

GEOGRAPHY OF SOME IMPORTANT ILLINOIS CROPS

BY

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THESIS

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY
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THE DEGREE OF MASTER OF SCIENCE

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INTRODUCTION.

The name Illinois was well known in the early days of American history. The French explorers, priests, and fur traders came to the Illinois country with diverse purposes. The explorers felt the urge to adventure while the missionary zeal of the priests forced them to brave dangers to convert the Indians. The coureurs de bois were drawn to the country of the Illinois Indians for the profit of the fur trade.

Other people came afterward with a desire for homes or for the purpose of making money from speculation in lands. They came largely by way of water routes to the interior of the Illinois country. This strategic location between the Mississippi Valley and the St. Lawrence Valley and bordering the large tributaries of the Mississippi made the land now in Illinois easily accessible to early settlers.

The first people to cultivate the soil in the Illinois country were the Indians. Their principal crops of corn, pumpkins, and beans were grown close to their villages along the streams. The soils they used were chiefly sandy soil or soft alluvial soil of the bottom lands and islands in the rivers. They used these soils because their crude stone implements were unequal to the task of breaking up large areas of the tough prairie sod.

The early white settlers also had difficulty with the sod of the prairie. Their first plows were generally of wood, fitted with an iron plate in front. Later the solid iron moldboard did a better job of turning under the sod. Once the sod was conquered, the yields were bountiful.

CHAPTER I. The Soil

One of the important factors controlling the production of crops is the soils of a region. Soils vary due to the kind of rock material from which they were produced, the length of time they have been forming, the topography, the climate in which they were formed, and the kind of plants and animals that contributed to their formation.

The soils of Illinois have a very complex character and history. The present area of the state was covered several times, with the exception of two small areas bordering the Mississippi River, by extensions of glacial ice sheets from the north. This ice was thick and ground off the bed rock and scraped off large quantities of the soil as it came into the region. When the glaciers melted back, the material held in the ice was left as a layer of "drift". Later winds picked up the dry light materials and deposited them as loess over most of the surface of the state. The soils of Illinois were largely derived from the wind-blown material called loess and glacial drift. This drift in valleys may be 200 feet or more in depth. The average depth in the state is about 78 feet according to Gannet (1). The loess covering is especially noticeable near the bluffs of the larger streams and in "cuts" for railroads and roads. The agents of weathering and the growth of organisms have changed the original surface material into soil.

(1) Gannet, H., The Average Elevation of the United States, Annual Report, U. S. Geol. Survey, Gov. Printing Office, 1892, p. 289.

The light-colored soil in the south-central part of the state is of an older type than that in the central and north. The areas originally timbered in the southern as well as those in the northern section are not so fertile, as a rule, as the level prairie soil that predominates in the central district. Many small areas of timber soil are scattered along the stream courses throughout the state.



Fig. 1. Looking across the Illinois River below Starved Rock.

CHAPTER II. Physiography

Illinois has a low elevation compared to the north-central states nearby. Its average altitude has been estimated by Gannet(2) as about 600 feet above sea level. The elevation of Indiana was estimated at about 700 feet, Michigan 900 feet, Iowa 1100 feet, and Missouri at 800 feet above mean ocean tide.

(2) Ibid. 290.

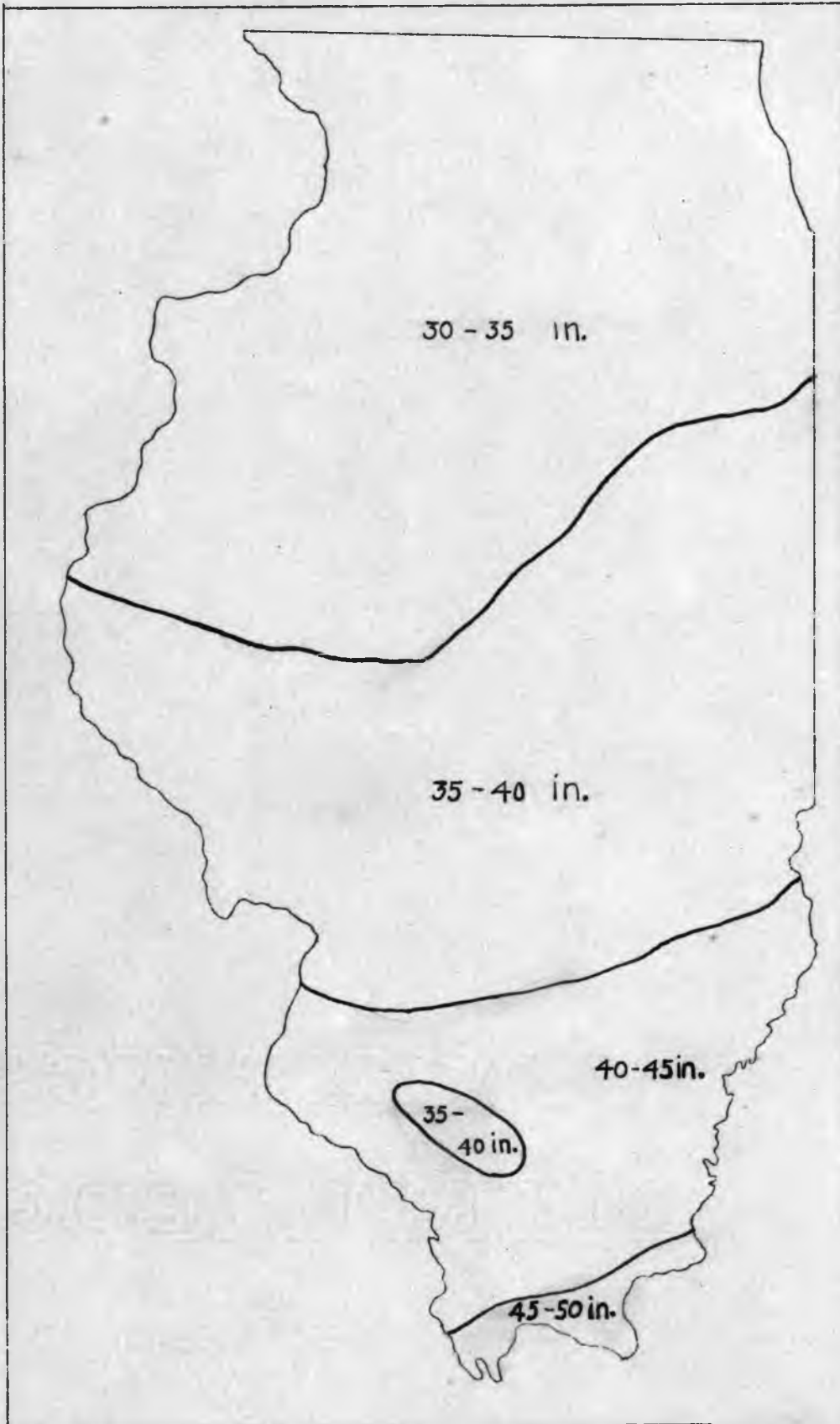


Fig. 2. map of average annual rainfall.

from Bul. 403
Ill. Ag. Exp. Sta. 1934.

The highest point of land in the state is in the northwest county, Jo Daviess, where an elevation of 1257 feet occurs. The lowest point is near the confluence of the Ohio and the Mississippi Rivers, about 300 feet.

Leverett (3) remarks that Illinois is like an inclined plane sloping from the north to the south. The Corn Belt, making up more than two-thirds of the state, is rather low and flat -- most of it being 600 to 700 feet above sea level. In levelness it ranks second in the United States. A rugged belt of Ozark hill land, however, extends across the southern end of the state.

CHAPTER III. Climate

1. Rainfall

The amount of rainfall and its distribution are of fundamental importance in the growth of vegetation. In Illinois the average is about 38.0 inches per year.

As the precipitation in Illinois comes largely from the Gulf of Mexico, the northern counties generally have less rainfall than those to the south. The extreme southern district has about 9.3 inches more rainfall than the extreme northern region. The yearly distribution is indicated in Fig. 2. However, in northern Illinois the summers are cooler, thus allowing a larger proportion of the soil water to remain unevaporated and leaving more for plant growth. A light rainfall will suffice in a region of cool temperatures. No large part of the state has a continued low production of basic crops over a series of years chargeable to deficient rainfall.

(3) Leverett, F., The Illinois Glacial Lobe, U. S. Geological Survey, Gov. Printing Office, Washington, D. C., 1899, p. 5.

The average snowfall in the state is 24.7 inches. The northern section averages only about 7 inches more per year than the extreme south, but the snow in the north remains longer on the ground. The melting snow helps plant growth by soaking slowly into the soil unless the soil happens to be frozen. A light snow helps to protect fall-sown grain from severe changes in temperature. The freezing of soil expands it, lifting it and the roots upward. When melting takes place, the soil settles, but the root system prevents the plant from settling with the soil. With continued freezing and thawing roots are lifted farther out of the soil, which results in winter-killing the plants. The plants most affected in Illinois are alfalfa and winter wheat. A snow cover tends to reduce the daily variation of soil temperature.

2. Temperature

Illinois has a continental type of climate, that is, it is in a region of rather cold winters and rather hot summers. The difference between the average of the warmest month and the coldest month for the whole state is nearly 50° F. The variation from the highest daily temperature to that of the lowest, however, is more than twice this figure. The average temperature for the three summer months is about 72° F. For each degree of latitude there is a difference of about 2 degrees in the mean temperature.

The drier air of higher altitudes, which permits a rapid loss of heat at night, causes the frost free dates along rivers to be "notched back." This is also because the lower places along streams are not exposed as much to cool winds. The water in the rivers also tends to make the growing season longer by making the temperature

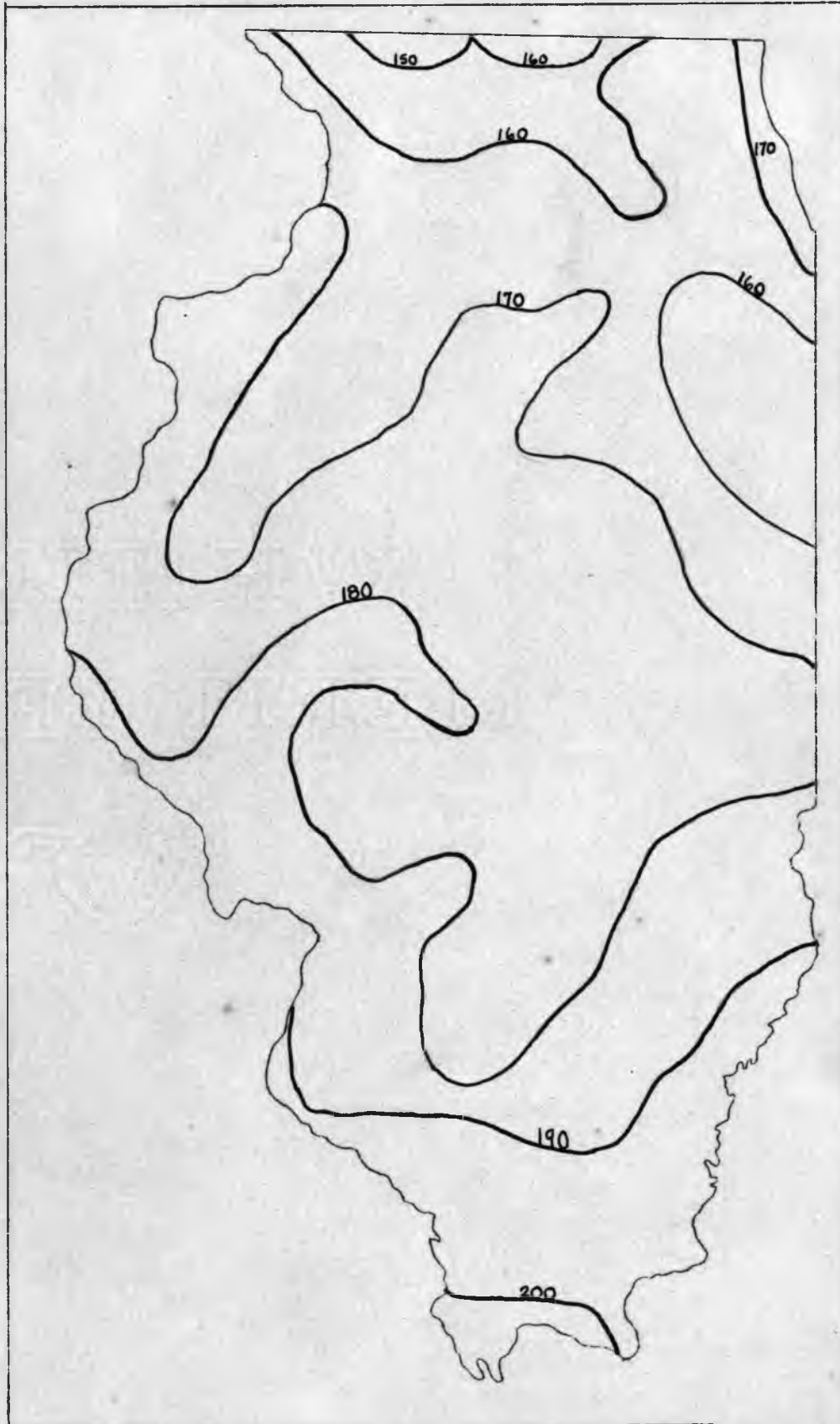


Fig. 3. Map showing the length of growing season.
Average number of days.

From Bull. 403. ILL.
Ag. Exp. Sta. 1934

less subject to sudden change. The cool air settling into the valleys, to some extent, neutralizes these effects, but the growing season is longer in the valleys. This is shown in Figure 3. A narrow strip of land near Lake Michigan shows the effect of that water in lengthening the growing season.

The length of the growing season in any locality is the average number of days between the last killing frost of spring and the first one of fall. This number gives some indication of what plants would be successful in a region.

This number must not be used without some care. For example, in a region where the growing season averages 100 days it would not be safe to plant corn that takes 100 days for maturity. The word "average" indicates the reason for this. In 50 per cent of the years the growing season is less than 100 days and in 50 per cent it is more than 100 days. A 50 per cent chance of ripening a crop is not enough for profitable agriculture.

The growing season in the state as a whole averages about six months. The shortest season -- 150 days -- is at the northern edge, the longest -- 200 days -- is at the southern tip. The average length for the southern counties, however, is only about 32 days longer than those counties to the extreme north. Table 1 shows this relationship:

Table 1. (4)

	Average in Spring	1st in Autumn	No. of days in Growing Season
Extreme northern section	May 4	Oct. 12	161
Extreme southern section	April 14	Oct. 24	193

(4) Mosier, J. G., Climate of Illinois, University of Illinois Agricultural Experiment Sta. Bull. 28, Urbana, Ill., 1918, p. 49.

The average temperature in Illinois is about 52° F. The difference between the north-south extremes is about 11° F. This difference in mean temperature has a bearing upon the kinds of crops grown. In the southernmost section, winter wheat, late-maturing corn, and even cotton are produced. In the northern part, spring grains, hay, and corn cut for silage are basic crops. Oats and winter wheat are classed as cool weather crops and corn as a warm weather crop. They both grow in the same area but the wheat and oats mature in the early summer due to an earlier sowing date. Most of the long period of warm temperature needed by corn comes after the wheat harvest.

The northern boundary for winter wheat coincides roughly with the southern boundary of spring wheat. It is near the mean summer isotherm of 70° F. and a mean winter temperature of 20° F.

The first killing frosts may occur in northern Illinois as early as September 15, one year in ten, but the average date for the northern counties is about October 11. The last killing frost in spring for the northern counties may be as late as May 15 one year in ten, but the average date for the region is about May 1.

In planting crops in Illinois, a farmer in most parts of the state must take some chance on frosts. That is, he cannot wait to

Note. According to Hunt (5) the rate at which the growing season shortens as we go north of a given latitude is about one day for each 10 miles. Of course, the reverse is true as we go south.

(5) Hunt, T. F., Cereals of America, Orange Judd Co., New York, 1912, p. 203.

put in corn until all danger of frost is past. In general practice he starts planting corn or other crops at a time when there is some risk, and by the time he has finished planting the risk is very small. It may be necessary every few years to replant some.

The spring planting dates for crops depend upon the temperatures at which the seeds germinate and the susceptibility of the resulting plant to adverse frosts. Henry (6) reports that spring wheat may be seeded 5 to 6 weeks before the average date of the last killing frost in any region, oats, 4 to 5 weeks, and corn, near the average date. Spring wheat is usually sown when the daily temperature is about 40°E, oats are seeded when the thermometer stands at 42° F., and corn, at 55° F. Corn needs a much warmer soil for the kernels to germinate.

3. Sunshine

The amount of sunshine a crop receives is an important element in determining its growth, as sunlight is responsible for food manufacture in plants. The average amount of sunshine in northern Illinois is about 52 per cent of that possible. The southern counties have about 47.7 per cent. The average for the entire state is 51.9 per cent.

The growth of crops is accelerated by rather strong sunlight. When there is only a small amount of moisture in the soil, however, the plant can better resist a period of drouth in cloudy weather, than when the temperature is raised by sunshine. Sunshine also causes more evaporation from the leaves of plants.

The crops of Illinois receive more sunlight in summer than any

(6) Op. Cit., p. 490.

states to the south; that is, where the per cent of cloudy days is the same. In Illinois the possible amount of sun on the longest day is about 15 hours, while in the south the days and nights are more nearly equal in length.

4. Wind

The wind velocity is important to farmers of a region because it controls to some extent the transpiration of plants and evaporation from the soil. In regions of high wind velocity evaporation from the soil and from leaves is much greater than where the wind moves more slowly. The average velocity of wind in Illinois is about 9.2 miles per hour. The average wind velocity at selected points in the Middle West differs somewhat from this figure for the state, as shown in the following table (7).

Table 2.

Indianapolis, Indiana	10.5
Des Moines, Iowa	7.7
Green Bay, Wisconsin	10.0

These figures are averages for over 20 years. However, they are not exactly comparable due to variations in the distance of instruments above the surface of the earth and other causes.

CHAPTER IV. Corn

Corn has quite definite moisture and temperature requirements during its growing season. It is nearly all south of the line of 60° F. mean summer temperature. Illinois is near the center of the district having the best climate for the crop. Corn requires about

(7) U. S. Statistical Abstract, U. S. Dept. of Commerce, Washington, D. C., 1923-1930.

10 days to germinate at 49° F. and about 2 days at 80° F. During the growth of corn it needs a mean summer temperature of 70° F. to 80° F. and an average temperature of more than 58° F.

Mosier (8) reports a study that indicates the yields of corn were slightly better when the temperature was somewhat lower than normal. For 21 years the average yield was 30.4 bushels per acre when the temperature was above normal. During 19 years when the temperature was below normal the yield was 33.6 bushels per acre. Optimum temperatures for corn seem to be lower than those prevailing during the growing months in Illinois.

In a careful study Rose (9) found that temperature factors show a correlation with the yield per acre of corn. He concluded that variations in temperature extremes above 90° F. and below 60° F. seem to be more significant than the mean temperature. He found that the yields in the southern part of the corn belt were reduced by high temperature while yields in the northern counties were reduced by low temperatures in the early part of the season.

Leighty (10) concludes that the corn plant needs high day and night temperatures. Corn does not do well where the average summer temperature is less than 66° F. or where the mean night temperature falls below 55° F.

(8) Op. Cit., p. 27.

(9) Rose, J. K., Corn Yield and Climate in Illinois, Abstract of Paper Presented at Academy of Science Proceedings, Bloomington, Illinois, April, 1935.

(10) Leighty, C. E., and Others, The Corn Crop, U.S.D.A. Yearbook, 1921, Gov. Printing Office, Washington, D. C., 1922, p. 182.

The minimum rainfall for corn during the summer months is about 8 inches. Corn needs more rainfall during its growth than some crops but it requires less water to produce a ton of dry matter than other crops. King (11) found the following amounts of water needed by plants.

Table 3

	<u>Tons of Water per ton of Dry Matter</u>
Dent Corn	350
Barley	392.9
Potatoes	421.7
Red Clover	452.8
Oats	522.4

Briggs and Shantz (12) at Colorado reported in later work:

Table 4

	<u>Pounds of Water Required per pound of Dry Matter</u>
Corn (dent)	280
(Silvermine)	302
Sugar beet	321
Oats	399
Wheat	364
Soy bean	672
Clover	638

(11) King, F. H., The Soil, Madison, Wis., The Macmillan Co., N. Y., 1908, p. 155.

(12) Briggs, L. J., and Shantz, H. L., Relative Water Requirements of Plants, Jour. Ag. Research, Dept. of Agriculture, Washington, D. C., 1914, p. 1-63.

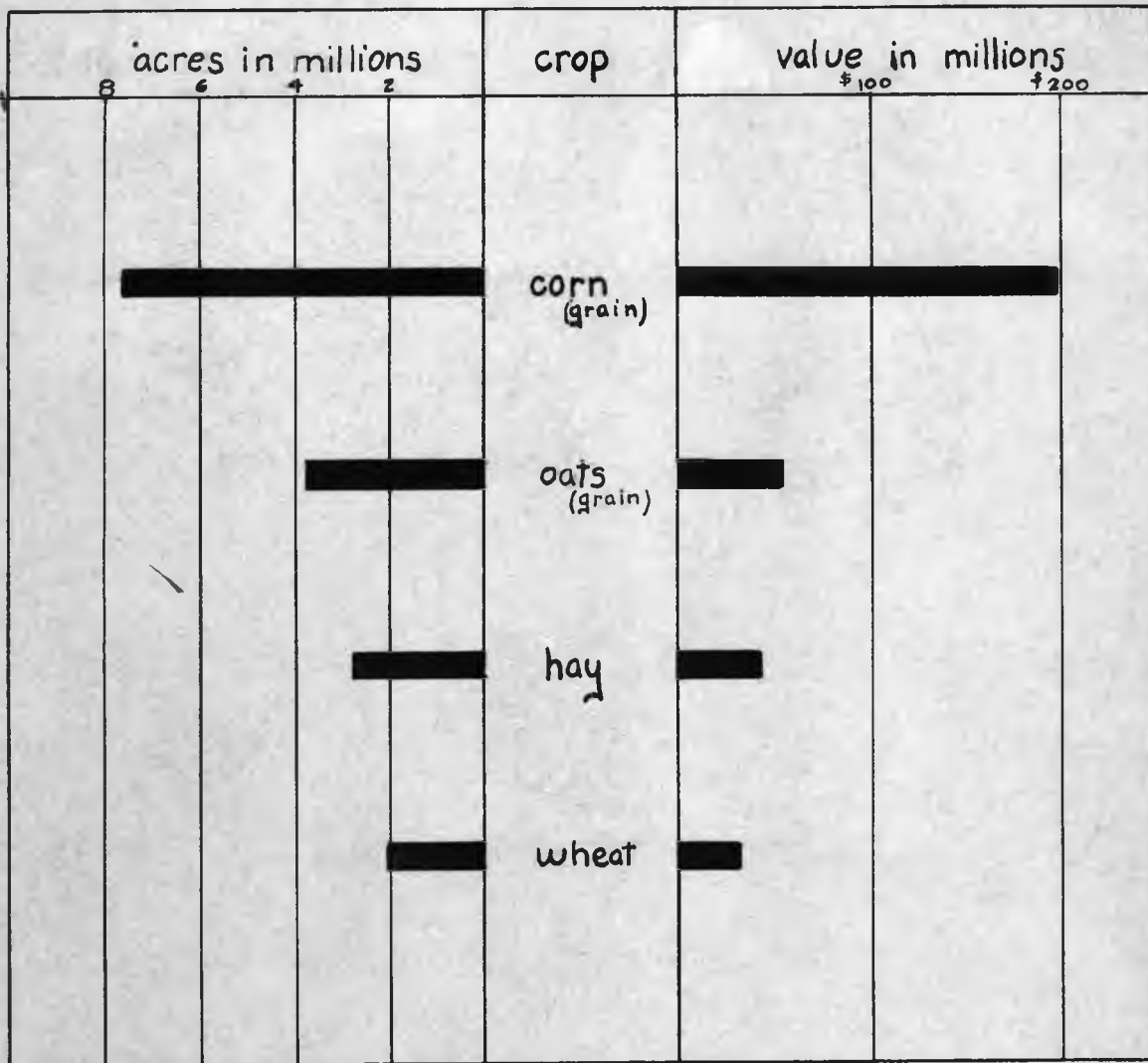


Fig.4. Relative importance of principal crops in Illinois. 1929

U.S.Census data

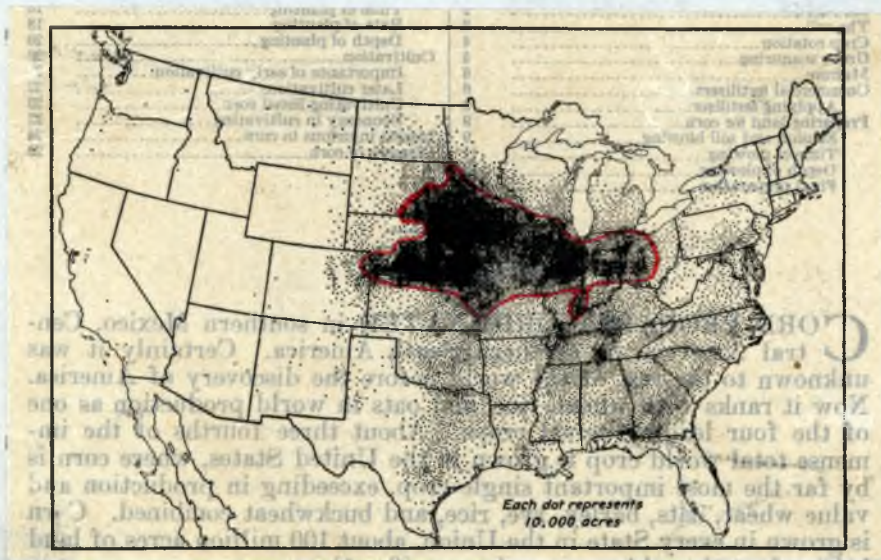


Fig. 5. A map showing the distribution of the corn acreage in the United States in 1929. Illinois is located near the center of the great "Corn Belt".

From U. S. D. A. Bul. 1714, 1933.

These reports indicate that corn leads other crops in its economy of water in producing a certain weight of dry matter.

Another way of stating the water requirement of corn is adopted by Montgomery (13). The use of 14 to 20 tons of water is required to produce one bushel of corn. For a yield of 50 bushels per acre this equals 7 to 10 acre-inches of water during the growing season.

The importance of heavy rainfall is indicated by Mosier's (14) summary:

June, July, and August Rainfall:

Less than 7 inches.....	25.3 bu. per acre (8 yr. av.)
Between 7 and 10 inches...	32.4 bu. per acre (9 yr. av.)
Over 10 inches.....	39.8 bu. per acre (11 yr. av.)

This is another indication of the importance of rainfall in producing crops of corn in Illinois.

The combination of favorable climate for corn with the proper soil for successful culture is rare. The dark, deep, rich loam of the Corn Belt seems nearly ideal and with proper fertility enormous crops can be raised. Figure 4 shows the outstanding place that corn occupies in Illinois agriculture, both in acreage and value. Acreage in corn is nearly as much as all of the others combined, and its value is more than one and one-half times as large.

As shown in Figure 5, Illinois occupies a central position in the great agricultural region designated as the "Corn Belt".

(13) Montgomery, E. G., Annual Report Nebr. Exp. Sta., 1901, p. 155.

(14) Op. Cit., p. 10.

U.S. GEOLOGICAL SURVEY
BUREAU OF GEOLOGY



Data from W. H. Jordan

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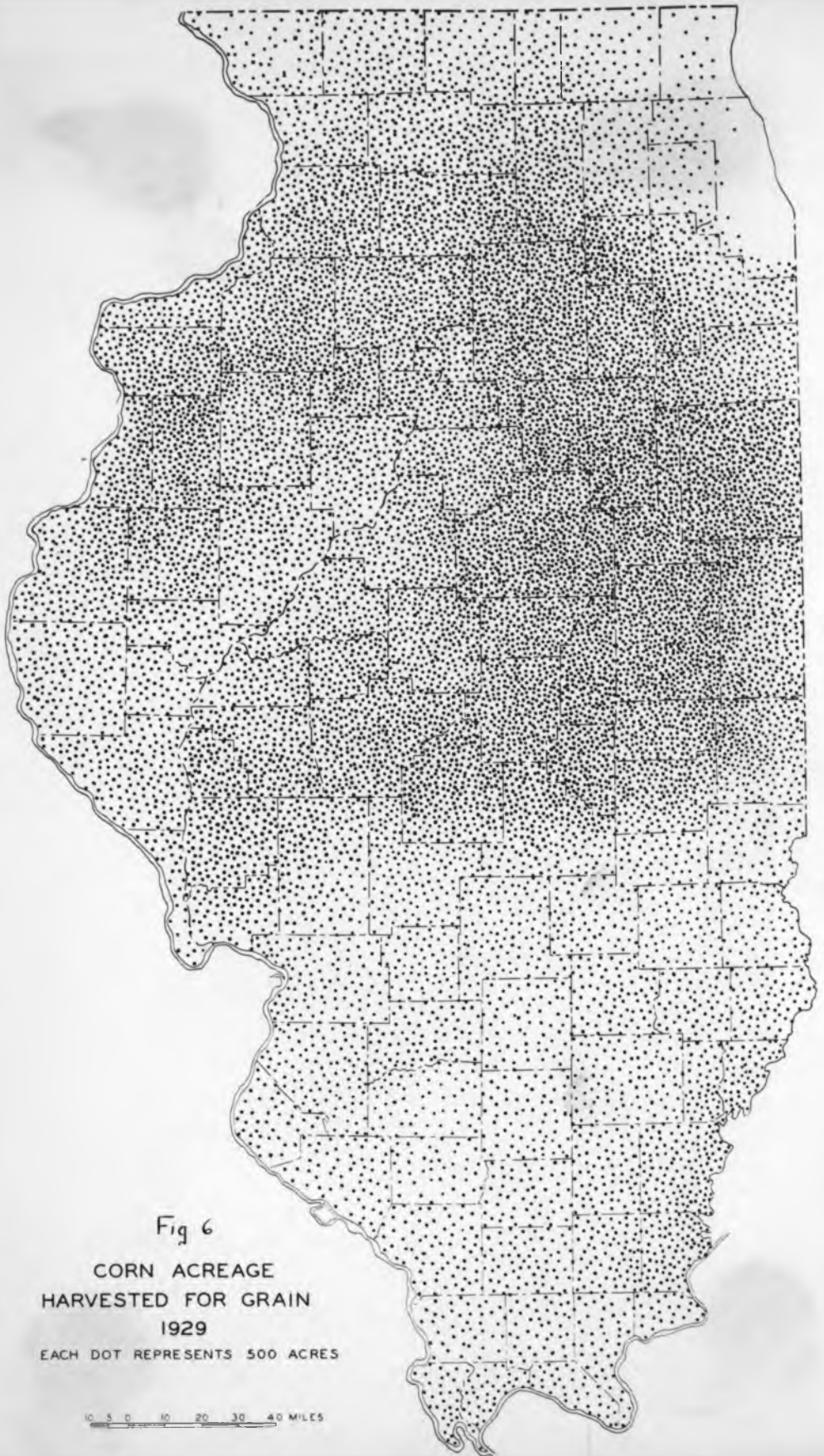


Fig 6

CORN ACREAGE
HARVESTED FOR GRAIN
1929
EACH DOT REPRESENTS 500 ACRES

0 5 10 20 30 40 MILES

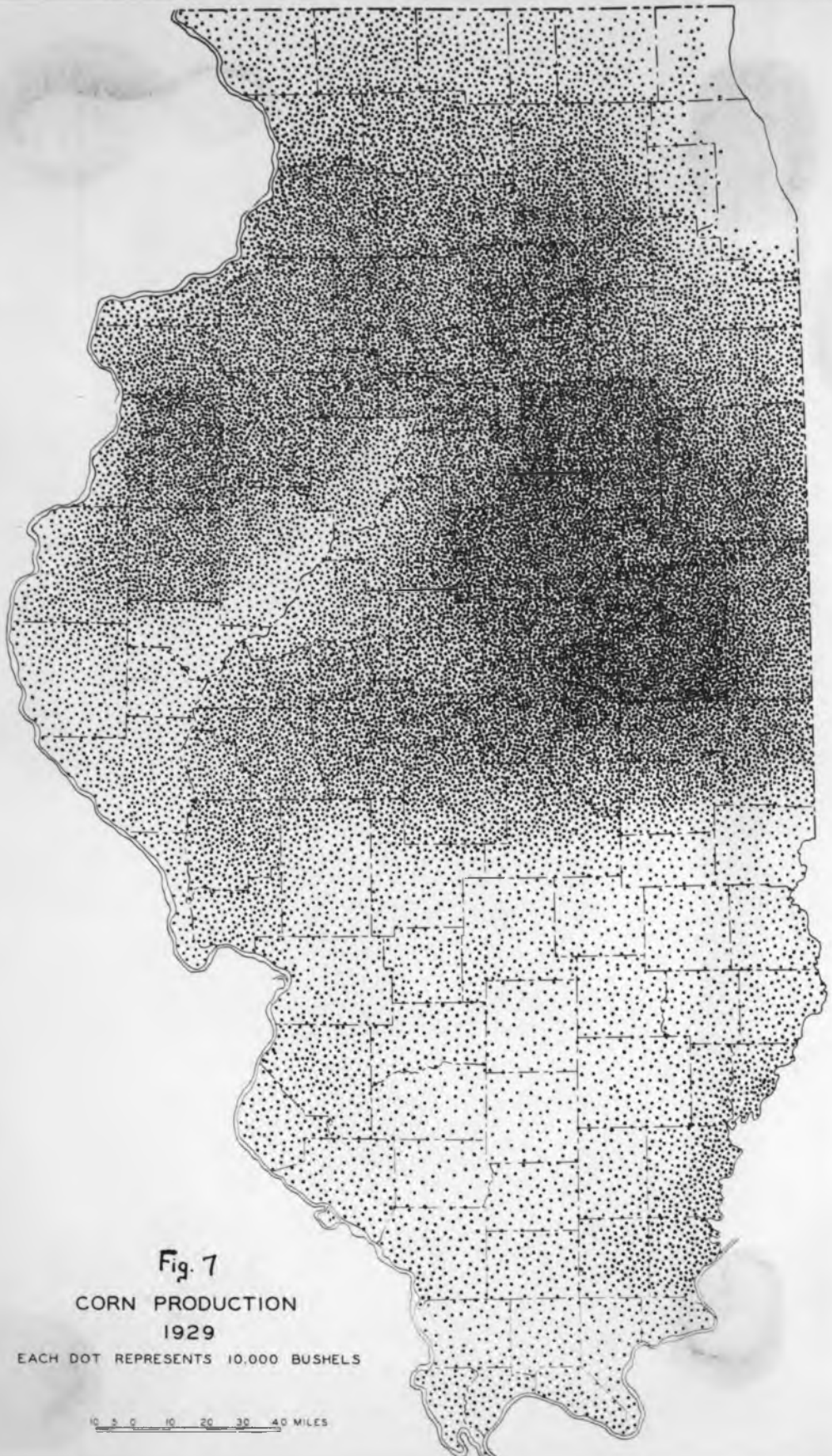


Fig. 7

CORN PRODUCTION
1929

EACH DOT REPRESENTS 10,000 BUSHELS

10 20 30 40 MILES



1. Northeastern, Dairy and truck area
2. Northwestern, Mixed livestock area
3. Western, Livestock and grain area
4. East-central, Cash grain area
 - (a) Corn and oats
 - (b) Corn and wheat
5. West-central, General farming area
6. Southwestern, Wheat, dairy, and poultry area
7. South-central, Mixed-farming area
 - (a) General farming
 - (b) Redtop, fruit, and poultry
 - (c) General and part-time farming
8. Southeast, Grain and livestock area
9. Southern, Fruit and vegetable area

Fig. 8 - Distribution of Income by Farming-Type Areas, 1929. The farms were divided according to the dominant types of farming. Geographical factors were largely important in determining the kind of farming in each area.

and Myers, K. M.

From Case, H. C. M. / Types of Farming in Illinois. U. of I. Agr. Exp. Sta. Bul. 403. 1934.

Data from U. S. D. A.

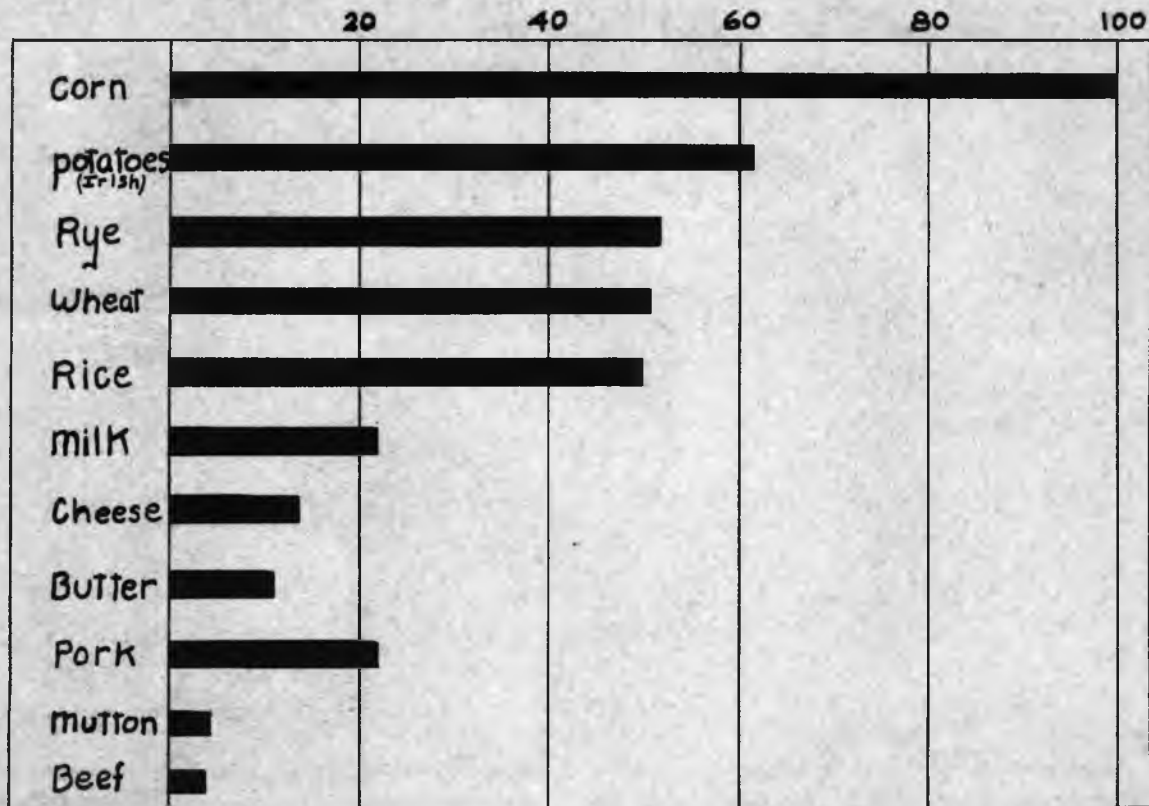


Fig. 9¹. Food production per acre compared to that of corn. Corn = 100



Fig. 10

CORN CUT FOR SILAGE
1929

EACH DOT REPRESENTS 200 ACRES

0 10 20 30 40 MILES

Figures 6 and 7 show the distribution of acreage and production of corn, harvested for grain in Illinois in 1929. Corn was easily the most important crop grown in the state, occupying about 24 per cent of the tillable land. It produced a cash income equal to 40 per cent of the total income from all crops and the farm value was equal to about half that of all crops. The per capita production of 24 bushels compared favorably with that of Iowa of 155 bushels. Because of the high yields, about 40 bushels per acre, that were obtained on the brown silt loam in the central part of the state, there was a great concentration of corn growing there, as indicated in Figure 7. On the light colored soil at the north, west, and south the yields averaged about 20 bushels per acre. In central districts nearly half of the land was in corn. About 60 per cent of the corn grown in this region (labeled 4a and 4b on Figure 8) within a radius of 160 miles of Chicago, was sold as a cash crop. In most other sections, a large proportion was fed to livestock. As shown in Figure 9, an important reason for corn growing in the state is the fact that ordinarily corn produces about twice as much food per acre as other cereal crops.

Due to a short growing season in the extreme northern section of the state most farmers use an early maturing variety of corn. In this region much of the corn is ensiled for the use of the dairy cattle supplying Chicago with milk. A similar situation obtains east of St. Louis and to a less extent surrounding other cities. These fluid milk regions merge gradually into cream producing districts. Figure 10 indicates the distribution of silage and, therefore, marks out the principal dairy regions. A dairy farm without a silo is rare.

Broom corn production is concentrated in Coles and adjoining

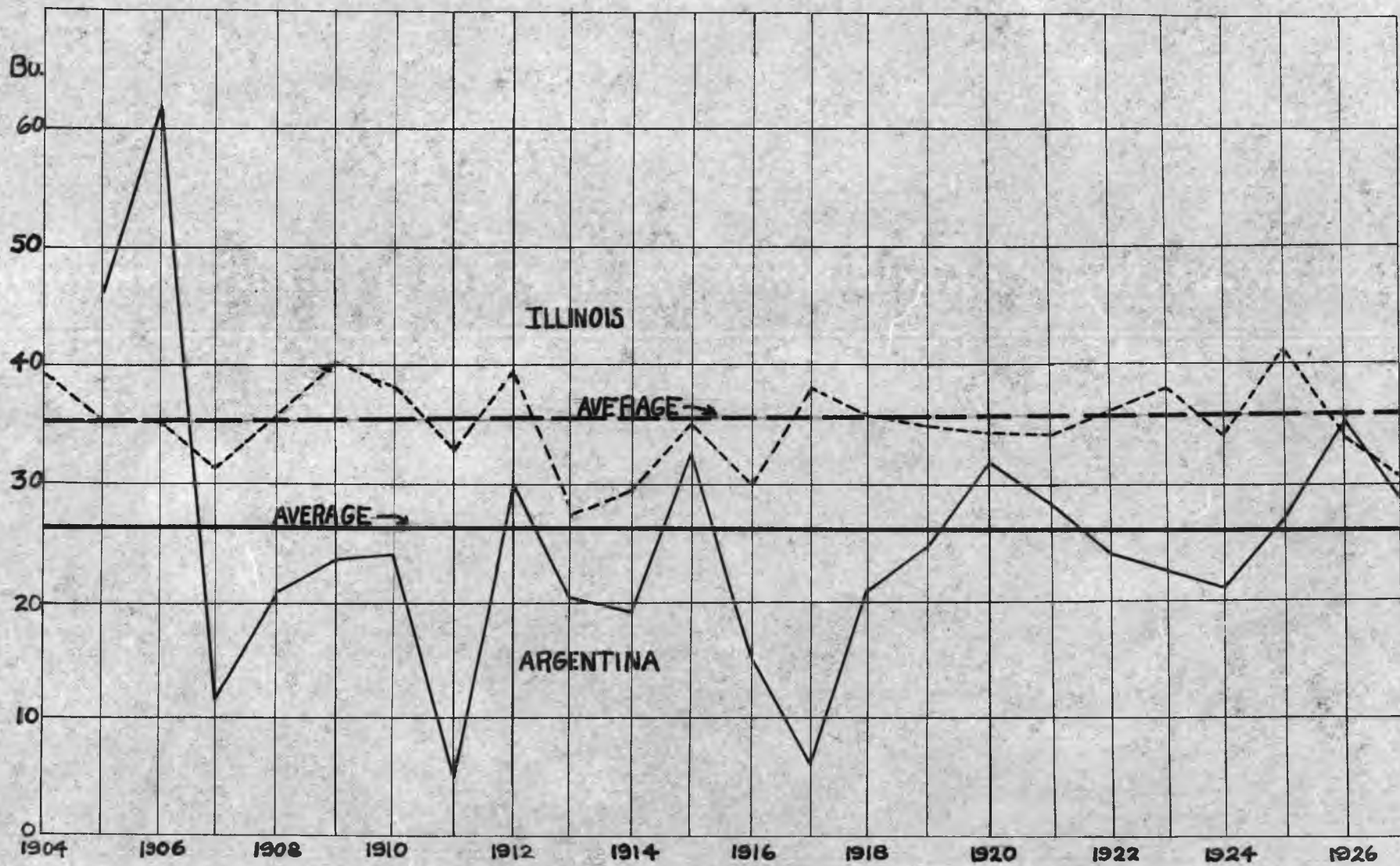


Fig. 11. CORN YIELD PER ACRE IN ARGENTINA
AND ILLINOIS
U.S.D.A. YEARBOOKS

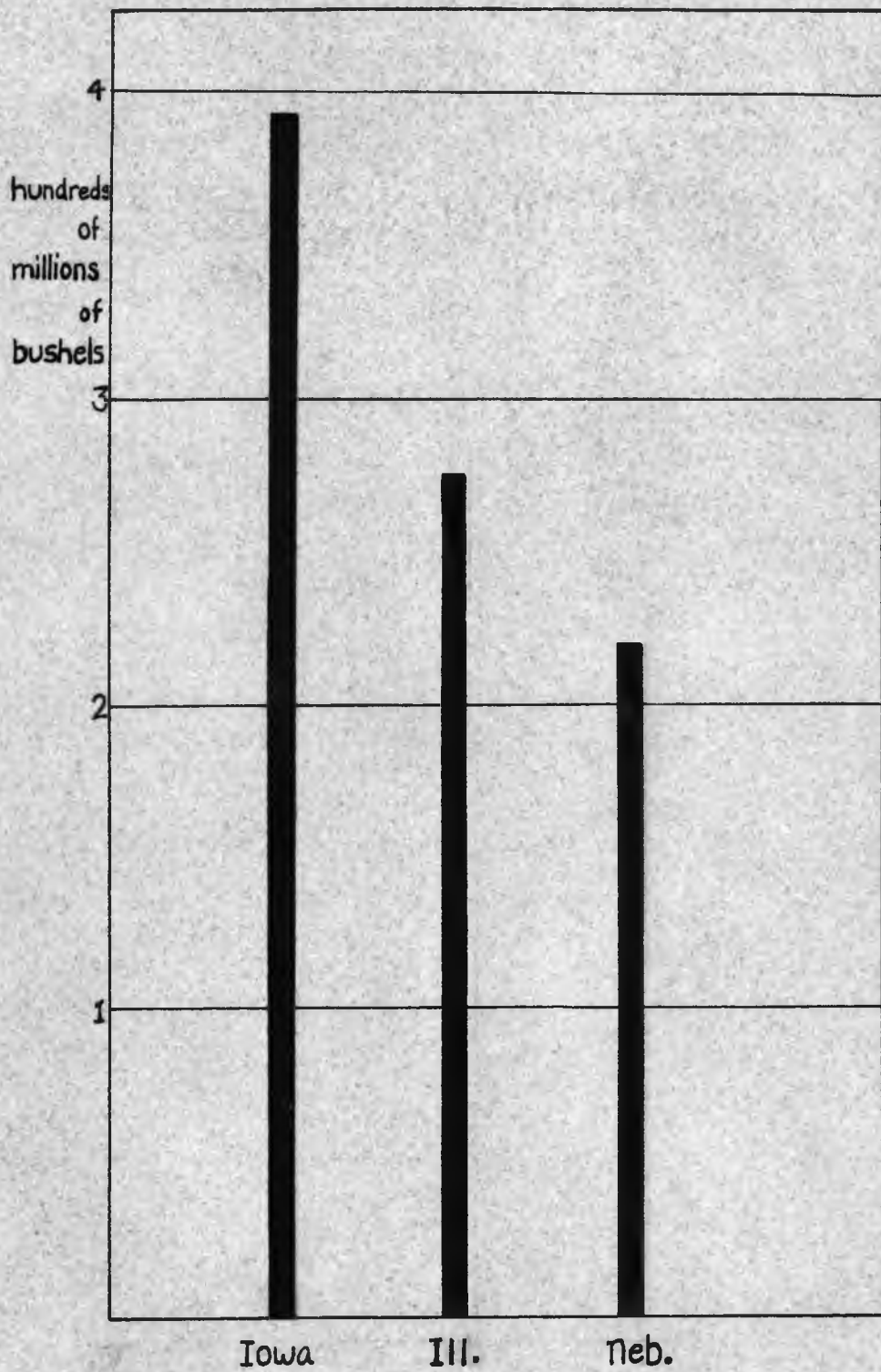


Fig. 12. The leading states in 'corn harvested for grain'. 1930 Census.

U.S. Census data

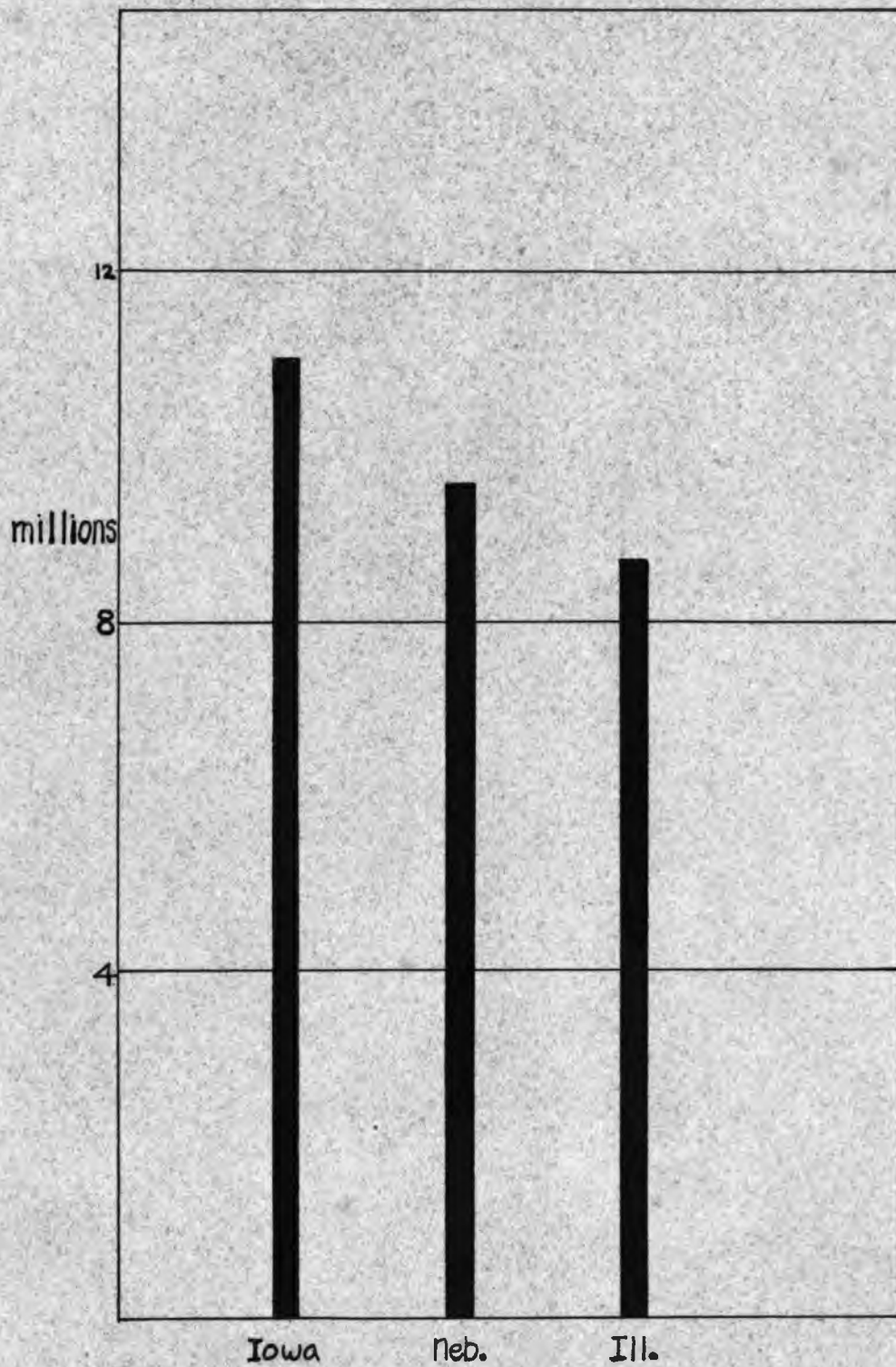


Fig.13. The leading states in corn acreage. 1930 ←

U. S. Census data

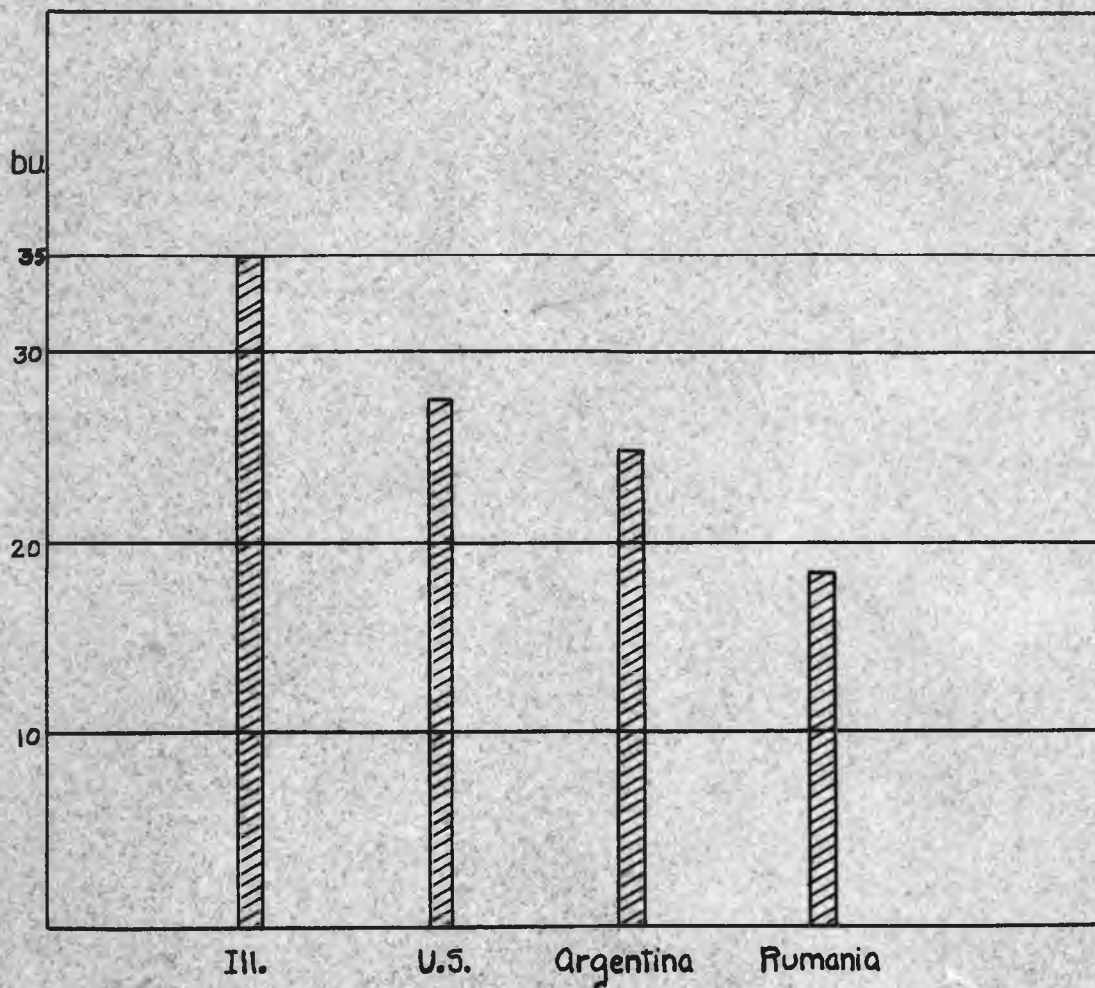


Fig. 14. Showing the yield per acre of corn. 8 year average.
 Argentina - 1914-1918 and 1922-1926
 U.S., Ill., and Rumania - 1909-1913 and 1921-1925

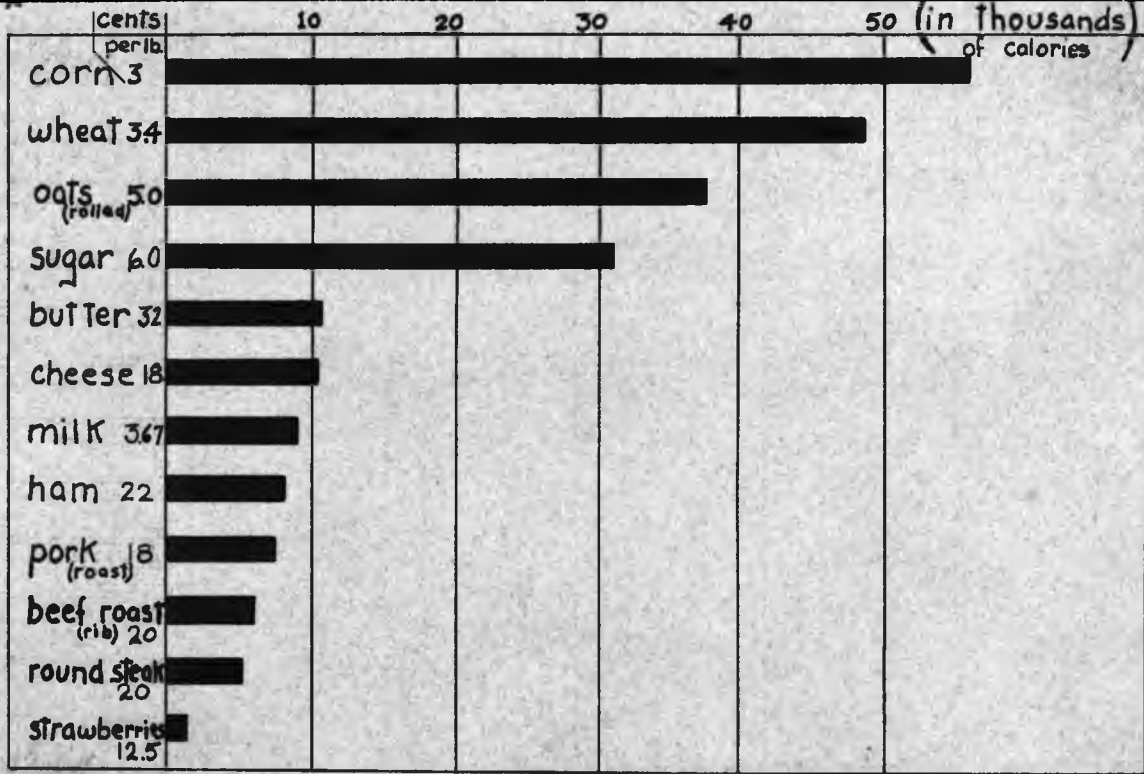


Fig. 15.² Food energy for \$1.00. The price used in calculating is shown after each food.

10
1110

Data from W. H. Jordan

BOME
SCOTTISH

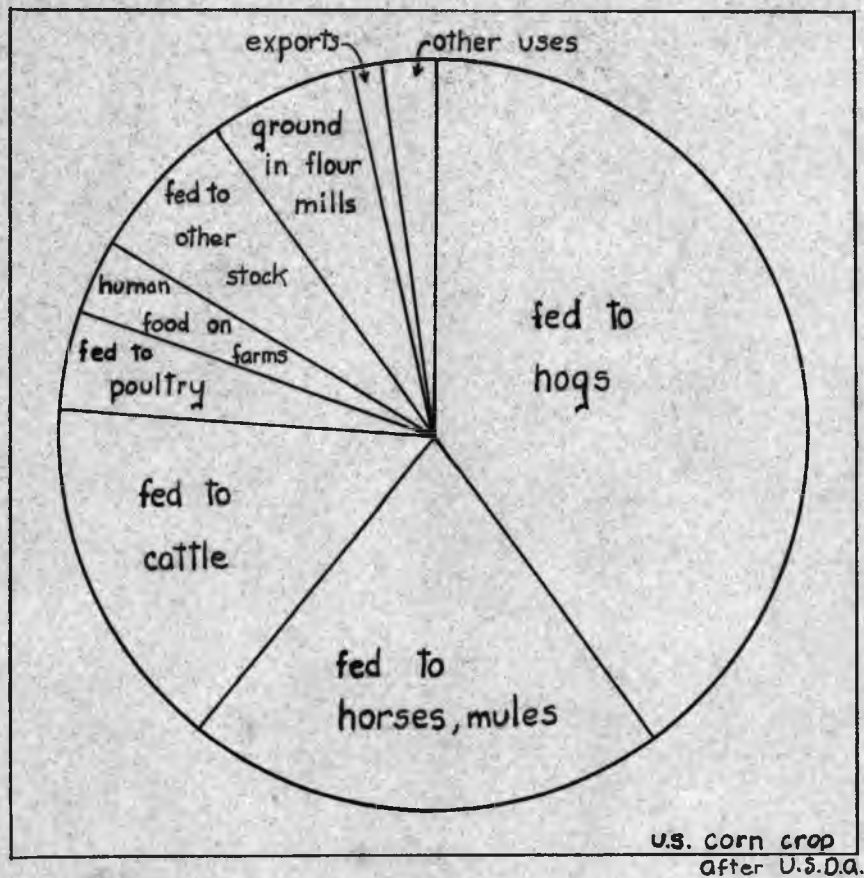


Fig. 16. Disposition of the corn crop. 1920

Based on estimates by U.S.D.A.

counties. The crop is unimportant to the state as a whole but affords a cash income to farmers who produce it.

Not only does Illinois have large yields compared to other corn producing areas of the world but the variation from one year to another is less. A farmer in Illinois is more sure of a paying crop than one in Argentina. This is graphically shown in Figure 11.

The level topography of the corn growing region facilitates the use of labor-saving machinery. Thus, the labor cost per acre is kept low.

Comparing Figure 12 with Figure 13 the fact is at once apparent that Illinois has a higher yield of corn per acre than Nebraska. The western-half of Nebraska lacks sufficient rainfall for a high yield and the hot winds there tend to interfere with pollination. The minimum summer rainfall for good yields of corn is about 9 inches. The warm, humid summer in the "Corn Belt" offers the proper climate for large production. Iowa, although of about equal size, has a larger tillable area and produces more corn per acre than Illinois or Nebraska. Only since 1919 has Iowa taken the lead from Illinois in corn production.

Figure 14 indicates that one reason for the specialization of corn growing in Illinois and the "Corn Belt" as a whole is the high average yields obtained there.

On the basis of national economy, Figure 15 shows why it is desirable to grow large amounts of corn. Energy is more cheaply supplied the body by grain rather than by animal products.

Now a word as to the disposition of the corn crop illustrated in Figure 16. More than 85 per cent of the U. S. corn crop is fed

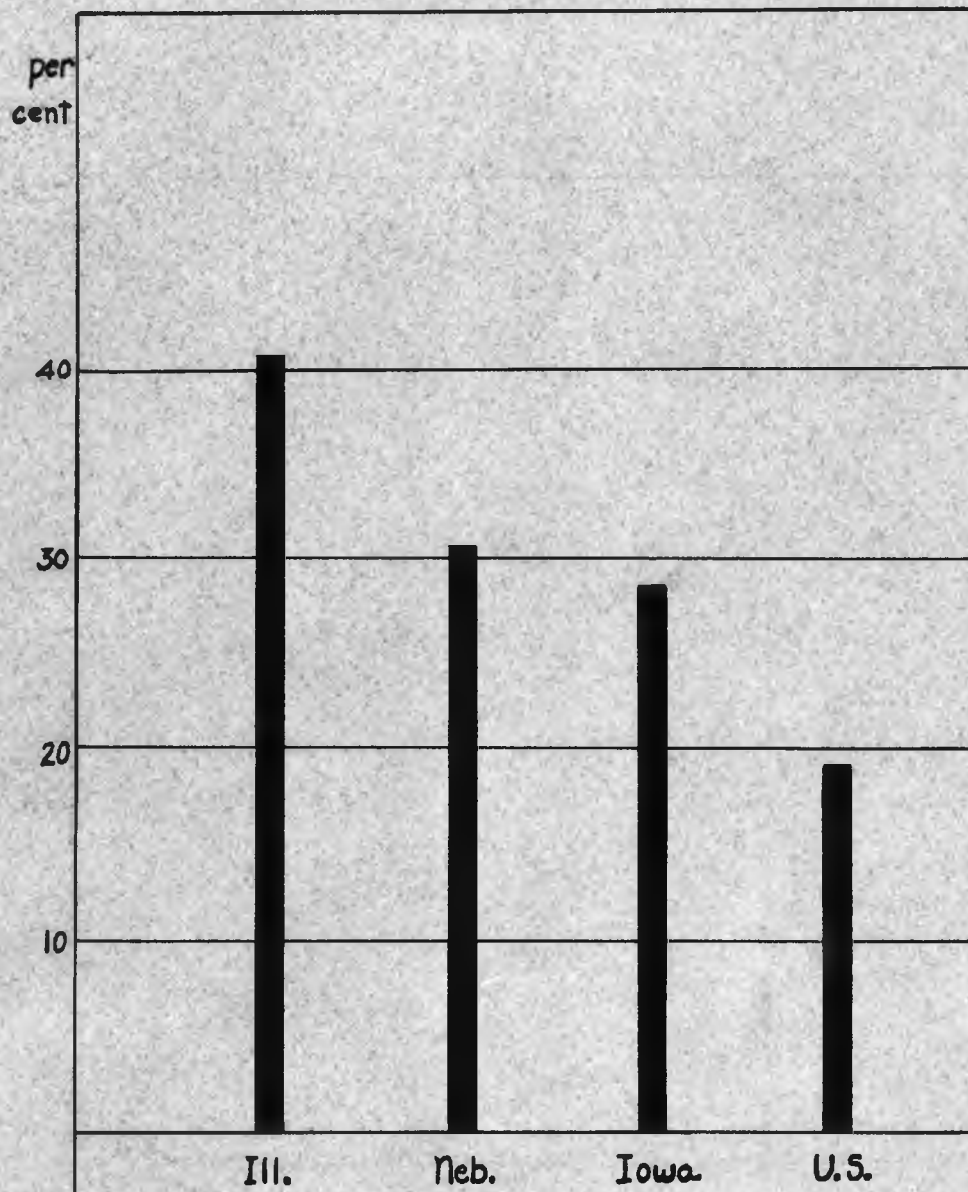


Fig. 17. Showing The Per Cent Of The corn That Is Sold Or To Be Sold From Farms. 1919.

U.S. Census data

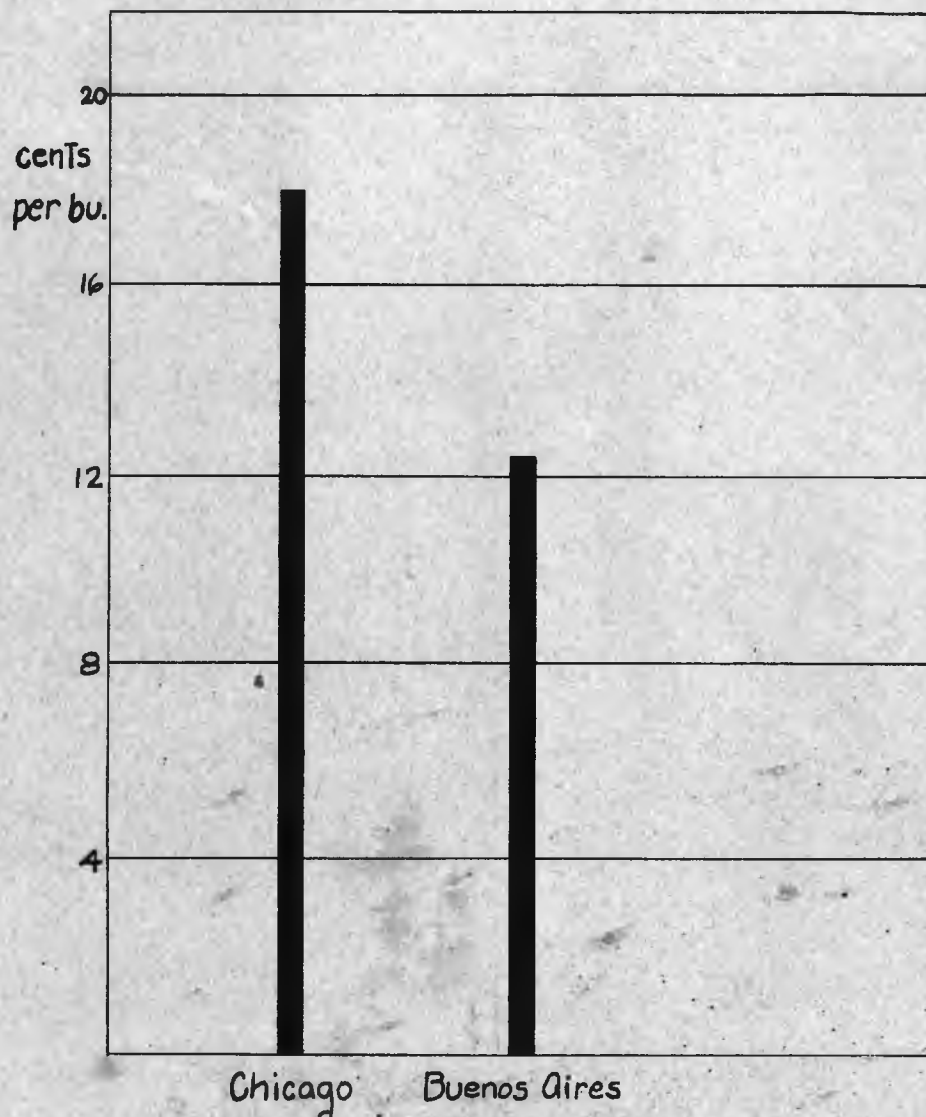


Fig. 18. Freight rates on corn (approximate).

Average 1927-1931. prices

to Liverpool

DATA ~ YEARBOOK AGRICULTURAL
STATISTICS

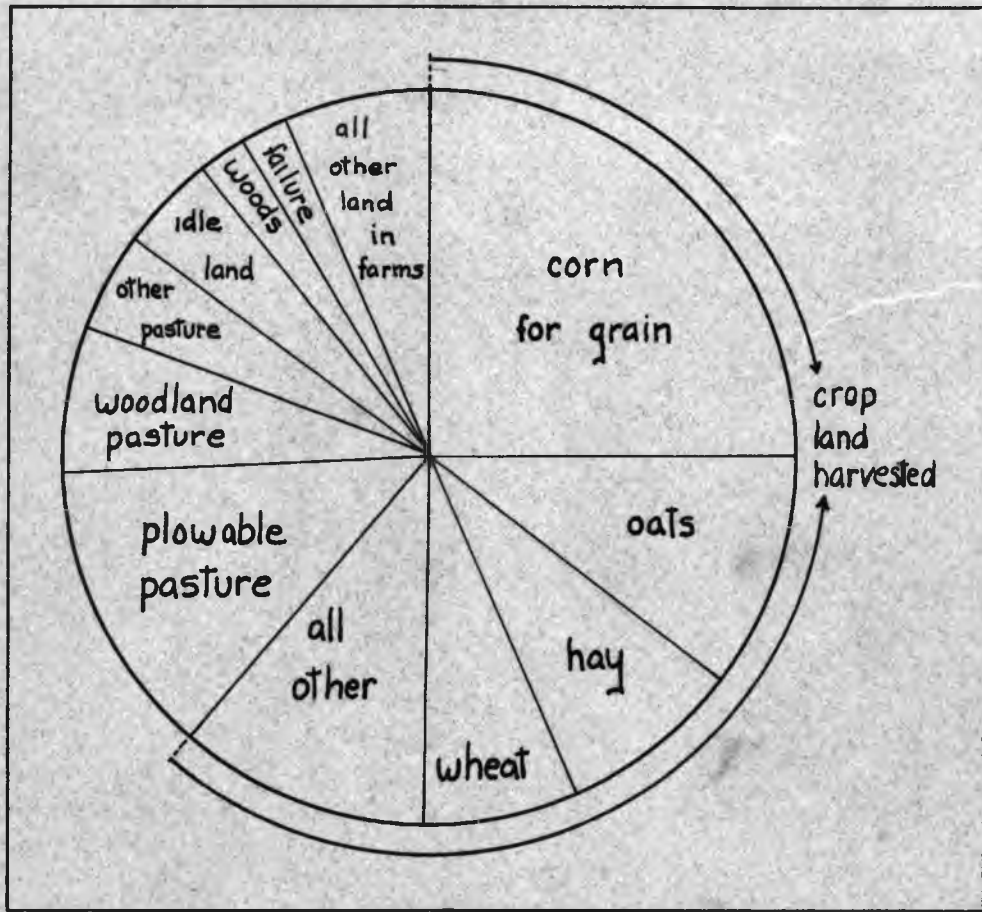


Fig. 13. Use of farm acreage in Illinois, 1929.

to livestock. Less than 10 per cent is used directly for human food. Of the corn fed to livestock, that fed to hogs is almost equal to the amount consumed by all other classes of stock on farms.

The Illinois farmer has some advantage over the corn growers of Iowa due to his geographical location -- closer to large markets. It costs the Iowa farmer about 5 cents more per bushel to market corn in Chicago than it does the average farmer in Illinois.

Figure 17 graphically illustrates the importance of corn as a cash crop to the Illinois farmer. Nebraska and Iowa market more of their corn in the form of meat, but with the decline in exports in recent years this proportion has greatly decreased.

Figure 18 illustrates a difficulty of corn marketing by the farmer of Illinois. The freight rate from Chicago to New York by rail is higher than the steamer rate from Buenos Aires to Liverpool or to New York and other eastern ports.

Figure 19 shows the uses made of farm land in Illinois. Corn occupies about one-fourth. Pasture of one kind or another claims one fourth. Oats, hay, and wheat make up another fourth of the acreage.

In the United States corn was grown on slightly over one-fourth of all crop land harvested in 1929. Acreage of oats, hay, and wheat accounts for nearly half of the harvested crop. The total acreage of pasture land in the United States exceeds that of the harvested crop land. A large proportion of the area in many states is rough or dry land that can only be profitably used for pasture.

CHAPTER V. Hay

Perennial hay plants need at least 25 inches of rainfall except under irrigation. Hay does the best when there are abundant rains during the growing season. Bright, warm weather is desired by the farmer after the hay is cut in order to cure it.

Legumes need a well-drained soil to produce good yields, but even soil having a high per cent of clay will raise good crops of hay if excess water is not a limiting factor.

Timothy hay and other types of native grasses, like red top, do fairly well on poorly drained soil. These types of roughage are grown in southern Illinois on many slopes where it is not advisable to plow very often on account of severe erosion.

The production of hay is not concentrated in any particular part of Illinois. Hay is produced in every county but is not considered an absolute necessity in feeding the livestock that is found on nearly every farm. In many places livestock is turned out to corn stalks or around stacks of straw to get its winter supply of roughage.

The greatest concentration of hay growing occurs in the dairy regions surrounding Chicago, because large numbers of high producing dairy cows are kept there. In order for a cow to produce milk economically, the farmer needs to supply a legume hay, and so the dairy districts grow a large amount of this type of roughage.

Most of the hay produced in the state is used on farms for livestock feed. A small amount is sold locally or from one county to another. The bulky nature of the crop makes it uneconomical to ship it far.

Nearly 3 million acres produced hay in 1929 or about 14 per cent of the tillable land area. Of this acreage, about one million

supported legumes and 14 million produced a mixture of timothy and clover. Figure 20 shows the distribution of this crop.

It requires according to Piper (15) an average of 7.35 acres of timothy to support a cow or horse for one year. Three acres of alfalfa or clover or 8.67 acres of pasture are required. In humid regions where land is cheap and labor is expensive, pasturage is the most economical way of supporting livestock. Where land is high priced and labor is abundant, legume hay is more economical.

There has been some decrease (16) in hay production during the last two decades because of the development of the tractor, truck, and automobile. The truck and automobile have virtually taken the place of the horse in cities and all three power units have made it possible for the farmer to grow other crops. The acres formerly needed to support horses are used for other purposes.

The hay reaching city markets is used for resale to breeders of fancy stock, for supplying stockyards, and for riding horses.

CHAPTER VI. Oats

Oats like a cool, moist climate. The Corn Belt, therefore, is not ideal for the highest yields per acre. High temperatures when the heads are developing results in a low yield. Carlton (17) believes that a quick-falling rain in hard showers and freedom from mist in the later stages of the oats growth are important in producing a good yield. If there is continued humidity of the air during

(15) Piper, C. V., and Others, Hay, U.S.D.A. Yearbook, 1924, U.S. Printing Off., Washington, D. C., 1925, p. 305.

1910-11, Chicago, 273,983
(16) Note. Hay Receipts, in tons: 1930-31, Chicago, 55,416
From U.S.D.A. Yearbook, U.S.Govt. Print. Off. Wash., D.C., 1932, 1932, p. 689, p. 575.



hundreds
of millions
of bushels

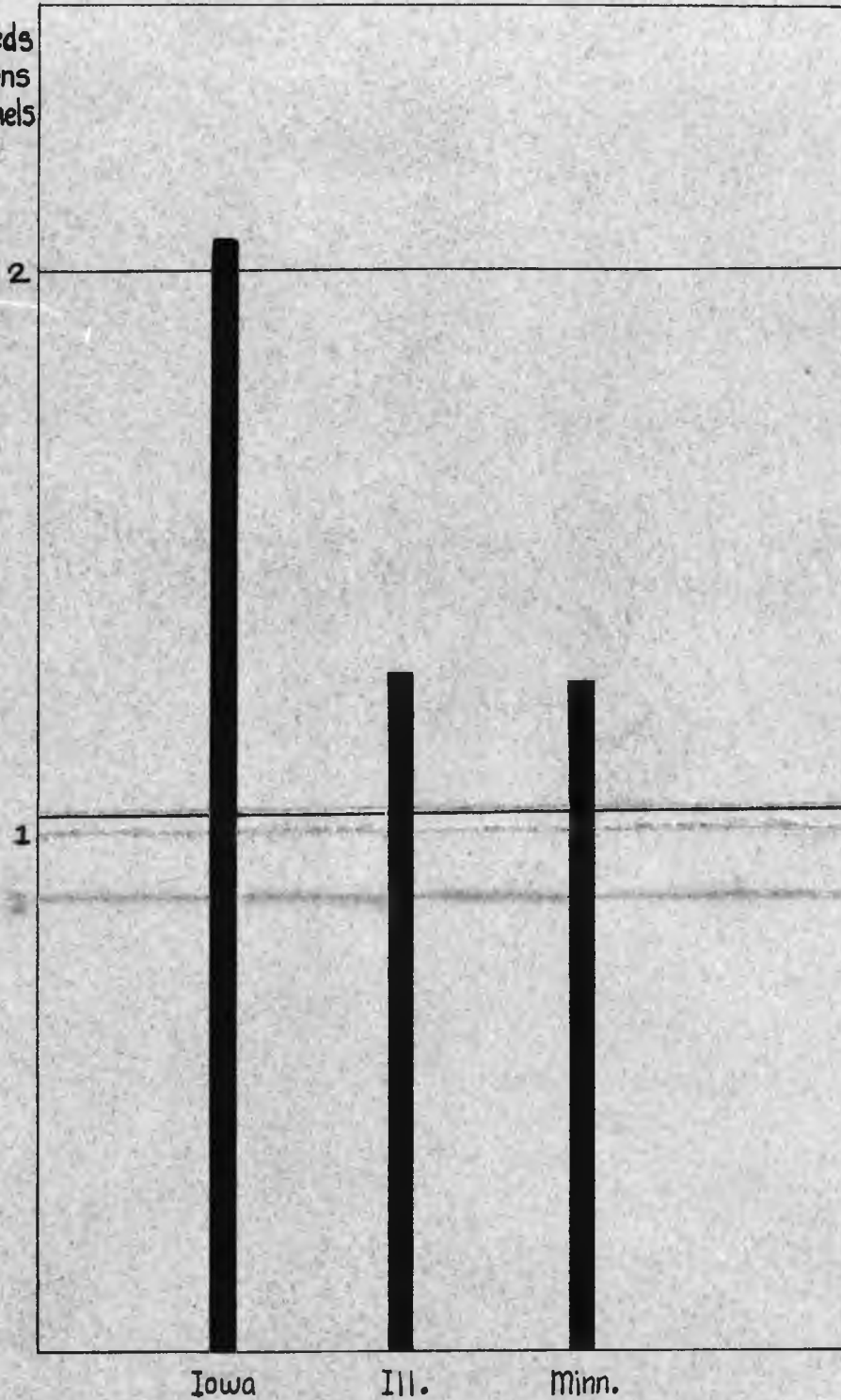


Fig. 20a. The leading states in oats production. 1929

U.S. Census data



Fig. 21

OATS ACREAGE
1929

EACH DOT REPRESENTS 500 ACRES

0 5 10 20 30 40 MILES

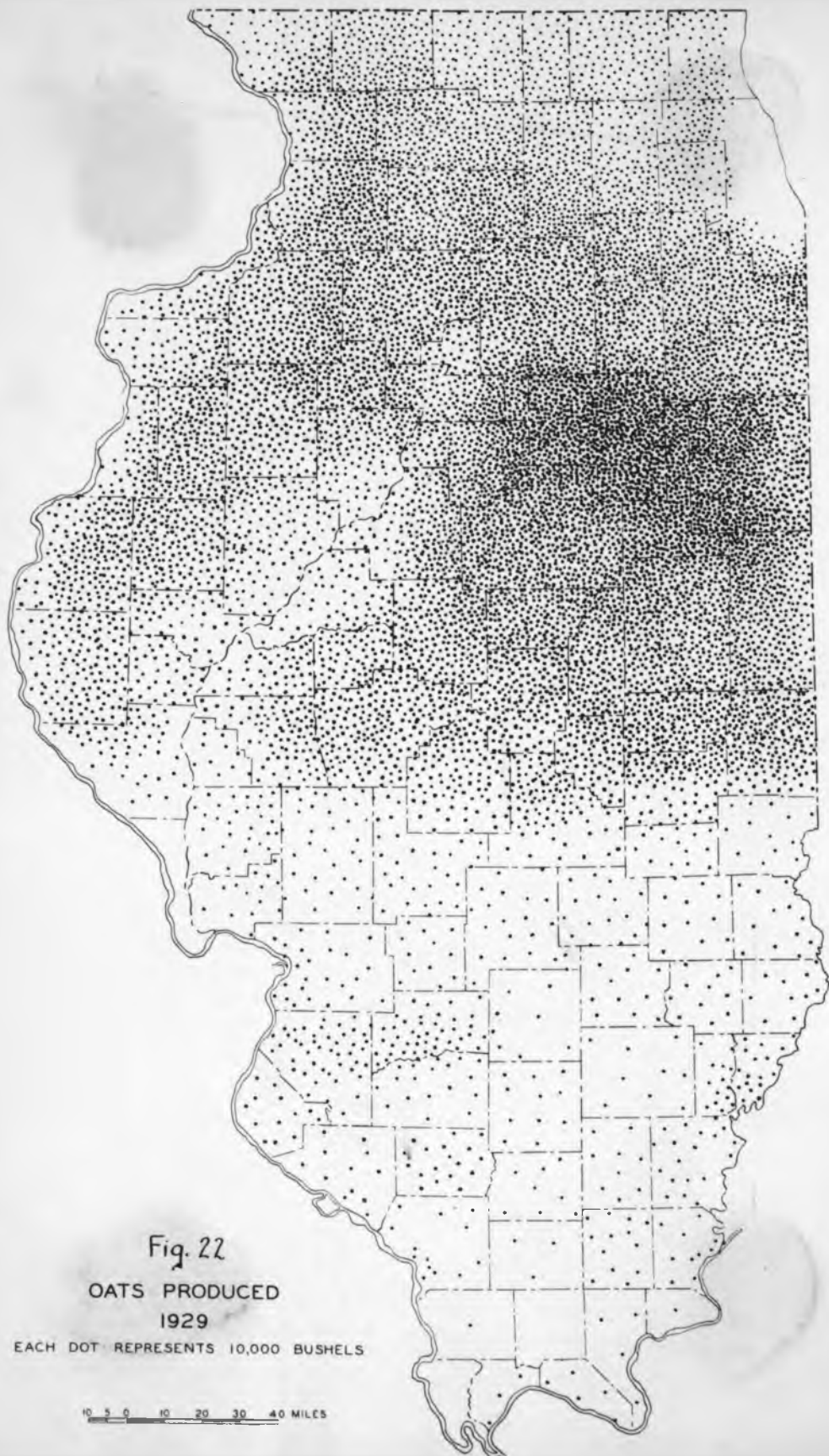


Fig. 22

OATS PRODUCED
1929

EACH DOT REPRESENTS 10,000 BUSHELS

10 20 30 40 MILES

(17) Carlton, H. A., The Small Grains, The Macmillan Company, 1916, p. 32.

ripening, the kernel develops a starchy consistency and the straw is weaker. Early spring seeding is important to prevent rust attacks and also to allow the grain to ripen in cool weather. The crop takes about 107 days between seeding and harvesting.

The relative importance of oats in Illinois is graphically illustrated in Figure 4. It is second in importance to corn and exceeds wheat both in acreage and value. In the United States, however, oats follow wheat in acreage and value.

As indicated in Figure 20a, Iowa easily leads all states in oats production. In 1929 Illinois produced only about two-thirds as much. Illinois, however, has the advantage over states to the north in being close to large markets.

In 1929 Illinois produced about 18 bushels of oats per capita. Figure 21 and 22 show the distribution of this cereal crop. In the north-central section of the state more than 50 per cent of the oats were sold as grain while in other parts of the state the major part was fed to livestock. The acre-yield generally decreased toward the south because oats need cool weather during the growing season. In northern counties 40 bushels were produced, whereas on good soil in south-central counties, the production averaged only slightly over 30 bushels per acre. The location of oats in Illinois is explained by the need of, a cash crop, bedding, a food for livestock especially during their growth, a crop for nursing seedling crops of legumes and a crop to take up the slack times in using labor, horse power,

and machinery. In the area of greatest concentration, oats grew on 30 per cent of the tillable land. In some southern counties a comparable figure is 1 per cent, while in north and west counties about 15 to 20 per cent of the land was so occupied.

Oats have a place of large importance in Illinois because they fit well into rotations. They are economical of labor, being sown before it is warm enough for corn and the oats harvest comes after corn is 'laid by'. They are also produced as a cash crop on many farms.

Soy beans have displaced a considerable area of oats in the central part of the state. Attacks by fungous diseases and the chinch bug also have influenced farmers to lessen the acreage. The growing use of the gasoline engine for power has decreased the need for oats as well as for hay and there will probably be a further decline in oats acreage in Illinois.

Oats are used extensively to feed breeding and growing stock of all kinds. The bulky nature of oats precludes shipment of the crop over long distances unless the price is very high. This explains the sale of oats for commercial purposes in Illinois.

CHAPTER VII. Wheat

The optimum weather conditions for winter wheat are much the same as for spring grains. Spring wheat needs about 90 days for the growing season and a rainfall of from 20 to 30 inches. The spring should be rather cool and moist. Drier, warmer weather is desirable during the early summer to facilitate ripening of the grain.

Yield of the wheat crop per acre depends to a large extent upon the amount and distribution of moisture and the factors relating

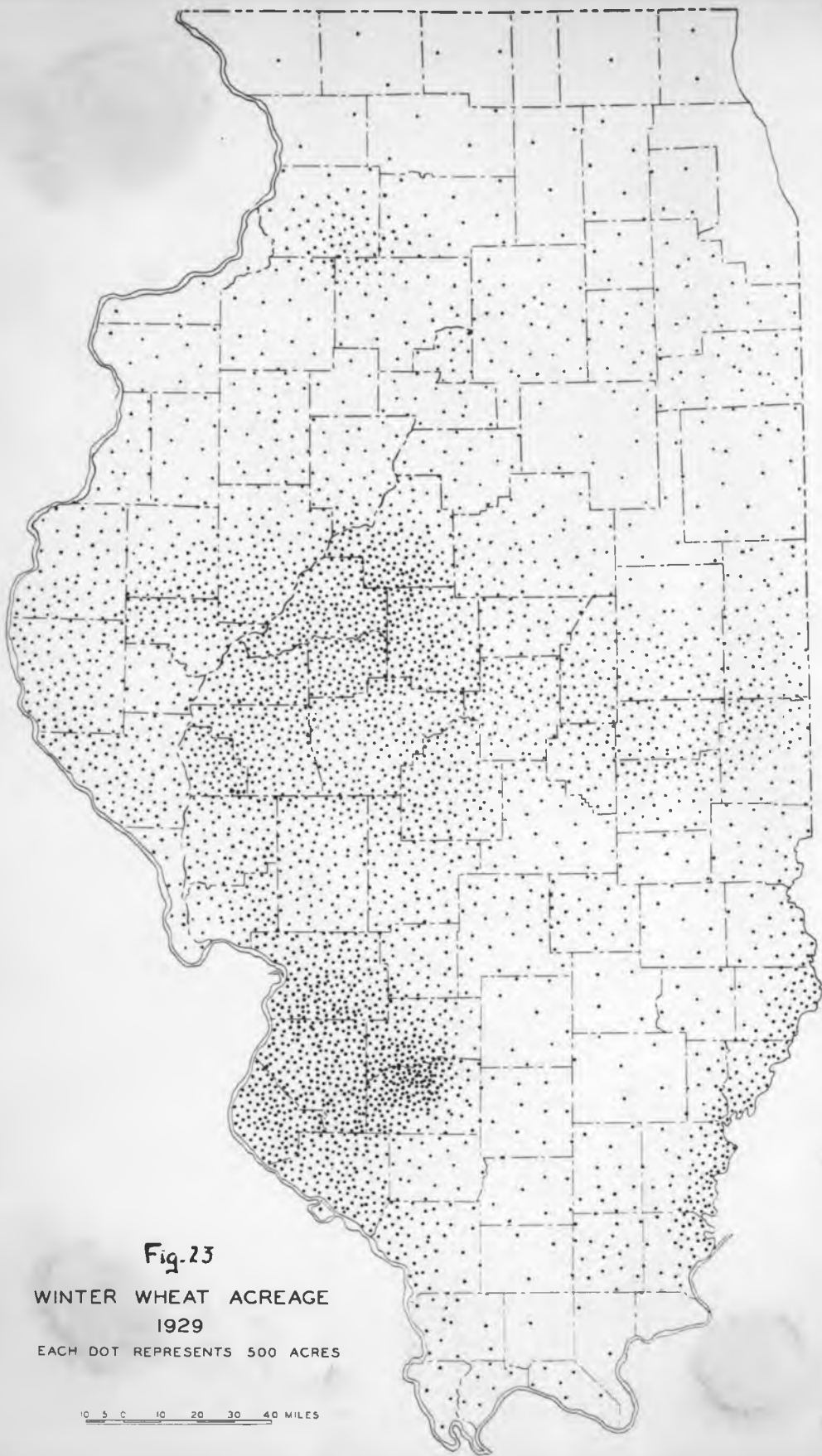


Fig. 23

WINTER WHEAT ACREAGE
1929

EACH DOT REPRESENTS 500 ACRES

10 20 30 40 MILES

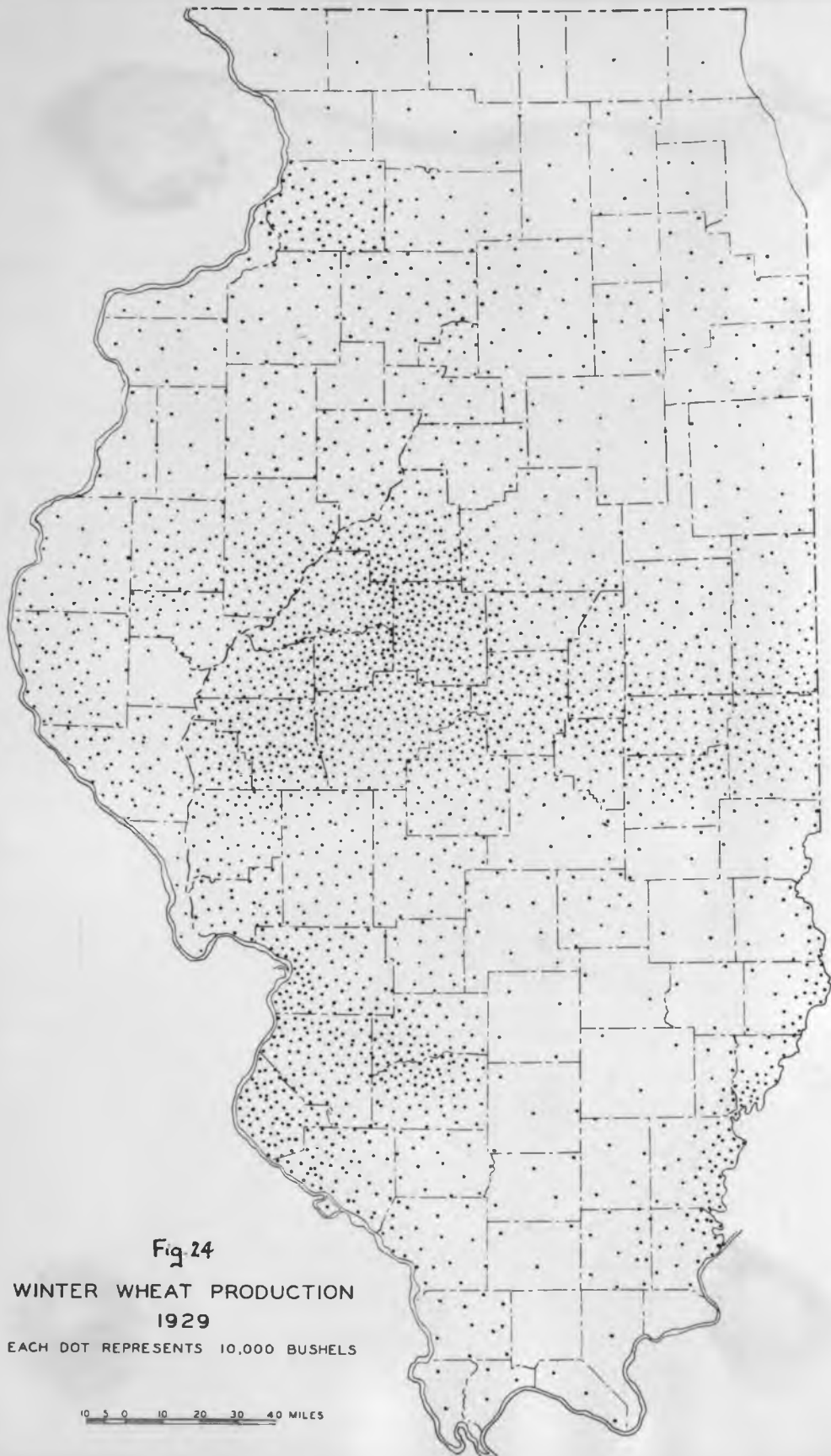


Fig 24

WINTER WHEAT PRODUCTION

1929

EACH DOT REPRESENTS 10,000 BUSHELS

10 20 30 40 MILES

to temperature. Ball (18) reports an investigation showing that the yearly rainfall best for wheat is between 25 and 35 inches. There is a rather slow decline in yield with more or less rainfall.

Wheat requires less humus in the soil than corn: too much humus causes the wheat to lodge thus reducing the yield. Sandy soil will not produce paying quantities of wheat, while a medium loam of high fertility produces good yields.

While the oat was the most important small grain grown in the northern half of the state, so wheat held similar honors for the southern half. The distribution of winter wheat acreage and production are shown by Figures 23 and 24. About 2,000,000 acres were harvested in 1929 occupying 8 per cent of the tillable land area. More than three-fourths of the wheat was grown in two areas, (1) a strip about sixty miles wide extending east and west, and (2) about 6 counties near St. Louis. In some areas wheat occupied more than 25 per cent of the tillable land. The yields per acre varied from about 10 in poor land districts up to about 20 bushels where the land was richer. As nearly all the wheat was sold, it supplied an income to farmers of more than 15 per cent of that produced from the sale of all crops. The per capita production in Illinois was about 4 bushels, or an insufficient amount for the use of livestock and human consumption. The danger of winter damage is an important factor restricting the use of fall-sown wheat in northern Illinois. This danger usually decreases toward the south.

Spring wheat is grown to some extent in the northern part of the state but it is of small importance compared to the acreage of winter wheat. In 1929 the ratio was 20 to 1 for the state.

(18) Ball, C. R. and Others, U.S.D.A. Yearbook, 1921, Gov. Printing Office, Washington, D. C., 1922, p. 111.



Fig.25. The leading states in winter wheat acreage. 1929

U.S. Census data

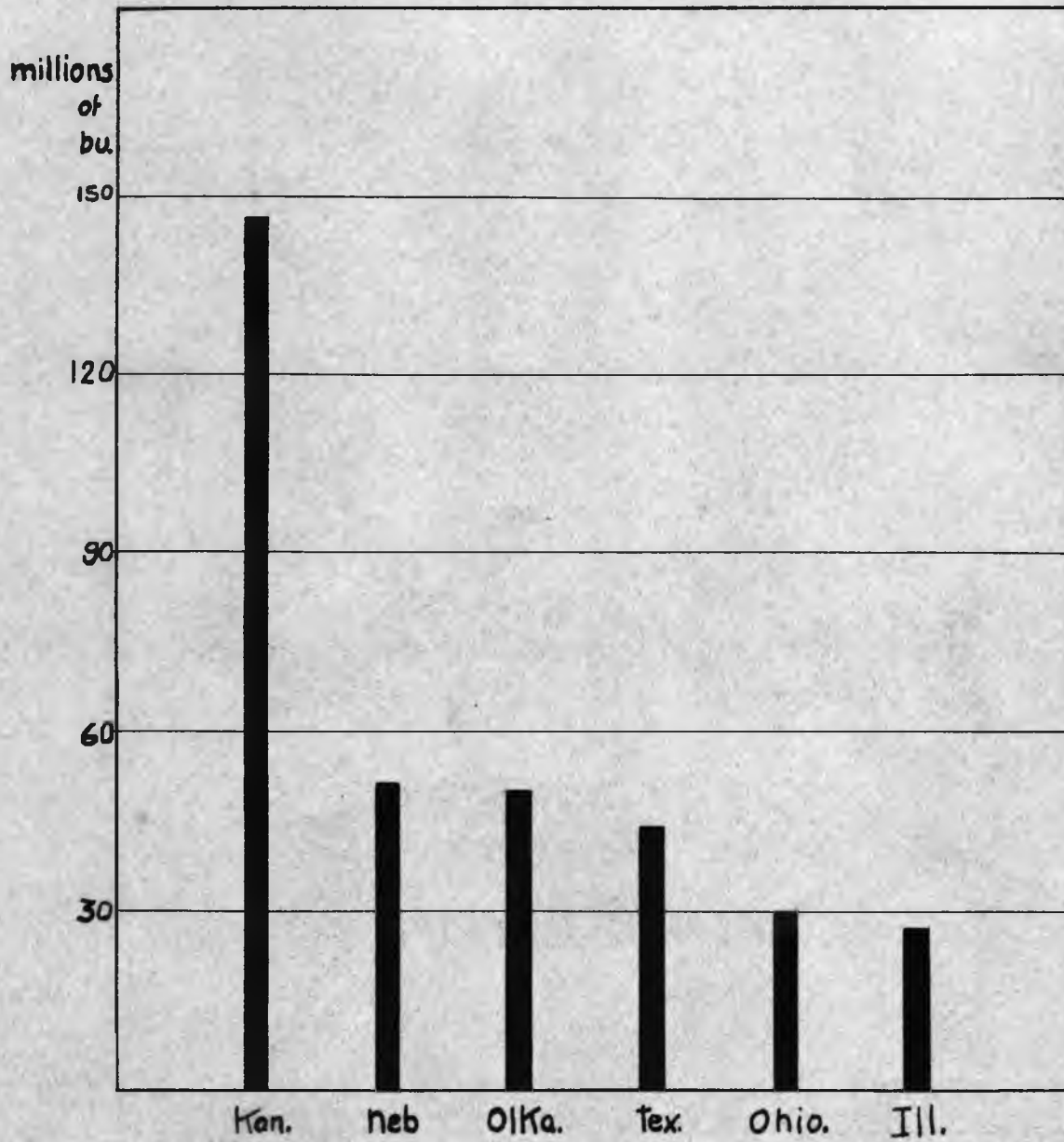


Fig. 26. Leading states in winter wheat production. 1929

U.S. Census data

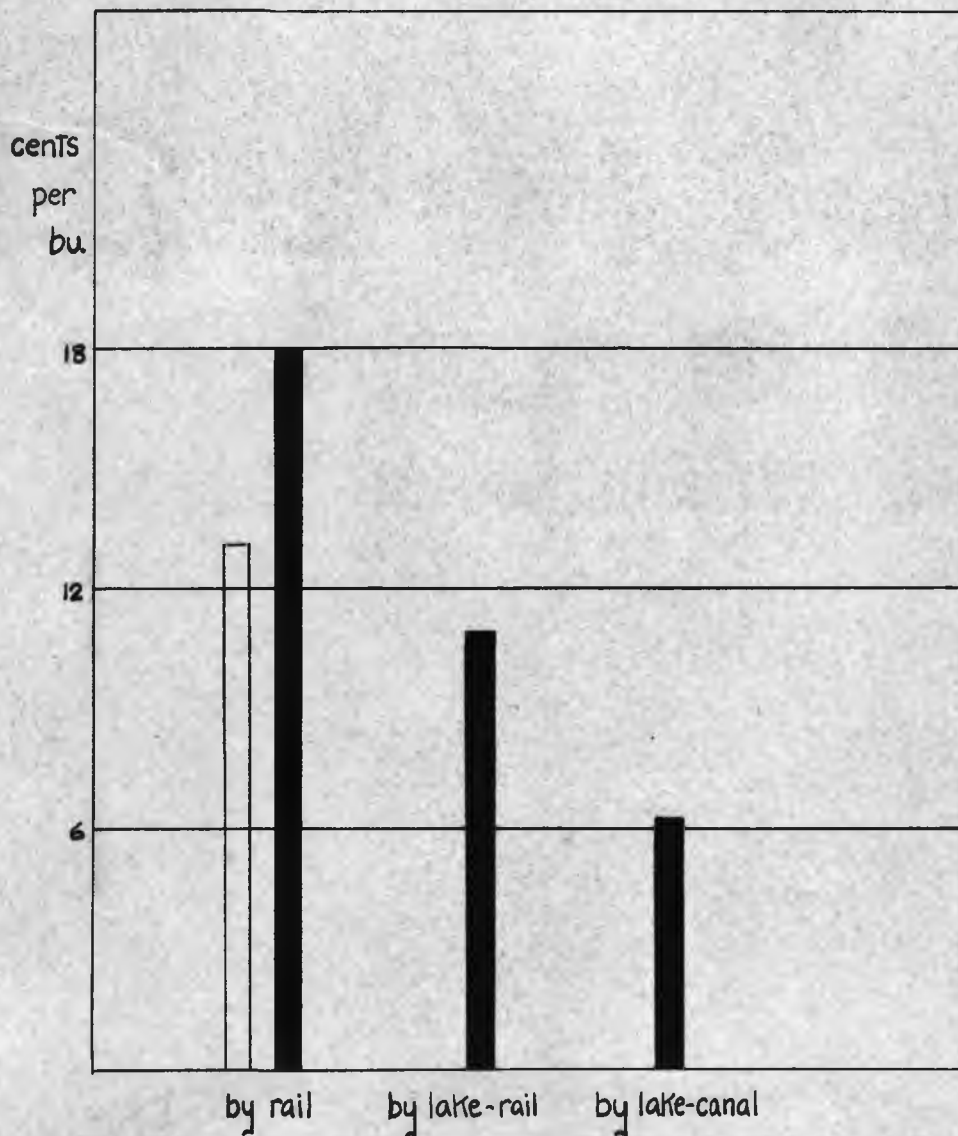


Fig. 27. Freight rates from Chicago to New York. 1929

=Wheat for domestic trade.
 =Wheat for export trade.

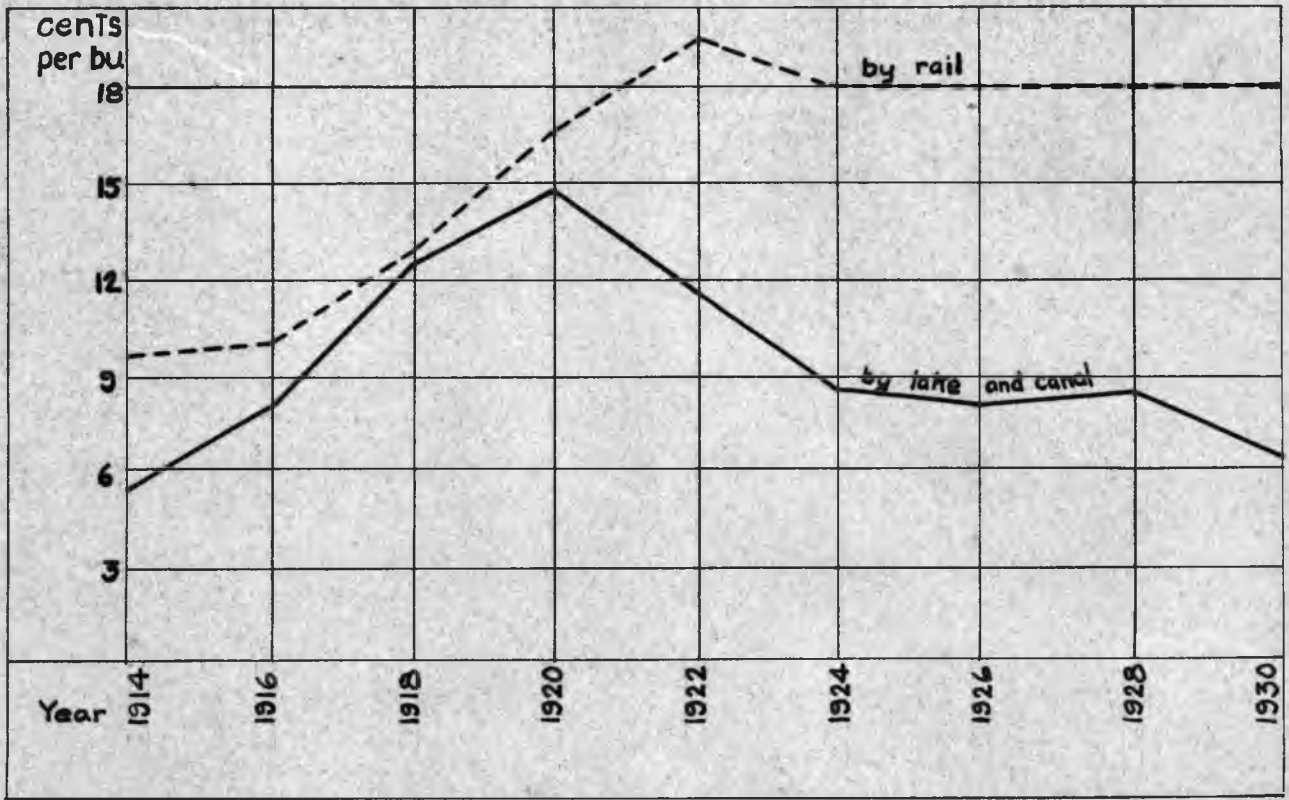


Fig.28. Freight rates from Chicago to New York on wheat.

Data from Statistical Abstract
of U.S. 1931

The common variety of winter wheat grown in Illinois is classed as Soft Red Winter. The Hard Red Spring wheat grown in the north produces the best bread flour. The soft variety is used for bread flour of poorer grades and for pastry flour.

In Illinois, wheat is usually not grown continuously on the same land. When wheat follows corn in the rotation, the land is generally just disced and harrowed in preparation for seeding.

Wheat fits well into the farmer's labor distribution because the seeding is done quite late in the fall and the crop does not require much care until harvest. Spring wheat is sowed first in the spring and is harvested after winter wheat and before oats.

As indicated by Figure 25, Illinois ranked fifth in winter wheat acreage in 1929. The four states having a larger acreage all have less rainfall and consequently the crop has less competition from corn. Most of the area of the 4 leading states has a milder winter and therefore less winter-killing than Illinois.

Kansas occupied first place in winter wheat production in 1929. The leading states in winter wheat production are shown in Figure 26. Beginning about 1858 and lasting until about 1879 Illinois was the leading state. Since then it has been surpassed in production of winter wheat by several states in the drier southwest, and sometimes by Ohio.

Wheat is sent away from Illinois for export chiefly by boat on the Great Lakes or by railroad to New York. The advantage of the Great Lakes and eastern waterways to the farmer is illustrated in Figures 27 and 28. The movement on the lakes, however, is limited to the ice-free period, from about April 20 to about November 20.

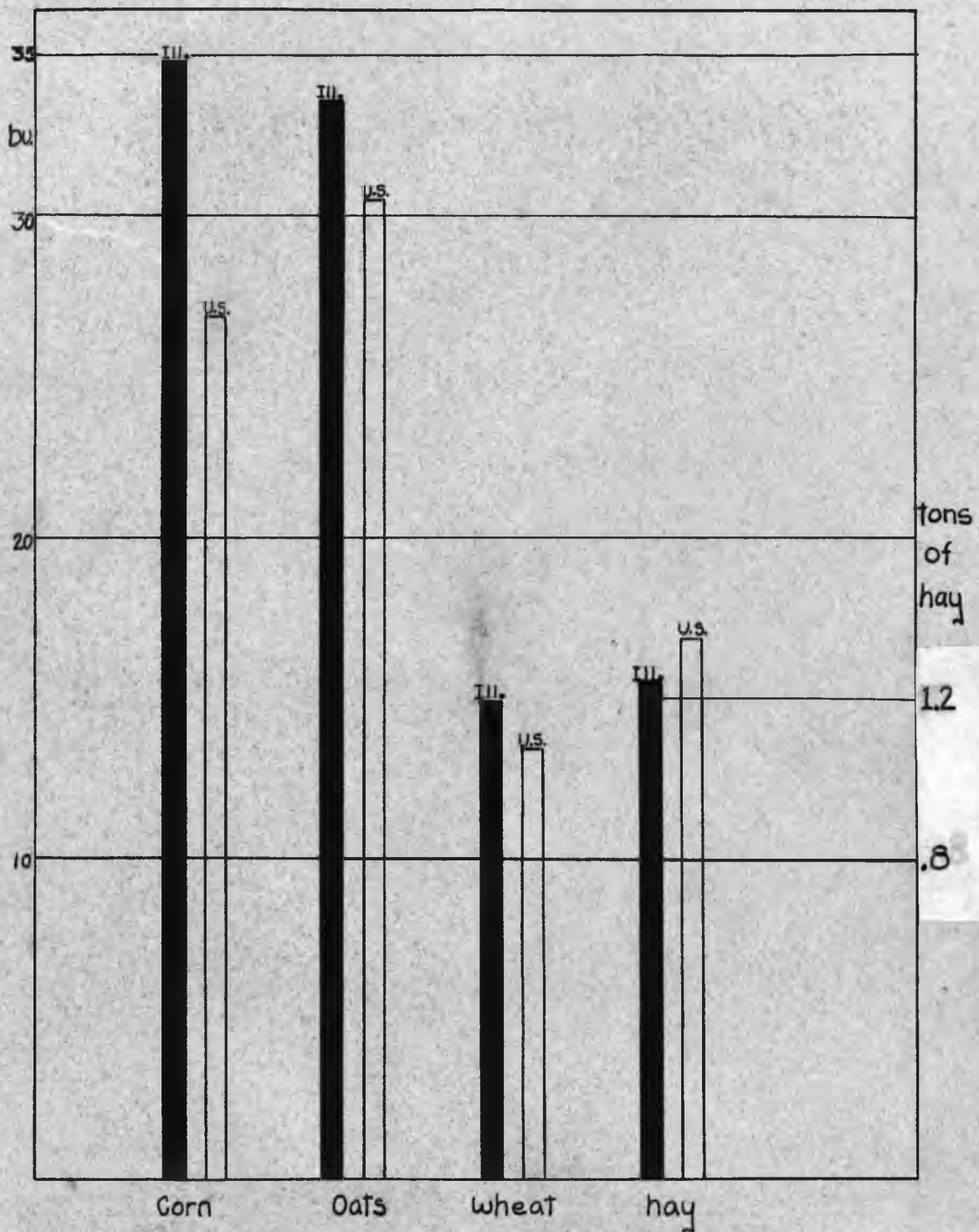


Fig. 29. The yield per acre of principal crops in Illinois and the United States. 1929.

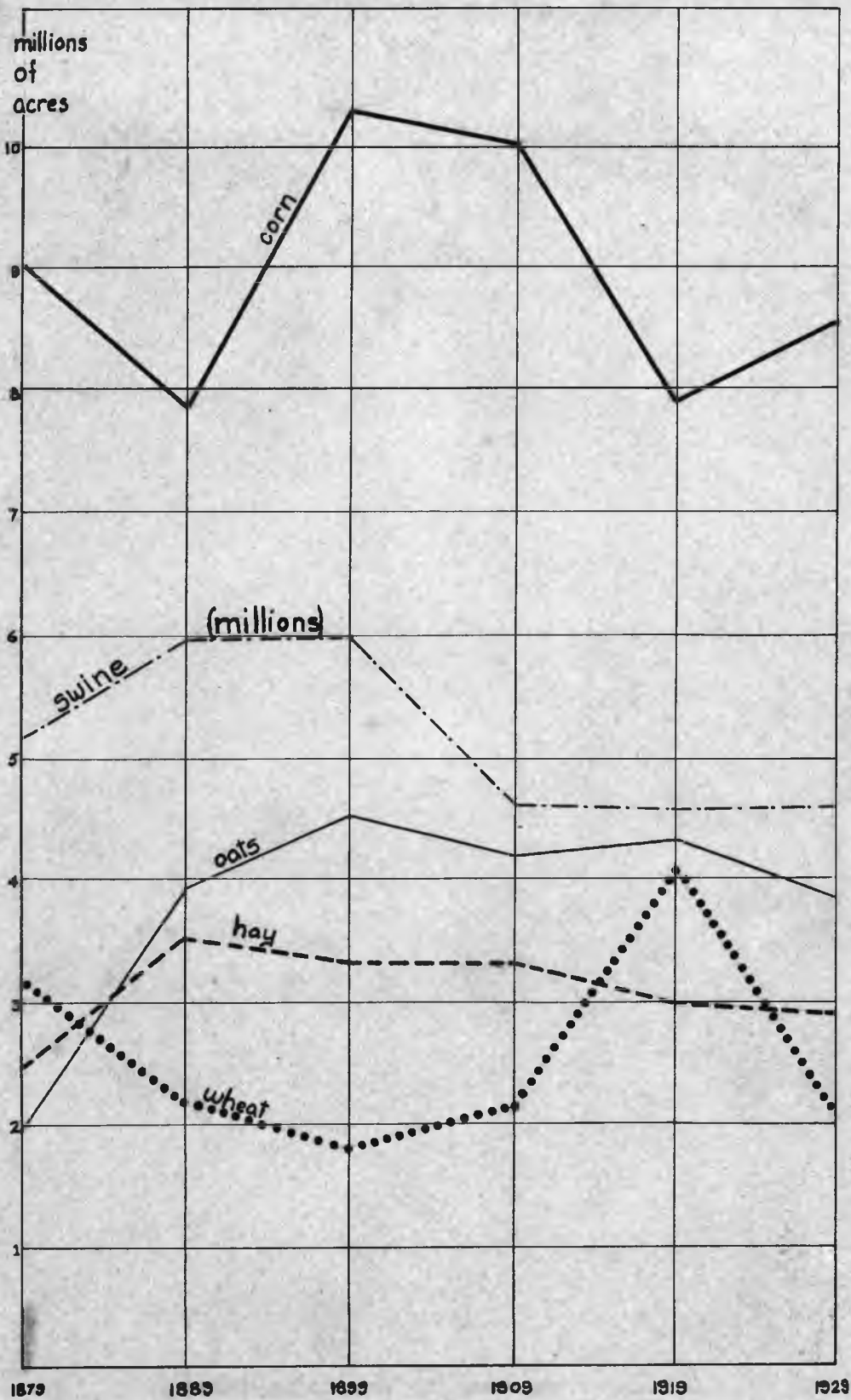


Fig. 30. Acreage of important crops in Illinois and number of swine.

U.S. Census data

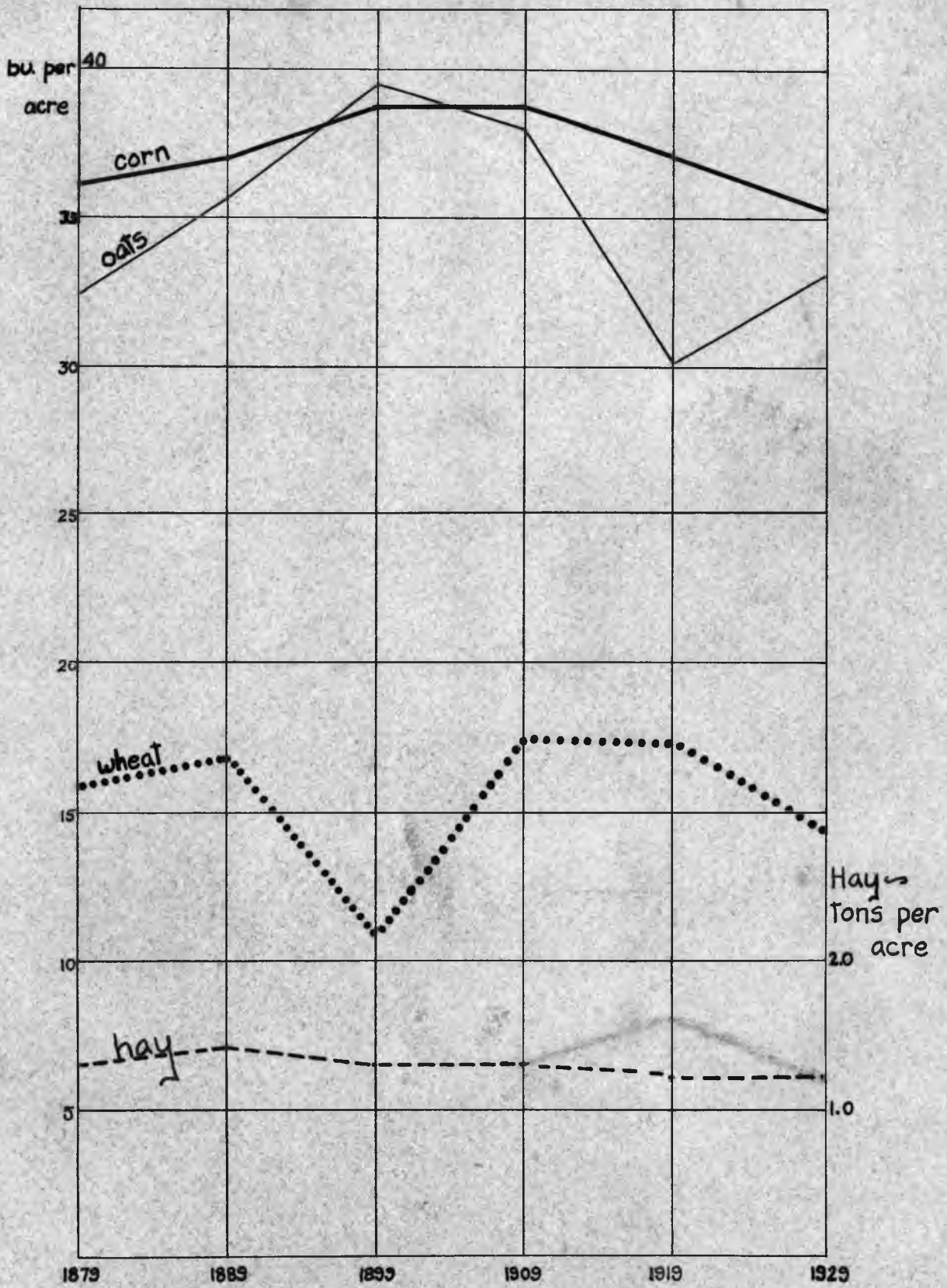


Fig. 31. Yield of important crops in Illinois.

U. S. Census data

Both rail and water rates rose during the war and for some time afterward. Since then rail rates have not declined materially while the all-water freight rate is now down to less than half what it was in 1920. Most of the wheat is sent to local mills in the state or nearby milling centers to be made into flour.

CHAPTER VIII. Crops in General

The high standing of Illinois in the yield per acre of basic cereal grains is shown in Figure 29. The level topography, fertile soil, and favorable climate are the chief factors in the successful production of these crops. Larger yields of hay per acre are obtained in some states north and east of Illinois as well as areas under irrigation in the western part of the United States.

Figure 30 indicates the comparative importance of the chief crops in Illinois and shows the number of swine in the state. According to the data presented, the acreage of hay is more constant than that of the other crops. The decline since 1889 indicates that less livestock, especially cattle and horses, are being kept. In the post-war year 1919, with a guaranteed price on wheat, less acreage was used for corn and more for wheat. The curves do not show the situation between the census years.

Figure 31 shows the production per acre of these crops. The reasons for the variations are many. Climatic factors are the most important. Fungus diseases and insects also cause changes in acre yields.

Tenancy

The fact that tenancy is more common on the more productive land is illustrated in Figure 32. The land in east-central Illinois has a greater capacity to support tenants and give a return to owners than

land in other parts of the state. About 55 per cent of farm land was rented in 1929, producing 55 to 60 per cent of the basic crops, and supporting 40 to 45 per cent of the livestock.

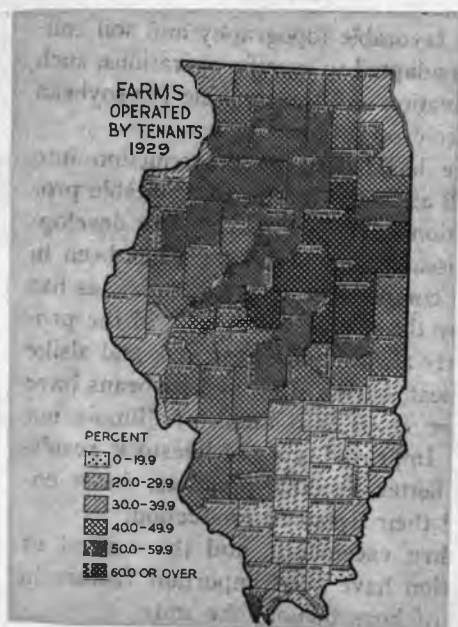


Fig. 32. Rich land is bought for investment by non-residents. The per cent of tenancy in good land districts is very much larger than where the land is poor.

From Case, H. C. M. et al.
U. of I. Agr. Exp. Sta. Bul. 403. 1934.

CHAPTER IX. Uses of Illinois Crops

1. Dairy Cattle

The majority of the crops that are fed to livestock in Illinois are consumed either by dairy cattle or hogs. Both of these animals make more economical use of the feed eaten than the steer. Larson (19) found that the dairy cow returns more than three times as much digestible protein and more than twice as much energy as the steer, per unit of food. The dairy cow is widely distributed in the state.

As shown in Fig. 33, Illinois ranks sixth among the 48 states in number of dairy cattle. With the exception of Texas, the leading dairy states are in or near regions where hay and pasture production is important. Dairy products spoil easily and are therefore usually

(19) Larson and Others, U.S.D.A. Yearbook, 1928, Washington, Gov. Printing Office, 1928, p. 282.

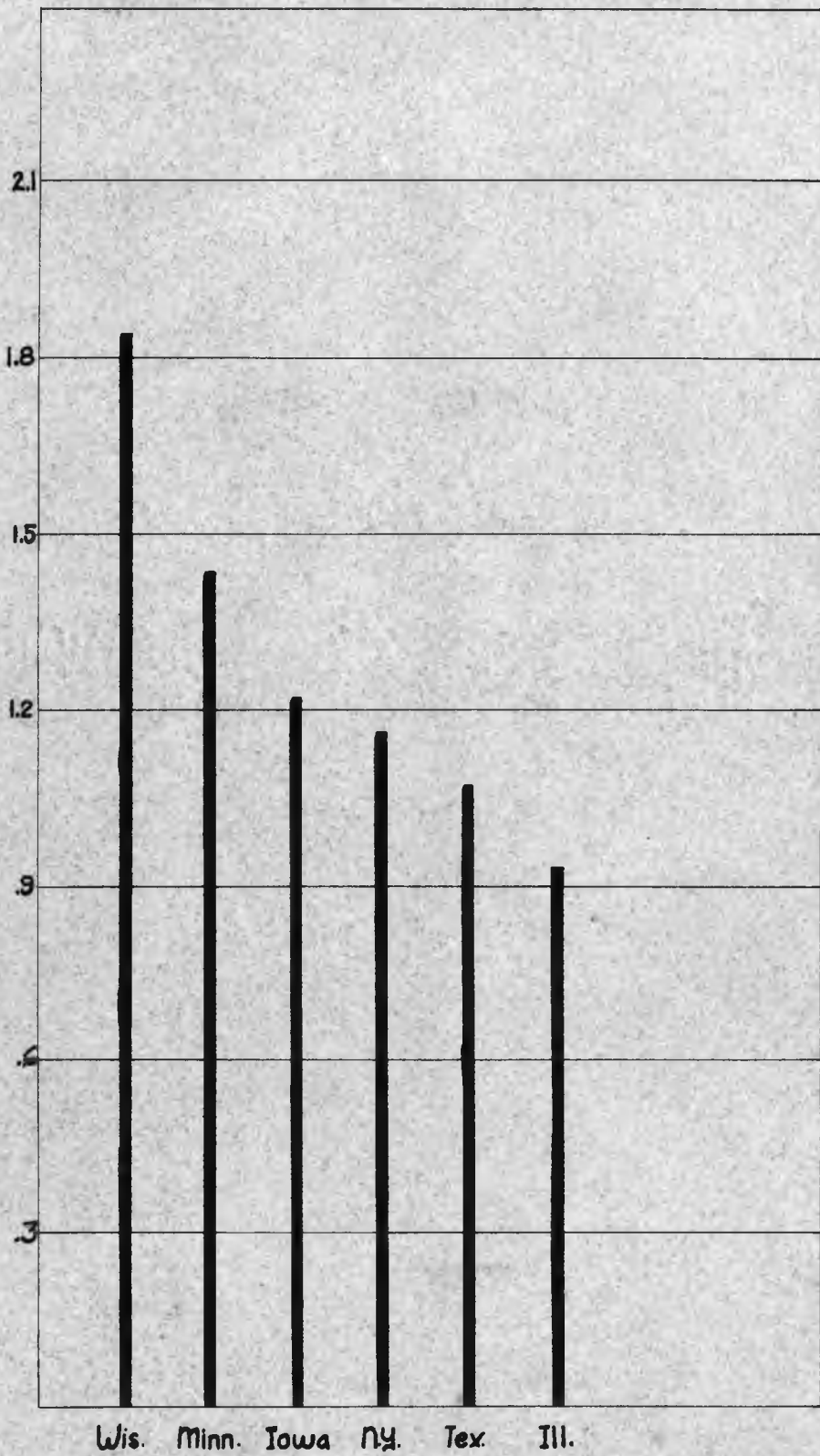


Fig 33. The leading states in number of dairy cattle.
(in millions) 1929

produced close to great consuming centers. There has been, however, a great development in the last two decades of refrigerator cars, hard roads and automobiles to offset some of the difficulty of distance from market. The increasing amount of dairy products sold has stimulated the dairy industry in Minnesota and Iowa in spite of their isolation.

With a long-time viewpoint in soil fertility, dairying conserves soil nutrients. Very little fertility is carried away from the farm in a system of dairy farming and much of that is returned with the purchase of concentrates.

The people of Illinois increased consumption of dairy products up to 1920. Between 1920 and 1930 this increase was about 20%. Since then there has been a decline due to the restriction in income.

The shipping of whole milk is an activity concentrated near Chicago, St. Louis, and other large centers of population. The use of milk for making butter and canning purposes is found farther away from the larger cities. The average production per cow is between 3000 and 4000 lbs. per year.

The satisfactory transportation of dairy products demands the use of refrigerator cars and trucks (in keeping a low temperature to prevent spoiling or freezing). The milk may be cooled in country plants and sent to the cities in insulated tank cars and trucks. Operators of truck lines have told the writer that when the haul is about forty miles or less, the milk will only rise about 3° F. in temperature during hot weather. After being carried to the city the milk is usually pasteurized and bottled before being distributed to the consumer.

When cream is produced on the farm it may be sent to a central

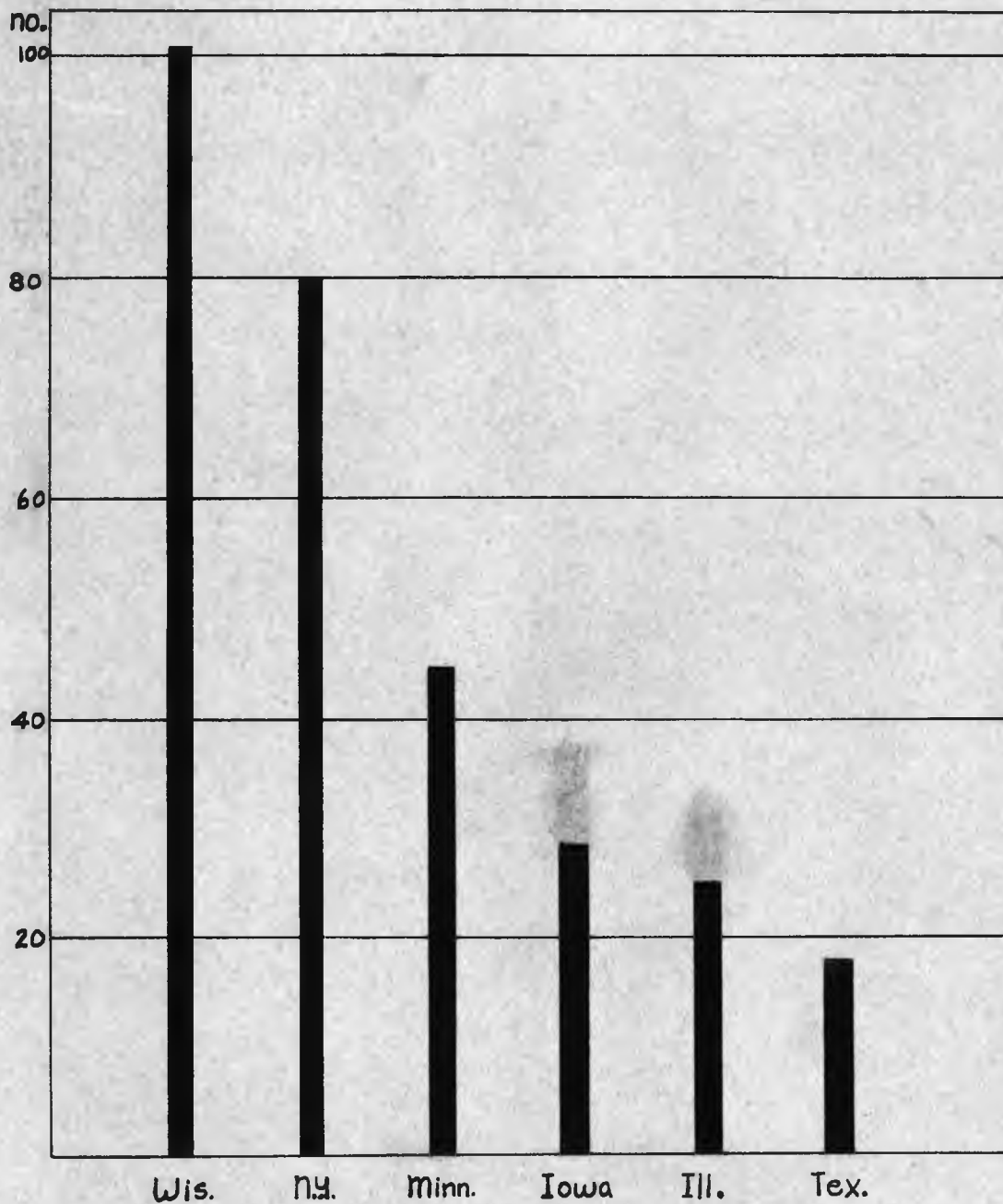


Fig. 34 The number of dairy cattle per sq. mi. of harvested crops and tillable pasture land in 1929.

Calculated from U.S. Census data.

creamery for manufacture into butter. Many farmers, also, still have butter routes for the sale of their product in towns and cities. Most of the condensing plants are located outside of the Chicago milk shed but some are located in McHenry County in the heart of the fluid milk district.

Wisconsin, however, easily holds the lead as a "dairy" state. The degree of concentration of the dairy industry in the various states is indicated in Figure 24. Texas has a greater number of dairy cattle than Illinois, but the latter has a greater concentration.

The United States imports more dairy products than are exported. The majority of the exports are canned and powdered milk for use in the Orient and in the Tropics.

2. Hogs.

Swine are another class of livestock that consume great quantities of the crops grown in Illinois. They are found on nearly every farm. The principal feed for hogs is corn. Due to having a small digestive tract they can not use large amounts of roughage and because of their short legs they do not range very far. They are on most farms because they consume large amounts of feed that would otherwise go to waste.

The economy of the hog has been summed up by Baker (20) "It takes 7 to 8 pounds of corn to produce a pound of dressed pork and lard and about 18 pounds of corn to produce a pound of dressed beef."

Illinois ranks high among the states in swine production as indicated by Fig. 25. These states are also the most important

(20) Baker, O. E., Regional Changes of Farm Animal Production in Relation to Land Utilization, U.S.D.A. Rpt. Wash., D.C., 1929, p. 17.

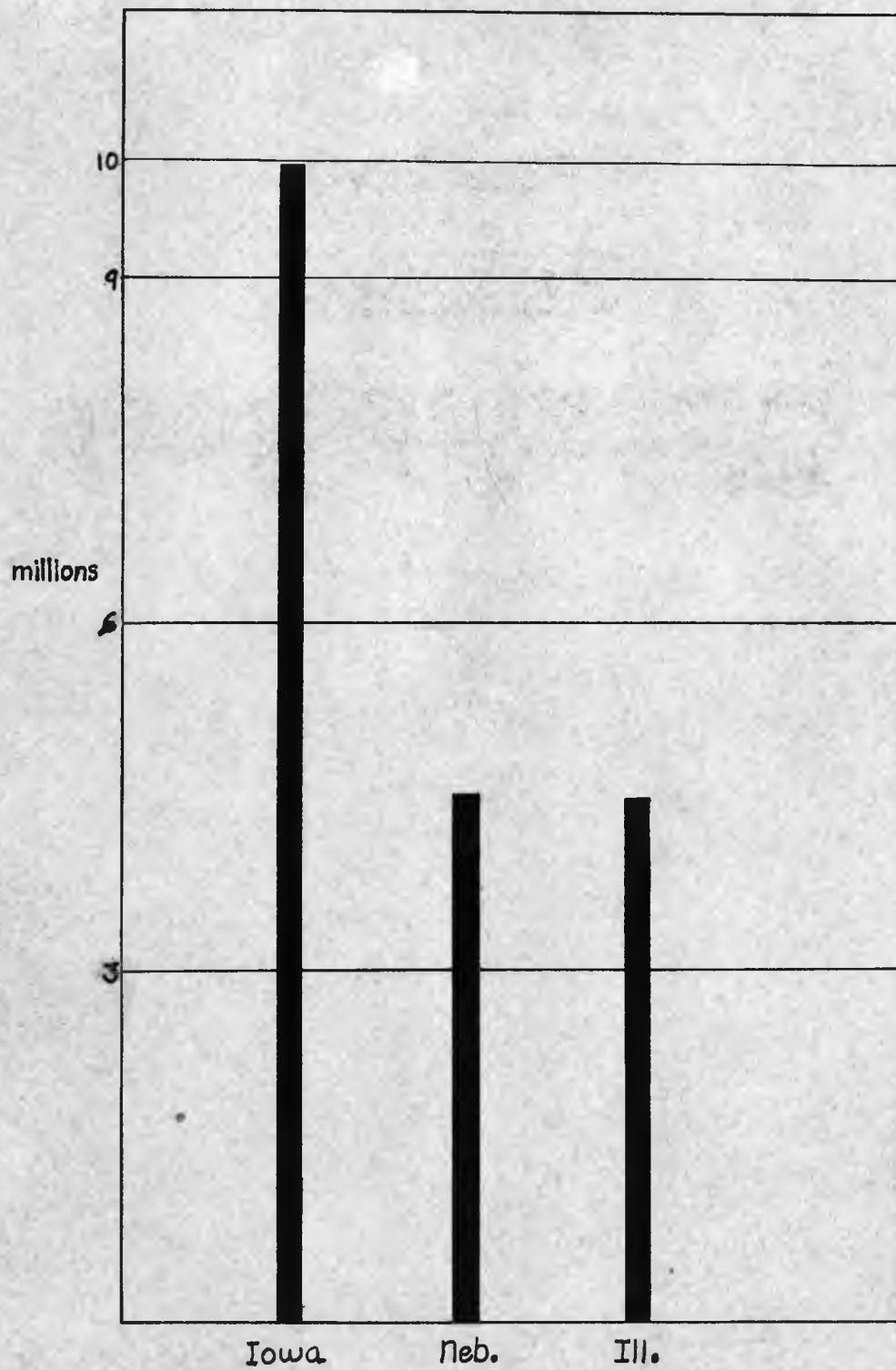


Fig. 35. The leading states in number of swine. 1930

U. S. Census data

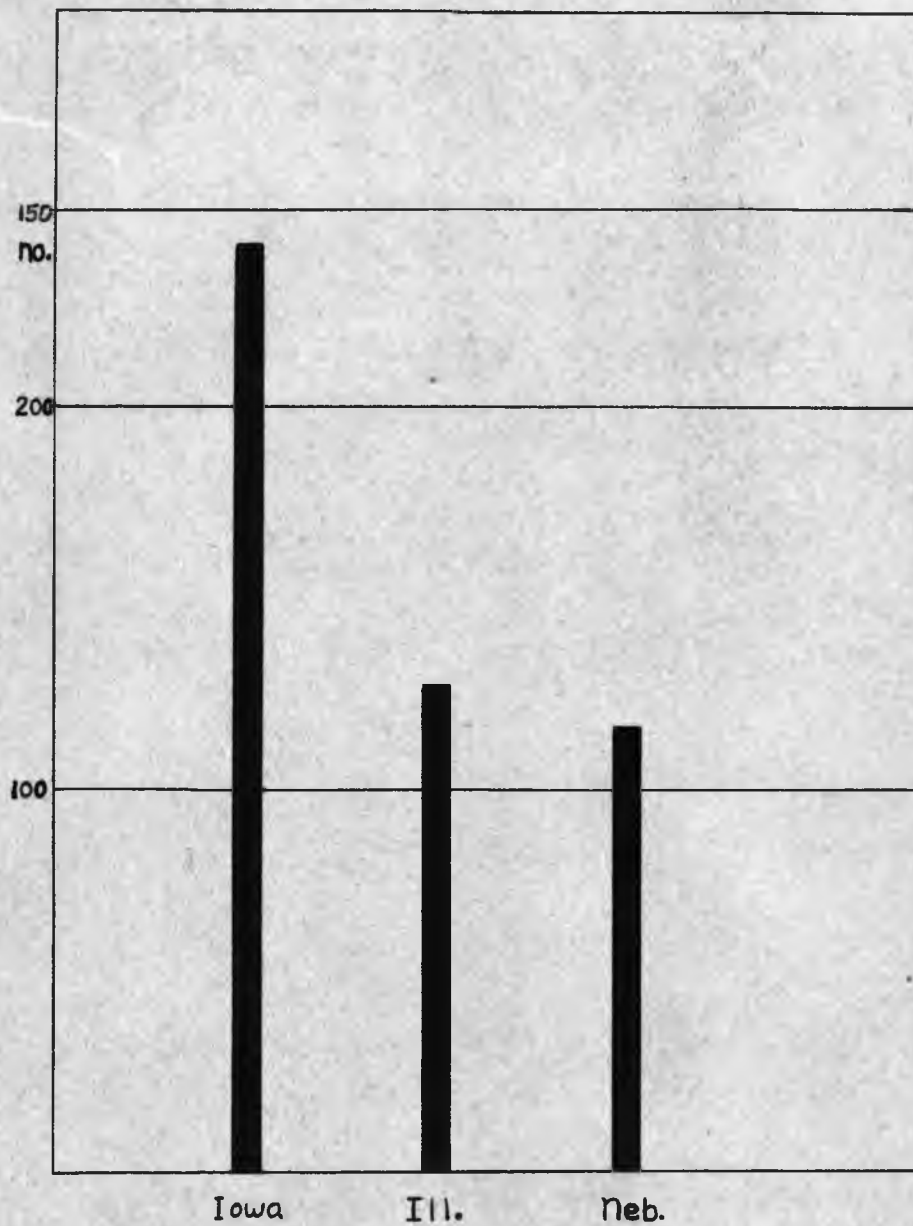


Fig. 36. The number of swine per square mile of harvested crops and tillable pasture in 1929.

Calculated from U.S. Census data.

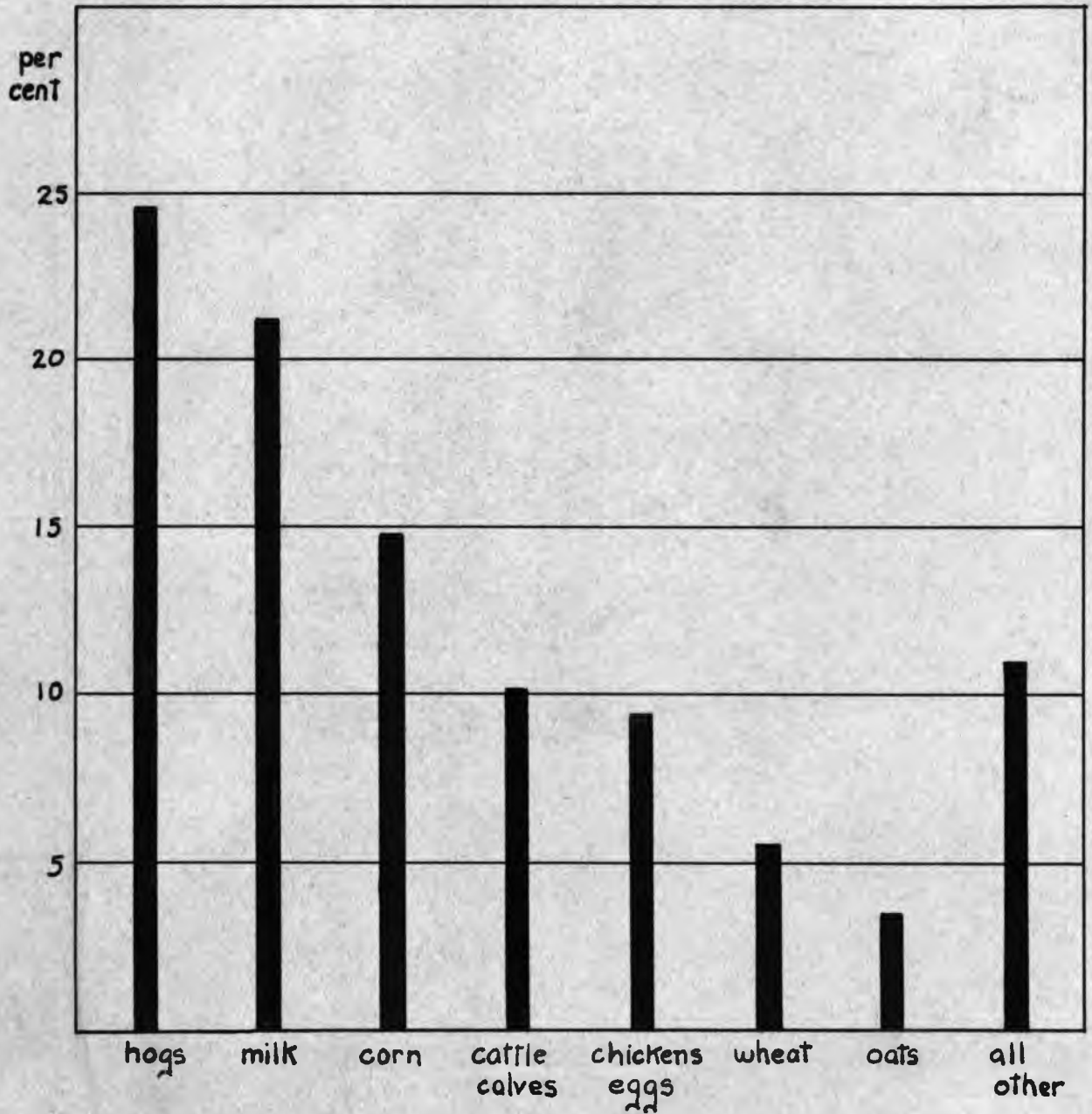


Fig 37. Sources of cash income from farms in Illinois.
average 1931-1933

Crop and Livestock Statistics
U.S.D.A. and Illinois Dept. of Agric. 1934

states in the production of corn. Nebraska and Illinois each have about the same number of swine while Iowa has more than twice as many as Illinois. Iowa leads only slightly in corn acreage but markets more corn in the form of meat.

In comparing Figure 36 and Figure 35, we find that although Illinois has fewer swine than Nebraska, there is a greater number per square mile of tillable land. Iowa "condenses" large quantities of corn into pork in order to reduce the freight charge to Chicago.

During average years in the United States the per capita consumption of pork is between 60 and 75 pounds. This is about equal to that of beef, veal, lamb, and mutton combined.

The export trade in pork and pork products averages about 81 per cent of all exports of meats.

Hogs and cash corn together make up almost $2/5$ of the average farmer's income in 1931-1933, according to data presented in Figure 37. The sale of hogs totaled more than twice the amount of money received from cattle, sold for meat. The sale of dairy products is an important source of income to farmers. The sale of chickens and eggs, largely under care of the farmer's wife, provided more income than that from wheat and oats together. The chief animal products contributed about 65.3 per cent of the average Illinois farmer's cash income during 1931-1933.

SUMMARY

The main variables that govern the geographic distribution and production of crops in Illinois are soil, topography, climate, and distance from market. Of these factors, climate is probably the most important, as it indirectly controls to large extent the kind

of soil, and the distance to market. In times past, climate has been responsible for the growth of the kind of plants that have contributed to the making of the soil. The climate also locates, in large measure, sizeable markets for farm goods near favorable areas for crop growth.

The soil of the state remains about the same from year to year. The topography, also is a non-variable factor. The distance to market remains the same but due to improved transportation, hauling costs have been reduced. The changeable influence is the weather from one year to another. The state of the weather directly influences the size of the crop, not only through changes in temperature, rainfall, and sunshine, but also indirectly through influencing the degree of damage from insects and diseases.

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