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MINNESOTA farm business NOTES



Profitable Organization of Farms in Central Minnesota

W. B. Sundquist and L. M. Day¹

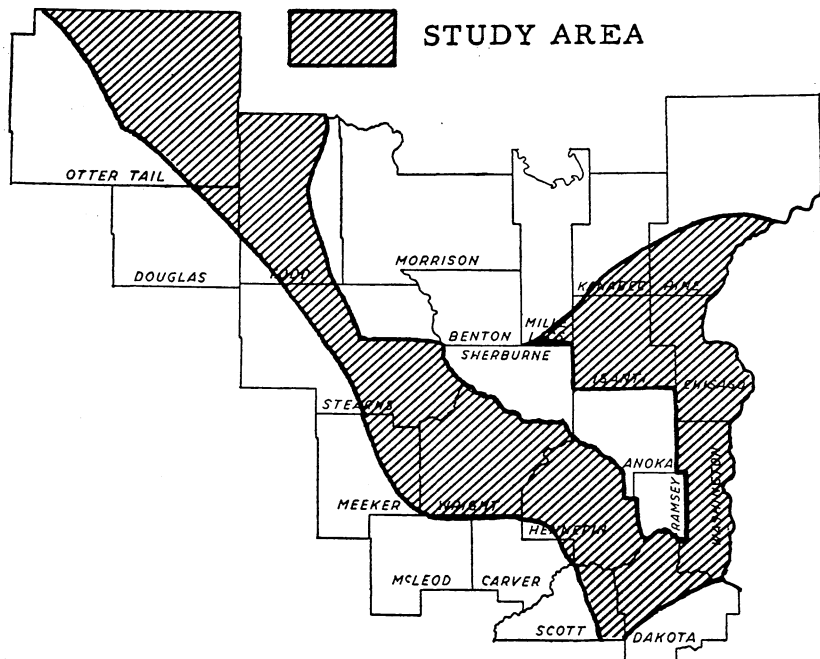
The April issue of *Minnesota Farm Business Notes* carried an introduction to the Dairy Adjustments Study conducted in the Lake States. Some results of the study for an area in east central Minnesota were also presented. This article, the second in a series, reports findings for the central Minnesota area shown in the accompanying figure.

Farm Resources Available

Except for sections of excessively droughty and sandy soils, most land in central Minnesota is moderately productive when adequately drained. Major soils are the Lester-Hayden, Wadena-Hubbard, Hayden-Bluffton, and Clarion-Lester series. Minor soils are also found.

Current crop yields per acre average about 49 bushels for corn, 42 bushels for oats, and 2.1 tons for alfalfa hay. With recommended fertilizer practices, these yields might be increased to 67 bushels of corn, 60 bushels of oats, and 2.8 tons of hay. Substantially higher yields can and are being obtained on better land.

Selected at random, 90 farmers were interviewed in order to determine: (1)



their available resources for farm production, and (2) their current use of these resources. Table 1 summarizes the resources available on "typical" small, medium, and large sized farms. Other typical farm situations were investigated, but are not reported here.

Each typical farm situation is an average for several farms. It does not

represent the resource base on any farm exactly because of differences in soil, buildings, equipment, etc. Moreover, farmers differ in experience, credit rating, managerial skills, and preferences. However, investigation of the organizational and income possibilities of the resources for several typical farms should be a more helpful guide to individual farmers than a study of the average resources of all farms.

Table 1. Available resources on typical farms of various sizes

Resource	Unit	Small farm	Medium farm	Large farm
Cropland	Acre	39	100	196
Open pasture	Acre	19	32	32
Family labor	Hours per year	3,317	4,367	5,645
Inventories*	Dollar	3,140	6,510	14,510
Chattel credit†	Dollar	2,060	4,380	10,100
Real estate credit†	Dollar	4,920	6,640	12,930
Dairy stanchions	Number cows	12	16	25
Farrowing capacity	Number sows	3	6	16
Silo capacity	Ton	60	60	130

* Includes inventory value of cash, livestock, and crops less the amount of money owed against these assets.

† The values of machinery and real estate assets were estimated by farmers. The credit availabilities shown here are half the values of these assets less existing loans.

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Alternatives Considered

With the "linear programming" system of budgeting, the results of several adjustment possibilities on farm organization and income were projected for each typical farm. Possibilities included:

1. Three different crop rotations using 50, 60, or 75 percent of available cropland for corn and oats and the rest for alfalfa.
2. Fertilization of these rotations at two levels—the one currently used by farmers and the level recommended by

Table 2. Current and estimated "most profitable" farm organizations

Item	Unit	Small farm		Medium farm		Large farm	
		Current	Most profitable	Current	Most profitable	Current	Most profitable
Income*	Dollar	2,800†	4,570	6,260†	10,030	9,240†	16,370
Cows milked	Number	9	12	14	16	24	19
Ration fed	Ratio		1:4		1:2.5		1:2.5
Sows farrowed	Number	3	0	6	5	12	12
Steers fed	Number	0	66	0	138	0	154
Crop rotation	Crop	CCOHH‡	CCOHH‡	CCOHH‡	CCOHH‡	CCOHH‡	COHH‡
Credit used	Dollar	1,530	19,310	3,250	36,310	1,690	31,560

* This income is net of operating expenses and expansion costs but has not been adjusted for taxes, depreciation on buildings and machinery, or interest on owned capital assets.

† Estimated from production data obtained from farmers.

‡ C is corn, O is oats, H is alfalfa hay.

the Soils Department of the University of Minnesota for the average soil test in this area. Current tillage practices could be employed or a system of "minimum tillage"—less intensive tillage using conventional machinery.

3. A stanchion dairy enterprise using one of three rates of grain feeding. These were: (a) 1 pound grain for every 2.5 pounds milk, (b) 1 pound grain for every 4 pounds milk, and (c) 1 pound grain for every 6 pounds milk. Building and equipment requirements and milk prices were based on milk sold for manufacturing uses.

4. A beef cow-calf herd producing a 90-percent crop of 430-pound calves.

5. A cattle-feeding enterprise with good grade 690-pound steers fed about 28½ weeks and sold at \$21.50 per cwt. with a gain of about 400 pounds.

6. Systems of farrowing and feeding hogs with either single or 2-litter farrowings or the purchase and feeding out of 35-pound feeder pigs.

7. It was possible to purchase additional corn at \$1.15 per bushel and to build more livestock-housing facilities with capital available up to the limits in table 1. Forage supplies, however, were limited to those grown on the farm. If feed supplies or money to purchase feed supplies were available for livestock, it was assumed that the livestock could be purchased with credit above the amounts shown in table 1.

Profitable Adjustments

Table 2 summarizes "current" and estimated "most profitable" organizations and incomes for the three typical farms. These findings are based on price estimates including \$15.50 per cwt. for market hogs, \$3.30 per cwt. for milk, and \$21.50 per cwt. for good, fat cattle.

At \$4,570 the income potential of the small typical farm is quite low. Additional deductions (real estate taxes and depreciation on machinery and buildings) must be made before obtaining a

net return for family labor and owned capital. The 12 cow dairy enterprise and the 66 head of feed cattle use all available forage and credit. However, the supply of available labor (one man all year) is not fully used. Just as for the two larger typical farms, it is most profitable to fertilize crops at recommended rates and to use minimum tillage.

The medium farm is most profitably organized with 16 dairy cows, 5 sows farrowed on a 2-litter system, and 138 head of feeder steers. This produces an estimated income, net of operating expenses, of \$10,030. However, it requires \$36,310 of credit, mainly to buy steers and corn.

The most profitable organization for the large farm would include 19 dairy cows, 12 sows farrowed on a 2-litter system, and 154 head of feeder steers. The estimated income, net of operating expenses, is \$16,370. This operation fully utilizes all available winter labor, as does the most profitable organization for the medium farm. The large farm is a two-man operation and the medium farm has almost a man and a half equivalent of available labor.

Alternative Organizations

Feeding out a large number of feeder cattle increases price and income risk and requires managerial experience and large amounts of credit. The net income for the small farm would be reduced by only \$330 and by about \$875 for the two larger farms if the cattle-feeding enterprises were reduced to a minimum and hog enterprises expanded to 8 sows on the small farm, 27 on the medium farm, and 56 on the large farm. All hogs would be produced on a 2-litter farrowing and feeding system.

A shift to this farm organization would reduce credit requirements by about 40 percent for the small farm, 38 percent for the medium sized farm, and 25 percent for the large farm. With

market hogs selling for \$17.00 per cwt. or higher, this dairy-hog type organization is slightly more profitable than the dairy-feeder cattle organization.

In General

The income potential of the small farm is very low even when organized in the most profitable way. Moreover, additional cropland is probably necessary for providing adequate income.

The organizations estimated most profitable for the two larger farms require heavy use of capital, both owned and borrowed. It is profitable to purchase corn in addition to home raised feeds in order to service livestock enterprises large enough to fully utilize available winter labor.

Increases in the size of enterprises and in management efficiency can contribute to profits on many farms.

Profitable Organization of Farms in Southeastern Minnesota

L. M. Day and W. B. Sundquist

This is the third article in a series on agricultural adjustment. It poses the question, "Can farmers in southeastern Minnesota improve their income position by: (1) eliminating dairying, (2) restricting dairy enterprise size but expanding other livestock enterprises, or (3) specializing in dairy production?"

The Resource Base

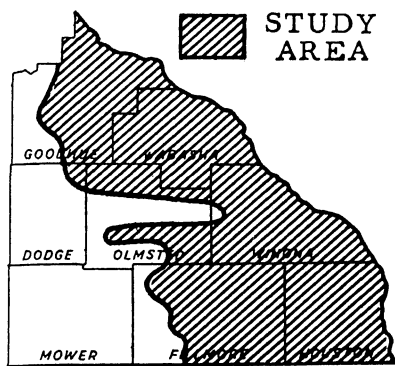
The accompanying figure shows the area concerned. Primary soils here are of the highly productive Fayette-Dubuque and Tama-Downs series. Smaller acreages of Wadena-Hubbard, Ostrander-Kenyon-Floyd, or closely related soils also exist.

Thirty-five farmers were interviewed. All had stanchion dairy barns and were

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was only 6 beef cows and 4 head of feeders. Large farms averaged 3 feeder cows, fed out about 12 head of feeder cattle, farrowed 15 sows on a 1-litter per year system, and had 25 dairy cows.

the dairy herd is eliminated, (2) the most profitable plan if a dairy herd is maintained in the stanchion barn but some steers are fed out, and (3) a "specialized" dairy plan generally resembling the current organization on these farms in that the feeder cattle enterprise is either very small or eliminated. The large farm had these alternatives and a fourth—a new milking parlor-loose housing system (see table 3).

Alternative Organizations

Table 2 shows the details of alternative plans for the typical small and medium farms.

The three plans for each farm include: (1) the most profitable plan if

All 10 farm plans presented in tables 2 and 3 have one thing in common. It

currently producing or equipped to produce milk for a manufacturing market.

The 35 farms were classified into three groups according to their amount of cropland: (1) those with 0 to 129 acres, (2) 130 to 189 acres, and (3) 190 or more acres. The amount of resources available on the "typical" farm for these three groups is shown in table 1.

The small farm had a full line of two-row equipment but combining and baling were custom hired. The medium and large farms had a complete line of two-row machinery and equipment with one exception. The most common corn planter on the large farm was a four-row. Power was not a limiting resource on any of the three typical farms.

Alternatives Considered

Adjustment alternatives considered are identical to those listed on page 1 with these two exceptions: (1) the alternative cropping sequences differed, and (2) the large farm could replace the existing stanchion barn with a new double four herringbone milking parlor-loose housing system.

The three cropping-sequence alternatives were: (a) corn, corn, oats, hay; (b) corn, corn, oats, hay, hay; and (c) corn, oats, hay, hay. Recently, crop yields per acre in the area averaged 63 bushels of corn, 49 bushels of oats, and 2.2 tons of hay. With recommended fertilizer practices, average yields might be increased to 84 bushels of corn, 61 bushels of oats, and 3.5 tons of hay.

Current Organizations

The typical small farm (96 crop acres) kept a dairy herd of 17 cows, farrowed 13 litters of pigs on a 1-litter per year system, and had no feeder cattle. The medium sized farm (164 crop acres) had 22 dairy cows and farrowed 12 sows largely on a 1-litter per year system. While some farms in the medium group had sizable beef enterprises, the average

Table 1. Resource availabilities on typical farms

Resource	Unit	Small farm	Medium farm	Large farm
Cropland	Acre	96	164	263
Open pasture	Acre	34	38	46
Family labor	Hours per year	3,974	4,313	4,336
Hired labor	Hours per year	30	277	1,897
Cash value of inventories	Dollar	8,191	12,630	20,440
Chattel credit	Dollar	4,470	5,290	6,900
Real estate credit	Dollar	7,170	14,170	15,930
Dairy stanchions	Number cows	20	26	28
Farrowing capacity	Number sows	7	8	13
Silo capacity	Ton	90	130	130

Table 2. Alternative plans for typical small and medium farms

Item	Unit	Small farm			Medium farm		
		Specialized dairy	Dairy with beef	No dairy	Specialized dairy	Dairy with beef	No dairy
Income*	Dollars	9,760	10,260	8,840	15,020	16,090	15,450
Rotation	Crops	CCOHH†	CCOHH†	CCOH†	65 acres CCOH† 99 acres CCOHH†	CCOH†	CCOH†
Beef cows	Number	0	0	21	0	0	34
Steers fed	Number	0	18	113	.....	103	224
Litters farrowed	Number	10	37	14	8	18	18
Dairy cows	Number	34	20	.....	42	22	.....
Dairy rations	Ratio	1:2.5	1:4	.....	1:2.5	1:4	.....
Corn purchased (+) or sold (-)	Bushels	0	+2,340	+2,060	-2,120	0	+4,180
Credit used	Dollars	15,570	12,840	24,460	16,350	19,210	48,980

* This income is net of operating and expansion costs but has not been adjusted for taxes, depreciation on buildings and machinery, or interest on owned capital.

† C is corn, O is oats, H is alfalfa hay.

Table 3. Alternative plans for typical large farms

Item	Unit	Specialized stanchion dairy	Stanchion dairy with beef	Loose housing dairy	No dairy
Income*	Dollars	21,420	23,290	21,720	22,250
Rotation†	Crop	95 acres CCOH† 168 acres CCOHH†	CCOH†	CCOH†	CCOH†
Steers fed	Number	34	208	44	271
Litters farrowed‡	Number	0	0	21	28
Dairy cows	Number	58	28	44	.....
Dairy rations	Ratio	1:2.5	1:4	1:2.5	.....
Corn purchased (+) or sold (-)	Bushels	-3,680	-1,370	-4,600	+2,210
Credit used	Dollars	29,010	34,590	25,290	51,020

* This income is net of operating and expansion costs but has not been adjusted for taxes, depreciation on buildings and machinery, or interest on owned capital.

† C is corn, O is oats, H is alfalfa hay.

‡ In addition, 84 head of feeder pigs are purchased and fed in each of the three dairy plans, and 40 beef cows are kept in the no dairy plan.

Truman Nodland

New techniques and new knowledge have altered and will continue to alter the comparative advantages of different farm enterprises. Therefore, it is advantageous for farmers to change their crop and livestock enterprises and their total farming operation size. This dynamic nature of farming is illustrated in the records of the Southeastern and Southwestern Minnesota Farm Management Services.

The basic information for this article was obtained from 153 farmers. Of these 105 belonged to the Southeastern Minnesota Farm Management Service from 1950 to 1959 and 48 belonged to the Southwestern Minnesota Farm Management Service from 1945 to 1957. Their farms are similar in type to all farms in the area. However, they are somewhat larger than the average in size and maintain more livestock.

Changes in average size of farms and acreages of crops raised are shown in table 1. In order to use large scale machinery and equipment farmers are increasing the size of their operations and concentrating on fewer kinds of crops.

New techniques and new methods of production are not always of equal advantage to the various enterprises. Thus it becomes desirable to shift enterprises. The major change in crops has been a shift from small grains to intertilled crops (largely corn and soybeans).

The proportion of farmers maintaining the principal classes of livestock are shown in table 2. With few exceptions the number of farmers reporting each class of livestock decreased. This indicates the trend toward increased specialization in livestock production on these farms and in southern Minnesota in general.

Table 1. Changes in average size of farms and cropping systems

Acres in:	Southeastern Minnesota		Southwestern Minnesota	
	1950	1959	1945	1957
Farm	225	244	265	275
Small grains	58	38	66	50
Corn	45	88	94	105
Soybeans	7	14	14	25
Hay	40	37	21	34
Tillable pasture ...	23	18	17	17

Table 2. Farms reporting specific classes of livestock

	Southeastern Minnesota		Southwestern Minnesota	
	1950	1959	1945	1957
	percent			
Dairy cattle	93	82	73	42
Beef breeding herds	4	7	27	21
Feeder cattle	10	15	62	60
Sheep	16	17	31	35
Hogs	86	78	100	83
Chickens	85	72	88	71

Table 3. Animal units* per farm reporting each class of livestock

Livestock	Southeastern Minnesota		Southwestern Minnesota	
	1950	1959	1945	1957
Dairy cattle	31	40	13	22
Beef breeding herds	24	29	19	30
Feeder cattle	34	48	24	73
Sheep	8	8	5	9
Hogs	20	29	32	40
Chickens	5	6	5	7

* An animal unit represents 1 dairy cow, 2 other dairy cattle, 1 feeder steer or heifer, 1½ beef cows or bulls, 3½ other beef cattle, 7 sheep, 14 lambs, 2½ hogs, 5 pigs, or 50 hens.

However, this decrease is accompanied by a substantial increase in size of the remaining enterprises on these farms (table 3). The net result is an increase in the total number of animal units per farm.

Because of these two livestock trends, farmers can better justify added invest-

ments in laborsaving equipment. Moreover, they can concentrate on new techniques and knowledge.

Each new idea may cause some adjustment in the farm business so one can use these ideas more effectively. Considerable adjustments have already been made in livestock enterprises. This is probably the area where the greatest future changes will be made.

(Continued from page 3)

is more profitable to fertilize at the recommended rate and to use minimum tillage practices (with current equipment) than to follow current practices. The higher crop yields obtained from heavier fertilization provide a larger feed supply. This can be used to expand livestock enterprises. Furthermore, in every case, the most profitable plan involves use of the existing stanchion barn.

Because of its large amount of labor available relative to cropland, the second best plan for the small farm is a "specialized dairy plan" with only a small hog enterprise. On the medium and large farms, with smaller amounts of labor available per crop acre, the second best plan eliminates the dairy herd. The "no dairy" plans with large feeder cattle enterprises use considerably more short-term credit and less labor than the plans including a dairy enterprise.

The incomes expected from these alternative plans do not differ greatly. Therefore, not all farmers will agree as to which is the "best" farm plan. All alternative farm organizations reported here require increases in the size of farm business generally and in capital use particularly as compared with current farm organizations.

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