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A GEOGRAPHIC INTERPRETATION OF
THE AGRICULTURAL REGIONS OF OHIO

A Thesis

Submitted to the faculty of Oberlin
College in partial fulfillment of
the requirements for the degree
of Master of Arts

By

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Oberlin, Ohio

1933

PREFACE

The purpose of this thesis is to divide the state of Ohio into agricultural regions, and, so delimited, to describe and interpret these regions in a geographic manner. The basis of division is the use of the land for varying agricultural purposes. These variables are expressed by means of isopleth maps showing acreage percentages of land use. Factors of the natural environment, such as soil, bedrock, climate, topography, and drainage, aid in the interpretation of these regions.

The writer is indebted to Dr. George D. Hubbard for permission to read his unpublished manuscript on the Physiography of Ohio, and to Dr. Reuel B. Frost for permission to include his map of the Physiography of Ohio.

M. E. S.

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A GEOGRAPHIC INTERPRETATION OF
THE AGRICULTURAL REGIONS OF OHIO

INTRODUCTION

Ohio is a state of varied interests. Manufacturing, mining, commerce, transportation, and agriculture all play important roles in the life of the state. Further, these activities are so completely dovetailed that it is difficult to separate them one from another and to make a study of any single one. However, this thesis proposes to study only the agricultural occupation of the state. Agriculture is not of first importance when value of the return on the product is considered, for products manufactured in Ohio in 1929 were worth six billion dollars, while agricultural products were valued at five hundred million dollars.¹ However, when the

1. The World Almanac and Book of Facts, New York World Telegram, 1933, 558.

utilization of the land is considered, agriculture is foremost, and it is significant to notice that of all the land in the state of Ohio (41,040 square miles or 26 million acres) 82.5% is occupied by farms.² Ohio is admitted^tly a good agricultural state. It is favored with a temperate climate of a continental type, with moderately cold winters and hot summers, a growing season six months long suitable for varied crops, a topography more than half of which is gently rolling, a soil enriched by glacial mixing or by river transport, and, finally, an immediate demand for a food supply.

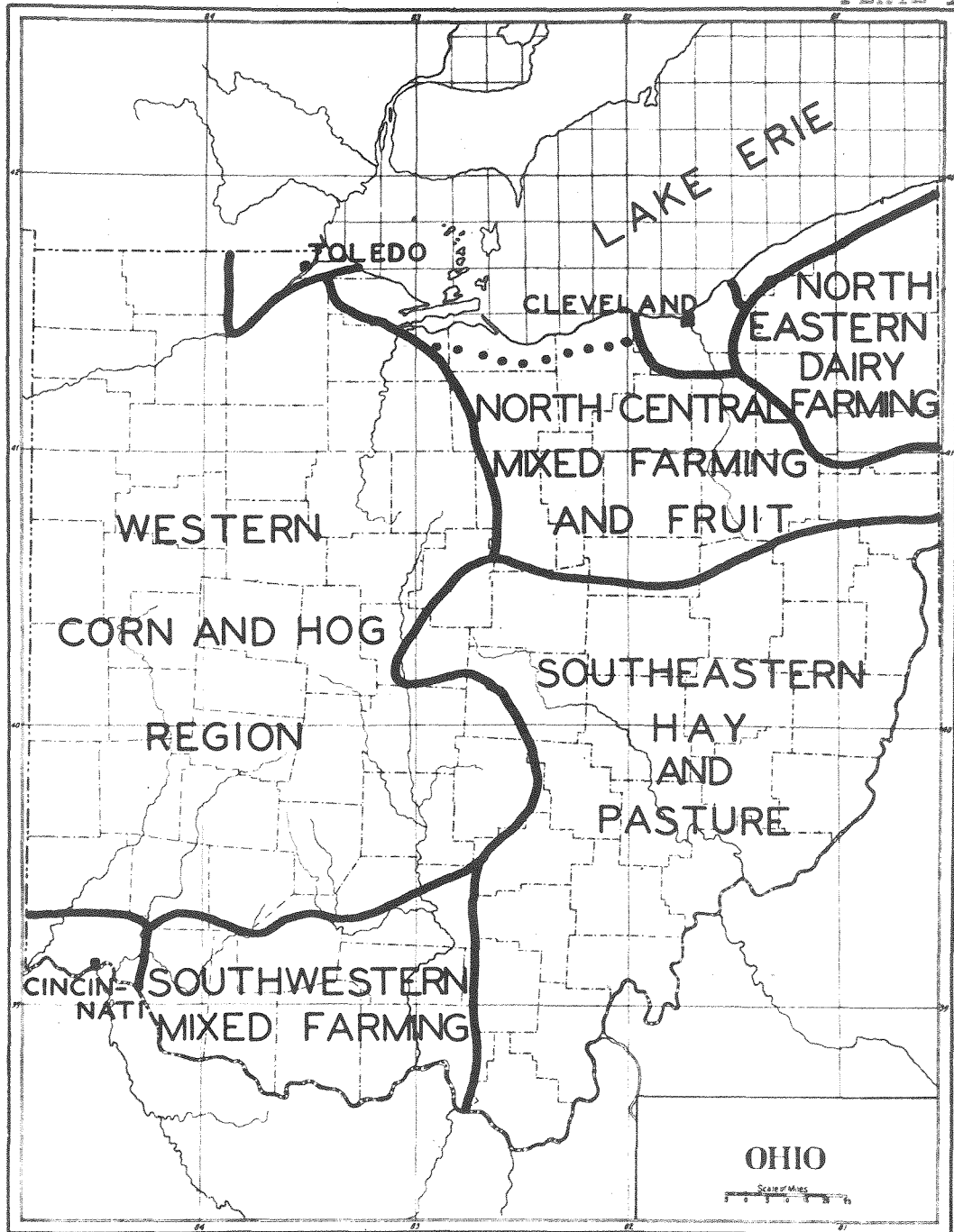
This study is only a phase of the complete life, or geography, of Ohio as a whole. Furthermore, it is a general study of the agricultural occupation of the state during one crop year. It does not consider the time factor nor attempt to show agricultural trends. It deals with occupation, that is, with land utilization expressed in acreage rather than with production, because acreage areas are more comparable than production figures, and the interpretations more sound.³ There is opportunity

2. U. S. Department of Commerce, Bureau of the Census, Agriculture of Ohio, First Series, 6.
3. Production is apt to fluctuate more than acreage, e.g. on account of unusual climatic conditions during a crop season.

for further and much more detailed study in this field when data concerning crop acreages localized by townships are available.

The state of Ohio is divided into six agricultural regions. The bases for this division are variations in percentage of land in farms, and variations in percentage of use of the farm land. The use of the farm land is divided into: pasture land, woodland, and crop land, and the latter subdivided into particular crops, such as wheat, hay, corn, etc. Soil, growing season, rainfall, topography, and rocks may individually or collectively aid in explaining the environmental reason for boundaries between the regions. Sometimes urbanization appears to dominate the factors of the natural environment. The six regions are as follows:

1. Western Corn and Hog Region
2. North Central Mixed Farming and Fruit Region
3. Northeastern Dairy Farming Region
4. Southeastern Hay and Pasture Region
5. Southwestern Mixed Farming Region
6. Urban Districts of Specialized Agriculture.



The Agricultural Regions of Ohio

CHAPTER I
MATERIALS AND METHOD

The Agricultural Regions of Ohio are determined after the construction and study of isopleth maps of Ohio agriculture. It is the purpose here to explain these maps, to add any items which will clarify the basis of interpretation, and to describe the method of study.

An isopleth map is one which is constructed to show relative percentages of a given factor over a certain area. The area under consideration here is the state of Ohio, and these maps show relative percentages of agricultural land uses over the state.⁴ The map of percentage of land in farms is necessarily constructed first because all the other maps are

4. All the maps referred to in this and subsequent chapters may be found in the Appendix. Frequent reference to them is advised, even though not always noted in the text.

based upon what it shows, namely, the percentage relationship of farm land to all the land. The percentage of farm land in each county is reckoned by dividing the number of acres of farm land by the total number of acres in the county, and the percentage figure is placed on the map in the proper county. Then the isopleths are drawn connecting areas of equal percentage. The resulting map is similar to one showing topography of the land by means of contour lines, with "peaks" of high percentages, and "depressions" of low percentages.

Next in order is the map showing the percentage of farm land devoted to crops. This is localized by townships rather than by counties. To obtain this percentage the total number of acres of crops in a township is divided by the total acres of farm land in the township, then this figure is written in the proper township location and the isopleths drawn accordingly. The pasture land and woodland figures are obtained similarly. The map of percentage of woodland includes woodland used for pasture. This is necessary to show the true picture of the extent of woodland over the state. A map of woodland alone, omitting that used for pasture, shows much less woodland than is known to exist. For instance, the wood-

land map in this work shows over 20% of woodland in northeastern Ohio. This includes pastured woods. A map of woodland excluding the pastured portions shows less than 10% in woods, and shows no difference between this and contiguous regions, e.g. the lake plain, a difference which may be seen readily in the field. The crop, pasture, and woodland percentage maps are each localized by townships, and therefore give a more accurate and detailed representation. The township unit is so much smaller than the county unit (the average number of townships in an Ohio county is 15) that a line drawn in reference to values per township is consequently more accurate than one drawn in reference to a county unit. These maps are used as bases for delimitation of the regions, partly because they show major land uses, but also because they are recognized as more accurate than any of the others.

The individual crop maps are next in order of construction. They show the percentage of crop land occupied by a particular crop. These percentage figures are obtained by dividing the number of acres in a crop, e.g. corn, by the total number of acres in crops. All the crop maps are localized by counties. It is regretted that census data for crops are not

localized in township units for the detail of interpretation would be increased enormously if these were available. The isopleth crop map is valuable in giving a relative idea of the importance of a crop acreage in a certain area. For instance, the map showing the percentage of the crop land in hay shows that the peak is in the southeastern part of the state. But here, also, the percentage of crop land is the least in the state, about 30% of the farmland, so that more hay may actually be produced in another section, but still not be as important in relation to other crop acreages.

All of the data upon which the isopleth maps are based are derived from the Bureau of the Census of the United States Department of Agriculture and refer to the crop year of 1929. The numbers of farm animals are those of April 1, 1930. Climatic data are derived from W. H. Alexander's book on the Climatological History of Ohio. The United States Department of Agriculture, Bureau of Soils, under the direction of the Ohio Experiment Station has surveyed the soil distribution in Ohio and published several county bulletins which are a great aid in this study of the state. Additional information is obtained from topographic, geologic, soil, and other maps. A

complete list of references is included in the bibliography.

The following definitions are inserted in order to be clear concerning the use of terms. These are accepted and used by the Department of Agriculture and the Bureau of the Census.⁵

Farm—A farm is all the land which is directly farmed by one person, either by his own labor alone or with the assistance of members of his household or hired employees. It is any tract of land of more than 3 acres, unless its agricultural products in 1929 were valued at \$250 or more.

Farm land.—All land in farms includes considerable areas of land not actually under cultivation and some not even used for pasture, since each farmer was asked to report as a unit all the land under his control, or rather all the land which he thought of as part of his farm. Isolated tracts of timberland and other areas not connected with the farm were not included.

Crop land.—The total crop land consists of the three classes of land, as follows:

1. Crop land harvested in 1929, comprising all land from which cultivated crops were harvested, all land from which hay was cut (including wild hay cut within the limits of the farm), and all land in small fruits, orchards, vineyards, gardens, nurseries, and greenhouses. A given acreage was counted but once, even though two or more crops were harvested

5. U. S. Department of Commerce, Bureau of the Census, Agriculture of Ohio, First Series, 6.

from it.

2. Crop failure, comprising land from which no crop was harvested in 1929 because of crop failure or destruction from any cause, including drought, flood, insects, or disease.

3. Idle or fallow land, comprising crop land which was lying idle or which was in cultivated summer fallow in 1929.

Pasture land.—The total pasture land consists of the three classes of land, as follows:

1. Plowable pasture, comprising land used only for pasture in 1929 which could have been plowed and used for crops without clearing, draining, or irrigation.

2. Woodland pasture, comprising woodland used for pasture at any time during 1929.

3. Other pasture, comprising all land used for pasture in 1929 which was not included under plowable pasture or woodland pasture.

Woodland.—This includes woodland used for pasture and woodland not pastured in 1929.

The method of dividing the state into regions is one of map study and correlation. In the first place it is necessary to study the maps individually and note any locations where lines are close together. This, in topographical terms, denotes a "gradient," that is, a relatively rapid change of percentage in a short linear distance. Some lines may be

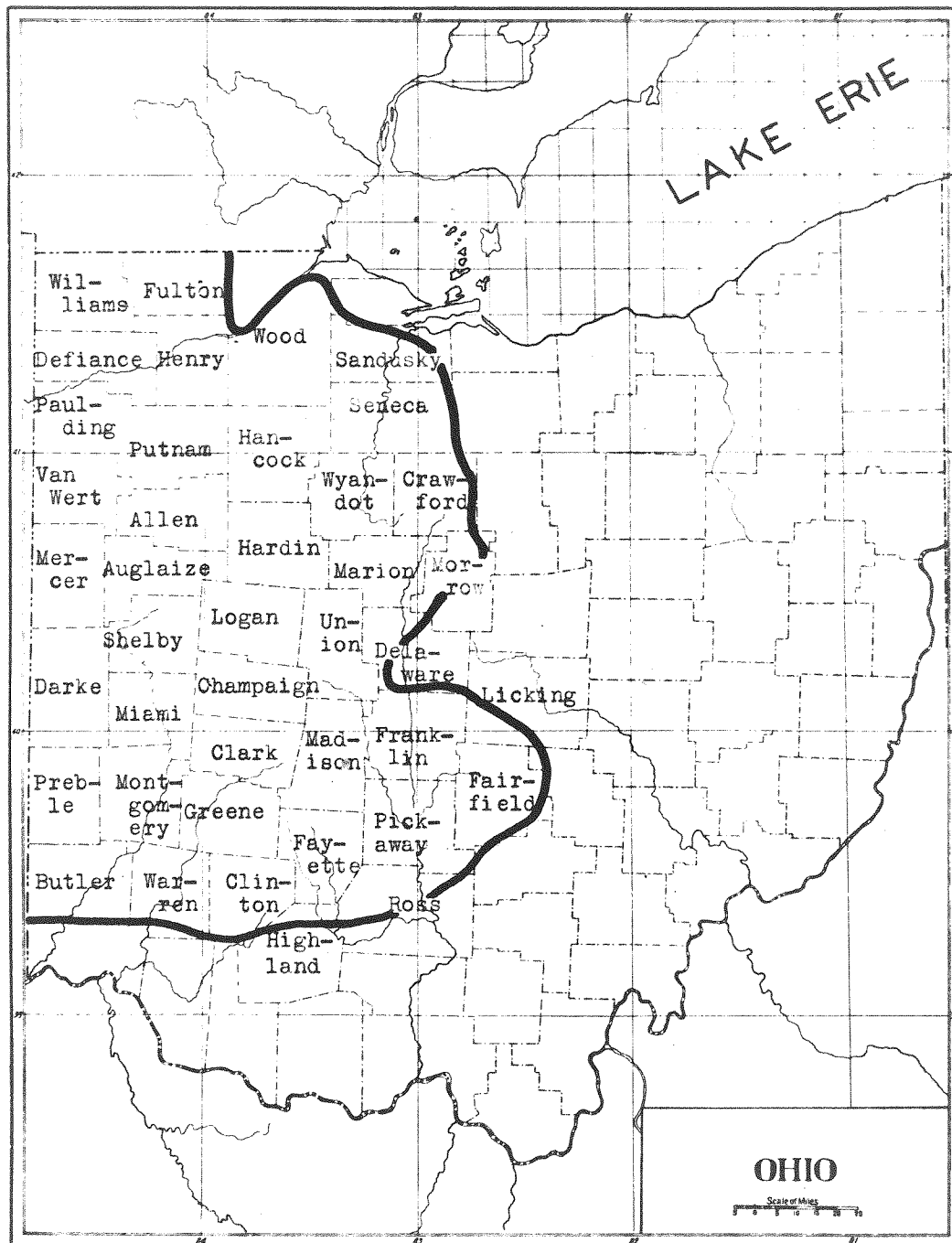
parallel for several miles and so denote a change in land use along a certain front. The peaks and depressions are soon noted and a very general picture of percentage distribution may be gained. For instance, in studying the original map of the percentage of crop land it is easy to see that the largest area of high percentage of crop land is in the western part of the state, and that the lowest percentage is in the southeastern part. This gives a hint of general farm practices in the two areas, and is worth noting and remembering for subsequent study. Pasture land percentages then are better understood, when it appears that there are more acres of farm land devoted to pasture in southeastern Ohio than in western Ohio. Further study and comparison of each crop map adds to the growing picture. It is of great importance, for instance, to notice that hay occupies more acreage than any other crop in southeastern Ohio. This item, together with the fact of high pasture acreage, tells a certain story of farm economy. One seeks further to find the kinds and amounts of live stock produced in this area. In this manner the general regional characteristics are recognized and located.

Then it becomes necessary to limit or bound the regions. Often, in constructing geographic re-

gions, the land forms or the climatic changes are used for the basis of boundary lines. In this study it seems more accurate to base the boundaries on actual land use, or on differences of that use, and let topographic or climatic factors be an aid in explaining the location of the boundaries. The maps of crop land and pasture land may be superimposed upon each other and areas of steeper gradients noted. Tentative regions may be drawn and compared with crop acreages and gradients. It is not to be expected that all will fit together perfectly, that is, that all crop boundaries will coincide with all regional boundaries, but the more boundaries that agree in a given area, the better the evidence for the location of a boundary. Emphasis should be placed on the importance of gradients in using a given line as a boundary basis, rather than using any particular isopleth which appears to fit the location one wishes. Such gradients are noticeable, for example, around the urban areas of Cleveland, Cincinnati, and Toledo, as well as around the northeastern section of the state.

After the regions have been determined and described, interpretations and explanations follow. The climatic factors operative in Ohio, the nature of the topography, of the soils, the locations and

sizes of the large cities are all of great importance from a geographical point of view. In addition are items gleaned from reading, from field observation, and from general knowledge. They all aid in completing the picture of the agricultural regions of Ohio.



The Western Corn and Hog Region

CHAPTER II
WESTERN CORN AND HOG REGION

The Western Corn and Hog Region is the largest agricultural region in Ohio, for it includes, wholly or in part, forty-two out of the eighty-eight counties of the state. It is the corn country of Ohio, where corn is raised to feed hogs, and the dominance of this practice justifies the size of the region. At least 25% of the crop land is occupied by corn, and over most of the area 30% or more is so occupied. (Plate XVIII) Moreover, there are .10 or more hogs per acre in the region.⁶ (Plate XXVII) These regions bordering on the state line must be thought of as extending beyond the line into adjoining territory.

6. Throughout this thesis farm animals per acre are expressed in percentages in order to remain consistent with the isopleth data. .10 hogs per acre is the same as one hog per 10 acres, .40 hogs per acre is one hog per 2½ acres of farm land, etc.

This western region, in particular, is an integral part of the great corn belt of the central lowlands of the United States and constitutes its most eastern extension. Various crops and products are localized in small areas within the region, but corn with its accompanying farm economies is dominant.

The boundaries of the Western Ohio region are well defined in the south and southeast. The southern boundary extends from west to east along or through Butler, Warren, Clinton, Highland, and Ross counties, and marks the southern limit of the area having more than 50% of the farm land devoted to crops. In Warren, Clinton, and Highland counties the boundary marks the southern limit of less than 40% of pasture land; it marks the 30% limit of corn at the Butler County line; and it marks the limit of less than .20 swine per acre. There is a physiographic and edaphic boundary here also, for this is the limit of the most southern extent of early Wisconsin glaciation, and, in consequence of it, a change in soils occurs. This change is primarily a decrease in lime content (and therefore of general fertility) toward the south.⁷

7. W. A. Lloyd, J. I. Falconer, and C. E. Thorne, The Agriculture of Ohio, 433.

The southeastern boundary consists of that portion extending from Ross County through Hocking, Fairfield, Licking, Delaware, and Morrow counties. It is one of the most distinct boundaries in this study of Ohio. Almost all the major crops show a steep gradient in the southern part of Fairfield County, denoting a definite change in land use. The percentage of farm land shows a difference of 23% between Fairfield and Hocking counties. The similarity and proximity of the lines indicating 50% of crop land and 40% of pasture land is easily observed, and it is of interest to note how they also coincide with gradients of crop acreages. There is a distinct increase in woodland area to the south of this line. A decrease in corn and wheat acreage may be noted towards the east, as well as definite decrease in swine per acre. In contrast hay acreage increases to the east and southeast. Reasons for these sudden changes are found both in the soil and topography, for that part of the boundary which extends through Ross, Hocking, and Fairfield counties coincides with the southern extent of the last (Wisconsin) glaciation. This glacial boundary divides distinct topographies: toward the west, in Fairfield and Pickaway counties, extend the level till plains, toward the east are steep slopes,

narrow ridges, and intricate dendritic valley systems of a region untouched by glacial action. This topographic change coincides with a distinct soil boundary, for the unglaciated soil is a mature residual type derived from the underlying sandstones and shales of Pennsylvanian and Mississippian age, while the glaciated soil of Fairfield and Ross counties is a mixture of local residual soils and drift material. The residual soil is classed in the DeKalb series, and includes sandy, stony, and silty clay loams; it is generally grayish or light yellowish brown.⁸ The glacial soil along the eastern border of this region is classed in the Volusia series, and includes loams and clay loams.⁹ There is a climatic change along this boundary, for the relief affects the length of the growing season. The area to the west of the boundary has a season averaging from 164 to 170 days, while toward the east the season is shorter by 14 days. (Plate XII) Briefly, there is a distinct natural boundary of topography, soil, and climate to cause a response in the boundary of agricultural economies.

8. Ibid., 435.

9. Ibid., 434.

The northeastern boundary of the Western Corn and Hog Region is not so well defined. It extends from Morrow County through Richland, Huron, Sandusky, Ottawa, and Lucas counties to the state line. The placement of this particular boundary is dependent primarily on the 25% isopleth for corn, but there is not a steep gradient of corn acreage here, and there appear to be few coincidental lines in this general area. This boundary of corn is chosen because to the east of this line there is a gradual decline in corn acreage, as well as in the number of hogs per acre. To the west of it, corn (over 25) and hogs (over .10 per acre) dominate the farm economy. In Huron and Lucas counties there is a similarity between the regional boundary and the 85% isopleth of farm land, with a steep gradient around Lucas County, the location of the city of Toledo. There is a slight relationship to potato acreage, which increases from this boundary towards the east. It is considered of minor importance because of the small amount of land involved.

This region is the great farming area of Ohio. More than 85% of the total amount of land is in farms, no part of the area has less than 50% of its land in crops, pasture land occupies in general less than 30% of the land in farms, and woodland acreage is generally

10% or less. A small area in Logan County has a percentage of pasture land around 40, and an increase in the percentage of woodland. This island-like area of heavier pasture and woodland is due to increased slope of the land, and possibly to higher altitude. Topographically, it is important as the highest place in Ohio, where Campbell Hill attains a height of 1550 feet. It is a knob-like area of glacial drift, located between the two main loops of moraines--an inter-lobate area. (Plate X)

Physical conditions are especially favorable for corn production in this part of the state. The level to gently rolling till plains and moraines are underlain by limestone rocks which have contributed to the high lime content of the soil, and are the main reason for its fertility. The climate, especially during the summer, is very suitable for corn, because it is hot, both day and night, and frequent showers foster quick growth and development. Although corn is the common large acreage crop throughout the region, there are localities of greater concentration. The greatest corn acreage is in the southern part, centering in Clinton County, 53% of the crop land being devoted to corn. The importance of this is better understood when one realizes that in this county 94% of the land is in farms, and, of this number 57%

is in crops. Wheat and oats each occupy minor portions of the crop land—each less than 30%. The number of swine per acre of farm land (.40) is also the highest of any county in the state and shows the area of swine production to be in agreement with that of the largest corn acreage. These figures give a definite basis for interpretation of the type of farm economy, namely, the raising of corn for hog food and pork production.

To the east of this area of corn and hog production there is an area where a larger amount of the land is sown to wheat. A peak of 30% is reached in Pickaway County, but corn acreage continues to dominate at 46%. Hay and oats are each below 10%, which shows that corn and wheat are the major crops. This is the largest acreage occupied by wheat in the state of Ohio, and is the area of southern specialization of this crop.

(Plate XI)

Coincident with the peak of wheat acreage is a small area of an increased percentage of beef cattle per acre. (Plate XXV) This is noted in Licking, Pickaway, and Fairfield counties, where the area of beef cattle of the Southeastern Hay and Pasture region extends into the corn country for a short distance. Pork production, though less, retains its importance.

To the west of the swine producing center is an

area of increased numbers of dairy cattle. (Plate XXIV) This extends along the valleys of the Miami and Little Miami rivers and includes the cities of Hamilton, Middletown, Dayton, Troy, Springfield, and Xenia, all cities of 10,000 or more inhabitants. (Plate XI) Such urbanization (not forgetting the influence of Cincinnati) must have an influence on agricultural economies. In consequence of this there occurs a decrease in corn acreage to less than 40%, an increase in hay and oats, while wheat acreage remains the same; each just below 20%. The acreage of forage crops is increased and the number of dairy cattle shows an increase with a corresponding decrease in swine. Here, then, is a dairy district along the Miami valley dependent on, and a product of, the urbanized condition. Corn is fed to dairy cattle for the production of market milk rather than meat supply which can be developed at a greater distance from the city than dairy foods. Also in this district tobacco is important as a cash crop, but is a minor crop in total crop acreage. Darke, Preble, Miami, and Montgomery counties are the center of this production. Tobacco culture in Ohio is really only an outlier of the intensified production of the Kentucky areas to the south and is of minor importance. It

is located here on rich ("black land") soils in the Miami valley, often found on the Brookston silty clay loam.¹⁰

Another area similar to the Miami valley is the one in the upper Scioto valley around Columbus. It, too, is best shown by the number of dairy cattle per acre of farm land, and shows the increase of dairying where density of population is greater. (Plates XI and XXIV) There is a decrease in the amount of farm land which would tend to raise the percentage figures, but the total number of dairy cattle is correspondingly increased. The only crop that shows the influence of the city is potatoes, and only 1% of the acreage is so occupied. This is a slight increase over surrounding counties and shows a demand from an urban area for a staple food.

The northern half of the Western Ohio region, while still dominated by corn in 30 to 35% of its crop acreage, has a different aspect than the south. Through the central part from west to east is a zone of beef cattle production. (Plate XXV) This is best shown in Mercer, Auglaize, Allen, Hardin, Han-

10. E. R. Allen and Oliver Gossard, Soil Survey of Miami County, Ohio, 8.

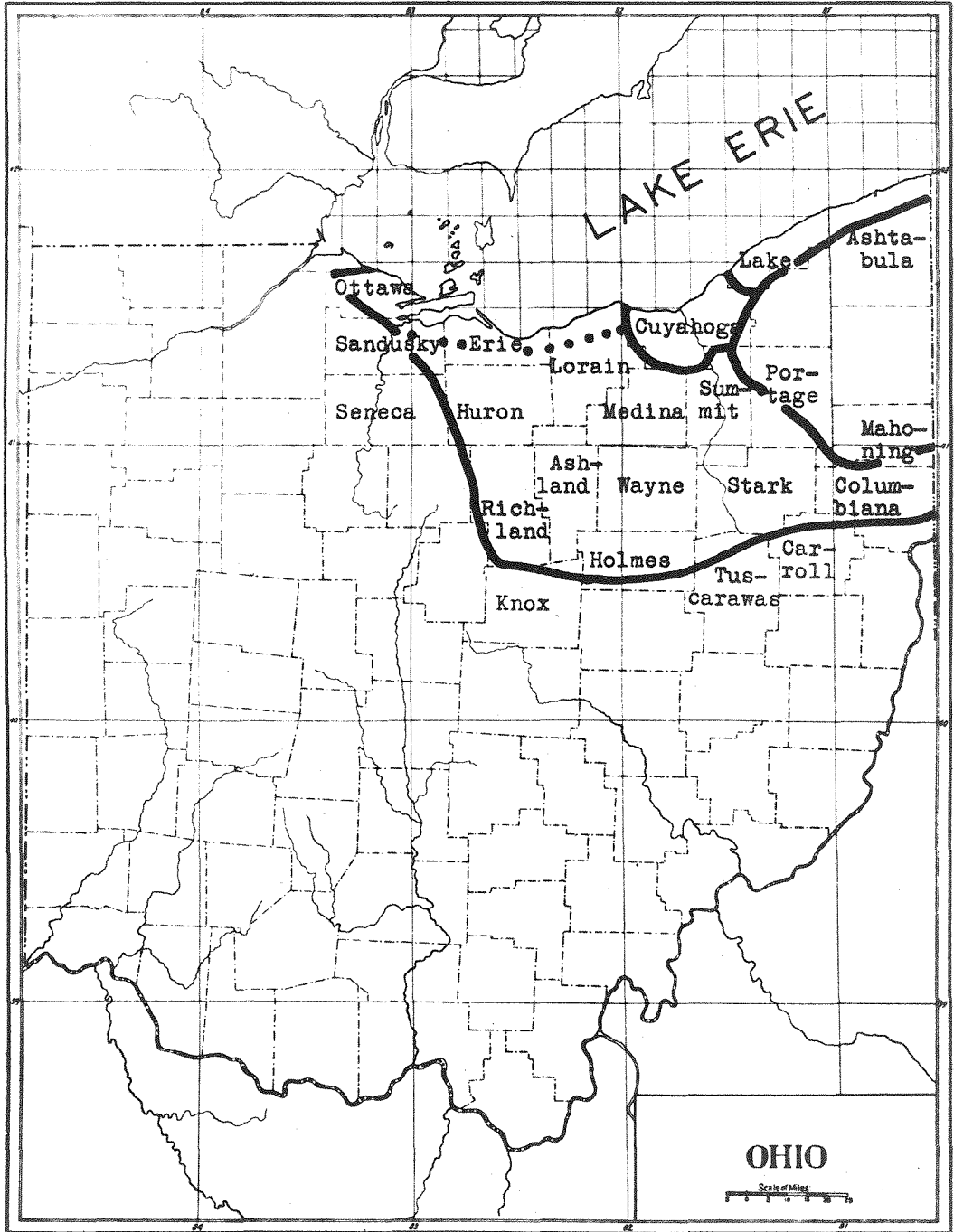
cock, Wyandotte, Crawford, and Seneca counties. In this area there is a corresponding increase in hay acreage, and also wheat acreage in the eastern part. The forage crops increase with the change of animals. Swine number over .30 per acre, but the feeding of beef cattle and of sheep in the eastern counties supplants the pork production. In the area of the Maumee drainage is an increasing oats acreage. The highest percentage (30) in the state occurs in Paulding and Van Wert counties.

Sugar beets are raised as a specialized crop in the Maumee drainage area. Similar to tobacco, the total acreage and acreage percentage are small, but the relatively high income return of the crop warrants its cultivation. The main producing counties are Paulding, Defiance, Putnam, Henry, Fulton, Wood, Lucas, and Ottawa, and small scattered areas in counties surrounding these.. (Plate XXIII) The sugar beet industry is an outgrowth of the Michigan industry and, while it has been successful in recent years, its profit making capacity depends on the economic factor of a protective tariff rather than any controlling environmental factor. The locality is favorable for the growth of sugar beets, however.

The soil, called the Fulton clay loam, is a heavy black soil, requiring extensive drainage before it can be used agriculturally.¹¹ It is a soil in which sugar beets thrive. Besides, the beets grow best where the climate is not so hot as that required for high corn production, (as in southern Ohio), and are generally found on the northern border of the corn belt, as they are found here.¹² The cost of draining the land is great, and so the income from the land must be great enough to yield an adequate return and cover the expense involved. Therefore, from a climatic, edaphic, and economic point of view, sugar beet production is well adapted to this locality.

11. Lloyd, Et. al., Op. cit., 432.

12 V. C. Finch and O. E. Baker, Geography of the World's Agriculture, 71.



The North Central Mixed Farming and Fruit Region

CHAPTER III

NORTH CENTRAL MIXED FARMING AND FRUIT REGION

The North Central Mixed Farming and Fruit Region is not united within itself. Agriculturally, it is greatly diversified, and this diversification extends to the topography, climate, and life of the people in it. It is a transition region between the more intensified crop farming of western Ohio and the more intensified pasture farming of eastern Ohio. In the central part of the state the break is distinct between the crop and pasture types, but in the north the change is more gradual and covers a wider territory.

Topographically, also, the region is transitional. It includes parts of three physiographic provinces: the lake plains, the till plains, and the glaciated plateau. (Plate X) The lake plains are very level with definite beach ridges parallel to the general shoreline of the present lake—a testimony of the

former extent of Lake Erie. In this region the gently undulating till plains are cut across by two terminal moraines, the Defiance and the Fort Wayne, but the morainic topography in this portion is not at all definite. The river valleys are youthful in their narrowness and steep slope of valley walls. The surface of the glaciated plateau may be characterized as rolling, although it varies in different parts. Before glaciation it had a strong valley system which was partially filled up and smoothed by glaciation, so that now the forms are well rounded. Occasionally along the old master valleys there is a decided slope to the land surface. The break between these topographic types is not distinct, but gradual. However, the difference between the extremes of the lake plain type and the glaciated plateau type is evident.

Agriculture is highly responsive also to the climatic conditions. The influence of Lake Erie is great along the shore, particularly in lengthening the growing season and preventing temperature extremes. The area which is most benefited is only a narrow portion along the shore, so that a particular kind of agriculture has developed within the climatic limits.

The soils vary with the topography and physical conditions. Along the lake plain the soil is gener-

ally light and friable, a sandy loam, but over the glaciated portions it is heavier, more clayey, and classed variably from a silty to a clayey loam.¹³

The degree of urbanization in this portion of the state undoubtedly has a decided influence on the degree and nature of the farm economy.

The region may be subdivided as follows: Eastern Lake Shore Fruit and Nursery Sub-region, Western Lake Shore Fruit Sub-region, and Interior Mixed Farming and Dairying Sub-region. The Western Shore includes Ottawa, northeastern Sandusky, northern Erie, and northern Lorain counties. The Eastern Shore comprises the lake plain portion of Lake and Ashtabula counties. Although these two sections are separated by metropolitan Cleveland, they may be considered agriculturally similar. Both have the same lake plain and beach ridge topography, similar soil conditions, and they receive the same climatic benefits from the lake. They differ somewhat in area, however, for the western lake plain widens toward the west in a broad arrowhead shape, while the eastern lake plain averages about five miles in width and is cut off abruptly at the south by the abutting plateau. The southern

13. Lloyd, Et.al., Op. cit., 434.

boundaries of the shore regions are determined by the change from the intensified fruit crops to the general farming type. This change is dependent on climatic factors of temperature and frost season. On the western plain the critical influence of the lake is felt only within an area of approximately five miles in width, and this area is considered as the Western Lake Shore, a counterpart of the Eastern Lake Shore. The Eastern Shore has a similar width, but its boundary is both climatic and topographic, on account of the proximity of the plateau area.

The agriculture of the lake plain is fruit raising in a highly intensified degree. The growing season along the lake shore averages 192 days or more, and this is equaled only in the Cincinnati district in the southwest corner of the state. This is very favorable for the raising of fruit, which is highly susceptible to frosts. It must be remembered that not only does the large water body prolong the autumn season and keep early frosts from attacking the fall fruit, but the cold raw winds from the lake delay the spring season so that the buds are not forced too early and then damaged by a late spring frost. The Western Shore specializes in peaches and cherries, while pears, plums, and apples are of subordinate

importance. This section leads the entire state in the production of cherries, pears, and plums. The Eastern Shore specializes in smaller fruits: grapes, raspberries, blackberries, and strawberries, and leads in the production of grapes and blackberries. All of these fruits are grown in both sections, but there is a specialization in small fruits along the eastern and of tree fruits along the western lake plain. This distribution may be influenced by the distance to market, the smaller more perishable fruits are nearer the Cleveland district and may be transported quickly with small cost of waste, while the larger fruits which bear transportation better are at a greater distance. The development of resorts along the lake has been another impetus to fruit and market garden development, in order to provide a food supply during the summer months. Along the Eastern Shore there has developed the nursery business, and the raising of plants, especially flowers, for seeds. This kind of culture has developed on account of the favorable season modified by the lake, the proximity of the Cleveland market, and the excellent transportation facilities offered by the main line railroads along the lake plain. The nurseries and seed houses are greatest in the Lake County portion. There is a large development in the growth and sale

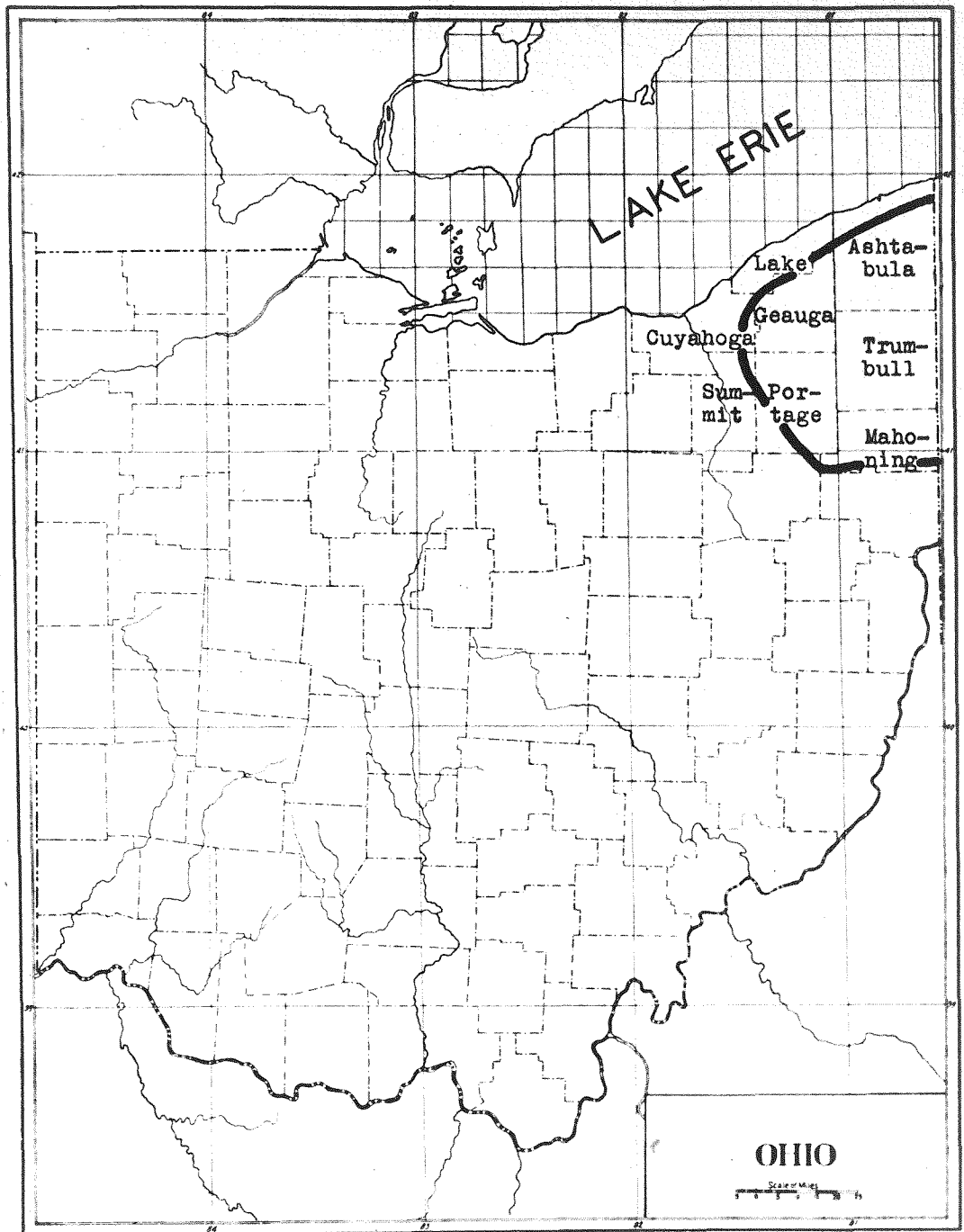
of flowers; these are grown both in the open and under glass. This development is probably influenced more by the proximity of a city than by natural aptitudes of the locality. It is significant, however, that the sale of nursery and seed products returned over a million dollars to Lake County agriculturalists in 1929.¹⁴ This was far ahead of any other county in the state, and over ten times the income from any other group of agricultural products, such as cereals, etc.

The Interior Sub-region of the North Central Ohio Region consists of 11 counties or portions thereof, namely, Erie, Huron, Richland, Ashland, Lorain, Medina, Wayne, Holmes, Summit, Stark, and Mahoning. As stated above, the section is a transition area, both from north to south and from east to west. The percentage of crop land varies from 50 to 65. The highest is maintained in the Wayne County portion. Wayne County is the center of northern wheat acreage in the state (Plate XX), for 25% of the crop land is planted to wheat. But this is not outstanding in the crop list, for hay also occupies 25% of the land,

14. U. S. Department of Commerce, Bureau of the Census, Agriculture of Ohio, Second Series, 27.

corn 22%, and oats 14%. These figures show the lack of specialization of one particular crop, and the comparative equality of the major crops. In this county dairy cattle are twice as numerous as swine and sheep. This is often called a dairy region, but considering the extent and acreage of crop land it would be better to designate its agriculture as mixed farming and dairying. Corn, wheat, and oats acreages decrease toward the northeast and southeast. Hay increases in these directions, and potatoes to the northeast only.

In this sub-region there are twenty-three cities ranging in population from 2,500 to 255,000. These stimulate an urban food demand which has a high degree of influence on the agriculture surrounding them, and must, collectively, be considered as one of the factors aiding in the development of dairying and especially of milk production in this area.



The Northeastern Dairy Farming Region

CHAPTER IV

NORTHEASTERN DAIRY FARMING REGION

Northeastern Ohio is a region devoted primarily to dairy farming, with subordinate developments in other agricultural fields. All of its agriculture is closely related to the urbanization along its western and southern margins, extending from Cleveland to Pittsburgh. It is composed of eight counties or portions thereof: Ashtabula, Trumbull, Mahoning, Portage, Summit, Guyahoga, Geauga, and Lake. The region is a unit because of the large proportion of pasture land (over 40%), the small proportion of crop land (less than 50%), and, in parts, the large areas of woodland (over 20%).

The predominance of dairying is due primarily to topography. Located in the region of glaciated plateau, this section of the state exhibits a well formed and hilly topography mantled with glacial

drift. Through the center of the region the relief is much less where a broad valley floor of pre-glacial times extends north through Trumbull and Ashtabula counties. Toward the west and east of this old valley are glaciated hills and smaller valleys. Relief, as a rule, is not more than 200 feet, and slopes are generally not steep, so that topography itself does not deter agriculture. However, the altitude in the hilly portions is 1100 feet or more, which is over 500 feet above the lake level. This altitude apparently has a decided effect on the climate, for the growing season is only 150 days or less over most of the region. Moreover, the rainfall is heavier than in any other section of the state except in Adams County on the Ohio River. Much of this falls in the form of snow (the central part averages over 50 inches) which suggests that the winters are long and cold and that late spring and early fall frosts may be expected. Heavier precipitation and glacial debris accompanied by poor drainage promotes a wet soil that fosters tree growth. Slopes which are too steep for cultivation, though relatively few, are wooded. Such is the natural background for the agricultural occupation.

Hay is the major crop in this area, occupying one-third of the crop land. Corn and oats each oc-

occupy about 15%, and wheat less than 5%. Potatoes attain a greater acreage in this region than any other section of the state, occupying 5% of the crop land in Geauga County. The relative number of farm animals per acre of farm land is as follows:

Dairy Cattle	.15
Beef Cattle	less than .01
Swine	.02
Sheep	.03.

This region supports more dairy cattle per acre of farm land than any other section of Ohio. (Plate XXIV)

Dairying is the major occupation of the farmers. It relies on the large amount of natural pasture including two-thirds of the woodlands, the suitability of the short damp growing season for hay crops, and proximity to city markets for selling the product. Most of this produce is sold as market milk, secondary processing for the making of butter or cheese is done outside the region.

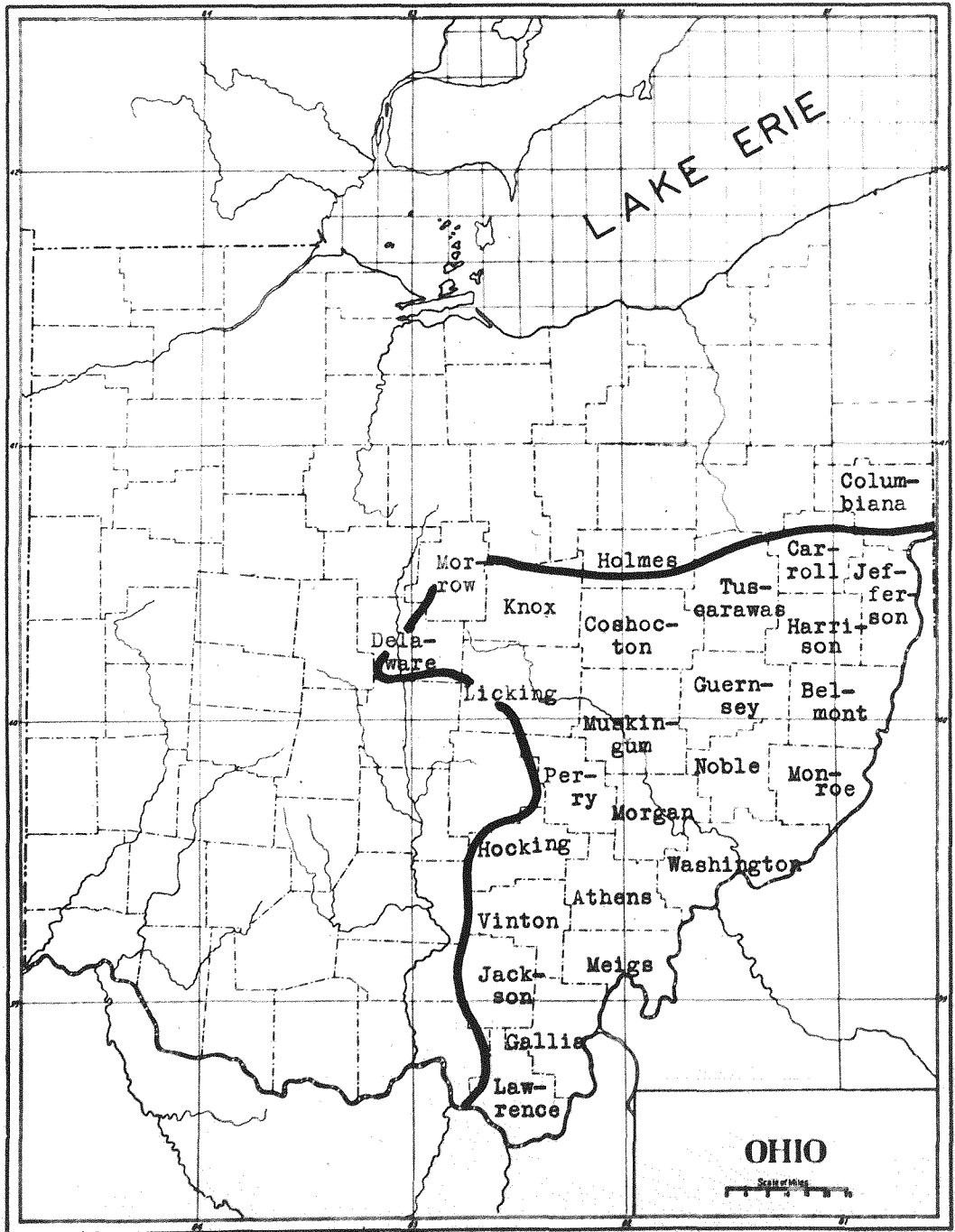
The potato crop is well adapted here because it can grow where the season is shorter and the precipitation heavier than in the corn-hog region. Moreover, there must be a nearby market, for the potato crop is bulky and the price per unit of weight is lower than other food crops, factors which make long trans-

portation impractical. Hence, with favorable climatic conditions and a large market, the potato crop is highly developed.

The large percentage of woodland suggests the possibilities of lumbering, but this occupation is carried on only in a small way by individual farmers. The stand of trees is mixed deciduous varieties with a predominance of beech and sugar maples. The maples have become important as producers of sap for the making of sugar and syrup. Although maple syrup is produced in more than half the counties of the state, its greatest development is in this region. Geauga County produced 62,400 gallons of syrup in 1929. The surrounding counties of the region collectively produce about two-thirds as large a quantity. This, too, is a well adapted agricultural activity, because it occupies the farmers in the slack season of February and March, and is a cash product that sells readily in the city.

Fruits and vegetables which may be transported to the city occupy a small amount of the land. Apple orchards and vineyards are possible along the northern edge of the region, where the slope of the land aids in preventing hard frosts, and there is some ameliorating influence from lake breezes. Apples also thrive in the southern part, for here the climate is consid-

ered less severe. Fruits are only supplementary and are not nearly so intensified as along the lake plain. The effect of glaciation is seen in the numerous marshes of the region and muck lands that have developed in them. These small sections have often been artificially drained and developed in truck and vegetable gardens. Celery and onions, and other vegetables of less importance, are grown in the muck soils and taken to the city. Such a section is developed in northeastern Portage County, and in Trumbull County along the old valley floor. These areas are small and scattered and of minor importance in acreage, but yield a good return.



The Southeastern Hay and Pasture Region

CHAPTER V

SOUTHEASTERN HAY AND PASTURE REGION

The Southeastern Hay and Pasture Region includes twenty-five counties in all or part, and over this entire area the major agricultural activities are the same. The limits of the region are determined mainly by the agreement of the 40% isopleth of farm land in pasture, and the 50% isopleth of land in crops. In other words, less than 50% of the land is in crops, and more than 40% is in pasture. Woodland occupies more than 20% of the farm land in the southern part. The nature of the soil and the character of the relief are both effective influences on the kind of farm economy these percentages suggest.

The northern boundary of this region, from the Pennsylvania state line to Knox County, is roughly the southern extent of glaciation. South of that limit, glacial drift does not mantle the land forms, much more of the land is in slope, and drainage is

better developed. While southeastern Ohio is referred to as a dissected plateau, the dissection is more apparent now than the plateau, for the old surface is suggested only in numerous narrow ridges. In consequence there is a relatively small amount of level land suitable for crop production, and this is found most frequently in the valley bottoms or on the tops of the hills. Indeed these are the most common areas where crops may be seen, especially corn. The soil is a mature residual type, derived primarily from clays and sandstones, and therefore lacking not only the advantage of glacial mixing, but also the enriching lime content of the underlying rocks. The southern part of the region maintains a woodland of over 20%, but the northern part, though hilly, has remarkably few wood lots. The amount of woodland is even less than in part of the glaciated portion of the northeastern region. The rest of the land--not in crops or in woodland--is left as pasture, and of this there is a high percentage, for at least half of the region has over 60% of its farm land in pasture. Similarly, although the region is bounded by the 50% isopleth of crop land, it is most certainly true that in more than half of the region 30% or less of the land is occupied by crops. The crops also show the trend of farm economies, for hay acreage is over 40% of the crop land in

the central part, corn is about 25%, wheat 10%, and oats about 5%. The preponderance of pasture and the large percentage of hay acreage on the relatively small amount of crop land suggest that grazing animals must be important.

Southeastern Ohio, or unglaciated Ohio, is often described as the major sheep grazing section of the state.¹⁵ This does not appear to be wholly true, for the center of sheep production is located actually inside the glacial boundary, that is, in the glaciated plateau section of Knox and Morrow counties. A study of the sheep distribution map shows an area of .20 or more sheep per acre of farm land extending in an east west direction in the central part of the state. (Plate XXVI) It crosses the glacial boundary at right angles and appears to have no relation to it. The Southeastern Hay and Pasture Region in this study includes a portion of the glaciated area in the northwestern part, that is, in Knox, Morrow, Delaware, and Licking counties, and includes also the portion of the densest sheep concentration. A similar area of concentration in this region, but to a lesser degree, is in Harrison

15. Langdon White and Clyde E. Cooper, "Sheep Industry of Southeastern Ohio," Economic Geography, VII, 263-272.

County. Relationships are meager in explaining this distribution. While in this region the sheep may be adapted to the large amount of land in hilly pasture, this does not explain the amount of sheep in the corn belt. It is possible that different feed regimes are practiced in the different regions, and that in the corn belt they may be raised more for mutton, while in the southeast wool is the primary end product.

Dairy cattle, while ranking more per acre than beef cattle, are of subordinate importance. This region, though appearing to be suitable for dairy cattle development, has relatively fewer cattle than any other region of the state, showing, no doubt, the added impetus that urbanization gives to dairy farming and market milk production. Beef cattle probably bring more profit to the farmer than dairy cattle, except near the cities, but there are relatively fewer beef cattle; these average about .02 per acre. The number of hogs is small, they are found in crop producing, and not in pastoral sections.

With such an agricultural scheme, it may be imagined that there is little real development or opportunity to make much of a living. Such is actually the case. Many of the farms are as nearly self-sufficing as possible in our times, the appearance of the

farm buildings in comparison with those of the corn country or northeastern Ohio clearly shows the relative prosperity of the sections.

But there is some development of a more specialized type. Fruits may be grown for commercial use in the extreme southern part along the Ohio River, for the region is far enough south to have a growing season of more than 164 days and the intensification of slope along the Ohio valley insures greater frost protection. Hence the Ohio River counties are noted for their fruit production. For instance, Lawrence, the most southern county in the state, ranks first in Ohio in apple, raspberry, and blackberry production, and is among the first three in peach production. The apple district extends along the Ohio River from Belmont to Scioto County.

Truck farming is another specialized activity. It has been discovered that vegetables raised on valley flood plain or terrace soils are better and mature earlier than those grown on the hill lands.¹⁶ The location of truck farms is scattered, but the farms are most numerous in the Ohio River counties where

16. S. W. Phillips, et. al., Soil Survey of Washington County, Ohio, 4.

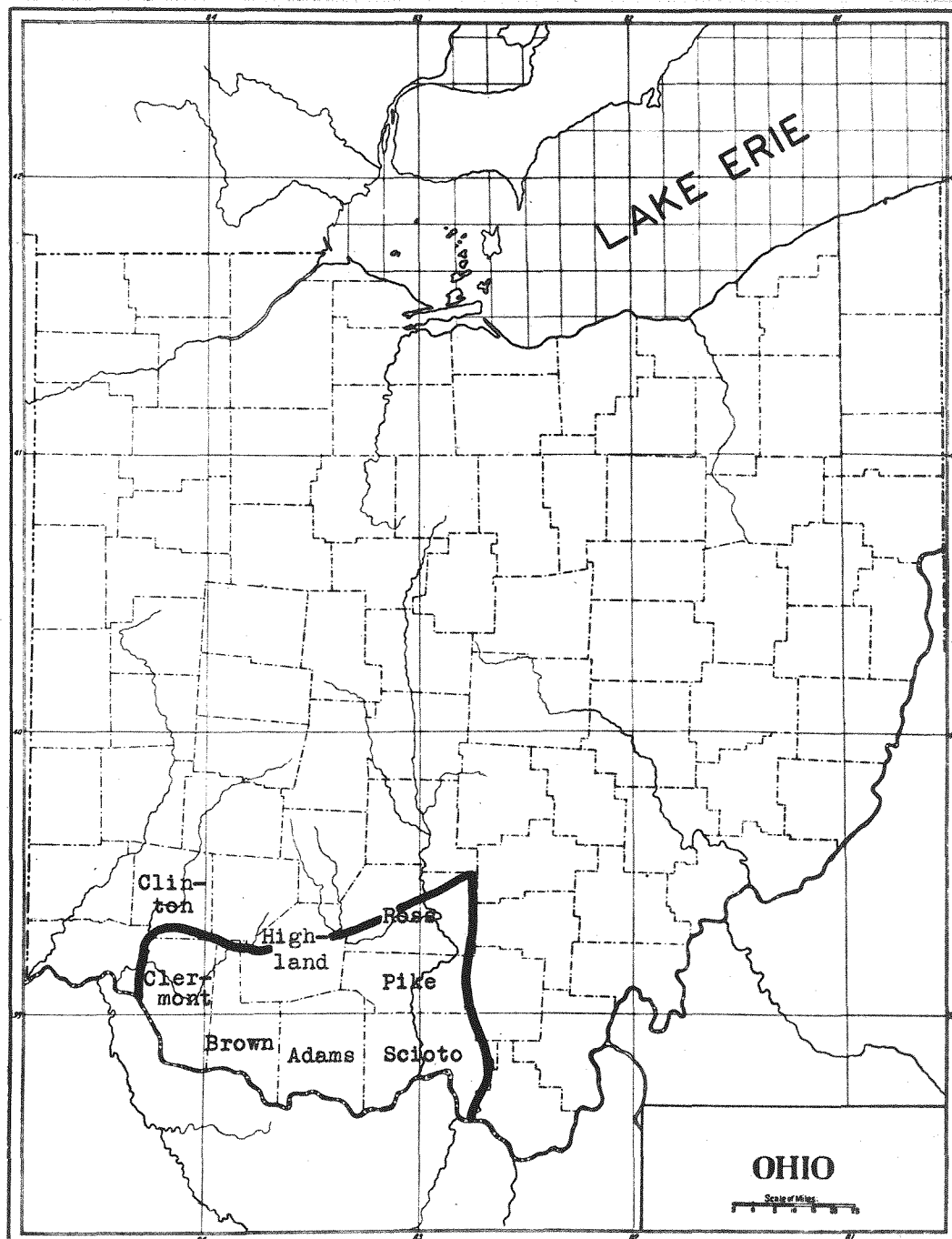
there is more flood plain development. The most common vegetables produced are tomatoes, sweet corn, string beans, cabbages, and, in the southern part, melons. The value of vegetables in Washington County alone was \$778,000 in 1929, the second highest rank in the state.¹⁷ The other counties of this region all rank much lower.

In dividing the United States into agricultural regions, all of eastern Ohio is generally classed as a part of the northeastern dairy region of the United States.¹⁸ The differences between the northern and southern portions of eastern Ohio have been shown. The northern section is comparable to the northern hay and dairy region of New York or Wisconsin, while the southern part is comparable to, and indeed a part of, the Allegheny Plateau of West Virginia and Kentucky. The Ohio River, acting as a great artery, has cut through the plateau and made it more accessible. The Ohio portion is more easily penetrated because of the valleys tributary to the Ohio which lead from the unglaciated part to the Ohio River. But in spite of

17. U. S. Dept. of Commerce, Agriculture of Ohio, First Series, 48.

18. O. E. Baker, "Agricultural Regions of North America," Economic Geography, III, 44-73.

this penetration, the type of human occupation is certainly more like the self-sufficing farmer of West Virginia than the dairy farmer of the northeast. This is pertinent to the people living in the back country locations, that is, away from the main river valleys, particularly in the second row of counties from the Ohio River. The presence of coal in this region, as in West Virginia, does not, unfortunately, foster any higher type of development.



The Southwestern Mixed Farming Region

CHAPTER VI

SOUTHWESTERN MIXED FARMING REGION

Southwestern Ohio is another transitional region between the Western Corn and Hog Region and the Southeastern Hay and Pasture Region. In relative crop acreages it resembles the corn country, in degree of productivity it resembles the pasture region. It is composed of Clermont, Brown, Adams, Scioto, Pike, Ross, and Highland counties. The western half of the region has been glaciated, the eastern half has not. (Plate X) None of the region was subjected to the last glaciation, the late Wisconsin, and therefore the drift is older than in the corn-hog region. Topographically also, it partakes of both areas, for the unglaciated portion in the southeastern part is similar to the area towards the east. West of the glacial boundary, however, the flat-topped hills, remnants of structural plains, show a more plateau-like expanse. The relief from the plateau to the valley floor averages 400 feet, which means that

much of the land is in steep slopes and that the available crop lands must necessarily be on the flat-topped ridges or on the flood plains. The glaciated portion differs from the till plains to the north. The topography is rougher, while the stream systems are not so well developed as in the unglaciated part. There are narrow valleys 200 feet or more deep which have been cut by streams tributary to the Ohio River. Such valleys are very different from those of the till plain and reduce a part of the land to slopes too steep for farming. The development of flood plains has been important in farm economies. The Scioto Valley has a wider flood plain than much of the Ohio Valley and it is good crop land. Besides this there are several old valley floors, formed by streams in earlier times and abandoned after drainage changes subsequent to the last glaciation, valleys which afford good farm lands.

As in Southeastern Ohio, the land in crops is less than 50% of the total, but the crop acreage is more like that of Western Ohio. Corn is the major crop, occupying from 33 to 46% of the crop land. Hay and wheat each occupy about 10% and oats 5%. Of the farm animals, hogs are most numerous for they average .10 to the acre, dairy cattle about .06 and

sheep about .05. This is relatively similar to the corn belt, but the number of animals per acre is less. There is a decided decrease in numbers of hogs in this region. (Plate XXVII) They average the same per acre in the Southeastern Hay and Pasture Region to the east. Woodland (over 20%) covers much of the unglaciated portions, and in the western part the steeper slopes are also wooded. It has been found necessary to plant more trees in order to prevent extensive soil erosion in this part.¹⁹

The long warm growing season is favorable to the production of corn and it is grown extensively on the best crop land. Lack of level expanses of land as well as poor soil curtails production of corn. It is used both as human and stock food, and the fattening of hogs for market is practiced here in a small way. Yet, in spite of the apparent similarity of these farm economies with that of the corn and hog farmer to the north the two types are different. In this region farming is more nearly at the subsistence level, as in Southeastern Ohio, where the cash income is very small and most of the produce of the farm is consumed by the family.

19. Arthur E. Taylor, et. al., Soil Survey of Clermont County, Ohio, 732.

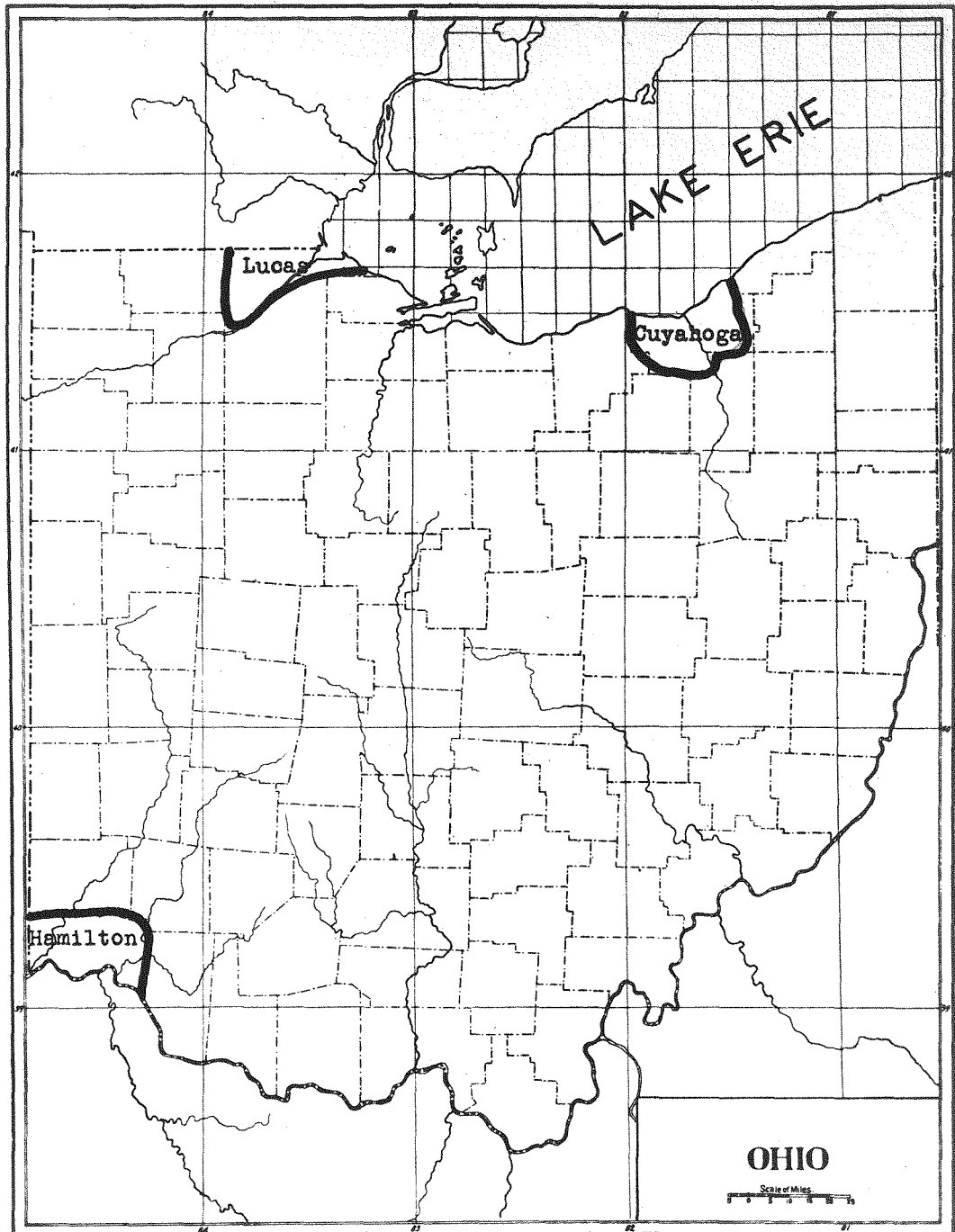
As in other regions of the state, there are particular crops which are grown on a small amount of land but bring a relatively high cash income. In this region the most important are fruits, vegetables, and tobacco. Fruits are not as well developed here as along the upper part of the Ohio River. They are located similarly, however, with respect to the slope of the land along the river valleys. Apples are the most common of the tree fruits, and small fruits, as strawberries, are also raised. Ross County leads the region both in acreage of, and income from, vegetables, for they occupy over 2000 acres of land and yield a return of a little over \$100,000.²⁰ Scioto and Clermont are next in order of income received; the other counties have much less return from vegetables. The most common vegetable is sweet corn, well adapted to the warm days and nights of the summer season, as well as the frequent summer showers. String beans, lima beans, tomatoes, cabbages, melons, peas, and peppers, are important in the order named. Some of these are grown for canning and not for immediate consumption. This would justify the amount of truck gardening develop-

20. U. S. Dept. of Commerce, Agriculture of Ohio, First Series, 47.

ment in so rural an area.

The small triangular shaped portion of unglaciated Ohio which is underlain by limestone has been designated the Blue Grass region because it is similar to the well known Kentucky area across the Ohio River. Partly on account of this similarity tobacco culture exists in southern Ohio. It is developed in the Ohio River counties and extends into the corn country, already described. The type grown here is the Yellow Burley, and it generally yields an income greater than the small grain crops, and second only to corn.²¹

21. Arthur E. Taylor, et. al., op. cit., 719.



The Urban Districts of Specialized Agriculture

CHAPTER VII

URBAN DISTRICTS OF SPECIALIZED AGRICULTURE

It is impossible to study the agriculture of a region such as Ohio and disregard the influence and very control of an urban community on the surrounding agriculture. It has been suggested at intervals throughout this thesis that urbanization was an important, or perhaps the deciding factor in a certain kind of crop development. But, more than this, it is necessary to set aside certain districts which are so urbanized as to be agriculturally warped out of all recognition. These are, of course, the areas around the three largest cities in Ohio: Cleveland, Cincinnati, and Toledo. (Plate XI) For the sake of convenience, the boundaries are those of their counties, Cuyahoga, Hamilton, and Lucas, respectively. It seems possible that the county limits are too narrow for these districts, but adequate material is not

available to make any more definite or exact interpretation.

In each of these districts the proportion of farm land is low, in Hamilton and Lucas counties it is just below 50% and in Cuyahoga it is 30%. Of this land in farms, the percentage of crop land is high, in general over 60%, because the available land has a high valuation and so must be made to yield a high return. The grain crops (corn, wheat, and oats) are negligible, but hay often increases a little, probably because of the increase of dairy cattle in these same districts. However, this study has shown that dairying is carried on at a greater distance from the city where land is cheaper because more land is needed to furnish an adequate milk supply. Potatoes increase in acreage around the cities, as the map very clearly shows. (Plate XXII) The reason for this intensification is explained above in the section on Northeastern Ohio. Highly specialized crops of the market garden variety or crops grown under glass fringe the urban districts.

Lucas County devotes 6000 acres to the growing of vegetables, not including those grown under glass. It ranks third in the state in value of these crops, which, in 1929, were valued \$678,000.00.²³ Tomatoes

and sweet corn far exceed the other vegetables in acreage and value. Next in importance are onions, cabbages, melons, and asparagus. Hamilton County ranks third in acreage and fifth in value of the vegetables raised. Tomatoes and sweet corn are again primary, while lettuce, spinach, cabbages, string beans, and asparagus are crops of lesser importance. Cuyahoga County ranks eighth in the state in acreage but first in value of vegetables grown in the open. Vegetables grown in Cuyahoga County in 1929 yielded \$829,000.00.²³ Tomatoes are again the major vegetable, but celery is second in importance. String beans, cabbages, lettuce, sweet corn, asparagus, and spinach complete the list of the more important vegetables. Considering the production of all three counties there are few interpretations to make. Most obvious, perhaps, is that the largest income is received in the county with the largest population. This is true in spite of the fact that Cuyahoga County is eighth in acreage rank. It shows how imperative a high yield is, when space for crops is limited and demand is urgent. The similar varieties of vegetables are due to a similarity of growing season,

22. U. S. Dept. of Commerce, Agriculture of Ohio.
First Series, 45.

23. Ibid., 43.

and also to the fact that these lists include only those vegetables grown in the open, a circumstance which would tend to produce those of the same general type.

In these urban districts there is a large development of fruit growing. The location of the counties is most certainly a factor in this, because both Lucas and Cuyahoga counties are on the lake shore in the midst of the fruit belt, and Hamilton County, in the southern part, is in the southern area of fruit raising. Both Cuyahoga and Hamilton counties lead in the production of particular kinds of fruit, Cuyahoga in grapes, and Hamilton in strawberries. Cuyahoga is second in blackberry production and ranks high in raspberries and strawberries. Hamilton County raises large amounts of apples, peaches, grapes, and strawberries. Lucas County produces apples, peaches, plums, grapes, and strawberries, but does not rank high in any one variety.

The degree of agricultural specialization is understood more clearly when one realizes the value of the return on vegetables, flowers, and fruit products. In Hamilton and Cuyahoga counties the income from flowers and vegetables grown both in the open and under glass is ten times as great as the income

from any other group of agricultural products. In Lucas County, cereals and vegetables yield about the same high return and flowers and vegetables grown under glass are third in value. Fruit is generally next in rank in all three counties, but much lower in value.

CHAPTER VIII

SUMMARY

The state of Ohio is divided into six agricultural regions on a basis of land utilization expressed on isopleth maps.

I The Western Corn and Hog Region is the corn and pork producing region of the state. The center of this production is in the southeastern part. Along the Miami valley and around Columbus there is an increase in the number of dairy cattle, due to a demand for dairy products near the cities. The northern portion feeds more beef cattle than the southern portion, but hogs are most numerous of the farm animals throughout the region as a whole. Tobacco, in the southeastern part, and sugar beets, in the northeastern part, are crops which yield a high return in proportion to the amount of land they occupy.

II The North Central Mixed Farming and Fruit

Region is composed of three subdivisions, the Eastern Lake Shore Fruit and Nursery Sub-region, the Western Shore Fruit Sub-region, and the Interior Mixed Farming and Dairying Sub-region. The Western and Eastern regions are along the lake shore and specialize in fruit, with tree crops predominating in the west, and small fruits and nurseries in the east. The Interior is a transition region between the crop specialization of western Ohio, and the pasturage specialization of eastern Ohio.

III The Northeastern Dairy Farming Region is unified in its dependence on a large hay crop, a high proportion of pasture, and an urban market for the consumption of market milk. Maple products, fruits, and vegetables are subordinate in acreage but yield a high income return.

IV The Southeastern Hay and Pasture Region is essentially a grazing area, with crops assuming a minor place. Sheep, dairy cattle, and beef cattle are the pasturing animals, with no intensive development of any one type. Sheep are relatively the more important. In the Ohio River portion, fruits and vegetables are profitably grown and provide an important source of income.

V The Southwestern Mixed Farming Region is

transitional between the corn belt to the north and pasture farming toward the east. The crops are similar to the corn country, but the production is small, and general farm economy resembles the southeastern part of the state. Fruits, vegetables, and tobacco are the specialized income crops.

VI The Urban Districts of Specialized Agriculture are located around the cities of Cleveland, Toledo, and Cincinnati, and are set aside as separate agricultural regions, because together they have a distinct agricultural situation. Farm land is relatively small, crop land is large, and ordinary farm crops are negligible. There is specialization of perishable or bulky products, such as fruit, vegetables, and potatoes, around each district.

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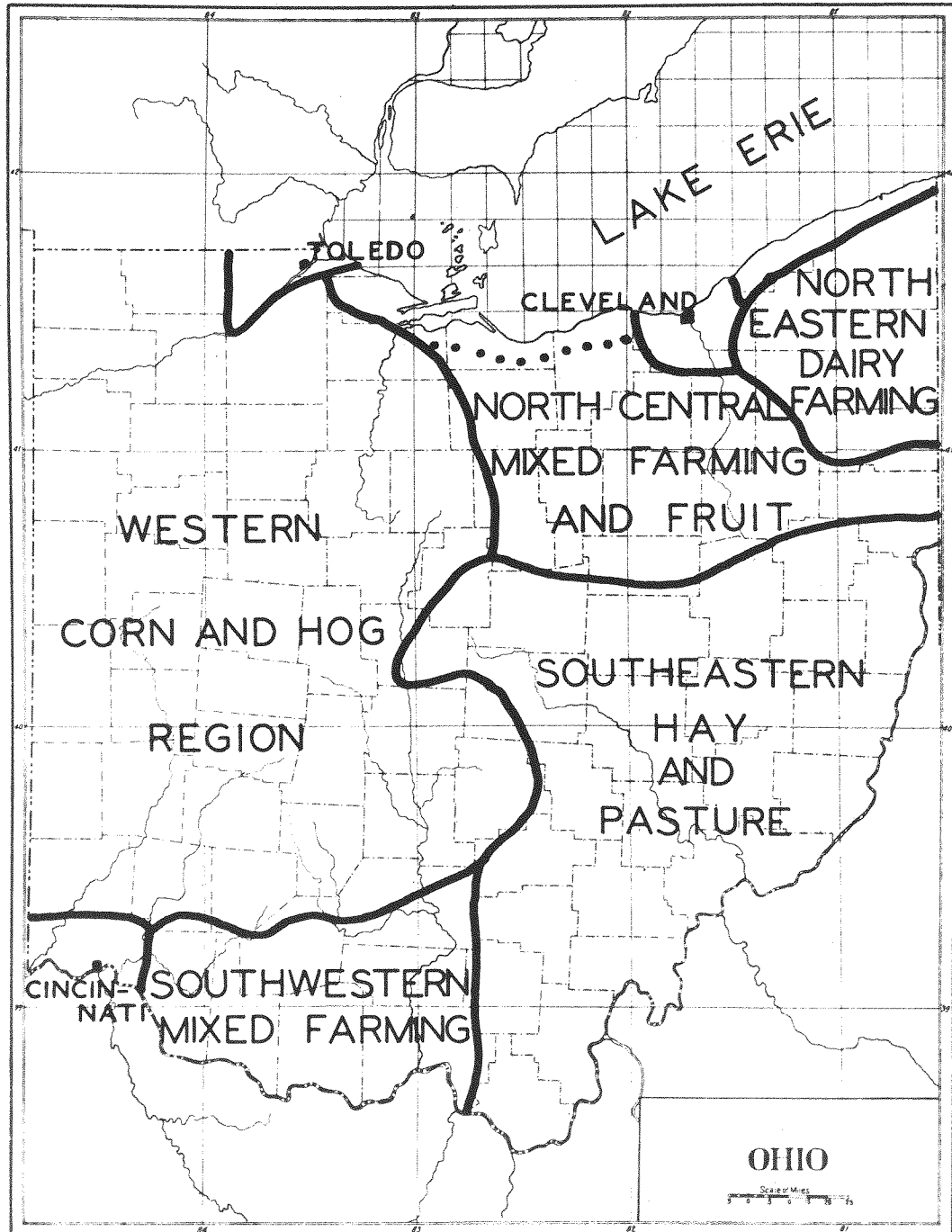
MAPS

Geology of Ohio, J. A. Bownocker, 1920. Scale 1:500,000.

Reconnaissance Soil Map of Ohio.

United States Geological Survey Maps of Ohio, Scale 1:62,500

APPENDIX



The Agricultural Regions of Ohio



The Counties of Ohio with the Regional Boundaries

The Geographical Press, Columbia University, New York



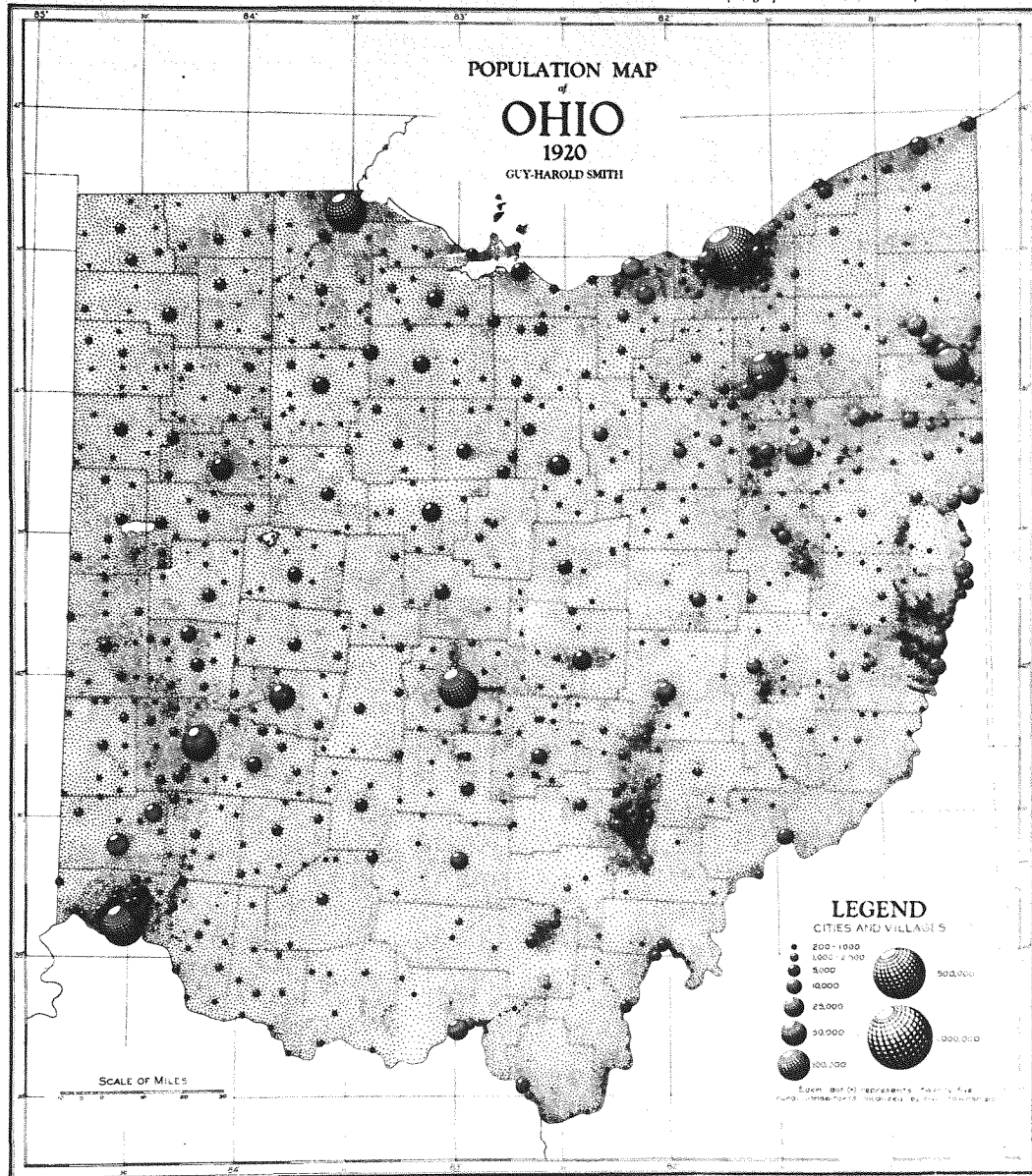
PHYSIOGRAPHIC MAP
of
OHIO
by R. B. Frost, Oberlin College
Scale 1:1,500,000
Moraire borders after G. D. Hubbard

Copyright 1931 by R. B. Frost

The Physiography of Ohio

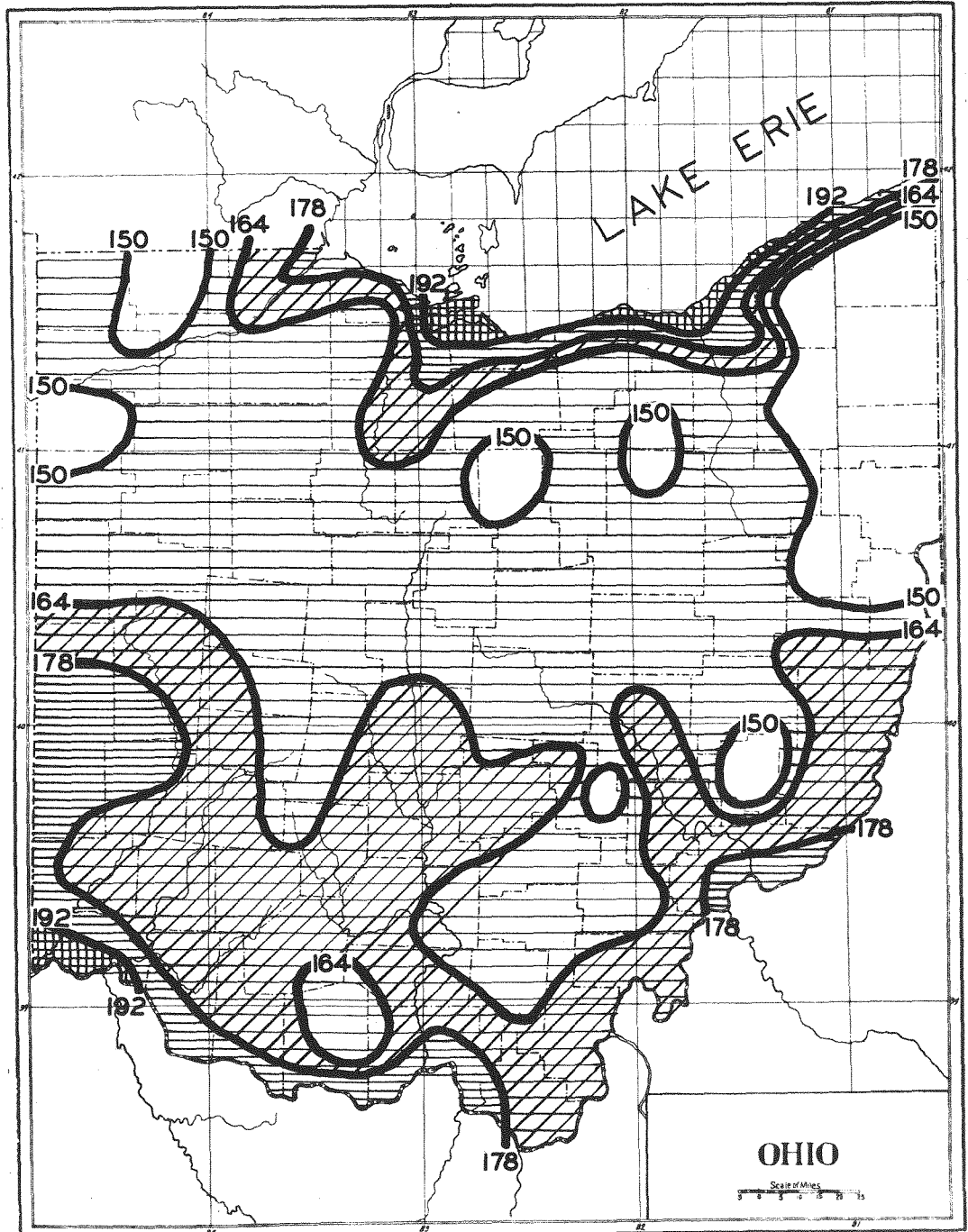
The American Geographical Society of New York

The Geographical Review Vol. XVIII, No. 3, 1928, PL. IV

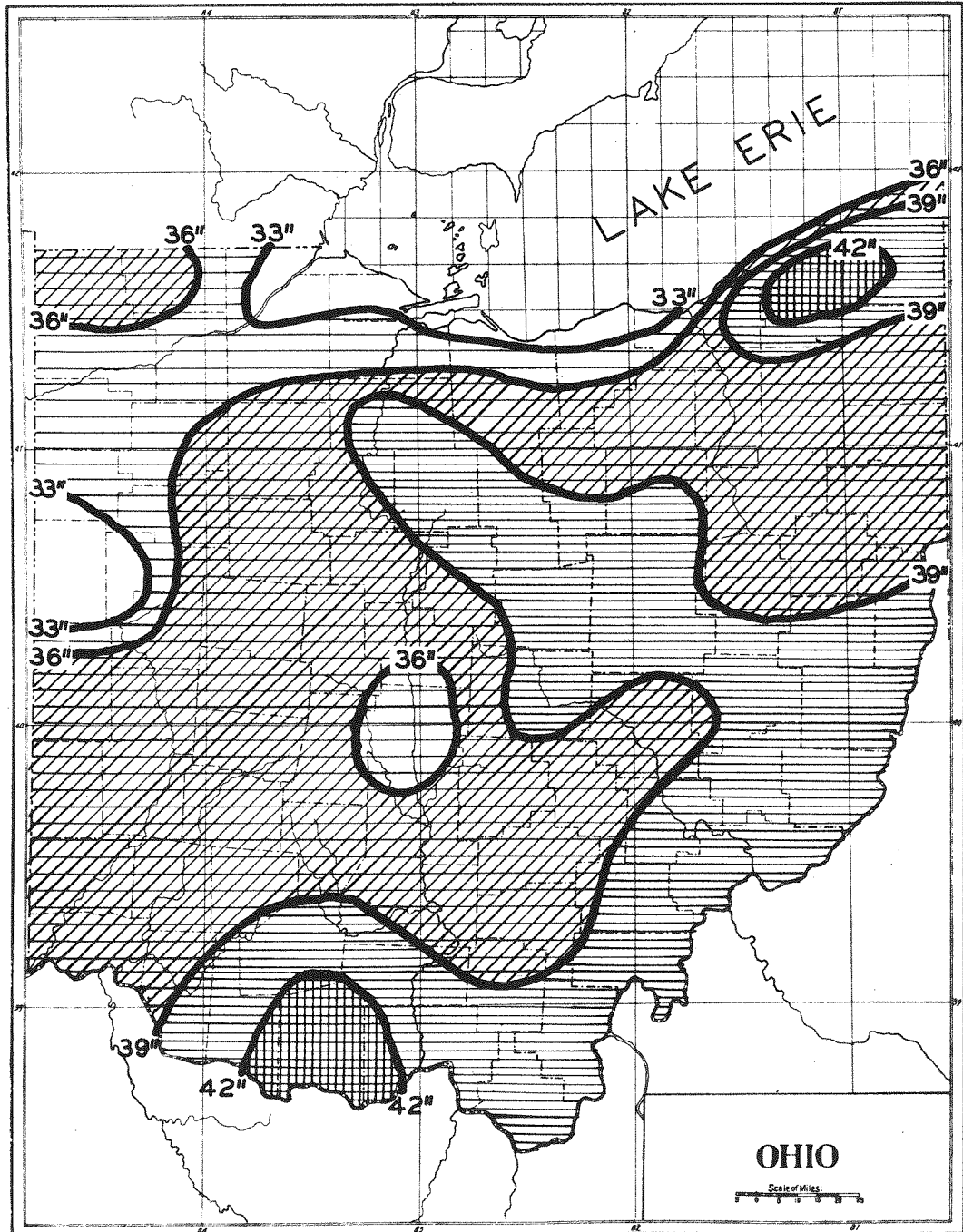


Copyright, 1928 by the American Geographical Society of New York

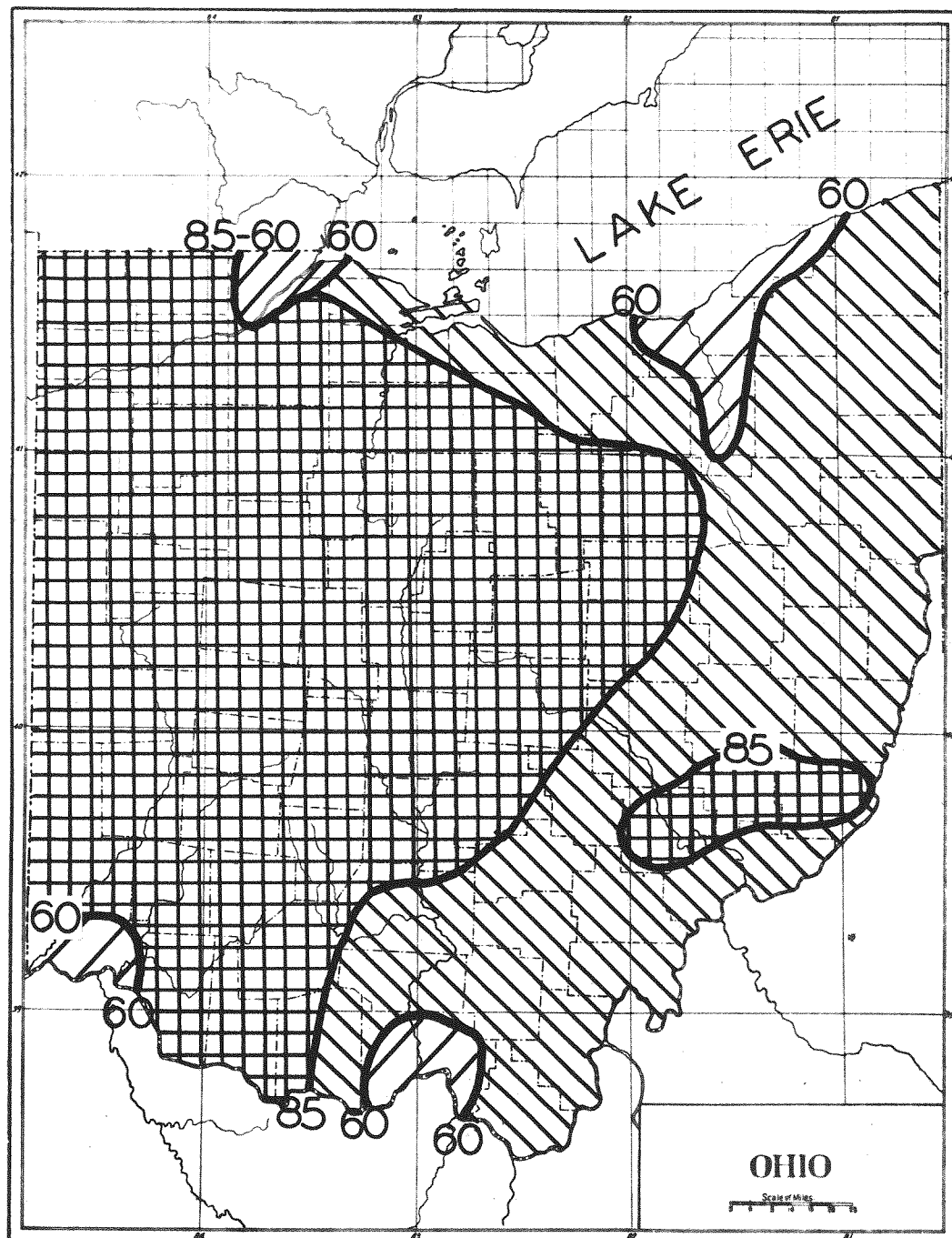
The Population of Ohio



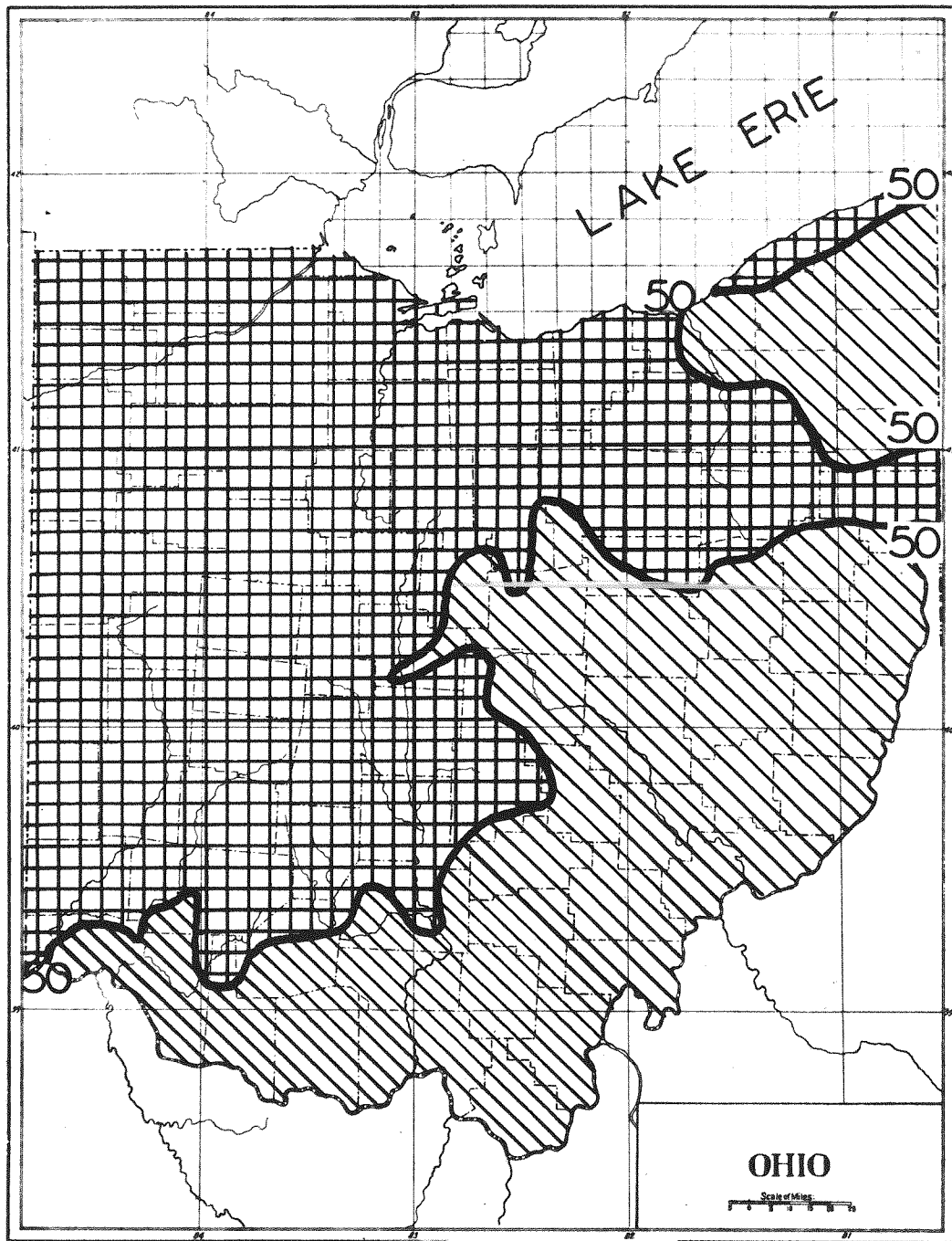
The Average Length of the Crop-Growing Season, in Days



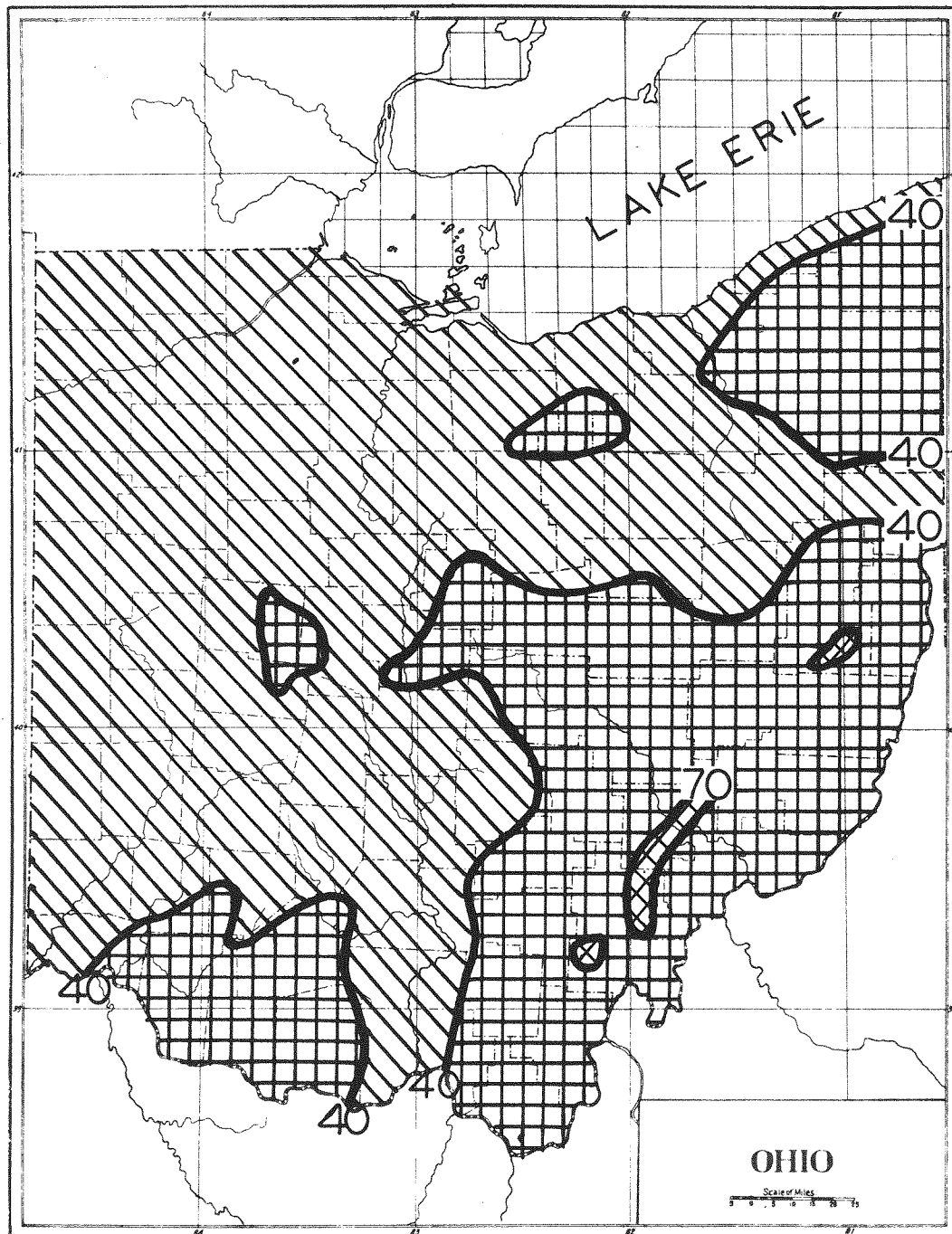
The Average Annual Precipitation, in Inches



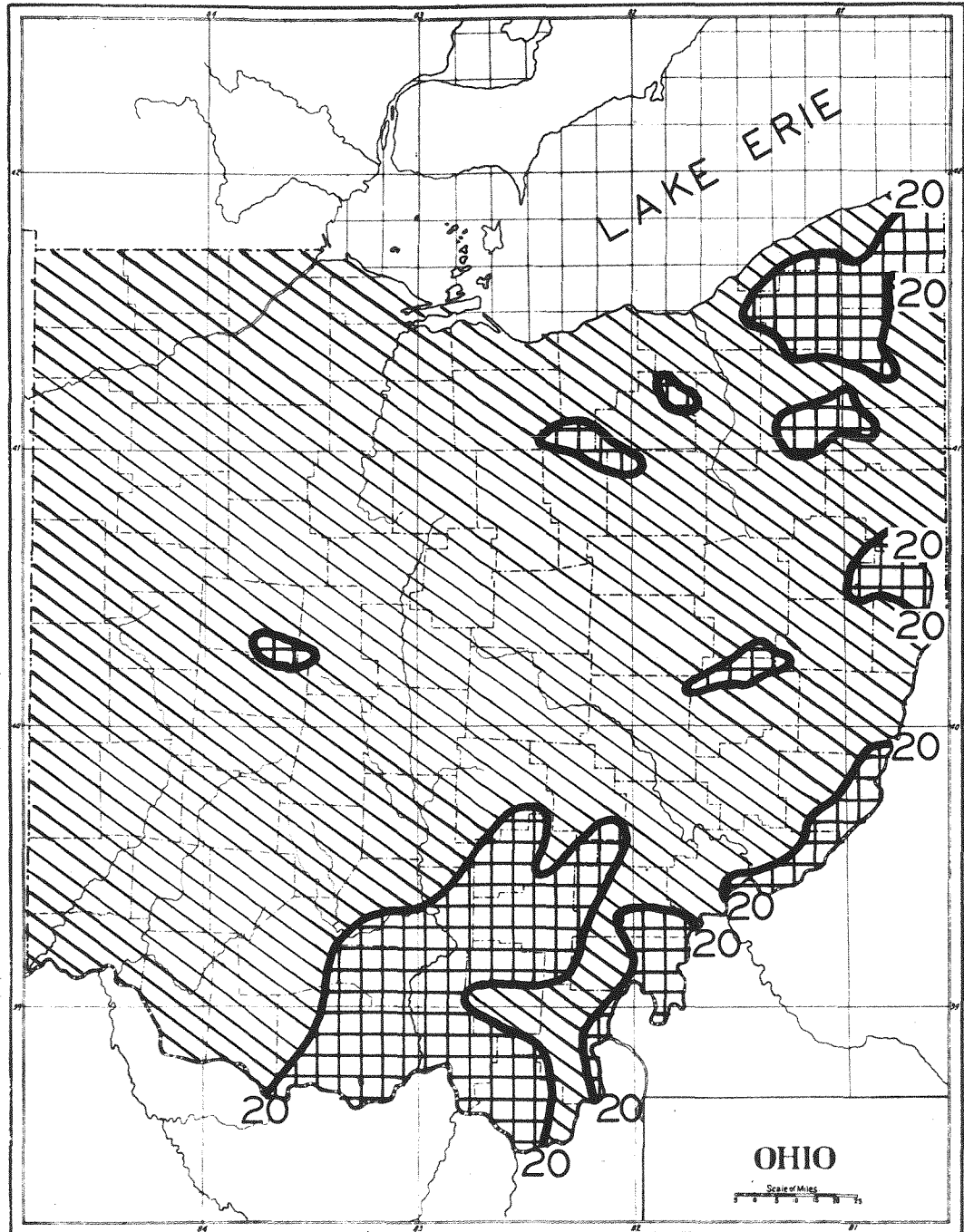
The Percentage of Land in Farms



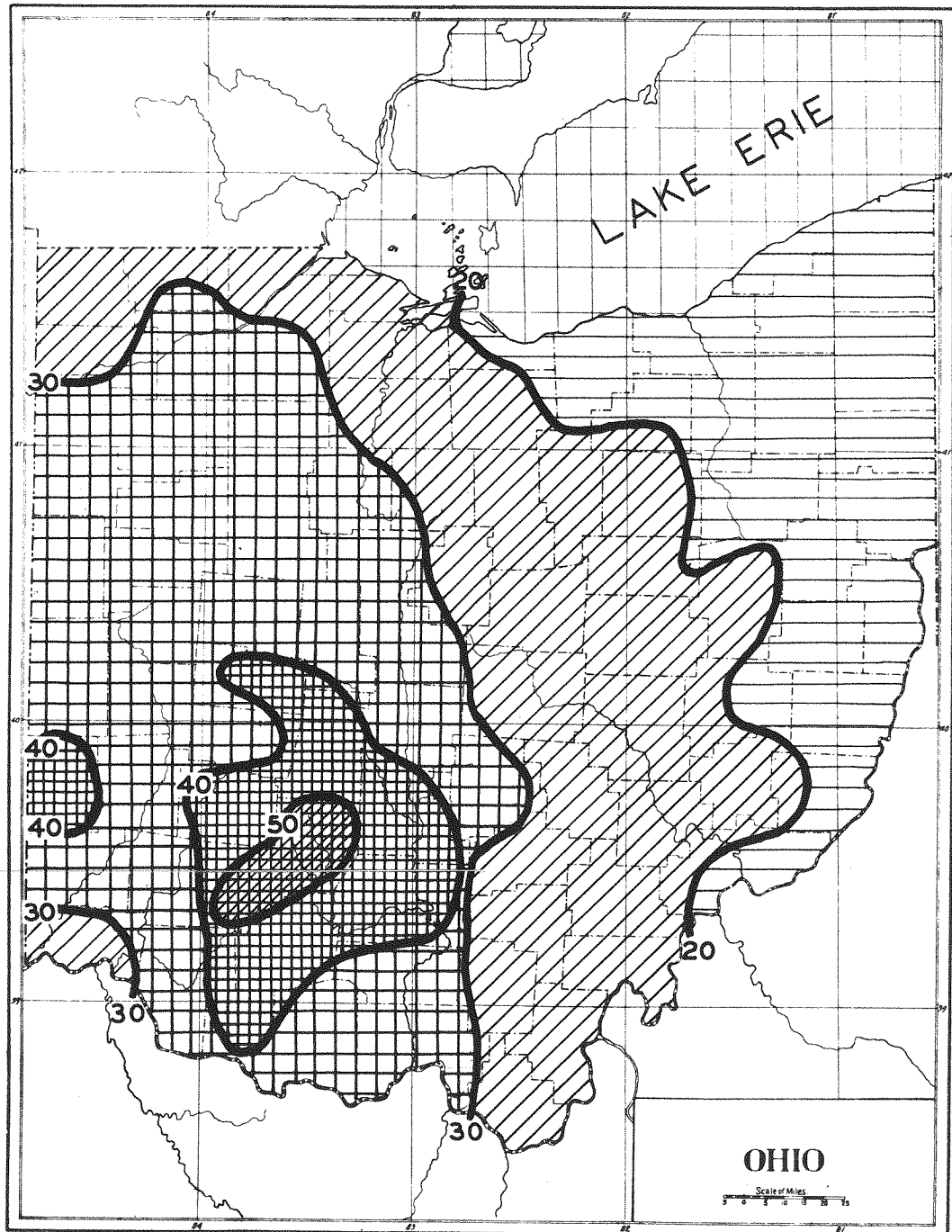
The Percentage of Farm Land in Crops



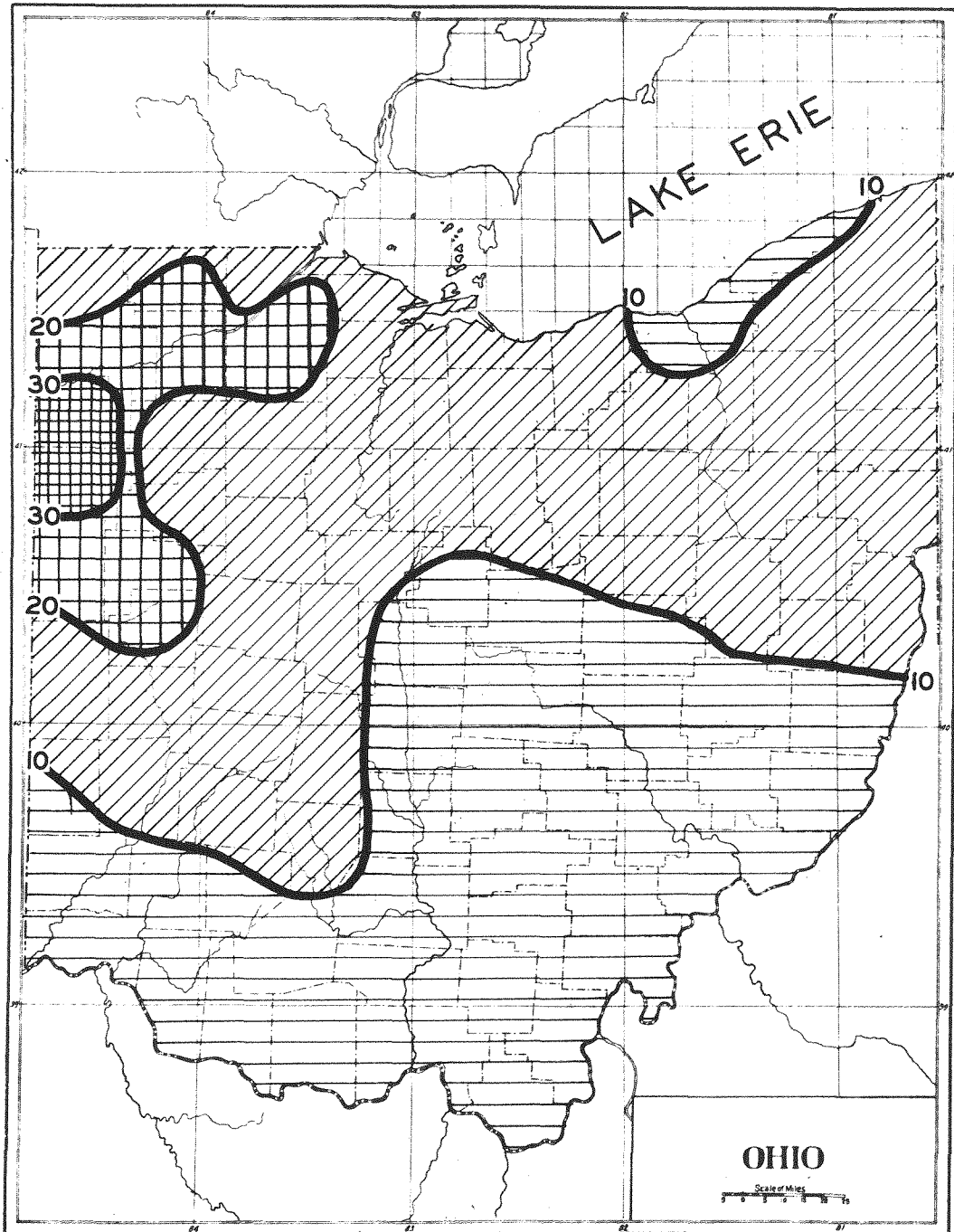
The Percentage of Farm Land in Pasture



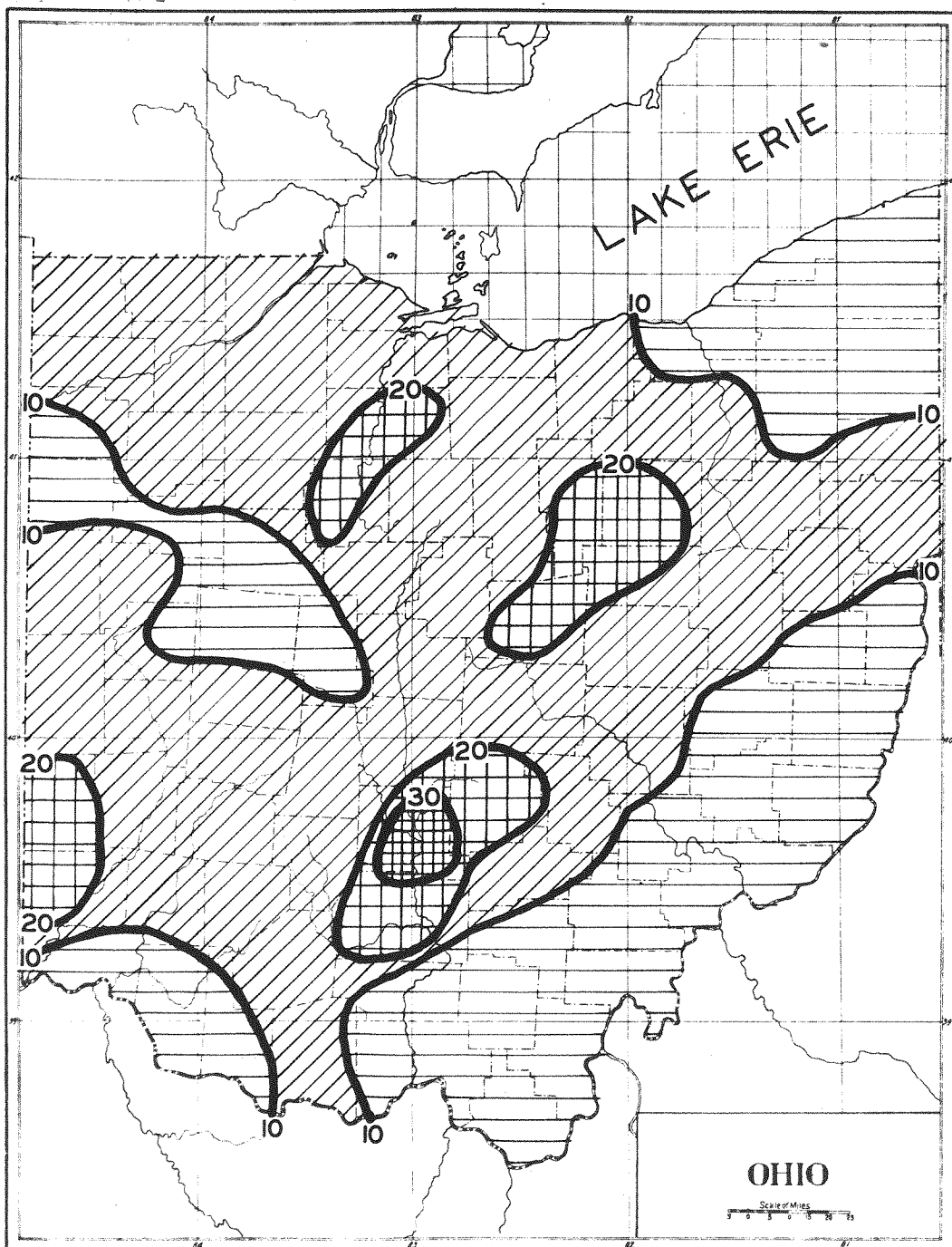
The Percentage of Farm Land in Woodland



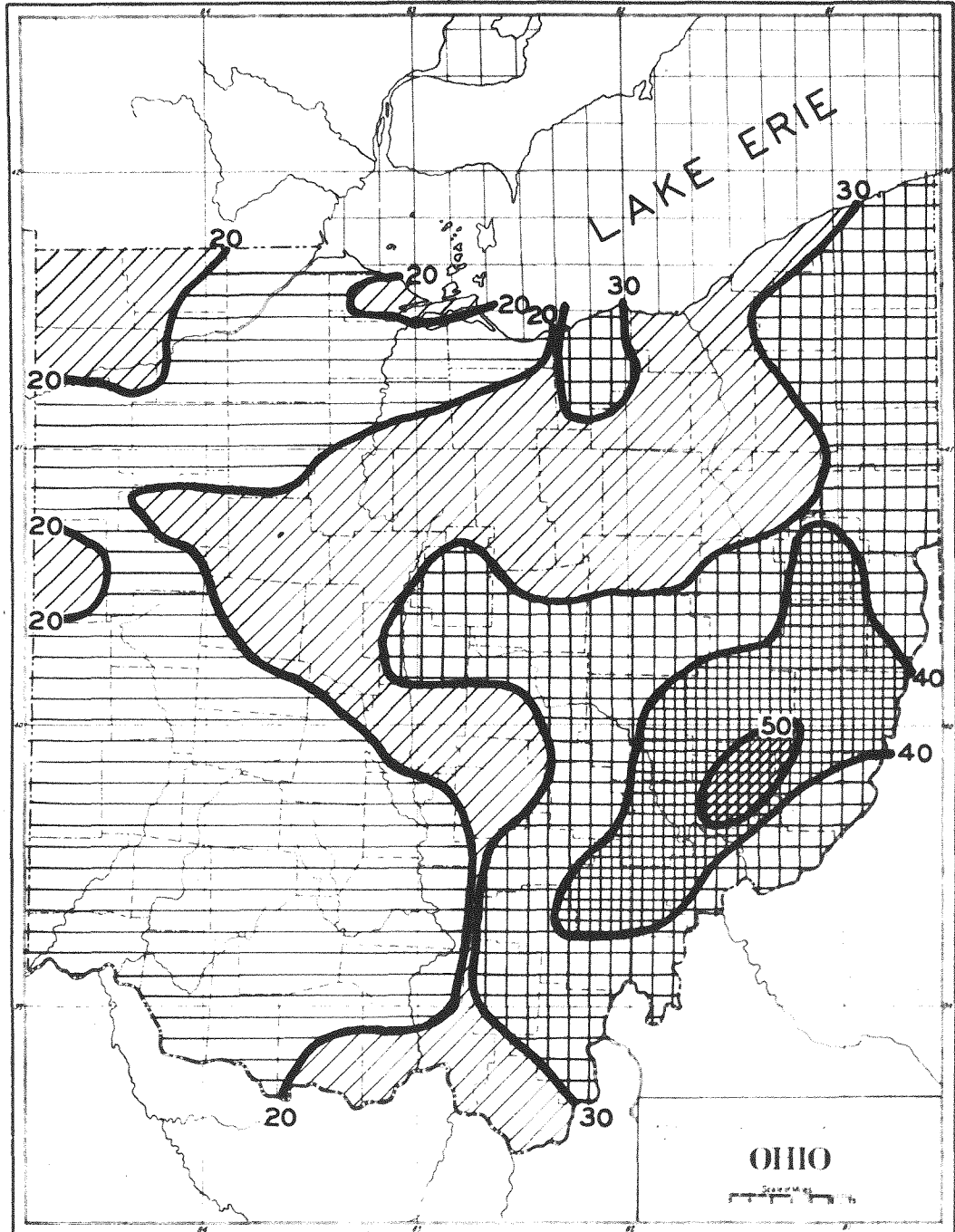
The Percentage of Crop Land in Corn



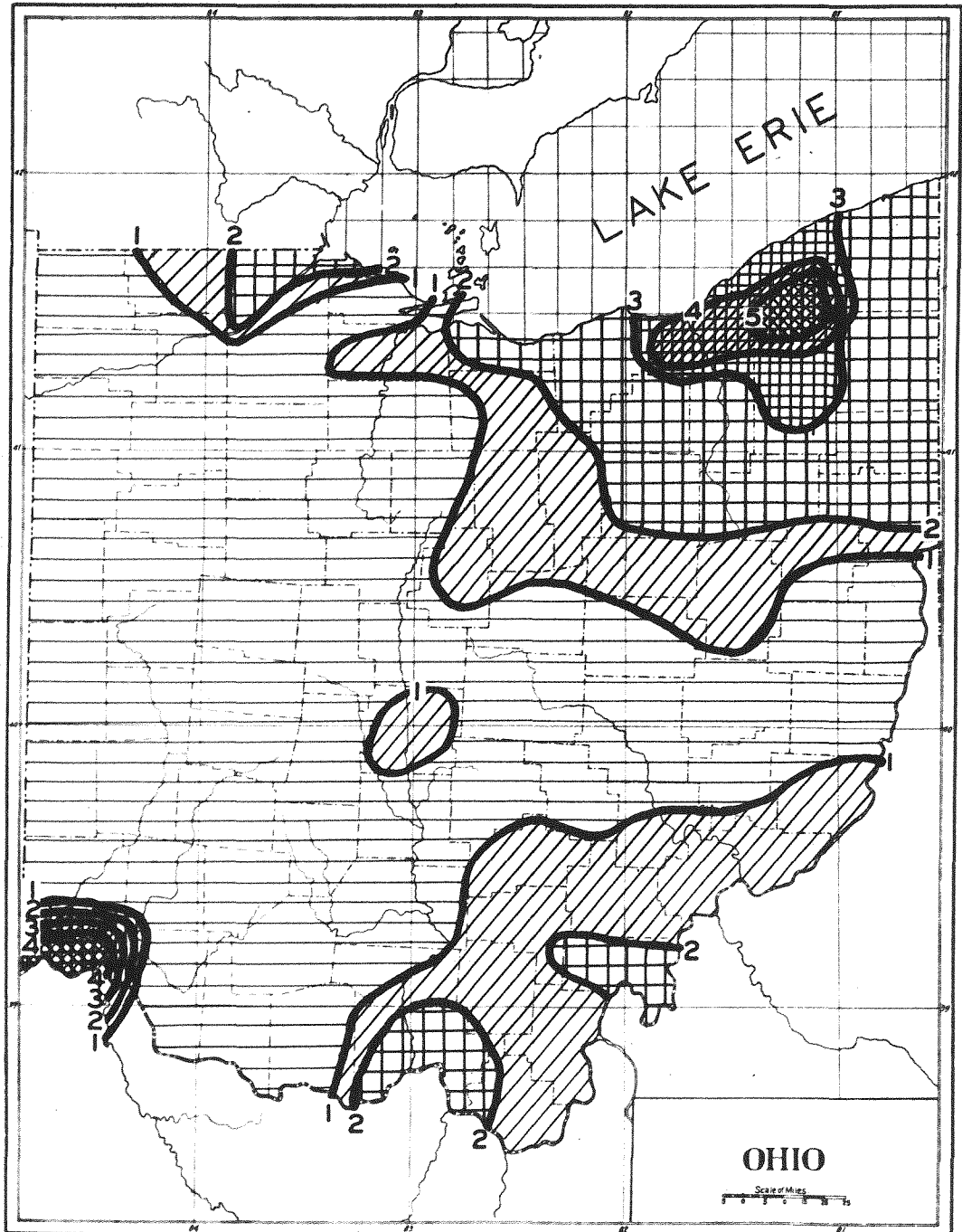
The Percentage of Crop Land in Oats



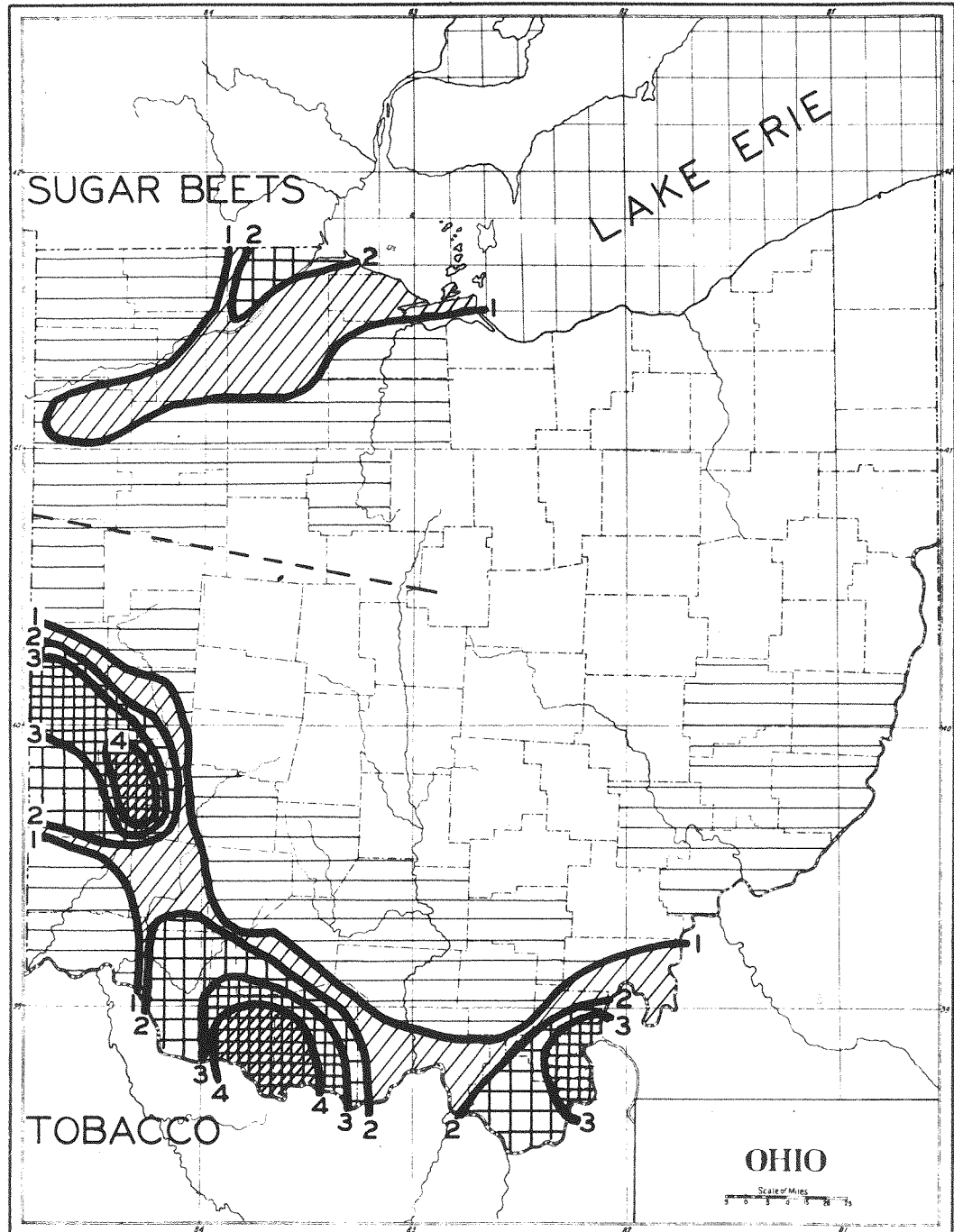
The Percentage of Crop Land in Wheat



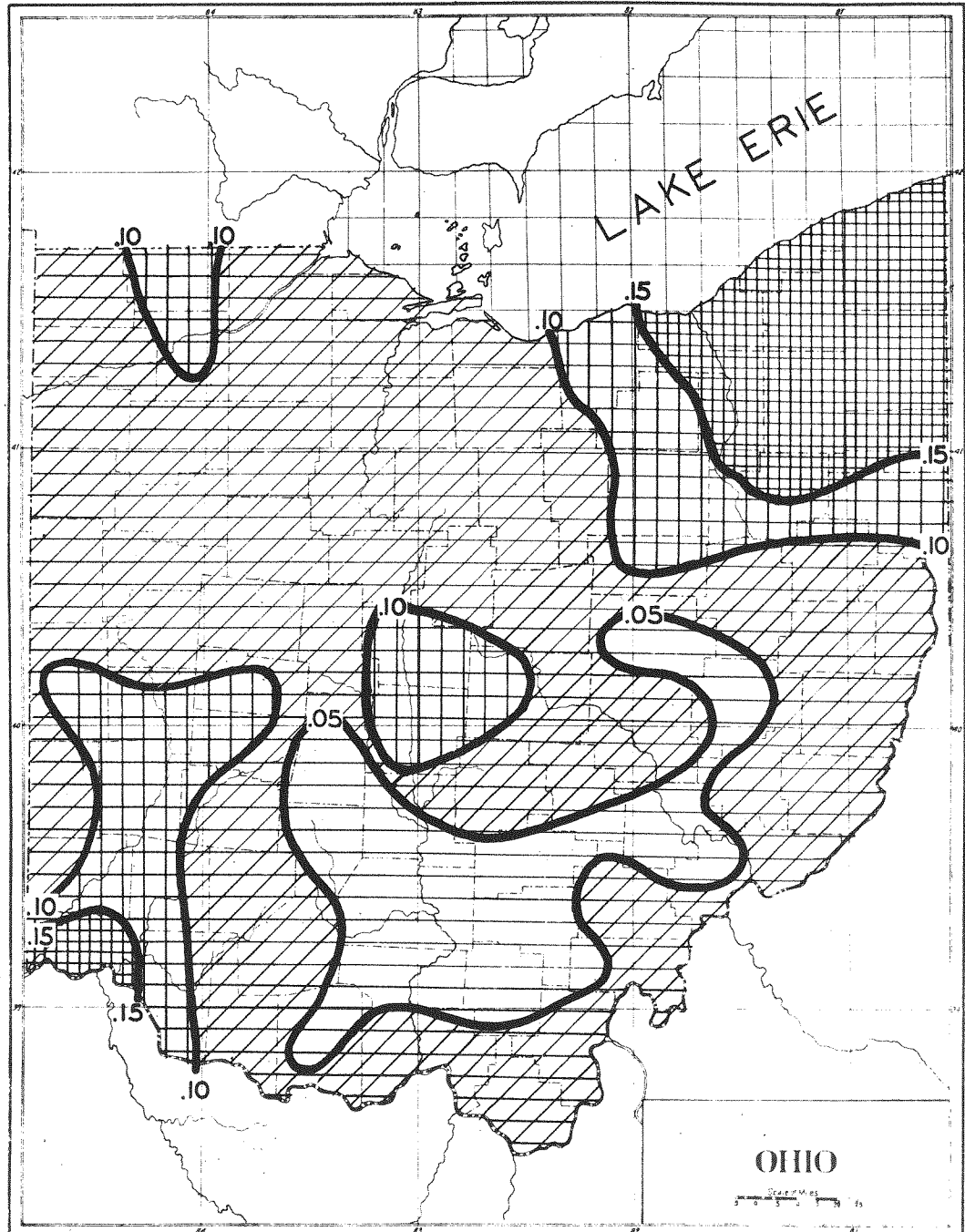
The Percentage of Crop Land in Hay



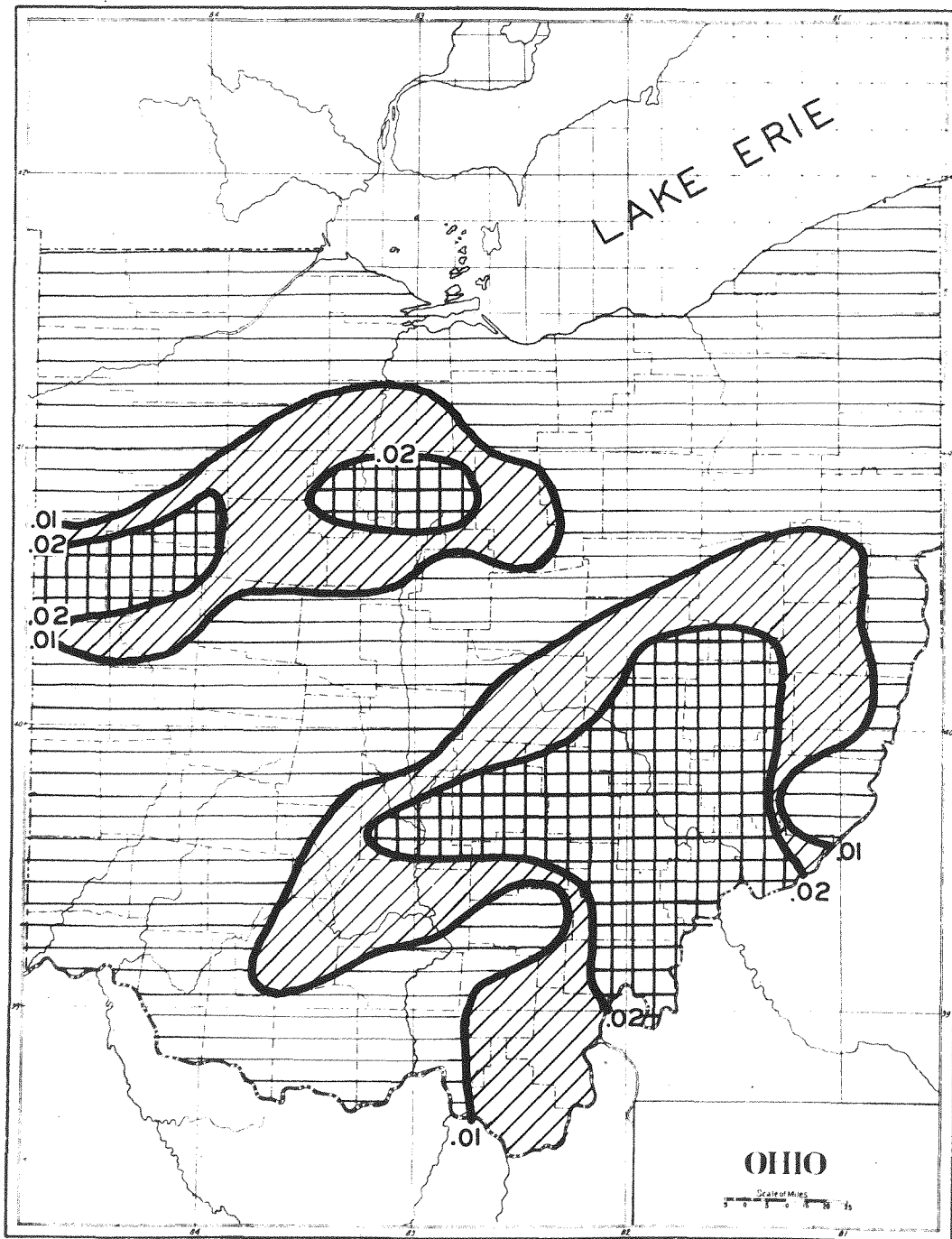
The Percentage of Crop Land in Potatoes



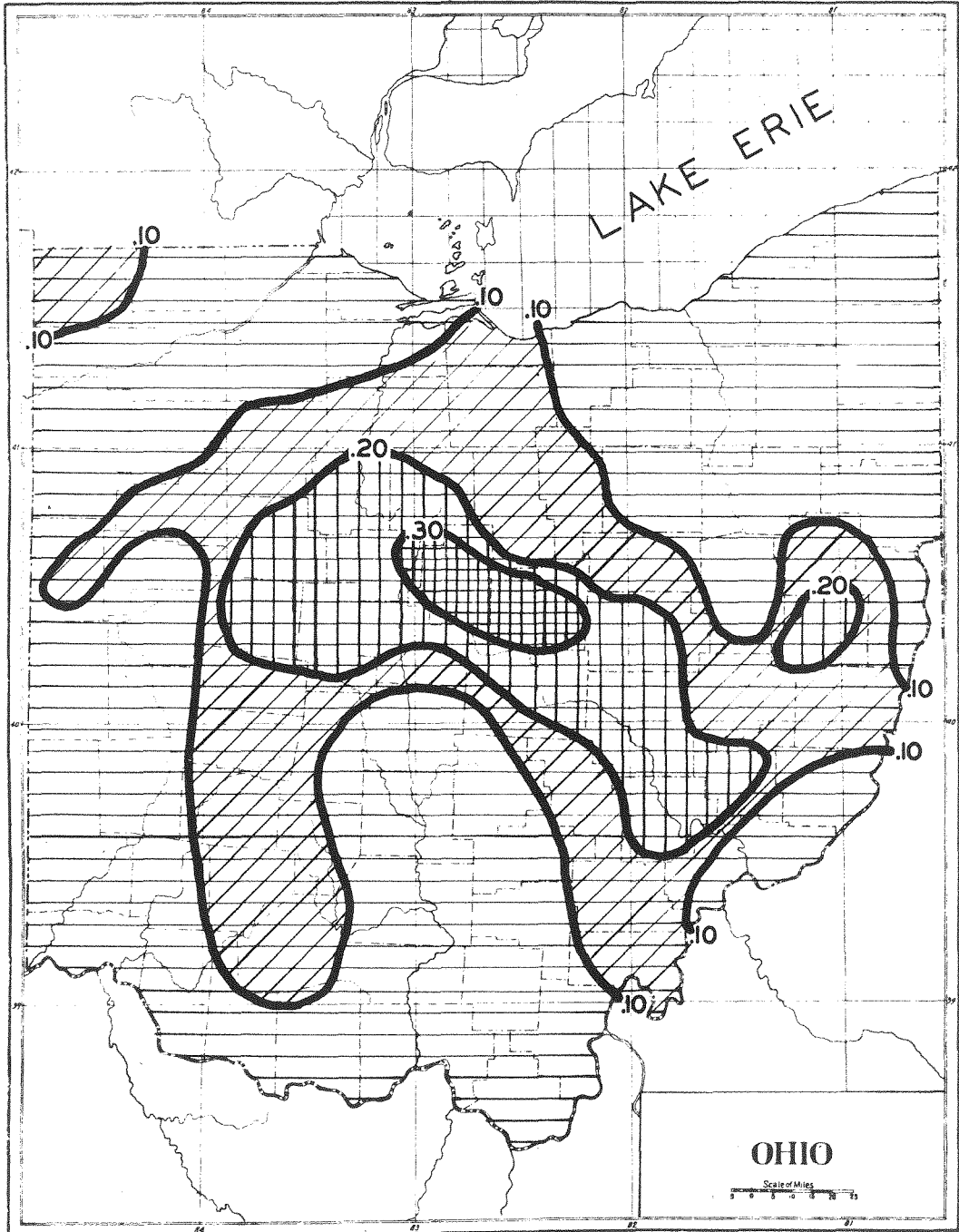
The Percentage of Crop Land in Sugar Beets and Tobacco



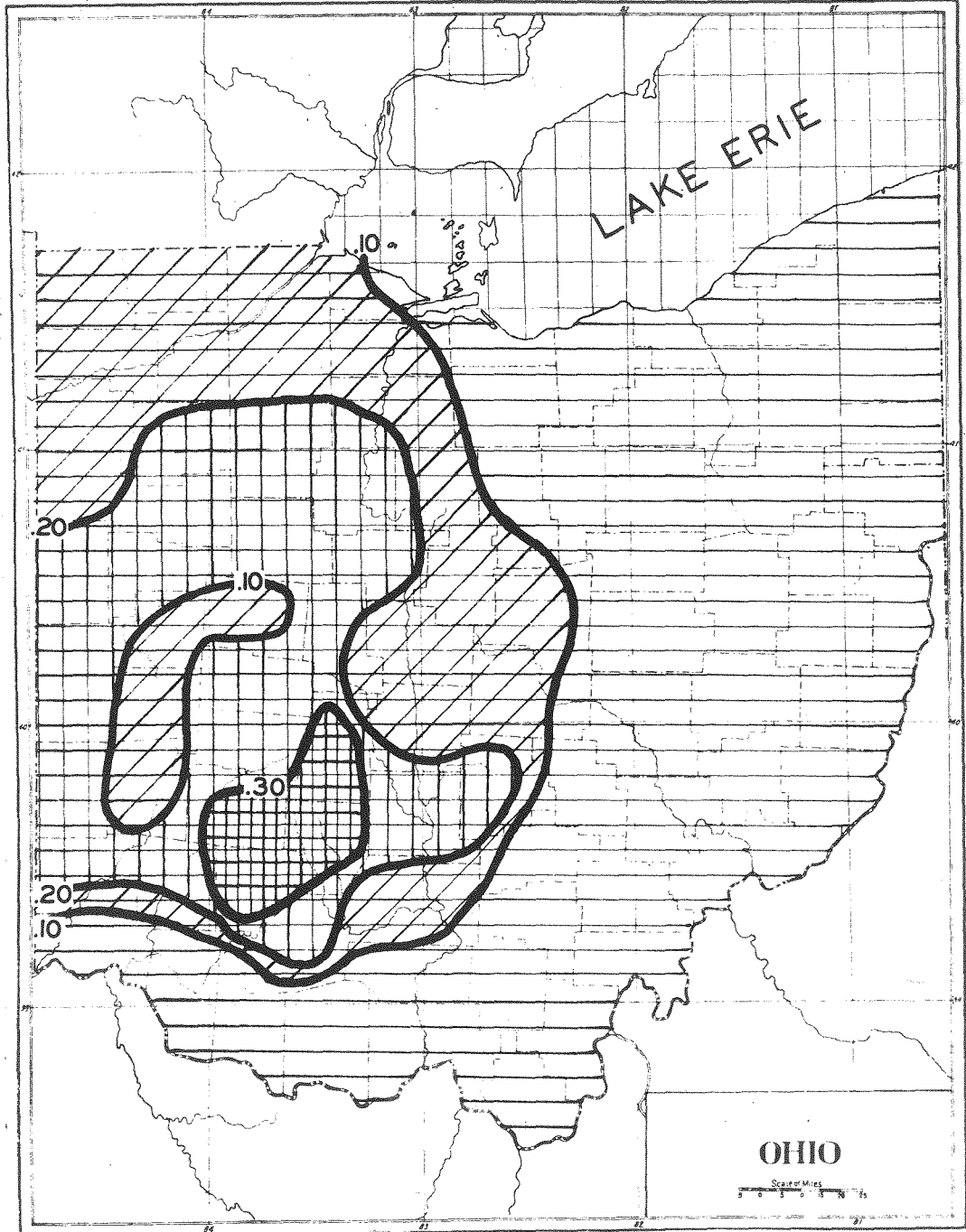
The Number of Dairy Cattle Per Acre of Farm Land



The Number of Beef Cattle Per Acre of Farm Land



The Number of Sheep Per Acre of Farm Land



The Number of Hogs Per Acre of Farm Land