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May 11 ²¹ 1918

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Committee on Examination

This is to certify that we the undersigned, as a committee of the Graduate School, have given Clinton Graham Worsham final oral examination for the degree of Master of Science . We recommend that the degree of Master of Science be conferred upon the candidate.

Minneapolis, Minnesota

May 11 1921

Andrew Ross
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A STUDY OF FARM ORGANIZATION IN THE
CUT-OVER AREAS OF NORTHERN MINNESOTA

A THESIS

Presented to the Faculty of the Graduate
School of the University of Minnesota in
Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE

By

Clinton Graham Worsham

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A STUDY OF FARM ORGANIZATION IN THE
CUT OVER AREA OF NORTHERN MINNESOTA

INTRODUCTION

During the last twenty years a great deal of research work has been carried on regarding the organization and operation of farms. Data have been obtained by questionnaires mailed to the farmers; by the survey method; and by the detailed cost accounting or route method. The data thus secured deal with farm organization in old and progressive communities. Well-founded principles have been established for the successful organization and operation of well-developed farms. Measures of efficiency for each farm enterprise and for the farm as a unit have been established. Farmers in any of the older agricultural districts of Minnesota may apply the engineering data gathered and tabulated by the investigator to his own business and thus learn the relative profitableness of the various enterprises included in his farm business. There are sufficient data to enable him to plan his farm operations efficiently.

It is but natural that the first farm management investigations should have been made in the older farming districts. Definite systems of farming have been followed there, which gave the basis for a study of the farm business and of types of farming. While the older regions have been thus studied, little attention has been given to studying farms that have been devel-

oped from timber land. Many farms that now compose some of the most successful and prosperous communities were once covered by a heavy forest. These farms have been cleared for so many years that the fact that they were once timber lands has long since been forgotten. In recent years, however, a considerable amount of interest has been manifested in the welfare of the settlers in the cut-over lands of Northern Minnesota. Cut-over lands are lands that have raised a forest of trees and on which the stubble of this virgin crop still remains in the form of stumps. In many localities the pines have reseeded themselves and there is a sturdy second growth of these trees.

In this state settlers are allowed to develop a farm wherever they choose and can obtain the land. Often they buy land without having seen it and without knowing or understanding the hardships that both they and their families must endure while clearing up a farm in the cut-over lands. Minnesota extends no aid to settlers in the form of a classified soil map; no advice is offered them either before or after making their choice of locality, and no financial help is extended in any way. It frequently happens that only after settlers become well established and have a small tract cleared they discover the land to be poorly drained or too sandy or too stony to ever make good farm land. Many of these mistakes could be avoided if the state would use some means of guiding settlers in selecting land for farms.

Some of the states have recognized the enormous problems with which settlers on cut-over land must contend, and have organized colonization companies and extended state aid in

other ways. Many foreign countries have developed various systems of helping settlers to secure homes at the least possible cost and on terms that will enable any one of good character and who is thrifty eventually to own a farm home.

With a view to learning conditions and the problems confronting settlers and their way of meeting them, a letter of inquiry regarding any available statistics that would furnish information concerning the progress of settlers, or that would throw any light on their present conditions was sent to the directors of the state agricultural experiment stations in those states that contained any appreciable acreage of cut-over land. Most of the states have not interested themselves with the problems of the cut-over-land farmers, and those that have carried on investigations have mainly concerned themselves with cost and methods of land clearing and land settlement. Below are a few typical letters selected from about thirty replies.

"Very little has been done here in regard to investigations of cut-over land problems in recent years owing to limited funds, but I am hoping that at the beginning of the new bienium more will be done. In this state, as well as in Minnesota, Wisconsin and Michigan, the cut-over-land problem is outstanding." - Edw. C. Johnson, Dean and Director of the State College of Washington, Pullman, Washington.

"Your letter of September 25, addressed to Dr. W.H. Dalrymple, regarding investigations of cut-over lands, has been received. We have not done any work along this line, but we are sending you one or two circulars on this subject, written some time ago." - Mrs. Ruth Heidelberg, Secretary, Louisiana State University, Baton Rouge, Louisiana.

"I regret to have to report that we have done practically no work in Pennsylvania along the lines laid down in your letter. Nothing whatever has been published relative to cut-over lands and methods of their utilization. I may state, however, that it is one of our problems which we hope to investigate as soon as funds are available for expansion of our experimental work.

The first step, of course, would be a general survey of the extent of such lands and their adaptation to different types of agriculture that will but meet the needs of the development of the state." - Frank D. Gardner, Professor of Agronomy, the Pennsylvania State College, Pennsylvania.

"Investigations were carried on at this institution up to about three years ago, relating to the cost of reclaiming cut-over timber lands. As Mr. Raven, in charge of the work, died very suddenly and unexpectedly, and as the data which he had gathered had not been tabulated, we have been unable up to the present time to get this information in shape for publication." - R.S. Shaw, Dean and Director, Michigan Agricultural College, East Lansing, Michigan.

"We have done no work on the cost and methods of clearing land in this state. At the present time West Virginia has no definite state policy in regard to clearing and settling cut-over land. There is a field for investigation on the subject in the state, but it has not been touched." - A.J. Dadisman, West Virginia University, Morgantown, West. Virginia.

"Your letter of September 25 is received and I have talked over the matter of development of farms, cost and method of clearing lands, etc., with Professor Shaw of the Soil Technology Division. I regret that we are not doing any work of this character in California and therefore have no information that would help you in any way." - Woodbridge Metcalf, Division of Forestry, University of California, Berkeley, California.

"We have published some data on the cost of land clearing, but for the most part have concerned ourselves more with methods than with cost because of the many variations which affect such costs." - John Swenhardt, University of Wisconsin, Madison, Wisconsin.

These letters show clearly that none of the stations have done any research work in farm organization in cut-over areas. Much valuable information has been published on how to get settlers on to land, but little has been written on aiding settlers and helping them to make a living once they get on a cut-over farm. The kind and amount of crops to grow; the kind and amount of livestock to keep; and the size and kind of buildings to erect are of vital importance. Wisconsin has taken the lead in land settlement and has published several bulletins on land clearing and given many valuable suggestions to settlers.

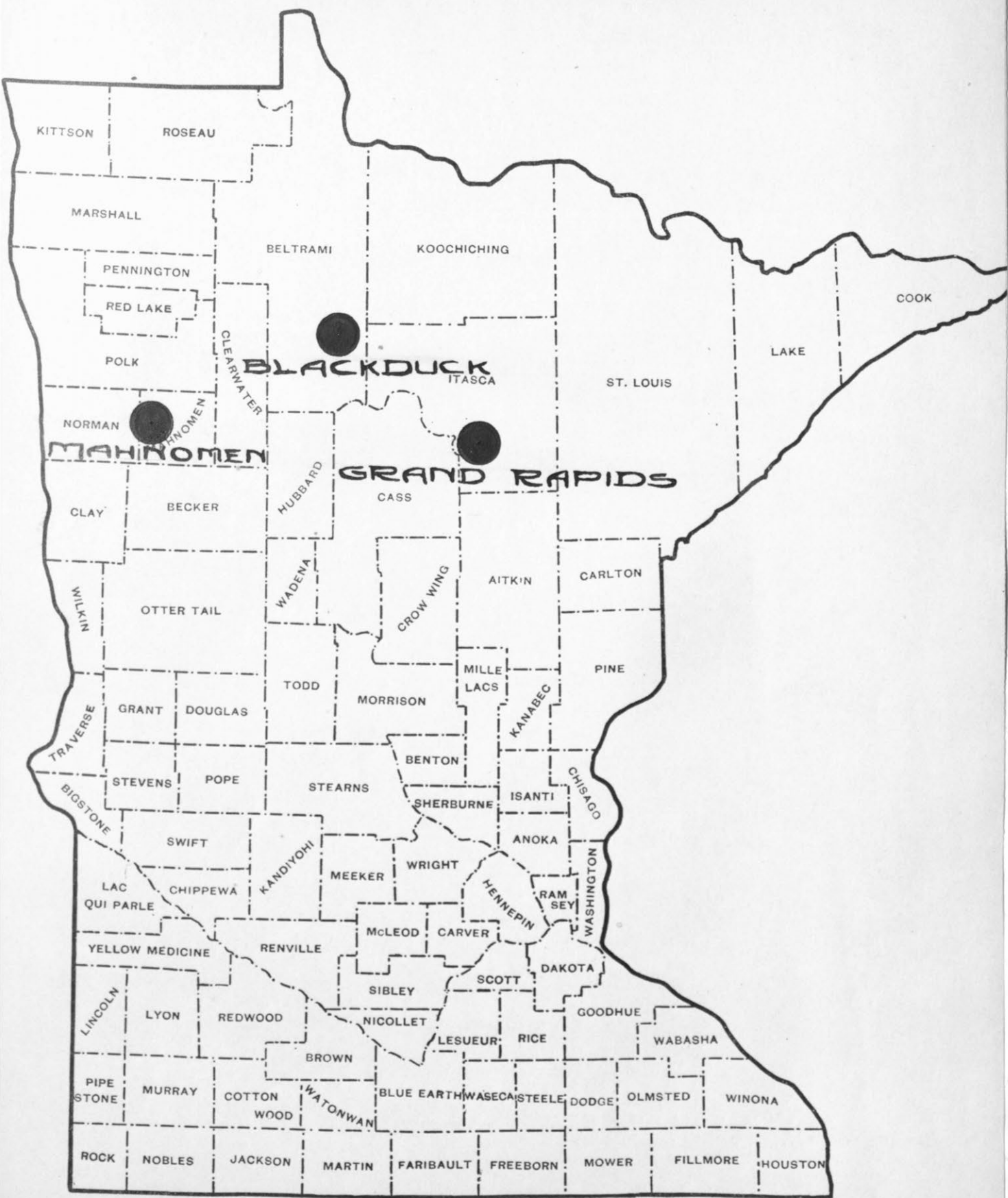
It has not, however, published any report showing the actual conditions of settlers who have spent a few years on their cut-over farms. Only the most successful settlers are mentioned or referred to occasionally, but how the majority are prospering is left to the imagination.

SOURCE OF MATERIAL

In the spring of 1919 the Division of Agronomy and Farm Management and the Division of Agricultural Economics, of the University of Minnesota, and the Office of Farm Management, United States Department of Agriculture, entered upon a study of the economic conditions of the settlers in northern Minnesota. The Division of Agronomy and Farm Management had for its part of the project the determination of the progress and present prosperity of the settlers in three typical areas, Blackduck, Beltrami County; Grand Rapids, Itasca County; and Mahanomen, Mahanomen County. The first two areas are typical cut-over districts, but the Mahanomen area is representative prairie land and is not considered in this paper. The location of these areas is shown on the accompanying map. The Blackduck area was chosen as being a typical clay soil and Grand Rapids is representative of cut-over conditions on a light soil.

The project was planned on a three-year basis, which it was thought would give a good average for the area as it would tend to equalize those conditions that make for large or small yields and abnormal prices and which are reflected in the receipts per farm. A part of the data secured have been made available for this study.

MINNESOTA.



METHOD OF SECURING DATA

Two men were put in the field in July and were furnished a Ford car. Headquarters were established in a town near the center of each area surveyed. From this town the field men worked out on all roads and cross-roads. A stop was made at every farm house within a radius of fifteen or twenty miles and an attempt made to secure from the settler a record of the farm business. No attempt was made to pick out desirable or undesirable settlers or to get records from only successful farmers. It took from three quarters of an hour to an hour and a half to fill out the questionnaire for each farm the first year in the field, when a record was secured of the 1918 farm business. In 1920 it took not more than an hour to record the 1919 farm business of those who had furnished data the year before.

In 1919 the field men secured 69 usable records in the Blackduck area and 67 in the Grand Rapids area. In 1920, in the Blackduck area, 60 records were secured from settlers who had given their record in 1919 and 15 new records were secured, a total of 75 records. At Grand Rapids, 51 records were from men who had given records in 1919, and seven new ones, a total of 58 records.

DESCRIPTION OF AREAS

Blackduck, the center of the Beltrami County area, is located about half way between Bemidji and Red Lake. The soil is a heavy clay and rolling enough to furnish good drainage.

Grand Rapids, the center of the Itasca County area, is at the extreme western end of the Mesaba Iron Range. The soil

in general is a sandy loam, but is spotted with frequent clay areas.

Table I-(10) shows the average climatic conditions for the two areas for a period of twenty years.

TABLE I-(10)

	<u>Beltrami</u>	<u>Itasca</u>
Average annual precipitation	24 inches	27 inches
Average annual snowfall	47 inches	50 inches
Mean temperature for January	3 degrees	5 degrees
Mean temperature for July	66 degrees	66 degrees
Average date of last killing frost in spring	May 20	May 30
Average date of first killing frost in fall	Sept. 20	Sept. 20

While the growing season is short, crops grow rapidly and there is never a lack of moisture, as summer rains are frequent.

Many farms in these localities were homesteaded, but most of the farmers purchased their land from some of the large lumber companies who bought the land originally for the timber that was on it. Most of these companies at present are making an earnest endeavor to sell the land on reasonable terms, demanding only a small cash payment and the balance in from five to ten years at 5 or 6 per cent interest. Raw land sells for about \$25 per acre. The large lumber companies are usually lenient with the settlers and rarely do they take a farm on default in payment. There are many land speculators, however, who have cut-over farms for sale and, who, then the settlers default in their payments immediately foreclose and takes possession of the farms.

PURPOSE OF THIS STUDY

The purpose of this study is to bring out good organization plans for cut-over farms and to set forth the actual conditions on farms studied. Before an attempt to reorganize farms is begun a study must first be made of the existing conditions on the farms. In many agricultural districts farmers have adapted their type of farming to the requirements of local conditions, and are farming efficiently. In other, and usually newer farming sections, no particular type of farming has been developed and each farm is an individual problem where there is urgent need for reorganizing the farm business.

The survey that has been conducted for the last two summers in the two typical cut-over sections in northern Minnesota furnishes the principal basis for any facts or conclusions that may be brought out regarding farm organization on cut-over farms.

FARM ORGANIZATION

Farm organization is the bringing into effective working relations all the parts of the farm with a view to securing the best possible balance between land, labor, capital, and management. It is combining in definite proportions and amounts the various farm enterprises so that the farm will make the largest returns over a period of years. Farm organization treats of the location and selection of the farm, of planning the farmstead and the farm layout, of choosing the kind and amount of crops to grow, of what stock to keep, and of the most efficient use of labor and equipment. The amount of capital the farmer possesses must also be considered when putting together the

various enterprises, as it is frequently the limiting factor immediately effecting the best organization. If the farm is to function profitably, all the facts concerning both the farm and the farmer must be studied and weighed according to the probable effect they will have upon the farm business.

Determining the Locality and the Farm

Good soil is of paramount importance in good farming. Likewise good farming methods are essential to success. There is a wide range of soils in the cut-over land, from soil that is entirely unfit for farming to good clay soil. The only classifications of soils in Northern Minnesota are given in the Minnesota Geological Survey (10). These publications give the results of reconnaissance surveys but can not be used for detailed information. Owing to the fact that cut-over soil is usually spotted and irregular in type there is an urgent need for a detailed soil classification.

Settlers should choose a type of soil with which they are familiar. The land should be free from excessive moisture. Waste land or peat bogs should not form a high percentage of the total land purchased. Unless the soil is naturally well drained it will be of little value in growing crops until it is tilled. As both capital and labor are needed to lay tile, few settlers can afford to so spend their time and money.

The question of clearing must also be considered. Until the underbrush and stumps are removed land can not be worked advantageously. Cutting away the underbrush is comparatively easy.

Getting rid of the stumps may be a short-time job if settlers have the money to hire some clearing done, but it may be a long-time proposition if there is a lack of capital. The kind and number of stumps per acre should be estimated and kept in mind in determining the price to pay for the land.

The farm should be located not only on a good road, but on one that is well traveled and that will be kept open and passable the year round. Land on a good road costs little, if any, more than other land. It is also important to be located near a good market. During the last two years wonderful progress has been made in establishing local cooperative creameries and potato-growing and marketing associations until now nearly every neighborhood has its own organization.

AMOUNT OF LAND TO BUY

Owners of cut-over farms usually have two motives for being on the farm; (1) in order to earn a living and (2) to provide a home. For both reasons it is essential to have a cash income from some source. If they have not saved it out of past earnings they must earn it as they go along, from the farm if possible and, if not, a part of their time must be spent working for some one else.

Why settlers must find outside work to do is indicated in Table II (2).

TABLE II(2)

Order of Progress on 542 Farms in
Northern Minnesota

		: Number	: Amount
		: of	: per
		: farms	: farm
At settlement	- Net worth	: 539	: \$1820
	Cash on hand	: 537	: 596
	Debt	: 539	: 813
First year	- Receipts	: 501	: 422
	Expenditures	: 501	: 971
	Deficit	: 501	: - 537
Second year	- Receipts	: 428	: 482
	Expenditures	: 428	: 677
	Deficit	: 428	: - 195
Third year	- Receipts	: 367	: 578
	Expenditures	: 367	: 639
	Deficit	: 367	: - 61
April 1, 1919	- Net worth	: 542	: 4755
	Debt	: 542	: 923
Increase	- Net worth	: 542	: 2934
	Debt	: 542	: 110
Increase per year in net worth:		: 542	: 630

This table shows that the settlers at the time of settlement were worth \$1820, of which \$596 was cash after making a cash payment on their farm. The first year on the farm expenses are high as buildings must be provided, feed for stock must be purchased, and moving expenses must be met. At the end of the first year there was a deficit of \$537; the second year of \$195; and the third year of \$61. The total deficit at the end of the third year amounted to \$793, but as the settlers had \$596 in cash at the time of settlement the actual deficit was \$197, which was met by obtaining credit at stores and by borrowing or by inheriting money.

The first year on the farm and with only \$596 cash it is impossible for settlers to erect their buildings and to clear and plant enough ground to garden truck and feed for livestock, and to receive in addition \$432 from the sale of farm products as shown in Table II(3). A large part of the \$432 receipts must come from outside sources. It is necessary for settlers to have some cash, and if there are no farm products for sale they have no alternative but to work outside. After the farms begin to produce and to return a small cash income, it may pay settlers to spend their entire time enlarging the farms and to struggle along with a depleted purse for a few years. The alternative is to work outside for cash and to develop their farms more slowly.

Table III shows that men with the fewest acres cleared received the highest percentage of their cash income from outside sources. In the Blackduck area the settlers with an average of 7.4 acres cleared received 55.7 per cent of their cash receipts from outside work. Settlers having an average of 70.8 acres cleared received only 14.8 per cent of their cash income by doing outside work. Settlers in the Grand Rapids group who had 7.6 acres cleared made 41.1 per cent of their cash income by working away from the farm. The ratio of outside receipts to the total cash receipts decreased steadily as the acreage cleared increased, with the exception of the last group. See 5th group (Beltrami area).

TABLE III(A)

Sources of Cash Receipts
Average of 1918 & 1919
Grouped by Number of Acres Cleared Per Farm
Beltrami Area

No. of Acres Cleared Per Farm	Total No. of Recrds	Avg. No. of Acres Cleared Per Farm	Labor Income			Crops			Forest Products			Livestock			Livestock Products			Outside		Total Cash Receipts	
			Amount	Range	% of Total	Value	Range	% of Total	Value	Range	% of Total	Value	Range	% of Total	Value	Range	% of Total	Value	Range		% of Total
Under 11	14	7.4	228.86	-1306 1161	13.2	97.94	0. 414.	13.2	72.77	0. 500.	9.8	61.83	0. 370.	8.3	96.74	0. 395.	13.0	415.46	0. 1500.	55.7	744.74
11 - 20	53	16.8	429.31	- 440 1120	23.5	223.56	0. 1006.	23.5	228.82	0. 3762.	24.1	105.60	0. 687.	11.1	184.89	0. 805.	19.5	207.15	0. 650.	21.8	950.02
21 - 30	28	26.5	240.77	-1668 2050	24.6	250.39	0. 932.	24.6	211.39	0. 724.	20.8	134.08	0. 1116.	13.2	257.28	0. 899.70	25.3	163.71	0. 970.	16.1	1016.85
31 - 40	23	35.9	283.06	-1209 1359	27.4	316.82	0. 1323.	27.4	175.29	0. 900.	15.2	158.65	0. 615.	13.6	307.27	0. 933.	26.6	198.43	0. 700.	17.2	1156.46
41 - 50	17	46.1	476.38	-1160 2712	31.9	404.19	0. 858.50	31.9	65.18	0. 600.	5.2	187.01	0. 797.	14.8	276.66	0. 1055.89	21.9	332.53	0. 1320.	26.2	1265.57
Over 50	9	70.8	612.66	-3341 6565	32.2	756.60	75. 947.	32.2	535.56	0. 1725.	22.8	336.22	0. 920.	14.3	373.44	52.50 1101.50	15.9	346.61	0. 1109.	14.8	2348.43
Average	144	27.5	366.19	-3341 6565	26.0	286.10	0. 1323.	26.0	201.56	0. 3762.	18.3	139.38	0. 1116.	12.7	232.56	0. 1101.50	21.1	241.08	0. 1500.	21.9	1100.68

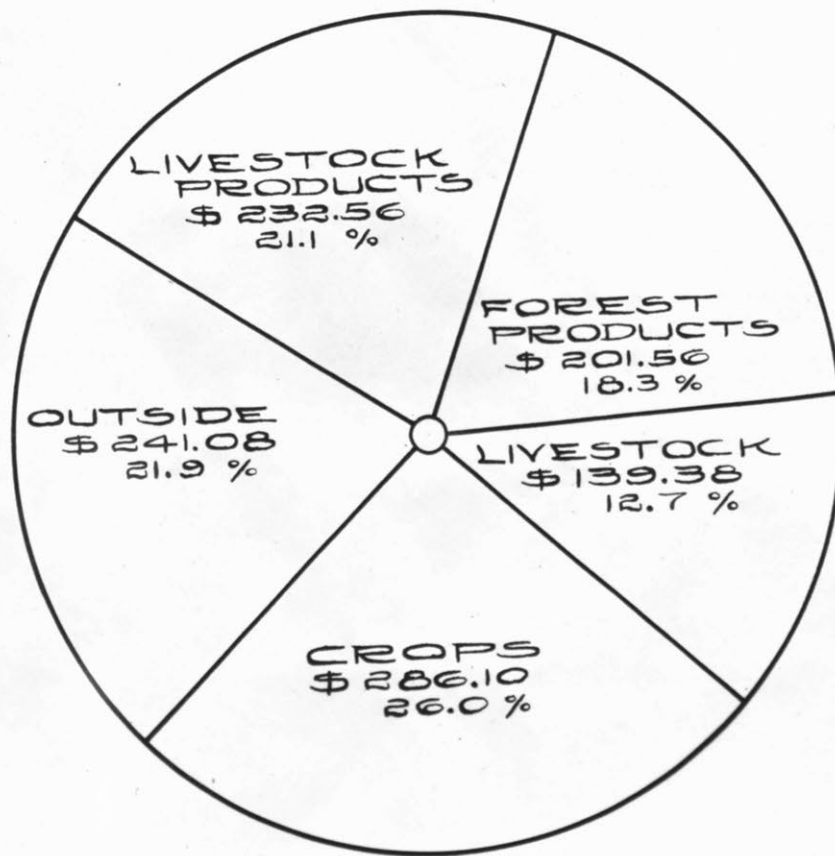


Figure 1 (A) - Sources of cash receipts on farms in the Beltrami area.

TABLE III(B)

Sources of Cash Receipts
Average of 1918 & 1919
Grouped by Number of Acres Cleared Per Farm
Itasca Area

No. of Acres Cleared Per Farm	Total No. of Records	Avg. No. Acres Cleared Per Farm	Labor Income			Crops			Forest Products			Livestock			Livestock Products			Outside		Total Cash Receipts	
			Amount	Range	% of Total	Value Amount	Range	% of Total	Value Amount	Range	% of Total	Value Amount	Range	% of Total	Value Amount	Range	% of Total	Value Amount	Range		% of Total
Under 11	8	7.6	840.45	- 515 2145	24.9	334.44	37.50 1213.50	24.9	11.25	0. 90.	0.8	117.39	0. 319.62	8.7	329.90	0. 587.50	24.5	552.38	0. 2340.	41.1	1345.36
11 - 20	26	16.6	646.21	-1130 2248	40.3	403.05	0. 1442.	40.3	62.01	0. 500.	6.2	79.07	0. 503.	7.9	245.29	0. 1500.	24.5	210.58	0. 2000.	21.1	1000.00
21 - 30	26	26.5	347.35	- 648 2348	37.5	471.11	0. 1524	37.5	81.70	0. 800.	6.5	158.70	0. 525.	12.5	374.62	0. 1644.	29.8	172.65	0. 750.	13.7	1257.78
31 - 40	24	37.5	637.46	- 617 3081	46.4	818.60	18. 2298.50	46.4	137.50	0. 1871.	7.8	179.42	0. 668.	10.2	423.95	0. 824.50	24.1	202.75	0. 1400.	11.5	1762.22
41 - 50	11	47.7	910.85	- 481 2589	59.8	1364.02	206. 3940.	59.8	31.91	0. 225.	1.4	275.40	35. 696.45	12.1	500.00	60. 1095.	21.9	109.10	0. 500.	4.8	2280.39
Over 50	30	82.0	2109.86	-1238 6039	51.9	2209.51	0. 12630.	51.9	118.62	0. 2100.	2.8	422.80	0. 1975.	11.1	825.73	0. 2757.70	19.4	627.60	0. 4900.	14.2	4254.26
Average	125	40.6	969.37	-1238 6039	47.6	1027.24	0. 12630.	47.6	90.83	0. 2100.	4.2	232.26	0. 1975.	10.8	483.68	2757.70	22.4	322.75	0. 4900.	15.0	2156.76

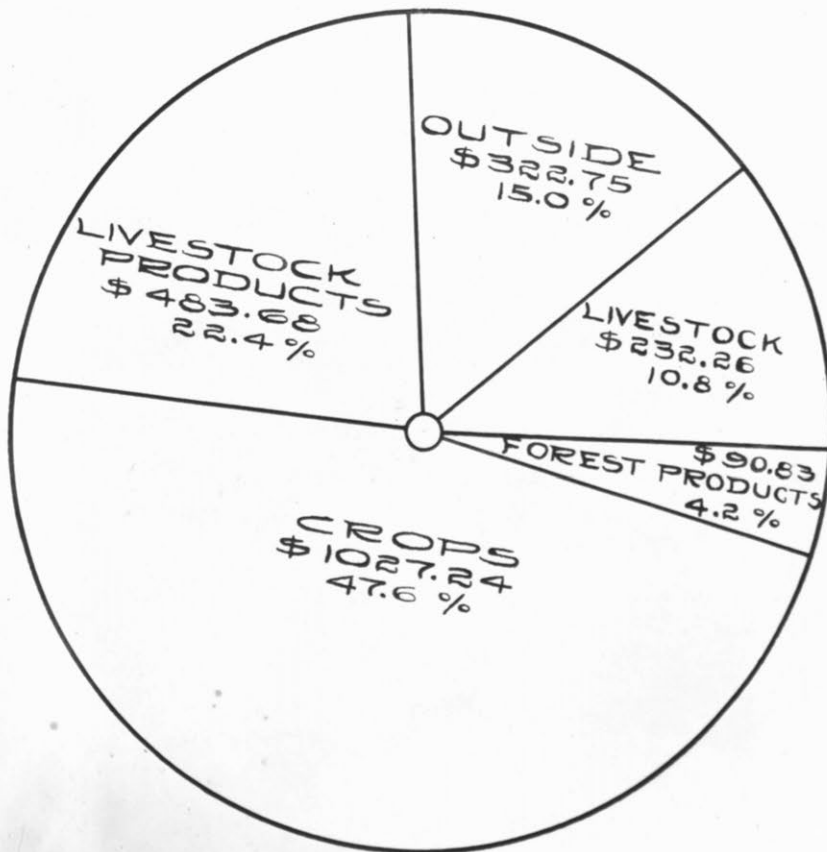


Figure 1 (B) - Sources of cash receipts on farms in the Itasca area.

Since settlers have little cash the first few years on the farm and clear an average of only three acres of land per year, an 80 acre farm is large enough for the average man to purchase.

FARM BUILDINGS

Unless settlers have a large amount of money the first buildings should be small and servicable. Many put up temporary buildings with the expectation of erecting more permanent ones a few years later. It is better to construct the buildings well and to plan them so that they may eventually be converted to some other use or may be added to as it becomes necessary.

If settlers have sufficient capital to hire twenty acres of land or more cleared, they should erect buildings adequate to care for the rapid development of the farm. The size of the buildings depends upon the type of farming adopted. If many dairy cows are to be maintained the hay mow should be large enough to hold at least a winter's supply of hay and bedding. There should be a root cellar in which to store succulent feed for the cattle if there is no silo, or if the farmer expects to carry over his potatoes and market them in the spring.

Settlers believe that it is more economical to build with sawed lumber than to put up log buildings. If there are saw logs on the place they are hauled to the nearest saw mill and there sawed into suitable lumber for the type of buildings desired. The charge for sawing is usually \$6 or \$7 per thousand feet of sawed lumber. Log buildings are thought to be not only a waste of lumber, but a considerable amount of skill is re-

quired to erect them. They require chinking almost every year and are short lived. The logs, if placed horizontally, do not shed water readily and as a consequence soon rot away. Good results have been obtained by splitting small logs and nailing them to the frame of the building in a vertical position and then back plastering.

CLEARING THE LAND

There are two recognized methods of land clearing in use. One is known as the green or forced clearing and the other as ripe or delayed clearing. Green clearing, as the name implies, is removing the stumps directly after logging and immediately breaking and planting the land. Ripe or delayed clearing is done by seeding down and pasturing the land for several years after the logging and brushing operations have been completed. By so doing the stumps will decay and can be removed at a much lower cost than when green. The land, being seeded down, furnishes excellent pasture and perhaps some hay.

The Northeast Demonstration Farm and Experiment Station, near Duluth, has shown that stump land thus seeded down and pastured, as the rate of three or four cows to each five acres, during the period from 1915 to 1919 made an annual gross return of \$15 per acre. (8). The first crops grown on the first breaking of land yielded at the rate of 60 bushels of oats per acre, 22 bushels of barley, and $8\frac{1}{2}$ tons of sunflowers for silage. On the same farm, where no clover had been sown, the first crops yielded at the rate of only 34 bushels of oats per acre and 8 bushels of barley.

Comparing the two systems of land clearing as to the actual cost of clearing, it is found that the delayed method is the less expensive at the Duluth substation. (8).

"It cost \$51.64 to clear an acre of green stump land in 1914, using dynamite. It cost \$55.31 to do the same job with ripe stumps in 1918, using dynamite on the stumps left by man and team. But labor and dynamite were 65 per cent higher in price in 1918. The only fair comparison is to use the same cost prices. If we use the same base price for labor and material, (1914 prices) in both cases, the cost of clearing ripe stumps in 1918 was \$37.72 or a saving of 26.9 per cent where dynamite alone was used.

In 1914 it cost \$59.04 to clear an acre of green stump land using dynamite and stump-puller together, but in 1918 it cost only \$44.08 to clear an acre of ripe stumps, using the same equipment. The saving effected was \$14.96, or 25.3 per cent, in spite of the greatly increased cost of labor and material. Very little dynamite was used and there was a saving of over one-third in labor. If the 1914 cost prices are used in both cases so as to make a fair comparison, there would be a clear saving of \$31.81, or 46 per cent, in favor of delayed clearing using stump-puller in connection with dynamite." (8).

TABLE IV(7)

Plot No.	Number of stumps	Square feet wasted
2.....	250	12,629
3.....	269	10,553
4.....	242	11,132
8.....	266	10,013
12.....	281	10,968
Total.....	1308	55,275

"A ten acre field contained 1308 stumps and each stump occupied an average of 42 square feet, making a total space of 55,275 square feet or 1.27 acres. By leaving the stumps on the land, 12.7 per cent of the ten-acre field was wasted in addition to the extra labor involved in dodging the stumps while cultivating the field." (7).

The cost of clearing land in the Blackduck and Grand Rapids areas is shown in Table V.

TABLE V

Cost of Clearing per Acre in Two Typical Cut-over Districts

	Blackduck		Grand Rapids	
	Quantities	Value	Quantities	Value
Labor - man hrs. 30¢	107.5	\$32.35	133.1	\$39.94
- horse hrs. 20¢	57.3	10.26	73.9	14.78
Dynamite - lbs.	44	9.95	48	11.40
Caps - number	64	1.36	65	1.47
Fuse - feet	93	1.17	86	1.34
Total cost		\$54.99		\$68.93
Settler's estimated cost		46.48		54.90
Number of stumps	140		103	
No. years logged off	14.3		22.2	

The figures are for an average of 160 acres cleared in the former area and 198 acres in the latter. The data were computed from estimates given by settlers on recent clearings. A rate of 30 cents per hour for man labor and of 20 cents per hour for horse labor was assumed for both areas. The work at Grand Rapids required 26 more man hours and 17 more horse hours than that in the Blackduck area. There were 140 stumps per acre in the Blackduck area and 103 in the Grand Rapids area, but there were only 44 pounds of dynamite used per acre in the former area compared with 48 pounds in the latter. On the stump basis 0.3 pound of dynamite was required in the Blackduck area, and 0.5, of 0.2 pound more per stump, was needed in the Grand Rapids area.

Sandy soils contain less moisture than clay soils. As the soil in the Grand Rapids district is sandy, a greater amount of explosive is required per stump. Table VI (7) shows the comparative cost of stump by dynamite in dry and wet soils.

TABLE VI (7)

Comparative Cost of Stump Removal by Dynamite in Dry & Wet Soils

	:No. of: :stumps:	:Lbs.of: :dyna- :mite	:No. of: :caps	:Hours: :labor:	: Cost per Stump - cents			
					: Dyn. :	: Caps :	: Labor:	: Total
Dry*								
Aug. 6-7	: 75	: 133.75	: 123	: 39	: 28.53	: 13.12	: 13	: 54.65
Wet								
Oct. 26	: 103	: 99.5	: 112	: 46.5	: 15.6	: 8.78	: 11.4	: 35.78

*8.03 inches of rain fell between dates.

In a dry soil 1.8 pounds of dynamite was required per stump while in a wet soil only 1 pound was needed to do the same work. The low amount of dynamite required per stump as shown in Table V is explained by the fact that the total number of stumps per acre included all stumps 8 inches in diameter or larger, and many of them could be pulled directly with a team and no explosive was required.

In some western states the stumps are frequently burned out by placing a metal hood over them to create a draft. This method of clearing land is slow and requires considerable experience to burn away the entire stump. This method is not used in Minnesota.

Some facts regarding what settlers have done in land clearing are shown in Table III. An average of 69 farms in the Blackduck area had 1.2 acres cleared when the settlers moved in. The first year 2.4 acres were cleared and the second year 2.8 acres. During the 10.6 years the settlers had been on their farms they had cleared a total of 26.5 acres, or an average of 3.3 acres per year. An average of 67 settlers in the Grand Rapids area had been on their farms 11.6 years and during that time cleared 30.8 acres; when they took possession of their places 5.2 acres were ready for the plow, making a total of 36.0 acres cleared. The first year they cleared 3.7 acres; the second year 2.7 acres, and they have averaged 3.5 acres annually.

CROPS GROWN

The usual custom on cut-over farms is to grow crops in a three-year rotation. The crops commonly grown are oats,

TABLE VII(A)
 Facts Regarding Clearing
 Grouped by Number of Acres Cleared
 1918
 Beltrami Area

No. Acres Cleared Per Farm	No. Farms	Avg. No. Acres Per Farm	Range & Size of Farm	No. Yrs. Settled on Land	Avg. Net. Worth at Time of Settling	Avg. No. Acres Cleared For Plow When Sold	Average Amount of Land Cleared			
							1st Year	2d Year	Total	Annually
10&Under	8	80	40- 160	5.3	\$ 772	--	2.3	2.2	7.5	1.4
11 - 20	26	184	37- 560	9.6	1223	1.44	2.1	2.2	16.8	1.8
21 - 30	16	112	40- 480	9.3	1438	1.34	3.5	3.1	27.9	3.0
31 - 40	9	169	80- 388	14.3	1094	2.5	1.9	1.9	38.0	4.3
41 - 50	6	208	101- 303	13.5	1616	0.42	2.3	8.5	47.0	3.5
51&Over	4	265	160- 400	19.8	389	--	0.6	0.6	70.8	3.6
Average	69	162	37- 560	10.6	1189	1.22	2.4	2.8	26.5	3.3

TABLE VII(B)

Facts Regarding Clearing
Grouped by Number of Acres Cleared
1918

Itasca Area

No. Acres Cleared Per Farm	No. Farms	Avg. No. Acres Per Farm	Range & Size of Farm	No. Yrs. Settled on Land	Avg. Net Worth at Time of Settling	Avg. No. Acres Cleared For Plow When Settled.	Average Amount of Land Cleared			
							1st Year	2d Year	Total	Annually
10 & Under	7	56	11- 116.5	3.2	\$542	3	1.6	0.9	7.5	.74
11 - 20	16	87.9	31.5- 160	8.7	1241	1.4	2.1	1.2	16.7	2.9
21 - 30	14	100	40- 190	13.6	1557	4.2	2.9	3.9	27.1	3.7
31 - 40	13	118.6	72- 180	12.5	860	6.0	2.8	1.3	37.7	4.3
41 - 50	5	175.4	133- 240	14.8	1777	13.2	.4	2.6	47.4	2.3
51 & Over	12	231.0	80- 600	14.8	2365	8.6	10.1	6.1	82.3	5.2
Average	67	125		11.6	1318	5.2	3.7	2.7	36.0	3.5

or some other variety of small grain, which is seeded to clover. The following year two crops of hay are cut and the sod turned under. The next year the field is planted to corn, potatoes, roots and some other cultivated crop. Settlers meet the requirements of a good rotation as their rotation includes a grass crop, a legume, and a cultivated crop. That such rotations give a satisfactory cropping method is indicated by the results during the ten-year period, 1904 to 1914, on the experiment farm at Grand Rapids (5), "where an average yield of 38.99 bushels of oats per acre were grown, 2.22 tons of clover hay first cutting, and 1.45 tons second cutting, or a total of 3.67 tons. Silage yielded 9.45 tons per acre green which would equal about 3.5 tons of fodder corn. Potatoes made an average yield of 243.4 bushels per acre and root crops 14.56 tons per acre."

The crops grown by the settlers in the two areas surveyed are shown in Table VIII and Figure 2. There is a decided uniformity of results. The proportion of the acreage of the various crops to the total number of crop acres is strikingly similar in both areas. The per cent that the number of acres of small grain is to the total crop acres is 39.9 in the Blackduck area and 33.3 in the Grand Rapids area; that of corn is 1.0 and 5.0, respectively. As the Grand Rapids area has a lighter soil, corn can be grown more successfully there than in a district having a heavy clay soil like that of the Blackduck area. Potatoes occupy 12.1 per cent of the total crop acres in the Blackduck area and 17.1 in the Grand Rapids area. The fact that there is a better potato market at Grand Rapids than at Blackduck partly explains the small difference in acreage in favor of the former

TABLE VIII(A)
Crops Grown
Average 1918 & 1919
Grouped by Number of Acres Cleared Per Farm
Beltrami Area

Total No. Acres Cleared Per Farm	Avg. No. Acres Cleared	No. Farms In Group	Avg. No. Acres Per Farm	Labor Income		Small Grain			Corn			Potatoes			Misc. and Roots			Tame Hay			Wild Hay		Total No. Acres of Crops Grown (Omitting Wild hay)
				Amount	Range	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	
Under 11	7.4	14	59.3	229	-1306 1181	2.3	0. 5½	32.4	0.	0.	1.6	0. 7½	22.5	0.0	0. ½	3.2	0. 10.	45.1	5.8	0. 18.	7.1		
11 - 20	16.8	53	152.7	429	- 440 1120	5.3	0. 21½	37.3	0.2	0. 4.	2.0	.12 8.	14.1	0.1	0. 1.25	6.6	0. 19.8	46.5	3.5	0. 20.	14.2		
21 - 30	26.5	28	154.6	241	-1668 2050	6.3	1. 14.	35.4	0.2	0. 3.33	2.0	.25 6.5	11.2	0.4	0. 8.	8.9	0. 19.	50.1	4.4	0. 35.	17.8		
31 - 40	35.9	23	163.9	283	-1209 1359	8.6	2. 29.	37.7	0.1	0. 1.	2.9	.5 10.	12.7	0.4	0. 2.5	10.8	2. 26.	47.4	2.1	0. 15.	22.8		
41 - 50	46.1	17	211.4	476	-1160 2712	12.3	1. 25.	45.4	0.4	0. 6.	2.6	0. 7.	9.6	0.3	0. 1.5	11.5	2. 38.	42.4	0.8	0. 25.	27.1		
Over 50	70.8	9	330	613	-3341 6565	27.0	11.5 36.7	46.6	1.3	0. 4.	5.7	2. 12.	9.8	0.5	0. 2.	23.4	12. 40.	40.5	9.7	0. 50.	57.9		
Average	27.5	144	280.5	366	-3341 6565	7.9	0. 37.7	39.9	0.2	0. 6.	2.4	0. 12.	12.1	0.3	0. 8.	9.0	0. 40.	45.5	4.6	0. 50.	19.8		

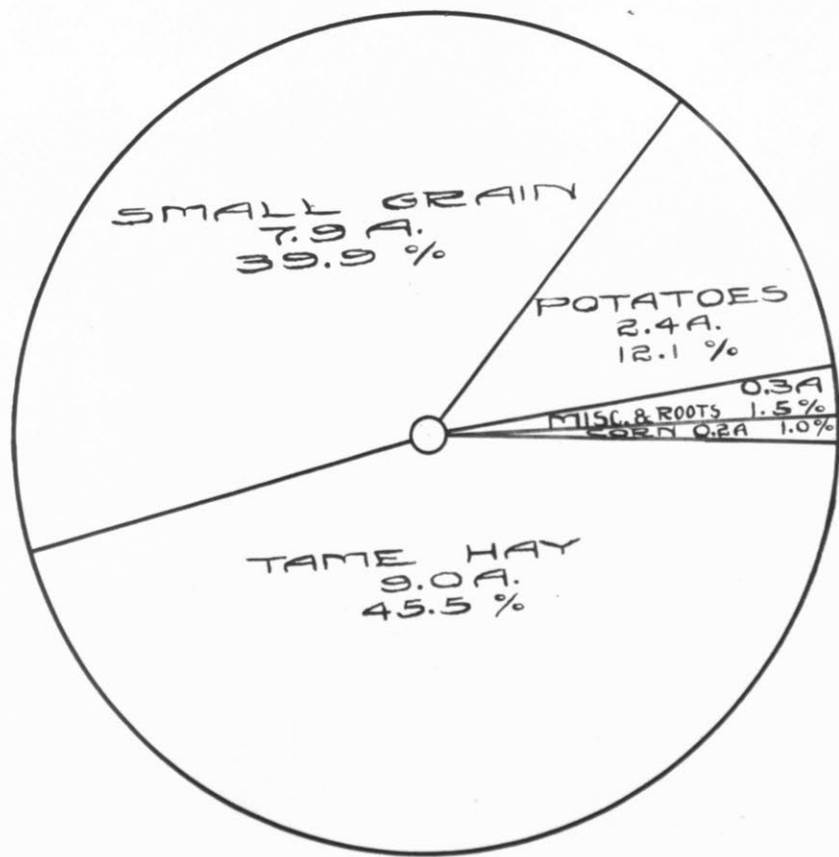


Figure 3 (A) - Crops grown on farms in the Beltrami area.

TABLE VIII(B)

Crops Grown
Average 1918 & 1919
Grouped by Number of Acres Cleared Per Farm
Itasca Area

Total No. Acres Cleared Per Farm	Avg. No. Acres Cleared	No. Farms In Group	Avg. No. Acres Per Farm	Labor Income		Small Grain			Corn			Potatoes			Misc. and Trees			Tame Hay			Wild Hay		Total No. Acres of Crops Grown (Omitting Wild Hay)
				Amount	Range	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	% Total	No. Acres	Range	
Under 11	7.6	8	55.5	841	- 515 2145	2.9	0. 5.	26.4	0.3	0. 1.	2.7	3.0	0. 7.	27.2	1.7	0. 1.	15.5	3.1	0. 9.	28.2	5.7	0. 16.	11.0
11 - 20	16.6	26	82.9	646	-1130 2248	4.2	0. 13.	30.0	0.4	0. 3.5	2.9	3.2	.5 11.	22.9	0.2	0. 1.	1.4	6.0	0. 20.	42.8	5.5	0. 30.	14.0
21 - 30	26.5	26	110.9	347	- 648 2348	6.5	0. 16.3	30.5	1.4	0. 10.	6.6	4.1	0. 10.	19.2	0.2	0. 2.5	1.4	9.0	0. 25.	42.3	5.8	0. 40.	21.3
31 - 40	37.5	24	117.6	637	- 617 3081	10.5	0. 26.	33.7	2.1	0. 10.	6.7	5.1	1. 15.	16.3	1.0	0. 3.	3.2	12.5	0. 34.	40.1	7.5	0. 46.	31.2
41 - 50	47.7	11	202.9	911	- 481 2589	20.2	10.5 29.	48.2	2.6	0. 12.	6.2	8.1	3. 16.	19.3	0.0	0. .5	0.0	11.0	0. 20.	26.3	15.1	0. 40.	41.9
Over 50	82.0	30	219.8	2110	-1238 6039	18.7	6.5 36.	31.0	2.5	0. 10.	4.1	8.8	0. 40.	14.6	0.3	0. 2.	0.5	30.0	0. 67.	49.8	1.5	0. 12.	60.3
Average	40.6	125	136.9	969	-1238 6039	10.1	0. 36.	33.3	1.6	0. 12.	5.0	5.5	0. 40.	17.1	0.5	0. 3.	1.6	13.8	0. 67.	43.0	5.8	0. 46.	32.1

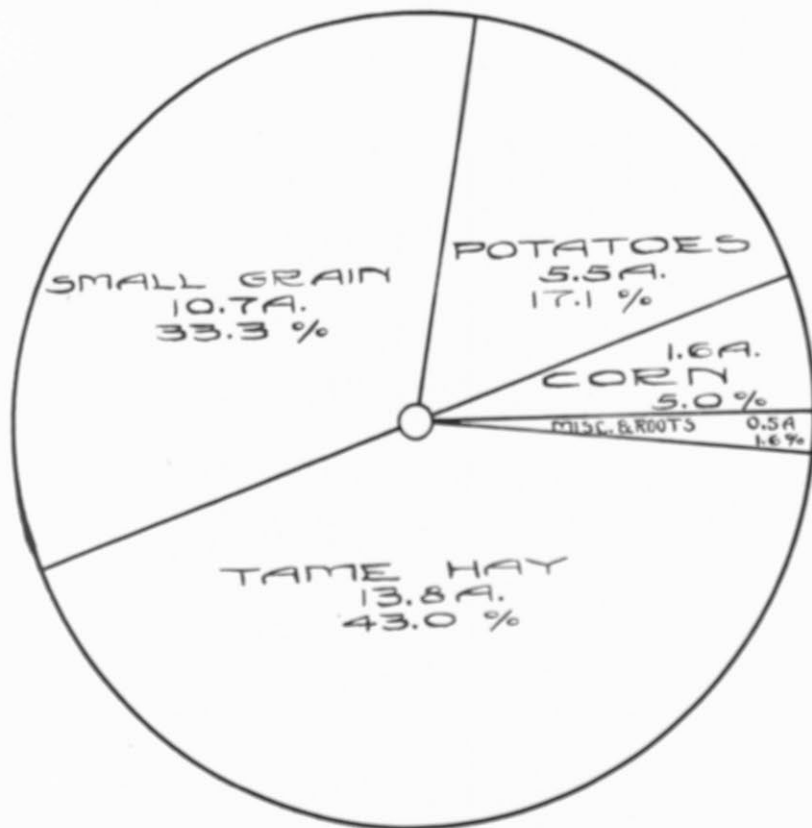


Figure 3 (B) - Crops grown on farms in the Itasca area.

district. Heavy labor demands prevent northern Minnesota settlers from growing root crops, such as mangels, sugar beets and carrots on an extensive scale. The average area planted to root and miscellaneous crops in the Blackduck area was 0.3 acre, and in the Grand Rapids area 0.5 acre. Tame hay constitutes 45.5 and 43 per cent, respectively, of the entire crop acreage. The number of acres from which wild hay was cut is not included in the total crop acres, as it is frequently cut from among the stumps by hand or along old logging tracks that have grown up to timothy and clover. The amount of wild hay land was usually estimated by the number of tons of hay cut from irregular patches of ground and from bottom land adjacent to some winding stream.

Table VIII bears out the statement that the settlers practice a three-year rotation. In the Blackduck district, 39.9 per cent of the total crop acres is in small grain, 14.6 per cent in cultivated crops, and 45.5 per cent in tame hay. The Grand Rapids area has small grain 33.3 per cent, cultivated crops 23.7 per cent and tame hay 43 per cent of the total crop acres.

Small Grain

All varieties of cereal grains thrive in the cut-over districts. Owing to the limited number of acres cleared, settlers must husband their crop land resources and grow only those crops that net them the greatest returns, whether disposed of as cash crops or by feeding to livestock. Settlers do not as a rule have a large enough acreage for the growing of grains to warrant raising many varieties. Usually settlers with only a few acres cleared limit themselves to one kind of grain.

Owing to the small grain fields and the distance between farms, threshing rates are so high that settlers frequently can not afford to have their grain threshed and feed it in the sheaf. Few farmers are equipped with a grain binder, and many of the settlers cut their grain with a mowing machine, throwing back the windrows at every round to prevent the team from tramping out the grain. Others use a scythe or an old-fashioned cradle and bind the grain by hand.

Of the small grains oats has the largest acreage. It not only yields well but is a good feed for livestock. Rye is grown extensively on the lighter soils and proves a good winter grain. There is usually a heavy blanket of snow to protect it from winter killing. Barley is grown on many farms and in feeding is used as a substitute for corn.

Cultivated Crops

Corn:

It was formerly the opinion of many authorities that corn could not be grown in the northern part of Minnesota with assurance that it would ripen. After years of investigation by Minnesota agronomists, a strain of dent corn, Minnesota No. 23, has been developed that ripens soon enough to escape all but the unusually early frosts. This corn does not grow very tall, however, and when cut for silage yields only five or six tons per acre.

Many settlers who grow corn for silage only use a variety that is tall growing and that develops a dense foilage, but is late maturing.

When cut for silage it has but few ears in the dent stage, but will yield several tons more in silage per acre than will Minnesota 23.

Sunflowers:

A substitute for corn as a silage crop has long been sought in the extreme northern states. Many crops have been experimented with, but none have compared so favorably with corn as have sunflowers. At the Grand Rapids substation investigations have been carried on since 1916, and it has been found that (1) "the tonnage produced per acre has been from 25 to 50 per cent larger than that obtained from Minnesota No. 13 corn."

The quality and palatability of sunflower silage (1) "would indicate that the sunflower silage is as efficient pound for pound for milk production as corn silage, however, when sunflowers are fed exclusively the cows will not consume it in so large quantities as they do corn silage, or a mixture of sunflowers, corn and soybeans."

A comparison by chemical analysis of corn and sunflower silage is shown in Table IX(9).

TABLE IX(9)

	Water	Ash	Protein	Carbo- hydrates	Fat	Crude fiber
Sunflower silage	82.84	1.43	1.13	13.7	1.13	0.42
Corn silage	79.1	1.44	1.7	11.	0.8	6.0

Both crops were grown at the Duluth Substation in 1919 and are summarized as follows (9) "we believe sunflowers have a place in our cropping system where corn is not entirely dependable on account of: (1) Growth under low temperatures, (2) resistance to frost, (3) early maturity, (4) dependable yields, (5) great adaptability to soil and growing conditions, (6) high oil content."

Potatoes:

Potatoes are grown for market on nearly every farm in the cut-over area. The business of growing and selling potatoes has become so standardized that there are few localities in which potato growing and marketing organizations are not the best supported of all cooperative associations. There are eight standard varieties of potatoes grown in Minnesota, but the local associations usually limit themselves to one or two varieties and thus increase their efficiency by shipping larger quantities of the same varieties. By growing only a few varieties the farmers are able to recognize the local varieties and to rogue out all foreign ones, thus eliminating much confusion over varieties.

There is a strong market for northern-grown seed potatoes in the southern states, and every year hundreds of carloads of seed potatoes are shipped south. Where seed is sold it is essential that the varieties be as represented. A potato seed certification law was passed in 1919 to protect both northern and southern growers. This law guarantees all potatoes bearing the official tag issued by the Minnesota Board for Potato Inspection and Certification to be pure in variety and free from diseases.

Potatoes may be certified if they pass all inspections, at a cost of about a cent and a half a bushel, and the grower is usually able to sell at from 25 to 30 cents above the market price.

The data in Table III and graphically illustrated in Figure 1, shows that the cash receipts from crops is 26 per cent of the total cash receipts in the Blackduck area and 47.6 per cent in the Grand Rapids area. Table X(4) brings out the fact that on an average of 82 farms potatoes bring 70.2 per cent of the total crop receipts in a district surveyed in 1916 in Itasca county and adjoining the area surveyed in 1918 and 1919. The average for the years 1918 and 1919, as explained in Table XI, shows that the sale of potatoes constitute 90.9 per cent of the total crop receipts in the Grand Rapids area, and 63.5 per cent in the Blackduck area. The high percentage in the former may be accounted for in part by the weather conditions in 1919. In that year a heavy rainfall occurred in June and more potatoes were drowned out on the heavy clay soil at Blackduck than on the lighter soil at Grand Rapids, and the yield was consequently higher at Grand Rapids than at Blackduck being 182 and 129 bushels per acre, respectively.

In the following letter Mr. A.G. Tolaas, Chief Inspector of the Minnesota Board for Seed Potato Inspection and Certification, states his reasons as to why there is a higher average yield of potatoes in Itasca county than in Beltrami county.

"Pursuant to our conversation relative to the production of potatoes in Beltrami and Itasca counties, I can say that personal observation has brought out the following facts:

Both Beltrami and Itasca counties are particularly suited to the growing of potatoes. In Beltrami county the varying types of soil under cultivation range from sandy to heavy

TABLE X(4)

Sales of Farm Crops

Number of Group	Acres Under Cultivation	Average Sales From Farm Products	Per Cent Of Total Income	Per cent of farm crop sales from			
				Hay	Potatoes	Truck & Vegetables	Others
1	Under 1	\$ 8	1.6	-	83.3	16.7	-
2	1 - 4.9	25	4.5	-	5.0	95.0	-
3	5 - 9.9	95	24.1	42.7	54.5	2.8	-
4	10 -14.9	150	33.8	28.2	50.6	21.2	-
5	15 -19.9	140	16.4	27.9	53.9	9.8	8.2
6	20 -24.9	288	46.1	15.9	76.2	15.2	.15
7	25 -34.9	389	47.0	10.3	74.9	13.8	-
8	35 -49.9	360	44.0	27.1	70.4	2.5	-
9	Over 50	1034	65.9	18.4	76.4	5.2	-
All	classes	262	36.9	20.8	70.2	8.1	.95

TABLE XI(A)

Facts About The Potato Crop
Average of 1918 & 1919
Grouped by Number of Acres of Potatoes Per Farm
Beltrami Area

No. Acres Of Potatoes	Avg. No. Acres Of Potatoes	Total No. of Records	No. Acres Cleared Per Farm	Total No. Bu. Raised	No. Bushels Sold	Price Per Bushel	Value Potatoes Sold	Yield Per Acre	Percent Potatoes Are to Total Crop Receipts	Distance to Market	Labor Income
Under .9	0.4	27	20.3	77	31	\$1.09	\$34	193	27.4	7	\$102
1 - 1.9	1.3	39	23.8	188	106	.87	92	150	49.9	4.8	371
2 - 2.9	2.2	35	29.5	266	142	.93	132	124	47.5	4.6	293
3 - 3.9	3.1	16	30.3	419	252	.78	197	135	59.4	6.4	547
4 & Over	6.2	27	36.1	738	491	1.04	512	119	89.0	4.8	646
Average	2.4	144	27.5	315	189	.96	181	129	63.5	5.3	366

TABLE XI(B)

Facts About The Potato Crop
 Average of 1918 & 1919
 Grouped by Number of Acres of Potatoes Per Farm
 Itasca Area

No. of Potatoes	Avg. No. of Potatoes	Total No. of Records	No. Acres Cleared Per Farm	Total No. Bu. Raised	No. Bushels Sold	Price Per Bushel	Value Potatoes Sold	Yield Per Acre	Percent Potatoes Are to Total Crop Receipts	Distance to Market	Labor Income
0 - 0.9	0.4	8	24.5	96	55	\$1.42	\$78	237	29.3	4.3	\$928
1 - 1.9	1.1	17	31.3	250	159	1.24	197	221	72.5	5.6	940
2 - 2.9	2.2	23	31.6	410	291	1.09	317	185	87.7	4.9	260
3 - 3.9	3.1	12	36.1	443	315	1.45	455	142	73.8	5.5	583
4 - 4.9	4.2	10	36.1	715	523	1.27	663	171	92.5	3.6	561
5 - 5.9	5.1	8	35.8	931	663	.87	579	184	97.3	4.6	709
6 - 6.9	6.0	9	47.9	1256	974	.87	845	209	92.9	6.4	889
7 - 7.9	7.1	10	32.0	1221	846	1.02	861	173	93.9	6.1	966
8 - 8.9	8.0	5	38	1220	774	1.28	993	153	98.0	2.6	1767
9 - 9.9	9.0	4	53.5	1638	1080	1.64	1771	182	98.6	4.0	1349
10 & Over	14.9	19	66.1	2774	2428	1.31	3171	151	93.6	4.4	2169
Average	5.4	125	40.6	986	765	1.22	932	182	90.9	4.9	969

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clay, while in Itasca county a great portion of the soil is of a rather mellow sandy clay texture.

The following varieties of potatoes are grown in Beltrami county most extensively: Bliss Triumph and Irish Cobbler, both early sorts, and Green Mountain and Burbank Russet, both late sorts. In Itasca county the chief variety grown is the Green Mountain while a few Bliss Triumph are also grown. Owing to the varying soil conditions in Beltrami county and to the various varieties grown, there is a considerable variation in yield as compared with Itasca county where the soil is of a more uniform character and the chief variety grown is the Green Mountain.

These factors being taken into consideration, the comparative average yield obtained under similar climatic conditions is greater in Itasca county than in Beltrami county. An especially important factor is the average yielding power of early and late varieties. In Beltrami county the early varieties are grown to a large extent, and early varieties as a whole do not yield as high as the late ones. In Itasca county the Green Mountain variety, which is a heavy yielder, is grown almost entirely and the uniformly good potato soil is a very important item contributing to the larger average yields.

During a year of excessive rainfall the average yield of potatoes in the heavier clay soils north of Bemidji is considerably reduced on account of plants drowning out; while during seasons of drouth, the yield on the lighter sandy soils is similarly affected. Although excessive rainfall might cause some reduction in the average yield of potatoes in Itasca county, the reduction would not be so great because the physical character of most of the Itasca soils is better than that of the heavy clay soil in Beltrami county; and in a dry season it is far easier to retain what moisture does occur on such soil than on the more sandy types."

Although Mr. Tolaas' views are founded on personal observation, his work brings him in contact with potato growers in all parts of the state and has given him much information of value on the potato crop.

As Grand Rapids affords a better potato market throughout the year than Blackduck, the farmers at Grand Rapids are slower to bring in their potatoes. Some of them are equipped to keep their potatoes through the winter and market them in the spring.

In the fall of 1919 the potato market rose steadily and did not fall until the harvest of the 1920 crop. In the Grand Rapids area many farmers were benefited by the exceptionally high spring prices, while in the Blackduck area comparatively few settlers had any potatoes for sale in the spring of 1920. The Beltrami farmers received an average of 96 cents per bushel and sold an average of 189 bushels, netting \$181. The average amount sold from the Itasca county farms was 765 bushels of potatoes at \$1.22 per bushel, at a total of \$932. The difference in price is not due to freight rates. Inquiry from the manager of the Minnesota Potato Exchange, brings out the fact that the Exchange paid the producers at Blackduck and at Grand Rapids the same price for the same grade of potatoes.

Settlers in the Grand Rapids area grew an average of 5.4 acres of potatoes per farm. The Beltrami County settlers grew an average of 2.4 acres or three acres less per farm than the Itasca County settlers. There appears to be a strong relationship between the number of acres of potatoes grown and the labor income. In both areas the highest labor incomes were made by the settlers having the largest acreage of potatoes, but those making the lowest incomes did not have the lowest acreage of potatoes. Those having the smallest acreage of potatoes and a large labor income probably received a large part from outside sources.

The greatest acreage of potatoes was grown on those farms having the largest number of acres cleared. This does not mean, however, that as new land is cleared the number of acres planted to potatoes remains in the same proportion to the

total acres of crops. It is shown in Table VIII that in the Blackduck area the per cent of potatoes to the total crop acres falls from 22.5 on farms where there are less than 11 acres cleared to 9.8 on farms where 50 or more acres have been cleared. In the Grand Rapids area, in the same groups the potato acreage falls from 27.2 per cent to 14.6 per cent, respectively. Labor requirements for potatoes are high and it is usually impossible to increase the potato acreage materially without employing some outside help. Farmers in the cut-over area seldom feel that they can afford to hire any labor, so they limit the number of acres planted to potatoes to what the family labor can care for in addition to doing the other farm work.

Root Crops:

Investigations have shown that if the dairy cow is to produce milk economically during the winter months, a succulent feed must be included in the ration. It is the belief of most settlers that until the farms have developed sufficiently to maintain ten or twelve cows it will not pay them to own silos and succulent feed other than silage must be provided. Rutabagas, mangels, carrots, and sugar beets, while not so high in food value as silage, make an excellent substitute. If the roots are properly stored in good cellars they will keep until late in the spring. Table VIII shows that less than 2 per cent of land cleared is used in growing root crops.

Clover:

That clover occupies nearly half of the total crop acres on cut-over farms in northern Minnesota is shown in Table VIII and by Figure 1. It is generally a sure and dependable

crop, often yielding four tons to the acre in good years. Clover makes a rank growth in this region and a great deal comes in voluntarily. Many tons of clover hay are cut from land that has not been stumped, despite the fact that it is generally hand work where so cut. When settlers can cut some tame hay from land that has not been cleared, and in addition to this can cut sufficient wild hay to carry them thru the winter, they will often plant all of their cleared land to crops other than hay.

LIVESTOCK

Settlers must harmonize their livestock and field crops. Winter feed is the controlling factor in determining how much livestock the farm will carry. Under usual conditions, in the cut-over country, the returns from livestock do not warrant the purchase of feeds. Enough stock should be maintained on the farms to consume all the roughage produced. Another factor in determining the amount of livestock to be kept on farms is the amount of labor available during the winter. Many settlers have work in the winter months that takes them away from home, and the farm chores fall on the wife and children. Using the family labor to care for the winter chores is giving employment to labor that probably would otherwise not be employed.

As the farms develop a time will eventually be reached when the settlers will find it profitable to remain on the farm the entire year. Meanwhile, there will probably be a time when the winter chores will be too heavy for the family, and yet not require sufficient labor to keep both the family and the settler busy.

Under such conditions, the settlers will probably remain at home and get out wood during their spare hours. By not working during the winter and thus swelling the outside receipts, the settlers will have only a limited amount of cash with which to pay the running expenses of the farms and to keep their families. When such conditions occur it nearly always means a decrease in the labor income.

Table XIII shows that the lowest labor incomes, with one exception, are made by the settlers in the group who have from 21 to 30 acres of cleared land per farm. While not proving the case, it indicates that when settlers have developed their farms to this extent they find that they must stay on their farms more and work outside less. This point is further borne out by Table III, which shows low outside receipts for the settlers in the group "21 to 30 acres of land cleared per farm."

The kind and number of livestock maintained on April 1, 1915 on 141 farms in ten cut-over counties is presented in Table XII(6). An average of 5 cows was kept per farm and 8.4 head of other cattle and 8.4 hogs, which is more than shown by the two years' survey in the Blackduck and Grand Rapids areas. Chickens averaged 44 to the flock and sheep 25 per farm. Fewer sheep were found in the later surveys.

Data showing the kind and number of livestock on the farms January 1 and the average for 1918 and 1919 are shown in Table XIII and in Figure 3. There is a marked similarity between the averages for the two areas. In the Blackduck area there was an average of 3.2 cows per farm, which was 40 per cent of the total number of animal units.

TABLE XII(6)

Livestock Statistics on 141 Farms
April 1, 1915

County	Farms	Average Number of Livestock per Farm					
		Horses	Cows	Other Cattle	Hogs	Poultry	Sheep
Aitkin	13	4	4.5(11)+	6.0(11)	6.5(11)	25(3)	15(3)
Beltrami and Roseau	14	4	5.5(12)	8.0(8)	9.0(5)	40(12)	75(2)
Carlton	7	3	6.0	5.0(4)	11.0(4)	40(6)	0
Cass	10	3	5.0(7)	13.0(6)	15.0(6)	50(3)	0
Hubbard	12	4	6.0(6)	23.0(11)	13.0(10)	60(11)	26(5)
Itasca	18	3	5.6(15)	9.0(7)	8.0(13)	57(13)	0
Koochiching	10	3	3.5(8)	6.0(8)	8.0(4)	40(6)	12(1)
Lake	7	3	3.5	5.5	2.0(1)	30(5)	0
St. Louis, District 1	24	2	4.0(22)	5.0(16)	6.0(10)	36(17)	2(1)
St. Louis, District 2	26	2	6.0(23)	6.0(23)	2.0(6)	44(18)	3(2)
Average		3	5.0(119)	8.4(101)	8.4(71)	44(94)	25(14)

+The figures in parentheses show the number of farms reporting. In all other instances, all in the locality have reported.

There was an average of 4.8 cows per farm in the Grand Rapids area, which was 46.6 per cent of the total animal units. There was an average of 3.7 head of other cattle constituting 17.5 per cent of the total animal units in the former area and 3.8 head, 16.5 per cent, in the latter area. Horses were 25 per cent of the total animal units in the Blackduck area where there was an average of 2 per farm; in the Grand Rapids area an average of 3 horses was found per farm, and are 27.2 per cent of all animal units. A total of 8 animal units is found on the average farm in the Blackduck area and 10.3 on the average farm in the Grand Rapids area. The number of head of cows, other cattle, and horses in both areas increases uniformly with the increase in the number of acres cleared.

Cattle

Dairy Cows:

Good dairy cows are a profitable investment to settlers, not only because they make possible an immediate cash income, but because they will utilize family labor and give employment at times when there is little else to do. It has been shown that milk cows are nearly half of the total animal units maintained on the farm. By combining "cows" and "other cattle" in Table XIII and in Figure 3, the cattle enterprise is shown to compromise nearly two-thirds of all the livestock kept by the settlers.

In both areas the receipts from livestock products are about one-fifth of the total cash receipts. Combining the

TABLE XIII(A)

Kind and Amount of Livestock Kept
Average of 1918 and 1919
Grouped by Number of Acres Cleared Per Farm
Beltrami Area

Total No. of Acres Cleared Per Farm	Total No. of Records	Avg. No. of Acres Cleared Per Farm	Avg. No. of Acres Per farm	Labor Income		Cows				Other Cattle				Horses				Sheep				Swine				Poultry				Total No. of A.U.
				Amount	Range	Head No.	Range	No.	%	A. U.	Head No.	Range	No.	%	A. U.	Head No.	Range	No.	%	A. U.	Head No.	Range	No.	%	A. U.	Head No.	Range	No.	%	
Under 11	14	7.4	59.3	229	-1306 1181	1.6	0. 6.	1.6	38.0	2.1	0. 6.	0.9	21.4	1.4	0. 4.	1.3	31.0	0.6	0. 4.	0.1	2.4	0.6	0. 3.5	0.1	2.4	2.2	2. 44.5	0.2	4.8	4.2
11 - 20	53	16.8	152.7	429	- 440 1120	2.3	0. 5.5	2.3	39.0	2.1	0. 8.	0.9	15.2	1.7	0. 5.	1.6	27.1	3.7	0. 63.	0.8	13.6	0.6	0. 6.	0.1	1.7	23.4	0. 90.	0.2	3.4	5.9
21 - 30	28	26.5	154.6	241	-1668 2050	3.5	0. 9.5	3.5	46.1	4.3	0. 11.5	1.0	13.2	2.2	0. 6.	2.2	28.9	2.7	0. 21.5	0.4	5.3	1.2	0. 3.	0.2	2.6	3.5	0. 157.5	0.3	3.9	7.6
31 - 40	23	35.9	163.9	283	-1209 1359	4.4	.5 10.	4.4	46.2	4.5	0. 9.	2.0	21.1	2.2	0. 4.5	2.2	23.1	2.3	0. 15.5	0.3	3.2	1.3	0. 4.	0.3	3.2	29.2	0. 107.5	0.3	3.2	9.5
41 - 50	17	46.1	211.4	476	-1160 2712	4.3	1. 11.	4.3	43.9	5.4	0. 10.5	2.3	23.5	2.6	0. 6.5	2.4	24.5	0.9	0. 8.5	0.1	1.0	2.0	0. 4.5	0.4	4.1	32.0	10. 72.5	0.3	3.0	9.8
Over 50	9	70.8	330	613	-3341 6565	4.9	1. 11.	4.9	23.7	8.4	2. 15.5	3.5	16.9	3.3	2. 4.	3.1	15.0	57.1	0. 107.5	8.2	39.6	2.6	0. 5.5	0.4	1.9	63.2	22. 125.	0.6	2.9	20.7
Agerage	144	27.5	280.5	366	-3341 6565	3.2	0 11.	3.2	40.0	3.7	0. 15.5	1.4	17.5	2.0	0. 6.5	2.0	25.0	6.7	0. 107.5	0.9	11.3	1.0	0. 6.	0.2	2.5	30.0	0. 157.5	0.3	3.7	8.0

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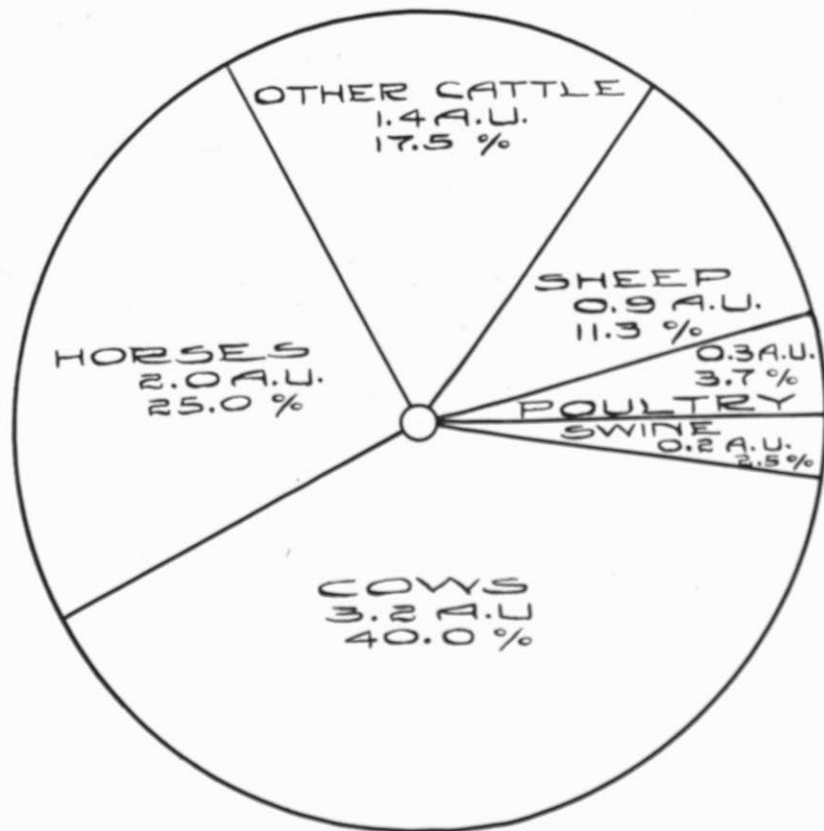


Figure 3 (A) - Kind and amount of livestock maintained on farms in the Beltrami area.

TABLE XIII(B)

Kind and Amount of Livestock Kept
Average of 1918 and 1919
Grouped by Number of Acres Cleared Per Farm
Itasca Area

Total No. Acres Cleared Per Farm	Total No. of Records	Avg. No. Acres Cleared Per Farm	Avg. No. Acres Per Farm	Labor Amount	Income Range	Cows		Other Cattle		Horses		Sheep		Swine		Poultry		Total No. A.U.												
						Head No.	A. U. %	Head No.	A. U. %	Head No.	A. U. %	Head No.	A. U. %	Head No.	A. U. %	Head No.	A. U. %													
Under 11	8	7.6	55.5	841	- 515 2145	2.0	1. 4.	2.0	42.6	0.9	0. 2.	0.4	8.5	1.8	1.5 2.	1.8	38.3	0. 0.	0.8	0. 2.	0.1	2.1	41.1	13. 75.	0.4	8.5	4.7			
11 - 20	26	16.6	82.9	646	-1130 2248	2.5	0. 7.	2.5	45.6	1.8	0. 8.5	0.8	14.5	2.0	0. 3.	1.9	34.5	0.0	0. 5.	0.0	0.4	0. 2.	0.1	1.8	2.3	0. 77.5	0.2	3.6	5.5	
21 - 30	26	26.5	110.9	347	- 648 2348	4.6	0. 10.	4.6	46.4	4.2	0. 15.	2.0	20.4	2.8	.5 6.	2.6	26.6	0.4	0. 6.	0.1	1.0	1.1	0. 5.	0.2	2.0	2.9	0. 63.5	0.3	3.1	9.8
31 - 40	24	37.5	117.6	637	- 617 3081	3.9	0. 13.5	3.9	45.3	2.7	0. 7.5	1.3	15.1	2.8	0. 5.	2.7	31.4	1.0	0. 10.	0.1	1.2	2.3	0. 13.5	0.3	3.5	2.8	0. 50.	0.3	3.5	8.6
41 - 50	11	47.7	202.9	911	- 481 2589	7.2	3.5 18.	7.2	50.7	3.4	0. 6.	1.6	11.3	3.7	2. 5.	3.4	23.9	8.9	0. 90.	1.3	9.2	1.8	0. 5.5	0.3	2.1	3.8	21. 70.	0.4	2.8	14.2
Over 50	30	82.0	219.8	2110	-1238 6039	7.6	1. 16.	7.6	44.7	7.1	0. 20.	3.2	18.8	4.4	1. 7.5	4.1	24.1	9.8	0. 70.5	1.4	8.2	1.6	0. 4.5	0.3	1.8	43.0	6. 100.	0.4	2.4	17.0
Average	125	40.6	136.9	969	-1238 6039	4.8	0. 18.	4.8	46.6	3.8	0. 20.	1.7	16.5	3.0	0. 7.5	2.8	27.2	3.4	0. 90.	0.5	4.9	1.4	0. 13.5	0.2	1.9	32.5	0. 100.	0.3	2.9	10.3

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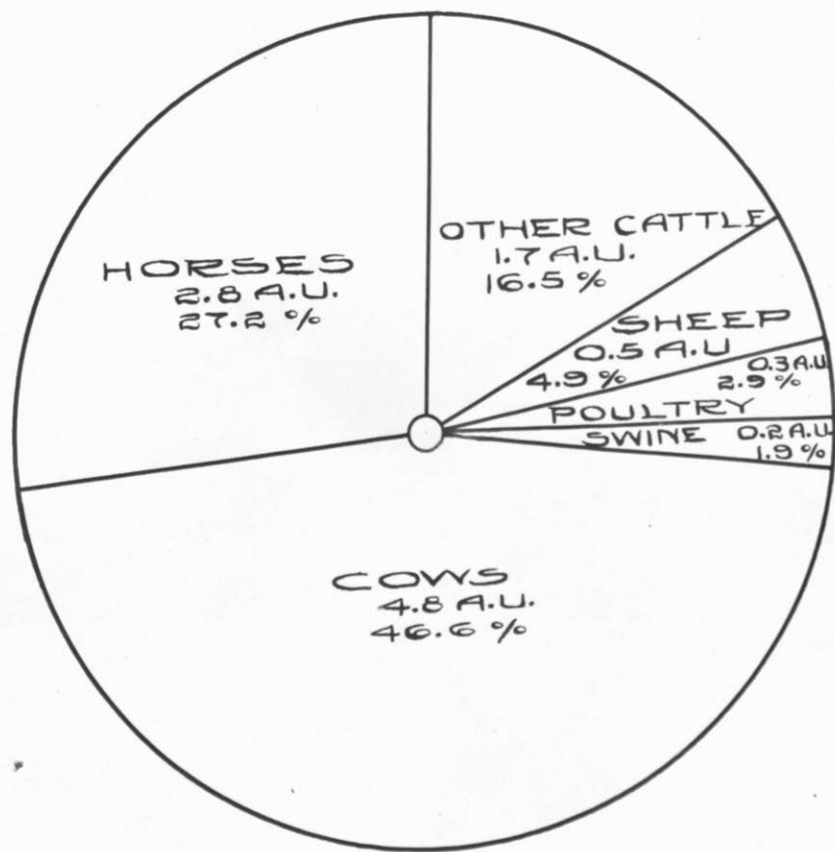


Figure 3 (B) - Kind and amount of livestock maintained on farms in the Itasca area.

receipts from "livestock" and "livestock products" they form one-third of the total cash receipts. Data regarding the receipts from dairy products are presented in Table XIV. The Beltrami county settlers received an average of \$332.56 total cash receipts from the sale of dairy products, and used dairy products valued at \$277.05 in the home, making a total return of \$509.61 exclusive of the value of skim milk. There were 3.2 cows per farm which returned an average of \$159.35 per cow. The 4.8 cows per farm in the Grand Rapids area returned \$483.68 in cash and furnished the table with products valued at \$282.40, making a total of \$766.08. There was an average return of \$159.60 per cow, which is only 35 cents per cow higher than from the average cow in the Blackduck area.

Beef:

Winter feed is the limiting factor in the number of animals that can be maintained on farms. Settlers try to keep enough cows through the winter to utilize all of the available family labor, and there is usually enough family labor available to milk all of the cows for which there is winter feed. For this reason beef raising is not adapted to cut-over farms. If settlers could borrow sufficient capital to enable them to graze cattle in carload lots, it is possible that it would be a profitable venture. No settlers were found in the two areas surveyed who made a business of raising beef cattle.

Swine

Table XIII shows that an average of 1 hog per farm is kept by the Beltrami county settlers. There is a gradual

TABLE XIV

Receipts Per Cow
Average of 1918 & 1919
Grouped by Number of Acres Cleared Per Farm
Beltrami Area

No. of Acres Cleared Per Farm	Total No. of Farms	Avg. No. of Acres Cleared Per Farm	Cash Receipts From Dairy Products	Value of Dairy Products Used in House	Total Receipts From Dairy Products	No. of Cows Per Farm	Avg. Receipts Per Cow
Under 11	14	7.4	\$96.74	\$236.12	\$332.86	1.6	\$208.04
11 - 20	53	16.8	184.89	197.15	382.04	2.3	166.10
21 - 30	28	26.5	257.28	275.31	532.59	3.9	136.56
31 - 40	23	35.9	307.27	366.00	673.27	4.0	168.32
41 - 50	17	46.1	276.66	354.99	631.65	4.3	146.90
Over 50	9	70.8	373.44	428.40	801.84	5.0	160.37
Average	144	27.5	232.56	277.05	509.61	3.2	159.25

Itasca Area

Under 11	8	7.6	329.90	188.49	518.39	2.0	259.20
11 - 20	26	16.6	245.29	204.40	449.69	2.5	179.88
21 - 30	26	26.5	374.62	305.32	679.94	4.7	144.67
31 - 40	24	37.5	423.95	226.69	650.64	3.9	166.83
41 - 50	11	47.7	500.00	420.95	920.95	7.2	127.91
Over 50	30	82.0	825.73	337.25	1262.98	7.6	166.18
Average	125	40.6	483.68	282.40	766.08	4.8	159.60

increase in numbers as the amount of cleared ground increases. In the group having the smallest acreage of land cleared an average of 0.6 hog per farm is found, while farms with more than 50 acres of cleared land have 2.6 hogs per farm. The largest number of hogs found on any one farm in this district was six, and some farms kept no hogs at all.

There is a tendency in the Grand Rapids area for the settlers who have the largest number of cleared acres to keep the largest number of hogs. The highest number is 13.5. The average is 1.4 hogs.

The above figures show that only hogs enough to furnish meat for the table are raised, and that very few are marketed.

Sheep

Sheep are found on so few farms that no tendencies can be shown. As sheep require a well-fenced pasture, the average settler is unable to keep sheep. Many settlers who regard sheep raising with favor have no flocks because they lack capital with which to buy either sheep or fencing. Table XIII shows the largest flocks in the Blackduck area to contain 107 head. The average of 6.7 sheep per farm means little, as sheep were found on so few farms. Sheep are less popular in the Grand Rapids area than in the Blackduck area. An average of 3.4 sheep were kept per farm. The largest flock had 90 head.

Poultry

An average of 30 chickens was kept on the farms in the Blackduck district and of 32 in the Grand Rapids area, as

shown in Table XIII. That poultry is kept primarily for household consumption is shown by the fact that such small flocks are maintained on the farms, and further by the fact that in the Blackduck area settlers consumed poultry and eggs valued at an average of \$53.46 and \$54.26 in the Grand Rapids area, Table XVIII.

The primary object in keeping chickens on most cut-over farms is to furnish eggs and meat for household use. Only the surplus products are marketed. There seem to be great possibilities in increased poultry production on cut-over farms. In the cut-over district of Barnum, Carlton County, the settlers apparently have extremely high returns from the sale of poultry and poultry products. Some farmers keep as many as a thousand birds.

Whether this is a specialized industry that is peculiar only to this district or whether it is an enterprise which the settlers in other localities have disregarded or of which they have not known the possibilities, is not known. It would seem, however, that other areas located equally advantageously in regard to marketing conditions might profit by the experience of the settlers in the Barnum district.

Horses

That a strong correlation exists between the number of acres cleared and the number of horses per farm is illustrated in Table XV. In the Blackduck area the lowest number of crop acres per horse is 7.4 acres and the highest, 18.7, is on farms where an average of 70.8 acres are cleared. The

TABLE XV

Number of Crop Acres Per Horse
Grouped by Number of Acres Per Farm
Beltrami Area

Total No. of Acres Cleared	No. of Acres Cleared Per Farm	No. of Farms	No. of Crop Acres	+No. Acres Wild Hay	No. Horse A.U. per Farm	No. Acres in Crops Per Horse
10 & Under	7.4	14	7.1	5.8	1.3	5.5
11 - 20	16.8	53	14.2	3.5	1.6	8.9
21 - 30	26.5	28	17.8	4.4	2.2	8.1
31 - 40	35.9	23	22.8	2.1	2.2	10.4
41 - 50	46.1	17	27.1	0.8	2.4	11.3
Over 50	70.8	9	57.9	9.7	3.1	18.7
Average	27.5	144	19.8	4.6	2.0	9.9

Itasca Area

10 & Under	7.6	8	11.0	5.7	1.8	6.1
11 - 20	16.6	26	14.0	5.5	1.9	7.4
21 - 30	26.5	26	21.3	5.8	2.6	8.2
31 - 40	37.5	24	31.2	7.5	2.7	11.6
41 - 50	47.7	11	41.9	15.1	3.4	12.3
Over 50	82.0	30	60.3	1.5	4.1	14.7
Average	40.6	125	32.1	5.8	2.8	11.5

+Not included in crop acres.

average number of crop acres per horse is 9.9.

The settlers in the Grand Rapids area, who had an average of 7.6 acres cleared per farm, kept one horse for every 6.1 crop acres, while the farms with an average of 82 acres cleared maintained one horse for every 14.7 crop acres. The average for this area is one horse for 11.5 crop acres.

In both areas, with the exception of the 21-30 group in the Blackduck area, the number of crop acres per horse increases regularly with the increase in the number of acres of cleared land. In older farming sections of Minnesota, one horse is expected to care for 25 to 30 crop acres and this is the ratio that the cut-over farms seem to be approaching.

Possibilities of Purebred Stock

Common or low-grade stock was the rule rather than the exception on the cut-over farms surveyed. Settlers have no money with which to buy high-priced stock and must be content with taking whatever stock the neighbors have to offer. If it were possible for them to buy purebred or high-grade stock in their own locality and at reasonable prices, they would gradually dispose of their less productive stock and grade up their herds. Another reason for keeping common stock is that many settlers do not appreciate good stock and are not familiar enough with farm practices to care for any kind of stock efficiently. It is true, however, that most farmers realize that it is more profitable to keep a few highly productive animals than to keep a larger number of poorer ones.

LABOR INCOME

Labor income alone is not a good measure of the efficiency of settlers as farmers. If the outside receipts, amounting to 55.7 and 41.1 per cent of the entire cash receipts of the settlers in the group "Under 11" acres of cleared land per farm in Table III, are considered as a part of the receipts made in the actual farming operations, then labor income is one of the best measures of the settler's ability. If the work performed in earning outside receipts is not considered as a part of the farm operations, then it is question whether or not the settlers should be regarded as farmers. When the cash receipts for outside work form so high a percentage of the total cash receipts, it would be equally fair to classify them under some occupations other than farming.

The labor incomes and the labor incomes minus outside receipts, of the settlers studied in the surveys, are presented in Table XVI. The settlers in the Blackduck area in the group "Under 11" have almost as large a labor income as those in the groups "21-50" and "31-40." After deducting the outside receipts from the labor incomes the settlers in the "Under 11" group fall far below any of the other groups. In the Grand Rapids area the group "Under 11" ranks third in labor income, but after taking away the receipts for outside labor they fall to fifth place. The smaller the labor income and the higher the receipts for outside work, the more "labor income minus outside receipts" will be affected.

TABLE XVI(A)

Labor Income Minus Outside Receipts
 Average of 1918 & 1919
 Grouped by Number of Acres Cleared Per Farm
 Beltrami Area

No. of Acres Cleared Per Farm	No. of Farms	Labor Income		Outside Receipts		Labor Income Minus Outside Receipts
		Amount	Range	Amount	Range	
Under 11	14	229	-1306 1181	415	0. 1500.	186
11 - 20	53	429	- 440 1120	207	0. 650.	222
21 - 30	28	241	-1668 2050	163	0. 970.	77
31 - 40	23	283	-1209 1359	198	0. 700.	85
41 - 50	17	476	-1160 2712	332	0. 1320.	144
Over 50	9	613	-3341 6565	347	0. 1109.	266
Average	144	366	-3341 6565	241	0. 1500.	125

TABLE XVI(B)

Labor Income Minus Outside Receipts
 Average of 1918 & 1919
 Grouped by Number of Acres Cleared Per Farm
 Itasca Area

No. of Acres Cleared Per Farm	No. of Farms	Labor Income		Outside Receipts		Labor Income Minus Outside Receipts
		Amount	Range	Amount	Range	
Under 10	8	840	- 515 2145	552	0. 2340.	288
11 - 20	26	646	-1130 2248	211	0. 2000.	435
21 - 30	26	347	- 648 2348	173	0. 750.	164
31 - 40	24	637	- 617 3081	203	0. 1400.	434
41 - 50	11	911	- 481 2589	109	0. 500.	802
Over 50	30	2110	-1238 6039	628	0. 4900.	1482
Average	125	969	-1238 603 9	323	0. 4900.	636

How the labor incomes of the settlers are distributed is illustrated in Table XVII. There is a tendency in both areas for the incomes to be in the group \$201 to \$600. More settlers made high labor incomes in the Grand Rapids area than in the Blackduck area, due principally because of the difference in the potato crop.

VALUE OF FARM PRODUCTS USED IN THE HOUSE

In addition to the labor income earned by the settlers they had a house to live in and farm products to use. No attempt was made to determine the value of the house rent. The value of the farm products consumed in the house is shown in Table XVIII and is shown graphically in Figure 4. In both areas the value of dairy products ranks first, being 35.7 and 34.7 per cent of the total value of all farm products for household purposes. In both areas the value of forest products ranks second. The ratio value of forest products to the total value of all products is 14.9 and 16.5 per cent, respectively; meat ranks third in the Blackduck area but in the Grand Rapids area it ranks fifth and is 14.2 and 13.9 per cent of the total value. The value of crops is fourth in both areas and is respectively 14.0 and 13.6 per cent of the total value. The value of poultry and eggs used stands fifth in the Blackduck area but is third in the Grand Rapids area, and is 13.8 and 16.2 per cent of the total value. "Miscellaneous", "fish and game" and "wool" are sixth, seventh, and eighth, respectively, in both areas.

TABLE XVII

Distribution of Labor Income
Average of 1918 & 1919
Grouped by Number of Acres Cleared Per Farm
Beltrami Area

No. of Acres Cleared Per Farm	No. of Farms	-\$601 and Under	-\$600 to - 201	-\$200 to 200	\$201 to 600	\$601 to 1000	\$1001 to 1400	\$1401 to 1800	\$1801 and Over
10&Under	14	1	1	3	7		2		
11 - 20	53	1	6	10	21	11	2		2
21 - 30	28	3	3	7	6	7	1		1
31 - 40	23	2	4	5	3	5	3	1	
41 - 50	17	2	2	3	3	4	1		2
51&Over	9	2		1	3	1		1	1
Average	144	11	16	29	43	28	9	2	6

Itasca Area

10&Under	8		1	1	1	2	1	1	1
11 - 20	26	1		3	12	2	5	1	2
21 - 30	26	2	8	3	2	6	2	1	2
31 - 40	24	1	1	8	5	3	2		4
41 - 50	11		2		2	3	1	1	2
51&Over	30	1		3	3	2	4	3	14
Average	125	5	12	18	25	18	15	7	25

The total value of all farm products consumed in the house by the settlers in the Blackduck area is \$391.91 and \$506.16 in the Grand Rapids area. If these values along with the value of house rent be considered with the labor incomes earned by the settlers, it shows that they enjoyed a fairly good income, on the average, in 1918 and 1919.

CREDIT CONDITIONS IN THE CUT-OVER AREAS

Although the subject of this thesis is farm organization it would not be complete without presenting a few facts concerning the credit conditions of the settlers on cut-over farms. A study of the credit needs has been made in cut-over areas of northern Wisconsin, and since conditions are comparable to those of the cut-over areas of northern Minnesota the following facts relating to credit conditions in northern Wisconsin are given.

These facts are based on about 100 sample letters and on personal conversations with settlers in different sections. Visits were made by Messrs. Richard T. Ely, B.H. Hibbard and Alonzo B. Cox, the authors of Wisconsin Bulletin 318 (3) to various cut-over districts and first-hand observations were made. These were supplemented by the "county agents, the bankers, the real-estate dealers, successful farmers, settlers, merchants selling to settlers, and editors."

TABLE XVIII(A)

Farm Products Used in the House
Average 1913 & 1919
Grouped by Number of Acres Cleared Per Farm
Beltrami Area

No. Acres of Cleared Land	No. of Farms	No. Acres Per Farm		Fish and Game		Crops		Dairy Products		Poultry & Eggs		Wool		Meat		Miscellaneous		Forest Products		Total Value Farm Products Used in House
		Cleared	Operated	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	
Under 10	14	7.4	59.3	12.21	3.9	27.21	8.6	112.86	35.7	38.51	12.2	5.36	1.7	31.20	9.9	19.69	6.2	68.85	21.8	315.79
11 - 20	53	16.8	152.7	11.81	3.9	46.46	15.3	99.00	32.6	41.73	13.8			39.53	13.0	12.82	4.2	51.95	17.2	303.30
21 - 30	28	26.5	154.6	4.82	1.3	50.86	13.5	136.04	36.1	52.93	14.1	5.54	1.5	44.46	11.8	12.55	3.3	69.29	18.4	376.49
31 - 40	23	35.9	163.9	6.17	1.2	72.31	14.6	186.87	37.7	60.38	12.2	3.48	0.7	88.51	17.8	22.12	4.5	56.35	11.3	496.19
41 - 50	17	46.1	211.4	5.88	1.3	71.72	15.4	186.96	40.1	64.38	13.8	10.88	2.3	58.45	12.5	16.47	3.5	51.41	11.1	466.15
Over 50	9	70.8	330.0	9.22	1.4	87.64	13.0	223.27	33.1	121.84	18.1	6.86	1.0	129.00	19.1	28.67	4.3	67.78	10.0	674.28
Average	144	27.5	280.5	8.73	2.2	55.05	14.0	139.74	35.7	54.26	13.8	3.87	1.0	55.33	14.2	16.34	4.2	58.59	14.9	391.91

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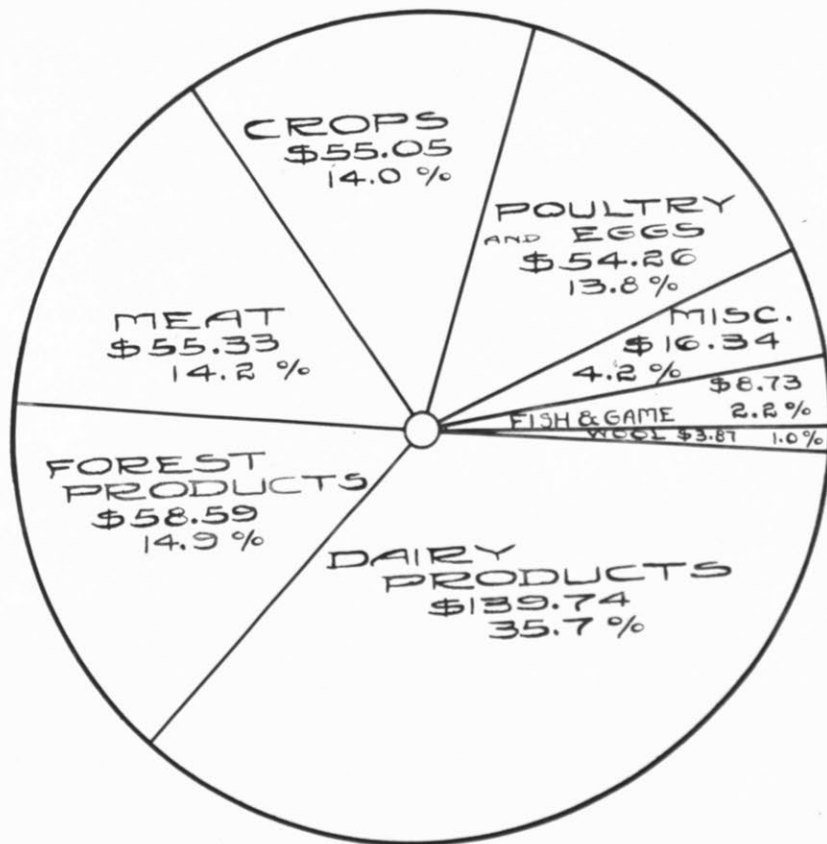


Figure 4 (A) - The value of farm products used in the house on farms in the Beltrami area.

TABLE XVIII(F)

Farm Products Used in the House
 Average of 1918 & 1919
 Grouped by Number of Acres Cleared Per Farm
 Itasca Area

No. Acres of Cleared Land	No. of Farms	No. Acres Per Farm		Fish and Game		Crops		Dairy Products		Poultry & Eggs		Wool		Meat		Miscellaneous		Forest Products		Total Value Farm Products Used in House
		Cleared	Operated	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	Value	% Total	
Under 10	8	7.6	55.5	10.75	5.0	33.25	15.5	78.90	36.7	38.19	17.8			13.13	6.1	10.63	4.9	30.31	14.0	215.16
11 - 20	26	16.6	82.9	10.06	3.6	38.30	13.7	96.07	34.4	47.95	17.1			28.49	10.2	7.38	2.6	51.40	18.4	279.65
21 - 30	26	26.5	110.9	4.29	1.1	55.00	13.7	149.56	37.2	64.74	16.1	2.45	0.6	52.18	13.0	15.72	3.9	58.54	14.4	402.48
31 - 40	24	37.5	117.6	12.33	3.2	61.29	16.1	111.05	29.1	65.15	17.1	1.08	0.2	45.76	12.0	5.52	1.4	79.39	20.9	381.57
41 - 50	11	47.7	202.9	6.45	1.3	73.55	14.6	221.64	44.0	65.34	13.0			58.24	11.6	20.23	4.0	58.45	11.5	503.90
Over 50	30	82.0	219.8	15.81	2.9	64.31	11.9	171.88	31.7	90.92	16.8			86.37	15.9	21.70	4.0	90.98	16.8	541.97
Average	125	40.6	136.9	10.38	2.6	55.17	13.6	141.10	34.7	65.97	16.2	0.72	0.2	52.26	12.9	13.53	3.3	67.03	16.5	406.16

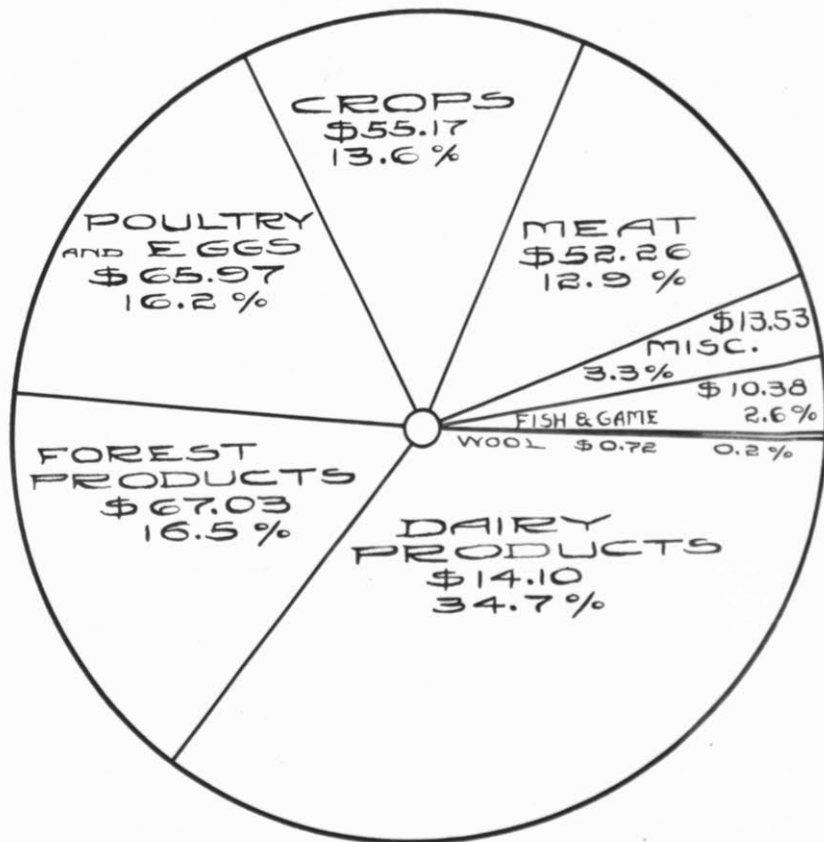


Figure 4 (B) - The value of farm products used in the house on farms in the Itasca area.

"What the Bankers Say"

1. "Will lend about 50 per cent of the value of the land.
2. The settlers usually want to borrow money to pay land contracts, to make improvements in building or clearing, or to buy livestock.
3. The loan is usually made at 6 per cent though it may go as high as 8 per cent.
4. Loans are usually made on straight time and run from 3 to 5 years.
5. From 75 to 90 per cent of the farmers want renewal when their mortgages come due. It is usually granted.
6. About half the banks charge a commission for handling mortgages.
7. Not over 40 per cent of the mortgages sold are sold locally.
8. The rate of interest on chattel mortgages is from 7 to 10 per cent.
9. Most of the banks in the cut-over regions have more applications for loans than they can supply.
10. Most of the bankers assert that the present system of financing the settler is inadequate."

"What the Real-Estate Men Say"

1. "Reports from 57 large land companies out of a possible 100 show about 1800 sales for 1917.
2. About half the settlers were native and half foreign.
3. About 90 per cent had had experience as farmers.
4. The average capital possessed by each was very little above \$500.
5. The usual price of land is \$20 to \$25 per acre.
6. The usual minimum payment demanded for 40 acres was from \$100 to \$200.
7. About four-fifths of the companies reporting furnish no equipment with the land.

8. Most of the companies grant a deed when half the purchase price is paid, about a fourth demand all cash, and the rent grant it on a payment of a third or fourth.
9. Payments on the contract or mortgage usually begin the first year and are supposed to be made in full within about five years. Some companies grant much more liberal terms, especially in exemptions the first year or two from any payment on principal and interest.
10. The interest rate is almost invariably 6 per cent.
11. Most of the replies state that from 75 to 90 per cent of the settlers want extension of time, as their resources are needed for additional farm improvements.
12. Renewals are granted by letting the past due notes run over.
13. The usual excuses for wanting extensions are need of money for improvements, living expenses, sickness, or failure to produce a crop.
14. Most companies report rendering the settlers much moral, educational, and financial assistance without which their chances of success would be materially lessened.
15. Practically all felt a need of a better system of financing settlers."

"What the Farmers and Settlers Say"

"The chief causes of failure in their opinion are: land sharks, high-priced land, lack of credit, and difficulty of land clearing.

Practically 100 per cent say it costs more to clear land than they were led to believe.

About 75 per cent buy on contract with a small payment down. The better companies do not require the purchaser to make any further payment for two or three years. He needs his income for other purposes.

About 80 per cent report being unable to meet their payments as they fall due.

They estimate that where a settler has no clearing to begin with it takes from two to five years to get enough land cleared on which to make a living. This does not include increased value of land.

Ninety per cent say they can not get as much credit as they need.

Markets are usually poor.

A great many report, especially from certain sections, that they did not get as good land as they anticipated."

All evidence tends to show that the first few years on the farm is the critical period for the settlers and the time during which they could use credit to the best advantage. It is also the time in which they can offer the least security to the lender. Under the heading "What the Farmers and Settlers Say" the settlers agree that 80 per cent of those settlers who borrow money fail to meet their payments as they fall due. Assuming that the banks are reasonably careful to whom they lend money, and knowing that 80 per cent of the borrowers are unable to meet their notes when they are due, it is little wonder that an interest rate of from 7 to 10 per cent is charged on chattel mortgages.

SUMMARY

1. No investigations have been conducted in other states to show the progress that has been made and existing conditions on cut-over farms. Most of the states that contain large areas of cut-over lands recognize the fact that this field of investigation has been neglected, and are now formulating projects preparatory to doing such research work.

2. From a farm management view point there is an urgent need for a detailed soil and land utilization survey. Without this survey no comprehensive plans for farm organization can be formulated for cut-over areas.

3. The state should assume some responsibility towards getting settlers favorably located. This could be accomplished by licensing the real-estate dealers, or by having them under the supervision of some existing state department.

4. If settlers are not located on good soil and close to good markets, their progress is seriously retarded.

5. Eighty acres is enough land with which to begin farming in cut-over areas unless settlers possess sufficient capital to hire a part of the land cleared.

6. A lack of capital is the greatest hindrance to settlers in the pioneer stage. A judicious use of capital would eliminate many slow and laborious years in opening up the farms. It would enable the settlers to more rapidly put their farms on a self-supporting basis. Settlers in the pioneer stage are poor risks. This is the principal cause of poor credit conditions.

7. Clearing the land of stumps is one of the settler's largest problems. It is closely associated with the amount of capital he possesses. Usually the smaller the capital the fewer will be the number of acres of land cleared annually.

8. Settlers with the least number of acres cleared received the highest per cent of their cash incomes from outside sources. This condition usually decreases as the cleared land increases.

9. Settlers grow their crops in a rotation consisting of small grain, tame hay and potatoes. About two-sixths of the land cleared is in small grain; three-sixths in tame hay, and one-sixth in small grain.

10. The largest acreage of potatoes was grown on the farms having the largest number of acres of land cleared. However, the highest percentage of cleared land occupied by potatoes is found on farms with the lowest number of acres cleared. The percentage decreases as the number of acres cleared land increases. Potatoes are the best cash crop for the settlers, and the returns constitute a high percentage of the total crop receipts.

11. The number of dairy cows increases proportionately with the number of acres of land cleared. Good dairy stock is closely related to a good income.

12. Only enough hogs and poultry to supply the household needs are raised on cut-over farms.

13. Few settlers maintain flocks of sheep.

14. There is an over-abundance of horse power on farms with only a small acreage of cleared land. This decreases as the number of acres of cleared land increases. On the larger cut-over farms the number of crop acres per horse approaches the ratio, which is found in the older farming districts, of one horse to 25 crop acres.

LITERATURE CITED

- (1) Berg, Otto I.
1920 Sunflowers for Silage. Minnesota Farmers' Institute Annual No. 33: 110.
- (2) Black, J.D.
1920 Progress of Northern Minnesota Settlers. Minnesota Farmers' Institute Annual No. 33: 28.
- (3) Ely, Richard T., Hibbard, B.H., Cox, Alonzo B.
Oct. 1920 Credit needs of settlers in Upper Wisconsin. Wisconsin Bul. 318: 12-13 and 14-36.
- (4) Gillilan, J.C.
Jan. 25, 1920 Incomes and their Sources from Farms in the Cut-over Area of Northern Minnesota. (Taken from a land settlement survey conducted by the Agricultural Economics Division in Itasca county during the fall of 1916) Thesis for M.S. degree: 132.
- (5) McGuire, A.J.
1920 Cropping System for a New Cut-Over Farm. Minnesota Farmers' Institute Annual No. 33: 113.
- (6) Peck, F.W.
Dec. 1918 Experiences of Northern Minnesota Settlers. Minnesota Bul. 180: 14.
- (7) Swenehart, John
Dec. 1920 Clear More Land. Wisconsin Bul. 320: 5, 14.
- (8) Thompson, M.J.
1920 Green vs Delayed Systems of Land Clearing. Minnesota Farmers Institute Annual No. 33: 52-53.
- (9) Thompson, M.J.
1920 Sunflowers at the Duluth Station. Minnesota Farmers Ins. Annual No. 33: 113.

(10) University of Minnesota

1915

Minn. Geological Survey - William H. Emmons,
Director, in cooperation with the United
States Geological Survey - Bul. No. 13
"Surface Formations and Agricultural Condi-
tions of Northwestern Minnesota" by Frank
Frank Leverett with a chapter on Climatic
Conditions of Minnesota by V.G. Purcell.

University of Minnesota

1917

Bul. No. 13 Survey Formation and Agricultural
Conditions of Northeastern Minnesota by Frank
Leverett and Frederick W. Sardeson, with a
chapter on Climatic Conditions on Minnesota
by V.G. Purcell.

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