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SOME FACTORS AFFECTING EARNINGS OF FARMERS  
in  
SOUTHEASTERN MINNESOTA, 1950-1959

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IN SOUTHEASTERN MINNESOTA

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INDEX

	Page
Introduction. . . . .	1
Trends in Resources Available and in Earnings . . . . .	2
Capital Investment Per Farm. . . . .	2
Crop Acreages and Land Use . . . . .	2
Number and Kinds of Livestock. . . . .	5
Prices Received for Products Sold or Paid for Items Purchased. . . . .	6
Farm Sales, Expenditures and Earnings. . . . .	7
Range in Earnings and Relation to Resources Used in Farming . . . . .	10
Some Management Factors Affecting the Level of Farmers' Earnings. . . . .	13
Level of Crop Yields and Earnings. . . . .	13
Crop Selection and Earnings. . . . .	13
Feeding Efficiency and Earnings. . . . .	15
Intensity of Livestock Production and Earnings . . . . .	16
Size of Business and Earnings. . . . .	17
Labor Efficiency and Earnings. . . . .	18
Overhead Expense and Earnings. . . . .	19
Summary and Conclusions . . . . .	19
Balance Is an Important Factor in Financial Success. . . . .	19
Each Farm Represents an Individual Problem . . . . .	22
Appendix - Method of Calculating Primary Factors. . . . .	23

INTRODUCTION

All studies of farmers' earnings show a wide variation among individual operators in a given community and within a particular year. This is true even though weather, soil, market outlets and other factors affecting earnings are relatively constant from farm to farm. The magnitude of this variation is seldom realized.

The purposes of this study are (1) to show the variations in farmers' earnings in a given year in a limited area where soil, weather, prices and other natural and economic factors are relatively homogenous, (2) to indicate the range in receipts and expenses from year to year among farms in this area, and (3) to point out some of the major management factors that condition or determine the variations in earnings among the farms studied.

Source of Data

The data used in this study were obtained from the farm accounting records of members of the Southeastern Minnesota Farm Management Service. This is a cooperative management service operated by the Institute of Agriculture of the University of Minnesota, the Southeastern Minnesota Farm Management Association, and the United States Department of Agriculture. This service has been in continuous operation since 1928. This report covers 105 identical farms for which records are

available for the 10 year period 1950 through 1959. <sup>1/</sup> These farms were distributed over the following counties:

Dakota	7	Mower	6	Steele	11
Dodge	7	Nicollet	9	Wabasha	8
Freeborn	7	Olmsted	7	Waseca	9
Goodhue	12	Rice	6	Winona	9
Le Sueur	4	Scott	3		

The farms included in this study are larger in area and carry more livestock per 100 acres than the average farm in Southeastern Minnesota. The operators, in general, are of more than average managerial ability. Most of them have had available the services of the S. E. Minnesota Farm Management Association for a period of years--some since as early as 1928. The operators, although somewhat above average in managerial ability, operate farms which are fairly representative of the type of farming common to this area. There is sufficient variation among these operators in size of farming unit, in farm organization, and in efficiency in production to illustrate the effect of the factors that determine or condition a farmer's earnings in the area as a whole.

#### TRENDS IN RESOURCES AVAILABLE AND EARNINGS

The period 1950 to 1959 was one of great change in agriculture--changes in size of farms in amount and kind of livestock maintained per farm, in land use and in the amount of capital required.

##### Capital Investment Per Farm

The average capital investment per farm and per acre for this group of farms is shown in Table 1. In general the inventories were conservatively priced. From 1950 to 1959 livestock inventories increased 46 per cent, power and machinery 51 per cent, and land and building 31 per cent. Many of these increases were the result of increased quantities or numbers as well as price changes.

##### Crop Acreages and Land Use

The utilization of the farm land for each of the years and the average for the period are shown in Table 2. In general there has been a decrease of 45 per cent in the acreage of small grain crops. The acreage of corn and soybeans has nearly doubled but the hay and pasture acreage has shown little net change. The area of tillable land was increased 14 per cent on the farms studied as compared with 9 per cent for all farms in southeastern Minnesota. Changes in farm size are due to purchases or sales of land and to changes in the acreage rented from year to year. The shift in crops has been in the same general direction as that on all farms in the general area but at a somewhat more rapid rate. With accounting records as a guide these operators adjusted to changing conditions more rapidly than did most farmers in the same general area.

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<sup>1/</sup> A similar study "Some Factors Affecting the Earnings of Farmers in Southwestern Minnesota," Dept. of Agricultural Economics Report No. 219 was published in 1954.

Table 1. Average Farm Capital Per Farm, 1950-59

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	10 year ave.
Dairy cattle	\$3323	\$4026	\$4720	\$4715	\$4535	\$4435	\$4456	\$4666	\$4831	\$5096	\$4481
Beef cattle	869	1504	1623	1485	1266	1249	1245	1434	1674	1799	1415
Hogs	1318	1544	1439	1316	1354	1130	1132	1498	1873	1700	1430
Sheep	152	196	215	206	212	208	180	153	137	145	180
Poultry	290	295	286	287	262	250	237	238	275	264	268
Total production livestock	5952	7565	8283	8009	7629	7272	7250	7989	8790	9004	7774
Horses	81	72	67	55	41	35	29	21	18	24	44
Crops	4858	5467	5912	6282	7026	7274	7413	7505	7414	7805	6696
Auto & tractor	2671	3039	3178	3259	3302	3248	3294	3385	3566	3580	3252
Crop machinery	3539	3952	4307	4594	4748	4642	4536	4631	4864	4949	4476
Livestock equipment	679	712	729	777	881	986	1093	1332	1439	1497	1012
Total other personal property	11828	13242	14193	14967	15998	16185	16365	16874	17301	17855	15480
Land	9896	10180	11003	11673	11636	11799	12275	12575	14082	14682	11980
Buildings	10663	11655	12498	9843	10093	10443	10623	11056	11861	12403	11114
Total real estate	20559	21835	23501	21516	21729	22242	22898	23631	25943	27085	23094
Total farm investment	38339	42642	45977	44492	45356	45699	46513	48494	52034	53944	46348
Investment per acre	172	188	200	192	195	196	197	204	214	221	198

Table 2. Average Land Use and Crop Acreages, 1950-59 and 10-Year Average

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	10 year ave.
Oats and oat mixtures	42	37	40	40	39	36	35	31	32	30	36
Other small grain	16	15	11	8	6	5	7	6	6	8	9
Total small grain crops	58	52	51	48	45	41	42	37	38	38	45
Corn, grain	37	44	49	55	52	55	55	62	67	80	55
Corn, silage	8	6	5	6	7	6	6	7	7	8	7
Soybeans, grain	7	7	7	9	15	13	16	17	22	14	13
Miscellaneous	2	3	4	3	3	3	3	3	2	3	3
Total intertilled crops	54	60	65	73	77	77	80	89	98	105	78
Alfalfa & alfalfa mixtures	33	40	38	36	36	40	39	39	35	36	37
Other hay & seed crops	6	4	3	2	2	2	1	1	2	1	2
Total hay & seed crops	39	44	41	38	38	42	40	40	37	37	39
Alfalfa & alfalfa mix. pasture	11	14	17	20	18	19	18	17	17	15	17
Other tillable pasture	12	6	5	3	5	4	4	6	5	3	5
Total tillable pasture	23	20	22	23	23	23	22	23	22	18	22
Soil bank & idle land	1	2	1	1	-	1	3	3	3	1	2
Total tillable land	175	178	180	183	183	184	187	192	198	199	186
Wild hay	3	2	3	2	2	2	2	1	1	1	2
Non-tillable pasture	25	25	23	22	23	23	22	22	21	20	23
Timber	6	6	6	7	7	7	8	6	7	7	7
Road & Waste	9	9	11	11	11	11	11	10	9	9	10
Farmstead	7	7	7	7	7	7	7	7	8	8	7
Total acres in farm	225	227	230	232	233	234	237	238	244	244	235

Numbers and Kinds of Livestock

Dairy cattle and hogs were the major kinds of livestock on the farms included in this study although there was some decrease in the proportion of farms reporting dairy cattle by 1959 (see table 3). The proportion of farms reporting beef breeding herds and feeder cattle showed some increase from 1950 to 1959. Turkeys were dropped altogether and by 1959 fewer farms reported hogs and chickens. The proportion of farms reporting sheep showed little change during this period.

Table 3. Percentage of Farms Reporting Specific Classes of Livestock

Class	1950	1959	Change in percentage of farms reporting
Dairy cattle	93.3	82.1	-11.2
Beef breeding herd	3.8	6.7	+ 2.9
Feeder cattle	10.5	14.8	+ 4.3
Sheep	16.2	16.5	+ 0.3
Hogs	85.7	78.4	- 7.3
Hens	84.8	72.1	-12.7

Although the proportion of farms reporting dairy cattle, hogs, hens, and turkeys declined the size of livestock enterprises increased. The number of animal units per farm reporting increased substantially in case of all livestock classes except farm flocks of sheep (see table 4). There was a strong tendency for increased specialization in fewer classes of livestock during this period. With the many new techniques coming into the livestock picture these farmers have found it desirable to concentrate on those classes that best fit their farm and their other resources. With larger numbers they can concentrate on mastering new techniques and justify an investment in labor saving equipment.

Table 4. Animal Units Per Farm Reporting

	1950	1959	Percentage change
Dairy cattle	30.9	39.9	+29.2
Beef breeding herd	24.3	28.8	+18.5
Feeder cattle	34.2	47.8	+40.0
Sheep-farm flock	8.0	7.9	- 1.2
Hogs	20.0	28.6	+43.0
Hens	5.2	6.2	+15.4

Prices Received for Products Sold or Paid for Items Purchased

The prices received for some of the principal items sold are shown in Table 5. The average price paid by farmers for the principal feeds used in livestock production are presented in Table 6. The general trend of prices was slightly downward over the 10 years covered by this study but there was little uniformity in trend among the items for which prices are given. Price changes from year to year may have considerable effect on the volume of income from particular sources. Likewise expenditures for certain items of expense may vary in magnitude as the result of price changes. Price changes from year to year are important factors causing year to year changes in the farmer's net income.

Table 5. Average Prices Received for Livestock, Livestock Products and Crops Sold, 1950-1959

Year	Butterfat in whole milk lb.	Beef cattle 100 lbs.	Hogs 100 lbs.	Wool lb.	Lambs 100 lbs.	Eggs doz.	Soybeans bu.
1950	\$.80	\$27.31	\$18.25	\$.55	\$26.14	\$.32	\$2.45
1951	.96	33.83	19.69	.93	29.87	.43	2.85
1952	1.04	28.91	17.43	.44	22.15	.36	2.58
1953	.95	20.73	21.28	.50	18.62	.43	2.53
1954	.84	20.30	21.14	.50	18.52	.31	3.03
1955	.85	20.71	14.39	.42	18.27	.34	2.19
1956	.93	18.13	14.45	.54	19.16	.32	2.35
1957	.93	19.78	17.76	.63	20.76	.31	2.10
1958	.91	24.63	19.42	.39	21.70	.31	1.98
1959	.90	24.95	13.89	.56	19.51	.25	1.98
10 year average	.91	24.02	17.77	.55	21.47	.34	2.40

Table 6. Average Farm Price of Principal Feeds, 1950-1959

Year	Corn bu.	Oats bu.	Barley bu.	Bran 100 lbs.	Oilmeal 100 lbs.	Meat scraps 100 lbs.	Alfalfa ton
1950	\$1.20	\$.72	\$1.20	\$2.80	\$3.95	\$6.30	\$21.00
1951	1.36	.81	1.23	3.20	3.85	6.20	19.00
1952	1.34	.76	1.21	3.50	4.85	6.50	17.00
1953	1.31	.71	1.11	2.95	4.10	5.30	17.50
1954	1.34	.70	1.02	2.85	4.20	5.75	17.00
1955	1.23	.61	.93	2.55	4.10	5.10	18.00
1956	1.25	.63	.94	2.55	3.70	4.60	18.50
1957	1.10	.61	.91	2.50	3.50	4.70	17.00
1958	.98	.54	.90	2.40	3.50	5.65	17.75
1959	.98	.58	.92	2.60	3.85	5.20	19.75
10 year average	1.21	.67	1.04	2.79	3.96	5.53	18.25



Farm Sales, Expenditures and Earnings

A summary of farm sales by years for the 105 farms is shown in Table 7. Average farm sales per farm varied from \$16,213 in 1950 to \$23,474 in 1958. Sales from the dairy enterprise were 39 percent of the total farm sales and constituted the largest single source of cash receipts. Hogs ranked second with 24 percent of the total sales.

The average annual expenditures per farm are shown in Table 8. Cash operating expenses increased rather steadily. The purchase of feed was the largest single item of operating expense. Capital expenditures including power, machinery, equipment and building fluctuated a great deal.

Total income, expenses and labor earnings are shown in Table 9. There was an increase in farm capital during nine of the ten years included in this study; the exception was 1955. The decrease in family living from the farm during 1953 and later years reflects a change in accounting procedure. Prior to 1953 family living from the farm included an estimated rental value of the farm dwelling. This was omitted from income beginning in 1953 and the value of the farm dwelling was excluded from the farm investment.

Labor earnings, the measure of financial success used, varied from \$6215 in 1951 to \$1903 in 1955. This is the return to the operator for his labor and management. The general trend of farm receipts was upward. Farm expenses were relatively stable from 1950 to 1955 and then increased rather rapidly.

Table 7. Summary of Average Farm Sales, 1950-1959

Sales	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	10 year ave.
Dairy cattle	\$2217	\$2195	\$1661	\$1328	\$1350	\$1339	\$1389	\$1605	\$2184	\$2052	\$1732
Dairy products	4141	4777	5391	5403	5128	5578	6311	6647	6694	6744	5681
Beef cattle	930	1415	1328	1286	1314	1318	1333	1780	2484	2157	1535
Hogs	4118	4609	4390	4681	4488	3650	3656	4897	5886	5046	4542
Sheep	161	166	131	171	207	445	316	332	347	328	260
Poultry	371	393	409	401	211	276	222	208	156	94	274
Eggs	1175	1549	1316	1578	1191	1347	1253	1077	1180	931	1260
Horses	16	9	17	13	12	8	17	12	9	—	11
Corn	443	539	811	1153	1386	1391	1919	1752	1510	2056	1296
Small grain	888	592	610	525	414	391	368	414	529	918	565
Other crops	618	705	884	805	1021	1275	1501	1491	1435	1408	1114
Machinery sales	547	563	374	139	161	134	149	282	312	288	295
Work off farm	366	378	333	328	357	455	430	531	464	457	410
Miscellaneous	222	151	195	164	229	198	291	239	283	227	220
Total farm sales	16213	18041	17850	17975	17469	17805	19155	21267	23473	22706	19195

Table 8. Summary of Average Farm Expenses, 1950-59

Expenses	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	10-year average
Dairy cattle purchases	\$ 318	\$ 325	\$ 351	\$ 160	\$ 138	\$ 163	\$ 216	\$ 250	\$ 232	\$ 386	\$ 254
Beef cattle purchases	657	871	788	366	502	540	653	810	1119	1109	742
Hog purchases	196	194	135	203	245	128	148	248	348	378	222
Sheep purchases	10	9	7	42	76	242	120	133	216	216	107
Poultry purchases	165	156	173	166	154	140	119	171	125	113	148
Horse purchases	10	7	13	4	1	6	5	4	6	13	7
Misc. livestock expenses	332	331	339	440	436	448	489	521	598	623	456
Feed purchases	2092	2412	2456	2227	2398	2246	2347	2542	2762	3066	2455
Crop expense	877	936	996	1248	1322	1369	1294	1438	1685	1695	1286
Custom work	435	530	590	600	614	661	702	726	833	800	649
Gas, oil & electricity	870	926	1028	970	994	1206	1055	1187	1280	1240	1058
Repair - tractors, autos & trucks	238	254	308	385	403	425	434	484	512	499	394
- real estate	478	387	422	421	349	291	345	333	398	365	379
- crop machinery	208	245	254	265	248	276	288	323	337	330	277
- livestock equipment	102	117	118	143	131	129	145	162	163	172	138
Hired labor	876	908	902	889	893	947	963	1080	988	950	940
Property taxes	567	604	665	695	736	756	831	879	972	1076	778
General farm expenses	215	224	251	269	276	290	305	312	333	370	284
Total cash operating expense	\$8646	\$9436	\$9796	\$9493	\$9916	\$10083	\$10460	\$11602	\$12906	\$13399	\$10574
Capital expenditures:											
Power	1021	1028	699	695	544	645	780	811	1020	732	797
Machinery	1246	1255	1089	1129	773	639	879	1190	1264	1106	1057
Equipment	159	156	165	212	344	244	335	532	287	335	277
Buildings	1347	1328	893	918	913	889	870	1162	1183	1299	1080
Total capital expenditures	\$3773	\$3767	\$2846	\$2954	\$2574	\$1117	\$2864	\$3695	\$3754	\$3472	\$3111
Total farm purchases	\$12419	\$13203	\$12642	\$12447	\$12490	\$12500	\$13324	\$15297	\$16660	\$16871	\$13785
Interest at 5% on farm capital	1917	2131	2299	2224	2268	2285	2326	2425	2602	2697	2317
Value of unpaid family labor	465	493	498	524	523	561	598	588	616	609	547
Cost of board for hired labor	205	200	170	151	152	156	149	143	126	119	157
Total farm expenses	\$15006	\$16027	\$15609	\$15346	\$15433	\$15502	\$16397	\$18453	\$20004	\$20296	\$16806

Table 9. Financial Summary, 1950-59

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	10-year average
Total farm sales	\$16213	\$18041	\$17851	\$17975	\$17469	\$17805	\$19155	\$21267	\$23474	\$22706	\$19195
Increase of farm capital	3794	3353	1093	876	1063	-727*	1578	1262	1820	589	1470
Family living from farm	722	848	824	468	351	327	303	309	349	305	481
Total farm receipts	\$20729	\$22242	\$19768	\$19319	\$18883	\$17405	\$21036	\$22838	\$25643	\$23600	\$21146
Total farm purchases	12419	13203	12642	12447	12490	12500	13324	15297	16660	16871	13785
Interest at 5% on average farm capital	1917	2131	2299	2224	2268	2285	2326	2425	2602	2697	2317
Estimated value unpaid family labor	465	493	498	524	523	561	598	588	616	609	547
Cost of boarding hired labor	205	200	170	151	152	156	149	143	126	119	157
Total farm expenses	\$15006	\$16027	\$15609	\$15346	\$15433	\$15502	\$16397	\$18453	\$20004	\$20296	\$16806
Labor earnings	\$ 5723	\$ 6215	\$ 4159	\$ 3973	\$ 3450	\$ 1903	\$ 4639	\$ 4385	\$ 5639	\$ 3304	\$ 4339

\*Net decrease of farm capital.

### RANGE IN EARNINGS AND RELATION TO RESOURCES USED

The previous section showed the trend in resources used per farm and earnings over a period of 10 years. Differences in earnings from year to year are great. Variations in weather and farm prices are important causes of these yearly fluctuations. However, the variations in earnings among farmers in any given year are greater than the range in average earnings from year to year. This is likewise true for the various resources used in the farm business.

Figures 1, 2 and 3 show the range in earnings among the 105 individual members of the Southeastern Minnesota Farm Management Service for the years 1951, 1955 and 1959. The fluctuations from farm to farm are essentially similar in years of relatively high average earnings as in years of relatively low average earnings.

The data in Table 10, in addition to further emphasizing the range in earnings, shows resources used and volume and efficiency of production under various levels of earnings. Higher levels of earnings do not require corresponding increases in use of resources such as land and capital. Volume and efficiency of production also have an effect on level of earnings.

The one-fifth of the farms with the lowest earnings use more land and capital resources than the next two higher levels of earnings. Efficiency of production is relatively low on these farms. Under such conditions an addition to volume of business would lower earnings even more. Management is an important cause of variations in earnings among farmers in any one year. The next section of this report will include a discussion of some of the factors responsible for variations in earnings among farmers which are due quite largely to differences in management.

Labor earnings

\$18000

16000

14000

12000

10000

8000

6000

4000

2000

0

- 2000

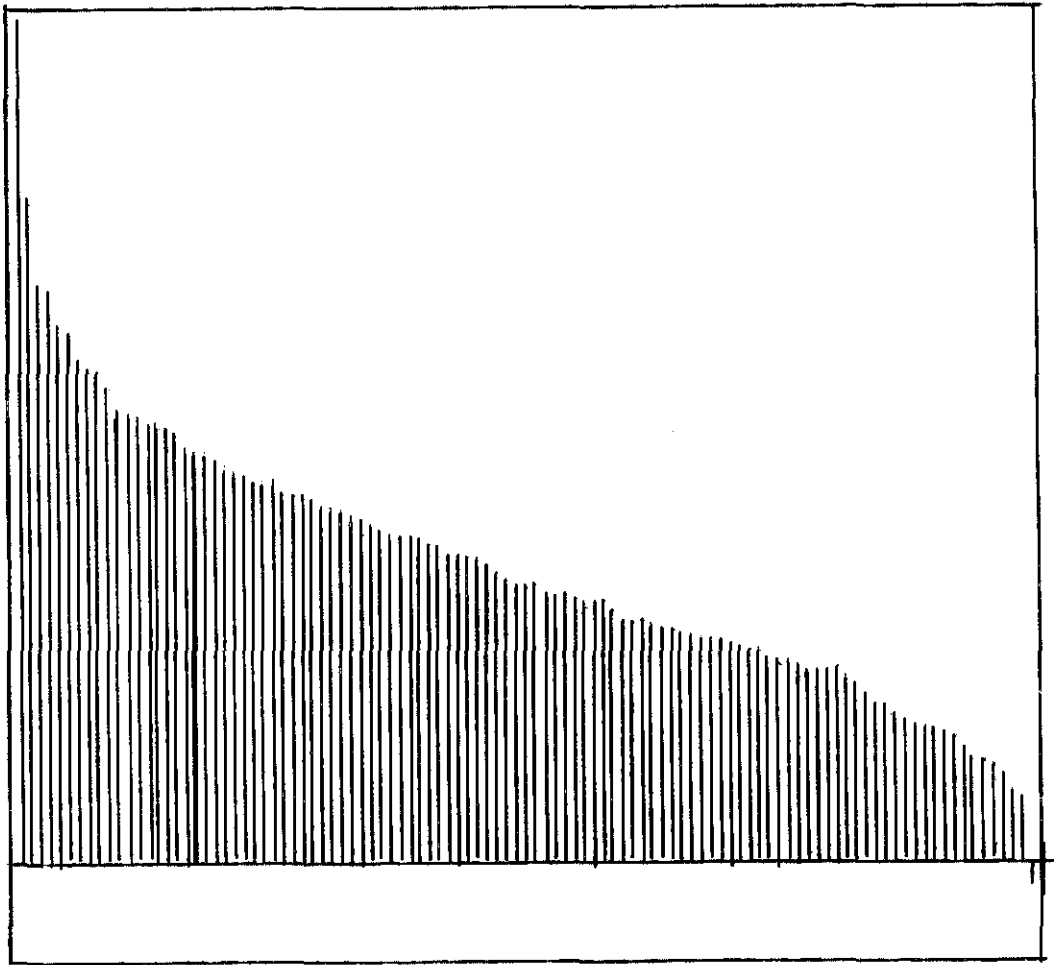


Figure 1 Range in Labor Earnings in 1951

Labor earnings  
\$ 8000

6000

4000

2000

0

- 2000

- 4000

- 6000

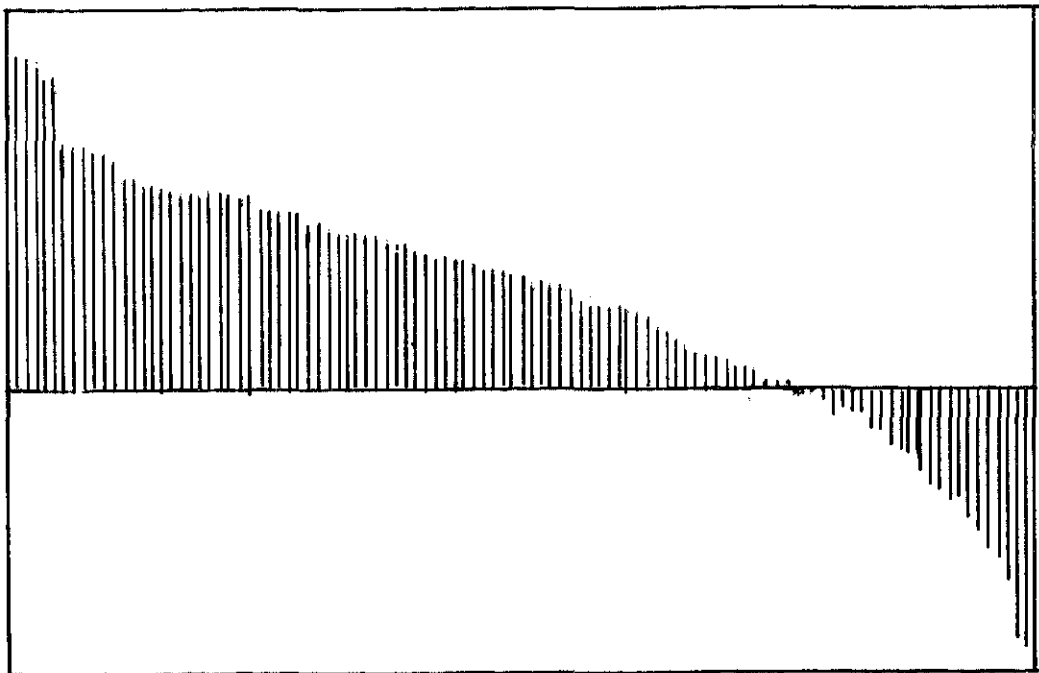


Figure 2 Range in Labor Earnings in 1955

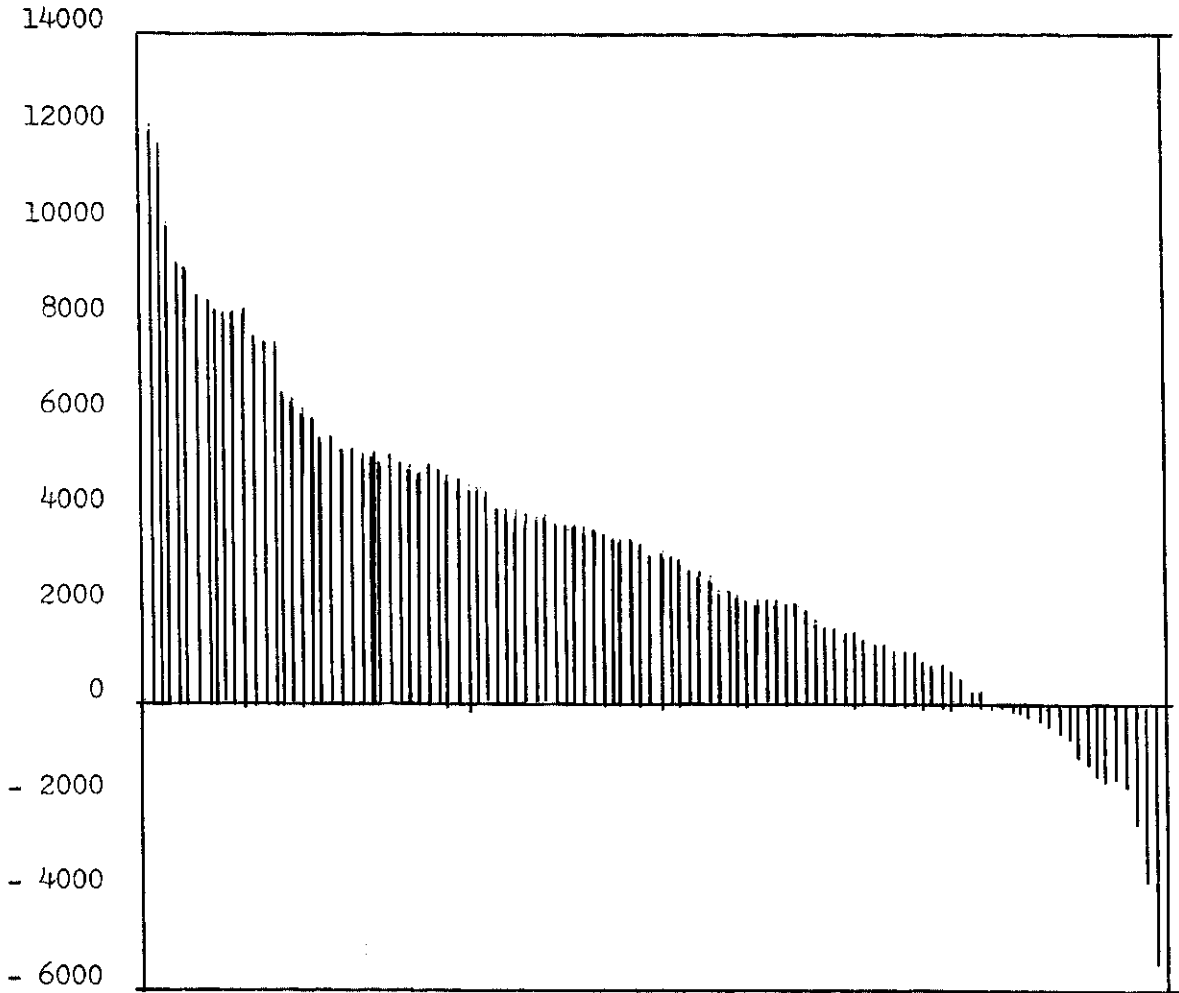


Figure 3 Range in Labor Earnings in 1959

Table 10 Relation of Earnings Per Farm to Resources Utilized, 1950-59

Item	Labor earnings				
	Lowest 1/5 of farms	Second 1/5 of farms	Third 1/5 of farms	Fourth 1/5 of farms	Highest 1/5 of farms
Labor earnings	\$480	\$2,756	\$4,154	\$5,600	\$8,705
Resources used:					
Acres per farm	226	203	218	241	282
Acres of tillable land	177	159	174	190	229
Capital investment	\$44,809	\$40,836	\$44,003	\$46,526	\$55,545
Number of workers	1.9	1.7	1.9	1.8	2.0
Volume of production:					
Man work units	472	480	513	545	607
Gross income	\$16,716	\$17,911	\$19,950	\$22,285	\$28,869
Animal units of livestock	55	57	59	67	74
Efficiency of production:					
Index of crop yields	94	101	102	103	105
Index of returns from livestock	90	100	103	105	111
Work units per worker	255	283	285	303	310
Expenses per work unit	\$ 10.17	\$9.21	\$8.96	\$8.64	\$9.01

## SOME MANAGEMENT FACTORS AFFECTING THE LEVEL OF FARMERS' EARNINGS

There are certain "management factors" that account for a substantial part of this farm-to-farm variation in earnings. These are at least partially within the control of the individual operator and he may be able to adjust his operations to decrease their effect in limiting his earnings. The "management factors"\* considered in this study are as follows:

1. Level of crop yields.
2. Choice of crops.
3. Efficiency of feed use by livestock.
4. Intensity of livestock production.
5. Size or scale of operation.
6. Efficiency in the use of labor.
7. Control of general or overhead expense.

### Crop Yields and Earnings

The average yield per acre of 5 important crops on the farms included in this study for each of the 10 years is shown in Table 11. All of these crops except alfalfa hay show a definite upward trend during the period covered. This upward trend reflects the use of higher yielding strains, increased use of commercial fertilizers and better farming practices generally. As will be indicated later, there was a considerable range in yields among these 105 farms due to differences in quality of soil, to variations in weather from year to year and among different parts of the area, and to differences in cultural practices including fertilization and tillage. In general these yields were materially higher than the average of all farms in these counties for this ten year period.

Since crops are the primary means by which economic wealth is extracted from the soil, the level of crop yields has an important bearing on the farmer's earnings. This relationship is indicated in Table 12. By the use of additional labor, fertilizer, tillage, and irrigation it might be possible to increase crop yields to the point where high yields would be uneconomic but within the range of practices on these farms better than average yields were reflected in higher than average earnings. Higher crop yields provide more products for direct sale or for processing into livestock and livestock products. Only when high crop yields are obtained by the excessive applications of labor and fertilizer are they likely to be unprofitable. Like all adjustments in farming practices, however, experience and judgment play a major role in determining the most profitable rate of application of the factors of production because of incomplete information. The experience of these 105 farmers suggest that more attention to stimulating crop yields may be profitable for most of them.

### Crop Selection and Earnings

Closely associated with crop yields as a factor conditioning farm earnings is the selection of crops best adapted to the particular farm and to the operator's experience and facilities for handling them. In any area certain crops produce a larger cash value product per acre or more and better feed per acre than do others. There is also a variation among crops in (1) the way they distribute labor and machine use seasonally, (2) contribute to the maintenance or improvement

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\*The method used in computing these measures is indicated in appendix pages 23 to 28.

Table 11. Average Crop Yields by Years on 105 Selected Farms in S. E. Minnesota Farm Management Association

Year	Corn bu.	Oats bu.	Soybeans bu.	Corn silage tons	Alfalfa hay tons
1950	52.8	47.1	15.8	9.3	2.2
1951	52.9	51.3	17.6	8.8	2.9
1952	66.7	47.2	22.2	9.7	2.7
1953	63.1	38.4	20.2	9.9	2.9
1954	72.1	47.2	22.8	11.1	2.8
1955	67.2	56.0	27.3	11.8	3.0
1956	78.7	49.9	26.5	12.3	2.8
1957	77.8	55.6	26.3	11.8	2.7
1958	71.4	69.3	21.6	13.3	2.7
1959	73.9	64.1	28.7	12.1	2.9
10 year ave.	67.7	52.5	22.9	10.8	2.8

Table 12. Average Labor Earnings on Farms Classified According to Index of Crop Yields

Index of crop yields Range	Average	Labor earnings
Lowest 1/5 of farms	78	\$3105
Second 1/5 of farms	93	3830
Third 1/5 of farms	101	4695
Fourth 1/5 of farms	109	4802
Highest 1/5 of farms	119	5262
Average all farms	101*	\$4339

\*Average index exceeds 100 because it was based on all farms in the S. E. Minn. Farm Mgt. Service and not on the average of this group of 105 farms. Yields on these farms slightly exceeded the average of the Association.

of the soil, (3) provide the type and quality of feed needed for the livestock program that best fits the farm and (4) provide a balanced use of the farmer's resources. Obviously the optimum cropping program for a given farm varies with the size and quality of the farm, local markets, labor, buildings, power and machinery, available capital and similar factors including the operator's skill and experience.

In this area most of the crops are marketed through livestock. Only 15.5 per cent of the total cash receipts per farm were obtained from the direct sales of crops.

The index of crop selection is shown in Table 13, by 20 per cent groups ranging from the lowest to the highest.



Table 13. Average Labor Earnings on Farms  
Classified According to the Index  
of Crop Selection

Index of crop choice Range	Average	Labor earnings
Lowest 1/5 of farms	48.2	\$4162
Second 1/5 of farms	57.3	4430
Third 1/5 of farms	62.7	4429
Fourth 1/5 of farms	64.4	4276
Highest 1/5 of farms	77.0	4398

Crop choice, although in general an important factor influencing farm earnings, was a minor factor affecting earnings differences among these farms. Most of the crops in this area are annual crops such as corn, oats and soybeans or perennials such as alfalfa which is only left down for a limited period. Changes can be made quickly with a minimum of disturbance to the farm plan and with little additional expense if any. As a result these are the first changes the farmer is likely to make as he reviews and adjusts his farming plans from year to year. Crops are selected on the basis of limitations of soil and topography and the needs of the livestock enterprises maintained. The operators included in this study have had information on the relative profitability of different crops in their area for the period of years they have been members of the S. E. Farm Management Service -- some 10 to 30 years or more. As a result they have adjusted their cropping systems toward a common goal of maximizing the acreage of the more profitable crops until little range in the proportion of land in high return crops remains. There is much less variability among these 105 farms in crop choice than is the case with the other six factors.

#### Feeding Efficiency and Earnings

Livestock were a major source of income on the farms included in this study. Eighty per cent of the cash receipts were from the sale of livestock and livestock products. Most of the crops grown were fed to livestock. In addition 23 per cent of the cash farm expenditures were for purchased livestock feed. There was a wide range in the efficiency with which this feed, home grown and purchased, was used in livestock production as indicated in Table 14. It appears that feeding efficiency has a direct and important relationship to earnings. This, of course, is to be expected when livestock production represents such an important phase of the farm business.

Table 14. Average Earnings on Farms Classified According to Index of Feeding Efficiency

Index of feeding efficiency		Labor earnings
Range	Average	
Lowest 1/5 of farms	77	\$2648
Second 1/5 of farms	92	3711
Third 1/5 of farms	100	4388
Fourth 1/5 of farms	110	5050
Highest 1/5 of farms	129	5897
Average	102*	4339

\*The average index of feeding efficiency exceeds 100 because it is based on all farms in the S.E. Minn. Farm Mgt. Service. The average index for the selected farms was slightly above the average of all farms for the 10 year period.

#### Intensity of Livestock Production and Earnings

A fourth factor affecting the level of farm earnings is the intensity of livestock production (see Table 15). In general the farmer gets a larger return per hour for the time he spends in crop production than he does from an hour spent in caring for livestock. However in a climate such as prevails in Minnesota, crop production is limited to a relatively small proportion of the year. In order to provide productive employment for the non-crop season as well as to provide a profitable utilization market for much of the crops he grows livestock. Livestock serves an important function on farms in the area covered by this study. By processing his crops through livestock he also retains on the farm some of the fertilizer elements in the crops that would be lost if the crops were sold.

Table 15. Average Labor Earnings on Farms Classified According to Number of Animal Units Per 100 Acres

Productive animal units per 100 acres		Labor earnings
Range	Average	
Lowest 1/5 of farms	16.6	\$4174
Second 1/5 of farms	24.3	4194
Third 1/5 of farms	31.1	4396
Fourth 1/5 of farms	37.5	4103
Highest 1/5 of farms	49.3	4830

Some further advantages of more intensive livestock production are indicated in Table 16. Crop yields are definitely higher on the more intensively stocked farms both because of the availability of more manure and because livestock provide a market for soil conserving crops for which there might not otherwise be a profitable outlet. There is considerable variation in the acres of tillable land per farm. Livestock is intensified on the smaller farms to the point where size of business in terms of work units is approximately the same in all groups and thus the variation in earnings between the groups as shown in Table 15 is small. It appears as if the returns per work unit is approximately the same for crops and livestock. However, the increase shown in the crop choice factor accompanying the increase in livestock intensity may be enough to offset the generally lower returns per hour received from livestock.

Table 16. Relation of Livestock Intensity to Other Management Factors, 1950-1959

Livestock intensity (animal units per 100 A.) Range	Ave.	Factor ratings						
		Crop yield index	Crop choice index	Feeding efficiency index	Size of business (work units)	Labor efficiency (work units per worker)	Expense per work unit	Acres of till. land
Lowest 1/5 of farms	17	96	59	100	491	269	\$10.93	240
Second 1/5 of farms	24	97	60	103	535	290	9.03	195
Third 1/5 of farms	31	101	63	99	535	289	8.31	178
Fourth 1/5 of farms	38	103	64	101	529	297	8.87	162
Highest 1/5 of farms	49	108	68	104	527	290	8.86	153

#### Size of Business and Earnings

Size of business is an important factor affecting the level of a farmer's earnings providing, of course, that quality of product or efficiency in production are not sacrificed in attaining size. The 20 per cent of these operators ranking highest in size of business had double the earnings of the 20 per cent ranking lowest in earnings (see Table 17).

Table 17. Average Labor Earnings on Farms Classified According to Size of Business, 1950-1959

Productive man work units per farm Range	Average	Labor earnings
Lowest 1/5 of farms	341	2983
Second 1/5 of farms	435	3590
Third 1/5 of farms	500	4537
Fourth 1/5 of farms	584	4553
Highest 1/5 of farms	756	6031

Some of the reasons for increased earnings on the larger farms are indicated in Table 18. Labor efficiency increased with increasing size of farm and the overhead expense per work unit decreased as size of business increased.

Table 18. Relationship of Size of Business to Other Management Factors, 1950-1959

Size of business (work units)		Factor ratings					
		Crop yield index	Crop choice index	Feeding effi- ciency index	Animal units per 100 acres	Work units per worker	Expense per work unit
Range	Ave.						
Lowest 1/5 of farms	341	101	65	105	30	253	\$10.71
Second 1/5 of farms	435	101	63	99	31	277	9.31
Third 1/5 of farms	500	101	62	103	30	288	8.86
Fourth 1/5 of farms	584	101	62	100	33	294	8.45
Highest 1/5 of farms	756	101	62	100	34	322	8.66

Labor Efficiency and Earnings

Labor efficiency as measured by work units per worker showed a fairly definite relationship to earnings. As in the case of some of the other factors considered, this relationship cannot be measured precisely but the direction of its effect is apparent (see Table 19).

Table 19. Average Labor Earnings on Farms Classified According to Labor Efficiency, 1950-1959

Man work units per worker		Labor earnings
Range	Average	
Lowest 1/5 of farms	200	\$3154
Second 1/5 of farms	248	4132
Third 1/5 of farms	279	3977
Fourth 1/5 of farms	317	5139
Highest 1/5 of farms	391	5291

Efficiency in the use of labor showed a consistent relationship with size of business and with the overhead expense per work unit (see Table 20). This is due in part to the method of calculating work units. Labor is more effectively used on the large farm units and the overhead expense per work unit is less.

Table 20. Relationship of Labor Efficiency to Other Management Factors, 1950-1959

Labor efficiency (work units per worker)		Factor ratings					
		Crop yield index	Crop choice index	Feeding effi- ciency index	Animal units per 100 acres	Size of business (work units)	Expense per work unit
Range	Ave.						
Lowest 1/5 of farms	200	99	61	99	29	440	\$11.07
Second 1/5 of farms	248	101	61	103	31	512	9.47
Third 1/5 of farms	279	102	64	102	32	518	8.80
Fourth 1/5 of farms	317	102	63	104	34	558	8.45
Highest 1/5 of farms	391	102	64	101	33	590	8.21

Overhead Expense and Earnings

There are on every farm expenses for power, machinery, equipment, and building that are difficult to allocate to specific lines of production. The cost of these items must be covered by the income from the farm as a whole. Frequently this item cannot be curtailed or eliminated without some loss of income. The prudent farm manager makes every effort to keep this category of costs at a minimum consistent with productive efficiency. Elaborate and expensive buildings may add to the attractiveness of a farm but in so far as they must be paid for out of the earnings of the farm they limit net earnings. On the other hand, an inadequate investment in these items handicaps farm operations and results in a decreased income. The farm manager has a difficult problem in keeping his overhead low and yet not too low. There appeared to be little consistent relationship between the level of overhead expense and any of the other six "success factors" used in this study.

Table 21. Average Labor Earnings on Farms Classified According to Overhead Expense for Work Unit--1950-1959

<u>Overhead expense per work unit</u>		<u>Labor</u>
<u>Range</u>	<u>Average</u>	<u>earnings</u>
Lowest 1/5 of farms	\$5.79	\$4204
Second 1/5 of farms	7.46	4465
Third 1/5 of farms	8.74	5008
Fourth 1/5 of farms	10.14	4571
Highest 1/5 of farms	13.87	3446

SUMMARY AND CONCLUSIONS

Balance is an Important Factor in Farm Financial Success

There is a wide range in the degree with which individual farmers succeed in achieving a high rating in the success factors discussed in the previous sections. Some have a high rating in one or two or three factors offset by low ratings in others. Sometimes this may be due to factors outside the farmer's control. With a soil of low productivity it may not pay him to push his crop yields to the level achieved by other farmers whose land has a higher yield potential. These uncontrollable factors must be accepted as natural limitations but can be offset to some extent by superior excellence in the other factors more nearly in control of the operator. In general, however, "balanced excellence" in each of the seven factors is highly important in maximizing earnings as indicated in the data presented in Table 22. As the number of factors in which an operator excelled the average of the group his labor earnings increased consistently. This relationship is shown graphically in Figure 5.

Table 22. Average Labor Earnings and Management Factors on Farms Classified According to Number of Factors in Which the Farmer was Above the Group Average, 1951

Number factors in which the operator excelled	Labor earnings	Crop yield index	Crop choice index	Feeding efficiency index	Livestock intensity index	Size of business (work units)	Labor efficiency index	Overhead	
								expense	per work unit
None	\$ 704	87	55.1	83	19.0	403	205	\$14.20	
1	2458	90	58.2	93	21.1	447	239	11.92	
2	3724	97	58.3	99	25.7	493	261	9.84	
3	4229	100	61.8	102	32.1	501	272	9.02	
4	4805	104	64.2	104	33.1	543	310	8.37	
5	5468	107	66.8	106	36.5	575	318	8.14	
6	5985	112	69.5	108	42.5	598	328	8.23	
7	6778	117	72.9	117	51.8	679	344	7.36	
Average all farms	4339	101*	62.8	102*	31.6	523	286	9.22	

\*These indices exceeded 100 because it is based on all farms in the S. E. Minn. Farm Management Association for the period covered and not on these 105 farms.

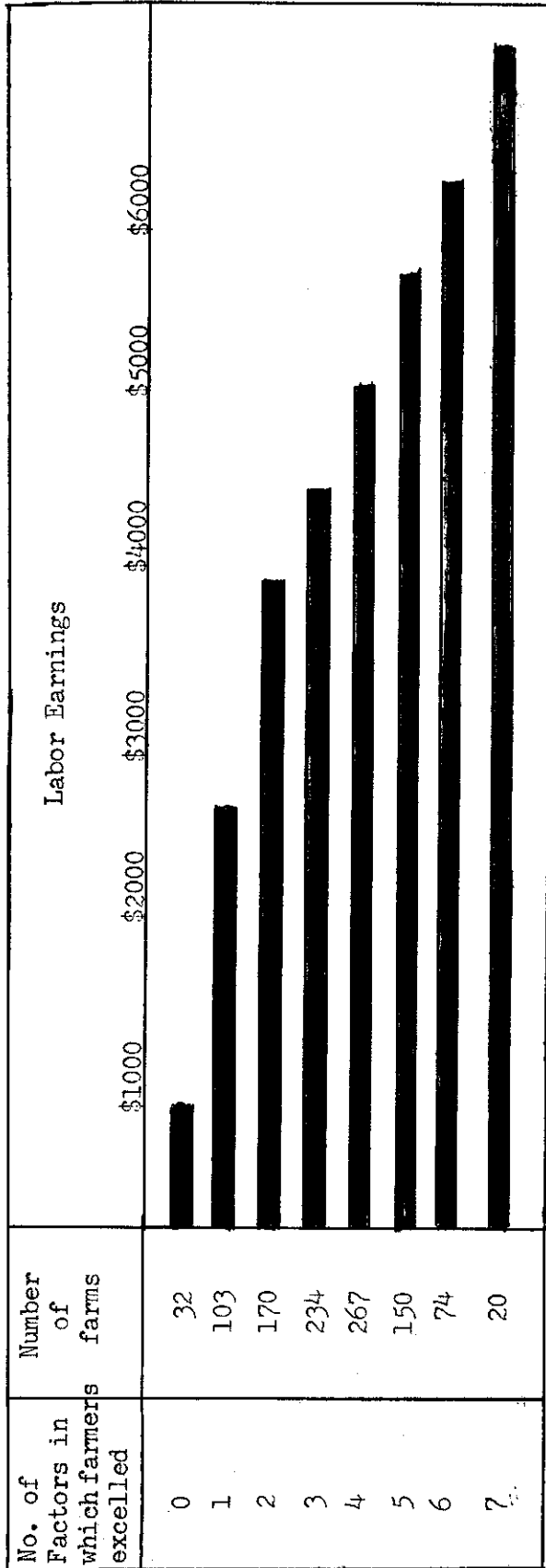


Figure 5 Average labor earnings on farms grouped according to number of management factors in which the operator was above the average of the group

Each Farm Represents an Individual Problem

That each farm is an individual problem must be clearly recognized. Each farm has certain handicaps that cannot be overcome by any planning procedures. Obviously, it may not pay on less productive soils to push crop yields to the level that is profitable on a more productive soil. The alert manager must concentrate on improvement in those factors which can be improved most economically. It may be more profitable to increase the volume of business by buying feed and carefully balancing the rations in which it is used than in attempting to force his crop yields to an unprofitable level. To do this requires not only technical knowledge but also reasonably precise and accurate information as to his current results. Members of the Southeastern Minnesota Farm Management Association had such information available in their farm records and in the advisory service the Association provided. Good records must be carefully kept and diligently studied if they are to serve as a useful guide to more profitable operation. As new techniques come into the farm picture and as the farmer is confronted with rapid changes in our whole economy to which he must adjust, he can scarcely afford to be without the services of accurate farm records interpreted in the light of his resources, his capabilities and his opportunities.



APPENDIX

Method of Computing Indices or Factor Ratings Used in Analysis of  
Records of the S. E. Minnesota Farm Management Service

In this section are presented illustrations of the method used in computing each of the seven factors considered in this report. An example has been selected from the 1959 records of one of the cooperating members of the S. E. Minnesota Farm Management Service.

1. Index of Crop Yields

The index of crop yields relates the average yield of the various crops grown on an individual farm to the average yield of crops on all farms in the group with which it is compared. The method of computation is shown in the following illustration.

<u>Crops Raised</u>	<u>Acres in each crop</u> (a)	<u>Total Production</u> (b)	<u>Ave. Yields for all Farms</u> (c)	<u>Acreages Needed With Average Yields</u> (b) ÷ (c)
Wheat	7	220 bu.	32.0 bu.	220 ÷ 32.0 = 6.9
Oats	12	650 bu.	63.5 bu.	650 ÷ 63.5 = 10.2
Barley	19	974 bu.	43.5 bu.	974 ÷ 43.5 = 22.4
Corn (Grain)	48	4000 bu.	63.5 bu.	4000 ÷ 63.5 = 62.9
Alfalfa (Hay)	24	80 tons	2.9 tons	80 ÷ 2.9 = 27.6
Red Clover (Hay)	<u>3</u>	8 tons	3.4 tons	8 ÷ 3.4 = <u>2.4</u>
Total	113			132.4

$(132.4 \div 113) \times 100 = 117$ , the index of crop yields.

2. Index of Crop Choice

The various crops are classified into four groups (A, B, C and D) on the basis of net income per acre or cost per unit of feed nutrients. The index shows the per cent of the tillable land in high return crops.

Percent of Tillable Land in High Return Crops

Example:

A Crops		B Crops		C Crops		D Crops	
Crop	Acres	Crop	Acres	Crop	Acres	Crop	Acres
Corn, grain	48.0	Alfalfa Hay	24.0	Wheat	7.0	Oats	12.0
				Red Clover Hay	3.0	Barley	19.0
				Sudan Pasture	6.0		
Totals	48.0		24.0		16.0		31.0
Weight	100%		50%		25%		0%
Totals Weighted	48.0		12.0		4.0		0.0

Total tillable acres in the farm are 119.

The percentage of tillable land in high return crops =  $(48.0 + 12.0 + 4.0) \div 119 \times 100$   
 = 53.8

Crop ratings for crops raised in southeastern Minnesota other than those listed above are:

Canning peas	B	Flax	C
Sweet Corn	B	Timothy hay	D
Alfalfa pasture	B	Brome grass hay	D
Corn for silage	B	Blue grass pasture	D

### 3. Feeding Efficiency

The index of relative feeding efficiency on different farms with different classes of livestock is a weighted or composite measure of the relative return from all feed fed to livestock on a given farm. It is computed for each farm as indicated in the following example.

<u>Class of Livestock</u>	<u>Return for \$100 feed</u> (a)	<u>Ave. Return for \$100 feed for all farms</u> (b)	<u>Index of Return for \$100 Feed</u> (a) ÷ (b) (c)	<u>Animal Units of Livestock</u> (d)	<u>Animal Units Times Index</u> (c) x (d) (e)
All Dairy Cattle	\$249	\$218	249 ÷ 218 = 114	27.9	114 x 27.9 = 3181
Hogs	99	115	99 ÷ 115 = 86	34.6	86 x 34.6 = 2976
Chickens	<u>126</u>	<u>114</u>	<u>126 ÷ 114 = 111</u>	<u>14.8</u>	<u>111 x 14.8 = 1643</u>
Total				77.3	7800

7800 ÷ 77.3 = 100.9 a weighted index of return for \$100 feed fed to productive livestock.

#### 4. Intensity of Livestock Production

To measure intensity of livestock production it is necessary to calculate average number of head and the number of animal units of each class of livestock on the farm during the year. Average number of head can be computed by adding the number on hand at the beginning of each month plus the number on hand at the end of the year and dividing this sum by 13.

Example using dairy cows:

		<u>Dairy Cows</u>											
		<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
<u>19</u>	<u>First of month</u>	19	20	20	21	21	20	20	20	21	20	20	20
<u>0</u>	<u>Purchased</u>												
<u>6</u>	<u>25 Heifers Fresh</u>	1	2	1					2				
<u>7</u>	<u>Sold</u>		2			1		1	1				2
<u>0</u>	<u>Died</u>												
<u>0</u>	<u>Transferred Out</u>												
<u>0</u>	<u>Butchered</u>												
<u>18</u>	<u>25 End of Month</u>	20	20	21	21	20	20	20	21	20	20	20	18

The sum of the top row of figures plus the number at the end of the year ÷ 13 = 20.0 or the average number of cows in this farm for the year.

Animal units are a basis of expressing in one figure a quantity of livestock which includes several classes of livestock. An animal unit represents a mature dairy cow or that number of other livestock which will consume the same quantity of feed. The animal unit equivalents of livestock other than mature dairy cows are:

- 2 head of young dairy cattle
- 1 feeder steer or heifer
- 1 1/4 beef cows or bulls
- 3 1/3 other beef cattle
- 7 native sheep (6 months or older)
- 14 native lambs (under 6 months of age)
- 7 feeder lambs
- 2 1/2 hogs (6 months or older)
- 5 pigs (under 6 months of age)
- 50 hens
- 1100 pounds net gain in weight of turkeys produced

To calculate intensity of livestock production the total animal units of livestock are divided by the total acres in the farm less acreage in farmstead, roads and waste. The number of animal units on the farm being used as an example is as follows.

Dairy cows	20.0
Young dairy cattle	7.9
Hogs	34.6
Chickens	<u>14.8</u>
Total	77.3

There are 187 acres in the farm, 13 of which represent acreage in farmstead and roads.

$$77.3 + \frac{(187 - 13)}{100} = 44.4 \text{ animal units per 100 acres.}$$

### 5. Size of Business

Size of business is measured by acres of crops and number of livestock or volume of livestock production. These have been combined in terms of work units or the quantity of man labor required per acre of crops or per farm unit of livestock production as shown in the following example.

Item	Quantity	Work Units Per Unit of Production	Total Work Units
Wheat	7.0 acres	.5	3.5
Oats	12.0 acres	.5	6.0
Barley	19.0 acres	.5	9.5
Corn, grain	48.0 acres	.7	33.6
Alfalfa, hay	24.0 acres	.6	14.4
Red Clover Hay	3.0 acres	.4	1.2
Milk cows	20.0 head	10.0	200.0
Other Dairy Cattle	7.9 animal units	3.5	27.6
Hogs	434.9 cwt. produced	.2	87.0
Chickens	14.8 animal units	10.0	148.0
Total work units			530.8

Average work units for crops and livestock other than that used in the above illustration are:

Item	No. of Work Units	Item	No. of Work Units
Beef breeding herd	3.5 per animal unit	Soybeans	.5 per acre
Feeder cattle	.25 per 100 pounds produced	Corn Silage	1.0 per acre
Sheep, farm flock	1.5 per animal unit	Canning peas	.5 per acre
Sheep, feeders	.3 per 100 pounds produced	Sweet Corn	.7 per acre
Turkeys	.5 per 100 pounds produced		

### 6. Efficiency in the Use of Labor

Efficiency in the use of labor is measured in terms of work units accomplished per worker. The total work units as shown in the previous table is divided by the number of full time equivalent workers to arrive at a measure of accomplishment per worker as shown in the following example.

	<u>Months of work</u>
Proprietor	12
Unpaid family labor	3
Day labor	-
Monthly labor	8
Total months of labor	<u>23</u>

$23.0 \div 12 = 1.9$ , the average number of workers for the year.

$531 \text{ work units} \div 1.9 = 279 \text{ work units per worker}$ , or the work accomplished per worker.

### 7. Control of General or Overhead Expense

There is on every farm a considerable expenditure for power, crop and general machinery, livestock equipment, and buildings that is difficult to allocate specifically to individual crops or units of livestock production. Instead the sum of these expenses are divided by the work units in order to secure the expenses per work unit.

<u>Item</u>	<u>Net Operating Expense</u>	<u>Expense Per Work Unit</u>
Power	\$2227.35	4.19
Crop and general machinery	987.07	1.86
Livestock equipment	611.16	1.15
Farm buildings	1035.71	1.95
Total	<u>\$4861.29</u>	<u>9.15</u>

$\$4861.29 \div 531 = \$9.15$  expense per work unit.