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Agriculture in the Clermont Silt Loam Area

☐ Area of very old glacial soils. ☐ Clermont silt loam area.

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An area comprising about twelve townships in Southwestern Ohio is known as the Clermont silt loam area. It is intersected by county lines so that almost equal parts of this territory lie in Warren, Clinton, Highland, Brown, and Clermont Counties. A large part of this area is very flat, with some rough and broken land near the few small branches of the Little Miami River which cut through it. No stream of any size is found here. The timber has been practically all cut off and since the land is quite level, more than seventy-five percent of it is tillable and has been farmed.

HISTORY OF AGRICULTURE IN THIS AREA

The fact that Cincinnati is only about twenty or twenty-five miles away has had a great influence upon the type of farming followed here. A wagon load of farm products could be hauled into the city direct from the farm, the entire trip being made in two days or less. This proximity of market naturally encouraged the extensive production of some cash crop.

Timothy the Leading Crop in the Past

Among other things, timothy hay was in great demand in the city a few years ago. It happened also that timothy hay could be produced on this Clermont silt loam area (which is wet sour soil) as well as any crop, and with a minimum amount of labor. The result was that this section served as a large source of supply for the timothy hay trade of the city for many years.

Cincinnati, one of the leading hay markets of the country, ships out more hay than any other city in the United States. Being located where it is, much of the hay which reaches the south comes from Cincinnati, on the edge of the hay producing section. Kansas City ranks second; and St. Louis, also near the divide between the producing north and consuming south, ranks third.

During the summer and fall fifteen or twenty years ago wagon loads of loose timothy hay could be seen moving from this territory toward the city any day. This was the farmer's chief source of income and this type of farming enabled him to make a comfortable living, and a fairly good income for the labor expended.

Fig. 1.—Rear view of barn, showing manure piled in the open (taken in 1916)

However, this system did not promote any live-stock farming. There was no need for these farmers to pay any attention to pastures or feed crops, as very little livestock was kept and only a small part of their income came from this source. Often almost an entire farm would be in timothy hay year after year as long as timothy would grow. Naturally, with the small amount of labor required in such a system, there was a tendency to increase the amount of land farmed. Farms of this section are larger than those in the other parts of the same counties as well as the average for the state.

Change in Type of Farming

Because of some very definite reasons this system of farming was compelled to pass. In the first place, much of this soil became so depleted that even timothy would not grow well; the yield became very low. At the same time, taxes and other expenses were increasing, so that the farmers found it necessary to adopt some other system which would give a larger return per acre and per man.

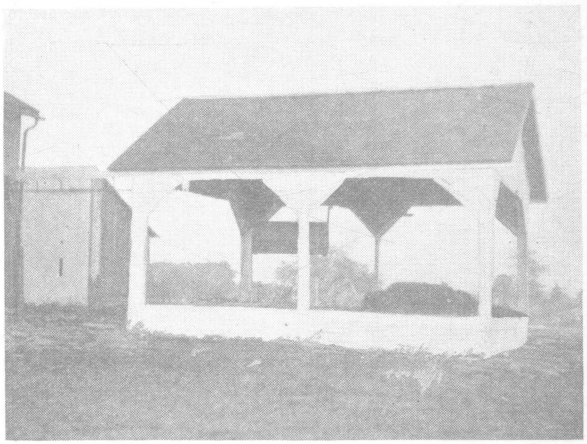

Fig. 2.—Manure shed, annex to barn in Fig. 1, with manure carrier running from the barn (taken in 1924). A substantial increase in crop yields has been secured on this farm

Along with this change also came the automobiles and trucks in the cities, which unquestionably replaced many horses. The consumption of gasoline increased, while the demand for timothy hay began to decline. Horses not on farms in Ohio decreased from 188,000 in 1910 to 89,000 in 1920, according to the census. Receipts of hay at the leading markets of the United States have decreased nearly 50 percent since 1910. New York, the market receiving the largest amount of hay since figures are available, received 348,000 tons per year during the ten years from 1904 to 1913, and only 197,000 tons per year from 1914 to 1923. From 1920 to 1923 the average was only 99,000 tons annually.

It is not surprising that the majority of farmers in this section found it rather difficult to make farming pay during the period of this change. Their hay yields were decreasing, farm operating expenses were increasing, and the demand for their product was falling off. Naturally, this forced a change in the system of farming.

Cereals Increase as Timothy Decreases

The easiest and most logical change was to plow up some of the timothy meadows and devote a somewhat larger acreage to corn and small grains. From 1910 to 1920 there was an increase of over 16 percent in the acreage of cereals in these five counties. Unquestionably the percentage would be much greater if figures for this territory alone were available rather than for the entire counties.

It is to be regretted that figures are not available by townships to show the changes that have taken place in the type of farming here. Figures for the entire five counties show that the amount of pure timothy hay decreased from 105,000 acres in 1910 to 50,000 acres in 1920, or a decrease of 52 percent. This is not entirely the result of changing from timothy to other grasses, as the acreage of all timothy, clover, alfalfa, and mixed hay in these five counties decreased from 141,134 acres in 1910 to 108,642 in 1920. This was a decrease of 23 percent, while the entire state showed a decrease of only 4½ percent.

During the last few years crop rotations in this area have been given more attention than in the past, yet many fields are producing very poor crops of wheat and corn after the exhausting effect of long cropping to timothy. While the average yield per acre of corn in these five counties during the four years from 1921 to 1924 was 33.6 bushels, of wheat 11.6 bushels, of oats 26.4 bushels, in this soil area alone it is safe to assume that the average yield per acre has

not been more than 10 bushels of wheat, 20 bushels of oats, and 25 bushels of corn, since some other portions of each of these counties are much more productive.

NATURE OF SURVEY

In view of these conditions, there are many difficulties in the way of a desirable farm program for this territory. The county extension agents in the five counties which include this area asked that a farm management survey be made to find out the desirable and undesirable practices in this territory. They, together with the

Fig. 3.—A good homestead on one of the successful farms of this area. Crop yields and livestock returns are far above the average

local bankers and township chairmen, picked out about 20 men in each county who were farming this Clermont soil, yet were making a good return on their labor and capital invested. These were selected men and probably represent the best farmers of their communities. It was thought that these men who are at present making a success on this land should have the best solution for the many problems there.

A complete farm management survey was taken of these farms, with special emphasis placed upon the yields and cultural practices of all fields during the three years previous to the survey. Some records were discarded, but 83 were used as being accurate records of farms which were almost entirely typical Clermont soil. These selected farms are existing demonstrations of many of the practices desirable in this territory.

The following table gives figures for the average of the 83 farms and also for the 25 best out of this already selected group. These 25 best include the 5 best from each county.

Table I.—Type of Farming on Selected Farms, Southwestern Ohio

	All 83 farms	*Average 25 best farms*
Soil Utilization (per farm):		
Total acres	126	131
Crop acres	66	72
Acres tillable	97	105
Acres pasture	49	48
Acres rotation pasture	26	28
Acres woods and waste	13	13
Rotation:		
Corn, acres per farm (3-yr. av.)	28.8	32.8
Wheat, acres per farm (3-yr. av.)	21.5	24.6
Hay, acres per farm (3-yr. av.)	11.3	7.8
Livestock (per farm) May, 1923-1924:		
Number of cows	6.0	7.6
Number of ewes	5.5	6.2
Number of brood sows	4.6	6.3
Number of hens	107	168
Number of animal units	27.2	32.8
Sources of Income (1923):		
Per cent receipts from crops	10%	8½%
Per cent receipts from livestock	84%	85 %
Incomes		
Average farm income	$1,318	$1,912
Average labor income	$ 843	$1,417

The following conclusions are based on the experience of these men who unquestionably are making a success of farming this Clermont soil:

Soil Utilization.—The area per farm—tillable land as well as the woods and waste land—is somewhat near the average of all farms for this territory. The reason these farms have paid is not because of natural differences but largely on account of the methods of management followed. Most of these farms at one time produced timothy hay as a chief source of income, the same as a majority of the farms in this territory.

Rotation.—A three-year rotation—corn, wheat, and hay (largely alsike clover)—is quite common among these men. As

shown in the table, the acreage of wheat per farm per year was not as high as the corn; this was because there were small acreages of rye and oats on some farms.

It will also be noticed that the hay acreage was very much smaller. This was because many of these men cut only a small amount of hay, and left the remainder for pasture and as a cover crop to be plowed under. Several of these farmers cut no hay at all, but pastured it lightly all summer and then plowed the remainder under for the benefit of the soil.

Livestock and Sources of Income.—More livestock were kept on these selected farms than on the average of the community.

Fig. 4.—Much of the so-called timothy hay is largely weeds

The best 25 farms (which includes the 5 best from each county) had still more livestock than the average of the 83 farms. Approximately 84 percent of the receipts on the 83 farms came from livestock. This is a striking contrast to the practice on these farms a few years ago or even to the average farm of this community today.

There is still considerable hay sold from some farms in this section, although a small amount compared with twenty years ago. Only 21 of these 83 farms sold any hay during the year surveyed, and only 4 of the 25 who made the largest labor incomes sold any. None of them do this as a general practice now.

Incomes.—This entire group of 83 records shows an average farm income of $1,318 per farm for the year from May 1, 1923, to May 1, 1924. This farm income is the difference between farm receipts and expenses, including inventory changes.

The labor income, which is this farm income less 4 percent interest on all capital invested in the farm business, is $843, as table No. I shows. This $843 which the men averaged for their year's work was fairly good for the year 1923, and really higher than farm account records show in other parts of the state. The amount is very much above the average of this Clermont territory, as these are among the best farmers there.

On the same table, the 25 men of this group who had the best return have been averaged. Their farm income was $1,912 and the labor income $1,417.

Table II.—Financial Summary

	Average all farms	*Average 25 best farms*
Capital Investment:		
Real estate	$ 9,846	$10,042
Livestock	1,172	1,470
Machinery	639	620
Feed and supplies	215	255
Total capital	$11,872	$12,387
Receipts (including inventory changes):		
Hogs	$ 848	$ 1,113
Cattle and cattle products	718	922
Poultry and eggs	412	554
Sheep	55	86
Crop sales	241	262
Total receipts (including miscellaneous receipts and gain in feed on hand)	$ 2,406	$ 3,146
Expenses:		
Labor expense	$ 182	$ 236
Purchased feed expense	238	311
Fertilizer	93	115
Taxes and miscellaneous	383	394
Depreciation	168	178
Total net expense (including loss in feed on hand)	$ 1,088	$ 1,234
Farm income	$ 1,318	$ 1,912
Labor income	$ 843	$ 1,417

The total capital invested in the land and chattels on these farms averaged slightly less than $100 per acre. The sources of income in order of their importance were hogs, dairy cattle, poultry, crops, beef cattle, and sheep. These were primarily one-man farms as shown by the labor expenditure of $182 per farm. Much of this was allowed for family labor outside of the operator's own work.

There is very little difference in the size of farm, type of farming, or capital invested per farm between the average of all 83 farms and the average of the 25 best ones. However, the 25 farms were more efficient with what they had, as their receipts per farm are $740 higher, while their expenses are only increased by $146 (see Table II).

Table III.—Efficiency Factors

	Average all farms	*Average 25 best farms*
Size of Business:		
Total acres	126	131
Crop acres	66	72
Total animal units	27.3	32.8
Number of men	1.4	1.5
Number of horses	4.2	4.4
Labor Efficiency:		
Crop acres per man	46.5	46.5
Crop acres per horse	15.6	16.5
Animal units per man	19.3	21.2
Crop Yields (3-year average):		
Corn —Bushels per acre	42.7	47.9
Wheat—Bushels per acre	14.7	17.4
Oats —Bushels per acre	21.3	23.8
Hay —Tons per acre	1.1	1.2
Quality of Livestock:		
Return per $1.00 worth of feed fed	$ 1.43	$ 1.63
Dairy receipts per cow per year	$76.30	$85.60
Egg receipts per hen	$ 2.16	$ 2.68
Pigs raised per sow per year	10.5	11.2

The reason these selected farms were making such a good return for the labor and capital expended was because of greater efficiency in production. Table III shows that the 83 men received $1.43 for each dollar's worth of feed, while the 25 best men received $1.63. This difference of 20 cents on each dollar's worth of feed meant $280 more labor income per farm, as they each fed approximately $1,400 worth of feed to the productive livestock. This, to-

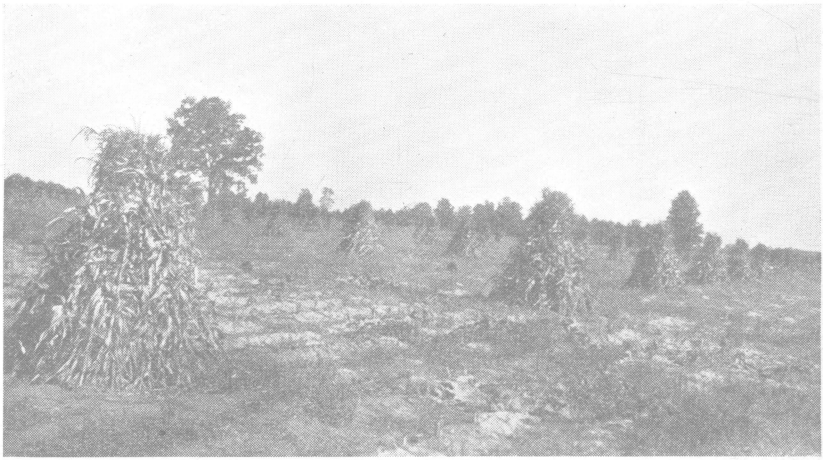

Fig. 5.—Typical Clermont silt loam. Corn on this farm has averaged about 50 bushels an acre for the last three years

gether with the egg sales, cream sales per cow, and pigs raised per sow, show that only stock of good quality were kept.

Unquestionably the good crop yields have had much to do with the success of these farms. The average corn yield for the three years 1921 to 1923 for all of these selected men was 42.7 bushels per acre. This is about 2½ bushels above the average for the entire state, even though the soil is inherently among the poorest of the entire state. Wheat and hay yields are just about equal to the state averages for these same three years.

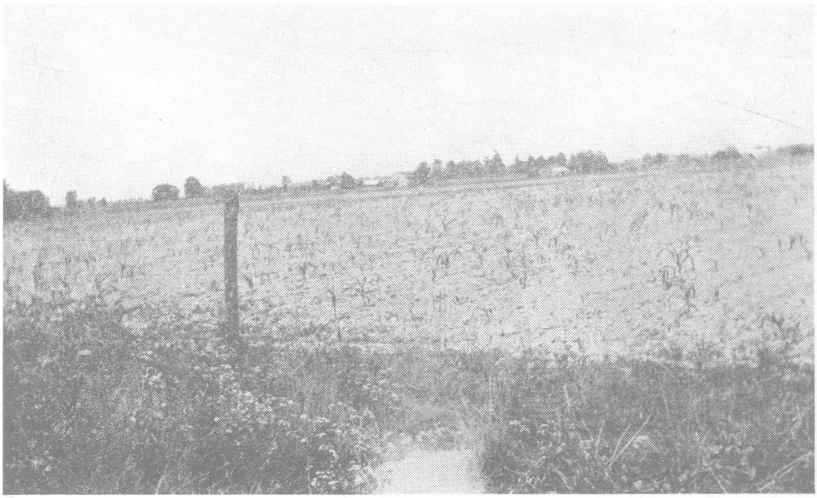

Fig. 6.—Another typical Clermont corn field. This picture was taken on July 29

TILE AND LIME ESSENTIAL

TILE

Much of the land in this section drains very poorly. Anyone can see at a glance that tiling is needed and needed badly. However, the question is not if it is needed, but whether or not it would be a wise investment. Tile lines in most of this soil should not be more than three rods apart for full efficiency. This makes tiling very expensive for the low value land. Tile here should make a very decided increase in yields to justify the added investment. Table IV shows the per-acre increase from tiling:

Table IV.—Relation of Tile to Corn Yields (3 years)

	Number of fields	*Number of acres*	*Corn yield per acre, bu.*
Completely tiled	57	1030	49.1
Partially tiled	88	1329	42.9
No tile	293	3758	41.3

These figures include all fields in corn during three consecutive years, so that an entire 3-year rotation would be covered. The same is true with the following table on wheat yields.

Table V.—Relation of Tile to Wheat Yields (3 years)

	Number of fields	*Number of acres*	*Av. yield per acre, bu.*
Completely tiled	42	737	17.5
Partially tiled	72	1071	15.0
No tile	211	2846	13.7

These completely tiled fields which have laterals every 3 or 4 rods, or closer, show a gain of 7.8 bushels of corn (Table IV), and 3.8 bushels of wheat (Table V) over the fields with no tile at all. This, however, does not necessarily tell the whole story, as there might be a tendency to tile the better or poorer fields.

The following classification is a division of the farms into three groups based upon the amount of tile per farm. This would discount any error through such a tendency.

Table VI.—Relation of Tile to Yields per Farm

	Number farms	*Hay yield per acre*	*Corn yield per acre*	*Wheat yield per acre*
Farms more than 1/3 tiled	18	1.4	48.3	16.2
Farms with little tile	29	1.1	42.6	14.0
Farms with no tile	36	.9	39.7	13.0

All of these tabulations covering 83 farms indicate that a gain of about 8 bushels of corn, 3½ bushels of wheat, and ½ ton of hay per acre was secured on the completely tiled land over the fields with no tile at all. These increases, figured at average prices for the three years covered by this survey, would give a return of about $5 or $6 per acre per year on the investment in tile. Some years undoubtedly would give a larger difference than this. Also, if tile were put in when prices were low they are prob-

Fig. 7.—Soybean growth produced on typical Clermont soil area. A 2- to 3-ton crop of hay is common even without fertilizers. The variety is Virginia, inoculated

ably paying a good return; but if they were to be installed at the present time it would require a large outlay of money.

These figures show consistently that tiled land produces better crops all through the rotation. When prices are somewhat more adjusted there will probably be a good return made on the investment in tiling on this soil.

LIME

Much of this soil is acid and needs considerable limestone an acre to neutralize it. However, many of the farmers were a little doubtful as to whether limestone was the first essential on this wet, compact soil containing practically no humus. Only 8 percent of

Fig. 8.—"All breeds and no breeding." A typical herd of dairy cows of this section

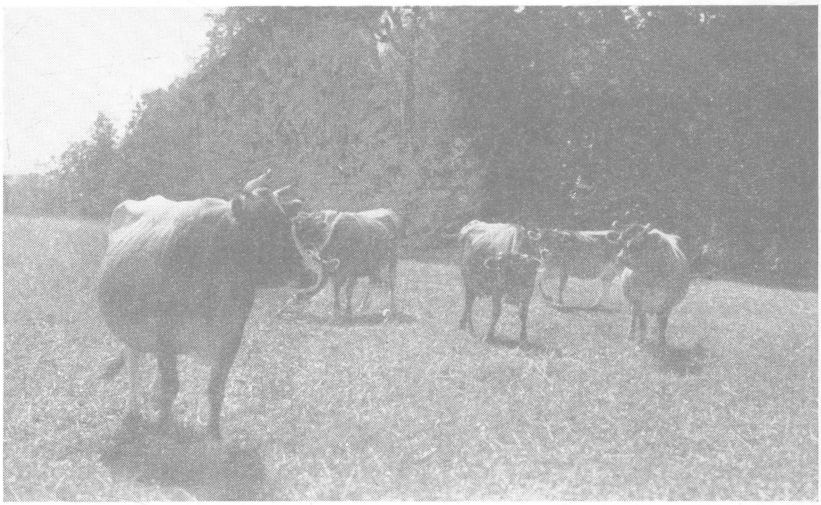

Fig. 9.—Cows on one of the good farms. Cream sold in 1923 averaged $171 per cow

the crop land on these farms has received any lime during the last eight years. This would give an average of 1 percent each year, which is a rather small proportion.

There are examples of limed fields in this area with good clover on them. However, there are other instances of fairly good clover fields which have never received any lime treatment. Table VII gives a comparison of the kinds of hay grown and the percentage of land limed between the average and the 25 best farms:

Fig. 10.—Response of clovers to liming on Clermont silt loam soil, Clinton County

Table VII.—Clover or Timothy (Average for 3 years)

	Average all 83 farms Per cent	*Average 25 best farms* Per cent
*Per cent of hay—clover	38	53
Per cent of hay—timothy	51	31
Per cent of hay—soybean	10	10
Per cent of times a stand of clover is secured	53	71
Per cent of crop ground limed in last 8 years	8	7

* Mixed hay was counted as partly clover and partly timothy, depending upon the amount of each in the mixture.

On all of these farms approximately one-half of the hay was timothy, while on the 25 most successful farms less than one-third was of this kind. Estimating over the last fifteen years these men figured that they received a fair stand of clover 53 percent of the time, while the 25 farms secured such a stand 71 percent of the time. This was with a comparatively small amount of lime applied. It must be recognized in this connection that phosphating and manuring on these better farms have been contributing forces toward better hay.

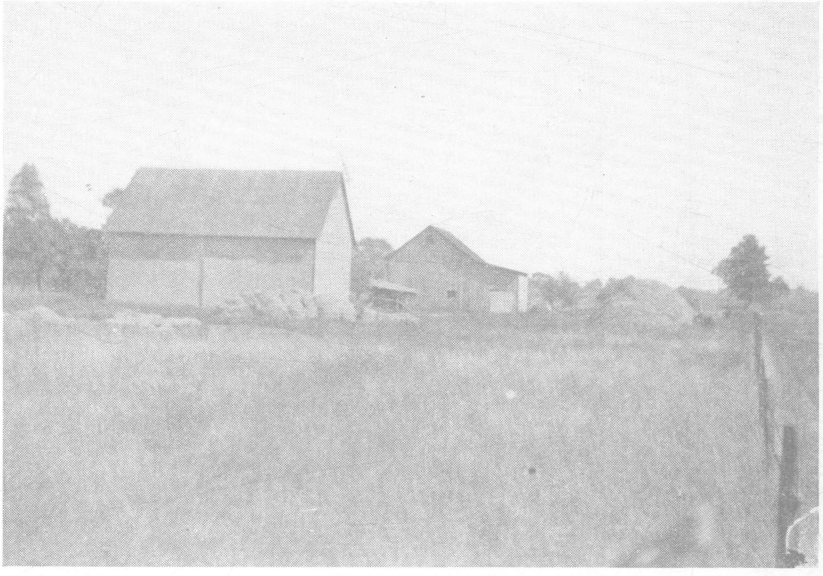

Fig. 11.—The waste of straw is too common in this area. The soils are lean in organic matter, and would respond markedly to the use of every available ton of crop residue

Limestone Demonstration Fields

Some limestone demonstration fields were started in 1923 in this territory. In each case from 1½ to 2½ tons of limestone an acre were applied to one part of the field, while the other half was left with no lime. The culture and seeding was the same over the entire field. Two fields seeded to a mixture of alfalfa and alsike clover produced a good stand of alfalfa where limed, and a good stand of alsike where no lime was applied.

One field which received only 1½ tons per acre where treated and sowed to sweet clover alone produced a rather spotted stand of

sweet clover on that portion, and none on the untreated half. The soil in this field reacts neutral where the sweet clover is found, and slightly acid where there is no sweet clover on the treated ground. The untreated part needs 2 tons an acre for neutralization.

Another field, one-half of which received 2½ tons of limestone an acre, was seeded to a mixture of red clover, alsike clover, sweet clover, and timothy. The treated portion produced a good stand of mixed red and sweet clover, while the untreated part had a stand of alsike and timothy, with only about one-half the yield of the other part.

In testing all of the fields that had received from 2 to 2½ tons an acre two years previous, the first 2 inches of soil were found to be neutral, at 4 inches deep it was slightly acid, and the remainder of the plow depth needed from 2 to 2½ tons per acre for neutralization. This indicates that another application will be advisable when the ground is plowed.

Table VIII.—Relation of Manure, Fertilizer, and Humus to Crop Yields

	Average all 83 farms	*Average 25 best farms*
Corn —yield per acre (3-yr. av.)	42.7 bu.	47.9 bu.
Wheat—yield per acre (3-yr. av.)	14.7 bu.	17.4 bu.
Hay —yield per acre (3-yr. av.)	1.1 tons	1.2 tons
Manure applied per acre, corn	5.2 tons	5.8 tons
Cover crop turned under per acre, corn	688 lbs.	1037 lbs.
Fertilizer per acre, corn and small grains	129 lbs.	155 lbs.
Per cent manure direct to field or from covered yards	56%	73%
Estimated change in crop yields on these farms during last 15 years	51% increase	71% increase

It must be remembered that these farms are selected ones and among the most profitable ones in this territory. Undoubtedly their success in crop yields was largely due to the fertilizer and organic matter program as shown in Table VIII. With an average of more than 5 tons of manure to each acre of corn, and a cover crop turned under which would have yielded more than 1/3 of a ton of cured hay per acre, it is not surprising that these men have estimated a 50 percent increase in yields during the last 15 years.

The residual effect of manure on clover in a potatoes-wheat-clover rotation on some plots on the Clermont County Experiment Farm, is shown in Table IX, taken from Bulletin 361 of the Ohio Experiment Station (Table 15).

Table IX.—Residual Effect on Clover of Treatment of Previous Crops in Potatoes-Wheat-Clover Rotation. Clermont County Experiment Farm

Plot No.	*Total treatment on previous crops of rotation*	*Clover yield 6-yr. av.*
1	None	1763 lbs.
2	Acid phosphate 400 lbs.	2721 lbs.
3	Acid phosphate 400 lbs., muriate potash 200 lbs.	2890 lbs.
4	None	1784 lbs.
5	Acid phosphate 400 lbs., muriate potash 200 lbs., nitrate soda 200 lbs.	2636 lbs.
6	Acid phosphate 800 lbs., muriate potash 400 lbs., nitrate soda 400 lbs.	3158 lbs.
7	None	1873 lbs.
8	Untreated manure 16 tons	4505 lbs.
9	Untreated manure 16 tons, acid phosphate 400 lbs.	4350 lbs.
10	None	1665 lbs.

The opinion of a majority of these men indicated that humus was the greatest and most immediate need of this land. The figures from this survey and the test work on this type of soil at the Experiment Farm substantiate this conviction.

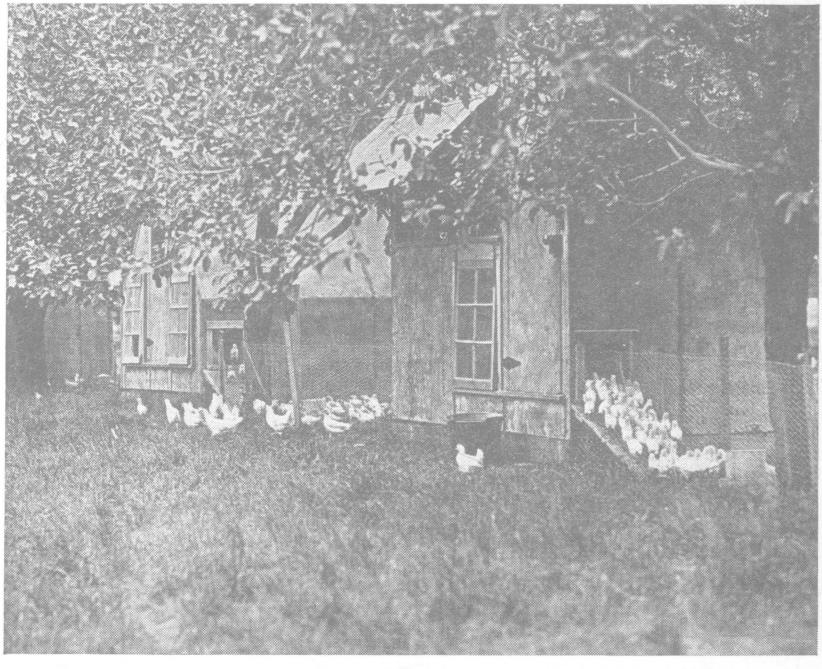

Fig. 12.—Chickens are one of the chief sources of income on these 83 farms

SUMMARY OF PRACTICES

The records of these selected farms show that it is possible to make a very good income on these Clermont silt loam farms. The following gives some of their practices:

1. Their farm practice called for a balance between livestock and crops, rather than the practice of selling crops which has been so common in the past and is still followed on many farms of this section. Most of the crops produced, except wheat, were fed on the farms.

2. They received a major part of their income from hogs, dairy cattle, and poultry.

3. They received an average of $1.43 net return for each dollar's worth of feed fed their livestock, which shows fairly good quality of stock.

4. They sold $76.30 worth of dairy products per cow; $2.16 worth of eggs per hen; and raised an average of 10½ pigs per brood sow per year.

5. They raised two litters of pigs per year.

6. Their crop yields averaged nearly double that of the majority of the farmers on this type of soil.

7. They were adding all possible humus-making material to the soil. Many of these men pastured down and plowed under a large part of their clover crop for soil improvement.

8. Practically no roughage was sold from any of these farms.

9. They used an average of 129 pounds of fertilizer for each acre of corn and small grains.

10. They were applying about 150 tons of manure per year to their crop ground. This amounts to over 5 tons per acre of corn since practically all the manure is applied to corn. More than one-half of this manure came directly from the stables or was kept in covered barnyards until hauled out.

11. Cover crops are being plowed under on much of the land. On a dry hay basis this would amount to more than 1/3 of a ton for each acre plowed for corn.

12. They are increasing the acreage of soybeans.

13. About 60 percent of their hay is a legume.

CONCLUSIONS

This study has shown some of the farm management practices followed by these men who are making a good return on this Clermont soil. The reason for their success is largely because they are receiving better crop yields than the average of this territory. The reason for the good crop yields is largely because of their use of legumes, plowing under of organic matter, feeding all harvested crops on the farm, and care of the available manure.

The Clermont soil program has been developed in this section, which, in addition to some of these things, calls for:

1. The use of lime for greater growth of legumes.
2. The use of legumes to balance the dairy ration and increase the organic matter returned to the soil.
3. The use of more dairy cattle to increase the farm income.
4. The use of more poultry to furnish a constant and steady income.
5. The laying of tile as fast as the incomes justify it—considering this a future need rather than a present necessity.

This puts at least part of the program within the reach of almost every farmer in this area. There should be at least one legume in the rotation for this soil. In fact, a 4-year rotation is suggested in connection with the Clermont program. This would be corn (followed by rye or vetch to be plowed under), soybeans, small grain, clover. This puts two legumes into the rotation. Increased use of soybeans will make a better ration at less cost. The highest single item of expense on these farms was purchased feed. More legume hay should reduce that expense and at the same time improve the ration fed.

It would be possible to increase the average farm flock from about 100 hens to nearly 200, with very little resultant increase in labor or equipment. This would insure a large enough working unit of poultry to warrant better attention, so that a higher egg production would probably result. This would furnish a steady income through the year instead of the seasonal income from wheat. Practically all of the income should come from livestock, with all of the manure and humus possible being returned to the land.

There is probably no section in the state of Ohio where the efforts of good management will pay as large a profit as in this area. The first problem here is the production of more and better crops to feed the livestock. A program of more legumes to balance the ration and improve the soil, plowing under cover crops, the feeding of all other crops to livestock, and better care and use of manure will unquestionably add materially to the incomes on these farms.