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Economic Opportunities Available to Farmers on 160-Acre Farms in Southeastern South Dakota

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ECONOMIC OPPORTUNITIES AVAILABLE TO FARMERS ON 160-ACRE FARMS IN SOUTHEASTERN SOUTH DAKOTA

BY

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ECONOMIC OPPORTUNITIES AVAILABLE TO FARMERS

ON 160 ACRE FARMS IN SOUTHEASTERN

SOUTH DAKOTA

This thesis is approved as a creditable, independent investigation by a candidate for the degree, Master of Science, and acceptable as meeting the thesis requirements for this degree; but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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CHAPTER I

INTRODUCTION

How can farm income be increased on 160-acre farms in southeastern South Dakota? This question has been asked by many farmers who are trying to determine the most profitable cropping and livestock systems.

The most profitable farm organization depends on how well the farmer selects his farm enterprises and combines the use of his land, labor, capital, and management. The major problem of the farm manager is selecting the enterprises in combination with available resources that will result in the greatest continuous earnings over a period of years.

There is no one combination of cropping and livestock system which is most profitable for all farmers because resources are different for each farm. Soil structure, fertility, drainage, and the degree of erosion differ among farms, and farmers have different levels of managerial ability. Available labor and capital, as well as types of equipment and buildings, also vary between farms.

The most efficient combination of enterprises for any farm will also vary over a period of time with changes in the farmer's managerial skills, technology, and available capital. Finally, the farmer's profits may vary from one year to the next primarily because of short-run price changes.

However, it is not feasible to change the organization of the

farm with every change in prices. The benefits of a given crop rotation can only be secured after several years. A change in the cropping system often requires a change in the livestock enterprises. Changing the crop and livestock enterprises may require a change in fields and fences. Expansion or remodeling of buildings may be required to handle new crops and livestock. Development of profitable herds or flocks requires a number of years. Hence, farmers need to take the long-run view in choosing their crop and livestock enterprises. They need to consider not only profits, but also the requirements for additional capital and labor which may also affect the well-being of the farm family.

Objectives

This study was made to serve as a guide for farmers who are planning to reorganize their farming operations. The specific objectives of this analysis were: (1) to determine the relative profitability of several alternative cropping and livestock systems for a case farm of 160 acres in southeastern South Dakota, and (2) to show the quantities of resources necessary for the alternative systems.

Procedure

This report presents information concerning the economic effects of combining various alternative cropping and livestock systems that are applicable to farmers on 160-acre farms in southeastern South Dakota. It does this by presenting the results of several complete

farm budgets of the annual costs and returns for a number of alternative cropping and livestock combinations for a 160-acre farm in Moody County. The farm selected for study was subjectively chosen by Extension Service personnel. It is believed to be a typical 160-acre farm unit for the county. Moody County is considered to be representative of the area studied (economic area 4b).

Data used for this study were obtained by budgeting several alternative cropping and livestock systems that were suggested by the farm operator, and by testing other combinations of enterprises used in the area. Projected prices, which indicate the long-run price relationships to be expected in the years ahead, were used to determine the costs, receipts, and net income for the present and alternative systems.[1] Rotations and yield estimates used in this study were based on previous research conducted at this station.[2] A study of the "Economic Use of Grain and Forage in Livestock Production" provided the input-output data for the livestock enterprises used in this analysis.[3]

Budgets were prepared with the intent that they would provide a

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[1]Agricultural Economics Department, Base Prices For Long-Term Budgets in South Dakota, Pamphlet 51, Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak., February, 1954.

[2]Russell L. Berry, Most Profitable Rotations For the Corn Belt Area of Southeastern South Dakota, Circular 129, Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak., May, 1956.

[3]Canute M. Johnson and Sigurd R. Stangeland, Economic Use of Grain and Forages in Livestock Production, Circular 105, Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak., June, 1954.

range of situations that might be valid for the long-run on 160-acre farms in the area. It was assumed that these situations could serve as approximate guides for farmers planning changes on similar farms. The budgeting of a case farm was used in this analysis because it was impossible to place several cropping and livestock systems on a farm at the same time.

Review of Literature

This review of literature is limited to that research which appeared to be most significant in dealing with the economics of cropping and livestock systems that have application to southeastern South Dakota.

Berry recently determined the net returns from several different crop rotations with varying amounts of legumes under price and production relationships likely to exist during the next few years for South Dakota.[4] His study revealed that when soil erosion is not a problem, a two-year rotation of corn and oats with a legume catch crop is the most profitable for Moody soils of southeastern South Dakota. The second most profitable rotation was corn, oats (sweet clover catch crop), corn, oats, alfalfa-brome, alfalfa-brome.

Berry indicates there is little advantage to standover legumes unless soil erosion is a serious problem or livestock is the major farm enterprise. He declares that "most farmers on Moody soil would do well

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[4]Berry, op. cit., p. 34.

to grow a green manure catch crop and, if necessary, sell grain and buy hay when the expected price relationships prevail." He recognizes, however, "that if legumes can be economically used as pasture, then costs of the legume crop might be low enough to justify standover legumes in the rotation."[5] The partial budgets used in this study did not include livestock. Hence, this study provides little help to the farmer on this problem.

Ottoson made an analysis of some alternative farming opportunities for 30 randomly selected 160-acre farms in the steeper part of the loess region of northeastern Nebraska.[6] The loess soils of this area are similar to the loess soils of southeastern South Dakota. The farms studied were divided into 15 high and 15 low forage farms. Emphasis in this study was on the costs and returns associated with alternative soil management and feed utilization systems under erosion conditions.

Ottoson found that corn yields were significantly related to the percentage of acres in forage in the rotations. The 15 high-forage farms had an average of 19 fewer acres of grain but produced slightly more grain and 255 more feed units than did the 15 low-forage farms. Somewhat more grain was sold for cash on the low-forage farms than on the high-forage farms. Investments were greater in forage-consuming livestock and smaller in hogs on high-forage farms. The study indicated

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[5] Ibid., p. 40.

[6] Howard W. Ottoson, Economic Analysis of Forage Production and Utilization in Dakota and Dixon Counties, Nebraska, Bulletin 173, pp. 3, 4, Agricultural Experiment Station, University of Nebraska, Lincoln, Nebr., November, 1953.

no significant difference in investment in all livestock, machinery, and land among the two groups of farms. The amount of labor required in both groups was about the same. Larger volumes of business, as well as larger net incomes, were shown for high-forage farms compared to low-forage farms under both 1939-1944 and 1950 prices.

The second phase of the Nebraska study was a budget analysis for the 30 selected farms of three alternative soil management systems and nine livestock feed utilization systems. The soil management systems were to achieve erosion control by: (1) the use of rotations only, (2) rotations plus contouring and terracing, and (3) rotations plus contouring, terracing, and fertilizer. Under (1), grain acreage would need to be reduced from 85 to 65 acres per farm to control erosion. Using contouring and terraces, grain acreage would need to be reduced to 35 acres in order to control erosion. High-forage farms needed little or no change in grain acreages to control erosion. Under soil management system (1), sample farms would produce less feed. Feed production under system (2) would increase 125 units. An increase of 1260 feed units would result with the adoption of system (3). The study indicates that erosion control itself does not necessarily increase farm returns.

Nine systems of feed utilization were analyzed in conjunction with soil management systems in this study. They were dairy cows, beef cows, three calf feeding systems, three yearling steer feeding systems, and a two-year feeding system. The study assumed sufficient livestock numbers to be kept under each system to utilize all of the forage, plus recommended amounts of grain. The remainder of grain was fed to hogs.

An increase in livestock investment was necessary, on the average, for all farms to utilize all forage produced under the alternative systems. The study showed that a higher capital investment was required for dry lot feeding systems than for beef cows, dairy cows, or the high-roughage feeding systems. Under soil management plan (3), larger increases in livestock housing were necessary. Dairy cows required additional housing investment, and additional labor when compared with other systems.

The Nebraska study pointed out that calf feeding systems would be most profitable with 1950 prices under soil managment system (1). A decrease in income from the present level would result with dairy and beef cow systems. All livestock systems except the pasture calf feeding system would decrease income under 1939-1944 prices. No study was made of feed utilization under soil management system (2). The study revealed that net incomes could be increased for all livestock systems under both 1939-1944 and 1950 prices under soil management system (3) using rotations plus contouring, terracing, and fertilizer.

This study is useful to farmers in the steeper loess hills area of southeastern South Dakota where erosion is of major concern. It does not, however, provide farmers on the more level farming areas the type of information needed in planning their long-run cropping and livestock systems.

A recent study by Bender deals with the use of all agricultural

lands in South Dakota.[7] The first part of the study points out the major factors of change that influence the agriculture of the state and its seven economic areas. The second part of the study deals with land and farm management problems of modal-type farms as they affect the seven economic areas. The third part of the study is concerned with Extension programs in meeting these changing conditions.

Bender's study was primarily concerned with the application of farm management principles as they apply to fertility, intensity of livestock enterprises, rates of feeding, and timing of production for maximum efficiency. His study considered two crop systems for a 151-acre farm with five alternative hog production plans. No study was made of the comparative returns from beef production, sheep production, or dairy production.

Although this study was not directed toward the objectives outlined in the present study, it does, however, provide farmers and ranchers with an excellent guide in the use of management principles for improving the efficiency of their farming operations in accordance with changes in the agricultural economy of the State.

Rogers made a financial study of 16 farms in southeastern South Dakota in 1928.[8] He also made budgets for several typical farm

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[7]Lyle M. Bender, The Rural Economy of South Dakota, pp. 380-404, Special Report No. 1, Agricultural Extension Service, South Dakota State College, Brookings, S. Dak., September, 1956.

[8]R. M. Rogers, Economic Adjustments on Farms in Southeastern South Dakota, Bulletin 249, Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak., March, 1930.

situations in the area. This study recognized the need for changes in farm organization and management if incomes were to be improved. Many of the basic adjustments found necessary to improve income at that time remain important today. However, they need to be adjusted in light of modern technology and new knowledge.

Advanced technology has completely changed many of the farming practices used since the time Rogers made his study. Horses are no longer the main source of power in present farming operations. Changes in demand among certain agricultural products have caused the choices and combinations of crops grown to be different from those of 30 years earlier. Machinery and labor requirements for many farming operations no longer correspond with those set forth in Roger's study. Farmers need current information when organizational changes in the farming system are being made.

The following chapter describes the economic area studied and presents the present organization of the sample farm.

CHAPTER II

DESCRIPTION OF AREA AND FARM STUDIED

The farm selected for study is located in Moody County. This farm is similar in size, topography, buildings, and machinery facilities to about 3,500 farms in economic area 4B of southeastern South Dakota (Figure 1). Farms of the 160-acre size represent about 27 percent of the total farms in the area (Table I). Farms in the area average about 220 acres in size. Rainfall averages 24-26 inches annually.

TABLE I. NUMBER AND PERCENT OF FARMS BY SIZE SOUTHEASTERN SOUTH DAKOTA AREA 4B, 1950

		Acres Per Farm										
		Under 10	10-29	30-49	50-69	70-99	100-139	140-179	180-219	220-259	260-499	500-999	1000 and over
All Farms	12,783	465	410	291	185	743	622	3470	1237	1738	3252	361	9
Percent	100	3.6	3.2	2.3	1.4	5.8	4.9	27.1	9.7	13.6	25.4	2.8	.07

Source: U. S. Census of Agriculture For North Dakota, South Dakota, 1950, V. 1-pt 11.

The southeastern area (economic area 4B) is characterized as the most intensive livestock feeding, hog, dairy, and poultry production

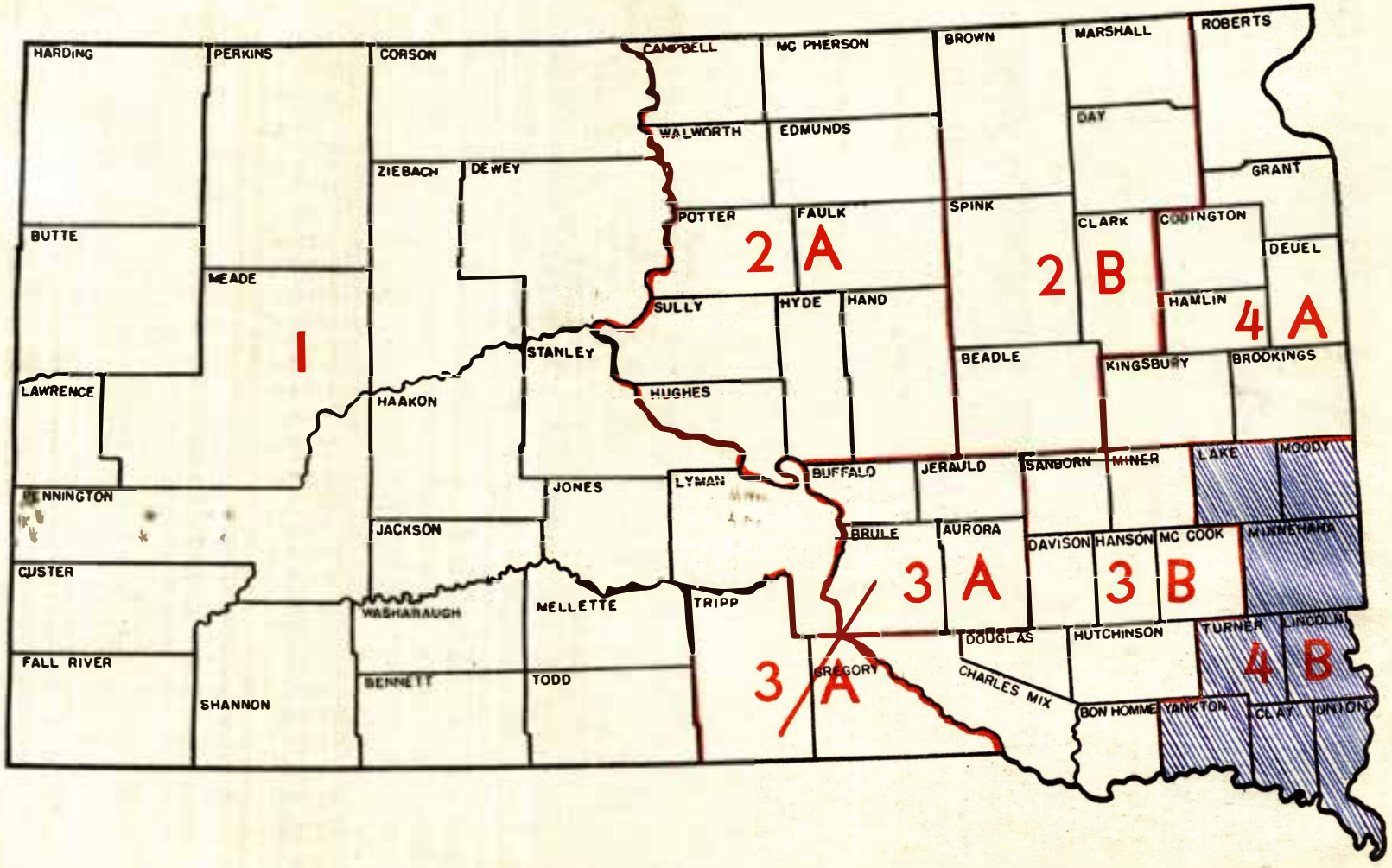

Figure 1. The Farm Selected for Study is Located in Moody County of Economic Area 4B.

area of the state.[9] Farms producing livestock (other than dairy and poultry) are the most numerous in the area. Grain farms are the next most important. Nearly 29 percent of the total farms in the area producing livestock (other than dairy and poultry) are of the 140-179 acre size.

Cash grain farms of the same size represent about 28 percent of the total cash grain farms in the area. General farms producing crops and livestock represent the third largest type of farms in the area (Table II).

Table II also shows the relative position of 140-179 acre farms by economic class or income groups. Nearly 42 percent of the farms having incomes ranging from $2,500-$4,999 were of the 140-179 acre group. Thirty percent of all farms in the area with incomes of $1,200-$2,499 were those of the 140-179 acre size. Twenty-two percent of the total farms reporting work off-farm of 1 to 100 or more days were of the 140-179 acre size. Over 26 percent of this group reported working 1 to 99 days off the farm. This group also had nearly 12 percent reporting 100 or more days of work off the farm.

Description of Farm Studied and Present Plan of Operation

The general location of the farm studied is Moody County in southeastern South Dakota. The farm is 160 acres in size, with 102

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[9] C. R. Hoglund, Facts For Prospective Farmers and Ranchers in South Dakota, Circular 59, p. 9, Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak., June, 1945.

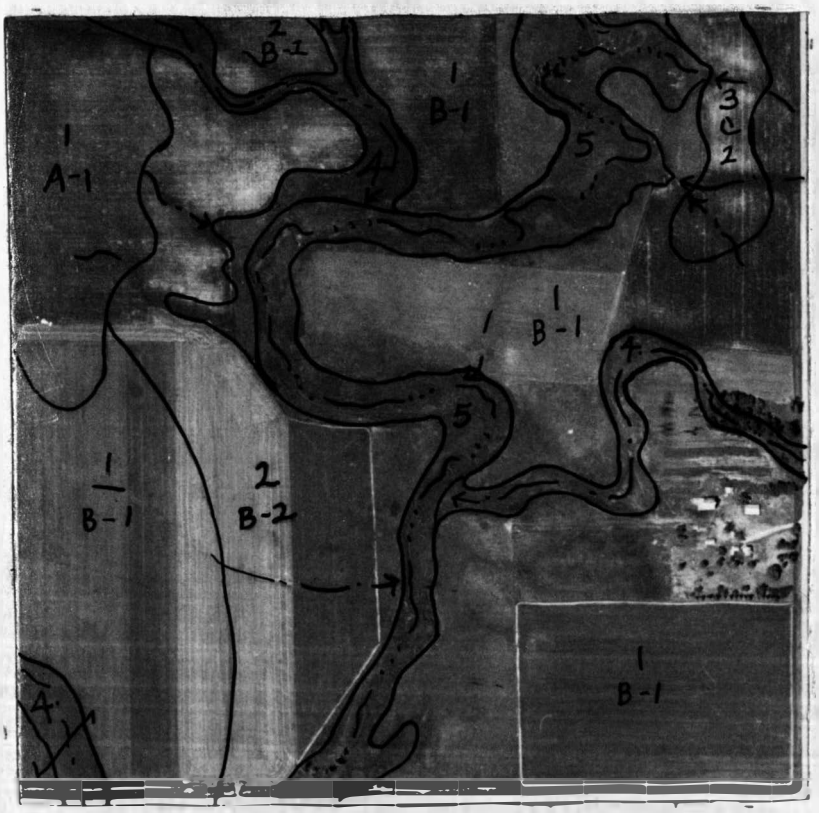
TABLE II. ORGANIZATION AND CHARACTERISTICS OF 140-179 ACRE FARMS SOUTHEASTERN SOUTH DAKOTA, AREA 4B, 1950

	Total All Farms	140-179 Acres	Percent of Total
Farms by type			
Cash grain	2,198	620	28.2
Dairy farms	345	70	20.3
Poultry farms	226	6	2.7
Livestock - other than dairy and poultry	7,434	2,133	28.7
General farms	1,971	615	31.2
Primarily crop	41	-	-
Primarily livestock	640	230	35.9
Crop and livestock	1,290	385	29.8
Miscellaneous and unclassified	589	26	4.4
Farms by economic class 1/			
Commercial farms	12,215	3,444	28.2
Class I - $25,000 and over	437	24	5.5
Class II - $10,000-$24,999	2,063	270	13.1
Class III - $5,000-$9,999	4,900	1,410	28.8
Class IV - $2,500-$4,999	3,160	1,310	41.5
Class V - $1,200-$2,499	1,240	375	30.2
Class VI - $250-$1,199	415	55	13.3
Value of farm products sold by source - 1949			
All farm products sold	$102,110,783	$21,209,252	20.8
All crops sold	22,095,089	4,448,385	20.1
Field crops - other than veg., fruits, and nuts	21,876,899	4,442,635	20.3
Other field crops sold	218,190	5,750	2.6
All livestock and livestock products	79,922,354	16,760,867	21.0
Dairy products	5,305,248	1,237,952	23.3
Poultry and poultry products	6,716,202	1,888,371	28.1
Livestock and livestock products - other than dairy and poultry	67,970,804	13,634,544	20.1
Forest products sold	23,340	-	-
Average sale per farm reporting	8,029	6,112	-
Off-farm work			
Working off their farms - farms reporting	2,851	627	22.0
1 to 99 days	1,994	526	26.4
100 or more days	857	101	11.8
Not working off their farm	9,689	2,763	28.5

Source: U. S. Census of Agriculture for North Dakota, South Dakota, 1950, V. 1-pt 11.

1/ Value of products sold.

acres of cropland and 49 acres of permanent pasture. The remaining nine acres are in the farmstead, roads, and fences. Moody, Kransburg, and Vienna are the predominant soil types on the farm studied.[10] Slope of the land is from 1 to 12 percent (Figure 2).



LEGEND[a]

SOIL TYPES

1-Moody Silty Clay Loam
2-Kransburg Silty Clay Loam
3-Vienna Loam
4-Local Alluvium
5-Stream Alluvium

SLOPE

A - 0 to 3 percent
B - 3 to 8 percent
C - 8 to 12 percent

EROSION-TOPSOIL REMOVED

1 - Slight, up to 25 percent
2 - 25 to 75 percent
3 - Over 75 percent

Figure 2. Soil Resources of Farm Studied

[a]Soil areas are designated by soil type, slope, and erosion respectively. Thus 2B2 indicates: 2 - Kransburg silty clay loam; B - 3 to 8 percent slope; and 2 - modern erosion 25 to 75 percent of topsoil removed.

The slope of the land made soil erosion a problem for the farm operator. Land in this farm can be divided into three general areas:

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[10]Soil data was furnished by Dr. Frederick C. Westin, Professor of Agronomy, South Dakota State College, Brookings, S. Dak.

(1) areas that are relatively level, consisting of 80 acres of cropland subject to slight erosion, (2) areas that are more rolling of about 30 acres, subject to limited erosion, and (3) areas that are subject to considerable erosion, consisting of about 45 acres of pasture. This land remains in permanent pasture.

This farm is laid out in seven irregular shaped fields of various sizes. The entire farm is fenced and cross fenced. Some of the fields are fenced with woven wire. Water facilities are adequate and suitable for livestock production.

The owner-operator of the farm is about 35 years old and does most of the work on the farm. His wife and two sons provide much of the labor required in doing the chores. The man days of labor available are estimated at 400 days including the labor furnished by the wife and sons. The total number of man days required to operate the farm under its present organization is 284 days. A summary of characteristics for this farm are shown in Table III.

Land and Crop Use

The sample farm consists of 160 acres of which 102 are in cropland, 49 in native pasture, and 9 in the farmstead and roads. The present rotation mainly consists of corn and oats, and a small amount of legumes (Table III). Acreage in various crops has remained rather constant over the years. At present, 38 acres are in corn with an average yield of 40 bushels per acre, 43 in oats yielding 35 bushels per acre, 12 in brome hay, 9 in alfalfa, and 4 in hog pasture. Erosion

TABLE III. ORGANIZATION AND OPERATING STATEMENT OF PRESENT PLAN

Organization

Land	Acres	Livestock	Numbers
Corn	38	Dairy Cattle	
Oats	43	Dairy Cows	4
Alfalfa	9	Dual Purpose	6
Tame Hay (Brome)	12	Dairy Calves	4
Total Cropland	102	Dairy 1 and 2 year olds	10
Native Pasture	45	Dairy Steers	10
Hog Pasture	4	Hogs	
Farmstead	5	Sows	10
Roads	4	Market Hogs	50
Total Land in Farm	160	Boar	1
		Chickens	
		Chicks	500
		Chickens	285

Machinery

Auto: 1
Power: 1-2 Plow Tractor, Plow, Disc Harrow, Corn Planter, Cultivator, Corn Picker, Mower, Rake, Stacker, Hay Loader, 2 Wagon Running Gears, Wagon Box, Hay Rack, Manure Spreader, Cream Separator, Miscellaneous Equipment.

Labor

Man Hours Required	2844
Man Days Required	284
Man Days Available	400

is a problem on the steeper slopes, and fertility depletion is of concern to the manager.

Good cultural practices are used along with adapted seed varieties, seed testing, and treating. No commercial fertilizer is used, but manure and crop residue are returned to the soil.

Livestock Organization and Management

No specific livestock enterprise is emphasized on this farm, although beef feeding has received the greatest amount of attention by the manager. The cattle herd consists of 4 dairy cows, 6 dual purpose cows, 20 dairy steers and heifers, ranging from one- to two-year-olds, and 4 dairy calves (Table III). About 10 steers and heifers, weighing about 400 pounds, are purchased in the spring each year, fed on pasture during the summer, fed several months in drylot, and marketed at about 800 pounds in January and February.

The hog enterprise usually consists of 10 sows which are farrowed in April or May. The average litter is five pigs weaned. The pigs are fed corn and oats and kept on alfalfa brome pasture. They are marketed in December and January at 220 pounds.

The poultry flock consists of 285 hens. With a newly constructed poultry house, greater emphasis is being placed on the poultry enterprise. To fully utilize the new building and family labor, a flock of 500 started pullets was purchased.

Buildings

The farm dwelling is of medium size, modern, and has many conveniences. Many improvements in the home have been made by the family since the farm was purchased in 1951. There are buildings adequate to house 125 ewes and 15 sows under a two-litter system, or 25 dairy cows and 10 sows, or 20 beef cows and 10 sows, or 40 feeder cattle. Hay and grain storage facilities are adequate for most feeding operations the operator may choose. The buildings are in good condition. A new 500-bird poultry house was constructed in 1955. Storage facilities for machinery are not adequate to house all of the necessary farming equipment.

Machinery and Equipment

A large percentage of the machinery on this farm is old, but in good operating condition. All of the equipment has been well cared for and kept in good repair. The family owns a late model car. The power equipment consists of one tractor of a two-bottom plow capacity. General machinery includes a plow, disc, harrow, endgate seeder, and manure spreader. Corn equipment consists of a two-row planter and cultivator and a one-row picker. Haying machinery includes a mower, side delivery rake, stacker, loader, and wagons.

Operating Statement

The farm, as presently operated, is estimated to have total

gross cash receipts of $6,112 (Table IV). The greatest proportion of receipts was obtained from the hog enterprise. The second largest receipts were obtained from the beef operation. Nearly equal amounts of receipts came from cash grain and poultry. Farm operating or variable expenses accounted for $3,950 and fixed expenses $2,667. Fixed expenses include a charge for interest on the capital value of inventory. Net farm income was estimated at -$506. House rent and farm produce used was estimated to be worth $982. This brings the total net income up to $476.

Investment Summary

The total investment for the farm studied was estimated at $31,353. Land valued at $17,920 accounted for over half of the investment. Buildings were valued at $6,680; machinery and equipment, $3,751; and livestock and feed amounted to slightly over $3,000.

The following chapter presents alternative methods of organization for the farm studied.

TABLE IV. ORGANIZATION AND OPERATING STATEMENT OF PRESENT PLAN

OPERATING SUMMARY

Receipts	Amount	Expenses	Amount
Crops		Operating	
Corn	$ 903.75	Crop Expense	$ 620.80
Oats	281.45	Livestock	2473.78
Total Crops	1185.20	Automobile	81.49
		Machinery Repair	187.47
Livestock		Building Repair	269.19
Dairy Cows	772.65	General Expense	317.80
Dairy Yearlings	757.20	Total Operating Expenses	3950.53
Sows	493.68		
Market Hogs	1442.94	Fixed	
Chickens	245.00	Machinery Depreciation	580.74
Eggs	852.00	Building Depreciation	400.78
Butterfat	363.66	Insurance	61.53
Total Livestock	4927.13	Interest--R. E.	983.99
		Interest--Op. Capital	405.23
Total Farm Receipts	6112.33	Taxes	235.15
		Total Fixed Expenses	2667.42
		Total Expenses	6617.95

Financial Summary	Amount	Investment Summary	Amount
Farm Receipts	$6112.33	Land	$17920.00
Operating Expenses	3950.53	Buildings & Improvements	6679.70
Net Cash Farm Receipts	2161.00	Machinery & Equipment	3750.75
Fixed Expenses	2667.42	Livestock	2715.54
Net Farm Income	-505.62	Crop and Feed Inventory	287.50
Value Farm Perquisite	981.86	Total Investment	31353.49
Net Income	476.24		

CHAPTER III

ALTERNATIVE METHODS OF ORGANIZATION FOR FARM STUDIED

In an attempt to utilize limited resources, a farmer must choose from many alternatives the cropping and livestock systems that will meet his family goals. A long-term plan, over a period of years, will combine resources into enterprises and systems of farming.

Alternative Cropping Systems

There is a wide range of alternative cropping systems that farmers may choose in planning their farming operations. Farmers have the opportunity to choose one of any number of combinations of grain and forage, depending on their own individual situation.

The study by Berry indicates that two cropping systems appear to provide suitable alternatives for the farm studied.[11] A six-year rotation of corn, oats (sweet clover), corn, oats, alfalfa-brome, alfalfa-brome (CO_2COBH) was the primary cropping system used in preparing budgets for this farm because it would provide the approximate amounts of grain and forage for the livestock enterprises that are needed to make maximum use of building and equipment facilities. Long-term average yields for the CO_2COBH rotation were estimated to be 55 bushels of corn per acre, 61 bushels for oats, and 2.2 tons of alfalfa-brome hay per acre. This rotation also provides some erosion

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[11] Berry, op. cit., p. 32, table 20.

control for the more rolling areas of the farm. The two-year rotation of corn, oats (sweet clover) (CO_s) was used in preparing a budget that would indicate the relative returns for those who may choose a cash cropping system with little emphasis on the livestock enterprise. Long-term average yields for the CO_s rotation were estimated to be 52 bushels of corn per acre and 56 bushels for oats. The pasture is estimated to produce 1.7 animal units per month. For the farm studied, the CO_s rotation may need to be supplemented by contouring or other mechanical practices to avoid excessive erosion on the more rolling areas. No attempt was made in this study to determine the degree of erosion that would take place under the various cropping systems.

The present Government soil bank program may offer an alternative cropping system for 160-acre farms in southeastern South Dakota. Two budgets were prepared for the farm studied showing the estimated returns for the first and second years of operation when the cropland was placed in the soil bank.

The total production of crops was determined by combining the estimated yields with the acreages shown in Table V.

Alternative Livestock Systems

The number of livestock enterprises that may be followed on the farm studied covered a wide range of alternatives because of the operator's experience in managing livestock. Eight alternative livestock systems which the operator might follow are:

1. Sheep and hog production. With this system, lambs would

TABLE V. COMPARATIVE SUMMARY OF LAND USE

	Present plan CO dairy and hogs	Plan 1 CO_3CDH sheep and hogs	Plan 2 CO_3CDH beef raising, feeding & hogs	Plan 3 CO_3CHH dairy grade C & hogs	Plan 4 CO_3CDH dairy grade A & hogs	Plan 5 CO_3CDH beef raising and chickens	Plan 6 CO_3CDH beef feeding and hogs	Plan 7 CO_3 beef feeding & cash crops	Plan 8a Soil Bank 1st year & beef feeding	Plan 8b Soil Bank 2nd year etc. & beef feeding
LAND USE					(Acres)					
Corn	38	30	30	30	30	30	30	45	86.5	86.5
Oats	43	30	30	30	30	30	30	45	0	0
Alfalfa-Brome	0	30	30	30	30	30	30	0	0	0
Alfalfa	9	0	0	0	0	0	0	0	19.5	19.5
Tame Pasture	12	12	12	12	12	12	12	12	12	12
Total Cropland	102	102	102	102	102	102	102	102	0	0
Native Pasture	45	45	45	45	45	45	45	45	31	31
Hog Pasture	4	4	4	4	4	4	4	4	2	2
Farmstead	5	5	5	5	5	5	5	5	5	5
Roads	4	4	4	4	4	4	4	4	4	4
Total Land in Farm	160	160	160	160	160	160	160	160	160	160

be dropped in March and early April, pastured until fall with supplemental feeding, and marketed at about 100 pounds. The one-litter system would be followed in hog production, with pigs being farrowed about March 1 and sold at about six months of age at 220 pounds.

2. Beef and hog production. Under this system, feeder calves would be fed on pasture during the summer months, fed in drylot, and sold in June at 750 pounds.
3. Dairy production. It was assumed that cows would produce 6000 pounds of 3.5 percent milk-fat per cow sold as manufacturing milk.
4. Dairy production. In this budget, it was assumed that cows would produce 6000 pounds of 3.5 percent milk-fat per cow as in plan 3, but the milk would be sold on a grade A market.
5. Beef and poultry production. Under this plan, calves would be pastured during the summer, fed in drylot, and sold in June at 750 pounds. The laying flock would be replaced with new stock each year. Sexed chicks would be purchased and kept for laying hens.
6. Beef production. Calves weighing about 540 pounds would be bought in spring, pastured, fed some grain while on pasture, and placed in drylot on full feed in fall. They would be sold in June weighing about 1000 pounds per head.
7. Beef feeding and cash crop production. Calves weighing about 540 pounds would be purchased in spring, pastured, fed some

grain while on pasture, and sold in the fall at about 750 pounds. Grain would be sold as cash crop.

These systems as described here do not exhaust the possible alternatives from which farmers may choose. A number of possible changes can be made within each system. For example, the system of hog production can be changed by multiple farrowing or by changing the date of farrowing or the time of sale of the animals.

In addition to the major alternative livestock enterprises presented here, several side-line enterprises would be carried on under each plan for which budgets were prepared. Table VI shows the numbers of various classes of livestock that would be produced under each alternative system.

The size of the major enterprises was determined by the quantity of feed produced and housing and equipment facilities. For the purpose of comparing alternative enterprise combinations, no lower limits were placed on the size of the enterprise. In order to fully utilize the production of forage and grain, it is generally necessary to have a combination of roughage and grain-consuming type of livestock. Although in some cases, one of the enterprises may be small.

An allowance of 10 percent of the forage production was made for losses in bad weather, spoilage, and to allow for a pasture reserve. For efficiency, the livestock enterprises should be fairly large. Hence, it is doubtful that more than two major livestock enterprises should be carried on simultaneously. Also, farm produced grain and hay would not be sufficient for additional enterprises of efficient size.

TABLE VI. COMPARATIVE SUMMARY OF LIVESTOCK ORGANIZATION

	Present plan CO dairy and hogs	Plan 1 CO_sCOMM sheep and hogs	Plan 2 CO_sCOMM beef raising, feeding & hogs	Plan 3 CO_sCOMM dairy grade C & hogs	Plan 4 CO_sCOMM dairy grade A & hogs	Plan 5 CO_sCOMM beef raising and chickens	Plan 6 CO_sCOMM beef feeding and hogs	Plan 7 CO_s beef feeding & cash crops	Plan 8a Soil Bank 1st year & beef feeding	Plan 8b Soil Bank 2nd year etc. & beef feeding
CATTLE ORG.										
Dairy Cows	4	3	2	25	25	0	0	0	0	0
Dual Purpose	6	0	0	0	0	0	0	0	0	0
Dairy Calves	4	3	2	24	24	0	0	0	0	0
Dairy Yearlings	10	0	0	8	8	0	0	0	0	0
Dairy Steers	10	0	0	0	0	0	0	0	0	0
Stock Cows	0	0	20	0	0	20	0	0	0	0
Calves	0	0	20	0	0	20	0	0	0	0
Steers	0	0	10	0	0	10	0	0	0	0
Heifers	0	0	10	0	0	10	0	0	0	0
Bull	0	0	1	0	0	1	0	0	0	0
Yearling Steers	0	0	0	0	0	0	25	0	0	0
Yearling Heifers	0	0	0	0	0	0	10	0	0	0
Feeder Steers	0	0	0	0	0	0	0	25	20	20
Feeder Heifers	0	0	0	0	0	0	0	10	20	20
SHEEP ORG.										
Ewes	0	17	0	0	0	0	0	0	0	0
Lambs	0	125	0	0	0	0	0	0	0	0
Rams	0	3	0	0	0	0	0	0	0	0
Ewes	0	100	0	0	0	0	0	0	0	0
HOG ORG.										
Sows	10	15	10	10	10	0	5	0	0	0
Market Hogs	50	120	80	80	80	0	40	0	0	0
Boar	1	1	1	0	0	0	0	0	0	0
CHICKEN ORG.										
Chickens	285	500	500	500	500	900	500	500	500	500
Chicks	500	600	600	600	600	1000	600	600	600	600

Machinery and Equipment Requirements

The regular line of machinery and equipment described in the present plan of organization was considered adequate to handle the major farming operations for each of the alternatives budgeted. A summary of the machinery and equipment needs for each alternative plan is shown in Table VII. A tractor farmhand and forage fork were added to the regular line of machinery for the sheep feeding, beef feeding, and dairy plans. The two dairy plans required more additional equipment than did the other plans. A six-can milk cooler was included in plan 3 where grade C milk would be marketed. In plan 4 where milk would be sold on a grade A market, a 250-gallon bulk milk tank and a hot water heater for the milk house were included. Some additional feeding equipment would be required for plans 1, 2, 6, and 7 where livestock would be fed in confinement or drylot.

Prices Used in Estimating Costs and Returns

Prices used in this study to determine the income and expenses of the alternative cropping and livestock systems were the expected long-run projected price relationships (Table VIII). These price relationships were prepared for use by farmers in preparing individual farm budgets.[12] The relationship of these prices was based on a study of possible technological changes and changes in demand for agricultural products. Therefore, these prices are a prediction of price

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[12]Agricultural Economics Department, op. cit., pp. 6-40.

TABLE VII. COMPARATIVE SUMMARY OF MACHINERY ORGANIZATION

	Present plan CO dairy and hogs	Plan 1 CO_sCOMM sheep and hogs	Plan 2 CO_sCOMM beef raising, feeding & hogs	Plan 3 CO_sCOMM dairy grade C & hogs	Plan 4 CO_sCOMM dairy grade A & hogs	Plan 5 CO_sCOMM beef raising and chickens	Plan 6 CO_sCOMM beef feeding and hogs	Plan 7 CO_s beef feeding & cash crops	Plan 8a Soil Bank 1st year & beef feeding	Plan 8b Soil Bank 2nd year etc. & beef feeding
MACHINERY 1/										
Automobile	X	X	X	X	X	X	X	X	X	X
Tractor	X	X	X	X	X	X	X	X	X	X
Plow	X	X	X	X	X	X	X	X	X	X
Disc	X	X	X	X	X	X	X	X	X	X
Harrow	X	X	X	X	X	X	X	X	X	X
Drill	X	X	X	X	X	X	X	X	X	X
Corn Planter	X	X	X	X	X	X	X	X	0	0
Cultivator	X	X	X	X	X	X	X	X	0	0
Corn Picker	X	X	X	X	X	X	X	X	0	0
Mower	X	X	X	X	X	X	X	0	X	X
Rake	X	X	X	X	X	X	X	0	X	X
Haystacker	X	0	0	0	0	0	X	0	X	X
Hayloader	X	0	0	0	0	0	X	0	X	X
Farmhand	0	X	X	X	X	0	0	0	0	0
Forage Fork	0	X	X	X	X	0	0	0	0	0
Wagon and Gears	X	X	X	X	X	X	X	X	X	X
Hayrack and Gears	X	X	X	X	X	X	X	X	X	X
Manure Spreader	X	X	X	X	X	X	X	X	X	X
Cream Separator	X	X	X	0	0	0	0	0	0	0
Milker - 2 Unit	X	X	X	X	X	0	0	0	0	0
Milk Cooler	0	0	0	X	0	0	0	0	0	0
Bulk Tank	0	0	0	0	X	0	0	0	0	0
Water Heater	0	0	0	0	X	0	0	0	0	0
Miscellaneous Equip.	X	X	X	X	X	X	X	X	X	X

1/ X - Indicates the machinery included in each budget for each plan.

TABLE VIII. PRICES USED IN ESTIMATING RETURNS OF ALTERNATIVE CROPPING AND LIVESTOCK SYSTEMS ON THE 160-ACRE FARM STUDIED

Product	Unit	Average Price
Corn	Bu.	$ 1.25
Oats	Bu.	.65
Hay	Ton	13.30
Sows	Cwt.	15.04
Market Hogs	Cwt.	17.23
Chickens	Lb.	.20
Eggs	Doz.	.30
Butterfat	Lb.	.57
Ewes (mixed age)	Lb.	.45
Rams	Lb.	.45
Ewes	Cwt.	8.56
Lambs	Cwt.	20.29
Whole Milk Grade C	Cwt.	2.90
Whole Milk Grade A	Cwt.	3.55
Dairy Calves @ 540#	Cwt.	18.83
Dairy Calves at Birth	Ea.	8.00
Dairy Cows	Cwt.	13.86
Dairy Calves @ 360#	Cwt.	12.83
Stock Cows	Cwt.	16.03
Dual Purpose Cows	Cwt.	16.03
Steers	Cwt.	22.24
Heifers	Cwt.	21.32
Feeder Steers @ 1200#	Cwt.	24.03
Feeder Heifers @ 1100#	Cwt.	22.56
Feeder Steers @ 750#	Cwt.	23.48
Feeder Heifers @ 750#	Cwt.	22.38
Dairy Yearlings	Cwt.	18.98
Conservation Reserve Payment	Acre	12.00

Source: Base Prices For Long-Term Budgets in South Dakota, Agricultural Economics Pamphlet 51, Agricultural Experiment Station, South Dakota State College, Brookings, South Dakota, February, 1954, and U. S. D. A. estimate of conservation payment.

relationships and do not represent a prediction of future price levels. Any major changes in either technology or demand will change the relative prices. Thus, while the general level of prices may vary from year to year from those used in preparing these long-term farm budgets, the farm plan which maximizes profit can be expected to remain most profitable in the long run unless expected trends in population, employment, productivity, income, and military needs change from what has been assumed.

CHAPTER IV

COMPARATIVE COSTS AND RETURNS OF ALTERNATIVE FARMING PLANS

From the various alternatives budgeted, which combination of resources will be the most profitable for the farm studied? Assuming the operator has equal preferences for the alternatives budgeted and is willing to carry the risk associated with each, the choice would be simply to choose the one that returns the greatest profit. Under this assumption, the Grade A Dairy-Hog alternative would be the most profitable. It also requires the largest capital investment and the most labor. Under average conditions, this plan may not be the most advantageous for the greatest number of farmers because of personal preferences, high capital requirements, and availability of labor.

Labor Requirements

Labor requirements should be considered when deciding on a farm plan. Oftentimes, the farm plan that returns the largest net farm income requires the greatest amount of labor. Labor requirements in some instances may either exceed the labor supply or will not provide full employment for the family. Thus, a study of labor needs for each alternative plan compared with available labor should be made when selecting a farming system. Labor requirements, by enterprises, for each of the alternatives budgeted are shown in Table IX. Total labor requirements and the distribution of labor by months for the alternative

TABLE IX. COMPARATIVE SUMMARY OF EIGHT ALTERNATIVE FARMING PLANS

	Present plan CO dairy and hogs	Plan 1 CO_3 sheep and hogs	Plan 2 CO_3 beef raising feeding & hogs	Plan 3 CO_3 dairy grade C & hogs	Plan 4 CO_3 dairy grade A & hogs	Plan 5 CO_3 beef raising and chickens	Plan 6 CO_3 beef feeding and hogs	Plan 7 CO_3 beef feeding & cash crops	Plan 8a Soil Bank 1st yr. & beef feeding	Plan 8b Soil Bank 2nd yr. etc. & beef feeding
Investments					(Dollars)					
Land	17920	17920	17920	17920	17920	17920	17920	17920	17920	17920
Buildings	6680	6680	6680	6911	6911	6680	6680	6680	6680	6680
Machinery & Equip.	3751	4061	4210	3963	4601	3751	3545	2852	3018	3018
Livestock	2716	3995	4210	5914	5914	3780	900	500	475	475
Crops	288	573	123	501	501	243	97	80	0	0
Total	31354	33229	33142	35209	35847	32168	33272	28031	28092	28092
Income										
Crops	1185		401	445	445	1461		3820	1622*	1038*
Livestock	4927	10110	8625	10753	11649	7129	13211	8150	8948	8948
Receipt Total	6112	10110	9026	11198	12094	8590	13211	11970	10570	10086
Operating Expense	3951	4069	4017	4638	4868	4823	7998	7426	8330	7996
Fixed Expense	2667	2910	2916	2965	3101	2684	2759	2317	2334	2334
Expenses Total	6618	6979	6933	7603	7969	7508	10757	9743	10668	10330
Net Cash Farm Rec.	2162	6042	5009	6561	7226	3767	5213	4544	2240	2090
Net Farm Income	-506**	3131	2092	3596	4125	1083	2454	2227	-98**	-244**
N.I. Plus Prs. Used	476	3967	3010	4515	5044	1865	3273	2967	642	496
				HOURS OF LABOR BY ENTERPRISE						
Corn	153	121	121	121	121	121	121	181	96	173***
Oats	58	40	40	40	40	40	40	61	113	---
Hay	46	66	66	66	66	66	66	---	---	---
Hogs	376	215	250	250	250	---	160	---	---	---
Sheep	---	311	---	---	---	---	---	---	---	---
Dairy	1398	405	270	3025	3025	---	---	---	---	---
Poultry	813	1000	1000	1000	1000	1800	1000	1000	1000	1000
Feeders, Beef	---	---	800	---	---	800	1015	85	85	85
Total Farm	2844	2159	2547	4502	4502	2827	2402	1327	1294	1258

*Government payment for Soil Bank Plan **Net Loss ***Weed control for all land

farming systems are shown in Table X.

The alternative cropping and livestock systems differ in amounts of labor required, which would make some alternatives more attractive than others for different farmers. Some farmers may want to choose an alternative that would use only family labor. Others may be willing to accept the additional risk, and hire additional labor in order to adopt certain alternative systems. As indicated in Table X, the two dairy-hog systems require more labor than any other type of livestock. The total supply of labor furnished by the operator and his family for the farm studied was estimated at 400 man days per year. Sufficient labor is supplied by the family to handle all of the cropping and livestock systems budgeted, except the two dairy-hog combinations. It would be necessary to hire some part-time labor for these systems. The additional labor required would not warrant a full-time man.

There is a surplus of family labor under all but the two dairy-hog systems during certain seasons of the year. The farm operator may want to consider off-farm employment during these periods to supplement farm income and to fully utilize family labor. He would also have the choice of expanding his farm unit by adding more land or expanding the livestock systems and purchasing additional feed in order to utilize his labor supply. This, however, depends on the farm operator's willingness to accept added risks, his managerial ability, and his ability to obtain additional capital.

TABLE X. DISTRIBUTION OF HOURS OF LABOR BY MONTHS FOR ALTERNATIVE CROPPING AND LIVESTOCK SYSTEMS

Cropping and Livestock Systems	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
PLAN													
Present Plan - CO	257	246	246	256	276	237	245	198	245	195	215	243	2844
1. CO_2CORN - Sheep	192	173	202	219	181	192	138	196	138	164	182	181	2159
2. CO_2CORN - Beef Raising and Feeding	243	229	235	256	153	168	110	166	118	139	228	234	2547
3. CO_2CORN - Dairy Grade C	446	411	447	437	373	369	318	370	286	304	366	380	4502
4. CO_2CORN - Dairy Grade A	446	411	447	437	373	369	318	370	286	304	366	380	4502
5. CO_2CORN - Beef Raising and Chickens	292	266	285	308	205	210	154	210	154	183	272	288	2827
6. CO_2CORN - Beef Feeding	265	233	247	274	176	170	109	171	127	156	219	255	2402
7. CO_2 - Cash Crop Beef Feeding	90	80	92	126	141	131	104	132	112	113	116	90	1327
8a. Soil Bank Beef Feeding First Year	90	80	90	90	242	100	100	186	95	80	80	90	1294
8b. Soil Bank Beef Feeding Second Year, etc.	90	80	90	90	115	186	100	186	95	80	80	90	1258

Capital Requirements

The capital required for the alternative plans is important because farmers, as a rule, do not have large sums of money for investments. Although alternatives that require large amounts of capital may offer larger earnings, if the farmer is unable to obtain or is unwilling to invest the needed capital to operate the plan, it would probably not be followed.

The capital investments for the alternatives budgeted ranged from a low of $28,031 to a high of $35,847. The capital investment for the present plan is $31,354. Land and buildings make up the largest portions of total investments. Plan 7, with a CO_s rotation and beef feeding system, requires the least amount of capital, while plan 4, with a CO_sCORN rotation and grade A dairy-hog system requires the largest capital investment. Plan 3, with a grade C dairy-hog system, requires the third largest capital investment. The larger investments for the dairy systems are mainly due to larger inventories in cattle and equipment. The range of capital requirements among other livestock systems is relatively small. Major differences among alternatives are found in investments in livestock, grain, feed, and building facilities.

Operating capital for such items as fuel, feed, seed, and repairs varies with the different cropping and livestock systems. Income and expenses depend on the timing of production and sales. Receipts from the dairy systems are received regularly throughout the year, while returns from beef feeding operations are usually received only once during the year. No attempt was made to determine the seasonal

operating capital needs because of the difficulty of estimating the timing of expenses and receipts. Farmers must, however, recognize the need for sufficient amounts of operating capital. The timing of individual expenses and receipts can be determined and the operating capital needs can be estimated once a farm operator chooses a farming system.

Costs and Returns

Detailed receipts, expenses, and net income of the alternative cropping and livestock systems are shown in Table IX. The net income from the present plan based on projected prices, including house rent and farm produce used, was estimated at $476. Crop yields are actual yields averaged over a five-year period for the farm. The choice of any one of the alternatives budgeted would increase net income over the present plan. The four livestock systems that give the highest net income with the CO_8CCBM rotation are the grade A dairy-hog, grade C dairy-hog, sheep-hog, and the beef feeding-hog plans.

The dairy combinations require more of both labor and capital. Therefore, for many purposes, labor income would probably be a better measure in choosing a long-run system of farming. Because the amounts of labor and capital required for the alternative livestock and cropping systems differ greatly, returns per hour of labor were estimated (Table XI). Returns per hour of labor for the sheep-hog combination were estimated at $1.82 per hour, the largest for any of the alternatives budgeted. Returns for the beef feeding-hog system returned $1.36 per

TABLE XI. RETURNS PER HOUR OF LABOR FOR FOUR ALTERNATIVE LIVESTOCK SYSTEMS

Livestock System	Labor	Net Income	Labor Income Per Hour
	Hours	Dollars	Dollars
Grade A Dairy-Hog	4502	5,044	1.12
Grade C Dairy-Hog	4502	4,515	1.00
Sheep-Hog	2159	3,967	1.82
Beef Feeding-Hog	2402	3,273	1.36

hour, the second largest amount for the four plans.

Returns per hour of labor for the grade A dairy-hog combination are $1.12 per hour. Returns per hour for the grade C dairy-hog system are somewhat lower, $1.00 per hour of labor.

It is unlikely that either of the soil bank-beef feeding plans would be choosen as a system of farming because of their low net returns to the operator. The soil bank plan as an alternative farming system does not appear to be advantageous for the farm studied because of the large acreage of land already in native and tame pasture. This plan may, however, be more attractive to other farmers under different conditions than was the case for the farm studied.

The choice of a cropping and livestock system does not depend entirely upon the net income received from a particular system. The dairy-hog system where milk is sold on a grade A market depends on a grade A outlet and on changes in buildings and equipment to meet health

regulations. For the farm studied, a grade A milk market is available. Buildings and equipment can be made to meet the necessary health standards. Under this plan, a part-time man would need to be hired. Competent part-time workers are difficult to hire during periods of local full-employment, especially on a daily or monthly basis. With this system, the operator assumes the risk that a man cannot always be hired. The cost of training and supervising a part-time worker must not be overlooked. The cost of additional meals and possibly being required to provide lodging for a part-time worker must be considered. If the farm operator cannot or is not willing to accept these costs and risks, he should not choose the dairy-hog system.

Thus, the final decision in choosing a cropping and livestock system depends to a large extent on the individual farmer's ability to hire a part-time worker or his desire to work longer hours if hired help is not available. These decisions will be determined by the level of income of the family, the need for capital, and the family desire for a higher income for living.

CHAPTER V

SUMMARY AND CONCLUSIONS

Can farm income be increased on 160-acre farms in southeastern South Dakota? This question has been of concern to many farmers who are trying to determine the most profitable cropping and livestock systems. The purpose of this study was to answer this question by budgeting the relative profitability of eight alternative cropping and livestock systems for a 160-acre farm in southeastern South Dakota.

The farm selected for study is located in Moody County. The selection of the farm was made by Extension Service personnel, and is considered to be representative of the area studied. The sample farm consists of 160 acres of which 102 are in cropland, 49 in native pasture, and 9 in the farmstead and roads. Buildings and facilities on the farm are adequate to handle the livestock, grain, and feed for all of the alternatives budgeted. Minor building changes would be required when shifting from one alternative to another. The total supply of labor furnished by the operator and his family for the farm studied was estimated at 400 man days per year.

The study of this farm indicates that the selection of more profitable cropping and livestock systems can increase net farm income. The choice of any one of the alternatives budgeted would increase net income over the present plan. Income can be increased from $476 for the present system to $5,044 with the grade A dairy-hog system under average management. Capital needs are increased from $31,354 for the

present plan to $35,847 under the grade A dairy system. Labor requirements are 4,502 hours with the dairy system, compared with 2,844 hours under the present operation. The dairy plan would require some part-time hired labor.

The grade C dairy-hog combination offers the second largest income for the farm studied. Some part-time hired labor would also be required under this plan. Where grade A markets are not available, farmers may want to consider this plan. For the alternatives budgeted, the sheep-hog system returns the third largest net income. The beef feeding-hog system contributed the fourth largest net income of the alternatives budgeted for the sample farm.

Returns per hour of labor for the sheep-hog combination were estimated at $1.82 per hour, the largest for any of the alternatives budgeted. Returns for the beef feeding-hog system returned $1.36 per hour, the second largest amount for the four plans. The grade A dairy-hog combination returned $1.12 per hour of labor. Returns per hour for the grade C dairy-hog system are somewhat lower, $1.00 per hour of labor.

As a guide in choosing a farming system, farmers planning to reorganize their farming operations should consider both the net returns and the returns per hour of labor for each alternative system. The final decision in choosing a cropping and livestock system depends, to a large extent, on the individual farmer's preferences for certain combinations of enterprises and for income or leisure. His decision also depends on his willingness to carry risk, and his ability to hire

and supervise part-time labor, or his desire to work longer hours if hired help is not available. These decisions will be affected by the availability of capital and labor, and the family's desire for a higher income for living.

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