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85 YEARS OF FARMING in the Northern Coniferous Forest Areas of Minnesota, Wisconsin, and Michigan

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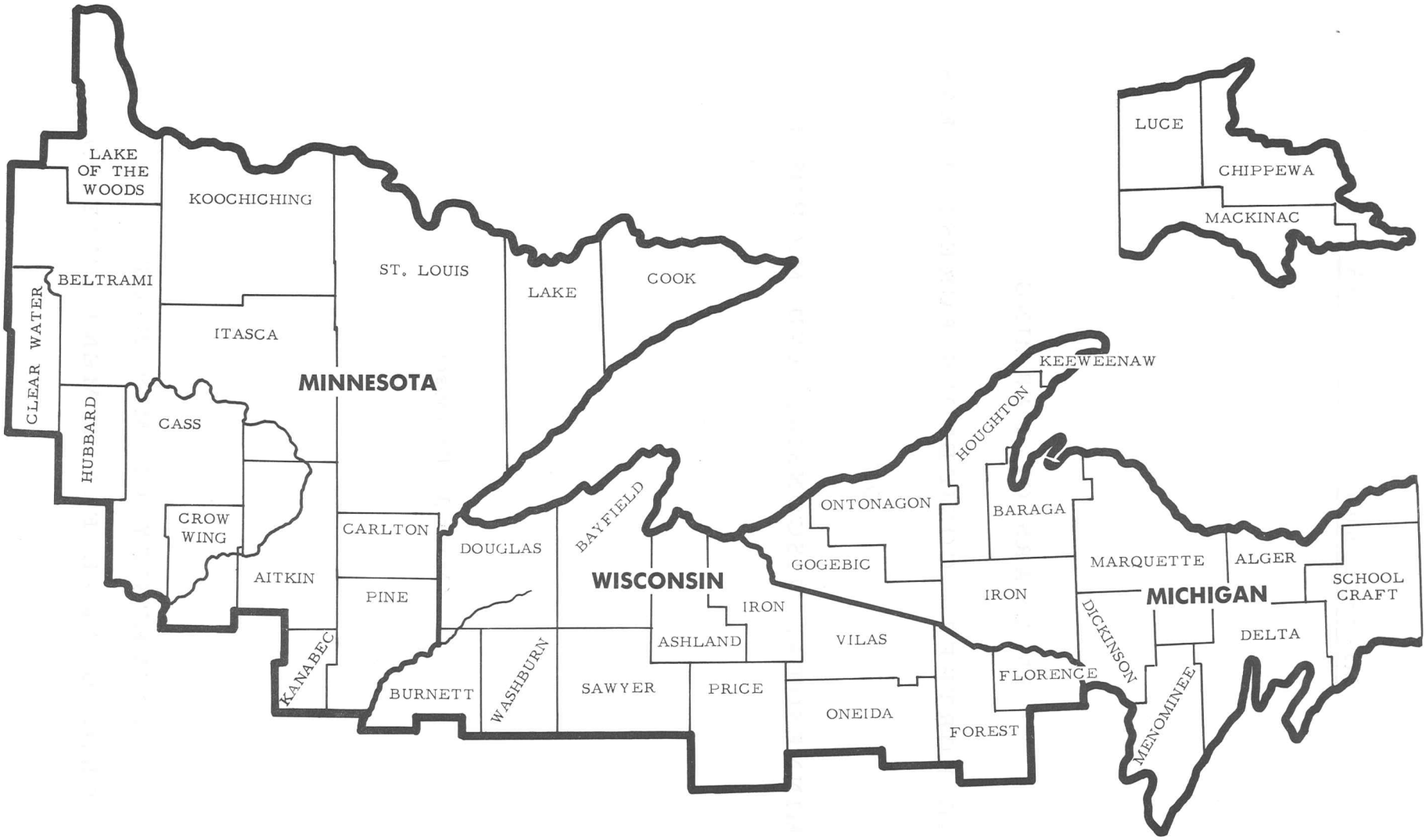

Counties in the tri-state area of Northern Minnesota, Northern Wisconsin, and the Upper Peninsula of Michigan covered in the study.

85 YEARS OF FARMING IN THE NORTHERN CONIFEROUS FOREST AREAS OF MINNESOTA, WISCONSIN, AND MICHIGAN

Mark J. Thompson *

Many years ago publicists and politicians suggested the creation of a 49th state to be established, after the fashion of West Virginia, by detaching the northeastern portion of Minnesota, a considerable zone in northern Wisconsin, and the Upper Peninsula of Michigan from their several states and merging them into a single new state to be called "Superior." This was largely a forested area with considerable mineral resources in the form of iron ore and copper. It differs radically in its economy from the more fertile prairie lands to the south. Since it was thinly populated, the residents of this area felt that they were discriminated against in favor of the large cities and the developed farming areas adjoining them. The dream of combining these northern segments of the three lake states into a single commonwealth never materialized. It is the purpose of the author to trace the development of farming in this general area from its beginning—from about 1870 to 1955.

The Upper Great Lakes Area, covering that part of Minnesota north and east of the Upper Mississippi River, the upper one-fourth to one-third of Wisconsin, and the Upper Peninsula of Michigan have long been a subject of controversy as to their farming potential. Much of this area—along with parts of New England, the Appalachian highlands farther south, the southern pine lands, and considerable areas in the high plains west of the Mississippi river—is classified by the United States Department of Agriculture as marginal land. Over-optimistic residents of this coniferous forest area have visualized a farmer on every 40 acres, whereas the extreme pessimist would suggest turning the land back to the Indians as soon as the current stand of timber could be harvested. Both views are overly extreme—the truth lies somewhere in between.

The virgin timber in this area has been harvested. Large areas in this region are in state and federal ownership. Private owners are white men - the Indians have not taken over. Foresters estimate the present timber sales income to surpass that of the "Golden Age" of white pine harvest, at least in terms of dollars, though not necessarily in terms of purchasing power. Much of the seemingly sterile terrain conceals mineral wealth that is being mined currently. Some industry is moving in. There has been some contraction of farming in recent years. Areas of thin or sandy land have gone out of agriculture, but the more productive soils and those not too stony for cultivation are still in production. Farming in this Great Lakes region is experiencing some of the same type of adjustments that occurred in New England a half century earlier. It is the purpose of the author to trace, with the help of state and federal census data, some of the pertinent facts regarding agricultural settlement and production adjustments over the period from 1870 to 1955. What

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follows is primarily an economic history of land use and agricultural development over this 85-year period.

Scope of the Study

This study will be limited to 15 counties in northeastern Minnesota lying north and east of the Mississippi river—Aitkin, Beltrami, Carlton, Cass, Clearwater, Cook, Crow Wing, Hubbard, Itasca, Kanabec, Koochiching, Lake, Lake-of-the-Woods, Pine, and St. Louis; 12 counties in northern Wisconsin—Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Oneida, Price, Sawyer, Vilas, and Washburn; and 15 counties in the Upper Peninsula of Michigan—Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Machinac, Marquette, Menominee, Ontonagon and Schoolcraft. (See the map on page 2.) This tri-state area totals 36,699,000 acres—of which 18,920,000 are in Minnesota, 8,088,960 in Wisconsin, and 10,682,240 are in Michigan. The total area of these 42 counties is 58,876 square miles, or approximately the same as that of the states of Michigan, Georgia, or Florida. This does not include the entire area in these states that was once forested. It is a continuous zone or belt of land extending across the north end of that portion of these three states lying south and west of Lake Superior.

The area just described was selected for this study because of similarity in soil, climate, forest cover, and degree of economic development in the counties named. The Upper Peninsula of Michigan was a natural unit separated from the rest of the state but adjoining the two tiers of counties selected in Wisconsin. Four counties in Minnesota—Mille Lacs, Morrison, Todd, and Wadena, though in the coniferous forest belt and adjacent to the counties selected—were in a somewhat more advanced stage of economic development than the other 15 counties in 1870 and were therefore omitted from this study.

Objectives

Some land use studies in marginal areas have been made to determine how rapidly land was shifted from cereal and inter-tilled crops to meadow, pasture, and finally timber. A procedure directly opposite to this will be followed in this study, namely, to record how rapidly the land came into cultivation. The status of farming will be shown at 10-year intervals as reported in the federal census of agriculture. Comparisons will be made at the state and county levels and on a per farm basis. In fact the data used—such as total acres, improved acres, individual crop acres, numbers of livestock, farm income, and farm population—will be shown on a per farm basis. Climatic data for these areas will be presented and also a statement of total population.

Procedure

The presentation and discussion of this report will be divided into six main sections or chapters as follows:

I. Farms: Number, Size and Area in Farms--Total and Improved.

II. Climate.

III. Crops.

IV. Livestock.

V. Farm property valuations and farm income.

VI. Population.

CHAPTER I. FARMS: NUMBER, SIZE AND AREA IN FARMS - TOTAL AND IMPROVED

In earlier years when agriculture was expanding into new areas, an increase in the number of farms was considered a criterion of economic progress. In recent years, however, progress has been associated with a decline in the number of farms, as farms are combined into units adequate in size to justify the use of power machinery. Table I lists the number of farms reported by the federal census in each of the state areas selected for study and the totals for the three areas by 10-year, periods from 1880 to 1950 and for the year 1954.

Table 1. Number of farms in selected areas, by states, 1880-1955 *

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	443	2,044	8,299	15,292	23,948	27,529	35,356	26,173	21,117
Wisconsin	483	1,727	4,668	8,512	12,895	13,698	15,830	12,171	9,434
Michigan	985	2,620	6,092	8,994	12,317	13,087	13,887	10,392	8,234
Total	1,911	6,391	19,059	32,798	49,160	54,314	65,073	48,736	38,785

* For the census years 1880 through 1950 the data on number of farms is for the previous year. The 1954 census (listed above as 1955) was taken in October, 1954. In all the previous census years the data on crops and numbers of farms were for the year preceding that in which the census was taken. Thus the interval between each census enumeration listed in Table 1 was 10 years except 1950 to 1955 which was 5 years.

It is apparent from the data in table 1 that settlement developed first in the eastern part of this territory and worked westward. The prevailing tide of immigration in this country has moved consistently from east to west. In 1880 Michigan reported almost as many farms as Wisconsin and Minnesota together. Minnesota forged ahead of Wisconsin in 1890 and by 1900 exceeded either of the two states to the east in number of farms. All three states reached their maximum number of farms in 1940 and by 1955 had declined at about the same rate - 40 percent in 15 years. According to Black* the maximum number of farms in New England was reached in 1880 - some 60 years earlier than the high point in the "Lake States" area. As already suggested, a decrease in number of farms in an area is not necessarily a mark of agrarian decline. It may merely reflect a combining of farms to secure a unit large enough to justify labor-saving power machinery.

Table 2. Land in farms as a percentage of total land in selected areas in Minnesota, Wisconsin and Michigan, 1880-1955

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	0.9	3.0	11.9	15.2	21.5	22.8	26.2	27.5	25.5
Wisconsin	2.9	3.8	7.7	12.8	17.2	17.5	20.7	21.9	17.8
Michigan	1.7	3.1	6.0	8.1	10.5	11.3	12.4	13.2	12.4
Area Average	1.8	3.3	8.6	12.1	16.4	17.2	19.8	20.9	18.6

* John D. Black, "Rural Economy of New England," 1950.

Wisconsin held the lead in the proportion of land in farms among the selected areas through 1880 and 1890, but Minnesota assumed the lead in 1900 and has held it since then. By 1955 Minnesota had twice as large a proportion of the selected area in farms as Michigan and one-half more than in Wisconsin. All three areas showed a decline from 1950 to 1955. The rate of decline in Wisconsin exceeded that in either Minnesota or Michigan. It is difficult to determine precisely the cause for the large proportion of land in farms in Minnesota as compared with Wisconsin and Michigan. Land development costs may have been lower in Minnesota. During the drouth years of the thirties there was some migration from the Great Plains areas to this region. Since Minnesota was nearer the drouth-stricken area, it may have received a larger proportion of these migrants.

The average acres per farm in this tri-state area are shown in table 3 for each of the census enumerations already mentioned. In both Minnesota and Michigan the largest farms, as measured in terms of acreage, were reported in 1880.

Table 3. Acres per farm in tri-state areas, 1880-1955.

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	188.3	146.3	135.5	137.3	131.3	121.7	113.7	151.9	169.8
Wisconsin	144.7	146.6	123.8	115.7	106.9	103.6	103.4	143.0	163.9
Michigan	170.3	143.3	111.1	96.3	93.9	93.7	93.7	129.7	153.1
Acre Average	168.0	145.4	123.5	116.4	110.7	106.0	103.6	141.5	162.3

A possible explanation is that the number of farms in each county was small—in some cases as low as six. In the early years logging camps were operated by horse power. Roads were generally poor and it was expensive to ship in hay. Camp managers tried to produce at least some of the hay they needed and also to provide pasture for their horses. In some cases land was also cleared for raising potatoes and other vegetables for use in the camp. It is quite possible that some of the area reported as farms in the 1880 census was really hay, pasture, and garden land operated by the logging companies to service their camps.

From 1880 to 1940 there was a general decline in the acres per farm, as reported by the federal census in each of these states. However this downward trend was sharply reversed after 1940 and the increase continued into 1955. This was a period of rapid mechanization of farm operations and a larger acreage was needed in order to justify the large investments in power units and power machinery that were coming into the picture. There was little change in amount of land in farms during thie period. Apparently the smaller farms were being absorbed by the larger ones that had shifted to mechanized operation.

A wide variation in the degree of agricultural development is apparent among the counties in each of the state areas. This is indicated in table 4.

Table 4. Maximum, minimum, and average percentage of land in farms by counties in tri-state areas in 1955

State	Maximum		Minimum		Average
	County	%	County	%	% - All counties
Minnesota - - - - - -	Kanabec	69.7	Cook	0.6	25.8
Wisconsin - - - - - -	Washburn	43.6	Vilas	3.8	17.8
Michigan - - - - - - -	Menominee	42.1	Keweenaw	0.8	12.4

One might expect that the counties with the highest percentage of land in farms would be those with the largest proportion of land that rated high for agricultural purposes. This is only partially true. Usually the counties more fully developed agriculturally are located closer to older farming areas and were settled earlier. On the other hand the counties with a small percentage of land in farms may be better adapted to mining, forestry, and recreation.

Improved Acreage

Improved acreage is that part of the land in farms that is currently in use in growing some crop, including pasture. The progress of agriculture toward farm development in the coniferous forest areas of the upper lake states is not measured adequately by the number of farms, farm size, or percentage of total land area in farms. These, rather, are secondary measures of farm advancement. The agricultural economy of an area must be measured primarily in terms of the improved acres per farm, per county, and per state unit. The rural economy of the area expands and contracts with increases and decreases in the acreage of improved land.

Unfortunately there was some shift in the terminology of land classification as used in the census enumerations from decade to decade. For example the term "total improved land" was used to indicate plowable land plus grass land neither plowable or in timber. This grass land was open permanent pasture or meadowland, free of brush but either too stony for cultivation or subject to overflow. From 1880 through 1920 this was listed as improved land. In 1930, 1950, and 1955 the term "improved land" covered plowable land plus a secondary classification "other pasture not plowable or woodland". Permanent non-plowable pasture cannot be determined precisely since it was included in "all other land in farms".

There was a steady expansion of improved acreage in farms in the selected counties in Minnesota from 1870 to 1950—a period of 80 years. There was a slight break in improved acreage from 1930 to 1940 in both Wisconsin and Michigan. This may be due to the fact that "permanent pasture, not plowable or woodland" was excluded in 1940. Minnesota took the lead in total improved acreage in 1900, just as was the case also with number of farms and percentage of land in farms (see tables 1 and 2). Wisconsin took the lead over Michigan in 1950. By 1930 the total improved acreage in the Minnesota area exceeded the combined acreage of the Wisconsin and Michigan areas. It should be remembered that the total acreage in the Minnesota area slightly exceeded the

Table 5. Total improved acreage, by decades, tri-state area, 1870-1955.

Year	Minnesota	Wisconsin	Michigan	Total
1870	664	1,573	13,801	16,038
1880	10,458	14,390	39,931	64,779
1890	51,643	37,930	101,511	191,084
1900	214,441	108,534	210,446	533,421
1910	350,359	238,533	340,602	929,494
1920	840,978	407,765	465,426	1,714,169
1930	1,292,311	559,432	617,724	2,469,467
1940	1,398,633	528,461	583,377	2,510,471
1950	1,654,650	666,124	630,122	2,950,896
1955	1,546,765	625,874	610,729	2,783,368

combined acreage in the areas in Wisconsin and Michigan. Apparently the proportion of agricultural development, as measured by the ratio of land in farms to total land in the selected counties, did not differ materially among the areas selected in each state. By 1950 almost 3,000,000 acreas of land were in some kind of crop.

Agricultural development started slowly in these areas. Only six of the selected counties in Minnesota reported improved acres in 1880 and the number of farms per county ranged from 6 farms reporting in Aitkin Counti to 380 in Crow Wing County. In Wisconsin only four counties reported improved land, with Bayfield County reporting 10 acres and Burnett 1,164 acres. Farm development started earlier in Michigan. By 1870 Michigan was cropping as many acres as Wisconsin reported 20 years later. Eight of the Michigan counties reported improved land, with the area ranging from 179 acres in Menominee to 7,562 acres in Ontonagon. Some decline followed in Ontonagon and the 1870 acreage was not equaled again until after 1900.

Changes in "plowable" improved acreage in each of the state areas for the years 1930, 1940, 1950, and 1955 are shown in table 6. The total improved acreage, which included meadow and pasture, reached its peak in 1950. The acreage of plowable improved land started to decline in the decade following 1940, however, and continued the downward trend to 1955. It seems reasonable to assume that land reported earlier as plowable may have been dropped back into a lower classification such as "permanent meadow and pasture."

Table 6. "Plowable" improved acreage, tri-state areas, 1930-1955

Year	Minnesota	Wisconsin	Michigan	Tri-State Area
1930	1,085,297	451,426	533,271	2,069,994
1940	1,398,633	528,461	583,377	2,510,471
1950	1,364,742	542,087	573,096	2,479,471
1955	1,295,077	508,112	557,171	2,358,360

A gradual readjustment of land use is occurring in the areas covered by this report. Some is being placed in the "soil conservation reserve" and taken out of agricultural production. Considerable acreages of the less productive land are being shifted to a less intensive use. Much of this is taking place naturally—a sort of "land pruning" process. The poorest land, much of which should not have been developed in the first place, is reverting to brush or forest cover. Some is of rough topography, perhaps stony, and generally low in fertility. The more level and more productive land remains in cultivation. This is merely following the precedent set in New England many years earlier. Industrial expansion has attracted the operators of the lower grades of land to non-farm or industrial employment. Some evidence of the rate of expansion up to 1950, and the recession since then, is shown in table 7.

Table 7. Percentage of total land area in the tri-state areas reported as total improved acreage, 1870-1955

Census year	Minnesota	Wisconsin	Michigan	Total Area Average
1870	0.0035	0.019	0.13	0.0508
1880	0.056	0.18	0.37	0.20
1890	0.27	0.47	0.95	0.56
1900	1.13	1.30	1.90	1.44
1910	2.37	2.90	3.20	2.82
1920	4.4	5.0	4.4	4.6
1930	6.8	6.9	5.8	6.5
1940	7.4	6.5*	5.5*	6.5
1950	8.7	8.2	5.9	7.6
1955	8.2	7.7	5.7	7.2

* Some decline is shown in 1940 because "permanent pasture not plowable nor woodland" is omitted this year from the total improved acreage and included in "all other land in farms."

At the high point in 1950, just over 7 1/2 acres of every 100 acres of total land in the area was used to grow grasses, cereal grains, or cultivated crops. The "plowable" improved acreage, however, reached a maximum in 1940 in both Minnesota and Michigan but not until 1950 in Wisconsin (see table 8). All three states showed decreases from 1950 to 1955.

Table 8. Percentage of total land area in tri-state areas reported as plowable improved acreage, 1930-55

Census year	Minnesota	Wisconsin	Michigan	Area average
1930	5.7	5.8	4.9	5.47
1940	7.4	6.5	5.5	6.47
1950	7.2	6.7	5.4	6.43
1955	6.8	6.3	5.2	6.20

It may be easier to visualize what is happening in these three areas if one is to assume a block of 100 acres of land taken from each of the areas representing the average land use of that area in 1950. Of the Minnesota area 27.5 acres would be in farms, of the Wisconsin area 21.9 acres, and of the Michigan area 13.2 acres. Just over 7 acres in Minnesota would be plowable, just under 7 acres in Wisconsin, and not quite 5.5 acres in Michigan. For the entire three-state area it would be 6.4 acres. Out of each 100 acres, the area of plowable land plus wet or stony sod land (semi-cleared) would be 8.7 acres in Minnesota, 8.2 acres in Wisconsin, and 5.9 acres in Michigan—or 7.6 acres for a 100-acre unit for the three-state area.

The amount of land that was classified as improved in some degree has been reported. The next step is to determine the rate of transition from wild to productive land, or the reverse, by census periods for each state area and for the entire tri-state area. Since the maximum acreage for the entire 85 years was attained in 1950, this year will be used as a base and expressed as 100. As indicated in the footnote in table 7, there was a slight decline in the area reported in 1940 because of the exclusion of non-plowable permanent pasture in the census enumeration for that year. In the earlier years, Michigan

Table 9. Relative proportions of total land reported as "total improved acreage" for each state area and for the tri-state area, by federal census enumerations, 1870-1955 *

Census year	Minnesota	Wisconsin	Michigan	Tri-State Total Area
1870	0.04	0.24	2.20	0.83
1880	0.63	2.10	6.30	3.01
1890	3.10	5.70	16.10	8.30
1900	13.00	16.30	33.30	20.90
1910	27.20	35.80	54.00	39.00
1920	50.80	61.00	73.90	61.90
1930	78.00	84.00	98.00	86.70
1940	84.50	79.40	92.60	85.50
1950	100.00	100.00	100.00	100.00
1955	93.00	94.00	96.80	94.60

* 1950 = 100

showed a relatively larger proportion of land reported as "improved acreage", with Wisconsin second. Two factors serve to explain this difference. Michigan got an earlier start, with Wisconsin second and Minnesota third. Then also, Minnesota reported the largest number of new farms each decade starting with 1900. These new farms would start with very small improved acreage. The total of these small clearings would be a substantial amount but on a per farm basis it would be small. In the Upper Peninsula of Michigan the farms were older and improvement came at an earlier period. Wisconsin was in an intermediate position as to time of settlement.

Table 10. Relative expansion and contration of "plowable improved acres", tri-state areas, 1930-1955

Census Year	Minnesota	Wisconsin	Michigan
1930	77.6	83.3	91.5
1940	100.0	97.5	100.0
1950	97.5	100.0	98.2
1955	92.5	93.7	95.6

The maximum acreage of total improved land and of plowable land were both attained in 1950. In Michigan and Minnesota there was no increase in plowable acreage after 1940 (see table 10). The data presented in tables 9 and 10 indicate that, contrary to popular opinion, contraction in farming in the areas studied has moved at a moderate pace. By 1955 less than 6 percent of the total improved land (plowable land plus permanent sod pasture) had gone back to brush, and only 6.1 percent of plowable land had gone out of production. In fact, it is probable that some of this improved land was merged with permanent hay and pasture land to replace rough unproductive land or possible overflow land that had been abandoned.

The acreage of improved land has long been a vital factor limiting the success of the settler in this northern coniferous forest area. His progress has been limited by the rate at which he was able to open up his land and get it into production. Too often he had too few acres in production to provide him a fair living. Various minimum acreages have been set as the lower limit to provide adequately for the family's needs—40 acres is a common figure used. It is only since the late twenties that the average improved acreage in this three-state area has reached this minimum (see table 11). Back in 1880 the average improved acreage per farm in Michigan met this average but fell slightly below in 1890, 1900, 1910, and 1920. There was a decrease in improved acreage from 1930 to 1940, but by 1950 and 1955 very substantial increases had been registered as the number of farms declined. Some of this increase was due to additional clearing on established farms and some through a combination of farms as one farmer would buy out his neighbor who was leaving the farm. Even with this increase, the acreage of improved land is still too low to use present-day power machinery economically in most cases.

Table 11. Total improved acres per farm, tri-state area, 1880-1955

Census Year	Minnesota	Wisconsin	Michigan	Average
1880	23.6	29.8	40.5	31.3
1890	25.2	21.9	38.7	28.6
1900	25.8	23.3	34.5	27.9
1910	29.5	28.0	37.8	31.8
1920	35.1	31.6	37.8	34.8
1930	48.9	40.8	47.2	45.0
1940	39.6	33.4	42.0	38.3
1950	63.2	54.7	60.6	59.5
1955	73.2	66.3	75.3	71.6

The "plowable" improved acreage on farms in these areas is reported in the federal census only from 1930 on. These data for this tri-state area are shown in table 12. The "plowable" improved acreage increased slightly more rapidly from 1930 to 1955 than did the total improved acres per farm.

Table 12. "Plowable" improved acres per farm, tri-state areas, 1930-1955

Census Year	Minnesota	Wisconsin	Michigan	Average
1930	37.2	32.9	40.7	36.9
1940	36.6	33.4	42.0	38.3
1950	52.1	44.5	55.1	50.6
1955	61.2	53.8	67.6	60.5

A comparison of the acreage data in tables 11 and 12 suggests that the non-plowable improved land—probably stony or overflow sod land—ranged between 8 and 11 acres per farm. The average farm in the tri-state area consisted of 162.3 acres in 1955 (see table 3). Of these, 71 acres were classified as "total improved" and 60.5 acres as "plowable." This leaves slightly over 100 acres of wild or timberland per farm. Expressing it in another way, 37.4 acres of every 100 acres in farms was plowable and 44.2 acres (adding stony or wet sod land) was classed as improved.

That land development in this tri-state area is not rapid is indicated by the following fact. If the average annual increase in the acreage of improved land since 1880 is divided by the number of farms reported in this area in 1955, it amounts to less than one acre per farm per year. The comparatively rapid increase in improved acres per farm since 1940 (see table 11) has been in part

due to an increased rate of land improvement. To a substantial degree, however, it has also been due to consolidation of the improved area into a smaller number of farms.

Some contrast between the rates of development in different counties within the three-state areas is shown in table 13. One should not conclude that the counties with the least improved acreage are necessarily the least productive among the counties in the state. This is not necessarily true, as will be pointed out in later chapters dealing with crops, livestock valuations, and income. Actually the poorest farm county may report a substantial acreage per farm. In fact, it takes more acres of land of low productivity to support a family than would be required of more productive land.

Table 13. Range in improved acreage per farm, tri-state area, 1955

State	County	Most improved acres per farm		Least improved acres per farm		Number of farms
		Total	Plowable	Total	Plowable	
Minnesota	Lake of the Woods	141.0	125.3			632
	Itasca			47.8	37.3	1,714
Wisconsin	Oneida	87.3	78.3			416
	Price			56.3	37.3	1,619
Michigan	Chippewa	110.7	106.5			999
	Gogebic			42.1	33.3	433

The counties shown in table 13 as having a small improved acreage per farm may be of more recent development or the clearing may be more difficult. It may also be a matter of soil and terrain. Lake of the Woods County in Minnesota, for example, lies in the bed of glacial Lake Aggasiz. Much of the land is level. Clearing is relatively easy and fires speeded up the process. At one time this county specialized in legume seed growing and a brisk demand stimulated clearing and farm expansion. Soils in other areas were more variable, in general—less productive, more rolling in topography, and more expensive to develop than was the case in Lake of the Woods county. Oneida County in Wisconsin was in an area adapted to potato production, and large-scale, low-cost production called for larger cleared acreages per farm. Chippewa County had been settled longer than most of the counties in the Upper Peninsula of Michigan. It was the top hay producer in this area. The land used for hay was brush rather than timber land; clearing was therefore less expensive and could be developed more rapidly than average raw land in this general area. It may be well to point out that rates of development proceeded at varying rates among the counties included. The high point in number of farms for the area as a whole was reached in 1940, but the total acreage in farms and the "improved" acres as well continued to increase up to 1950. There was, however, some variation among counties in the census year in which the maximum number of farms and the maximum number of improved acreage is reported. This is indicated in table 14.

Table 14. Census year in which the maximum number of farms and the maximum "improved" acreage was reported in certain counties in the tri-state area.

State	County	Maximum number of farms	Maximum "improved" acreage
Minnesota	Cook	1910	1930
	Lake	1910	1930
Wisconsin	Iron	1930	1950
Michigan	Schoolcraft	1910	1940
	Luce	1910	1940
	Houghton	1930	1940
	Keweenaw	1940	1940

The data in table 14 suggest a considerable degree of variability in rate of settlement and agricultural development among counties in the tri-state area. Four counties—two in Minnesota and two in Michigan—reported the maximum number of farms in 1910, whereas in others the number continued to increase up to 1930 and 1940. In most of these selected counties the acreage of "improved" land continued to increase after the number of farms had reached its maximum. In this cutover area, farm units were not as stable as in more fully developed farming areas. When outside employment in the mines, the woods and other local industries was available, some settlers tended to curtail their farming operations. Later, as outside employment opportunities lessened, they stepped up their farming activities. As early as 1870 Ontonagon County in Michigan reported 7,562 improved acres in farms. In the 1880 census this dropped to 2,757 acres, then rose to 5,570 acres in 1900 and 11,992 in 1910. With this shifting in and out of agriculture, it is quite possible that census data from decade to decade are not strictly comparable but at least they give a fair picture of the direction of trends and, to a lesser extent, the magnitude of changes.

From the data presented in this chapter it would appear that the farm industry in this northern coniferous forest area reached the peak of its development in the decade 1940 to 1950. Some of the following questions may well be raised. Was all good land taken up by this time? Did non-farm industry have more monetary appeal to settlers in the area than farming? After 1950 both the total acreage in farms and the improved acreage declined. The purchasing power of farm product prices had receded materially from the World War II level. The small farms were at a decreasing disadvantage in that they could not use power machinery as effectively as the larger and more fully developed farms in areas to the south of them. Mining (mostly taconite development), wood working industries, and the tourist industry have all greatly expanded in the current decade. The Great Lawrence Seaway development may provide additional employment opportunities outside of farming in the future. It seems reasonable to assume that agriculture in this area is "marking time" or receding—not because the supply of potential agricultural land has been exhausted but because agriculture finds itself unable to compete on even terms with other segments of the economy of the area or with land in more fully developed areas elsewhere.

CHAPTER II. CLIMATE

Climate as well as land is a basic factor determining potential crop production in any area and, indirectly at least, the livestock adaptation of the area. Two primary elements of climate are precipitation and temperature. In evaluating the potential crop production of any area one must know not only the mean temperature and mean precipitation but the seasonal variations in each factor and the variability from year to year. In three locations in the area under study, continuous climatological data are available for the period covered—Duluth, Minnesota, and Marquette and Escanaba, Michigan. Two of these are located on the south shore of Lake Superior—Duluth and Marquette. Escanaba is located at the north end of Lake Michigan. Undoubtedly the location of these large lakes may have a modifying effect on the climate, especially in the spring and fall. In general, however, these longtime records give a fairly consistent picture of trends in precipitation, temperature, and length of growing season. These continuous records will be supplemented with records for a more limited period in 46 communities scattered through the tri-state area.

Longtime Trends in Temperature and Precipitation

The mean temperatures for the growing season, April through September, for the years 1871 to 1955 by decades are given in table 15. These data are only for the growing season, since it is then that temperatures are primarily limiting factors in crop production.

The total precipitation is lowest at Duluth, but the precipitation during the growing season at Duluth exceeded by 11 percent the growing season precipitation in Wisconsin and Michigan. There was relatively little variation in

Table 15. Mean temperatures for the period, April through September, 1871 to 1955 for three locations, in degrees Fahrenheit.

Period	Duluth	Marquette	Escanaba
1871-1880	55.79	56.08	55.78
1881-1890	54.85	53.96	55.27
1891-1900	55.86	56.34	57.07
1901-1910	54.20	55.04	55.47
1911-1920	53.89	54.98	55.16
1921-1930	54.89	55.59	55.35
1931-1940	56.01	56.51	56.85
1941-1950	55.54	56.45	56.48
1951-1955	55.34	57.18	55.80
85-year average - - - - -	55.15	55.80	55.91

either total or growing season precipitation from decade to decade. However, the precipitation for the first 10 years and the last 5, both total and growing season, was materially higher than in any of the intermediate periods at Duluth.

Table 16. Precipitation in inches for the growing season and for the entire year for 3 locations, 1871-1955

Period	Duluth		Marquette		Escanaba	
	6 mo.	12 mo.	6 mo.	12 mo.	6 mo.	12 mo.
1871-1880	24.36	34.21	20.31	31.28	21.73	33.53
1881-1890	20.89	29.94	18.27	33.54	19.81	33.11
1891-1900	18.03	26.69	15.96	32.14	17.61	28.96
1901-1910	20.02	27.65	17.96	32.44	17.67	28.71
1911-1920	17.39	26.20	18.18	32.86	17.71	28.59
1921-1930	18.76	25.74	17.45	30.42	16.60	26.34
1931-1940	16.89	26.09	16.98	31.26	16.27	27.56
1941-1950	19.65	28.05	19.20	32.00	17.38	27.31
1950-1955	26.89	34.81	20.33	32.75	20.17	29.82
85-year Average - -	20.32	28.82	18.29	32.09	18.33	29.33
% precipitation in growing season		70.5		57		62.5

A material portion of the total precipitation comes as snow in winter in this northern area. As indicated in table 17, the snowfall recorded at the Marquette weather station was more than double the amount reported at Duluth and 84 percent more than reported at Escanaba. But this is merely a matter of more of the total precipitation coming in the winter months as snow, since

Table 17. Annual snowfall in inches as three locations, 1899-1954

Period	Duluth	Marquette	Escanaba
1899-1904 - - - - - - - -	42.38	-	-
1904-1914 - - - - - - - -	52.81	121.50	61.47
1914-1924 - - - - - - - -	58.01	110.62	61.05
1924-1934 - - - - - - - -	52.14	100.79	59.24
1934-1944 - - - - - - - -	58.39	97.69	63.41
1944-1954 - - - - - - - -	55.84	111.94	49.44
Average - - - - - - - -	53.26	108.51	58.92

the total average annual precipitation for the Marquette station is only slightly larger than that reported for Duluth or Escanaba.

Table 18. Summary of climatological data for three stations, 1871-1955

Location	Mean Temperature in degrees Fahrenheit		Precipitation in inches		Snowfall in inches
	April-Sept.	12 mo.	April-Sept.	12 mo.	Total for year
Duluth - - -	55.15	38.04	20.32	28.82	53.26
Marquette -	55.80	41.72	18.29	32.09	108.50
Escanaba - -	55.91	41.42	18.29	29.33	58.92

The summary of temperature and precipitation data given in table 18 indicates little variation in mean temperature for the growing seasons among these three areas. The mean temperature for the year, however, indicates somewhat colder winters at Duluth than at the two stations in Michigan. These data also stress the fact that Duluth, though with less total precipitation for the year, has more rainfall during the growing season.

Table 19. Highest and lowest temperature and precipitation for each of three locations, 1871-1955

Item	Duluth	Year	Marquette	Year	Escanaba	Year
Maximum annual mean temperature *	44.4	1931	45.8	1931	45.8	1931
Minimum " " " *	34.2	1917	36.1	1876	37.0	1917
Maximum annual precipitation **	45.3	1879	42.9	1881	48.5	1881
Minimum " " **	18.1	1910	19.7	1925	16.1	1925

* In degrees Fahrenheit
** In inches

Maximum annual mean temperatures were recorded at all three locations in 1931 (see table 19). The year of minimum temperatures coincided in the case of Duluth and Escanaba. As far as precipitation is concerned, the two Michigan stations reported the same high and low years but neither of these coincided with the extremes for Duluth.

As already stated, complete climatological data are available for only three weather stations for the entire period 1871 to 1955. Temperature records, however, are available for 46 stations for varying periods of time during these 85 years and precipitation records for 54 weather-reporting stations. The temperature data is presented in table 20 for the three states and for two periods—prior to 1930, and the period of 1930 to 1955. These data indicate that mean temperature in the growing season is slightly lower in Minnesota than in Michigan and Wisconsin. No significant difference between growing season temperatures in Michigan and Wisconsin is indicated. In all three states, temperatures since 1930 exceed those of the earlier period by approximately one degree.

Table 20. Temperature in degrees Fahrenheit, 46 stations in Minnesota, Wisconsin, and Michigan, 1871-1955

State	Period	No. of stations	Years of report		Mean temperature April through Sept.
			Average	Range	
Minnesota - - - -	Before 1930	16	27	12-44	38.5
	1930 and later	16	21	20-22	39.3
Wisconsin - - - -	Before 1930	15	25	12-41	40.1
	1930 and later	17	17	14-22	41.2
Michigan - - - - -	Before 1930	15	28	9-40	40.2
	1930 and later	15	18	8-22	41.3

Table 21. Precipitation in inches for 54 stations in Minnesota, Wisconsin and Michigan, 1871-1955

State	Period	Number places	Years of record		Precipitation		Snowfall	
			Average	Range	6 mo.	12 mo.	Average	Range
Minnesota - - -	Before 1930	18	26	6-44	18.34	25.03	44.8	37-55
	1930 and later	18	21	20-22	18.63	26.00	57.5	45-71
Wisconsin - - -	Before 1930	19	24	9-41	20.51	28.97	52.4	35-69
	1930 and later	19	18	6-22	21.30	30.85	58.3	44-82
Michigan - - -	Before 1930	17	27	6-44	18.18	30.37	89.2	48-127
	1930 and later	17	18	3-22	18.15	32.03	101.7	58-175

The data on precipitation as shown in table 21 show slightly different relationships among these states in precipitation—both total and seasonal. The Minnesota stations report less total precipitation and also less growing season rainfall. Growing season precipitation is about the same in Minnesota and Michigan but materially lower than in Wisconsin. On the other hand, Michigan has the maximum annual precipitation. This is accounted for by the much heavier snowfall in Michigan. In general both temperatures and precipitation tend to decrease from east to west. There is, of course, considerable variation within each of these states. In Minnesota both the highest and lowest annual precipitation occurs on the northern border at Pigeon River and Baudette, respectively. In Wisconsin the maximum precipitation is reported inland, but in Michigan it tends to follow the shore of Lake Michigan.

The Growing Season

The crop-growing potential of any area is definitely limited by the number of frost-free days—that is, the number of days between the last killing frost in the spring and the first killing frost in the fall. Coupled with this also are such factors as mean temperature, amount of precipitation and its seasonal distribution, the direction and velocity of winds, the amount of sunshine, and, of course, precipitation. The length of the growing season and its variability in 76 locations in these three states are shown in table 22.

Table 22. Length of frost-free season at 76 locations in Minnesota, Wisconsin, and Michigan

	Minnesota	Wisconsin	Michigan
Number locations reporting	23	20	33
Date of last killing frost in spring			
a. Average date	May 27	May 26	May 29
b. Range of dates	May 8-June 14	May 26-June 10	May 11-June 22
c. Latest date on record	July 11	June 29	July 18
Date of earliest killing frost in fall			
a. Average date	Sept. 18	Sept. 21	Sept. 22
b. Range of dates	Sept. 20-Oct. 3	Aug. 28-Oct. 13	Aug. 11-Oct. 18
C. Earliest date on record	July 18	July 2	July 19
Length of growing season			
a. Average number days	114	118	114
b. Range	73-148	79-160	50-155

There is little difference among these three states in the average length of growing season. However, there is a wide range within each state. Some communities have twice as long a growing season as others and in Michigan as much as three times as many frost-free days. In some cases in the inland areas with a short growing season, this limited frost-free period may be partially compensated by higher summer temperatures.

The areas with a short growing season and low summer temperatures are limited to such crops as hay, oats, barley, winter rye, early potatoes, and short-season vegetable crops. Some areas with a longer growing season may have their choice of crop limited by low summer temperatures. For example, Grand Marais on Lake Superior has a growing season only 2 days shorter than that at Red Wing, Minnesota, but most of the crops that dominate the cropping systems in the Red Wing area would find the low summer temperatures at Grand Marais a bar to maturity. The lower summer temperatures in these areas selected for this study provide some resistance to drouth damage in years of short rainfall. In general, the coastal areas have a longer frost-free season than many areas farther south, but this is at least partially offset by the lower temperatures as compared with inland locations.

CHAPTER III. CROPS

Crop adaptation is a basic factor in determining the farming potential of any area. Crops are a medium whereby the productivity of the soil may be utilized in production for home consumption, sale, or processing through livestock. In this chapter the cropping history of this area will be presented and trends in crop selection and yield noted.

The earliest record of crop production is found in the agricultural census of 1870. This is fragmentary and sketchy. Farming was just getting underway in a few counties. No information is available as to numbers of farms, acreage per farm, or acreage per crop. The acreage of improved land by counties in 1870 for each of the three states is shown in table 23.

Table 23. Improved acres by counties, tri-state area, 1870

Minnesota		Wisconsin		Michigan		Tri-state totals
County	Acreage	County	Acreage	County	Acreage	
Aitkin	6	Ashland	175	Chippewa	2,148	
Crow Wing	380	Bayfield	10	Delta	759	
Kanabec	50	Burnett	1,154	Houghton	2,064	
Lake	111	Douglas	234	Keweenaw	408	
Pine	50			Mackinac	371	
Cass	74			Marquette	310	
				Menominee	179	
				Ontonagon	7,562	
	671		1,573		13,801	16,045

Settlement in the United States has been primarily from east to west. The earliest settlement in this tri-state area was in Michigan. The Great Lakes provided access to this area before the coming of the railroad and the copper mines attracted settlers.

The most important crops in this tri-state area have long been oats, hay, and potatoes. However, during the early years wheat was the major cereal grain. Wheat was the staple bread grain. The first land cleared was seeded to wheat to supply family needs. It was only later when livestock were brought into the picture that oats and hay competed with wheat for the limited acreage of cleared land. The wheat acreage by states in this tri-state area is shown in table 24 for the period covered by census data. Trends in wheat acreage were rather irregular: a sharp upturn in 1890, then a sharp recession in 1900, followed by a steady increase up to 1940 and some recession since then. Wheat has never been a major cash crop in this tri-state area, although there is a record of a single farmer shipping a full carload of wheat out of Munger Station, 12 miles north of Duluth, in 1918. Doubtless this large acreage was a consequence of the popularity of the wheat crop in response to the World War I slogan, "wheat will win the war."

Table 24. Wheat acreage by states, tri-state area, 1880-1955 *

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota - - - -	739	10,797	31,297	17,378	45,980	8,623	12,872	23,345	10,654
Wisconsin - - - -	616	878	4,360	7,915	15,732	3,451	3,305	5,724	1,082
Michigan - - - -	1,634	1,039	12,152	3,970	18,433	2,779	4,081	8,450	2,234
Totals - - - - - -	2,989	12,713	47,809	29,363	80,145	14,853	20,258	37,519	13,970

* Census data are usually reported for years ending in 0 and 5 but cover the previous crop years, as 1879, 1889, etc.

The acreage dropped sharply by 1930. The small farms in the cutover area could not compete successfully with the large-scale wheat production in the Great Plains area. Even at the high point in 1920, wheat occupied less than 5 percent of the improved land in this tri-state area.

Oats came into this area as the livestock population increased and the emphasis shifted from bread to feed grains. By 1900 the oat acreage forged ahead of wheat, and by 1955 there were 21 acres of oats to 1 acre of wheat in the tri-state area. Its principal competitor in later years was barley and to a lesser extent rye. Rye and to a more limited extent barley were sale crops, whereas oats was almost exclusively a feed crop. Rye is the only winter grain raised generally in this area.

Table 25. Oat acreage by states, tri-state area, 1880-1955

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota - - - - -	878	7,040	13,833	36,939	108,064	122,281	101,365	154,932	164,831
Wisconsin - - - - -	704	3,113	8,940	20,895	49,443	50,063	38,351	60,163	57,620
Michigan - - - -	3,226	15,667	27,354	42,072	67,628	47,478	40,497	64,411	69,539
Totals - - - - - -	4,808	25,820	50,127	99,906	225,135	219,822	180,213	279,506	291,990

Oats has forged ahead to first place among the cereal crops in this tri-state area (see table 25). By 1930 both barley and corn acreages were expanding and taking some land from oats. The oat acreage increased in 1950, when the acreage of barley dropped sharply. This increase continued into 1955 as the corn acreage dropped for the first time. By trial and error, farmers in this area have found oats to be the cereal crop best fitted to their conditions.

Hay has always been a major crop in this tri-state area (see table 26). It is a stable, dependable crop. In the earlier years there was some sale outlet for hay in the lumber camps but, by and large, it was primarily a feed crop. The cool climate and fairly dependable precipitation favors the hay crops. In contrast to the prairie soils to the south and west, these timber soils were relatively low in humus content and needed grasses and legumes to help maintain productivity. The acreage of hay increased steadily up to 1940 and has receded only slightly since then. In 1955 it still occupied 40 percent of the

Table 26. Hay acreage by states, tri-state area, 1880-1955

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	2,549	21,549	71,058	198,615	402,646	573,356	671,254	653,350	641,034
Wisconsin	4,447	18,179	51,101	100,414	191,536	235,504	277,642	262,398	251,790
Michigan	14,057	48,053	102,719	140,187	247,540	288,844	286,054	255,323	240,391
Totals	21,053	87,781	224,878	439,216	841,722	1,097,704	1,234,950	1,171,071	1,133,215

total improved acreage. Its nearest rival, oats, occupied only a little over 12 percent of this improved acreage. These two crops together dominate the cropping system of this tri-state area and in 1955 claimed 60 percent of the total acreage of improved land.

Potatoes have declined in relative importance in the cropping systems in this tri-state area. According to the 1880 census, potatoes occupied 6.5 percent of the total improved acres in this area. At the maximum total acreage reported in the 1920 census, this percentage had fallen to 5.3 percent. In 1955 less than 1 percent of the total tillable land was in potatoes. Climatically the crop is well adapted. Summers are cool and rainfall is usually ample. The labor requirement per acre is much higher than for hay or the cereal crops. Because of the limited acreage of crop land there is often more labor available than the cleared acreage provides employment for. The potato crop could use this surplus labor to advantage, and did in the earlier years, but disease came in to curtail yields. Intensive cropping exhausted the scant virgin fertility of the top soil. In the mean time the open prairie land to the west developed severe competition for this cut-over area. The prairie soils of the Red River Valley were more productive. They were adapted to labor-saving machinery and large-scale operation. They were able to fight disease and insects effectively with their mechanized equipment.

The small farms of the cut-over areas could not meet this competition and the potato acreage, after increasing steadily up to 1920, had declined to less than 25 percent of the 1920 acreage by the time of the 1955 census. This decline, however, has not been uniform over the area. Oneida and Iron Counties in Wisconsin have maintained or increased their acreage in recent years. Houghton County shows the highest acreage in the Upper Peninsula. In Minnesota, Clearwater and Beltrami Counties, relatively near the potato country of the Red River Valley, and Lake of the Woods on the border of glacial Lake Agassiz, are the top producing counties in the study area in Minnesota.

Table 27. Potato acreage by states, tri-state area, 1880-1955

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	1,200	2,309	7,659	19,151	48,422	42,523	31,885	11,833	7,726
Wisconsin	852	1,641	5,833	11,697	25,429	19,321	14,182	6,500	6,822
Michigan	2,141	4,121	7,644	13,980	17,401	15,604	17,559	12,363	7,890
Totals	4,193	8,071	21,136	44,828	91,252	77,448	63,626	31,696	21,438

The four crops just discussed have in recent years made up 80 to 85 percent of the acreage of crops grown in the tri-state area under study. A number of other crops grown in the area on a much smaller scale merit some mention. Their acreages, by census periods, are shown in table 28. Barley reached the highest total of this group with 85,363 acres in 1930. The barley acreage exceeded the wheat acreage in three of the last four census enumerations but it is still of limited importance. The rye acreage reached its maximum acreage in 1920 at the same time as wheat. A war demand for bread grains stimulated this spurt in acreage.

The corn acreage increased steadily to 1950, when it exceeded the acreage of all other crops except oats and hay. The acreage dropped sharply during the next 5 years. Corn is largely harvested as fodder or silage, but in recent years the development of short-season hybrids has made it possible to harvest a larger proportion of the crop as grain.

Table 28. Tri-state acreage of minor crops, 1880-1955

Crop	1880	1890	1900	1910	1920	1930	1940	1950	1955
Barley	453	739	3,337	14,259	30,256	85,363	45,165	24,026	19,857
Rye	424	2,347	6,089	10,441	62,170	11,874	20,659	7,936	4,918
Corn, all	616	3,808	13,896	29,328	33,027	82,228	141,161	164,878	134,825
Corn, grain	-	-	-	-	-	11,608	60,260	69,431	49,319
Buckwheat	25	301	1,032	2,021	4,852	3,337	2,862	5,010	2,803
Flax	-	70	304	904	4,180	6,221	27,814	80,477	23,184
Seed crops	-	-	7,268	17,815	9,824	41,396	81,398	38,808	50,737
Misc. grains	-	-	-	2,504	1,845	30,194	13,762	28,873	14,944
Vegetables	-	-	3,674	2,531	9,433	5,089	6,077	6,162	4,393
Fruits	-	-	252	670	1,220	8,694	8,392	5,616	3,462

Two minor crops in this area are buckwheat and flax. Buckwheat is a short-season crop that will yield relatively better on light sandy soil than most of the crops grown in this area. The flax acreage increased steadily up to 1950, when the total acreage grown in this tri-state area exceeded that of all other crops except oats and hay. It should be noted, however, that 85 percent of this acreage was in Minnesota and more than half of it in three counties where considerable acreages of land adapted to rapid clearing with large-scale power equipment had been opened up. Historically, flax has been a pioneer crop on virgin land plowed up for the first time. As the rate of land development slowed down the flax acreage dropped in 5 years to less than one-third of this peak acreage.

The harvesting of legumes and grasses for seed has been an important operation in limited areas—especially in Minnesota. In only six counties of this state are considerable acreages of legume and grass crops harvested for seed at the present time. The principal legume seeds are red clover, alfalfa, and alsike. Of the miscellaneous grain crops harvested, beans are of some importance. Both beans and peas are grown mostly in Chippewa and Menominee Counties in Michigan. In some cases these grains are grown in a mixture called "succotash." The principal vegetables grown in this area include cabbage and rutabagas.

Table 29. Total number of bearing fruit trees, tri-state area, 1890-1955

Census Year	Minnesota	Wisconsin	Michigan	Total
1890	200	239	4,177	4,616
1900	4,475	3,750	102,554	110,779
1910	14,073	19,454	112,236	145,763
1920	39,720	90,911	176,832	307,463
1930	45,879	113,495	193,439	352,813
1940	48,491	120,997	162,070	331,558
1950	38,940	99,932	113,607	252,479
1955	4,068	47,444	48,903	100,415

Fruit production was never an important enterprise in this tri-state area, although its major development was in Wisconsin and Michigan. Tree fruits are clustered in these areas—the Bayfield Peninsula in Wisconsin, Houghton County in the copper country of Michigan—both bordering Lake Superior—Menominee and Delta Counties on Green Bay, and Baraga and Ontonagon Counties on Lake Superior. These rank in production in the order named. Since 1940 production has been sharply curtailed. Of the acreage devoted to fruit production, about 79 percent is in small fruits and only 21 percent in tree fruits. Of the small fruits, the strawberry acreage exceeds the raspberry acreage in the ratio of five to three. Cranberries, centered in Burnett County, Wisconsin, are a poor third. Of the tree fruits seven out of eight are apples, about one in ten are plums, and cherries make up the remainder.

Crop Acreages Per Farm

Crop acreages by states are shown in the previous section. Crop acreages per farm would give a better picture of the scale on which these crops were produced on the farms reporting them. Unfortunately, the number of farms reporting each crop is not given for the decennial census enumeration prior to 1930. For this early period only the acreage per farm for all farms in the tri-state area can be computed. These data are presented in table 30.

Table 30. Average acreage of individual crops per farm on all farms in the tri-state area, 1880-1920

Crop	1880	1890	1900	1910	1920
Oats	2.23	3.75	2.69	4.35	4.61
Wheat	2.91	2.44	2.27	0.78	1.54
Barley	0.23	0.11	0.18	0.44	0.55
Rye	0.28	0.34	0.34	0.30	1.14
Flax	-	-	-	-	0.08
Hay	9.78	13.10	12.15	13.50	17.25
Potatoes	1.62	1.22	1.14	1.40	1.77
Corn	0.63	0.64	0.61	0.90	0.69
Vegetables and fruits	-	-	0.20	0.09	0.22
Miscellaneous *	-	-	0.43	0.68	0.34
Totals	17.68	21.60	20.01	22.44	28.19

* Includes buckwheat, mixed grains, and grass and legume seeds.

Although not giving a picture of the concentration of crops grown on a limited number of farms, the data do give a general picture of changes in acres per farm for the whole area. The total acres of crops per farm increased only slowly and there was a slight recession in 1900. Wheat led oats in 1880 but fell behind in later years. Both wheat and rye acreages in 1920 reflect the World War I emphasis on bread grains. For the period covered, oats and hay were the dominant crops. The fact that the total acreage of crops did not increase more rapidly is due largely to the opening up of a large number of new farms which were currently in the process of development and had much less crop land per farm than those with a longer period of development.

Starting in 1930, the number of farms growing each crop is reported. The acreage of grain crops per farm grown is shown in Table 31 for 4 census enumerations. The wheat acreage per farm in 1950 is incomplete in that the number of farms growing spring wheat is not recorded for Minnesota.

Table 31. Field crop acreage per farm (excluding intertilled and sod crops) for farms reporting only, tri-state area, 1930-1955.

Crop	1930	1940	1950	1955
Wheat	3.38	4.20	3.95*	8.53
Oats	8.33	8.23	12.50	15.10
Barley	4.70	6.37	7.80	11.20
Rye	10.40	7.10	9.30	6.10
Flax	8.00	13.30	21.90	21.60
Buckwheat	5.30	4.60	7.70	8.00
Mixed grains	9.00	10.00	12.30	15.30

* Winter wheat only.

The average acres per farm growing this crop as reported in Michigan and Wisconsin was 5.9 acres. Since wheat was grown on a much larger scale in Minnesota than in these other states, the average acreage for all wheat for the area would be much above 5.9 acres. Many of these crops were grown on only a limited number of farms but were an important crop on those farms. Flax and mixed grains are good examples of this type of crop.

The acreage of sod crops, intertilled crops, and fruit crops per farm reporting are shown in table 32. In most cases the acreage of these crops on the farms grown showed some increase. This indicates an increasing specialization in certain crops as their adaptation is demonstrated by experience. Only potatoes showed a distinct downward trend through this period.

Table 32. Intertilled and sod crop acreage per farm reporting, tri-state area, 1930-1955

Crop	1930	1940	1950	1955
Hay	20.2	21.7	27.5	29.7
Grass-legume seeds	9.7	8.5	9.1	11.6
Corn - grain	4.3	5.7	8.4	11.5
- fodder	6.2	11.2	5.8	7.1
- silage	7.8	9.4	8.3	9.8
Potatoes	1.72	1.32	1.34	1.25
Vegetables	1.25	1.70	2.62	4.00
Fruits - small	0.38	0.46	0.51	0.72
- tree	0.74	0.77	0.24	1.35

The data presented in table 33 give a generalized picture of the average distribution of crops by crop groups. Grass or sod crops dominate the picture and show some increase from 1880 to 1950. Grain crops come second and inter-tilled crops last. Both of these latter two groups show some decrease in relative importance during this period of 75 years.

Table 33. Average acres per farm of each crop group and percentage each is of total crop acreage, all farms in tri-state area, 1880-1955

Census Year	Grain crops		Grass crops		Inter-tilled crops	
	Acres	Percent	Acres	Percent	Acres	Percent
1880	4.75	28.3	9.78	58.3	2.25	13.4
1890	6.64	30.9	13.00	60.5	1.86	8.6
1900	5.90	29.5	12.15	60.7	1.95	9.8
1910	6.55	29.2	13.50	60.2	2.38	10.6
1920	8.27	29.2	17.25	61.3	2.68	9.5
1930	7.41	24.5	20.70	68.4	2.14	7.1
1940	5.77	20.5	19.00	67.4	3.41	12.1
1950	10.20	27.7	22.30	60.5	4.37	11.8
1955	10.21	23.7	28.40	66.1	4.30	10.2
Average		27.0		62.7		10.3

Crop Production

Crop production information for 1870, the earliest census enumeration included in this study, was much less complete and therefore of limited comparability with the data of more recent enumerations. It will therefore be shown separately (table 34) so that general comparison may be made with later years. Production will be reported in tons, rather than bushels, so that production of all crops are on the basis of a common unit. Because of its earlier settlement, agricultural development in the Michigan area was far in advance of that in the Wisconsin and Minnesota areas in 1870.

Table 34. Crop production by county units, tri-state area, 1870

State	County	Wheat	Corn	Oats	Barley	Potatoes	Hay	Total
		tons	tons	tons	tons	tons	tons	tons
Minnesota -	Aitkin	-	1.06	-	-	13.20	-	46.26
	Crow Wing	-	106.98	-	-	46.50	-	53.48
	Kanabec	3.00	2.80	3.20	-	4.50	-	13.50
	Lake	6.60	-	-	0.48	19.50	445.00	471.60
	Pine	2.58	3.08	7.36	-	10.80	133.00	156.80
	Cass	-	8.40	19.20	-	27.00	-	54.60
		12.18	122.32	29.76	0.48	121.50	578.00	864.24
Wisconsin -	Ashland	-	-	5.6	-	15.90	-	21.50
	Bayfield	-	-	-	-	16.50	-	16.50
	Burnett	76.00	15.26	23.02	1.58	59.85	-	175.71
	Douglas	0.30	-	11.04	3.36	46.20	-	60.90
		76.30	15.26	39.66	4.94	138.45	-	274.61
Michigan -	Chippewa	9.03	1.82	32.08	0.94	278.30	2,760.00	3,082.17
	Delta	8.82	-	69.84	-	125.10	145.00	348.76
	Houghton	0.99	-	137.50	7.77	661.20	703.00	1,510.46
	Keweenaw	-	-	11.44	0.72	60.30	215.00	287.46
	Mackinac	2.25	-	7.89	2.71	60.03	139.00	211.88
	Marquette	-	0.84	140.80	-	93.00	99.00	333.64
	Menominee	12.60	-	11.76	-	36.00	40.00	100.36
	Ontonagon	30.03	1.34	140.33	8.95	242.91	1,437.00	1,860.56
		63.72	4.00	551.64	21.09	1,556.84	5,538.00	7,735.29

Crop production data will be shown in tonnage per farm for the decennial census periods of 1880 through 1920. This information for three important crops—oats, hay, and potatoes—is shown by state areas in table 35.

Table 35. Tonnage of oats, hay, and potatoes per farm, by state areas, 1880-1920 inclusive.

Crop	State	1880	1890	1900	1910	1920
		tons	tons	tons	tons	tons
Oats - - - - - - -	Minnesota	1.03	1.05	0.71	0.93	1.92
	Wisconsin	0.70	0.71	0.94	1.13	1.80
	Michigan	1.45	2.28	2.00	2.29	2.16
	Average	1.06	1.35	1.22	1.45	1.96
Hay - - - - - - - -	Minnesota	10.40	11.50	13.35	17.20	27.70
	Wisconsin	12.10	10.20	13.90	15.40	28.00
	Michigan	11.60	19.90	21.30	19.70	26.50
	Average	11.40	13.90	16.20	17.40	27.40
Potatoes - - - - - -	Minnesota	4.72*	4.83	2.85	5.28	6.51
	Wisconsin	5.91	3.18	3.87	5.04	6.33
	Michigan	6.91	6.24	3.72	6.60	3.96
	Average	5.85	4.75	3.48	5.64	5.60

* Estimate based on Michigan acreage; none reported for Minnesota and Wisconsin.

Michigan led in oat tonnage per farm through this period. Farms were older and more land was under cultivation. Wisconsin led in hay production in 1880 and 1920, with Michigan first in the intervening census years. Michigan led in potato production but was overtaken by Wisconsin in 1900; in 1910 and 1920, Minnesota was in the lead.

The production of oats per farm almost doubled over this period of 40 years. The rate of increase was greatest in Wisconsin and least in Michigan. The tonnage of hay produced more than doubled in each of the three states. The trend in potato production was somewhat erratic. Michigan held the lead in 3 of the 5 census years. Minnesota moved from last place in 1880 to first place in 1920, with steady increases except for a sharp drop in 1900. Michigan held the lead in total tonnage of these 3 crops for the first 4 decades by a fairly substantial margin, but by 1920 Minnesota and Wisconsin, with identical tonnages of these 3 crops, were 11 percent ahead of Michigan.

Table 36. Tonnage of minor crops per farm, all farms tri-state area, 1880-1920

Census Year	Wheat	Barley	Rye	Corn *	Corn **	Buck-Wheat	Seed crops	Total *	Total **
	tons	tons	tons	tons	tons	tons	tons	tons	tons
1880 - - - - -	1.233	0.142	0.129	0.507	0.112	-	-	2.011	1.616
1890 - - - - -	0.918	0.052	0.115	0.820	0.022	-	-	1.905	1.107
1900 - - - - -	1.005	0.086	0.132	0.750	0.063	-	-	1.973	1.286
1910 - - - - -	0.390	0.230	0.120	0.694	0.153	-	0.280	1.714	1.173
1920 - - - - -	0.513	0.290	0.454	0.764	0.062	0.030	0.070	2.121	1.419

* Minnesota and Wisconsin.
** Michigan.

Trends in tonnage of some of the minor crops in this tri-state area are shown in table 36. Wheat acreage has trended downward. Barley and rye production increased by the end of the period. Corn tonnage increased sharply in 1890 in Minnesota and Wisconsin, holding fairly constant in later years. Corn production in Michigan trended down, was important, and the general trend was downward. Buckwheat and seed crops came into the picture only in the last two decades of this period. Production of these crops did not show any consistent trend during this period. Production of miscellaneous crops in Michigan tended to lag behind that in Minnesota and Wisconsin.

Gross production per farm measured in tons of product increased by approximately 80 percent in 40 years, or 2 percent per year. During this period the improved acreage per farm was increased only 11 percent. Part of this was due to a selection of crops that produced a higher tonnage per acre, like potatoes and hay, and part to increased yields per acre.

Not all farms grew every crop found in this area. The importance of any crop and its place in the area is measured not alone by the acreage it occupies, but also by the proportion of farms on which it is grown. This percentage of all farms in this tri-state area that grew the field crops reported in the federal census for the years 1930 to 1955 are shown in table 38. Hay and potatoes are the only crops reported on more than 50 percent of the farms. The

Table 37. Gross production per farm, all farms, tri-state area, 1880-1920

Census Year	Oats	Potatoes	Hay	Minor Crops	Total
	tons	tons	tons	tons	tons
1880	0.93	5.88	11.40	1.88	20.09
1890	1.35	4.74	13.20	1.62	20.91
1900	1.22	3.48	16.20	1.72	22.62
1910	1.46	5.64	16.10	1.50	24.70
1920	1.96	5.61	27.40	1.88	36.85

oat crop is not far behind. The irregularity with which these are grown reflects the shifting of crops in a pioneer area to determine their profitability and adaptation to the farmer's resources. They also reflect changes that come with clearing, land improvements, and changes in the farmer's resources.

Table 38. Number of farms reporting specified crops as a percentage of all farms, tri-state area, 1930-1955

Crop	1930	1940	1950	1955	Average
Hay	*	87	88	*	87½
Potatoes	82	74	48	46	62
Oats	48	33	46	50	44
Corn - grain	5	16	17	15	13
- silage	9	9	18	19	14
- fodder	-	11	-	-	-
Grass - legume seeds	6	16	8	10	10
Wheat	8	8	9*	4	7
Barley	3	11	6	5	6
Flax	1	3	8	4	4
Mixed grains	6	2	4	2	3½
Rye	3	4	2	1	2½
Buckwheat	1	1	1	1	1

* Data missing or incomplete.

The average crop tonnages per farm for the crops raised in this tri-state area are shown in table 39. These data need careful interpretation. The proportion of farmers in this area growing each of these crops varies widely. In general those who grow a crop successfully are likely to continue its production. An increase in the tonnage grown per acre may reflect the fact that those farmers who obtain high yields are most likely not only to continue the production of this crop, but also to increase the acreage grown. Farmers with low production, on the other hand, tend to discontinue or at least reduce the acreage of a crop that does not produce satisfactory yields. Then, too,

Table 39. Average crop tonnage per farm reporting, tri-state area, 1930-1955

Crop	1930	1940	1950	1955	Average
	tons	tons	tons	tons	tons
Corn silage	45.0	50.8	64.4	64.8	56.2
Hay	-	28.1	36.3	-	32.2
Corn fodder	19.0	9.8	-	-	14.4
Corn, grain	2.9	4.3	9.5	11.4	7.0
Mixed grains	6.1	8.8	2.4	9.8	6.8
Potatoes	4.5	3.8	7.3	9.4	6.2
Oats	3.8	3.9	4.1	6.5	4.6
Barley	2.4	2.7	3.8	5.3	3.6
Flax	1.8	3.1	4.2	3.8	3.2
Rye	2.4	2.4	3.4	3.7	3.0
Wheat	1.5	1.9	3.1*	3.3	2.4
Buckwheat	1.2	1.7	2.7	2.7	2.1
Grass-legume seeds	0.6	0.4	0.4	0.8	0.5

* Wisconsin-Michigan average only.

the tonnage produced per acre does not tell the whole story. The value per acre — price per ton x tonnage produced — may be the important determinant in crop selecting. The acre-costs of growing the crop also come into the calculation of profitability. Seasonal conflicts in demand for labor or power may also be a factor in determining the crop that best fits the farmer's resources. Weather is also an important factor in determining the acre yields of a crop and the years of census enumeration may chance to be abnormally favorable or unfavorable.

Average Yields Per Acre

In discussing average crop yields, it is necessary to break down the total period covered by this study into the two periods used previously — 1880 to 1920, and 1930 to 1955. Crop yields for the common crops of this tri-state area in terms of tons per acre, and the average crop yields for the entire state of Minnesota, are shown by decennial census years in table 40. For four crops — wheat, potatoes, buckwheat and hay — the tri-state area yields exceeded the average yields for the whole state of Minnesota. For the other five crops listed, they fell below. Hay was the only crop to show a definite upward trend in yield from 1880 to 1920. The yields for the state of Minnesota likewise showed little upward trend. When new farms are opened up in this cutover forest land, the yields the first year are likely to be less than what might be expected in 3 or 4 years when the soil is in better physical condition. In view of this fact, one may conclude that crop yields in this tri-state area do not differ materially from average yields in these states as a whole.

Table 40. Yield per acre of major field crops - tri-state area and for the entire state of Minnesota, 1880-1920 inclusive

Crop	1880	1890	1900	1910	1920	Average
	tons	tons	tons	tons	tons	tons
Hay, tri-state	1.04	1.02	1.36	1.22	1.62	1.25
Minnesota	*	*	*	*	1.30	*
Oats, tri-state	0.50	0.38	0.45	0.49	0.43	0.45 -
Minnesota	0.54	0.46	0.38	0.40	0.58	0.47
Potatoes, tri-state	3.86	3.04	4.04	3.09	2.64	3.34 +
Minnesota	3.06	2.31	2.55	2.49	2.93	2.67
Barley, tri-state	0.48	0.41	0.49	0.53	0.47	0.48 -
Minnesota	0.61	0.60	0.48	0.46	0.56	0.54
Corn, tri-state	0.91	0.76	0.71	0.76	0.84	0.80 -
Minnesota	0.87	0.76	0.92	0.90	0.94	0.88
Wheat, tri-state	0.44	0.46	0.46	0.47	0.34	0.43 +
Minnesota	0.41	0.39	0.33	0.48	0.30	0.38
Flax, tri-state	0.19	0.24	0.22	0.18	0.23	0.21 -
Minnesota	*	0.25	0.20	0.20	0.27	0.23
Rye, tri-state	0.58	0.40	0.41	0.38	0.36	0.43 -
Minnesota	0.46	0.53	0.38	0.37	0.49	0.45
Buckwheat. tri-state	0.39	0.37	0.35	0.33	0.31	0.35 +
Minnesota	0.30	0.33	0.32	0.30	0.28	0.31

* Data missing.

The data for later years, 1930 to 1955, provide a more precise comparison of crop yields since the number of farms growing a crop is given and the acreage per farm raising the crop can be determined. Crop yields for 9 crops for each of 3 states—Minnesota, Wisconsin, and Michigan—on all farms growing the crop in each state are presented in table 41.

Table 41. Field crop yields per acre, by states, for farms growing this crop, 1930-1955

Year	State	Wheat	Oats	Barley	Rye	Corn	Flax	Potatoes	Hay	Silage
		tons	tons	tons	tons	tons	tons	tons	tons	tons
1930	Minnesota	0.39	0.42	0.46	0.31	0.62	0.21	2.37	1.68	4.92
	Wisconsin	0.50	0.52	0.60	0.37	0.72	0.26	2.88	1.23	6.36
	Michigan	0.50	0.50	0.58	0.43	0.80	0.23	3.00	1.15	8.06
1940	Minnesota	0.44	0.50	0.38	0.33	0.74	0.22	3.24	1.33	6.13
	Wisconsin	0.47	0.45	0.44	0.33	0.80	0.22	2.23	1.34	5.93
	Michigan	0.43	0.43	0.49	0.34	0.80	0.25	2.62	1.20	8.90
1950	Minnesota	0.34	0.39	0.45	0.34	0.94	0.17	5.61	1.34	5.90
	Wisconsin	0.54	0.47	0.49	0.34	1.20	0.18	7.00	1.18	5.40
	Michigan	0.51	0.52	0.56	0.44	1.41	0.21	6.30	1.12	8.90
1955	Minnesota	0.34	0.39	0.45	0.34	0.94	0.17	5.61	1.34	5.90
	Wisconsin	0.41	0.47	0.50	0.36	1.05	0.16	9.51	1.46	8.10
	Michigan	0.59	0.53	0.61	0.42	1.00	0.22	7.90	1.42	8.90

In order to bring out more clearly the differences in crop yields per acre among these three states, the data for the census enumerations from 1930 to 1950 have been condensed in table 42. Acre yields are higher in Michigan than in Wisconsin in the case of 7 of the 9 crops listed. Minnesota ranks below these other states except in the case of flax, for which the average yield equals that of Wisconsin and is only a trifle below Michigan. The reason for this difference is not altogether apparent. In general, crop yields increase with the length of time an area has been in cultivation. Since the Minnesota area is of most recent settlement, this may be one causal factor. It is also

Table 42. Yield per acre of field crops on farms growing this crop, by states, 1930-1955

State	Wheat	Oats	Barley	Rye	Corn	Flax	Potatoes	Hay	Silage
	tons	tons	tons	tons	tons	tons	tons	tons	tons
Minnesota	0.40	0.44	0.44	0.33	0.85	0.20	3.67	1.19	6.01
Wisconsin	0.48	0.48	0.52	0.35	1.04	0.20	5.40	1.30	6.30
Michigan	0.51	0.50	0.57	0.41	1.08	0.21	4.99	1.22	8.20

true that the climatological data for Minnesota are based on records kept at Duluth. The growing season at Duluth is longer than in most of the Minnesota area. Precipitation is also heavier than in much of the area. For the area as a whole, climatic conditions are less favorable than at Duluth.

The greatest difference in yields between Wisconsin and Michigan as compared with Minnesota is in the case of potatoes. Potatoes are a much more specialized enterprise in Wisconsin and Michigan and the technic of potato culture is more advanced. Another factor that may account for differences between crop yields in Minnesota, as compared with the two states to the east, is that livestock plays a more important role in farming in Wisconsin and Michigan. It has been a factor in maintaining soil productivity above the level in Minnesota where more of the crop production is marketed directly rather than processed through livestock.

Table 43. Field crop acre yields, northern tri-state areas, and the entire state of Minnesota, 1930-1955

Crop	1930		1940		1950		1955		Average	
	Tri-state	Minn.	Tri-state	Minn.	Tri-	Minn.	Tri-state	Minn.	Tri-state	Minn.
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons
Wheat	0.47	0.51	0.45	0.59	0.48	0.50	0.45	0.58	0.46	0.55
Oats	0.53	0.60	0.46	0.68	0.49	0.59	0.41	0.66	0.47	0.63
Barley	0.55	0.64	0.45	0.72	0.52	0.70	0.52	0.59	0.51	0.66
Rye	0.37	0.45	0.33	0.46	0.38	0.41	0.38	0.42	0.37	0.44
Corn	0.71	0.85	0.77	1.11	1.23	1.06	1.01	1.37	0.93	1.10
Flax	0.23	0.28	0.23	0.29	0.19	0.31	0.18	0.27	0.21	0.29
Potatoes	2.73	2.90	2.70	2.80	5.61	5.25	7.68	5.10	4.60	4.01
Hay	1.15	1.13	1.29	1.38	1.10	1.44	1.41	1.82	1.24	1.44
Legume seeds	0.05	0.08	0.12	0.05	0.06	0.02	0.07	0.05	0.08	0.05
Timothy	0.07	0.09	0.06	0.06	0.05	0.08	0.11	0.08	0.07	0.08

It is apparent from the yield information presented in table 43 that the yield per acre of most crops in the state of Minnesota as a whole are higher than in the tri-state area of coniferous forest land selected for this study. Only in the case of potatoes and legume seeds does the tri-state area lead. The growing season is shorter in the tri-state area and the temperature is lower. The soils, generally speaking, are newer geologically and inherently less productive. Coniferous forest soils are more limited in humus as compared with deciduous forest land. Tall grass prairie soils, such as occur in

southern and western Minnesota, contain much more organic matter than do the forest soils of these three states. The thin surface layer of humus found in the coniferous forests is often largely destroyed by forest fires. Many of these soils in the coniferous forest are of coarse texture. In many areas crop production is limited by lack of adequate drainage. Rough topography in parts of the area and stony soils also limit production. Drainage, rock picking, and the use of commercial soil supplements may serve, at least in part, to offset some of the handicaps to crop production and contribute to crop yields more nearly in line with other areas of these states.

CHAPTER IV. LIVESTOCK

Changes in crop choice and production have been reported in the previous chapter. Since livestock provide a market for most of the crops produced, this chapter will deal with trends in livestock production over the 85 years covered by this study. According to Chapter III, 60 out of every 100 acres produced hay, 5 produced corn, and 18, feed grains. A conservative estimate of the proportion of all crops grown on the farms in this tri-state area that is consumed by livestock on the farms where raised in 85 percent. The only cash sale crops of any importance are potatoes, a few vegetables, some fruits, wheat, rye, flax, legume and grass seeds, and peas and beans—and only part of these are sold off the farm.

Livestock may be classified into two groups: (1) draft animals, including horses, mules, and a very limited number of oxen; and (2) livestock which produce a product for home consumption or sale, such as cattle, hogs, sheep, and poultry.

The number of horses and mules reported in the selected area in each of these three states is indicated in table 44. The horse and mule population reached a peak in this area in 1920. This was the peak year for Wisconsin and Michigan, but numbers of work stock continued to increase in Minnesota until 1940. This later peak in Minnesota reflects that agricultural development here reached its peak somewhat later than in the states to the east. In all three states, work stock numbers dropped sharply after 1940 and by 1955 were only 21 percent of the peak number in 1920. Once mechanical power was adopted generally, work animals were eliminated at a surprisingly rapid rate.

Table 44. Horse and mule population by states in in tri-state area, 1870-1955

State	1870	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	76	917	2,733	13,792	23,372	50,543	51,541	53,401	27,480	12,733
Wisconsin	51	541	1,514	7,359	13,399	24,969	23,770	22,931	10,420	5,189
Michigan	369	1,790	5,159	11,742	16,381	23,317	20,153	18,169	6,081	2,835
Totals	496	3,248	9,406	32,893	53,152	98,829	95,464	94,501	43,981	20,757

It will be necessary in the case of livestock to present data for the years 1880 to 1920 on the average number per farm in the area, as was done with crop data for this same period. Starting in 1930 the number of farms reporting each class of livestock is available, so for these years the average per farm reporting will be given. It is apparent from these figures that most

Table 45. Horse and mule population per farm by tri-state areas, 1880-1920

State	1880	1890	1900	1920	1930
Minnesota	2.07	1.54	1.66	1.53	2.11
Wisconsin	1.10	0.91	1.57	1.57	1.93
Michigan	1.87	1.97	1.92	1.81	1.89
Average	1.67	1.47	1.72	1.64	1.98

farms had less than two head of work stock per farm. These were used both in crop production and land development, as well as for road travel. This suggests that there must have been considerable cooperation in the use of work stock through loan, exchange work, or custom hiring. This assumption is

Table 46. Horse and mule population per farm reporting, tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	2.57	2.52	2.13	2.05
Wisconsin	2.28	2.30	1.98	2.12
Michigan	2.25	2.00	1.77	1.68
Average	2.37	2.27	1.96	1.95

supported by the report on number of horses and mules per farm as shown in table 46. Most farm operations require a team of draft animals as well as most road hauling. With the relatively small crop acreage per farm, those farmers owning horses or mules shared their use with their neighbors. The data in table 47 also suggests this—although in these later years tractors, trucks and automobiles were taking over much of the operations formerly performed with animal power. In 25 years, horse ownership had dropped from 75 percent of all farms in the area to only 26 percent. Mechanization proceeded rapidly in these areas. With a limited acreage of land available for crop production, the farmers were quick to dispose of their work stock and save the production of their limited acreage of crop land for sale or for conversion through productive livestock.

Table 47. Farms reporting horses and mules as a percentage of all farms in the tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	75	59	48	29
Wisconsin	76	63	43	29
Michigan	73	59	33	20
Average	75	60	41	26

Cattle

Cattle easily rank first in the economy of a farm in the tri-state cutover area covered in this study. The major product of these farms is roughage—hay and pasture. This can be utilized to best advantage by ruminants. Cattle, or more particularly dairy cattle, play an important role in that they provide considerable productive employment for the farmer, especially in winter when there may be limited use for the available labor. With the limited acreage of crop land available on most of these northern farms, cattle provide remunerative employment for any surplus of labor over that needed in crop production or in land development.

Table 48. All cattle, tri-state area, 1870-1955

State	1870	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	95	2,558	12,324	49,441	106,081	199,604	287,257	292,792	299,418	321,457
Wisconsin	318	1,778	8,734	28,621	53,390	104,443	147,104	137,999	148,343	161,987
Michigan	556	4,490	14,177	38,566	56,331	96,386	138,221	111,464	113,540	123,442
Total	969	8,826	25,235	116,628	215,802	400,433	572,582	542,255	561,301	606,886

Cattle numbers in this tri-state area showed a continued increase from 1870 to 1955. The increase was continuous throughout the period in Minnesota, but in both Wisconsin and Minnesota there was a small decrease following the drouth and depression years of the thirties. In these states the upward trend continued through the forties and up to the 1955 enumeration, although in 1955 cattle numbers in Michigan were still below the 1930 peak.

Table 49. Average cattle per farm, tri-state area, 1880-1920

State	1880	1890	1900	1910	1920
Minnesota	5.77	6.03	5.59	6.90	8.33
Wisconsin	3.68	5.06	6.13	6.27	8.10
Michigan	4.96	5.50	6.02	6.26	7.80
Average	4.80	5.52	5.90	6.47	8.08

The number of cattle per farm showed a steady increase each succeeding decade up to 1920. Numbers of cattle per farm did not vary greatly among the three states (see table 49).

The number of cattle, per farm reporting cattle, for the years 1930, 1940, 1950, and 1955 shows a definite upward trend after 1940 (see table 50). There were also rather small differences in the number of cattle per farm among the three states. The lower figures in 1930 and 1940 are partly due to the omission of calves under 3 months of age in those enumerations. These

"all cattle" figures include beef as well as dairy cattle, but diary cattle dominate the picture by a wide margin. Anyone familiar with this area recognizes a growing interest in beef cattle, but as yet the numbers are small.

Table 50. Number of all cattle per farm reporting cattle, tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	10.5	10.6	12.1	17.9
Wisconsin	10.2	10.9	15.2	19.7
Michigan	10.0	9.1	14.4	18.1
Average	10.2	10.2	13.9	18.5

The total number of milk cows in each state in the tri-state area is shown in table 51 for the same census years from 1870 to 1955, as shown in previous tables covering the entire period. Cow numbers increased steadily and rapidly from 1870 on and right through the depression of the thirties up to 1940. Even in the depression years, the farmer got a larger return for his crops marketed through livestock than he could have received had he sold them in

Table 51. Total number of milk cows in tri-state area, 1870-1955

State	1870	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	59	909	4,630	19,083	54,235	101,722	135,717	196,045	143,307	144,768
Wisconsin	201	1,067	3,564	11,719	27,943	55,327	70,906	89,931	77,615	82,209
Michigan	443	1,760	5,832	14,649	28,115	51,808	62,462	74,474	58,541	61,999
Total	703	3,736	14,026	45,451	110,293	208,857	269,085	360,450	279,463	288,976

the cash market. This included the World War II years. Labor was relatively scarce and high in price. Prices of some competing products rose more rapidly than the price of dairy products. This was a good time to cull dairy herds since cull cows brought an attractive price. By 1955 the number of milk cows again turned upward in each of these areas under study.

Table 52. Milk cows per farm, all farms, tri-state area, 1880-1920

State	1880	1890	1900	1910	1920
Minnesota	2.0	2.3	2.3	3.5	4.2
Wisconsin	2.2	2.1	2.5	3.3	4.3
Michigan	1.8	2.2	2.4	3.1	4.2
Average	2.0	2.2	2.4	3.3	4.2

The number of dairy cows per farm in the three state areas shows a slow but steady increase in numbers from 1880 to 1920. The number per farm exhibited comparatively little variation among the three areas studied. Had data been available to show the number of cows per farm reporting milk cows there may have been greater variability among areas, but such information is not available.

Table 53. Milk cows per farm reporting milk cows, tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	7.1	6.5	7.2	8.7
Wisconsin	7.3	7.1	8.2	10.6
Michigan	6.8	6.3	7.5	9.8
Average	7.1	6.6	7.6	9.7

Changes in the census classification may be responsible for some of the changes in number shown in table 53. In 1930 and 1940 the designation is "dairy cows and heifers, 2 years old and older" and for 1950 and 1955, "cattle and calves." Had calves been included, the numbers may have been higher than the figures shown for 1930 and 1940. The drouth and depression of the thirties doubtless were among the factors accounting for the decrease from 1930 to 1940. A very definite increase in dairy animals occurred from 1950 to 1955. There was only a slight reduction in the proportion of all farms in the area reporting dairy cows during this period. In 1930 dairy herds were reported on 82 percent of all farms in this tri-state area. By 1955 this had dropped to 79 percent.

Dairy cattle play an important role in the economy of these northern dairy farms. Hay was the principal crop produced and a cash market for hay was very limited and often non-existant. Dairy cows provided remunerative employment for the available family labor. Beef cattle and sheep might have utilized the available roughage supply, but they would have furnished a market for very little labor. The steady income in the form of a cream check provided current funds for family living.

These early settlers had some excellent leadership in determining their farming program and their choice of livestock. The late A. J. McGuire, Superintendent of the North Central Experiment Station at Grand Rapids, 1904-1914, was an outstanding evangelist in pointing the way to more profitable farming in the early years of the current century. The program he recommended was (1) to brush the land, (2) to sow grass and clover between the stumps for pasture, (3) to remove the stumps a few years later and seed clover, (4) to market the pasture and meadow crops through dairy cows, (5) to organize cooperative creameries as a market for dairy products, and (6) improve the grade herds through the use of purebred dairy sires. A number of so-called "gentleman farmers" introduced into the area herds of dairy or dual-purpose breeds, all with excellent blood lines. Among these were John G. Williams, C. P. Craig, George Stone, Theodore Hollister, G. G. Hartley, L. B. Arnold and the McLaren family.

Other agricultural leaders aided in the farm management aspects of farm development. The late E. J. Delwiche of the Ashland Branch Station in northern Wisconsin taught farmers to grow winter wheat and canning peas on the red clay soils. The late Andrew Boss of the Minnesota Agricultural Experiment Station laid the foundation of the legume seed industry in the border country by the distribution and seeding of state-purchased legume seeds in the ashes of the 1910 Baudette forest fire. Finally, under the guidance of Harry Russell, Dean of the Wisconsin Agricultural College, and agricultural engineers Larry Livingstone in the Upper Peninsula of Michigan and A. J. Schwantes of Minnesota, over 25 million pounds of war-salvaged explosives were utilized in land development in this tri-state area in the years following World War I. These explosives made possible a rapid expansion of farm development in this coniferous forest area.

Sheep

Sheep thrive on rough land. They can brouse on the brush and undergrowth and prepare the land for stump removal and breaking. Like cattle, they are ruminants and can utilize the major feed production of this area—hay and pasture. In view of this one might expect they would play an important role in the agricultural development of this tri-state area. But such is not the case. They are easy prey for predatory animals. It is difficult for a shepherd to graze large flocks of sheep in brush land. Sheep tight fences are expensive. Numbers of sheep and lambs in the area increased steadily with increasing settlement up to 1920 in Wisconsin and Michigan and up to 1940 in Minnesota (see table 54). In all three states, there was a substantial drop in

Table 54. Total number of sheep and lambs on farms in tri-state area, 1870-1955

State	1870	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	18	246	1,768	11,023	24,286	71,143	117,477	127,221	80,680	107,992
Wisconsin	148	632	3,200	6,471	14,056	35,590	30,345	18.027	11,379	14,865
Michigan	116	513	2,595	10,306	12,525	30,391	18,485	7,325	3,134	4,923
Total	282	1,391	7,563	27,800	50,867	137,124	166,307	152,573	95,193	127,780

sheep numbers in the decade from 1940 to 1950. From 1950 to 1955, however, the number of sheep in this area increased one-third. The total number of sheep in these three areas in 1955 was, nevertheless, still 23 percent below the high point of 1930.

Table 55. Numbers of sheep and lambs per farm (all farms) in tri-state area, 1880-1920

State	1880	1890	1900	1910	1920
Minnesota	.55	.86	1.33	1.59	2.97
Wisconsin	1.30	1.85	1.38	1.65	2.76
Michigan	.12	.99	1.70	1.40	2.47
Average	.66	1.23	1.47	1.55	2.73

There was a steady increase in the average number of sheep on farms (all farms in area) from 1880 to 1920 (see table 55). Wisconsin registered a sharp drop in 1900 and Michigan in 1910, but all were at their maximum for the period in 1920. Wisconsin held the lead in sheep per farm in the area up to 1920, when Minnesota moved ahead.

The number of sheep and lambs per farm reporting sheep for the last four census enumerations is shown in table 56. All three areas showed a substantial drop in sheep following the drouth and depression of the thirties. Another factor accounting for the lower sheep numbers in 1940 was the fact that only

Table 56. Number of sheep and lambs per farm on farms reporting, tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	29.5	24.5	34.7	43.4
Wisconsin	27.2	17.8	26.7	32.6
Michigan	27.0	12.0	13.6	26.0
Average	28.0	18.0	25.0	34.0

sheep 6 months old or older were included. By 1955, sheep flocks reached the maximum size reported in these four enumerations in Minnesota and Wisconsin and in the area as a whole, but Michigan did not quite equal the 1930 figure.

Only a relatively small proportion of all farmers in this tri-state area maintain flocks of sheep (see table 57). For the area as a whole only a little over 10 percent of the farmers kept sheep in 1930 and 1940. There was a distinct drop in 1950, but by 1955 a substantial gain was registered in Minnesota and Wisconsin. The proportion of sheep farmers in the Michigan area continued to decline up to 1955.

Table 57. Farms reporting sheep as a percentage of all farms in tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	14.3	14.7	8.8	12.2
Wisconsin	8.7	6.4	3.5	4.8
Michigan	5.2	4.4	2.4	2.3
Average	10.7	10.5	6.1	8.3

Swine

The density of hog population in the United States is closely associated with the volume of corn production. Since this tri-state area lies outside the "corn belt" area, hog numbers are limited. Some countries with somewhat similar climate, like Denmark and Eastern Canada, have built up a substantial pork-producing enterprise based on barley as the principal grain feed and specializing in a bacon-type of hog. In this area, hogs are maintained as a source of meat supply for the farm family and to utilize the limited quantity of corn and barley available, also the skimmilk on those farms marketing cream for butter manufacture.

Table 58. Number of swine, all ages, tri-state area, 1870-1955

State	1870	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	105	400	3,108	12,769	20,295	47,199	45,293	33,133	53,133	59,512
Wisconsin	172	523	1,177	6,306	10,738	29,517	20,972	14,150	11,682	12,273
Michigan	336	1,071	4,327	16,482	16,152	22,552	17,513	10,932	10,190	6,509
Total	613	1,994	8,612	35,557	47,185	99,268	83,598	58,215	75,005	78,294

In all of these states the trend in hog numbers was steadily upward until 1920, when both Wisconsin and Michigan reached their maximum level (see tables 58 and 59). From that point, numbers dropped steadily in Michigan. Wisconsin shared this downward trend up to 1950, though at a slower rate, but registered some increase in 1955. Hog numbers in Minnesota decreased from 1920 to 1940 but reached their peak for the entire period in 1955.

The number of swine per farm dropped off sharply after the drouth and depression years of the thirties, but by 1950 these losses had been more than

Table 59. Swine of all ages per farm, all farms in tri-state area, 1880-1920

State	1880	1890	1900	1910	1920
Minnesota	.90	1.52	1.54	1.33	1.90
Wisconsin	1.08	.68	1.35	1.26	2.28
Michigan	1.10	1.65	2.70	1.80	1.83
Average	1.03	1.28	1.86	1.46	2.00

recovered (see table 60). Part of the drop in numbers indicated in 1940 was due to the fact that pigs under 4 months of age were omitted from the census enumeration that year. Michigan showed a small decrease in numbers in 1955, but Wisconsin and Minnesota registered substantial gains. Hog production is generally fairly closely correlated to corn production. This relationship is not as close as in the major corn counties of these same states.

Table 60. Swine of all ages per farm on farms reporting, tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota	5.14	2.84	6.90	7.86
Wisconsin	4.76	2.90	4.80	5.80
Michigan	4.20	3.00	4.90	4.64
Average	4.70	2.91	5.53	6.10

Hogs are raised in part for home consumption and purchased feeds may be used to a limited extent. Also, the hogs are fed in part on skimmilk and other by-product feeds. It should be noted that although the corn acreage decreased in this tri-state area from 1950 to 1955, the production of corn actually increased due to higher yields per acre. Even in this group of counties on the northern fringe of the corn belt there is evidence of a relationship between corn production and the number of hogs raised.

Table 61. Percentage of farms in the tri-state area reporting swine, 1930-1955

State	1930	1940	1950	1955
Minnesota	32.0	33.0	28.0	36.0
Wisconsin	32.0	30.0	20.0	22.5
Michigan	31.7	26.0	20.0	17.0
Average	31.9	29.7	22.7	25.2

In 1930 nearly one-third of the farmers in this tri-state area were raising hogs (see table 61). By 1955 this had dropped to one-quarter. This, in part at least, reflects the increasing specialization that characterizes farming generally at the present time. Swine production is holding its own with farm operators in the selected Minnesota counties, at least as far as number of producers is concerned. In Wisconsin the proportion of farms on which hogs are raised has dropped more than 20 percent and in Michigan it has been cut almost in half in the past 25 years.

Poultry

Chickens far outnumber any other class of poultry in this tri-state area. The chicken population reached its peak in 1930 and since has trended downward. This is true in each of the three states although the rate of decrease has varied somewhat among them. Poultry of all kinds are concentrate consumers but the crop land of this area is largely devoted to roughage production. In general, it is deficit area as far as egg and poultry production is concerned. The number of chickens in this area increased to a peak in 1930 and has gradually declined, until in 1955 it was only 80 percent of the peak

level (see table 62). The decline was only 8 percent in Minnesota but 31 percent in Michigan.

Table 62. Number of chickens in tri-state area, 1870-1955

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota -	5,550	35,857	152,412	349,381	668,744	990,372	922,425	941,431	912,405
Wisconsin -	5,220	22,255	90,106	189,694	342,705	497,946	406,417	354,249	317,349
Michigan - -	16,380	54,525	136,218	226,202	284,689	432,183	339,972	282,191	298,669
Total - - -	27,150	112,637	378,736	765,277	1,296,138	1,920,501	1,668,814	1,577,871	1,528,423

The average number of chickens per farm, based on all farms in the tri-state area, is shown in table 63 by states and in total for the area for the period 1880 to 1920. The number of chickens per farm increased steadily by census periods from 1880 to 1920 in Minnesota and Wisconsin and for the tri-state area as a whole. Michigan, which reported the most chickens per farm for the first four census enumerations, dropped below the other two states in 1920.

Table 63. Average number of chickens per farm for all farms in the tri-state area, 1880-1920

State	1880	1890	1900	1910	1920
Minnesota - - - - - - -	12.5	17.5	18.3	22.6	27.9
Wisconsin - - - - - - -	10.8	12.9	19.3	22.3	26.6
Michigan - - - - - - - -	16.6	20.8	22.3	25.2	23.1
Average - - - - - - - -	13.3	17.1	20.0	23.4	25.9

Table 64. Chickens per farm reporting chickens, tri-state area, 1930-1955

State	1930	1940	1950	1955
Minnesota - - - - - - - -	49.5	45.8	69.7	83.0
Wisconsin - - - - - - - -	48.5	42.7	53.4	63.5
Michigan - - - - - - - -	46.3	41.8	50.9	69.5
Average - - - - - - - - -	48.1	43.4	58.0	72.0

The size of flocks on farms reporting chickens increased 50 percent in 25 years (see table 64). The increase in Minnesota was 68 percent, in Wisconsin 31 percent, and in Michigan at approximately the average figure. Flocks in Minnesota averaged larger than those in the other two states each year. In all probability, poultry feeds were somewhat cheaper in Minnesota because of its nearness to the grain fields to the west. The decrease in numbers between 1930 and 1940, like that already noted for other classes of livestock, doubtless also reflects the effect of drouth and depression. In 1930 about 75 percent of all farms in the area reported poultry flocks; but by 1955 this dropped to a little more than one-half. In Wisconsin, however, the percentage of farms reporting poultry remained at a constant percentage of approximately 60 percent each of the four years.

In addition to chickens, other classes of poultry are reported on farms included in this tri-state area—ducks, geese, and turkeys. The total number of ducks on farms in the area covered by this study is shown in table 65 for each of the states included for the year in which a census enumeration was made. These data are not strictly comparable for all census years reported. In 1930 the number raised is reported, for the other years the number on hand April 1 is given. This would be largely breeding stock and hence smaller than the number raised.

Table 65. Numbers of ducks reported on all farms in tri-state area, 1890 to 1950

State	1890	1900	1910	1920	1930	1940	1950
Minnesota	591	2,051	x	x	21,441	2,601	6,087
Wisconsin	1,194	1,042	x	x	6,073	1,352	4,692
Michigan	1,068	1,996	x	x	3,933	501	8,195
Total	2,853	5,089	x	x	31,447	4,463	18,974

Table 66. Numbers of geese reported on all farms in tri-state area, 1890-1940

State	1890	1900	1920	1930	1940	1950
Minnesota	303	1,156	x	x	19,886	3,226
Wisconsin	85	874	x	x	5,813	1,061
Michigan	1,285	1,547	x	x	3,855	387
Total	1,673	5,089	x	x	29,554	4,674

Neither ducks nor geese were of any importance in this tri-state area (see tables 65 and 66). The numbers varied widely from decade to decade. In general the number of both classes of poultry were greater in Minnesota, but in no area or in any decade did these enterprises assume any importance.

Table 67. Turkey numbers on all farms in tri-state area, 1890 and 1900

State	1890	1900
Minnesota	629	1,777
Wisconsin	274	868
Michigan	2,169	3,562
Total	3,072	6,207

Turkey numbers for this tri-state area were reported in the federal census for 1890 and 1900 (see table 67). Most of these turkeys were reported in Michigan, but even there the number was insignificant. Turkey numbers were also reported for the census years 1930, 1950, and 1955 (see table 68). By 1955 the turkey population had risen sharply in Minnesota and Wisconsin, but the number of turkeys in Michigan had dropped below the 1930 level. On the other hand, the data for Minnesota and to a somewhat lesser extent for Wisconsin, bring out a highly significant recent development in turkey production generally. It is being highly commercialized. In the 25-year period covered by these data, the number of turkey flocks decreased from over 5,000 to just under 700—but the number of turkeys raised increased near seven-fold. Turkeys are being produced on what virtually amounts to a factory system. This development is most apparent in Minnesota—in such counties as Aitkin with 290,617 birds raised, Cass with 159,519, Crow Wing with 138,975, and Clearwater with 107,166. This commercialization and concentration of production is also apparent in Wisconsin but to a lesser degree. Nearness to areas of large-scale grain producing gives Minnesota an advantage in poultry production.

Table 68. Numbers of turkeys raised on farms reporting turkey production, tri-state area, 1930-1950

State	1930		1950		1955	
	Total	Per farm	Total	Per farm	Total	Per farm
Minnesota	118,361	32	490,381	891	965,831	2,019
Wisconsin	20,440	26	39,541	297	69,065	645
Michigan	9,955	16	5,327	34	3,173	35
Total	148,756		535,249		1,038,069	
Av. per farm		29		637		1,536

Some general trends in livestock production in this tri-state area are shown in table 69. These data would be highly significant if all farms in the area were producing all classes of livestock shown in this table. The increasing specialization on classes of livestock best fitted to these farms has already been noted. As these farm units develop from the self-sufficing stage into commercial units, this specialization becomes increasingly important. Some generalizations, however, may be made from these data. Horses have largely been supplanted by mechanical power. Dairy cow numbers per farm have increased nearly four-fold and all cattle more than three times.

Table 69. Average numbers of livestock per farm on all farms in tri-state area, 1880-1955

Kind of livestock	1880	1890	1900	1910	1920	1930	1940	1950	1955
Horses - - - - -	1.67	1.37	1.72	1.64	1.98	1.70	1.42	0.83	0.50
Swine - - - - -	1.03	1.28	1.86	1.46	2.00	1.50	0.87	1.32	1.64
Sheep - - - - -	0.66	1.23	1.47	1.55	2.73	2.63	2.34	1.90	3.30
All cattle - - - -	4.80	5.50	6.02	6.48	8.08	10.40	8.32	11.47	15.77
Milk cows - - -	2.02	2.20	2.41	3.32	4.22	4.98	5.43	5.82	7.68
Chickens - - - -	13.10	17.10	20.00	23.40	25.90	25.10	25.40	29.40	37.70

Sheep numbers have also increased. This increase in roughage-consuming animals fits into the hay and pasture dominance in the cropping system. Swine production has increased at a much less rapid rate than the crop acres. Swine are concentrate consumers and can use little roughage. Chickens are also concentrate consumers. The number per farm nearly trebled, but in general a substantial part of the poultry ration is purchased as special poultry feeds. In evaluating these data, the reader should remember that the crop acreage on most of these farms is limited. Livestock serve to supplement crops not only by providing a home market for them but also by providing remunerative employment for the farmer and his family when crops did not utilize it fully.

CHAPTER V. PROPERTY VALUATIONS AND FARM INCOME

A knowledge of the value of the capital used in farming and also of the income accruing from farm operation is of major importance in evaluating the economy of any farming area. Unfortunately, there is no consistant source of comparable data available for the 85-year period covered by this study. A fair approximation of crop production is available from census sources by decennial periods but even this is not consistently reported. Further, this is gross production. Much of the crop products are processed through livestock and appear in the income category as meat, milk, wool, eggs, poultry and the like. Some of both crop and livestock products are consumed by the farm family and do not appear as sales. Some spoilage occurs. Some timber products are used in building and fences and also as fuel.

An effort is made in this chapter to review the data on capital valuations, the value of farm production on the value of sale or gross income insofar as as census records supply it. It should also be kept in mind that "off the farm" work – in the woods or mines, on the railroad, or elsewhere – may contribute very materially to supporting the settler in a new country while he carves his farm out of the native forest areas. He is not entirely dependent on what he can produce on his limited acres of cleared or partially cleared land.

Value of Real and Personal Property

Only very limited valuation data are available for 1870. The number of farms is not given, so only total figures for the area studied are available. These are presented in table 70. The farm product values appear to include

Table 70. Total value of real estate, livestock sales and farm product sales, tri-state area, 1870

State	Real estate values, land, buildings, and fences	Livestock	Farm product values
Minnesota - - - -	29,300	14,865	14,622
Wisconsin - - - -	118,330	14,415	28,788
Michigan - - -	1,012,153	87,258	225,270
Total - - - - -	$1,159,783	$116,538	$268,680

actual sales and the value of products consumed on the farm. This suggests that there may be some duplication, in that a crop value may be duplicated in the value of the product of the animal to which it was fed. Only Michigan had any appreciable farm development at that time. This state reports 87 percent of the real estate valuations, 75 percent of the livestock sales, and 84 percent of farm product values.

The value of land and buildings per farm in this tri-state area is shown by states and in total in table 71 for the census enumerations from 1880 to 1955. Since Michigan was settled at an earlier date and hence more fully developed, the real estate valuations were higher in the first three enumerations.

In succeeding years, however, there was relatively little range among these three states in this item. Values rose sharply in 1920, thus reflecting the price inflation during and following World War I. By 1930 land prices were

Table 71. Real estate valuations, land and building per farm in tri-state area, 1880-1955

State	1880	1890	1900	1910	1920	1930	1940	1950	1955
Minnesota	$ 989	$1,005	$1,210	$2,644	$5,377	$4,530	$2,495	$5,789	$7,015
Wisconsin	873	1,191	1,223	2,601	5,480	3,973	2,337	6,230	7,659
Michigan	1,295	1,818	1,463	2,594	4,324	3,831	2,656	5,658	7,718
Average	1,052	1,338	1,297	2,613	5,060	4,111	2,494	5,892	7,464

declining sharply and continued to do so up to 1940. Since then real estate valuations have risen sharply, both because of the rising price level and the additional clearing, buildings, and other improvements that were added during the years since 1940. More off-farm labor was available during this period and at least a part of the income from this was plowed back into the farm in the form of improvements.

Table 72. Value of livestock per farm, tri-state area, 1880-1950

State	1880	1890	1900	1910	1920	1930	1940	1950
Minnesota	$214	$221	$248	$516	$779	$771	$516	$1,559
Wisconsin	119	191	274	364	832	804	634	1,753
Michigan	282	346	351	457	839	820	577	1,381
Average	205	253	291	446	817	798	576	1,564

Livestock valuations were available for all the decennial census enumerations starting in 1880. These figures may look low, but the reader should be reminded that these farms were not heavily stocked and in some cases outside employment made it difficult or perhaps unnecessary to maintain as much livestock. Michigan livestock values per farm were higher than those in either Minnesota or Wisconsin until 1950. This was partly the result of earlier settlement and development in Michigan, and partly due to the level of dairy cattle prices being somewhat higher in that state. The price depression of the thirties is reflected in a substantial drop in valuations from 1930 to 1940. The sharp increase from 1940 to 1950 is the result of some increase in numbers but more largely to higher prices used as a basis for these valuations.

The value of farm machinery and implements on the farms in this tri-state area is shown in table 73 for the year in which they were reported. Valuations increased year by year until 1940. The decline from 1930 to 1940 doubtless reflects decreased replacements of machinery during the drouth years.

Table 73. Value of machinery and implements per farm, tri-state area, 1880-1940

State	1880	1890	1900	1910	1920	1930	1940
Minnesota	$ 65	$ 55	$ 65	$ 125	$ 379	$ 437	$ 311
Wisconsin	50	62	91	143	422	453	380
Michigan	57	113	133	229	456	492	452
Average	57	77	96	166	419	461	381

Value of Farm Production

The estimation of "value of farm production" is not reported on a strictly comparable basis from one census enumeration to another. In some cases the gross value of all products produced in these counties is given. Obviously this results in an inflated estimate, since feed crops may be reported first as crops produced and then duplicated in the value of livestock or livestock products produced – at least in part – with these feeds. In 1880 the value of farm production was defined as "the estimated value of farm production sold, consumed, or on hand." In 1890 the term "estimated value of farm products, 1889" was used.

In view of this lack of comparability, the author made some adjustments in the census enumeration to bring the data more nearly on a comparable basis. From the total value of crop production he deducted the value of hay, silage, and cereal crops commonly utilized through livestock and to this added the value of all livestock sold or slaughtered on the farm for family consumption. There is some lack of comparability in the data given by decades as the result of inventory carryover or loss during the year and also because of the omission of income from forest product sales in some of the enumerations. This latter is an important item on a substantial proportion of farms in this tri-state area. These adjustments make the data from census year to census year more nearly comparable but, at least in the earlier years, the adjusted data doubtless fall materially short of precise accuracy.

It should also be noted that work off the farm—in the woods, in the mines, on roads, and at other occupations—was also an important source of income on these cutover farms, especially while they were in the pioneer or development stage. In the later years the census data on farm income was more nearly complete. For this reason the discussion will center on the data for the decades 1910 to 1950.

The value of farm production per farm more than doubled from 1910 to 1920 in both Minnesota and Wisconsin. In Michigan the increase was at a much less rapid rate. This was a period of active farm development, especially in Minnesota and Wisconsin, and also of rising prices. By 1930 declining prices and the start of a period of general depression reduced the value of farm production but the full effect was not registered until 1940. From this low point, farm production value per farm trebled in this area. Higher prices and an increased level of farm production accounted for much of this increase. However, a factor of some importance was a substantial decrease in the number of farms reported in the area from 1940 to 1950. It seems reasonable to

Table 74. Value of farm production per farm, tri-state area, 1880-1950

State	1880	1890	1900	1910	1920	1930	1940	1950
Minnesota - -	$ 289	$ 226	$ 241	$ 619	$1,542	$1,119	$ 638	$1,869
Wisconsin - -	194	184	364	593	1,613	1,147	650	2,070
Michigan- - -	562	487	432	840	1,169	1,099	686	2,025
Average - - -	348	299	346	684	1,441	1,122	658	1,988

assume that the smaller and less productive farms were eliminated in this pruning process.

The gross income per farm for each state and for the area as a whole is shown in table 75. Gross income per farm differs little from the value of farm production per farm for the years 1900 and 1950, as shown in table 74,

Table 75. Gross income per farm from farm operation, tri-state area, 1900-1955

State	1900	1910	1920	1930	1940	1950	1955
Minnesota - - - - - - -	$ 262	$ 156	$ 283	$ 899	$ 474	$1,816	$1,984
Wisconsin - - - - - - -	332	148	301	900	481	1,995	2,494
Michigan- - - - - - - -	470	179	265	833	510	1,922	2,231
Average- - - - - - - - -	355	161	283	877	488	1,911	2,236

but is decidedly lower for the intervening years. Undoubtedly a substantial portion of the disparity between these two figures for the decades 1910 through 1940 is due to differences in the items included in the census enumeration from year to year. Obviously, gross income per farm would be less than the total value of farm production, when the value of livestock consuming at least a portion of the crops is added to the gross value of all crops produced on the farm.

The percentage distribution of farm sales by sources is shown in table 76. Livestock dominates the picture in providing 80.3 percent of this income. Crops are second with 16.2 percent, and forest products are third with only 3.2 percent. The importance of cattle in the farm economy in this area is indicated by the fact that nearly half the cash income from sales is from dairy products and a major share of the livestock sales income is from dairy cattle and calves. Sales of sheep and wool provided most of the income from other livestock, and honey and wax were the principal items of miscellaneous products sold. Of the total income from poultry and egg sales, eggs supplied close to 75 percent. The sales of miscellaneous poultry—turkey, ducks, and geese—were of importance only in Minnesota, with turkeys supplying by far the major portion of this.

Table 76. Percentage distribution of income from sales of farm products by sources, tri-state area, 1910 and 1930-1955

Census year	Dairy product sales	Live-stock sales	Poultry and egg sales	Other livestock income	Crop sales	Forest product sales	Misc. product sales	Total
1910 - - - - - -	47.7	26.2	11.0	1.0	13.9	-	0.2	100.0
1930 - - - - - -	44.1	16.5	13.4	0.5	19.5	5.4	0.6	100.0
1940 - - - - - -	48.6	17.9	11.8	0.9	17.7	2.9	0.2	100.0
1950 - - - - - -	49.5	20.2	9.5	2.1	14.6	3.9	0.2	100.0
1955 - - - - - -	54.9	15.4	9.7	0.4	15.4	3.7	0.2	100.0
Average- - - -	48.9	19.3	11.1	1.0	16.2	3.2	0.3	100.0

An interesting comparison may be made of the data in table 76 with information supplied by Edward Becker, rural development agent for 13 counties in northeastern Minnesota, in an address on "The Agricultural Situation" delivered at Grand Rapids, Minnesota, July 18, 1958. These 13 counties are all included in the 15-county Minnesota area used in this study. Following is a quotation from Mr. Becker's address:

"Agricultural income for the 13 counties totaled about 32 million dollars, census of 1955. Dairy products accounted for 47 percent of total sales; livestock, mostly dairy cattle and calves 20 percent; poultry, including turkeys 16 percent; and forest products from farms 4 percent. The total sale of all forest products amounted to 37 million dollars, with pulpwood and similar products supplying about 60 percent; lumber, 32 percent; Christmas trees, piling, and miscellaneous products made up the remainder. Farmers earned about $1,125,000 of this from their own woodlots and a sizable amount of logging operations on publicly owned lands. Off-farm work is common. Sixty-one percent of the farmers in the area did some off-farm work."

The general pattern in this 13-county area cited by Mr. Becker fits in well with the tri-state area as reported in table 76. It is regrettable that potato sales information is not available for the census years covered in this study. In 1950 upper Michigan farmers received 38 percent of the gross income from potato sales in this tri-state area, Wisconsin farmers 29 percent, and northeastern Minnesota farmers 33 percent. Average potato sales per farm were $213 in the Upper Peninsula of Michigan, $136 in the northern Wisconsin counties, and only $72 in the northeastern Minnesota counties.

Fruit and vegetables are a minor source of income in these tri-state areas—$3.38 per farm in Minnesota, $15.19 in Michigan, and $18.38 in Wisconsin. Similar figures for vegetable sales per farm are $14.18 in northeastern Minnesota, $17.58 in northern Wisconsin, and $11.83 in upper Michigan. Dairy cattle remain the main source of farm income through the 85 years covered by this study.

CHAPTER VI. POPULATION

In this chapter no effort will be made to distinguish between urban and rural population. Gross numbers by decades will be presented for each of the state areas included in this tri-state study. Emphasis will be upon the total population as a local market for farm production in the area, rather than as a measure of growth or decline of regional agriculture. To develop this approach, the following information will be presented: (1) the total population of the area from the first decennial census in which it is reported, (2) the changes in persons per square mile for the census dates, and (3) the population per farm by states, both in numbers and in percentage of a base period.

Population records go back to 1830. These will be divided for study into groups: (1) the 40 years preceding the period of this study, 1830 to 1860, and (2) the period 1870 to 1956. The census of 1955 did not include a population enumeration. Population data for this period are shown in table 77. There were few, if any, farmers among the settlers prior to 1860 and this sutdy deals with agricultural development. The Lake Superior country was first visited by French explorers three centuries ago. The fur traders followed. There was a settlement at Grand Portage in 1775, before the Declaration

Table 77. Population by states, tri-state area, 1830-1860

State	1830	1840	1850	1860
Minnesota - - - - - -	-	-	97	1,748
Wisconsin - - - - - -	-	-	-	1,339
Michigan - - - - - -	626	534	2,127	19,506
Totals - - - - - - - -	626	534	2,224	22,593

of Independence was signed. A trading post was established at Fond du lac in 1816 and La Pointe on Madeline Island was settled in 1834. Apparently these were missed in the census enumeration.

In line with the general trend of American immigration from east to west, the first permanent settlement was in Michigan. Doubtless the discovery of copper in the decade following 1840 and the beginning of the lumber industry a little later brought early settlers to Michigan. Most of these located in Chippewa county near Sault Ste. Marie. Settlers were reported in Houghton, Marquette, and Ontonagon Counties in 1850, but it was not until 1860 that the copper country showed much evidence of settlement. The 97 settlers in Minnesota in 1850 were all in what is now Itasca county. Douglas and Ashland counties accounted for most of the Wisconsin settlers in 1860.

The population by states in the tri-state area is shown in table 78. Michigan reached its maximum in 1920 but Minnesota and Wisconsin reached their top figure in 1940, with some recession by 1950 in all three states. The total population never quite reached the million mark. If the taconite mining industry continues to develop and the Great Lakes-St. Lawrence Seaway is completed, some further increase in population may bring the total well over the million mark in the years ahead.

Table 78. Population by states in tri-state area, 1870-1950

State	1870	1880	1890	1900	1910	1920	1930	1940	1950
Minnesota	9,818	11,080	72,190	165,524	311,048	404,763	405,725	445,227	434,749
Wisconsin	2,393	6,703	64,101	121,614	158,539	183,740	178,153	192,495	180,422
Michigan	43,730	85,030	180,523	261,362	325,628	332,536	318,967	322,824	302,258
Total	55,941	102,813	316,814	548,500	795,215	921,039	902,845	960,546	917,429

Using the 1950 population as a base of 100, the relative changes in population from decade to decade are shown in table 79. Michigan reached the

Table 79. Population of tri-state area, 1860 to 1950, expressed in percentage of the 1950 population for each state or the area

State	1860	1870	1880	1890	1900	1910	1920	1930	1940	1950
Minnesota	0.4	2.3	2.5	16.6	38.1	71.5	93.1	93.3	102.4	100.0
Wisconsin	0.7	1.3	3.7	35.3	67.4	87.9	101.8	98.8	106.7	100.0
Michigan	6.5	14.5	28.1	59.7	96.5	107.6	110.0	105.5	106.8	100.0
Tri-state area	2.5	6.0	11.2	34.5	60.8	86.7	100.4	98.4	104.7	100.0

high point in 1920, but Minnesota and Wisconsin did not reach their respective peaks till 1940. In all states there was some recession by 1950. Since these state areas vary in size, a better indication of comparative population density is the population per square mile. Data covering this point are presented in table 80.

Table 80. Population per square mile by states and tri-state areas, 1930, 1940 and 1950

State	Year	Gross area in sq. mile	Gross population	Population per sq. mile	3-decade average
Minnesota	1930	29,575	405,725	13.7	
	1940	29,309	445,227	15.2	
	1950	29,043	434,749	15.0	14.6
Wisconsin	1930	12,639	178,153	14.1	
	1940	12,411	192,495	15.5	
	1950	12,244	180,422	14.7	14.8
Michigan	1930	16,691	318,967	19.1	
	1940	16,614	322,824	19.4	
	1950	16,538	302,258	18.3	18.9

There is little difference in the density of population in the Minnesota and Wisconsin areas, but the Michigan area exceeds them by nearly 19 percent. When one associates this fact with the smaller number of farms in the Upper Peninsula area, the Michigan farmers would appear to have a better home market for their products. Further support for this assumption lies in the fact that there is more total population per farm in the Michigan area, and hence more potential customers for local farm production (see table 81). From 1880 to 1890 the area population increased faster than the number of farms, but from

Table 81. Ratio of total population to total number of farms by states in tri-state area, 1880-1950

State	1880	1890	1900	1910	1920	1930	1940	1950
Minnesota	25.0	35.3	19.9	20.3	16.9	14.7	12.6	16.6
Wisconsin	13.8	37.1	26.0	18.5	14.2	13.0	12.1	19.1
Michigan	86.3	68.8	42.9	36.2	26.9	24.3	23.2	29.0
Average	41.7	47.1	29.6	25.0	19.3	17.3	16.0	21.6

then on the number of area residents declined steadily up to 1940. By 1950 the trend was reversed. Should this increase in population per farm continue a somewhat improved market for home-produced commodities may be expected. If such a development as the taconite industry and others that may come in with the Great Lakes-St. Lawrence River Seaway materialize into increased commercial activity and a growing population, there may be a growing local market for farm production.

Dr. Lowry Nelson, University of Minnesota rural sociologist, and his associates have made a series of population studies in northeastern Minnesota, principally of rural people. It is quite likely that their findings probably also characterize the rural population of the Wisconsin and Michigan areas included in this study. The population of the forested area is quite prolific. During the depression of the thirties the Minnesota area reported the largest natural increase in the state. During the twenties, when agriculture was making relatively slow progress compared with the boom in industry, migration from the rural areas was much greater in this area than in the state as a whole. This out-migration from farms was again resumed in the forties and early fifties in this northeast cutover area.

In a later study, Dr. Nelson and his staff show a population decline of 8.7 percent since 1950 in these northeastern counties. The rate of rural population decline was the lowest of any area in the state, except in farming districts adjacent to metropolitan centers. Only one of the counties in the area covered by this study, Lake, showed a population increase and a new mining industry developing in this area was a probable factor in this increase.

Edward Becker reports that in 1956, 65 percent of the population of the 13 northeastern Minnesota counties in which he works was urban, 22 percent lived in the country but did not operate farms, and only 13 percent was strictly rural or farm people. Although they numbered only about one in eight in the total population, these northeastern Minnesota farmers were maintaining production at a high level in the fifties. The swine and cattle population were at

an all-time high. The combined acreage of the major crops, hay and oats, and the combined tonnage produced in 1954 as reported in the federal census, was the greatest in the 85-year period for which production data for the area are available. Ninety percent of these farms had electricity available, but in general their power and equipment were limited as compared with farms elsewhere in the state. Only 79 out of every 100 farmer operators had a tractor. The average age of these operators was above the average for the state. There were more farmers over 65 in these counties than in any other rural area in the state. On the other hand, these 13 northern counties had the smallest percentage of heads of families, 45 years of age and over of any rural area. At the other extreme, he reports the smallest percentage of head of families 45 years of age or younger.

The following statement by Mr. Becker sums up conditions as he sees them in the area. "The young people seem to be leaving the farms. Why shouldn't they? Only 40 percent had the convenience of water piped into the house and barn; only 56 percent had telephones; 25 percent had home freezers; and a mere 15 percent had television sets." But in spite of the rugged, ill-paid farming of the area, in spite of its scant medical and hospital service, and in spite of the somewhat austere living of these "shock troops of agriculture," he does see a more pleasant and encouraging side of the picture that is too often overlooked by those who make insidious comparisons between this northern cutover area and the developed farm sections of these same states. His final appraisal is this, "yet it is a happy country; people love it and, for the most part, leave it only under duress. They like it. They like its lakes and the fishing that the lakes provide. They like the woods and the game that provide the hunters with their quarry. They even like farming when they can make a living out of it. They like their neighbors. There is a kind of a camaraderie about life in the northern forested area, perhaps born of a common liking for the country's physical attractions and the consciousness of a common problem."

SUMMARY

Introduction

The purpose of this study is to trace the history and development of agriculture in the coniferous forest area of northeastern Minnesota, northern Wisconsin, and the Upper Peninsula of Michigan for an 85 year period, 1870 to 1955, using largely data from the federal census of agriculture. Fifteen counties each in Minnesota and Michigan and 12 counties in Wisconsin make up this tri-state study area.

Farms

There were 1,911 farms in 1880, 65,073 at the peak in 1940, and 38,785 in 1955. These farms made up 1.8 percent of the land area in these 27 counties in 1880 and reached 20.9 percent in 1950. Average total acres per farm was 168 in 1880 and 111 in 1920, and up to 162 in 1955. The total improved acreage per farm rose from 31.3 acres in 1880 to 71.6 acres in 1955. Of this 71.6 acres, about 85 percent was reported as "plowable".

Climate

The climate would be classed as cool with long cold winters, a rather short growing season with fairly ample precipitation but somewhat variable among different parts of the area. In general precipitation decreased from east to west, especially in winter. The average growing season was 114 days in the Minnesota and Michigan areas and 118 days in the Wisconsin area.

Crops

Hay was the dominant crop in this area, occupying 62.7 percent of the total crop acreage, grain (mostly oats) occupied 27 percent, and intertilled crops (mostly potatoes) 10.3 percent. Average yields per acre for the principal crops for this tri-state area for the years 1930-1955 were hay, 1.24 tons, oats, 29 bushels, and potatoes, 156 bushels.

Livestock

Horses supplied animal power for these farms. The average number per farm reporting was approximately 2 from 1930 to 1955 but the percentage of farms reporting horses dropped from 75 percent in 1930 to 26 percent in 1955 as tractors came into the picture. The number of cattle per farm reporting in the tri-state area increased from 10.2 head in 1930 to 18.5 head in 1955. For the same period the number of milk cows per farm reporting increased from 7.1 to 9.7. The percentage of farms reporting sheep dropped from 10.7 percent in 1930 to 8.3 percent in 1955. The number per farm reporting increased from 28 in 1930 to 34 in 1955. Swine were of minor importance in the area. Only one-quarter of the farmers reported swine in 1955 and the number per farm was only 6.1 head. Poultry, mostly chickens, was a minor enterprise on these farms. The number of chickens per farm reporting varied from 48 in 1930 to 72 in 1955 but only a little over half of the farms in the area maintained flocks of chickens.

Property Values and Farm Income

The average real estate value per farm ranged from $1052 in 1880 to $7,464 in 1955 and the value of livestock from $205 to $1,564. The gross cost income from farm operation per farm varied from $355 in 1900 to $2,236 in 1955. Income from sales was distributed as follows: Dairy products, 48.9 percent, other livestock income, 31.4 percent, crop sales, 16.2 percent, other (mostly forest products), 3.5 percent, as an average for the census enumeration years 1910 through 1955.

Population

The total population per square mile was just under 16 in 1950, as compared with 15.3 in 1930. Since 1950 there has been considerable migration out of the area. It is largely young people who are leaving and the average age of those remaining is increasing. Current expansion of taconite mining and an expansion of population and industrial development due to the Great Lakes-St. Lawrence Waterway may provide an increased local market for the farm products of this tri-state area and lead to some expansion of agricultural production.