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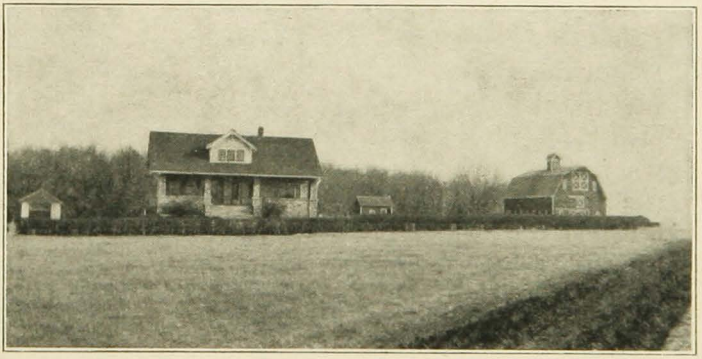
SYSTEMS OF FARMING IN NORTHWESTERN MINNESOTA

Supplement to Minnesota Experiment Station Bulletin 257, Types of Farming in Minnesota

L. F. GAREY AND F. F. ELLIOTT



UNIVERSITY FARM, ST. PAUL

Based on a study of types of farming in Minnesota, the counties have been grouped into seven types of farming areas. The counties in each of these areas have approximately the same proportion of crops and livestock and in each, the physical conditions are fairly uniform. The results have been published as Minnesota Experiment Station Bulletin 257, "Types of Farming in Minnesota."

This bulletin is one of a series of four supplementing "Types of Farming in Minnesota." Its purpose is to outline the situations in Areas VI and VII in greater detail and to present ways in which the information may be helpful in determining suitable farming systems.

It is generally recognized that there is wide variation in the agriculture of an area. No two farms or no two farmers are alike. Consideration must be given to the wide variation of conditions under which a system of farming is carried on when making the application of results of specific farm management studies conducted in limited areas.

In a small area where conditions are best suited to the production of a limited number of commodities, the variation in agriculture is less than in a large area where there is a greater range in the choice of commodities. That a better idea may be had of the variations and the extent to which they exist in a type of farming area, there is presented in this supplement an organization analysis of the farms found in the areas to which it applies. Townships representative of the different parts of the area have been selected and the organization of each of the farms in those townships analyzed to determine representative systems of farming followed on farms of different sizes.

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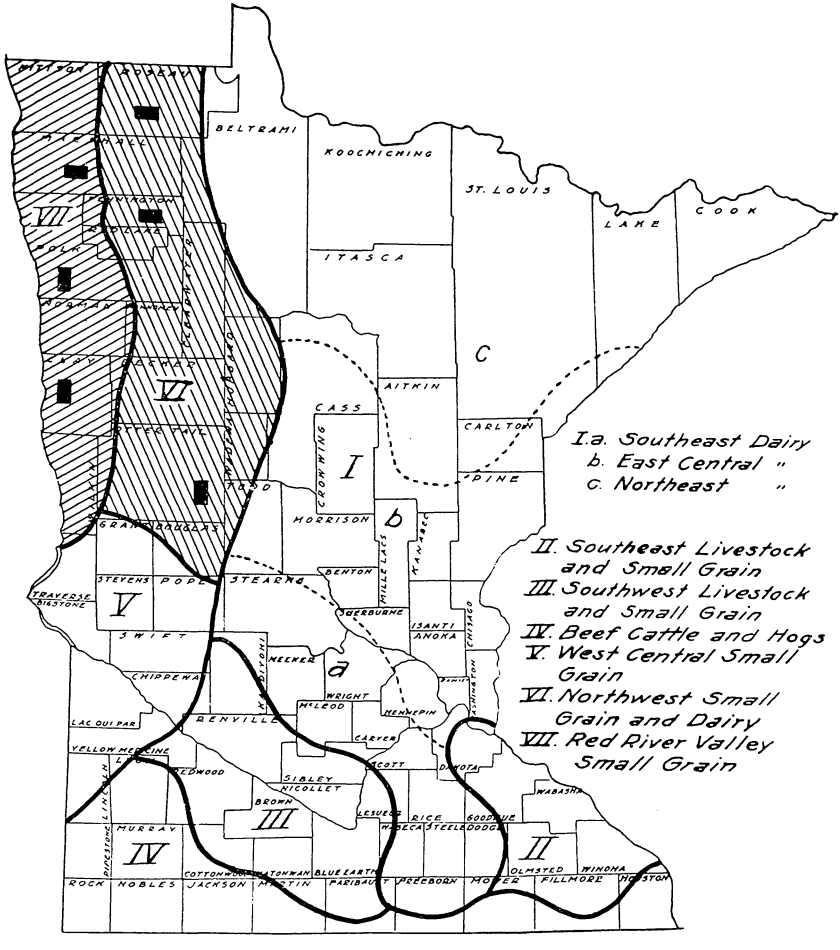

Fig. 1. Heavily Shaded Portions Are Townships from Which Data Were Taken

TYPICAL FARMING SYSTEMS IN NORTHWESTERN MINNESOTA

L. F. GAREY and F. F. ELLIOTT[1]

DESCRIPTION OF REGION

Agriculture of the northwest region is characterized by the production of small grains, dairy products, and potatoes. The production of any one of these, however, is not uniform throughout the region owing to variations in climate, soil, land surface, and transportation. Wheat, rye, and flax are most dominant in the counties adjacent to the Red River. Climate and topographic conditions in the eastern and southern parts permit good pastures which, with other feeds that can be grown there, make dairying more important than in other parts of the region. Potato production is more localized than that of either small grain production or dairying. The heaviest concentration occurs in Clay and Norman Counties.

Considering the wide variation in climate, soil, land surface, etc., it has seemed wise to divide the region into two parts, the northwest small-grain and dairy area as Area VI, and the western part or Red River Valley small-grain area as Area VII.

The soil in the entire region is of glacial origin. That in Area VII was formerly a glacial lake bed and consequently is very rich in organic matter. The soil in Area VI is lighter, and, in many places, contains sand and boulders.

The land surface in Area VII is level, sloping very gently to the north. The extreme western part of Area VI is level; the eastern part is rolling to the extent of being too rough for tillage in some places; and in the southern part are lakes and wet land that interfere with regularity in the shape of fields.

The average annual precipitation varies from 20 inches in the extreme northwestern part of the region to 26 inches in the southeastern part. In the western area, about 57 per cent of the precipitation comes between May 1 and August 31, whereas, in the eastern area, about 66 per cent comes during this period. The growing season varies from 100 days in the northeastern part to 130 days in the southern part. These factors are largely responsible for the varied agricultural production.

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Acknowledgment is made to W. L. Austin, chief statistician for agriculture, Bureau of Census, for co-operation in making the special tabulations of the 1925 census data.

Transportation facilities are provided by the Great Northern, Northern Pacific, and Soo Line railroads. Highway development permits some transportation by truck. The surplus of small grain and dairy products is shipped east, but the potatoes go largely to the south and southeast.

SHIFTS IN CROP AND LIVESTOCK PRODUCTION IN AREA VI, 1879-1924

Significant changes have taken place in the agriculture of this region during the years, 1879 to 1924. Passing from a frontier country in the early part of the period, with chief emphasis upon grain production, it has become a settled farming section with more emphasis upon feed crops and livestock.

These changes are significant to farmers who are contemplating new systems of farming. They are a result of changing economic conditions which affect the business organization of a farm as well as the production program for a locality or an area.

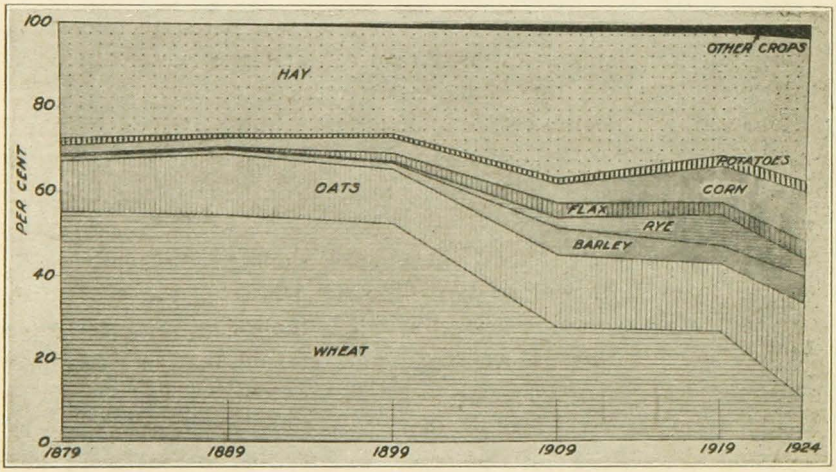

Fig. 2. Per Cent of Crop Land Occupied by Crops Designated in Area VI, 1879-1924

Figure 2 illustrates the decided shift in crop production which has taken place during the 45-year period. The wheat acreage has dropped from 55.1 per cent of the crop land to 10.4 per cent. The acreage of all other crops has increased: oats, from 12.0 to 22.8 per cent; barley, from 1.2 to 6.5 per cent; rye, from 0.5 to 4.2 per cent; flax, from 0 to 4.1 per cent; corn, from 2.1 to 12.1 per cent; potatoes, from 1.7 to 2.4 per cent; hay, from 24.4 to 34.2 per cent. The acreage devoted to strictly cash crops dropped from 57.3 per cent of the crop land in

TABLE I

NUMBER OF LIVESTOCK PER 100 ACRES IN FARMS IN AREA VI, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	1.6	2.4	2.2	3.3	3.6	4.0
Other cattle	4.3	3.2	3.3	3.9	4.3	3.6
Swine	1.2	1.7	1.9	2.0	2.7	3.4
Sheep	0.2	0.2	0.3	0.3	0.3	0.3
Horses	1.2	1.9	2.2	2.0	2.5	2.2
Total	8.5	9.4	9.9	11.5	13.4	13.5

* Owing to difference in date at which census was taken these data are not strictly comparable from period to period. The error, however, is small.

1879 to 16.9 per cent in 1924. This decrease was absorbed by an increase in feed crops.

With the shift from cash to feed crops a change in the number and proportion of livestock has taken place. Table I gives the number of livestock per 100 acres in farms. There has been a rapid increase in the number of dairy cows per 100 acres in farms, whereas the number of other cattle changed but little. There has been an increase in the number of swine, a small increase in the number of horses, and no significant change in the number of sheep.

SHIFTS IN CROP AND LIVESTOCK PRODUCTION IN AREA VII, 1879-1924

As in Area VI, there has been a shift from wheat to feed crops. Land occupied by wheat decreased from 60.4 per cent in 1879 to 20.3 per cent in 1924. The acreage of oats increased from 13.0 to 22.5 per cent; barley, from 0.1 to 10.5 per cent; rye, from 0 to 5.0 per cent;

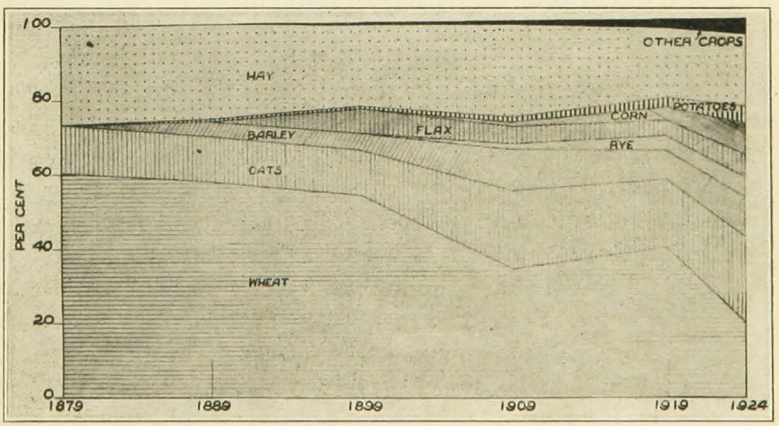

Fig. 3. Per Cent of Crop Land Occupied by Crops Designated in Area VII, 1879-1924

flax, from 0 to 6.2 per cent; corn, from 0 to 8.0 per cent; potatoes, from 0 to 4.4 per cent. Hay acreage decreased from 26.5 to 19.4 per cent. The change in hay was owing to shifting from wild to tame hay.

The percentage of crop land occupied by strictly cash crops decreased from 60.4 per cent in 1879 to 35.9 per cent in 1924.

TABLE II

NUMBER OF LIVESTOCK PER 100 ACRES IN FARMS IN AREA VII, 1880-1925*

	1880	1890	1900	1910	1920	1925
Dairy cows	0.8	1.7	1.5	2.3	2.1	2.4
Other cattle	1.2	2.9	2.5	2.9	2.9	3.0
Swine	0.4	1.5	1.5	1.2	1.6	2.5
Sheep	0.3	1.1	1.4	1.3	1.7	1.5
Horses	0.9	1.7	2.3	2.3	2.6	2.4
Total	3.6	8.9	9.2	10.0	10.9	11.8

* Owing to difference in date at which census was taken these data are not strictly comparable from period to period. The error, however, is small.

There was a general increase in the number of all livestock per 100 acres in farms. The number of sheep increased at a faster rate than other livestock; the number of dairy cows and other cattle, at about the same rate altho neither increased in number as fast as swine.

TYPICAL FARM ORGANIZATIONS IN AREAS VI AND VII, 1925

Records of the federal census formed a basis for determining the typical organizations on farms of different sizes in the localities specified in the areas. Six representative sub-areas, located in Clay, Polk, Marshall, Roseau, Pennington, and Ottertail counties were selected. Each sub-area included three or four townships. A total of about 1,100 farms was included.

The farms were first grouped according to size. The groups were then subdivided, using as a basis the most important enterprise in the area. All other enterprises were included to show the complete organization of each farm. Farms having the same or practically the same organization were considered typical and the average or most common organization made up the typical farming system. There were several common systems of farming in each sized group. As typical systems show the most common organization in a locality, they should be useful to farmers who are considering changes in their present organization.

Tables III to VIII give the various types of farm organizations found in the sub-areas designated above. Following each table, the percentage that each of the different sized farms was of the total number of farms is given. For example, the most common size given in Table III is the 160-acre farm, constituting 28 per cent of all the farms. The 320-acre farm is the next most common farm, constituting 23 per cent of all farms, and so on. In the line "Frequency of type" is given the percentage of farms of the same size having the specific organization indicated.

Explanations of Tables III to VIII

There was considerable variation in the acreage of some of the crops. With all such crops the same plan is used, i.e., the figures representing the range in acreage are horizontal for the crop concerned and separated by a bar. For example, on 160-acre farms with 20 acres of potatoes the range in the acreage of tame hay was 0-15 acres. With some crops there were two common acreages with little variation from each. Where this was true the more common acreage was placed directly opposite the crop concerned and the lesser one just below that figure. For example, on the 160-acre farms with 20 acres of potatoes, two acreages of oats commonly occurred. The most common acreage of oats was 20 and the other was 65. This plan was used with all crops with more than one common acreage. The same scheme is used in giving the number of livestock. However, with livestock two common ranges frequently occurred and are so indicated.

WAYS TO USE TYPICAL FARMING SYSTEMS

Typical farming systems, as indicated in Tables III-VIII, provide farmers in a locality a basis for testing and appraising the relative profitableness of different types of farms as well as long-time and year-to-year adjustments in different farming systems. They present a picture of the most common types of organization and enable a farmer to make a comparison of his own organization with that commonly found in a locality.

The information on production practices, crop yields, livestock production, and labor requirements and distribution are available from other sources. Such information for specific localities in Minnesota is given in Minnesota Experiment Station Bulletin 205, Technical Bulletin 44, and in unpublished reports. This bulletin will be useful as a guide in considering the requisites of a particular farming system in a locality.

TABLE III

TYPICAL ORGANIZATION STATEMENTS OF FARMING SYSTEMS ON FARMS OF DIFFERENT SIZES IN CLAY COUNTY—SPECIAL TABULATIONS OF THE 1925 CENSUS

Item	Typical 80-acre farms*	Typical 160-acre farms*				Typical 200-acre farms*		Typical 240-acre farms*		Typical 320-acre farms*				Typical 480-acre farms*	
Frequency of type in per cent....	57	23	15	30	23	40	54	38	52	24	22	22	32	54	38
Crops—															
Potatoes, acres	15	0-5	10	20	35	18	40	12	40	10	25	40	80	40	60
Wheat, acres	3-25	..	10	0	20	..	0	0	15	10	0	35	0	0	0
				30			30	10	58	105	35		60	10	25
Flax, acres	..	..	..	..	..	..	..	..	..	20	0	0	..	0	5
										0	20	15		30	25
Oats, acres	8-25	0	40	20	50	80	35	25	35	80	40	65	50	110	90
		50		65	15			80	100		110	110	80		245
Barley, acres	10	..	18	25	20	35	20	5	30	20	40	25	30	0	45
				5			40	35				60	80	30	90
Corn, acres	10	10	10	20	10	20	10	10	18	15	15	30	30	30	40
		0									35				
Tame hay, acres.....	10	..	..	0-15	0	5	..	0-10	5	..	0	0	0	0	10
					7	40			25		20	10	20	20	
Wild hay, acres.....	..	70	35	5	..	..	40	80	0	20	10	50	..	200	30
		0		25			5	25	40		75	0		10	
Pasture, acres	7	40	20	15	20	20	20	20	20	30	30	20	40	20	30
		0						60	45		70	65		90	
Other land, acres	10	10	10	5	5	5	5	10	5	15	10	5	5	10	5
Crop land lying idle, acres...	..	0	7	..	..	..	..	0	..	..	..	..	..	..	..
		25						20							
Livestock—															
Work horses, number.....	3-4	2-8	4-8	4-7	4-8	4-8	4-9	4-6	6-10	5-8	4-9	6-9	8-15	8-12	11-16
Cows, number	0-6	3-5	4-9	0-4	0-2	3-6	3-5	3-6	3-8	5-12	6-12	3-7	3-9	15-30	3-8
				7-11	6-12			8-11				10-15			14-25
Cows milked, number.....	0-5	1-4	3-7	3-6	0-2	3-4	3-5	2-5	2-7	5-10	5-9	0-3	3-7	7-15	5-10
					6-9			6-10				5-9			
Other cattle, number.....	0-10	1-6	3-8	3-18	0-2	1-7	0-6	1-7	5-10	3-12	2-12	2-9	3-6	4-10	3-10
				10-15	8-10										25-35
Sows, number	0-2	0-2	0-2	0-5	0-3	...	0-5	0-3	...	0-2	0-4	0-7	0-5	0-4	0-8
Other hogs, number.....	0-8	..	0-4	0-8	0-8	0-7	0-5	0-5	3-9	0-4	1-5	1-8	3-6	0-10	8-20
Poultry, number	40-100	25-125	25-50	25-75	50-125	50-125	50-100	50-100	50-125	50-100	50-100	50-100	50-100	50-100	50-100
															200-400
Per cent with tractors.....								8	6	9	50	10	27	60	100

* Farms of different sized groups constitute the following percentages of all farms: 80-acre farms, 6 per cent; 160-acre farms, 28 per cent; 200-acre farms, 6 per cent; 240-acre farms, 15 per cent; 320-acre farms, 23 per cent; 480-acre farms, 6 per cent. For explanation of data in above table see page 9.

TABLE IV

TYPICAL ORGANIZATION STATEMENTS OF FARMING SYSTEMS ON FARMS OF DIFFERENT SIZES IN POLK COUNTY—SPECIAL TABULATIONS OF THE 1925 CENSUS

Item	Typical 160-acre farms*		Typical 200-acre farms*		Typical 240-acre farms*	Typical 320-acre farms*			Typical 400-acre farms*		Typical 480-acre farms*	
Frequency of type in per cent	28	60	40	50	85	19	32	42	44	56	43	57
Crops—												
Wheat, acres	25	60	35	60	50	15	45	95	65	150	75	150
Flax, acres	0	0	0	..	15	30	0	20	40	20	40	20
	30	15	30		30		30	45				70
Oats, acres	30	25	30	30	45	50	60	40	80	40	75	45
								90		85		90
Barley, acres	0	20	20	20	25	20	45	30	35	40	40	30
	30					60	12					70
Rye, acres	..	..	0	..	..	..	0	10	0	0	80	0
			20				25	20	30	20		30
Corn, acres	10	10	15	10	20	15	15	15	15	15	25	25
						60						
Tame hay, acres	10	15	20	20	15	15	10	10	30	20	40	30
						75	45	30				65
Wild hay, acres	..	..	..	..	..	..	20	..	..	..	..	..
Potatoes, acres	0	4	7	15	3	0	0	3	6	5	10	2
	15	15			25	5	5	20		20		15
Sugar beets, acres	0	..	0	..	0	..	..	..	..	..	..	0
	15		25		15							25
Pasture, acres	20	20	50	30	50	10	25	30	25	30	40	40
						80			120			
Other land, acres	6	8	5	10	10	5	5	10	5	10	10	10
Summer fallow, acres	20	..	0	0	10	35	25	0	0	0	0	40
			20	15				40	20	50	50	
Livestock—												
Work horses, number	3-7	3-6	5-7	4-8	4-8	4-8	6-10	7-11	8-12	8-12	6-12	6-12
Cows, number	2-7	4-8	3-5	3-10	4-9	0-5	3-7	7-14	10-14	7-12	5-12	4-10
			8-14			10-20	8-12					
Cows milked, number	1-7	3-7	3-8	3-8	3-8	0-5	3-9	6-10	10-14	5-9	5-10	4-10
						7-14						
Other cattle, number	2-6	2-6	2-8	3-8	4-8	1-6	3-9	3-11	7-14	4-14	4-10	3-6
						17-23						10-15
Sows, number	..	0-3	0-4	0-4	0-4	0-4	1-5	0-3	3-8	0-3	1-3	1-6
Other hogs, number	..	0-8	0-8	0-6	0-5	1-8	1-5	3-8	7-12	0-5	1-6	1-10
					10-20		8-20					
Poultry, number	50-100	50-75	40-75	50-100	50-100	25-75	50-100	50-100	50-200	50-75	50-100	50-100
Per cent having tractors	42	10	25	7	24	30	24	23	43	33	22	75

* The farms of different sized groups constitute the following percentages of all farms: 160-acre farms, 17 per cent; 200-acre farms, 14 per cent; 240-acre farms, 10 per cent; 320-acre farms, 24 per cent; 400-acre farms, 5 per cent; 480-acre farms, 10 per cent. For explanation of data in above table see page 9.

TABLE V

TYPICAL ORGANIZATION STATEMENTS OF FARMING SYSTEMS ON FARMS OF DIFFERENT SIZES IN MARSHALL COUNTY—SPECIAL TABULATIONS OF THE 1925 CENSUS

Item	Typical 160-acre farms*			Typical 200-acre farms*			Typical 240-acre farms*		Typical 320-acre farms*			Typical 400-acre farms*		Typical 480-acre farms*		
Frequency of type in per cent	23	45	32	31	38	31	38	45	19	21	56	53	40	44	31	25
Crops—																
Wheat, acres	..	35	60	15	50	90	40	80	30	55	100	110	175	95	140	225
Flax, acres	0 20	..	..	0 20	..	0 20	..	0 25	30	..	25 0	0 30	..	15	0 20	..
Oats, acres	25	30	25	45	40	30	60	25	40 110	60	50	50	50	40 100	35 90	65
Barley, acres	0 40	25	25	0 10	30	30	30	25	30 100	60	40 80	80	75	45 140	60	90
Rye, acres	30	20	0 10	0 20	5 35	20	30	0 25	30	30	25	12	0 30	60	60	..
Corn, acres	15	10	10	8	10	..	10	15	0 10	10	15	25	0 20	20	15	..
Potatoes, acres	..	..	..	..	0 5	..	0 3	0 3	..	..	..	..	..	..	..	..
Tame hay, acres	30	..	0 10	..	10	..	10	20	..	10	15	12	10	..	..	..
Wild hay, acres	..	10	..	30	..	..	0 20	..	15	..	..	12	5	30	15	..
Pasture, acres	25	20	15	40	20	20	35	35	60	30	30	25 55	20	40 110	80	50
Other land, acres	5	10	5	20	5	5	5	5	5	10	10	10	5	10	10	5
Fallow, acres	..	..	..	..	..	..	..	..	20	55	10	30	20	55	65	45
Livestock—																
Work horses, number	2-5	4-8	5-8	4-6	4-9	5-9	5-9	5-10	5-8	4-8	5-11	4-9	9-12	9-11	8-12	10-16
Cows, number	5-8	2-8	0-6	3-7	2-8	3-5	4-8	2-7	5-9	4-8	4-10	2-6 10-14	4-8	4-8	4-10	2-10
Cows milked, number	2-8	2-8	0-5	3-7	2-6	3-5	4-8	2-7	3-8	4-6	3-8	2-6 9-12	3-6	3-7	4-8	2-10
Other cattle, number	1-7	1-8	0-4	2-6	2-7	1-5	4-8	1-6	3-10	3-6	2-8	4-9	5-10	4-10	6-12	1-8
Sows, number	0-4	0 3	0-3	0-2	0-2	..	1-4	0-2	0-2	0-2	0-5	1-3	0-2	0-3	0-3	0-3
Other hogs, number	..	..	..	0-1	0-2	1-3	1-5	0-4	..	..	..	..	..	..	..	1-5
Poultry, number	50-100	50-75	25-75	50-100	50-100	50-75	50-100	50-125	50-100	60-75	50-75	30-75	75-100	50-100	75-100	25-50
Per cent having tractors	16	19	24	22	55	44	55	47	12	22	58	27	82	28	19	100

* Farms of different sized groups constitute the following percentages of all farms: 160-acre farms, 23 per cent; 200-acre farms, 12 per cent; 240-acre farms, 13 per cent; 320-acre farms, 19 per cent; 400-acre farms, 7 per cent; 480-acre farms, 7 per cent; 640-acre farms, 6 per cent. For explanation of data in above table see page 9.

TABLE VI

TYPICAL ORGANIZATION STATEMENTS OF FARMING SYSTEMS ON FARMS OF DIFFERENT SIZES IN ROSEAU COUNTY—SPECIAL TABULATIONS OF THE 1925 CENSUS

Item	Typical 80-acre farms*		Typical 160-acre farms*		Typical 200-acre farms*	Typical 240-acre farms*		Typical 320-acre farms*		Typical 480-acre farms*
Frequency of type in per cent	90	35	45	20	100	67	33	70	30	86
Crops—										
Wheat, acres	0	0	10	25	15	10	30	10	30	30
	15									
Flax, acres	0	0	10	5	0	0	10	0	5	15
	10	15			15	15		15		
Rye, acres	0	..	0	..	0	..	10	0	0	0
	10		15		25			20	10	30
Oats, acres	15	0	18	20	20	10	30	20	30	20
		20				30		45		50
Barley, acres	0	0	5	0	0	0	10	10	..	10
	5	10		15	5	10				
Corn, acres	0	0	5	0	0	0	..	..	10	0
	5	15		5	10	5				18
Tame hay, acres	0	20	10	15	30	70	55	20	30	40
	30		35	40	80			50		20
Wild hay, acres	..	60	0	..	..	..	..	0	..	20
			10					30		50
Potatoes, acres	..	..	..	..	..	..	..	..	..	..
Sugar beets, acres	..	..	..	..	..	..	..	..	..	..
Buckwheat, acres	..	..	..	..	..	..	..	..	..	0
										10
Pasture, acres	40	30	30	45	45	50	40	90	75	80
		70	60					40		
Other land, acres	..	..	25	10	10	30	60	120	40	45
					70	120		30	115	225
Summer fallow, acres	..	0	10	20	..	0	0	0	0	0
		15				25	15	25	25	50
Livestock—										
Work horses, number	2-3	2-4	3-6	3-4	3-6	4-6	3-6	4-8	4-9	4-9
Cows, number	0-3	0-15	4-10	3-8	3-12	6-12	5-12	6-10	6-15	10-15
	4-7	8-15								
Cows, milked, number	0-2	0-3	3-8	3-8	3-8	6-12	4-8	6-9	5-12	10-15
	4-7	8-12								
Other cattle, number	0-6	0-8	4-8	3-6	2-8	0-10	3-9	4-8	4-10	5-12
Sows, number	..	0-2	0-2	0-1	0-3	0-2	0-3	0-2	0-1	0-3
Other hogs, number	0-2	0-2	0-4	0-1	0-4	0-3	0-5	0-3	0-3	0-1
Sheep, number	..	..	0-15	0-5	0-15	0-30	0-15	0-30	..	0-20
Poultry, number	0-50	0-50	30-75	30-60	30-75	50-75	30-75	50-75	50-100	40-100
Per cent having tractors	7	3	8	15	18	7	20	11	50	60

* Farms of different sized groups constitute the following percentages of all farms: 80-acre farms, 7 per cent; 160-acre farms, 41 per cent; 200-acre farms, 9 per cent; 320-acre farms, 13 per cent. For explanation of data in above table see page 9.

TABLE VII

TYPICAL ORGANIZATION STATEMENTS OF FARMING SYSTEMS ON FARMS OF DIFFERENT SIZES IN PENNINGTON COUNTY—SPECIAL TABULATIONS OF THE 1925 CENSUS

Item	Typical 80-acre farms*		Typical 160-acre farms*		Typical 240-acre farms*		Typical 320-acre farms*		Typical 480-acre farms*
Frequency of type in per cent	41	56	21	35	41	100	48	48	89
Crops—									
Feed crops, acres	..	20	..	20	45	40	25	65	75
Corn, acres	..	0-5	..	..	0 10	10	0 10	15	0 15
Oats, acres	..	10-25	..	15	30	25	20	30	30 70
Barley, acres	..	..	..	5	10	5	0 5	15	15
Wheat, acres	..	10 0	..	..	0 15	0 10	..	20	15
Flax, acres	..	..	..	0 15	..	0 10	10	0 10	0 15
Rye, acres	..	..	..	..	0 15	0 20	0 10	0 20	0-20
Potatoes, acres	..	..	..	..	..	.	..	..	..
Tame hay, acres	40	30	40 115	35	30 65	50 90	220 130	80 160	140 220
Wild hay, acres	..	..	20 90	..	..	..	..	..	..
Pasture, acres	0 20	20	40 100	40 80	50	30 90	50 200	40 90	50 120
Other land, acres	30	5	..	15	10	..	10	25	15 85
Summer fallow, acres	..	..	..	0 30	0 15	0 15	..	..	0 35
Livestock—									
Horses, number	0-2	2-4	0-3	2-5	3-5	4-7	3-5	4-7	4-8
Cows, number	..	4-7	..	2-5 6-12	0 6-12	10-15	9-15 4-7	10-15	8-12 15-20
Cows milked, number	..	4-6	..	0-3 5-8	0 4-10	10-15	9-13 3-5	8-12	8-12 14-18
Other cattle, number	..	0-8	..	3-10	0-3 5-10	3-10	4-8	6-12	3-7 8-12
Sows, number	..	..	..	0-3	0 3-6	0 3-5	0-2	0 2-4	0 2-6
Other hogs, number	..	0-3	..	0-3	0 2-6	0-7	0-3	0-5	0-3
Sheep, number	..	0-5	..	..	..	0-10	0-10	..	0 10-20
Poultry, number	..	0-50	..	25-75	50-100	50-100	50-100	50-100	50-150
Per cent having tractors	..	25	..	4	11	6	..	31	37

* Farms of different sized groups constitute the following percentages of all farms: 80-acre farms, 6 per cent; 160-acre farms, 57 per cent; 240-acre farms, [illegible] 320-acre farms, 7 per cent; 480-acre farms, 2 per cent. For explanation of data in above table see page 9.

TABLE VIII

TYPICAL ORGANIZATION STATEMENTS OF FARMING SYSTEMS ON FARMS OF DIFFERENT SIZES IN OTTERTAIL COUNTY—SPECIAL TABULATIONS OF THE 1925 CENSUS

Item	Typical 80-acre farms*		Typical 120-acre farms*		Typical 160-acre farms*		Typical 240-acre farms*			Typical 280-acre farms*	
Frequency of type in per cent.....	41	54	51	43	52	42	21	46	27	47	53
Crops—											
Feed crops, acres.....	15	35	35	55	55	75	40	65	105	60	120
Corn, acres	5	15	15	25	20	30	15	25	40	20	40
Oats, acres	0 10	15	15	25	25	35	15	30	50	30	50
Barley, acres	0 5	5	5	5	10	10	10	10	15	10	30
Wheat, acres	0 8	5	0 15	0 10	0 25	0 15	15	20	0 25	30	20
Rye, acres	..	..	..	..	5	..	0 10	0 15	0 20	5	..
Flax, acres	..	..	0 7	..	5	..	..	0 15	..	..	..
Potatoes, acres	0-3	0-3	3	5	5	5	3	8	10	5	10
Sweet corn, acres.....	..	..	..	0 10	0 10	0 12	..	..	..	..	..
Tame hay, acres.....	15	15	25	20	20	30	35	30	35	30	30
Wild hay, acres.....	..	..	..	..	..	..	..	..	..	..	..
Pasture, acres	45	15	40	30	40	30	90	80	60	140	85
Other land, acres.....	5	5	10	5	10	5	35	20	15	10	15
Summer fallow, acres.....	..	..	..	..	..	..	..	..	..	..	..
Livestock—											
Horses, number	2-4	2-4	2-5	3-5	4-6	4-6	4	4-6	4-6	4-6	4-7
Cows, number	1-4 5-8	0-4 6-10	3-6 7-11	6-12	7-12	6-12	7-12	7-14	10-17	9-12	12-25
Cows milked, number.....	1-4 5-8	0-4 5-9	3-6 7-9	6-12	5-10	6-12	7-12	6-12	8-15	9-11	12-20
Other cattle, number.....	0-5	0-6	3-8	5-9	3-10	3-9	3-6	7-15	2-8 12-17	2-9	8-20
Sows, number	0-2	0-4	0-4	2-6	2-6	3-8	0-3	2-6	3-10	0-3	3-10
Other hogs, number.....	0-2	0-5	0-7	2-10	2-8	10-25	0-10	5-20	5-20	2-10	15-50
Sheep, number	..	..	..	..	0-25	..	..	..	..	..	..
Poultry, number	50-150	40-75	50-100	50-100	50-100	75-125	50-100	75-125	75-100	50-150	100-150
Per cent having tractors.....	..	..	3	..	20	..	..	..	..	..	44

* Farms of different sized groups constitute the following percentages of all farms: 80-acre farms, 17 per cent; 120-acre farms, 26 per cent; 160-acre farms, 20 per cent; 240-acre farms, 19 per cent; 280-acre farms, 7 per cent. For explanation of data in above table see page 9.

USE OF RESULTS IN DETERMINING PROFITABLE LONG-TIME SYSTEMS OF FARMING

The problem confronting the farmer is to determine a system of farming that gives promise of yielding the greatest returns. It is necessary for a farmer to consider the physical conditions on his farm, the long-time outlook for yields, and probable prices for products and cost goods.

Tables IX and X indicate a method that may be used to test the results from a certain system of farming. The organization statement used in Table IX is taken from a representative township in Marshall County, Area VII. In this area, the 160-acre farm is the most common sized farm. On farms of this size, three types of organizations are frequently found. The greatest difference is in the amount of wheat that is grown and the number of livestock that is maintained. Thus 23 per cent of the farmers use an organization with no wheat; 45 per cent, an organization having 35 acres of wheat; and 32 per cent, an organization with 60 acres of wheat. (See Table V.)

TABLE IX

STATEMENT OF ORGANIZATION AND PRODUCTION OF CROPS AND LIVESTOCK AND DISPOSAL OF CROPS ON A TYPICAL (MOST COMMON) 160-ACRE FARM IN MARSHALL COUNTY, MINNESOTA

Cropping Organization

Crop	Acres	Yield	Production	Requirements		Salable surplus
				Feed	Seed	
		Bu.	Bu.	Bu.	Bu.	Bu.
Wheat	35	11	385	...	53	332
Oats	30	27	810	750	60	...
Barley	25	23	575	250	50	275
Rye	20	13	260	...	30	230
		Tons	Tons	Tons		
Corn	10	2.0	20	20	..	...
Hay	10	1.3	13	13	..	...
Pasture	20	...	..	..	..	...
Other land	10	...	..	..	..	...

Livestock Organization

Class	No.	Production	Sold	Feed requirements		
				Grain	Roughage	Supplementary feeds
				Lbs.	Lbs.	Lbs.
Horses	5	.....	.....	15,000	30,000	....
Cows	4	4 calves 720 lbs. butterfat	1 cow 1 veal calf 720 lbs. butterfat	4,000	20,000	1,060
Other cattle	5	.....	700 lbs.	500	15,000	....
Sows	2	3,000 lbs.	3,000 lbs.	13,500	.....	450
Poultry	75	300 doz. eggs 175 lbs.	300 doz. eggs 175 lbs.	3,000	.....	....

To demonstrate the method of determining a long-time profitable

organization, an estimate of the production of crops and livestock and the disposal of crops is given in detail in Table IX for the organization having 35 acres of wheat. Table X gives the statement of receipts and expenses and the returns to the organization above variable expenses for this system of farming. Returns for the other two organizations on the 160-acre farms—one with no wheat and one with 60 acres of wheat—are calculated in the same manner, but only the returns to the organization are given.

In Table X are given the probable returns that can be expected from organizations with specified yields and prices. The crop yields were those recorded in the townships from which the data were taken. In the table, the same rate of production from livestock has been used for the different systems of farming.

TABLE X

STATEMENT OF RECEIPTS, EXPENSES, AND RETURNS TO ORGANIZATION ABOVE VARIABLE EXPENSES ON A TYPICAL (MOST COMMON) 160-ACRE FARM IN MARSHALL COUNTY, MINNESOTA

RECEIPTS:			
Crops—			
Wheat	332 bu. @ $ 1.20	$398	
Barley	275 bu. @ .55	151	
Rye	230 bu. @ .75	172	
Total sales crops			$ 721
Livestock—			
Butterfat	720 lbs. @ $ .45	$324	
1 cow	60.00	60	
1 veal calf	10.00	10	
Beef	700 lbs. @ .06	42	
Hogs	3,000 lbs. @ .09	270	
Eggs	300 doz. @ .20	60	
Poultry	175 lbs. @ .15	26	
Total livestock sales			$ 792
Total crop and livestock sales			1,513
EXPENSES:			
Threshing		$ 94	
Twine		40	
Hired labor		100	
Supplementary feeds bought		35	
Seed bought		20	
Miscellaneous livestock expense		16	
Total variable expenses			$ 305
RETURNS TO ORGANIZATION ABOVE VARIABLE EXPENSES			$1,208

In this organization wheat, barley, and rye were sold and constituted the only income from crops. The livestock products were butterfat, beef, pork, eggs, and poultry. Owing to the small number of livestock kept, the quantity of these products was small.

The returns of $1,208 from the above organization are not net and should not be considered as such. No charges have been included for

machinery expenses, taxes, insurance, interest, repairs, and others, all of which would have to be subtracted to obtain a net figure. It is necessary to consider only the expenses which vary when comparing the returns from one farm organization with those of a similar farm of the same size in the same area. Taxes, insurance, repairs, and other such expenses will be about the same in any of the organizations on the same sized farms, consequently they may be disregarded in the comparison.

It should be further understood that the returns are figured on an average basis and do not necessarily represent what an individual might obtain. As was indicated above, about 45 per cent of the farmers on 160-acre farms had this organization. Among the group some farmers are more efficient than others and will gain more from the organization. If, however, the returns of all the farmers, both those that are efficient and those that are not, were obtained and averaged, the figure should correspond very closely with that in Table X.

Returns from the other two organizations used in the illustration were obtained from the same yields and prices, and may be compared with the most common organization in the following statement:

Organization with no wheat and with largest number of livestock	$1,285
Organization with 35 acres of wheat and with smaller number of livestock	1,208
Organization with 60 acres of wheat and with the smallest number of livestock	1,229

With average yields and prices that have existed in Area VII, the results do not indicate much difference in the returns that can be expected from the three organizations. Such differences as do exist are in favor of the organization having the largest amount of feed crops and the largest number of livestock.

By using the same procedure as given in Tables IX and X it is possible to determine fairly accurately the approximate returns that can be expected from an organization that might be used on 160-acre farms. Such a procedure will enable farmers, county agents, or others to determine which of a number of organizations will likely prove most profitable with the existing physical and economic conditions in a certain locality or on a certain farm.

APPLICATION OF AGRICULTURAL-OUTLOOK MATERIAL TO TYPICAL FARMING SYSTEMS

A farmer must always consider possible adjustments that should be made in a system of farming. Market prospects for certain products for a given year or the failure of a certain crop make short-time adjustments necessary or desirable. Such a method suggests some changes

in the business which may be made at little or no expense, but which may add to the income.

Agricultural-outlook statements are prepared annually to help farmers make profitable adjustments in their business. The method outlined above is useful in interpreting the agricultural-outlook material and affords an opportunity to determine what adjustments likely would be most profitable for the year. The effect that changing prices have on the returns for the three typical organizations is indicated in Table XI.

The first column of Table XI gives the estimated, five-year average prices that were believed to be representative of the area. These prices were used for determining the returns from the three organizations previously referred to. In the second column the prices of grain were higher and the prices for livestock were the same as for the five-year average. In the third column are given the returns with higher prices for livestock and average prices for grain; and in the fourth column, with low prices for grain and average prices for livestock. It will be noted that these changes in prices have resulted in changes in returns from the three organizations. With average prices the organization with the least amount of cash grain and largest number of livestock gave highest returns. The organization with the largest amount of cash grain and smallest number of livestock was the most profitable with high prices for grain and average prices for livestock as indicated in

TABLE XI

RETURNS FROM THE THREE ORGANIZATIONS ON A 160-ACRE FARM IN MARSHALL COUNTY AT VARIOUS PRICES FOR DIFFERENT PRODUCTS

Item	Probable returns above variable expenses that change with organizations			
	5-year average price, 1924-28	High grain and average prices for livestock	High livestock and average prices for grain	Low grain and average prices for livestock
Wheat, bu.	$ 1.20	$ 1.40	$1 .20	$ 1.00
Barley, bu.	.55	.65	.55	.45
Rye, bu.	.75	.85	.75	.70
Hay, ton	10.00	10.00	10.00	10.00
Butterfat, lb.	.45	.45	.50	.45
Cows, per head	60.00	60.00	70.00	60.00
Veal calves, per head	10.00	10.00	15.00	10.00
Beef cattle, lb.	.06	.06	.09	.06
Hogs, lb.	.09	.09	.12	.09
Eggs, doz.	.20	.20	.20	.20
Poultry, lb.	.15	.15	.15	.15
Organization with no wheat and largest number of livestock	$1,285	$1,368	$1,475	$1,219
Organization with 35 acres of wheat and smaller number of livestock	1,208	1,317	1,370	1,104
Organization with 60 acres of wheat and smallest number of livestock	1,229	1,383	1,336	1,092

the second column. On the other hand, with average prices for grain and high prices for livestock (third column) both of the organizations having a larger number of livestock and smaller amount of cash grain show to better advantage than the organization with the largest amount of cash grain and the smallest amount of livestock. The same situation prevails with low-priced grain and livestock at average prices, as indicated in the fourth column.

In other words, Table XI demonstrates that as prices change likewise the returns to be expected from different organizations change. Therefore, if a farmer is to take advantage of economic conditions, he must consider price relationships when determining the best procedure for a certain year. Using the same procedure for like conditions, county agents and others can determine the effect that changing prices will have upon the different organizations used on the different sized farms in each area.

Table XII gives the ten-year average yields (1919-28) for different crops by counties in Areas VI and VII and for each area as a whole. A more local application of the method can be made by using data from a specific county. With yields in a community or from an individual farm the same procedure can be followed. Owing to the variation in yields within an area, it is desirable to use yields as nearly representative as possible as well as prices which are likely to be received.

TABLE XII

TEN-YEAR AVERAGE CROP YIELDS, 1919-28 FOR EACH COUNTY AND FOR AREAS VI AND VII

County	Corn	Wheat	Oats	Barley	Rye	Flax	Potatoes	Hay
				Area VI				
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Tons
Becker	28	12	33	24	15	9	99	1.23
Clearwater	30	15	34	29	19	9	119	1.61
Douglas	32	13	34	28	17	10	100	1.32
Hubbard	25	12	31	25	16	9	106	1.42
Mahnomen	24	14	30	24	8	9	80	1.05
Ottertail	32	14	32	27	17	9	98	1.38
Pennington	26	18	30	24	9	8	79	1.38
Red Lake	27	14	27	24	10	9	72	1.29
Roseau	30	13	29	24	12	8	90	1.47
Wadena	27	11	30	25	15	9	93	1.29
Average for Area VI	30	14	32	26	14	9	97	1.35
				Area VII				
Clay	28	13	31	26	14	8	88	1.10
Kittson	26	12	28	22	14	8	98	1.31
Marshall	27	12	26	23	13	8	106	1.39
Norman	28	12	27	25	14	8	90	1.18
Polk	27	13	30	26	16	8	88	1.28
Wilkin	29	12	31	26	13	8	94	1.14
Average for Area VII	28	12	29	25	14	8	90	1.24