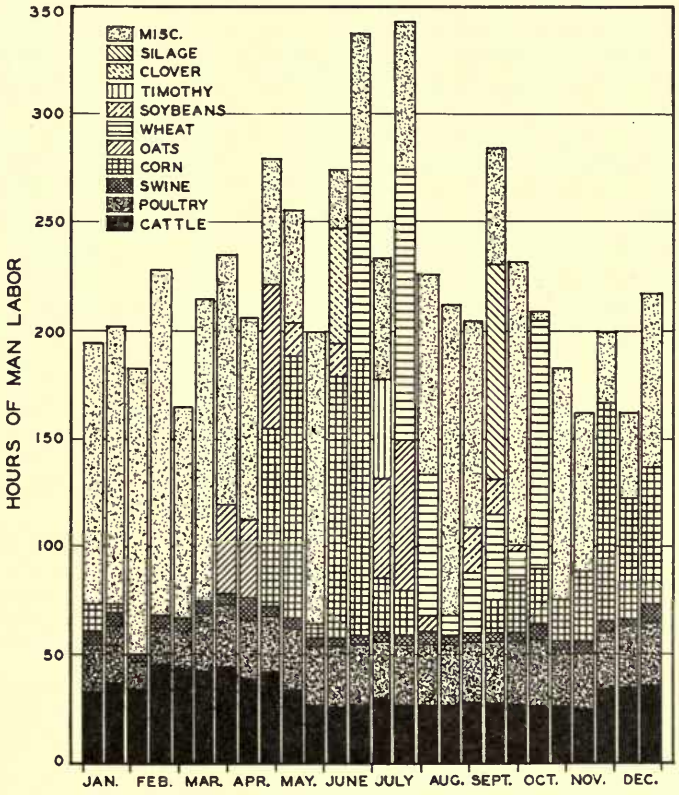


FIG. 10.—SEASONAL DISTRIBUTION OF MAN LABOR ON A 140-ACRE CLINTON COUNTY FARM

This farm has obtained a very good distribution of man labor by growing a rotation of corn, oats, winter wheat, and red clover and by feeding the feed grains to dairy cows. The shaded portion of this labor chart shows the man labor put on crops and livestock. The light portion, at the top, shows the miscellaneous labor that can be shifted to any convenient time.

## Careful Utilization of Power Reduces Expense Ratio

Power is one of the largest items of expense in operating farms. A three-horse team in the field 10 hours represents, on the average farm in this area, a cost of about $3.40, or 11.3 cents per horse-hour. There

is wide variation, however, in the hour-cost on different farms. On 18 farms in Clinton county in 1927 the hour-cost of horse labor varied from 6 cents on the low-cost farm to 18 cents on the high-cost farm.

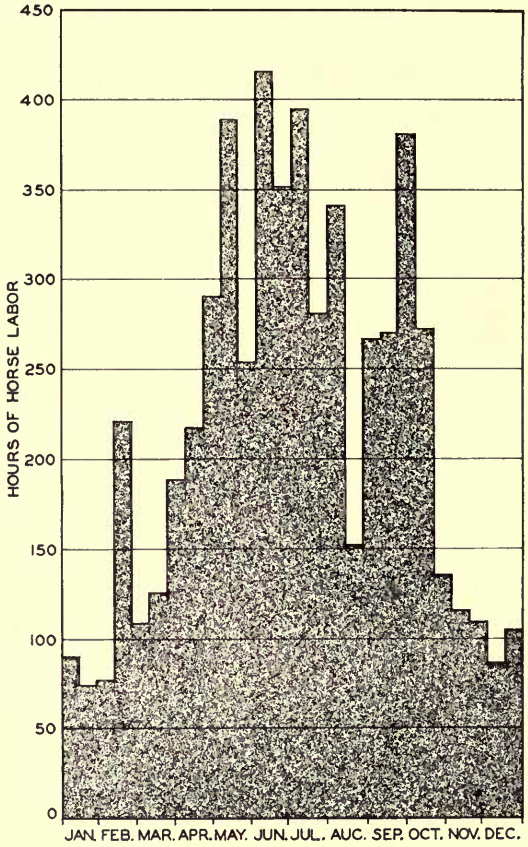


FIG. 11.—SEASONAL DISTRIBUTION OF HORSE LABOR ON A 172-ACRE CLINTON COUNTY FARM

This farm made good use of the horses. It had a rotation of corn, oats, clover, wheat, wheat, and clover sown in the last wheat to plow for corn the next spring. Heavy rains in early June and late August kept horses out of the field long enough to cause the two low summer periods.

On the low-cost farm the horses worked an average of 957 hours each a year, and the cost of caring for them and feeding them averaged $60.76 a horse. On the high-cost farm the horses averaged less than half as many hours (445) and cost more than twice as much $136.34).

The hours of productive work obtained from a horse in a year's

time depend largely on the system of farming followed and the number of horses kept. The largest number of productive hours per horse will be obtained in a system in which the need for horse labor is distributed fairly evenly thru the year. Even with well-planned rotations, however, a farmer is sometimes handicapped by the character of his soil. In this area, for instance, there frequently are periods, lasting a week or ten days after hard rains, when the heavy soils cannot be worked. Field work accumulates at such a time; and a farmer to be sure of having enough power to do this work quickly when the weather is favorable must keep on hand more horses than would be necessary for an equivalent acreage on a quicker-draining type of soil. This sends his cost for horse labor up.

In the use of tractors similar differences in costs occur. The hour-cost of a two-plow tractor on the 18 cost-account farms varied from 62 cents to $2.86. The factor having the most influence on this cost was the number of hours during which the tractor was used, for the interest on the investment and depreciation, two items that make up

TABLE 14.—LABOR STANDARDS FOR FARM OPERATIONS BASED ON RECORDS ON 18 FARMS IN CLINTON COUNTY, ILLINOIS, 1927

| Operation | Width of implement | Number of men | Number of horses | Acres per 10-hr. day, once over | Hours per acre, once over | |
|---|---|---|---|---|---|---|
| | | | | | Man | Horse |
| *With horses* | | | | | | |
| Plowing | 12″ | 1 | 2 | 1.84 | 5.44 | 10.88 |
| Plowing | 14″ | 1 | 3 | 2.01 | 5.0 | 15.0 |
| Plowing | 24″ | 1 | 4 | 4.06 | 2.45 | 9.8 |
| Disking, single | 8′ | 1 | 4 | 12.95 | .77 | 3.08 |
| Harrowing, spikes | 12′ | 1 | 4 | 17.71 | .56 | 2.24 |
| Harrowing, spikes | 15′ | 1 | 4 | 19.66 | .50 | 2.00 |
| Rolling | 8′ | 1 | 2 | 14.57 | .68 | 1.36 |
| Drilling | 7′ | 1 | 2 | 12.28 | .81 | 1.62 |
| Drilling | 11′ | 1 | 2 | 17.04 | .58 | 1.16 |
| Planting corn | 42″ | 1 | 2 | 11.08 | .90 | 1.80 |
| Cultivating | 1 row | 1 | 2 | 5.62 | 1.77 | 3.54 |
| Cutting hay | 5′ | 1 | 2 | 10.05 | .99 | 1.98 |
| Raking hay | 10′ | 1 | 2 | 17.08 | .58 | 1.16 |
| Putting up hay | | | | | | |
| Up to 1 ton yield | .. | .. | .. | ..... | 2.84 | 2.85 |
| 1 ton and more per acre | .. | .. | .. | ..... | 5.86 | 5.84 |
| Cutting grain with binder | 7′ | 1 | 4 | 10.81 | .92 | 3.68 |
| Shocking grain | | | | | | |
| Oats | .. | 1 | .. | 6.4 | 1.56 | .... |
| Wheat | .. | 1 | .. | 6.27 | 1.59 | .... |
| Threshing | | | | | | |
| Oats | .. | .. | .. | .... | 3.27 | 3.40 |
| Wheat | .. | .. | .. | .... | 3.44 | 3.76 |
| Silo filling, per ton | .. | .. | .. | .... | 2.51 | 3.51 |
| Hand husking | | | | | | |
| 20-29 bushels | .. | 1 | 2 | 1.57 | 6.38 | 12.76 |
| 30-39 bushels | .. | 1 | 2 | 1.18 | 8.45 | 16.9 |
| 40 bushels or more | .. | 1 | 2 | .88 | 11.3 | 22.6 |
| *With two-plow tractor* | | | | | | |
| Plowing | 24″ | 1 | .. | 6.16 | 1.62 | .... |
| Disking, tandem | 7′ | 1 | .. | 16.71 | .60 | .... |
| Cutting grain with binder | 7′ | 2 | .. | 13.79 | 1.45 | .... |
| *With three-plow tractor* | | | | | | |
| Plowing | 42″ | 1 | .. | 7.93 | 1.26 | .... |
| Disking, tandem | 8′ | 1 | .. | 28.70 | .348 | .... |

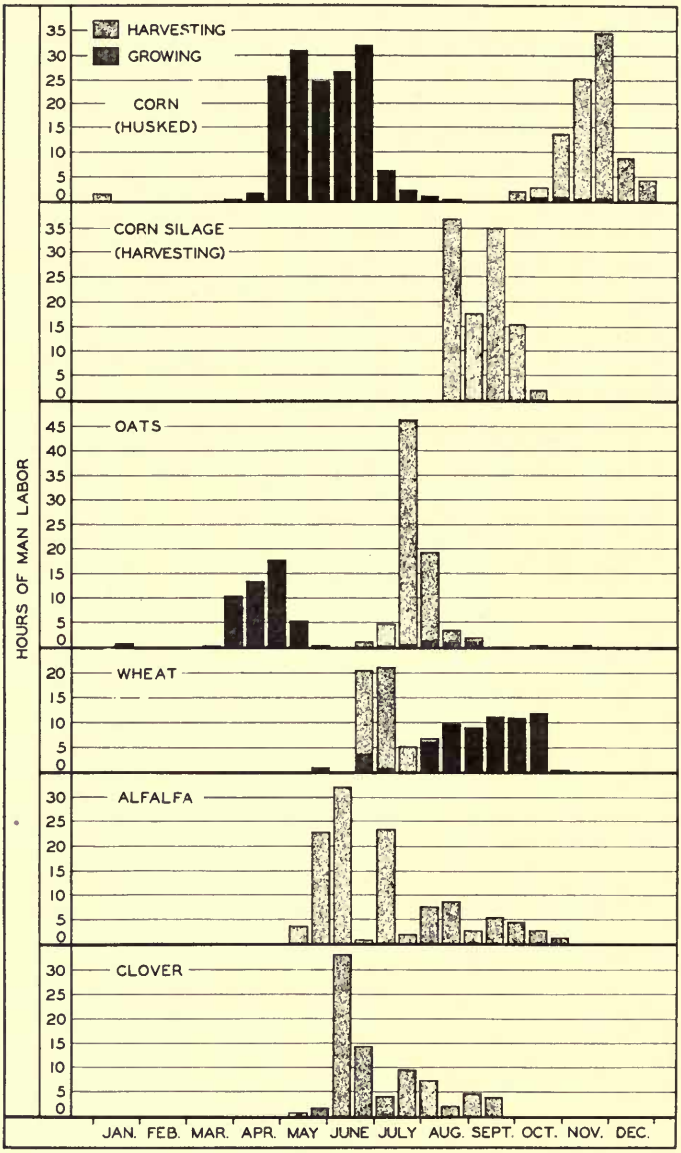


FIG. 12.—DISTRIBUTION OF MAN LABOR IN GROWING AND HARVESTING TEN ACRES OF SIX DIFFERENT CROPS

The time of year when a crop demands labor, as well as the amount of labor it requires, needs to be carefully considered when choosing the crop to include in a rotation. This graph is based on data from six Clinton county farms in 1926, 1927, and 1928.

so large a part of the total yearly cost, remain about the same regardless of the actual number of hours the tractor is used.

The amounts of labor required in this area during the different months of the year by different kinds of crops and livestock are sug-

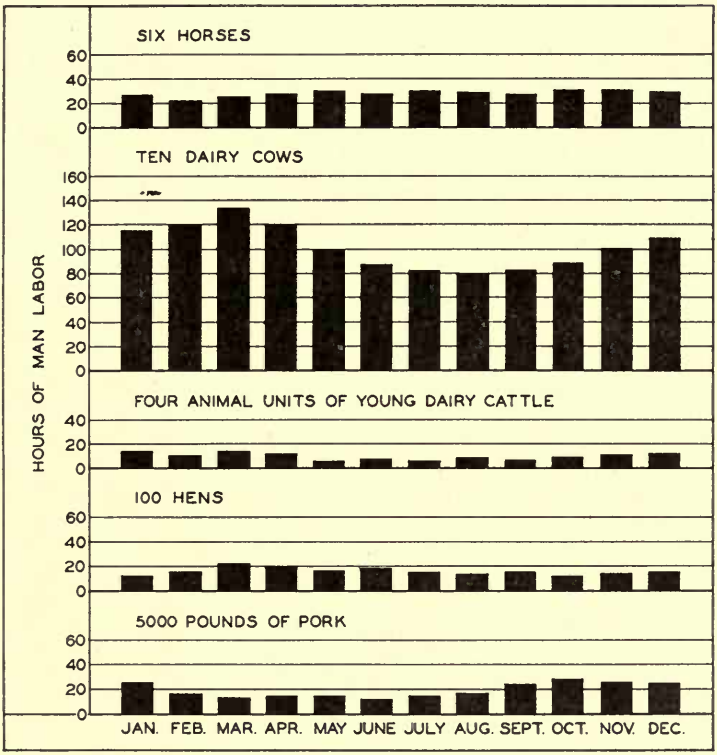


FIG. 13.—DISTRIBUTION OF MAN LABOR REQUIRED IN CARING FOR LIVESTOCK

The kinds of livestock shown here are practically the only ones carried in Area 7. They all make rather uniform demands thruout the year, and in this way make good use of the large amounts of family labor available. Graph based on data from six Clinton county farms for 1926, 1927, and 1928.

gested in Figs. 12 and 13. The amount of work that a man with different amounts of horse or tractor power may be expected to accomplish in a work day is suggested by the data in Table 14. Farmers in Area 7 will find this information of help in fitting together such combinations of crop enterprises as will permit an economical distribution of field labor and be desirable from other standpoints as well

Among the group of 114 farms, the 23 most profitable spent $5.34 an acre for power and machinery in 1927; the least profitable spent $4.90. But the expenditure per $100 of income was only $22 on the most profitable farms as compared with $59 on the least profitable. (Data not shown in tables.)

## Watching Building and Equipment Costs Helps Reduce Expenses

While variations in the expenses of operating different farms in this area are not so great, and hence not so important in affecting earnings, as are variations in gross receipts, nevertheless when one man can operate his farm at a total yearly cost of $2.06 an acre for buildings, fences, machinery, and tools, and another spends $6.28 for the same purpose (Table 15 and Fig. 14), it is evident that there are opportunities for materially increasing net earnings by carefully watching

TABLE 15.—ANNUAL EXPENSE FOR BUILDINGS, FENCES, MACHINERY, AND TOOLS, 18 FARMS IN CLINTON COUNTY, ILLINOIS, 1927[1]

(Figures indicate expense per acre for total farm area)

| Farm No. | Size of farm | Total expense | Buildings | Fence | Crop machinery and tools |
|---|---|---|---|---|---|
| | *acres* | | | | |
| 5 | 79.7 | $6.28 | $2.46 | $ .90 | $2.92 |
| 10 | 116.3 | 6.16 | 2.04 | 2.28 | 1.84 |
| 12 | 102.3 | 5.57 | 1.97 | .78 | 2.82 |
| 19 | 141.0 | 4.46 | 1.51 | .72 | 2.23 |
| 13 | 171.6 | 4.20 | 1.34 | .59 | 2.27 |
| 16 | 258.5 | 3.95 | 1.08 | .70 | 2.17 |
| 15 | 180.5 | 3.84 | 1.54 | .78 | 1.52 |
| 20 | 153.8 | 3.53 | 1.42 | .72 | 1.39 |
| 18 | 90.5 | 3.49 | 1.81 | .40 | 1.28 |
| 8 | 141.5 | 3.46 | 1.47 | .17 | 1.82 |
| 14 | 150.5 | 3.44 | 1.05 | .53 | 1.86 |
| 7 | 187.7 | 2.87 | .94 | .38 | 1.55 |
| 6 | 160.5 | 2.86 | 1.46 | .01 | 1.39 |
| 21 | 182.5 | 2.75 | .80 | .48 | 1.47 |
| 4 | 190.2 | 2.65 | .92 | .41 | 1.32 |
| 1 | 168.3 | 2.52 | 1.32 | .26 | .94 |
| 2 | 178.8 | 2.13 | .68 | .35 | 1.10 |
| 3 | 165.6 | 2.06 | .47 | .19 | 1.40 |
| Average | 156.6 | $3.68 | $1.35 | $ .59 | $1.74 |

[1]Included in these expenses are labor and material for current repairs, depreciation, and interest on investment. The cost of the residence of the operator and of tractors and automobiles is not included.

equipment costs. Assuming that each of these farms included 160 acres, the total difference in yearly equipment expenses would have amounted to $675. In order that the figures for the 18 farms in Table 15 might be put on a more strictly comparable basis, the cost of the residence of the operator and of tractors and automobiles is not included.

It would be a mistake to have less equipment on a farm than is essential to the most effective use of man and horse labor. The addition

of the labor-saving equipment that is commonly used in the neighborhood can generally be depended upon to add to total farm earnings.

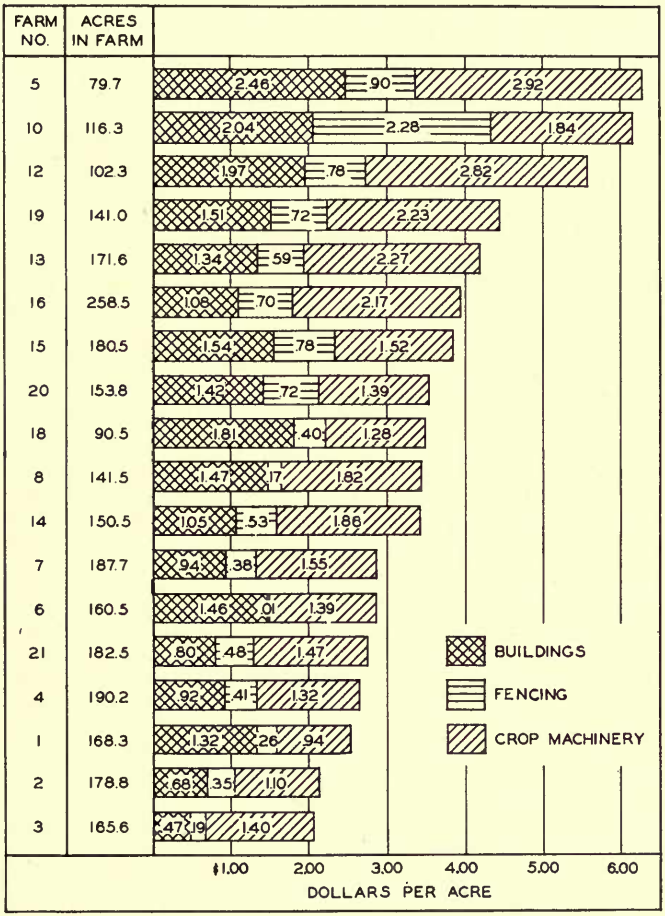


FIG. 14.—COST PER ACRE FOR BUILDINGS, FENCING, CROP MACHINERY, AND TOOLS, 18 CLINTON COUNTY FARMS, 1928

None of these farms are underequipped, yet on some this class of expense is less than half what it is on others. The variations from farm to farm shown on this graph are typical of what is found, over a longer period of time, by cost studies in this and other areas of the state.

The purchase of large machines, however, requiring heavy investment should be made only after careful study of the costs and savings involved. These large machines are, in most cases, used only a few days during the year, and depreciation and interest on the investment

will sometimes more than offset the saving in labor, especially in areas where farms are comparatively small.

Among the 114 farms, the operators of the 23 most profitable in 1927 spent $3.46 an acre for buildings and fences and other miscellaneous items; the operators of the 23 least profitable spent only $2.72.

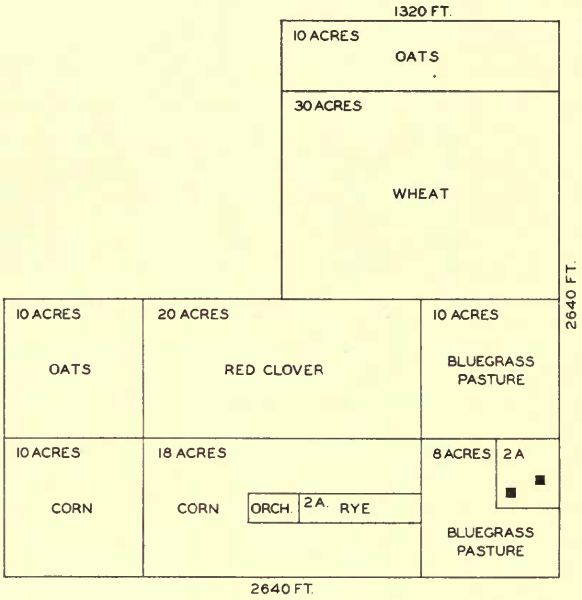


FIG. 15.—POORLY ARRANGED FIELD SYSTEM ON A 120-ACRE CLINTON COUNTY FARM

This was the field arrangement in 1920 of the same farm as is shown in Fig. 16 before a definite plan of soil improvement and crop rotation had been adopted.

But the greater income of the more profitable farms justified this additional expense; for every $100 income they spent $14 for this item, the least profitable farms spent $33. (Data not shown in tables.)

### Well-Organized Farm Layout Economizes Labor

The presence of creeks, ditches, rolling land, low land along creek beds, and the tendency in southwest Illinois for some of the land to hold pockets of water well into the early summer make the problem of arranging the crop land into fields of regular shapes and equal sizes a difficult one. Large fields with straight edges do not require such frequent turning of horses and machinery in planting and cultivating

as do small, irregularly shaped fields. Fields that are two to three times as long as they are wide, or perhaps even longer in proportion to their width, make the best-shaped fields, for the work can be done with the least loss of time.

Fields should be as near the farmstead as possible. This is especially true on livestock farms because of the large number of trips necessary in handling livestock, in hauling manure, and in hauling feed crops

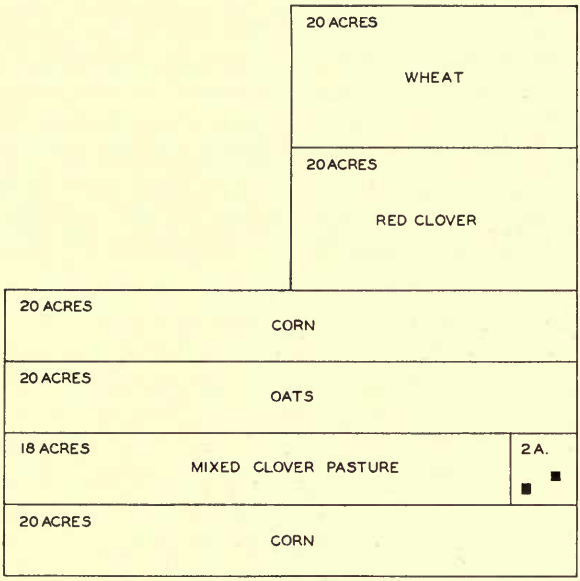


FIG. 16.—REVISION OF FIELD SYSTEM ON FARM SHOWN IN FIG. 15

The revised field plan, with a six-year rotation of corn, oats, wheat, red-clover hay, wheat, and sweet clover was established on this farm as fast as the fields could be limed ahead of the clover crop. The productivity of the soil has been built up to a point where two fields of corn and one of wheat may be used instead of two of wheat and one of corn.

to the buildings for storage. On a 160-acre farm the time necessary to get men, teams, and machinery to and from farm buildings and fields not conveniently located to buildings can easily total more than 200 hours in a year's time.

The rearrangement of fields for greater convenience often requires time, for getting the fields into condition to grow all the crops included in the rotation cannot usually be done in less than the full rotation period. Where limestone has been applied to acid land, farmers will find the problem of rearranging their fields much simplified, for clover can then be grown on all the crop land. Thus clover can be included in

the rotation, and by the time a rotation period has gone round it will have been grown on every field of the crop land. A good illustration of what one of the cooperating farmers did in reorganizing his farm for more economical operation is shown in Figs. 15 and 16. Not all farmers have as level land as that on this farm. Nevertheless many farmers can improve their field layouts, even in the rougher areas, by making all fields as large as possible and by straightening the fence lines.

### Diversification of Crops Gives Added Security

The necessity, in this area, of raising a variety of feed crops as well as wheat, is clearly emphasized by years of experience. The killing of wheat in the winter of 1927-28 and the wide differences in the yields of other crops from year to year should convince all farmers of the advantages in diversifying. Seasons well adapted to oats and barley are usually too cool in the early summer for corn; whereas hot weather, good for corn, hinders small grain from properly filling out.

With an assured feed supply regardless of the season, a more definite and uniform plan of livestock production can be organized. Milk production, in particular, is maintained more uniformly when two or three grain crops are sown regularly and when legume pastures are used in addition to permanent pastures. Diversity of production insures against failure should a season happen to be poor for some one crop or the weather and market unfavorable for a particular type of livestock.

Diversification of crops and livestock makes it possible to avoid extremely high peak-load demands for labor or other items of production. With a good selection of crops and livestock the work of the farm can often be spread more evenly and expenses of production thus materially cut down. With specialization in crops or livestock, seasonal requirements for man labor and power are usually accompanied by high seasonal wages and the expense of feeding additional horses the year around in order to have the power needed at the peak time.

**Rotations Used During Period of Study.** During the years of this study when corn ranged between 60 cents and a dollar a bushel, wheat between $1.25 and $1.50 a bushel, oats between 35 and 50 cents, the rotations recommended and most commonly used were the following:

*On all-tillable land having no bluegrass pasture and where the land was not yet in shape to grow alfalfa,* a rotation of corn, oats, wheat, mixed legumes, wheat, and sweet-clover pasture gave a balance of crops. Where practically all the feed crops except wheat were used on the farm, this rotation built up the soil in two or three rotations to a

point where a heavier rotation might be practiced. Corn was then frequently introduced in place of oats, especially where part of the corn crop was siloed or used for early hogging off.

*On land where an adequate amount of nontillable pasture was available but where no alfalfa was grown,* a rotation of corn, oats, wheat, mixed legumes, and wheat, with sweet clover seeded in the last wheat but plowed under the following spring before corn was planted, was generally followed. The sweet clover attained a good growth in the summer after the wheat crop was taken off and again in the spring by the time it was necessary to plow for corn. In this rotation red clover was retained as a legume crop, for alfalfa will not grow satisfactorily on some of the land until it is much improved.

*Where alfalfa could be grown but where there was no permanent bluegrass pasture, the usual rotation was* corn, oats or soybeans, wheat, wheat, sweet-clover pasture. An additional field was planted in alfalfa, which was allowed to stand, probably for the period of the rotation. This rotation did best on land in a fairly high state of fertility.

*Where some permanent bluegrass pasture was available and where alfalfa could be grown,* the rotation usually was corn, oats or soybeans, wheat, and wheat seeded to sweet clover but plowed under the following spring before corn. With this rotation, sweet clover would frequently make a two-ton growth in the fall and often in the spring it would be three feet high when plowed under.

**Current Changes in Rotations.** Because of the price relationships that have existed among farm crops since 1930, some of the better farmers in the area are making some rather marked changes in their rotations. They feel that the above rotations have too much of the crop land in small grains. They are therefore adopting the following rotations which they feel will improve soil fertility and give a good balance of feed for the dairy.

(1) Corn, for silage or fodder
Wheat
Sweet-clover pasture
Corn
Oats
Mixed legume hay

(2) Corn
Soybeans
Wheat
½ mixed legume hay, ½ sweet-clover pasture

(3) Corn
½ soybeans, ½ soybean hay
Wheat
Sweet-clover pasture

(4) ½ corn, ½ silage or fodder corn
½ oats, ½ wheat
½ mixed legume hay, ½ sweet-clover pasture

The above rotations are adapted to farms with *all-tillable land having no bluegrass pasture and where land is not in shape to grow alfalfa.* No. 1 is being considered by farmers who have been follow-

ing the old six-year rotation, as they have their farms arranged in six fields and their fences permanently placed. The mixed-legume hays indicated are usually a combination of red clover, alfalfa, and alsike clover.

*On land where an adequate amount of nontillable pasture is available, but where no alfalfa is grown,* some of the more successful farmers are now using the following rotations:

(1) Corn
Oats
Mixed legume hay
Corn
Wheat (with sweet clover)

(2) Corn
Soybeans
Wheat
Mixed legume hay

(3) Corn
½ soybeans, ½ soybean hay
Wheat (with sweet clover)

*Where alfalfa can be grown but where there is no permanent bluegrass pasture,* the rotations given below are used:

(1) Corn
Oats
Sweet clover until June 1, then planted to corn silage
Wheat
Alfalfa

(2) Corn
½ wheat, ½ oats
½ alfalfa (1 year), ½ sweet-clover pasture

(3) Corn
½ oats, ½ corn silage
Wheat
½ alfalfa (1 year), ½ sweet-clover pasture

(4) Corn
½ oats, ½ soybeans
Wheat
Sweet-clover pasture
Alfalfa (several years)

In No. 1 sweet clover is pastured until about June 1, the cows are then moved to a part of the alfalfa field. As soon as the cows are taken from the sweet-clover pasture, this field is plowed and planted to corn for silage. Alfalfa is successfully used as an annual nay crop, as shown in the first three rotations.

*Where some permanent bluegrass pasture is available and where alfalfa can be grown,* the rotation usually is corn, oats and soybeans, and wheat, with the wheat sown to sweet clover, which is plowed under the following spring before corn. Alfalfa is left down for several years on a separate field. With this rotation, sweet clover will frequently make a two-ton growth in the fall and often in the spring it will be three feet high when plowed under.

### Adjusting to Market Conditions Means Better Income

How to adjust farm production to meet changing market demands and prices is always a problem even in an area that lies as close to a large market as this area does. Yields of crops vary so widely from

year to year that it is impossible to forecast with any accuracy at planting time what the total production of the important crops will be. But since prices of feed crops usually all move in the same direction, and since most all of the feed produced is fed to livestock on the farm where it is raised, little is gained by making *temporary* shifts in acreages of feed crops. Certain rather *permanent* changes in cropping systems do of course become desirable as changes occur in soil conditions or long-time changes in prices become apparent; the adjustments in rotations now taking place in the area, as mentioned above, probably are in the latter class. But temporary crop adjustments, aside from those necessary in years of crop failure, are seldom wise, for they have a tendency to throw production plans out of line and often result in increased cost for the crops grown.

In an area such as this, where a large part of the farm income is from livestock, there is more opportunity to make adjustments in livestock to meet price changes than it is possible to make among the crops, for, unlike crop production, the production of livestock and livestock products can be fairly closely estimated in advance. The number and ages of cattle and sheep on the range and the number of breeding animals among them give a very good indication of the amount that will come to market from the range. The production of milk for the next few years can be estimated fairly closely from the numbers of milking cows and heifers on the farm. With hogs and poultry, the possibility of indicating production very far in advance is hazardous, as the numbers of these animals change rapidly. Even with livestock, however, it is not profitable to make too violent changes in numbers.

Short-time adjustments in the amount of livestock kept are also somewhat safer than changes in crops, for these adjustments can be made closer to the time of marketing. Hogs, for example, can be fed to heavier weights, and more feed grains disposed of in that manner, so long as the price ratio is favorable to hogs. The number, grade, and class of feeder steers can be changed at each feeding season to meet conditions in the finished-cattle market. To meet a declining milk demand, dairy cows can be culled out of the herd at an age earlier than normal. If a good market is in view for dairy products, cows can be held in the herd longer than normal or can be fed more heavily so as to increase their milk production. These livestock adjustments, moreover, can be made without changing the established plan of crop production.

## PROFITABLE FARMING REQUIRES BALANCED FARMING

The most profitable of the 114 farms whose accounts have furnished the principal basis for this discussion proved to be those that put into practice the greatest number of the principles of good farm management—not those that excelled in some particular essential

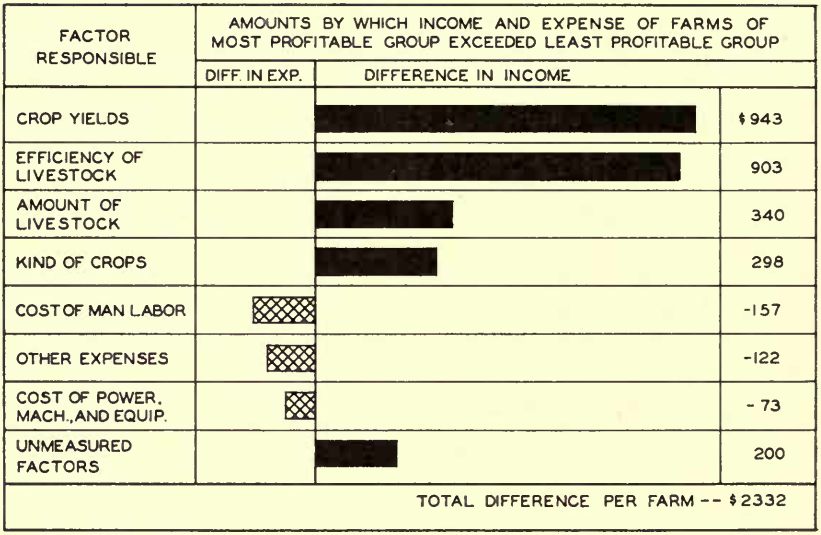


FIG. 17.—LOCATION OF CAUSES OF DIFFERENCES IN NET INCOMES BETWEEN 23 MOST PROFITABLE AND 23 LEAST PROFITABLE OF THE 114 FARMS INCLUDED IN THIS STUDY

This graph assumes that the farms in both groups were 165.4 acres in size, the average of all 114. Horse cost, mechanical power, and machinery expense are here combined as "Cost of power, machinery, and equipment," since on many farms machines are now built with engine power mounted on them. "Other expenses" include all expenses for buildings, fences, and tile, as well as insurance, telephone, rentals, and other miscellaneous expenses. The most profitable farms, it will be noted, had higher expenses as well as higher receipts.

and fell far short in others. The 23 most profitable farms, as a result of better management, averaged a net income larger by $2,206 than the 23 farms with the lowest profits.

The most profitable farms and the least profitable, however, were not strictly comparable because they were not the same size. To ascertain what the difference in income between the two groups would have been had the farms been the same size, we may assume that each group averaged the same number of acres as the 114 farms, or 165.4 acres. With a net acre-income of $11.87 on the most profitable farms and a

loss of $2.23 on the least profitable farms, the difference in total net income between the two groups becomes $2,332 per farm.

To what extent may it be said that each of the factors discussed herein was responsible for this difference in income? This question is answered graphically in Fig. 17 with respect to the readily measurable factors affecting farm income. Better crop yields are responsible for $943 of the difference; more efficient livestock, for $903; more livestock carried, for $340; and better selection of crops, for $298. While the outlay for man labor, "other expenses," and power, machinery, and equipment is $352 greater for the most profitable farms, this additional expenditure would seem to have been justified in view of the increased income.

A brief statement of the methods used in arriving at these individual differences will be of interest.

The difference due to better crop yields was ascertained by applying to the difference in the average yield of each crop in the two groups the acreage of the crop grown on the average of all farms. To this total farm difference for each crop was applied the average yearly price received for the part of the crop that was sold. When a balance was taken of these money differences the high-profit farms were ahead $943.

Each animal unit[1] on the most profitable farms was responsible for $167 in livestock receipts, while each animal unit on the least profitable farms produced only $106. When this $61 difference per animal unit is applied to the number of animal units on the average-sized farm, it amounts to $903 in favor of the higher-profit farms.

The average farm among the 114 fed $120 worth of feed during 1927 for every $100 worth of livestock on hand at the beginning of the year. This feed produced livestock and livestock products worth $174. Thus for every $100 worth of stock on hand, $54 was returned above feed cost. The most profitable farms carried a livestock inventory of $9.50 an acre, the least profitable group carried $5.72, or a difference of $3.76. When this difference is applied to the area of the average farm and to the return above feed fed, $340 of the difference in farm incomes is accounted for.

With the exception of wheat, the most profitable farms excelled in the area devoted to the higher-profit crops. When the percentage of crop area planted to each crop in the two groups of farms is applied to the crop area of the average farm and crop yields on the

[1] An animal unit is one cow, horse, mature steer or its equivalent in other livestock.

average of the 114 farms used, the difference in relative proportion of land in higher-profit crops is seen to have been responsible for $298 of the difference in net incomes on the two groups of farms.

The most profitable farms had a total labor cost of $6.48 an acre, including hired and family labor, the least profitable farms, $5.53. When the difference between these labor costs is applied to the area of the average farm, the least profitable farms are shown to have used $157 less labor than the most profitable.

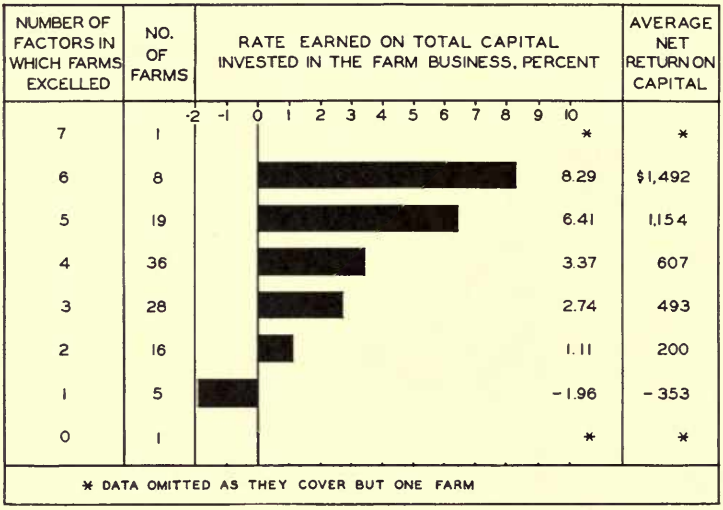


FIG. 18.—RELATION BETWEEN RATE EARNED ON FARM INVESTMENT AND NUMBER OF GOOD MANAGEMENT FACTORS ON WHICH 114 FARMS IN AREA 7 EXCELLED

The seven factors used as the basis of this chart are the same as those used in Fig. 17. Note the marked relation between the amount the farm earned and number of good management factors in which it was above average.

Power and machinery costs on the most profitable farms were 44 cents higher an acre than on the least profitable. Applied to the average acreage, this showed the least profitable farms to have had $73 lower power and machinery costs.

Farm expenses in addition to those mentioned above were $3.46 an acre on the most profitable farms and $2.72 on the least profitable. The total farm expenditures for this item, which included buildings and fences as well as other miscellaneous items, was thus $122 less on the least profitable farms than it was on the most profitable.

This leaves $200 to be credited to other management factors, one of the most important of which probably is the differences in prices

received for cash crops in the two groups of farms. Such differences in prices, judging from other studies, are very largely due to differences in grades of grain sold, rather than to good fortune in "hitting the market."

Only one farm in the group of 114 was above the average in all seven of the factors indicated in Fig. 18. Eight farms were above average in six of the seven; nineteen above in five; and so on down to one farm that was below average in all seven. The farmers that were above the average in the largest number of these factors earned the highest rate of interest. Those that were above in six earned 10¼ percent more on their capital than those above the average in only one. This difference amounted to $1,845 (Fig. 18).

These facts should demonstrate to the thoughtful farmer that he might well direct time and effort to improving the efficiency of enterprises that are below the average attained by the better farmers in his area. At the same time he should consider increasing the size of those enterprises in which he is efficient.

## SUCCESSFUL FARMERS POINT THE WAY

There is no one system of farming in southwest Illinois that can be said to be the most successful. On equally profitable farms there are wide variations in the contributions which the different enterprises make to the total farm income. The outstanding characteristic of successful farms is that they have good balance. The enterprises they have and the practices they follow are selected because the available soil, capital, and labor are best combined and used in that way.

Some idea of the methods and practices of five farmers who, thru careful planning, have attained a high standard of success in comparison with their neighbors, will be of interest. Especial attention is called to the wide variations that exist in sources of income on these five successful farms located in the same community (Table 16, page 456).

The information concerning Farms 1 and 2 was taken from records kept by the owners in the Illinois Farm Account Book. That concerning Farms 3, 4, and 5 came from detailed cost-account records kept by the owners in cooperation with the University.

### Farm 1—General Farming

Farm 1 is devoted to general farming. It consists of 185 acres. The land is all tillable, tho bluegrass in permanent pasture is used. The crop rotation, which requires five years, is corn, oats, wheat, clover hay, and wheat, with sweet clover plowed down before corn the following spring. Sales of dairy products and dairy cattle are the principal source of in-

TABLE 16.—EARNINGS, ORGANIZATION, AND DISTRIBUTION OF CAPITAL ON FIVE SUCCESSFUL FARMS IN SOUTHWEST ILLINOIS, 1927

| Farm No. | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Rate earned | 7.4% | 7.6% | 6.6% | 8.7% | 8.3% |
| Labor and management wage | $ 1 196 | $ 1 231 | $ 927 | $ 895 | $ 1 429 |
| Size of farm, acres | 185 | 176 | 120 | 108 | 180 |
| Land area tillable, acres | 174 | 135 | 116 | 98 | 162 |
| Income from— | | | | | |
| Crops | $ 1 581 | $ 2 875 | $ 1 121 | $ 1 020 | $ 1 908 |
| Horses | ..... | ..... | 99 | 10 | ..... |
| Cattle | 648 | 34 | 341 | 267 | 315 |
| Hogs | 534 | 82 | 622 | ..... | 595 |
| Sheep | ..... | ..... | ..... | ..... | ..... |
| Poultry and eggs | 842 | 336 | 714 | 1 205 | 1 015 |
| Dairy sales | 2 160 | 647 | 2 252 | 1 139 | 1 881 |
| Miscellaneous | 61 | ..... | 51 | 63 | 316 |
| Acres in harvested crops, total | 150 | 126 | 96 | 86 | 159 |
| Corn | 36 | 26 | 28 | 31 | 39 |
| Oats | 22 | 15 | 13 | 14 | 11 |
| Wheat | 59 | 51 | 35 | 29 | 92 |
| Barley | .. | .. | .. | .. | .. |
| Red clover | 24 | 5 | 20 | 7 | .. |
| Alfalfa | .. | 2 | .. | 2 | 17 |
| Mixed clover | .. | 19 | .. | .. | .. |
| Timothy | 6 | .. | .. | 3 | .. |
| Soybeans | 3 | 2 | .. | .. | .. |
| Potatoes and truck | .. | 6 | .. | .. | .. |
| Orchard | .. | .. | .. | .. | 8 |
| Acres in pasture | | | | | |
| Legume | .. | 9 | 20 | .. | [1] |
| Permanent | 24 | .. | .. | 17 | 7 |
| Crop yields | | | | | |
| Corn, bushels | 35.0 | 42.3 | 43.6 | 40.0 | 40.6 |
| Oats, bushels | 19.0 | 20.0 | 17.7 | 8.9 | 23.4 |
| Wheat, bushels | 15.0 | 19.6 | 20.9 | 20.0 | 16.0 |
| Hay, tons | 1.8[2] | 2.3 | 1.2 | 2.8[3] | 1.8 |
| Number of— | | | | | |
| Work horses | 10 | 6 | 6 | 5 | 6 |
| Cows | 17 | 6 | 14 | 8 | 12 |
| Other cattle | 11 | .. | 6 | 4 | 7 |
| Brood sows | 4 | 1 | 4 | .. | 1 |
| Sheep | .. | .. | .. | .. | .. |
| Chickens | 324 | 157 | 345 | 354 | 405 |
| Investment per acre in productive livestock | $ 12.03 | $ 3.57 | $ 16.30 | $ 10.68 | $ 11.63 |
| Receipts per acre from productive livestock | 22.60 | 6.24 | 32.61 | 24.20 | 20.63 |
| Capital invested, total | $24 350 | $23 831 | $20 596 | $13 457 | $25 306 |
| Land | 14 800 | 17 060 | 12 049 | 7 335 | 15 717 |
| Farm improvements | 3 179 | 1 833 | 3 529 | 2 409 | 4 318 |
| Machinery and equipment | 1 450 | 1 203 | 1 412 | 1 051 | 1 434 |
| Feed and supplies | 1 575 | 2 583 | 1 159 | 1 063 | 1 467 |
| Productive livestock | 2 226 | 628 | 1 958 | 1 154 | 2 140 |
| Horses | 1 120 | 524 | 490 | 445 | 230 |
| Receipts, total | $ 5 826 | $ 3 974 | $ 5 200 | $ 3 704 | $ 6 030 |
| Expenses, total | $ 3 237 | $ 1 552 | $ 2 462 | $ 1 636 | $ 2 209 |
| Farm improvements | 226 | 78 | 282 | 135 | 334 |
| Machinery and equipment | 201 | 352 | 447 | 256 | 494 |
| Feed purchased | 1 702 | 108 | 1 380 | 651 | 833 |
| Misc. livestock expense | 22 | 62 | 52 | 106 | 6 |
| Miscellaneous crop expense | 368 | 120 | 180 | 166 | 349 |
| Hired labor | 436 | 497 | 23 | 22 | 37 |
| Other expense | 282 | 335 | 98 | 300 | 156 |
| Unpaid labor | $ 775 | $ 600 | $ 1 382 | $ 1 100 | $ 1 728 |
| Net income to investment and management | $ 1 814 | $ 1 822 | $ 1 356 | $ 968 | $ 2 093 |
| Gross receipts per acre | $ 31.50 | $ 22.55 | $ 43.33 | $ 34.30 | $ 33.50 |
| Total expense per acre | 21.70 | 12.20 | 32.10 | 25.34 | 21.87 |
| Net receipts per acre | 9.80 | 10.35 | 11.23 | 8.96 | 11.63 |
| Tractor | No | No | No | No | Yes |

[1]Sixteen acres of sweet-clover pasture plowed in June and put into corn. [2]Harvested 7 tons of stubble clover. [3]Harvested 20 tons of stubble clover.

come, totaling $2,808 in 1927. Little grain other than wheat is sold, most of it being fed to livestock. Crop sales and increases in crop carryovers were $1,581 in 1927 and constituted approximately 25 percent of the total receipts.

Crop yields are not so high as on the other four farms, nor are the livestock returns so high per animal; but by a well-balanced system of farming and by economical operation, the farm is made to return earnings about equal to the others. The total expenses were only $21.70 an acre, which is low for a livestock farm selling as high as $31.50 worth of products to the acre. However, the expenses on this farm, which in 1927 included $1,702 spent for feed, would be materially lowered if crop yields were increased by using a mixed legume in the rotation, for pasture, instead of keeping a permanent pasture.

This farm represents a very safe type of farming for this area where crop failure is especially to be guarded against. Income is derived from a variety of sources and very largely from livestock. A failure of one crop or a decline in wheat prices, therefore, would not seriously cripple the business for the year.

## Farm 2—Cash Grain

Altho a good example of the cash-grain farms of this area, Farm 2 does not include as much tillable land as most of them. There are only 135 acres of tillable crop land. The operator has been able to increase his volume of business somewhat by growing 6 acres of potatoes and truck crops. The remainder of the tillable land carries the same rotation as livestock farms usually do. Approximately 75 percent of the total receipts are derived from the sale of crops.

This farm has a good type of noncalcareous subsoil and has good surface drainage. Practically all of it has been limed. Clover has been grown at least once on all the tillable land. The natural condition of the soil and the continuous seeding of legumes with the small grains is responsible for the unusually high crop yields. The total receipts per acre, however, amounted to only $22.55.

As a result of strict economy in operation and the incurring of little livestock expense, the cost of operating this farm was only $12.20 an acre. It was principally thru keeping down costs that the net receipts were kept as high as $10.35 an acre.

## Farm 3—Dairy and Wheat

Farm 3 represents the more strictly dairy-wheat farms that are following a soil-improvement program. It was covered with limestone during the three-year period 1920-1922. The field system was reorganized in 1920 and a rotation consisting of corn, oats, wheat, clover hay, wheat, and sweet-clover pasture adopted. The layout of the fields before and after reorganization are shown in Figs. 15 and 16. The present organization provides as many fields of approximately the same size as there are years in the rotation, and thus makes possible a strict adherence to the rotation without dividing a field between two or more crops. The long narrow fields economize labor by reducing to a minimum the number of necessary turns with machinery.

Thru the use of limestone and legumes, the yields of grain crops have been gradually increased until in 1927 the corn averaged 44 bushels when the county average was only 26 bushels, and wheat yielded 21 bushels when the county average was only 11 bushels.

By using legumes for hay and pasture, better feeds have been available. Since more feed can ordinarily be taken from an acre in legumes than from an acre in grasses, less acreage is now required for hay and forage and a higher proportion of the farm is devoted to growing feed grains and wheat.

More livestock has been added as increased crop yields have made more feed available. The dairy herd is as large as can be carried on the home-grown roughages. A mill feed averaging about 16 percent protein was bought to balance the home-grown clover hay and silage. With this ration very good results were obtained. The cows produced 7,921 pounds of milk, which was 1,158 pounds more than the average of all 18 Clinton county cost-accounting farms. The feed cost was $1.08 a hundred pounds of milk. The average feed cost per hundred pounds of milk for the 18 cost-account farms in Clinton county was $1.30.

The hog enterprise was not large, only 7,686 pounds of pork being produced; nevertheless it returned a good profit and was a valuable supplement to the dairy. Pork was produced at a feed cost of $4.98 per hundred pounds. This was $1.64 less a hundred pounds than the average on the 18 Clinton county farms.

With a rotation of corn, oats, wheat, clover hay, wheat, and sweet-clover pasture, 14 dairy cows with the accompanying young stock, 4 brood sows, and a flock of 375 chickens, labor is utilized fairly evenly thruout the year.

### Farm 4—Emphasis on Poultry

The poultry enterprise is stressed on Farm 4, which includes only 108 acres. The receipts from poultry in 1927 were $1,205. Because this enterprise produces a high-value product as compared with the cost of feed, it is especially well adapted to a small farm such as this, where the problem

FIG. 19.—POULTRY ARE AN IMPORTANT SOURCE OF FARM INCOME IN AREA 7

More houses of modern type are needed to care for the poultry enterprise. Above is shown a very serviceable type of house. The yard was later filled with dirt in order to provide better drainage, an essential part of a good poultry yard.

of developing a profitable volume of business is especially acute. Dairying is also an important enterprise on this farm, affording steady employment the year around and increasing the volume of business. Hogs are not kept except for home meat.

The pasture has not been brought into the rotation; bluegrass in permanent pasture has been continued. An extra field of corn has been put into the six-year rotation in the place of sweet-clover pasture; thus the sequence of crops is corn, corn, oats, wheat, hay, and wheat, with sweet clover seeded in the wheat and plowed down the following spring. The hay is mostly red clover with a small field each of alfalfa and timothy. Ordinarily additional clover hay has been obtained from a stubble crop. With equal acreages of corn and wheat in a six-year rotation, the new cropping plan has made more feed available for livestock.

## Farm 5—Acreage Increased to Utilize Labor

Farm 5 illustrates the advantage of increasing the size of the farm to utilize available family labor. This farmer with several sons added 80 acres of rented land to the 100 acres of owned land. The 100 acres he has improved with a soil-building program; the 80 acres have been only partly limed. The organization of the home farm of 100 acres is essentially the same as that of Farm 3 excepting that Farm 5 grows alfalfa in the rotation as an annual hay, rather than red clover. Yields are about the same on both farms. The 80 acres of rented land were farmed mostly in wheat in 1927, since wheat is usually the most profitable crop on unlimed land and further is a crop that can be handled entirely during the summer months when the boys are not in school.

Farm 5 also furnishes a good example of the advantages of a soil-improvement program. In 1927, 30 acres of wheat were grown on the home farm and 62 acres on the rented land. The home farm had been limed and had had one-third of the land in legumes each year since 1919, while the wheat land on the rented farm was only partly limed and had not grown a legume crop in recent years. The rented land, however, was treated with a light application of manure and commercial fertilizer ahead of the 1927 wheat crop. The total cost of wheat on the home farm was 88 cents a bushel—on the rented farm, $1.32 a bushel. The difference of 44 cents in favor of the improved land was due very largely to the higher yield there.

The operator of this farm did not do so well with his cows as the operator of Farm 3. This was due largely to the fact that sweet clover did not come thru the winter in good shape and was only pastured until June, when the field was plowed and put into corn. The cows were then turned on to a limited area of the alfalfa field and were barn-fed to keep up production. The production per cow averaged about 600 pounds less than on Farm 3, the feed cost about $8 more. Farm 5 produced a hundred pounds of pork at slightly less cost than the average of the 18 Clinton county farms. On Farm 5 the combined feed and labor cost of a hundred pounds of pork was $7.57 as compared with $7.66 on the 18 farms.

The operator of Farm 5 is successful because he is a fairly efficient producer of livestock products and raises the maximum acreage of the

most profitable crops at a low cost. The farm is a well-balanced unit, requiring no feed purchases except supplementary feeds to make a better balanced ration.

## SUMMARY

This bulletin aims to analyze and measure the important management factors that have caused wide differences in income among farms in the dairy and wheat area of Illinois neighboring St. Louis, known as farming-type Area 7 and including the greater part of Madison, Bond, Clinton, St. Clair, Washington, Monroe, and Randolph counties.

The farms in the area are small, family-sized farms operated without much hired labor. They average about 130 acres, according to the 1930 Census. The farms included in this study average about 165 acres.

While the soils of the area in general are not so highly productive as those of some other areas of Illinois, under good management they are capable of producing better crop yields than many operators are obtaining.

Winter wheat has occupied about 40 percent of the crop land in recent years, corn about 20 percent. The land adjacent to small streams is cut into hills and valleys suited only to permanent bluegrass pasture.

Milk production has about doubled in the past twenty-five years, displacing hog and sheep production to quite an extent. About 80 percent of the whole milk used in St. Louis is produced in Illinois and most of it in this area. Livestock raising, aside from the production of milk and poultry, is of minor importance. Only enough pigs are raised and fattened to supply meat for the family or to sell to neighbors for butchering.

Among a group of 114 farms studied, the 23 most profitable earned in 1927, a normal crop year, 9.4 percent on an average capital investment of $19,430; the 23 least profitable failed by 2.6 to earn anything on an average capital investment of $14,474. (*Pages 419-20*)

In terms of "labor and management wage," the most profitable farms earned $1,463; the least profitable failed by $538 to have anything for their labor and management. In terms of "net income from investment and management" the most profitable had a return of $1,834; the least profitable were short $372 of realizing anything. (*Pages 419-20*)

What were the important management factors that influenced these differences in earnings? The results of this study show that the factor of first importance was the larger volume of business which the most profitable farms developed. This was obtained thru higher acre-yields

of crops, the planting of a larger proportion of the crop land to the higher-profit crops, and the carrying of more livestock and livestock of better grades. Better utilization of labor and power, and more conservative expenditures for buildings and equipment considering volume of business, were also factors in causing the difference in earnings.

1. *Larger Volume of Business.* With only 11 percent more expense, the most profitable farms handled 174 percent more business than the least profitable farms. Volume of business is of special importance in this area, where farms often contain less than 100 acres and where the soil is not naturally highly productive. *(Pages 420-22)*

2. *Higher Acre-Yields.* Wheat yielded 6.8 bushels more an acre in 1927 on the most profitable farms than on the least; corn 19.3 bushels more, oats 5 bushels more, and hay 1,200 pounds more. These higher yields lowered unit costs. *(Pages 422-25)*

3. *Larger Proportion of Higher-Profit Crops.* The most profitable farms had 32 percent of their crop area in corn, the least profitable 20 percent. While the least profitable farms had the largest proportion of wheat in the rotation, their lower yields destroyed any advantage they might have reaped from this arrangement. The most profitable farms had only 11 percent of the crop area in oats; the least profitable farms had 15 percent. The most profitable farms had 5 percent of their crop area in alfalfa, the least profitable 3 percent. The least profitable farms had more of their area in timothy than in any other hay crop in spite of the fact that the crop was yielding only 1.1 tons an acre and that there is practically no justification for continuing to raise the crop at all in this area. *(Pages 425-31)*

4. *Marketing Crops Thru Livestock.* The 23 most profitable farms sold $2,574 worth of livestock and livestock products; the 23 least profitable, $1,299. The most profitable carried 26.2 percent more productive livestock than the least profitable. They had an investment of $9.50 an acre in productive livestock, the least profitable $5.76 an acre. A large part of the difference in income from livestock occurred in receipts from hogs, which were $844 on the most profitable farms and $186 on the least profitable; and in receipts from dairy products, which were $992 on the most profitable farms and $519 on the least profitable. *(Tables 9 and 13, and pages 431-36)*

5. *Better Grades of Livestock.* On the 23 most profitable farms the livestock enterprises returned $167 per animal unit, on the least profitable farms $106. For every $100 invested in livestock, the most profitable farms sold $43 more livestock and livestock products than the least profitable group. This was one of the most important single

causes for the differences in incomes between the two groups of farms. (*Pages 436-38*)

6. *Utilizing Labor to Better Advantage.* While the most profitable farms had a labor cost of $6.48 an acre, and the least profitable only $5.53, the most profitable farms used their labor to better advantage. Their accounts showed an average cost of $27 in hired and family labor for every $100 of income; the least profitable farms had a labor cost more than twice as large—$67 to $100 each of income. (*Page 438*). The layout of fields and buildings, the way in which crops are combined in rotations, and the way in which livestock are fitted into the farm scheme, are recognized as important factors affecting labor costs. (*Pages 446-48*)

7. *Keeping Down Power and Machinery Costs.* Power and machinery costs were 44 cents an acre higher on the most profitable farms than on the least profitable, but they were smaller in relation to income on the most profitable farms. An intensive study of 18 Clinton county farms revealed a range of 6 to 18 cents as the hour-cost of horse labor on the different farms, 62 cents to $2.86 as the hour-cost of a two-plow tractor. On the farm with the lowest labor cost the horses average 957 work hours each a year, at a cost per horse for feed and care of $60.76. On the farm with the highest cost the horses averaged only 445 work hours each and cost $136.34 each. (*Pages 439-44*)

8. *Buildings and Equipment.* For buildings and fences and other miscellaneous equipment the most profitable farms had a charge of $3.46 an acre, the least profitable $2.72 an acre (*page 446*); but the gross receipts on the most profitable farms were three times as large per acre as those on the least profitable farms. (*Table 2, page 420*)

*Diversification of Crops and Adjustment to Market Conditions.* Altho it is a matter of common observation that diversification of crops is a good form of insurance against a bad growing season or an adverse market for any individual crop, and that certain adjustments to market conditions are profitable in the long run and others are not, it was not possible in the present study to make any exact measurement of the financial advantages accruing from these management factors. (*Pages 448-51*)

*Importance of Balanced Farming.* If the most profitable and least profitable farms had each averaged 165.4 acres, the average of all 114, their net incomes would have differed by $2,332, owing to differences in management mentioned above and to other unmeasured factors. Further analysis indicates that the farms that earned the highest re-

turns on their capital were those that excelled in the greatest number of good management factors—not those that excelled in some one or two particulars and fell far short in others. In other words, *it was balanced farming that made profitable farming.* (*Pages 452-55*)

That balanced farming does not mean adherence to some particular system of farming is indicated by the fact that among the most profitable farms five very different systems were represented—general farming, cash grain, dairy and wheat, poultry, and general livestock. (*Pages 455-60*)

Since good balance is the primary consideration in profitable farming, it is suggested that farmers in this area direct their attention to improving the efficiency of the enterprises in which they are weak, and increasing the size of the enterprises in which they are efficient, rather than place their principal efforts on further improving the enterprises in which they are already reasonably efficient.