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FARMING in CUMBERLAND COUNTY . . .

In the Claypan Region
of Southern Illinois

A study of the effect
of differences in soil
and topography . . .

By R. C. ROSS, V. B. FIELDER,
and G. H. WALTER

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FOREWORD

THE KIND OF FARMING that prevails in a region is, of course, the result of many complex influences: soil, climate, markets, people. In areas where farming has deteriorated until it no longer provides an adequate living, it is especially important that the influences that have been and are at work be understood if real solutions for the problems that have developed are to be formulated.

The area chosen for this study is one where farming has long failed to provide a satisfactory income for a large share of the families attempting to live on the land. The problems have been accentuated by war conditions. It is hoped that the analysis presented in this bulletin may be of value not only to those interested in the problems of this particular area, but also to those who may undertake similar investigations of other areas and who therefore may be interested in the methods used.

Many members of the staff of the Illinois Agricultural Experiment Station and the Bureau of Agricultural Economics, U. S. Department of Agriculture, participated in this study. The work of the Illinois Station was done under the direction of an interdepartmental committee consisting of R. S. SMITH, Agronomy, *Chairman*; H. C. M. CASE, Agricultural Economics; W. B. NEVENS, Dairy Cattle Feeding; and R. R. SNAPP, Beef Cattle Husbandry. Under this committee R. C. ROSS acted as coordinator for all departments of the Station. Part of the material on woodlands and pastures was selected from special reports by J. N. SPAETH, Forestry, and R. F. FUELLEMAN, Crop Production.

Acknowledgment is due also the following people who assisted in the collection of data: E. A. DUERST, K. E. KINSINGER, G. A. LEE, E. N. SEARLS, and L. H. SIMERL, all of the Department of Agricultural Economics, University of Illinois; and PAUL T. VEAL, Bureau of Agricultural Economics, U. S. Department of Agriculture.

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FARMING IN CUMBERLAND COUNTY

A Study of the Effect of Differences in Soil and Topography

By R. C. ROSS, V. B. FIELDER, and G. H. WALTER¹

THE CLAYPAN REGION of southern Illinois, comprizing approximately 7.5 million acres, is characterized by small farms, low farm incomes, and soils of low productivity. These soils, which are not suited to the methods of farming practiced in more productive areas, have not been used for purposes for which they are best adapted; this has led to a low standard of living for a large number of farm families and to widespread need for public assistance. Economic and social problems have been intensified by the financial burden of school districts, townships, and counties which are too small and numerous.

Because of the extent of this region and the low level of living which many of the farms afford, it was considered desirable to try to ascertain the effect which differences in soils and topography have had on the farming and living conditions in the region, and to suggest adjustments which will improve the general welfare of the farm families living there.

Cumberland county lies in the northern part of this region and is representative of the region as a whole (Figs. 1 and 2). As early as 1932 an interdepartmental land-use committee of the College of Agriculture recommended it for a comprehensive land-use study.

For the present study the county was divided into five areas on the basis of topography and soil (Fig. 6, page 288). These areas are described as hilly, light-gray prairie, dark-gray prairie, river bottom, and morainal. Farm-survey records were obtained from an average of about 55 rural families selected at random in each area. These records were supplemented by special field surveys on pastures, soil erosion, and woodland. County records were used for data on public assistance and assessed value of land and improvements; additional data on public assistance were obtained from records of the Old Age Assistance

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Administration, Works Progress Administration, and the Illinois Emergency Relief Commission.

The first part of this study is a comparison of Cumberland county with three areas: the entire type-of-farming area of which it is a part (No. 7); Type-of-Farming area 4a (which represents the most productive land in the state); and the state as a whole. These comparisons provide a setting for the sections that follow, especially for the applicability of the findings to the claypan region as a whole. Population and agricultural trends in Cumberland county are treated next. Then follows the principal part of the study, a description of the physical characteristics of the five major soil areas in the county and an analysis of the farm-survey records for each of these areas. A concluding section summarizes the more important findings and recommends adjustments, indicating procedures for achieving them.

CUMBERLAND COUNTY AND THE CLAYPAN REGION

Cumberland county has the various kinds of soil and topography which are commonly found in the claypan region. These include prairie and timber soils that are low in productivity and nearly level; rough, hilly lands adjacent to streams; and large areas of river-bottom land. The representative nature of the county is further indicated by the fact that the seven soil types which constitute 71 percent of its area occupy 79 percent of the claypan region.¹ Except in the bottomland, the soils of the region are old, mature, silt loams, badly leached and strongly acid. They are usually gray and have developed a claypan within 2 feet or less of the surface on the nearly level areas. This claypan not only impedes the downward movement of water but also cuts off its upward movement at times when there is rapid evaporation from the surface; this causes the soil to dry out. As a result, near crop failures frequently occur if rainfall is either excessive or scanty during the growing season.

The proportion of the various grades of soil in Cumberland county is almost the same as for the 13 counties of Area 7, only .26 percent of which is in soil grade No. 3 or better. In the 18 counties of Area 4a, on the other hand, 57.8 percent of the land grades No. 3 or better (Table 1).

A relatively high proportion of farms in Cumberland county are

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¹The proportions of these soil types vary greatly among counties.

TABLE 1.—PERCENTAGES OF CUMBERLAND COUNTY AND OTHER ILLINOIS AREAS IN VARIOUS SOIL GRADES^a

Soil grade	Cumberland county	Area 7: southern Illinois	Area 4a: east-central Illinois	Entire state
1 to 3.....	.8	.26	57.8	30.8
4 to 7.....	23.0	22.2	37.8	37.9
8 to 10.....	76.2	77.6	4.4	31.3

^aFrom Soil Report 69, Cumberland County Soils, University of Illinois Agricultural Experiment Station, 1940. The index numbers assigned to a soil type for production of field crops is based on the ability of the type to produce the major crops grown in the region without soil treatment but with the soil in a cleared and drained condition. The scale used is 1 to 10, the most productive soil in the state being rated as 1 and the least productive as 10.

small. In 1940, 51 percent in this county and 58 percent in Area 7 had less than 100 acres, whereas only 26 percent in Area 4a were this small (Table 2). Nearly 33 percent of the farms in Area 7 were under 50 acres, whereas less than 14 percent in Area 4a had less than 50 acres.

Soils of low productivity of course mean low income per acre; when low productivity is combined with small size, very low incomes result. In 1939, 68 percent of all the farms in Cumberland county and 80 percent of those in Area 7 produced gross incomes of less than \$1,000 (Table 3). In Area 4a only 18 percent yielded incomes this

TABLE 2.—PERCENTAGE OF FARMS IN SPECIFIED SIZE-GROUPS^a

Size of farm	Cumberland county	Area 7: southern Illinois	Area 4a: east-central Illinois	Entire state
<i>acres</i>				
Under 50.....	27.8	32.6	13.8	21.0
50- 99.....	23.5	25.5	12.2	17.9
100-179.....	29.5	25.2	34.5	31.7
180-259.....	12.5	10.0	21.7	16.7
260-499.....	6.2	6.0	15.9	11.3
500 and over.....	.5	.7	1.9	1.4

^aU. S. Census, 1940.

TABLE 3.—PERCENTAGE OF FARMS WITH SPECIFIED GROSS INCOME, 1939^a

Income	Cumberland county	Area 7: southern Illinois	Area 4a: east-central Illinois	Entire state
Under \$600.....	49.4	61.9	12.4	29.0
\$ 600-\$ 999.....	18.8	18.2	5.9	12.2
1 000- 1 499.....	13.8	9.5	7.9	11.7
1 500- 2 499.....	10.7	7.0	20.1	17.7
2 500- 3 999.....	5.1	2.2	26.3	15.3
4 000 and over.....	2.2	1.2	27.4	14.1

^aU. S. Census, 1940.

General productivity and adaptation of Illinois soils. Cumberland county, marked with a cross, lies at the northern edge of the claypan region of southern Illinois, which is occupied largely by soils of low to moderate productivity. (These area designations should not be confused with the rating scale for soil grades referred to in Table 1 and in the footnotes on several pages.) (Fig. 1)

KEY TO SYMBOLS: I—General farming soils of high productivity. II—Moderately productive soils adapted to small grains, soybeans, meadow, and pasture. III—Low to moderately productive soils adapted to cowpeas, soybeans, small grains, meadow, and pasture. IV—Soils adapted to general farming, livestock and dairy farming; variable in productivity because of variation in drainage conditions and erosion. V—Soils adapted to pasture and meadow, orchards, and timber; therefore to dairying, livestock farming, and orcharding. VI—Sand regions; soils adapted to special crops such as melons, sweet potatoes, etc. VII—Large bottoms, some with an overflow hazard.

(Prepared by Department of Agronomy, University of Illinois)

Cumberland county is representative of Farming Type Area 7. About half the claypan region of southern Illinois is included in these 13 counties. General rather than specialized farming is the rule, and the farms are small. Area 4a, consisting of 18 counties and lying above Area 7, represents the most productive land in the state. (Fig. 2)

low. For 62 percent of the farms in Area 7 the gross farm income was less than \$600; in Area 4a only 12 percent had this low an income.

Public assistance has been more widespread in southern Illinois than in other parts of the state. A number of counties in this region have carried a large chronic relief load. This has been particularly true of a few counties in which coal mining is an important industry. If

TABLE 4.—PERCENTAGE OF TOTAL POPULATION DEPENDENT ON FIVE TYPES OF PUBLIC ASSISTANCE^a

Year and month	Cumberland county	Area 7: southern Illinois	Area 4a: east-central Illinois	Entire state
July..... 1939	20.9	28.1	14.6	15.4
July..... 1940	22.4	27.3	14.5	14.9
January.....	16.7	22.4	11.6	12.1
July..... 1941 ^b	15.1	24.2	12.6	12.3
January.....	10.1	18.2	7.6	8.3

^aMonthly reports of the Illinois Public Aid Commission. The five types of public assistance are: general relief, Works Progress Administration, old-age assistance, blind pensions, and mothers' pensions. ^bOn basis of the total 1940 population.

these heavy coal-producing areas are excluded, the proportion of people receiving public assistance in Area 7 has been similar to that in Cumberland county. In recent years about twice as large a percentage of the total population in Area 7 as in Area 4a has been dependent upon five types of public assistance (Table 4).¹

Many other conditions in Cumberland county, such as state of public health, availability of farm facilities such as electricity, hard roads, telephones, etc., low value of land and buildings and amount of state aid to schools, are also similar to those in the claypan region as a whole.

Thus Cumberland county is not only representative of the claypan region in general but it is especially representative of that portion designated as Type-of-Farming Area 7. That the economic level of agriculture in the whole of the claypan region is low is shown by comparison of Cumberland county with Type-of-Farming Area 4a.

POPULATION AND AGRICULTURAL TRENDS

Cumberland county is relatively small both in area and in population.¹ The population reached a peak of 16,124 in 1900, then steadily declined to 10,419 in 1930 and increased to 11,698 in 1940.² The farm population declined even more rapidly (52 percent) from 1900 to 1930, and has increased at a somewhat slower rate since 1930. The recent gain was partly due to the depression, which caused a movement away from the city and to the country. Since Cumberland county is close to

¹The county contains about 350 square miles and ranks 84th in size among the 102 counties of Illinois.

²The number of families declined from 3,571 in 1900 to 2,825 in 1930, and the average size of family declined from 4.5 persons to 3.7 persons.

several small cities, this movement raised its total population, and the farm population followed the trend of the total population. In 1940 only 30 percent of the people in the county lived in villages of more than 100 persons. The population of the four principal towns was lower in 1930 than it had been for several decades; but by 1940 it was 17 percent over that of 1930, this increase accounting for 40 percent of the total increase in the county. In 1940, 10.3 percent of the population were 65 years old or older, whereas only 7.2 percent of the people of the state as a whole were that old.

Most of Cumberland county lies in an area of mixed farming, altho the western part of the county is in the wheat, dairy, and poultry area (Area 6). General rather than specialized farming has been the rule. About 71 percent of the land in farms is tillable. Approximately 56 percent of this tillable land is used in growing grain and hay crops and about one-third is in pasture. According to the 1940 Census, 42 percent of the farms drew their major incomes in 1939 from livestock and livestock products, 23 percent from field crops, and 32 percent from farm products used by the farm household (subsistence-type farms).

The percentage of farms operated by full owners, part owners, and tenants has remained relatively constant since 1900. In 1940 full owners operated 43.8 percent of the farms; part owners, 25.7 percent; and tenants, 30.4 percent. Percentages given in Census reports beginning with 1900 have not ranged more than 3 points from these percentages. The proportion of land operated by each tenure group has also been relatively uniform for the past twenty years.

Because of the limited amount of feed produced per acre, livestock numbers have been low. The number of cattle has, however, increased gradually over a long period. Cattle kept mainly for milk are the most important class of livestock, altho only 124 farms drew their major source of income from dairy products in 1939. Nearly all dairy cattle are of grade breeding. Herds frequently contain both dairy and beef animals or animals of nondescript type. On many farms cattle are kept only to utilize feed and pasture and to supply the family with dairy products; on these farms little attention is given to breed. The few beef-cattle herds are found only on the larger farms. Few farmers buy feeder cattle.

While the number of hogs has declined in the last few decades, some are raised on most farms. In years when feed is plentiful considerable numbers are fed, especially in the better corn-producing areas and on the larger farms. When feed supplies are short, many farmers sell feeder pigs. There are few purebred herds in the county.

Altho the number of sheep has been fairly constant for the past forty years, it is much below that of the early years of the county. Very few flocks are found there now even tho the rough and rolling land is suited to them. As mechanization has gradually taken place, the number of horses has declined. The poultry enterprise has been important, tho available data do not show definite trends (Table 5). While the condition of poultry houses is generally better than that of other farm buildings, the flocks kept often exceed the capacity of the houses. Thruout the county the poultry shows better breeding than other livestock, no doubt because of the practice of buying chicks from hatcheries, which in turn buy eggs from flocks of improved breeding. The general-purpose breeds predominate.

TABLE 5.—PROPORTIONS OF FARM LAND IN SPECIFIED CROPS, AND NUMBER OF LIVESTOCK PER 100 ACRES OF FARM LAND, CUMBERLAND COUNTY, ILLINOIS^a

Year	Percent. of area in—					Number of livestock per 100 acres of farm land ^b					
	Corn	Oats	Wheat	Soy-beans	Tame hay	All cattle	Milk cows	Sheep	Swine	Horses	Poultry
1880.....	18.4	4.6	13.4	....	7.5	4.4	1.7	2.6	12.8	2.5	(^c)
1890.....	22.4	11.9	5.0	....	16.3	7.5	2.7	2.4	17.0	3.6	119.3
1900.....	26.8	9.7	1.4	....	19.5	6.7	2.4	1.6	15.0	4.6	79.1
1910.....	23.8	6.5	4.4	....	18.0	5.3	2.4	1.9	9.3	4.5	96.4
1920.....	19.7	10.0	6.7	....	17.5	7.4	2.7	1.4	11.5	4.8	142.0
1930.....	18.2	4.7	2.1	4.2	16.2	6.7	2.7	2.3	6.7	2.8	....
1940.....	22.6	4.0	1.8	11.8	12.0	6.8	3.4	1.3	7.7	2.0	90.0

^aU. S. Census Reports, 1880-1940. ^bSome variations, particularly in swine numbers, result from variations in time of year and in classifications of Census data. ^cNot available.

Corn has long been the principal crop, with soybeans, hay, oats, wheat, and broomcorn grown in smaller amounts. The acreage of oats and wheat has varied considerably and in recent years has been much smaller than formerly (Table 5). A part of the acreage thus vacated has been used for soybeans, which now occupy an area considerably greater than the combined acreage of oats and wheat. Commercial apple production, rather important in the western part of the county two decades ago, has almost disappeared.

Because of the relatively large area in pasture, the quality of the pastures has a marked effect not only upon the kinds and numbers of livestock kept but also upon the farm income. In the hilly area are large amounts of untillable land. Many pastures in this area are pastures in name only, consisting of fields that were cultivated until no longer productive and then turned into pastures. They are usually badly eroded and therefore poor.

Livestock furnish a use for a large part of the crops grown, and

on many farms livestock and livestock products provide a major proportion of the farm income. The limited crop sales are largely of soybeans and broomcorn, with some corn and wheat in good years. In most years the county buys somewhat more feed grains than it sells.¹

Dairy products are marketed by several methods. Some whole milk is assembled by trucks for shipment to St. Louis, some is sent to Mattoon, and some to a cheese factory at Neoga. One or more cream stations are maintained in each trading center in the county.

FIVE MAJOR SOIL AREAS

Satisfactory analysis of farming and farm living conditions in an area as varied in topographic features and soils as is Cumberland county can be made only by studying the markedly different areas as separate units. Cumberland county divides naturally into the five major areas described here and called soil-group areas because each consists of groups of certain well-defined soil types, which in turn are closely related to the slope of the land. Of course there are marked differences within each of these five designated areas, but those differences are not great enough or extensive enough to mar the essential unity of each area. Two of these areas—the river-bottom and the morainal areas—are single continuous units; each of the other three consists of two or more widely scattered tracts.

The hilly areas (H), totalling 120 square miles, include those portions of the county which are dissected by numerous small streams.² The characteristic topographic features are the short steep slopes bordering the flat bottomland along small creeks and the nearly level remnants of upland that are interspersed thruout the broken land (Figs. 4 and 5). In general, these slopes are covered with timber or young growth like that found on most of the woodland of the county. Cropland consists largely of the bottomland bordering streams and small areas of flat poorly drained upland of low productivity.

¹In 1938 only two grain elevators were in operation within the county. The amounts of grain handled are small, the business consisting largely of grinding feed and handling supplies.

²This area contains both upland and bottomland soils. The principal upland soil types are Hickory gravelly loam, rating 10, with slopes of 15 percent or greater; Bluford silt loam, rating 8, with slopes ranging from 1.5 to 3 percent; and Wynoose silt loam, rating 9, with slopes ranging from 0 to 1.5 percent. The principal bottomland soils are Huntsville loam, Sharon loam, and Bonnie silt loam, rating 5, 6, and 7. (See footnote, Table 1, for an explanation of these ratings.)

Woodland areas in Cumberland county at time of settlement. Most of the hilly, morainal, and river-bottom areas at this time, about 1830, were heavily wooded. (Fig. 3)

Woodland areas in Cumberland county in 1939. These areas are now largely on the short steep slopes adjacent to bottomland. (Fig. 4)

In the hilly areas a large proportion of the upland is too steep to be cultivated. It is best to keep land of this kind in pasture and timber. The slopes erode easily when not protected by trees or grass. (Fig. 5)

Compact subsoil and lack of organic matter hinder absorption of water; the sloping soils in this area therefore erode easily unless they are well-protected by trees or grass. Erosion is frequently severe at the point where soils of different slopes meet. The post-oak flats (Wynoose silt loam), for example, have a tight subsoil and must be drained by surface ditches. But if outlets are not well-protected, these ditches frequently cause gullies at the break in topography. Too intensive cropping or pasturing at this break may also cause serious erosion, especially where soils slope steeply.

Bottomland soils of streams rising in or above the glacial moraine produce good yields as they have been partly formed of sediment from the highly productive soil of east-central Illinois. Bottomland soils of streams originating below this moraine are of low productivity since their watersheds are the adjacent hills and uplands which contain soils of low productive capacity.

The light-gray prairie areas (LP) lie in five widely scattered tracts and total 116 square miles (Fig. 6). The soils include some of the poorest prairie types of the state.¹ Because of the flat topography and the claypan subsoil, adequate drainage in most of this area is a serious

¹Cisne silt loam, rating 9, predominates; Newberry silt loam, rating 7, and Hoyleton silt loam, rating 8, are less extensive. The former are nearly level; the latter has slopes from 1.2 to 3.5 percent. (See footnote, Table 1, for explanation of rating scale.)

(Fig. 6)

In the prairie areas most of the land is flat and difficult to drain because of the impermeable claypan subsoil. Small natural drainageways are frequently wooded. (Fig. 7)

problem. Drainage is generally provided by small surface ditches. Only 5 percent of the yearly rainfall percolates thru the predominant soil type, whereas in the best agricultural soils in the state 25 percent of the water gets thru.¹ While the small amount of gently rolling soil naturally has good surface drainage, the subsoil is permeable only slowly. Gully erosion is of little importance, but there is considerable sheet erosion on soils with slopes of as little as 1.2 to 3.5 percent—soils usually under cultivation.

The dark-gray prairie areas (DP) lie in three localities and total 55 square miles. Tho they include some light-gray soil, they are made up largely of the better grade of dark-gray prairie soil² (Fig. 6). The topography is nearly level, and soil erosion is negligible. Drainage is a serious problem since the impermeable subsoil blocks both natural and artificial underdrainage. Before 1900 drainage districts were formed in the dark-gray prairie area of the northwest part of the county and many tile were laid. This venture proved unsuccessful and surface ditches came to be recognized as the only satisfactory method of drainage.

¹Percolation experiments conducted by the Illinois Agricultural Experiment Station. Figures are average of years 1936, 1937, and 1938. The comparison given above is between Cisne silt loam and Muscatine silt loam.

²Ebbert silt loam, with a crop productivity rating of 7, is the most extensive soil type; there are considerable areas also of Putnam silt loam (now correlated with Cowden), rating 8, and Cisne silt loam, rating 9. The slopes range from 0 to 1.2 percent.

The bottomland along the rivers is often covered in the spring by flood waters, but the floods come too early to do much damage to crops. Farmsteads, pastures, and wood lots are on higher land. (Fig. 8)

The river-bottom area (R) includes the Embarrass river bottom and the adjoining hill lands (Fig. 6), 31 square miles in all.¹ Altho this area contains both valley and hill land, it has been considered a single area because the farm units ordinarily include both bottomland and the adjoining hill land. Farmsteads, pastures, and wood lots are located on the hill land, while grain crops are produced on the bottomlands. The character of this hill land and its erosion problems are similar to those of the hilly areas.

Altho the bottomlands are subject to overflow, floods seldom cause much damage to crops since they usually occur before spring planting; the damage is confined largely to washouts in roads, deposits of sand on fields, and delays in field work. This bottomland was developed, in part, from soil material from the dark-colored soil region of east-central Illinois which is drained by the Embarrass river. It is the only extensive area in the county that is naturally fertile and produces good yields.

The morainal area (M), totalling 27 square miles, includes a terminal moraine and morainal outwash which extends about 3 miles south of the northern edge of the county (Fig. 6). This area is not

¹This bottomland soil is largely Huntsville loam. The adjoining hill land is Hickory gravelly loam and Bluford silt loam. See footnote 2, page 285.

representative of the claypan region. Its soils are more varied than those of any of the other soil-group areas, ranging from the best to the poorest of the state.¹ These soils are dark and do not have the impervious subsoil which is characteristic of most of the other upland soils in the county. Rolling topography is characteristic of this area (Fig. 6). Drainage is not a problem except as it causes soil erosion. This area contains the county's most serious erosion problem, as a large proportion of the rolling land is under cultivation; extensive soil losses from sheet and gully erosion have occurred.

FARMING IN THE DIFFERENT SOIL AREAS

Farm-survey records show marked differences among the five soil-group areas of Cumberland county in size of farms, proportion of land in crops and pastures, proportions of the various crops grown, amounts of livestock, and income per acre. Altho about the same number of records was obtained in each area (Table 6) and this sample was considered adequate, the differences in the sizes of these areas need to be kept in mind as the more extensive areas are also the less productive.²

Principal Uses of the Land

The hilly area, which has the poorest soils and the most broken topography, also has the smallest farms, averaging 121 acres. In contrast, the most productive areas (river-bottom and dark-gray prairie) have the largest farms, averaging 204 and 210 acres (Table 7). The hilly area also has the smallest proportion of farm land in crops and the highest proportion of nontillable pasture and timber not pastured.

The percentage of the farm area in pasture at the time of this

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¹Westville silt loam, rating 7, with slopes ranging from 7 to 15 percent, is the major soil type. Others are Drummer clay loam, Osceola silt loam, and Hennepin gravelly loam, rating 1, 6, and 10. The two former types are nearly level, while the latter is too steep for cultivation and is almost entirely covered with trees.

²Within these areas 28 records were secured which were classed as nonfarm because no cropland was involved. Some of these records were obtained from landowners who rented out all the cropland but kept a few acres of pasture and some livestock; others had a garden and very limited pasture and kept a cow, a few pigs, and chickens to supply the family needs; still others merely occupied the house and in some cases had a small garden. Most of these records represented people who were either employed in town or were receiving public assistance. They were not included in the analysis of farming in the county.

TABLE 6.—SIZE OF SOIL-GROUP AREAS AND EXTENT OF SAMPLES INCLUDED IN THE FARM SURVEY, CUMBERLAND COUNTY, ILLINOIS, 1939

Area	Size of area ^a	Percent of area surveyed	Farms surveyed	
			Number	Average size
	<i>acres</i>			<i>acres</i>
Hilly (H).....	76 800	9.1	52	121
Light-gray prairie (LP).....	74 240	12.8	56	152
Dark-gray prairie (DP).....	35 200	31.1	47	210
River bottom (R).....	19 840	51.5	45	204
Morainal (M).....	17 280	42.4	52	127
All areas.....	222 080 ^b	20.2	252	...

^aEstimated. ^bU. S. Census, 1940.

survey ranged from 26 in the light-gray prairie area to 44 in the hilly area. In the prairie and morainal areas a large proportion of the pastureland is tillable, whether it is rotated with cropland or kept in permanent pasture; but in the hilly and river-bottom areas more than half the pasture area is untillable, representing, for the most part, broken and partially timbered land. In each area are small acreages of timber which were not pastured, the most extensive acreages being in the hilly and river-bottom areas.

In all areas the proportion of cropland was smallest on the small farms, increasing rapidly with size of farm until the farms exceeded 100 acres, after which little change occurred until the farms reached 500 acres. The hilly area has more small farms than any other area.

Of the farms included in this survey, 50 percent in the hilly area and 52 percent in the morainal area were less than 100 acres in size; whereas only 19 to 24 percent were this small in the other three areas (Table 8). In the more-productive areas, dark-gray prairie and river-bottom, 26 and 22 percent respectively of the farms consisted of 260 acres or more; whereas in the hilly area the proportion of farms this large was only 6 percent and in the morainal area 8 percent. The

TABLE 7.—UTILIZATION OF LAND IN FARMS IN DIFFERENT SOIL-GROUP AREAS OF CUMBERLAND COUNTY, ILLINOIS, 1939^a

(Acres per farm used for purposes indicated)

	Hilly	Light prairie	Dark prairie	River bottom	Morainal
Crop area.....	55	100	134	122	78
Rotation pasture.....	4	10	15	3	10
Permanent tillable pasture.....	22	24	43	18	20
Nontillable pasture.....	28	6	8	42	9
Timber not pastured.....	7	2	3	8	3
Other ^b	5	10	7	11	7
All farm land.....	121	152	210	204	127

^aFarm survey. ^bIncludes idle land, fruit, farmsteads, and waste.

TABLE 8.—PERCENTAGE OF FARMS OF DIFFERENT SIZES IN THE DIFFERENT SOIL-GROUP AREAS OF CUMBERLAND COUNTY, ILLINOIS, 1939^a

Size of farm	All areas	Hilly	Light prairie	Dark prairie	River bottom	Morainal
<i>acres</i>						
Under 30.....	6	8	4	2	7	12
30-49.....	8	17	4	..	2	13
50-99.....	19	25	16	17	11	27
100-179.....	33	27	44	34	29	27
180-259.....	20	17	21	21	29	13
260-499.....	11	6	11	17	18	6
500 and over.....	3	..	..	9	4	2
Total.....	100	100	100	100	100	100

^aFarm survey. Of the 28 families surveyed which were listed as nonfarm because of having no cropland, 14 would be classed as farms in the Census; of these, 11 would be in the group under 30 acres, 2 in the 30-49-acre group, and 1 in the 100-179-acre group.

fact that the poor-soil areas have the greatest proportion of small farms and the smaller farms have the lowest proportion of cropland explains why there are such variations in farm incomes among the various soil-group areas. These income-depressing conditions are most significant in the hilly area because of its extent.

Other differences between areas are seen in the percentage of untillable land on the farms of each area (Table 9).

In an area of general farming, limited acreages of untillable land, if reasonably productive for pasture, can of course be utilized to advantage with livestock. In the hilly and river-bottom areas 43 and 33 percent, respectively, of the survey farms were more than 40 percent untillable. This situation was less serious in the river-bottom area than in the hilly area because the farm units there were larger and the cropland more productive.

Cropping Systems Followed

The use made of the crop area appeared to have little relation to the productive capacity of the land. Corn was the outstanding crop in

TABLE 9.—PERCENTAGE OF UNTILLABLE LAND IN SURVEYED FARMS OF CUMBERLAND COUNTY, ILLINOIS, BY SOIL-GROUP AREAS, 1939^a

Untillable land	Hilly	Light prairie	Dark prairie	River bottom	Morainal	All areas
<i>perct.</i>						
None.....	..	50	73	9	40	35
1-20.....	21	39	19	18	40	28
21-40.....	36	11	6	40	14	21
41-60.....	27	..	2	24	6	11
More than 60.....	16	..	..	9	..	5
Total.....	100	100	100	100	100	100

^aFarm survey.

The largest areas of productive soils are in the bottomlands. A large proportion of the corn grown in the county is grown on these fertile areas, where it can be planted when the spring floods have subsided. (Fig. 9)

each area, occupying from 38 to 54 percent of the cropland (Table 10). In the hilly area the high proportion of land in corn resulted from the desire of the farmers to grow the maximum amount of feed on their limited crop area; in the river-bottom area the land is suited to corn because of its fertility and because corn can be planted after the spring floods have subsided. Broomcorn was grown to some extent as a cash-crop substitute for corn in all areas, but it was planted most extensively

Good stands of sweet clover can be grown on the flat prairie soils after they have been well limed. On the larger farms much more of the land has been limed than on the smaller farms. (Fig. 10)

Post oak flats in the hilly areas are low in fertility and poorly adapted to grain crops. Fields are frequently idle. (Fig. 11)

in the dark-gray prairie area and least extensively in the river-bottom area, where corn yields are the highest in the county.

Soybean acreage ranked next to corn in all areas except in the river bottom, where it took third place. In all areas more than half the soybeans were harvested for hay, and on the smaller farms nearly all the crop was so used. Soybeans thus supplement the limited acreage of other legume hays. The acreage in small grains usually did not exceed one-third that in corn. Many of the farms with a small crop area grew little or no small grain, since the very limited acreages did not justify the maintenance of harvesting equipment. Legume hays were found only in limed areas and in areas in the Embarrass river bottom which do not require liming. Timothy was widely distributed thruout the county, being used either alone or with redtop on soils of low productivity which had received no treatment.

The cropping practices too intensive for the soil were found every-

TABLE 10.—PERCENTAGE OF CROPLAND IN DESIGNATED CROPS IN THE DIFFERENT SOIL-GROUP AREAS OF CUMBERLAND COUNTY, ILLINOIS, 1939^a

Crop	Hilly	Light prairie	Dark prairie	River bottom	Morainal
Corn.....	53	41	38	54	47
Broomcorn.....	6	6	13	3	6
Small grains.....	11	16	12	18	7
Soybeans.....	15	17	26	13	16
Legume hay.....	9	4	1	7	5
Timothy hay.....	4	6	7	2	11
Other crops.....	2	10	3	3	8

^aFarm survey.

where in the county, they were most common on farms with a small crop area. On farms with less than 40 acres of cropland, 80 to 100 percent of the crop area was frequently given over to corn, broomcorn, and soybeans for hay. This intensive cropping resulted from efforts of these farmers to produce maximum amounts of feed and sale crops for current income even tho such practices deplete the soil and contribute to erosion. In bottomland subject to overflow, the deposit of silt at flood time offset, to a large extent, the effects of destructive cropping; but on the uplands the results were cumulative.

Yields of Principal Crops

Because of variations in rainfall, crop yields in Cumberland county vary widely from year to year.¹ For the thirteen years from 1929 thru 1941 average acre-yields in bushels, as reported by the Illinois Cooperative Crop-Reporting Service, were: corn, 29.2; oats, 20.6; winter wheat, 14.7; and soybeans, 12.7. For the four years 1933-1936 growing conditions were unfavorable, and the average yields of these crops

TABLE 11.—CROP YIELDS PER ACRE BY SOIL-GROUP AREAS, CUMBERLAND COUNTY, ILLINOIS, 1938^a

Crop	Hilly	Light prairie	Dark prairie	River bottom	Morainal	Weighted average, all areas
	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>
Corn.....	36 ^b	35	40	53	44	39
Oats.....	19	22	22	27	29	23
Wheat.....	12	16	21	20	20	17
Soybeans.....	12	15	22	20	17	17

^aFarm survey. ^bIn the hilly area a considerable part of the corn acreage is in the creek bottoms, which are much more productive than the upland soils.

were about 25 percent less. For the following five years, 1937-1941, conditions were unusually favorable and yields were similar to those of 1938. A comparison of the 1938 yields in each of the soil-group areas shows clearly the differences in production due to the character of the soil (Table 11).

Since a large part of the raised feed is fed, a series of poor crop years curtails the numbers of livestock kept, while a series of good years causes livestock numbers to increase. Thus the favorable crop yields of 1937 and of 1938 caused an increase not only in the amount

¹Altho the average annual rainfall for the period 1919 thru 1939 was 41.06 inches, it varied from 30.4 inches in 1925 to 65.2 inches in 1927 (Cumberland County Soil Report, University of Illinois, Urbana).

TABLE 12.—AVERAGE ANNUAL CROP YIELDS PER ACRE ON THE TOLEDO EXPERIMENT FIELD IN CUMBERLAND COUNTY, ILLINOIS, 1913-1939^a

Treatment	Corn 26 crops	Oats 25 crops	Wheat 22 crops	Hay 24 crops
	<i>bu.</i>	<i>bu.</i>	<i>bu.</i>	<i>tons</i>
No treatment.....	20	14	8	.2
Manure.....	33	19	13	.5
Manure and lime.....	45	31	24	1.6
Manure, lime, and rock phosphate.....	45	31	25	1.6
Residues.....	22	14	9	1.3
Residues and lime.....	28	29	20	1.1
Residues, lime, and rock phosphate.....	28	30	24	1.3
Residues, lime, rock phosphate, and potash.....	46	33	30	1.8

^aData supplied by Department of Agronomy, Illinois Agricultural Experiment Station.

of crops sold and on hand but also in the number of livestock kept and in the proportion fed out for market.

In the area where production is limited by low soil fertility, the soil treatment applied to cropland and pastures is important. Of the 252 farms surveyed, 117 had received applications of some limestone, 11 had received some phosphate, and 8 some commercial fertilizers. Most soil treatment is applied to the cropland and so affects pastures only when they are rotated with cropland.

The value of liming cropland is illustrated by results at the Toledo experiment field located in the light-gray prairie area (Table 12).¹ In this area, which constitutes about 30 percent of the county, at least 4 tons of limestone an acre are required to correct soil acidity. The application of limestone, which makes possible the growing of clovers in the rotation, has given marked results where used with either manure or crop residues.

While a fairly large proportion of the farmers on the largest farms followed good management practices, this proportion diminished rapidly as the farms became smaller. On the small farms, where the best practices are most needed, there was a dearth of good practices. The reason for this is easily understood: the better practices reflect a higher degree of managerial ability, and even those who know good practices are more likely to apply them when the enterprise is large enough to justify the effort; and money to finance such practices as the application of limestone is easier to get for larger farms. Differences in the quality of the farming in the different soil-group areas can be shown by comparing the prevalence of certain good farming

¹The large increases in productivity indicated by the data in Table 12 are obtained only by several years of soil-building. In fact, the data from the Toledo experiment field indicate that about ten years are required to build up yields to the present average on treated soils.

TABLE 13.—PERCENTAGE OF FARMERS IN THE DIFFERENT SOIL-GROUP AREAS USING THE CROP PRACTICES INDICATED, CUMBERLAND COUNTY, ILLINOIS, 1939^a

	Hilly	Light prairie	Dark prairie	River bottom	Morainal
Cropland in cultivated crops.....	36	54	57	53	52
Limestone applied to cropland.....	78	95	88	79	80
Permanent pastures manured.....	37	68	64	30	13

^aFarm survey.

practices (Table 13). More of the better crop practices were followed in the areas where the farms were larger.

In a sample of 58 pastures representing 32 farms, 18 had been treated with lime or manure or both; none had received phosphate fertilizer; none had been manured within the year previous to the survey. The dominant species of plants in all pastures, both treated and untreated, were redtop and timothy.¹ Twenty-nine percent of the treated pastureland and 41 percent of the untreated lacked vegetative cover. Treated pastures also had only half as much weed cover as untreated pastures and they had fewer unpalatable and less-nutritive

TABLE 14.—CARRYING CAPACITY OF PASTURES MEASURED IN ANIMAL UNITS PER ACRE, CUMBERLAND COUNTY, ILLINOIS, 1939^a

Area	Treated pastures			Untreated pastures		
	Number of fields sampled	Area sampled	Average carrying capacity per acre	Number of fields sampled	Area sampled	Average carrying capacity per acre
		acres	animal units		acres	animal units
Hilly.....	4	34	.64	7	312	.28
Light prairie.....	2	80	.63	9	173	.35
Dark prairie.....	4	230	.69	14	291	.29
Morainal.....	8	150	.52	10	395	.40
All areas.....	18	494	.63	40	1 171	.33

^aReported by R. F. Fuelleman, Department of Agronomy, Illinois Agricultural Experiment Station. No fields were sampled in the river-bottom area.

annual grasses. The estimated average carrying capacity of treated pastures, measured in animal units, was approximately twice that of untreated pastures² (Table 14).

¹Some Kentucky bluegrass, Canada bluegrass, white clover, red clover, lespedeza, and sweet clover were found. Untreated fields seldom contained Kentucky bluegrass or legumes, but considerable areas of Canada bluegrass were frequently encountered.

²A few woodland pastures were included in the untreated fields, but this would not change the ratio appreciably since all untreated pastures were poor. Woodland pastures were invariably poor and their carrying capacity small.

Livestock Numbers and Practices

The number of hogs per farm was greatest in the river-bottom, dark-gray prairie, and morainal areas, where corn production is largest (Table 15). On some of the larger farms both hogs and cattle were fed.

In the hilly area the number of hogs appeared large in relation to grain production; pigs were either sold as feeders or fed out, depending on the available feed supply. The prairie areas raised more dairy

TABLE 15.—AVERAGE NUMBERS OF LIVESTOCK PER FARM IN DIFFERENT SOIL-GROUP AREAS OF CUMBERLAND COUNTY, ILLINOIS, 1939^a

	Hilly	Light prairie	Dark prairie	River bottom	Morainal
Horses and mules.....	3.2	3.9	5.5	3.6	2.9
Milk cows.....	4.6	6.0	6.0	4.7	3.9
Other cattle.....	5.6	6.2	14.7	8.4	4.6
Brood sows.....	2.0	2.8	4.4	4.7	2.9
Other hogs.....	11.8	12.7	28.3	33.6	19.5
Sheep and lambs.....	4.1	2.2	4.1	.8	3.2
Hens.....	94.6	147.6	117.0	151.7	113.3
Other poultry raised.....	211.1	314.4	276.2	302.3	272.0

^aFarm survey.

cows than any other region because of available markets for whole milk and the large amounts of forage. Beef and dual-purpose cattle in limited numbers were widely distributed thruout the county since they are kept to utilize pasture on both tillable and untillable land.

A few sheep were found in each area, but numbers were limited by poor drainage in pastures, lack of fences, and danger from dogs. Poultry was relatively important in all five areas. The light-gray prairie and river-bottom areas had the largest flocks of laying hens.

TABLE 16.—PERCENTAGE OF FARMERS IN EACH SOIL-GROUP AREA USING PRACTICES INDICATED, CUMBERLAND COUNTY, ILLINOIS, 1939^a

	Hilly	Light prairie	Dark prairie	River bottom	Morainal
Dairy cattle					
Herds purebred or grade.....	41	54	70	52	50
Purebred bulls used.....	26	47	50	37	28
Protein supplements fed.....	15	27	29	28	28
Grain for feeding ground.....	37	44	49	33	28
Silo used.....	2	11	17	5	2
Swine					
Purebred boar used.....	27	18	34	38	15
Spring pigs full-fed.....	41	62	78	76	66
Sanitation practices applied.....	35	38	68	44	27
Poultry					
Mash fed.....	54	55	79	67	60
Mash fed all year.....	15	38	36	44	31

^aFarm survey.

Livestock of good quality is found on many farms in Cumberland county; but on many others income could be increased if a better quality of animals were kept and they were better managed. (Fig. 12)

Livestock numbers were proportional to the amount of feed produced since little feed was shipped either into or out of the county. The poor quality of the animals in the hilly area reflected the small amount of grain raised.

Livestock practices followed the same pattern as crop practices: the better methods were used most extensively on the larger farms and least on the small farms. There were marked differences, also, between the soil-group areas: farmers in the hilly areas, where farms are small and poor, made the least use of improved livestock practices (Table 16).

Tenure and Ages of Operators

Of the farms included in the survey, 42 percent were operated by full owners, 32 percent by part owners, and 26 percent by tenants. Altho the proportions varied in different parts of the county, in each of the five areas full owners were most numerous, part owners second, and tenants fewest except in the Embarrass river bottom, where part owners and tenants were equal in number. The proportion of owners was largest on the small farms; and part owners and tenants were most numerous on the larger farms.

The land operated by owners and part of that operated by tenants represented entire farm units; part owners and tenants often rented individual fields for a year at a time. Where such fields are rented there is little inclination to follow a regular cropping system, and the crops are usually of the sort which are entirely removed from the land; hence soil depletion is more likely to occur on these fields than on owner-operated farms.

Types of leases had no apparent relation to the soil-group areas. For the county as a whole, leases based on a division of the crop predominated; in 62 percent of all the leases a part of the crop represented the entire payment, and in 18 percent a cash payment was made for hay or pasture land in addition to a part of the crops for tilled land. The usual crop rental is two-thirds to the tenant and one-third to the landowner. Cash leases made up 17 percent of all leases and livestock share leases 3 percent. An operator sometimes rented land under more than one type of lease. Seventy-nine percent of the leases were oral; this high proportion doubtless rises from long tenure¹ and the fact that one-third of those renting land were related to the owner.

¹Full owners averaged 22.7 years on the present farm; part owners, 19.1 years; and tenants, 7.3 years.

TABLE 17.—PERCENTAGE OF FARM OPERATORS IN SPECIFIED AGE-GROUPS IN THE DIFFERENT SOIL-GROUP AREAS OF CUMBERLAND COUNTY, ILLINOIS, 1939^a

Age of operator	Hilly	Light prairie	Dark prairie	River bottom	Morainal
<i>years</i>					
20-39.....	20.4	19.7	45.8	32.5	16.3
40-59.....	55.1	50.0	39.6	48.9	53.0
60 and over.....	24.5	30.3	14.6	18.6	30.7
Total.....	100.0	100.0	100.0	100.0	100.0

^aFarm survey.

The ages of the operators varied significantly in the different soil-group areas (Table 17). In the dark-gray prairie and river-bottom areas there were higher proportions of operators under 40 and lower proportions 60 or over than in the other areas. The morainal area had the smallest proportion of operators under 40 and the largest proportion 60 or over; the light-gray prairie area ranked next in each instance. Obviously younger men have taken up farming in areas where opportunities are greatest.

Incomes From Farming

Farming opportunities on such small farms as those in the hilly area are of course extremely limited. In fact nearly all farms with a small crop acreage in the county are seriously handicapped. (The river-bottom farms are an exception; they are fertile enough to provide good incomes even when crop areas are not large.) Much of the land not in harvested crops contributes little to the farm income. Hence, in grouping the farms by size, the number of acres in crops rather than the total area has been used. Thus differences in income which are directly due to differences in soil are clearly shown.

The farm incomes (from sale of farm products plus government payments) in the various areas reflect natural conditions, size of crop area, and quality of farming, which in turn is directly related to size of crop area (Table 18).¹

In the light-gray prairie and hilly areas, which together make up two-thirds of the county, the average gross incomes from farms with 120 acres or more in crops were approximately \$2,000 and \$2,500 respectively; the incomes from farms with 80 to 119 acres in crops

¹Inasmuch as no data were secured on operating expenses, no net-income figures are available. More detailed data classified by sources of income are given in Table 19, page 304.

were \$1,250 and \$1,600; from farms with 40 to 79 acres, \$600 and \$900; and from farms with less than 40 acres the incomes were approximately \$460 and \$525 respectively. The light-gray prairie area had the advantage over the hilly area in that two-thirds of its farms had 80 acres or more in crops, whereas four-fifths of the farms in the hilly area had less than 80 acres in crops.

In the dark-gray prairie and morainal areas gross incomes were similar to those in the light-gray prairie and hilly areas except that on

TABLE 18.—GROSS INCOME PER FARM IN THE DIFFERENT SOIL-GROUP AREAS AND SIZE OF CROP AREA, CUMBERLAND COUNTY, ILLINOIS, 1938^a

Crop acres in farm	Hilly		Light-gray prairie		Dark-gray prairie		River bottom		Morainal	
	Num-ber	Income	Num-ber	Income	Num-ber	Income	Num-ber	Income	Num-ber	Income
120 and over	4	\$2 475	18	\$2 014	18	\$3 479	20	\$3 742	10	\$4 393
80-119	5	1 253	17	1 568	16	1 419	7	2 371	6	1 464
40-79	16	869	12	621	9	706	10	1 581	12	805
Under 40	23	521	7	463	3	405	7	298	19	609

^aFarm survey. Figures are sales and government payments from June, 1938, to June, 1939, less purchase price of livestock bought and direct cash outlay incurred in harvesting and marketing broom-corn. Operators of 13 farms had moved to them in the spring of 1939; since they had not had a full year on the farm, income figures were not used. More detailed figures on income are shown in Table 19, page 304.

the largest farms incomes were materially higher. Because of their more productive soil, all the river-bottom farms except the smallest had relatively favorable gross incomes. More than four-fifths of these farms brought their operators incomes of more than \$1,200, whereas only one-fifth of the farms in the hilly area produced incomes that high. The few farms with the smallest acreage in crops had the lowest average income of any in the county; they were located on the bluffs adjacent to the river bottom.

In appraising these income data, attention needs to be given to the different proportions of various-sized farms in the five areas and to the conditions at the time of the survey.¹ The very favorable crop yields both in 1937 and 1938 resulted in bigger feed supplies than usual and in expanded sales of both crops and livestock.

In all these areas the relation between number of acres in crops and gross income per farm is clearly shown; yet size of crop area is not the only factor affecting these incomes. Altho it is true that the larger farms afford greater opportunities; it is also true that they attract a

¹See page 279.

higher quality of farming. As the crop area becomes smaller, the quality of farming becomes progressively poorer, and the income suffers from both these factors. The problem works in a circle, for the very limited incomes on the small farms are responsible, in part at least, for the deterioration in equipment on these farms, failure of the operators to adopt better farming practices, and the generally lower standard of living. A large proportion of the farms in Cumberland county can be made to yield better incomes if a way can be found to induce and to make it practicable for their operators to adopt more efficient and economical methods of production.

TABLE 19.—CASH SALES AND GROSS INCOME PER FARM FROM DIFFERENT SIZES OF FARMS IN THE DIFFERENT SOIL-GROUP AREAS, CUMBERLAND COUNTY, ILLINOIS, 1938^a

Crop acres in farm	120 and over	80-119	40-79	Under 40	120 and over	80-119	40-79	Under 40
	Dark-gray prairie				Light-gray prairie			
Number of records.....	18	16	9	3	18	17	12	7
All livestock.....	\$2 565	\$ 854	\$ 378	\$353	\$ 939	\$ 629	\$261	\$213
Livestock products.....	540	300	277	40	502	610	185	226
Crops.....	1 112	555	277	126	604	450	292	38
Government payments..	124	71	42	4	96	22	21	27
Total cash sales.....	\$4 341	\$1 780	\$ 974	\$523	\$2 141	\$1 711	\$759	\$504
Purchases ^b	862	361	268	118	127	143	138	41
Gross income.....	\$3 479	\$1 419	\$ 706	\$405	\$2 014	\$1 568	\$621	\$463
	Hilly				Morainal			
Number of records.....	4	5	16	23	10	6	12	19
All livestock.....	\$ 477	\$ 622	\$ 559	\$345	\$4 953	\$ 572	\$380	\$414
Livestock products.....	722	217	236	148	275	92	186	115
Crops.....	1 490	604	189	66	1 144	885	343	91
Government payments..	98	49	35	34	228	35	1	10
Total cash sales.....	\$2 787	\$1 492	\$1 019	\$593	\$6 600	\$1 584	\$910	\$630
Purchases ^b	312	239	150	72	2 207	120	105	21
Gross income.....	\$2 475	\$1 253	\$ 869	\$521	\$4 393	\$1 464	\$805	\$609
	River-bottom							
Number of records.....	20	7	10	7	.....	.....	.....	.....
All livestock.....	\$1 969	\$1 811	\$ 832	\$ 89	.....	.....	.....	.....
Livestock products.....	456	280	643	59	.....	.....	.....	.....
Crops.....	1 673	649	315	204	.....	.....	.....	.....
Government payments..	86	3	42	.....	.....	.....	.....	.....
Total cash sales.....	\$4 184	\$2 743	\$1 832	\$352	.....	.....	.....	.....
Purchases ^b	442	372	251	54	.....	.....	.....	.....
Gross income.....	\$3 742	\$2 371	\$1 581	\$298	.....	.....	.....	.....

^aFarm survey. Sales and government payments are from June, 1938, to June, 1939. The numbers of records differ slightly from those given earlier because the records of farms which had been under the present operator for less than a full year are omitted.

^bPurchases include livestock bought and direct cash outlays in harvesting and marketing broom-corn. The latter outlays were calculated at \$50 a ton of broom fiber sold; this figure was based on rates paid in 1938 and on the quantities of labor indicated in an unpublished master's thesis ("An Economic Study of Broomcorn Production in Illinois," by C. D. Palmer, University of Illinois, 1928) as having been used in the production of this crop.

LEVEL OF LIVING

The small incomes obtained from many farms in the hilly area, and indeed on farms of limited crop area thruout the county, naturally depress the living conditions of the families on these farms. More of the houses and other buildings and fences are in poor condition than in the county as a whole. Machinery on the smaller farms is often inadequate. On many of the farms with less than 80 acres in crops, conditions do not justify the use of mechanized equipment. The trend toward mechanization is indicated by the fact that 86 percent of the farms with 120 acres or more in crops had tractors.

At the time of this survey electricity was available to only 9 percent of the farms, but lines under construction were expected to bring it within reach of about 20 percent. Such home improvements as running water were most common on the farms with the larger crop acreages. Families on the larger farms reported the preservation of more food, the possession of a wider variety of reading materials, and the purchase of larger amounts of life insurance than those on the smaller farms.

The differences in the productivity of the five soil-group areas in Cumberland county doubtless account for the differences in the proportion of young people 16 to 24 years old who have left these areas. In the hilly area 43 percent of this group had left home when this survey was made, while in the dark-gray prairie area and in the river-bottom area only 21 and 23 percent respectively had gone. In all three

In the more fertile areas of Cumberland county are many productive farms with good buildings. This farmstead has another fairly new barn which is obscured by the one in the foreground. (Fig. 13)

Farmsteads in the light-gray prairie areas are usually well kept. Farm income is substantially increased by liming the soil and using the better farm practices. (Fig. 14)

areas a considerable number of those still at home were employed away from the farm. It is of course to be expected that those areas which offer the least economic opportunity will lose the largest share of their young people. When a large proportion of the young people migrate from such areas and the older people remain on the land, deterioration of community life and activities inevitably follows.

Lack of opportunity to acquire an adequate income from farming or from other occupations is shown in the number and location of public-assistance cases in Cumberland county. In 1938 there were 977

Farmsteads in the hilly areas generally reflect the unproductive character of the soil. The buildings are usually located on the flat upland which is interspersed thruout these areas. (Fig. 15)

Public-assistance cases and families receiving Farm Security loans, Cumberland county, 1938. The hilly, morainal, and river-bottom areas, which include nearly all the hilly land of the county, averaged 2.4 public-assistance cases to the square mile; whereas the dark-gray prairie and light-gray prairie areas averaged only one such case per square mile. (Open circle with dot indicates a public-assistance case; open circle with vertical line, a Farm Security loan. Circled numbers indicate town cases.) (Fig. 16)

such cases (involving 2,354 persons, 20.1 percent of the 1940 population) in which some type of public assistance was received (Table 20). It is estimated that seven agencies paid out nearly \$300,000 for their clients. In addition, the commodities distributed by the Surplus Commodity Corporation in 1938 would have cost \$5,875. From 1936 thru 1938 more than \$57,000 had been loaned by the Farm Security Administration and its predecessor agencies in an attempt to help 85 needy farmers become self-supporting.

TABLE 20.—TYPE AND EXTENT OF PUBLIC ASSISTANCE IN CUMBERLAND COUNTY, ILLINOIS, IN DECEMBER, 1938, AND MONTHLY IN 1940

Agency	1938			1940 Total number of persons per month
	Number of cases	Number of persons	Amount of assistance	
WPA.....	327	1 414	\$13 573 ^a	926
Old-age assistance.....	438	438	7 145	445
Direct relief.....	92	296	956	523
Mothers' pensions.....	45	131	326	76
Blind pensions.....	29	29	882	24
CCC.....	36	36	1 080	Not available
NYA.....	10	10	180	Not available
Total.....	977	2 354	\$24 142	...

^aWages only.

In the rural areas public-assistance cases show a decided concentration in or near rough, hilly land not well-suited for farming (Fig. 16).¹ The hilly, morainal, and river-bottom areas, which contain nearly all the hilly land of the county, averaged 2.4 such cases per square mile, whereas the dark-gray prairie and light-gray prairie areas averaged only one case per square mile.¹

Altho 42.1 percent of the farm land in Cumberland county was subject to one or more mortgages in December, 1935, there was no noticeable concentration of mortgage debt in any of the different soil-group areas. Foreclosures on farm real-estate mortgages have been few in recent years even tho mortgage debt is high in all soil-group areas compared with the current sale price of the land (Table 21). During the nineteen years 1917-1935, mortgages were foreclosed on only 158 tracts. The proportion of foreclosures was larger in the hilly areas than elsewhere.

In 1939 neither the county nor the municipalities had any outstanding obligations in bank loans, bonds, or tax-anticipation warrants.

¹All towns and villages excluded and considering direct relief, WPA, old-age assistance, CCC, NYA, and FSA cases which constituted over 93 percent of all cases. The total number of occupied houses per square mile is greater in the hilly and morainal areas than in the other areas.

TABLE 21.—SALE PRICE AND ESTIMATED MORTGAGE DEBT AGAINST
MORTGAGED TRACTS IN THE DIFFERENT SOIL-GROUP AREAS OF
CUMBERLAND COUNTY, ILLINOIS

	Hilly	Light prairie	Dark prairie	River bottom	Morainal
Estimated average mortgage debt per acre of mortgaged land, 1935.....	\$19	\$23	\$34	\$26	\$34
Average sale price per acre, 1932-1937*....	29	28	42	31	48
Percent mortgage debt was of average sale price.....	66	82	81	84	71

*Illinois Tax Commission, WPA project records, Urbana, Illinois.

Township road bonds appeared to be the only debt of government units that was likely to become a burden. Tax delinquency has not been a serious problem in recent years and showed practically no tendency toward concentration in any of the soil-group areas. In the eleven-year period 1925-1935 an average of only 9,200 acres, less than 5 percent of the land in farms, came up for the annual tax sales. Practically all this land was bought by tax buyers, very little being forfeited to the state.

The school system, on the other hand, is a heavy burden on the people of the county. Even tho total school enrollment is about half what it was thirty years ago, practically no change has been made in number and size of school districts. Consequently many school districts are able to claim a considerable amount of state aid. For the five-year period 1933-1937 the average state aid claimed by elementary-school districts varied from 10.5 percent to 110.9 percent of the total expenditures. In 62 of the 92 elementary-school districts the state aid claimed averaged 50 percent or more of the total expenses of operating the schools. State aid claimed was a greater proportion of the total expenditures in the hilly areas than in any of the other areas. This resulted from larger enrollment in the schools and lower assessed valuation of taxable property.

Besides state assistance for schools, Cumberland county has received a considerable amount of financial aid from both state and federal governments for other purposes. The estimated expenditure of \$300,000 by public-assistance agencies in 1938 exceeded the total county taxes assessed for that year by more than \$75,000. If the county had had to depend on its own resources for local government and public services, existing facilities could not have been maintained without raising the tax rates or incurring greater indebtedness. Cumberland county, in other words, falls far short of being self-supporting. The public at large has a direct interest in the problems of a county which leans so heavily on state and federal aid.

RECENT SHIFTS IN PRODUCTION

Conditions have changed greatly in Cumberland county since 1939, when this survey was made, because of the nation's defense program and our entry into the war. Farming in Cumberland county and in the whole claypan region has been affected. The directions of these changes and the trends to be expected in the future have a definite bearing on the problems with which this study is concerned.

Except for a greater oats acreage and a much larger proportion of soybeans harvested for beans, the 1939-1941 average crop acreages showed little change over 1939. Marked increases occurred in numbers of hogs, smaller increases in numbers of cattle and sheep (Table 22).

During the war years 1942 and 1943 further shifts in production have taken place as farmers have responded to wartime production goals, relatively high prices for most agricultural products, and the patriotic incentive of making maximum contributions to the war effort.

As a result, farmers have reduced their acreages of hay and plowable pasture and have increased their intertilled crops. This increase has been largely in soybeans which, because of relatively high prices, have become a major cash crop, two-thirds of the acreage being harvested for beans. A considerable shift from wheat to oats has taken place because of adverse weather conditions at the time for seeding wheat.

Still further increases have occurred in numbers of cattle, hogs, and sheep. Numbers of milk cows and production of milk have increased but little in Area 7 as a whole but have increased materially in Cumberland county.

Wartime Maximum Production

To ascertain the extent to which agricultural production could be adjusted to wartime demands, a committee representing the Illinois Agricultural Experiment Station and the U. S. Department of Agriculture, in 1942 and again in 1943, set up goals for each county and type-of-farming area.¹ The setting up of these goals required that an inventory be made of the maximum productive capacity of each county and type-of-farming area if the soils were to be used intensively during the emergency. Such use would be exploitative but not irreparably so.

¹Set forth in mimeographed reports: "Wartime Farm Production Adjustments in Illinois, 1942"; and "An Appraisal of Maximum Wartime Production Capacity in Illinois, 1943."

TABLE 22.—SHIFTS IN PRODUCTION OF MAJOR CROPS AND LIVESTOCK IN AREA 7
AND IN CUMBERLAND COUNTY, ILLINOIS, SINCE 1939^a
(Expressed in percentages of 1939)

	Prewar period 1939-1941, average	War period		Wartime maximum production	Long-time desirable production
		1942	1943		
Area 7					
Crops					
Corn.....	(b)	-1	+7	+11	-44
Soybeans for beans.....	+35	+214	+225	+527	....
All soybeans.....	+4	+35	+45	+99	-19
Total cropland in intertilled crops	+4	+15	+17	+30	-36
Wheat.....	-6	-33	-30	-1	-5
Oats.....	+10	+40	+40	-1	+67
Plowable pasture.....	+8	-17	-13	-26	+11
Total hay and plowable pasture..	+5	+1	+3	-15	+25
Livestock and livestock products					
All cattle (January 1).....	+6	+15	+20	+12	(e)
Milk cows (January 1).....	-1	-1	+1	+4	....
Hogs (January 1).....	+20	+48	+74	+53	....
Sows to farrow.....	(b)	+15	+34	+23	....
Sheep.....	+10	+37	+28	+10	....
Milk.....	(b)	+1	+2	+5	....
Eggs.....	-1	+14	+29	+38	....
Cumberland county					
Crops					
Corn.....	+1	+7	(b)	(e)	-44
Soybeans for beans.....	+41	+290	+265	....	....
All soybeans.....	+8	+43	+34	....	-19
Total cropland in intertilled crops	+3	+20	+13	....	-36
Wheat.....	-7	-50	-1	....	-5
Oats.....	+4	+39	+1	....	+66
Plowable pasture.....	-14	-27	-13	....	+12
Total hay and plowable pasture...	+4	-15	-4	....	+41
Livestock and livestock products					
All cattle (January 1).....	+9	+19	+19	....	(e)
Milk cows (January 1).....	+6	+12	+12	....	....
Hogs (January 1).....	+30	+81	+86	....	....
Sows to farrow.....	+9	+43	(e)	....	....
Sheep.....	+20	+31	+33	....	....
Milk.....	(b)	+18	+18	....	....
Eggs.....	-1	+14	+20	....	....

^aArea 7 figures were compiled from data in a mimeographed publication, "Wartime Farm Production Adjustments in Illinois," 1942, and "An Appraisal of Maximum Wartime Production Capacity in Illinois," 1943, compiled cooperatively by the Illinois Agricultural Experiment Station and the U.S. Department of Agriculture. Cumberland county data are from unpublished materials from same sources as the above reports. ^bLess than .5 percent change. ^cData not available.

On the basis of the calculations made by this committee a still further shift in Cumberland county from hay and plowable pasture to intertilled crops would be desirable under emergency war conditions. This shift would be similar to that already made but would include further expansion in acreage of soybeans, especially where the crop is to be harvested as beans, and some increase in corn. Under such a plan wheat and oats would approximate the 1939 acreages.

Even for wartime maximum production, the numbers of meat animals have already been too greatly expanded, and decreases are therefore indicated for all cattle, hogs, and sheep. A moderate in-

crease in milk cows and milk production, as well as a further increase in chickens and eggs, is desirable. These recommendations are based on the fact that Cumberland county is short in feed production and cannot support so much livestock unless farmers ship in feed.

Long-Time Desirable Production

Goals representing an ideal long-time use of land resources were also set up by the above committee. In these goals are included the development of operating units large enough to be profitable and the adoption of systems of farming suited to the character of the land.

The shifts that have taken place under the emergency conditions of the war have been largely in the opposite direction to those designed to give the best long-time use of the land. The long-time adjustments that are now needed are therefore much more drastic than were needed in 1939, when the field work of this study was completed. The extreme reductions indicated for corn and soybeans and the increases recommended in small grains, hay, and plowable pasture (Table 22) show the extent to which the land resources of this county have long been misused and how misuse has increased under war conditions. The need for adopting recommended changes is more urgent than ever.

RECOMMENDATIONS AND SUMMARY

The foregoing analysis of Cumberland county farms shows what wide differences there are in the natural conditions under which farmers in this county try to make a living for their families and in the soil, crop, and livestock practices followed by individual farmers. All these differences find ultimate expression in the incomes derived from these farms and in the level of living enjoyed by those who are dependent on these incomes.

On the basis of their productive capacity, the farms of the county may be divided into three groups:

1. Those that now provide an adequate income but whose production could be increased by better management. About half the farms are in this class.
2. Those which, because of their small size or low productivity, now fail to support a family but could be made to do so if the soil were better managed and better methods of crop and livestock production used. About one-fourth of the farms are in this class.
3. Those that are so small or so unproductive that they never

could be made to yield a satisfactory living for a family. About one-fourth of the farms are in this class.

For the problems associated with this last group of farms there are two possible solutions: (1) their absorption into larger adjacent farms or the consolidation of two or more of them; (2) acquirement by their operators of outside employment, the income from which would supplement that derived from the farm. Present opportunities for outside employment, however, are so limited that they could not be made to care for any large proportion of these cases.

Better farming practices. That there is little opportunity for operators of the poorer farms to shift to better locations in the county is shown by the fact that 75 percent of the farm land lies in the three poorest soil-group areas of the county and 85 percent has a productive rating of 7 or lower.

Thruout the county, therefore, there is urgent need for farmers to improve their soil and adopt better farming practices, and many must find a way to acquire larger farms if they are to earn enough to support their families without public aid. It is clear that improvement of the soil should have first attention. This means providing good drainage, controlling erosion, building up soil fertility, developing cropping systems suited to soil conditions, and adopting more widely the best soil-management practices. Recommendations for good soil management will be found, type by type, in the Cumberland County Soil Report,¹ and only general recommendations will therefore be given here.

Shifting extensive acreages of land of low productivity from inter-tilled crops to small grains, hay, and pasture, to which they are better suited, would greatly improve the economy of the area. It will of course take time to make some of these shifts, to apply soil treatment, to develop suitable types of livestock, and to initiate desirable management practices; and while the results of some improved practices will be quickly apparent, full benefits from many others, such as the use of limestone, will not be realized for several years. Moreover some cash outlay is necessary for the initiation of most improved practices. Increases in the net income may therefore be small during the first years of an improvement program, but over a period of years they should increase cumulatively and make possible further improvements both in farm practices and in living conditions for the family.

It would seem that farmers in Cumberland county can make their best contribution to the war effort by using this period to start general

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¹University of Illinois, Agricultural Experiment Station, 1940.

adjustments that have long been needed. Any surplus income during the war period should be used to pay debts, to lime the land, to purchase more land where necessary, and to work toward a more general livestock-and-small-grain type of farming.

Greater use of limestone. With the exception of the bottomland soils, most of which are subject to overflow, and a few scattered tracts of clay loam in the upland, all the soils in the county are acid and need limestone to prepare the way for a soil-improvement program. Some are in greater need of this material than others. In the hilly areas the soils are strongly acid except for the numerous small tracts of bottomland and the rough, broken land. The light-gray prairie area is, in general, the most strongly acid of all areas. The major soils in both the dark-gray prairie and the morainal areas are medium acid. In the river-bottom area the major soil type (Huntsville loam) is neutral to slightly acid. The broken part of the area is similar in acidity to the hilly area.

Since limestone is basic to a program of soil improvement and conservation, its availability, cost, and method of financing are important considerations. While liming of soils is increasing at a rapid rate in Cumberland county, applications have not been large enough or extensive enough to replace the amounts of calcium being lost thru plant use and leaching. More effective methods need to be devised to induce farmers to use it and use more of it.

The main problem restricting the use of limestone has been its cost. Before the war, when trucking facilities were adequate, limestone was being delivered to the farms for about \$2 a ton,¹ a very reasonable rate. Nevertheless a large number of owners and operators could neither pay cash for it nor get long enough credit to enable them to pay for it out of the crop increases that would result from its use. Crop yields ordinarily do not increase until the third year after the limestone is applied. Some arrangement is therefore needed whereby purchasers will be permitted to defer payment for the limestone until the increased income is realized.

The grant-of-aid plan of the AAA has been a partial solution to the limestone problem. It has permitted as much as 70 percent of the total AAA payment to be assigned for limestone. This is a slow method of getting limestone used in a region of so many small farms since AAA payments per farm are very small. Many farmers have expressed

¹Limestone delivered at this cost was from quarries in adjoining counties. There are no quarries operating in Cumberland county.

approval of a plan whereby they could receive all their AAA payment in limestone or other soil-improving materials rather than in cash. However, the grant-of-aid plan has, up to this time, fitted into the usual practice in the claypan region of liming only small acreages at a time.¹

Loans for as long as three years can be obtained from production credit associations. Parts of these loans are often used for liming, altho the association does not usually make small loans just for liming. Since the security required consists of chattels valued at twice the amount of the loan, and since the returns from liming cannot always be realized within three years, these loans are not well-suited to the needs of the area.

The agency best fitted to solve this problem is probably the Farm Security Administration since it can make loans for periods as long as five years to farm owners who do not have enough security to get credit from other acceptable sources. Loans can be made to tenants who have long-term leases if these leases provide compensation for unexhausted improvements or if the landlord is willing to reduce rental payments for a period of years, the difference in rent to apply to the cost of liming.

A highly desirable arrangement would be for farm-mortgage agencies to encourage their clients to apply limestone and, if necessary, lend them enough money to pay the costs. The additional security provided by the greater productivity of the land would justify this practice, which the Farm Security Administration follows on its tenant-purchase farms in the county.

Revision of cropping systems. The cropping systems used on the harvested crop acreage in Cumberland county are generally too depleting. In all areas corn and broomcorn occupy too much cropland. The combination of corn, broomcorn, and soybeans, used on 59 to 100 percent of the crop area of individual farms in an effort to produce the greatest volume of cash and feed crops creates serious problems of soil depletion and erosion.

The fairly large acreage in nonlegume hays indicates how little of the cropland has been limed. The more general use of limestone would permit cropping systems that would keep more fertility in the soils and reduce erosion. In the county as a whole this would lead to the more

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¹The AAA grant-of-aid plan has been considered highly successful in stimulating the use of limestone. The plan was put into operation in 1940. In 1940 and 1941 the farmers of Cumberland county requested a total of 26,924 tons of limestone under this method of financing.

extensive planting of legumes and small grains and some reduction in timothy and redtop hay, soybeans, and corn. Of course such a program would take several years to accomplish, and it would mean a smaller income from grain than is realized under the present system (except as higher grain yields might offset reduction in acreage); but it would increase the amount of feed crops, help maintain fertility, and reduce erosion.

Some of the cropland that is now least productive or most subject to erosion could be used more advantageously for pasture than for harvested crops; but even for this purpose such lands should come under an improvement program.

Pasture improvement. Pasturing of some of the timbered areas in Cumberland county should be discontinued. An improvement program for pastures that are to be continued should include soil treatment and the control of grazing and weeds. Tho it is commonly thought that land worn out from grain growing will be all right for pasture, pasture grasses, like ordinary crops, are affected by the fertility of the soil. Improvement of pastures will increase their livestock-carrying capacity and provide a better quality of feed.

When included as part of the regular rotation, pastures should be given the same treatment as the rest of the crop area. For permanent pastures on tillable land, the first requirement is limestone to correct acidity. Pasture-improvement tests in the claypan region¹ show that a mixture of sweet clover, lespedeza, timothy, and redtop gives best results. The application of manure or other fertilizers is also beneficial.

Control of grazing is important because it reduces the number of weeds. On rolling land it also helps prevent erosion, since a good cover of pasture grasses means less surface runoff. Clipping of weeds is another practice which increases the carrying capacity of pastures.

Better woodland management. The outstanding need of farm woodlands is protection from grazing and fire. In the hilly area and in broken parts or the river-bottom area, there are large acreages of brush and timberland that are pastured. In fact two-thirds of the woodland in the entire county was reported in the 1935 U. S. Census as pastured. Heavily shaded pastures produce a scant growth of grasses and the grasses are of poor quality. Moreover, pasturing of woodland destroys young trees, reduces their rate of growth and the

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¹A "test-farm demonstration project," on the use of phosphate on pastures is underway in Shelby county. Some farmers claim that the carrying capacity of their pastures is five times what it was. The results of this project are easily observed by Cumberland county farmers.

proportion of desirable species, and increases erosion. Such land would be more profitable if used exclusively for timber production. The woodland of the county is confined almost entirely to the hilly and river-bottom areas. Since there are no blocks large enough to justify public operation, these wooded tracts should be included in farms and managed as a part of the farm business.

In all the broken areas more care and attention to woodlands would add to their value as income-producing enterprises, altho a period of time is necessary before returns would be secured. Where erosion and gullyng are taking place, trees should be planted or allowed to seed naturally. Where stands are already established, most of the timber is thrifty and growing rapidly in size and value; it should not be cut until the maximum return can be obtained in timber for farm needs and for market.

Larger farming units. Possibly three-fourths of the farms in Cumberland county could, thru the adoption of the practices recommended here, be made to provide a reasonable living for the farm family. Many farms, however, have too small a productive area to maintain a family adequately no matter what improvements their operators might make in farming practices.

The most drastic adjustments in size are needed on the smallest farms. Since a large proportion of the operators on the smaller farms are 60 years old or older (in 1939 39 percent were over 60, 22 percent were over 70), changes in operators may take place rather rapidly over the next ten years, leading to a combining of many farms. The poor condition of more than one-third of the houses on the small farms is another factor that may lead to a combining of some of these farms. That such a trend toward larger farms has long been underway is indicated by the decrease in the number of farms in the county from 2,484 in 1900 to 1,779 in 1940, a drop of 28 percent, whereas the total area in farms has not changed.

The final remedy for the existence of farms too small or too unproductive to be made economic must lie in a reduction of the rural population and the relocation in industrial areas or in other agricultural areas of the families now living on these farms.

Livestock adjustments. The amount of livestock which the farmers in this county can profitably keep depends, of course, for one thing on the amount of feed they can grow or buy. Many of them need to adjust their types of livestock to their equipment, labor supply, market, and the feeds they grow, or should grow, on their own farms. This

would mean more dairy and beef cattle and fewer hogs in the morainal area; more beef-breeding herds and sheep in the rough areas; more hogs in the river area, where there is a large surplus of corn for feed; and more dairy cattle in the eastern part of the county, where legume pastures can be grown on the prairie lands. More poultry would be profitable on farms where suitable housing can be provided and where feed and labor are available. By intensifying his livestock production in this way, a farmer could increase the volume of his farm business without having to acquire a larger acreage.

Possibly even more important than the adjustment of the kinds and number of livestock is the improvement of its quality. On many farms larger production and a better income could be realized from the same number of animals and the same amount of feed if better breeding were practiced, balanced rations were fed, and better care were given.

On many farms the breeds of livestock might profitably be changed, as where beef breeds are now used for dairy purposes. Returns would be materially increased if dairy breeds were kept on farms where milk is the principal source of income and beef breeds on those where sale of calves or fat cattle is the primary aim. On farms where some dairy products are sold and the calves are raised for feeding, dual-purpose cattle may be best. For any type of cattle the use of high-quality bulls, preferably of the same breed as the cows, is desirable. Only the best animals should be kept for breeding purposes.

With improvement of crop and pasture lands, more beef-breeding herds would be justified on the larger farms in the hilly area. Such herds should be built up gradually, the foundation stock being secured when cattle prices are low.

More efficient dairy production can be developed by feeding rations that are properly balanced with protein supplements, by grinding the grains, by testing to keep the herds free from disease, and by keeping records of the milk and butterfat production of individual cows in order to identify and cull out the low producers.

Swine production can be made more profitable by the more widespread use of sanitary measures for the control of parasites and diseases and by vaccinating against hog cholera. Feeding practices can be improved by using legumes for forage, purchasing protein supplements to balance grain feeds, and feeding hogs rapidly to market weights when feeds are available. In some parts of the county farmers sell feeder pigs when their feed supplies are short and feed out pigs when supplies are plentiful.

Larger numbers of sheep could well be kept to utilize roughage,

particularly in the hilly and morainal areas, where drainage is not a serious problem. Dogs may possibly be the limiting factor in sheep production.

On the smaller farms it seems advisable to continue to use horses rather than tractors, as the amount of work to be done does not justify a large investment in power equipment and the small income does not permit heavy expenditures for fuel, upkeep, and replacement. On the larger farms the choice of power and equipment may be guided by individual preference after due consideration has been given to the kinds and acreages of crops grown; but care needs to be taken to limit the total power supply to the needs of the farm. Too often tractors are added without reducing the number of horses.

Poultry can be made to contribute more income to these Cumberland county farms than it is now contributing. While the quality of the poultry stock and the character of the housing are generally good, on many farms the housing is entirely inadequate for the number of hens kept; this results in low production and high losses. Feeding practices could be improved by the more general use of balanced rations, both in mash form and in regular feeds. Use of more green legumes and the rotation of feeding lots is needed. After improvements are made in housing and feeding, the laying flock could be increased on many farms to make use of available labor.

Improvement of living conditions. Even where little or no cash is available, numerous improvements in a farm family's scale of living can often be made thru better planning and effort by the family itself. Indeed the home production of a varied and adequate food supply is likely to mean not only a more healthful diet but less expense as well.¹ An ample garden and dairy and poultry products and at least a part of the meat supply can be produced at home with little cash outlay.

Much can be done in Cumberland county and the claypan region to improve family living in this way. An increase in income from the products raised and sold is, however, an essential step in raising the living here to a reasonable level. This holds true not only for the present farm operators, but also for the younger people who will gradually replace the present operators. While the war period, because of the higher prices it has brought for farm products, might be ex-

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¹The gardens in the light-gray prairie and hilly areas of Cumberland county are considerably better than those in other areas of the county. In all areas the quantities of vegetables canned at the time this study was made was definitely related to the size of the farm, the larger quantities being canned on the larger farms.

pected to provide a start toward the establishment of those basic improvements that would permanently raise the income level, in reality it has retarded them, for under the incentive of wartime prices farmers have expanded the use of practices that are largely opposed to those that are desirable from a long-time point of view. To the period following the war, therefore, must be left the more fundamental adjustments that are needed to put farming in this area on a basis where it will provide a reasonable standard of living for those who choose this way of life.

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