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Selected Characteristics of Representative Irrigated and Dryland Farms and Ranches in the Belle Fourche Area: Comparing Irrigated and Dryland Operations

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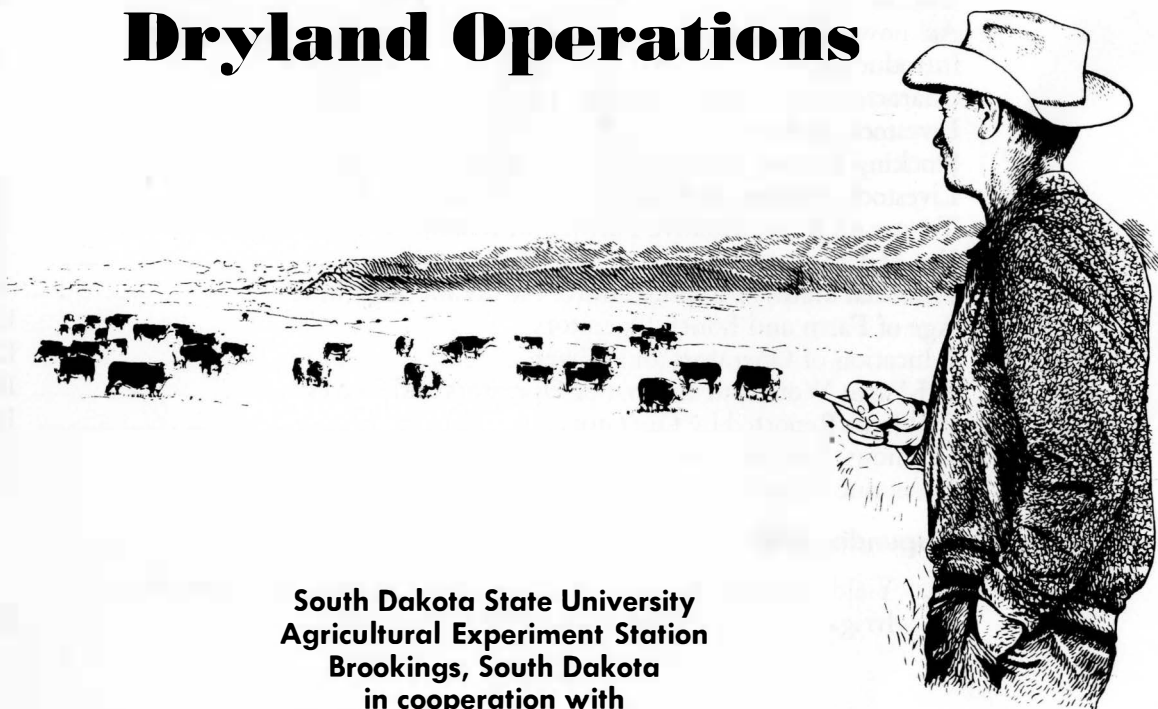
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**Selected Characteristics of Representative Irrigated
and
Dryland Farms and Ranches in the Belle Fourche Area**



**Comparing Irrigated and
Dryland Operations**



South Dakota State University
Agricultural Experiment Station
Brookings, South Dakota
in cooperation with
Farm Production Economics Division
Economic Research Service
U. S. Department of Agriculture

CONTENTS

Summary	3
Acknowledgments	3
Introduction	4
Characteristics of Representative Farms and Ranches	5
Livestock on Representative Farms and Ranches	6
Stocking Rate on Representative Farms and Ranches	6
Livestock Systems on Representative Farms and Ranches	6
Tenure on Representative Farms and Ranches	7
Use of Cropland	8
Financial Status of Representative Farms and Ranches	8
Age of Farm and Ranch Operators	10
Education of Operators and Wives	10
Off-Farm Work and Income of Operators and Wives	11
Problems Reported by Operators	11
Opinions of Operators on Size of Unit and Stocking Capacity	12
Economic Interdependency of Irrigated and Dryland Areas	13
Appendix Table	
1. Yields of Major Crops on Irrigated and Dryland, Belle Fourche Irrigation Project and Surrounding Area, 1963	16

SUMMARY

This is a descriptive report of the farms and ranches on the Belle Fourche Irrigation Project in northwestern western South Dakota and the surrounding dryland area. Data for 1963 are presented describing representative farms and ranches in the area and also describing the extent of interrelationships between the dryland and the irrigated areas.

Livestock are found on almost all dryland and irrigated units with beef cattle and sheep being most common. Stocking rates ranged from less than 5 acres per animal unit on the small irrigated farms to over 34 acres per animal unit on the large ranches.

The smaller irrigated units were primarily fully owned. All other size groups were part-owner operated. Net worth of irrigated farms ranged from an average of \$20,130 on 240-acre units to \$35,675 on 720-acre units. The ratio of debts to assets increased as size increased on the irrigated farms and declined as size increased on the dryland units.

No significant differences in age of operator were found between irrigated and dryland units, or between the sample operator and the county census averages. There was a significant difference in age as classified by size of operation. Younger operators tended to be found on the larger units and older operators on the smaller units.

Even with limited opportunities for off-farm employment in this area, about one-third of the irrigation operators had part-time off-farm jobs earning an average of \$1,700 per year and 10% of the wives had

year-round full-time jobs earning an average of \$3,100 per year. Fewer dryland operators or their wives had off-farm work.

In an "opinion" survey of operators' problems, the operators of irrigated units most often listed "shortage of irrigation water" as their major problem. Next in importance was "low prices and high costs." Among dryland operators, the most common problem listed was "lack of rain" with "low prices and high costs" again in second place. About 75% of all operators questioned said their operations were large enough to be operated as economic units. Among the other 25%, reasons given for not expanding included "land not available" and "land too high priced."

To determine the interdependency of the irrigated and dryland areas, questions were asked regarding sales of feed and/or livestock by irrigated operators to dryland operators and vice versa. It was found that 8% of the hay, 1% of the barley, 10% of the oats, and 24% of the corn that was raised on the irrigated units was sold for cash. Almost no feed raised on the dryland units was sold for cash. Purchases of feeder livestock by irrigation operators directly from dryland operators were more common but not general. Hence, little interdependence between irrigation and dryland operators was found. Perhaps the main interrelationship occurs on operations that have some irrigated cropland and some rangeland. Six of the 69 sample units had this type of arrangement. This ratio perhaps represents the bulk of interrelationships between the dryland areas in the local economy.

ACKNOWLEDGMENTS

Special thanks are extended to Ronald D. Krenz, Farm Production Economics Division, Economic Research Service, U.S. Department of Agriculture, and W. F. Lagrone, Farm Production Economic Division, Economic Research Service, U.S. Department of Agriculture for their assistance in the preparation of this report. The help of D. C. Myrick, Foreign Development and Trade Division, Economic Research Service, U.S. Department of Agriculture, Leroy C. Rude, Farm Production Economics Division, Economic Research Service, U.S. Department of Agriculture and others who helped develop the schedule used in this study is also gratefully acknowledged.

Selected Characteristics of Representative Irrigated and Dryland Farms and Ranches in the Belle Fourche Area

By Charles C. Micheel*

INTRODUCTION

More than 50 years have passed since water first became available for irrigation on the Belle Fourche Project. Since that time many changes have taken place. This report is not intended as a comparison between the past and the present but presents a description of the present through the use of representative farms and ranches on the irrigated land and the surrounding dryland area. These representative farms and ranches are based on averages and are intended to represent the range in size covering most operations in the area.

Economic interdependence and cooperation between irrigated and dryland farms and ranches both within the same unit and on or off a project area have always been considered important factors in the success of an irrigated project. The analysis of data on this interdependence is pointed toward a better understanding of these relationships between irrigated and dryland operations.

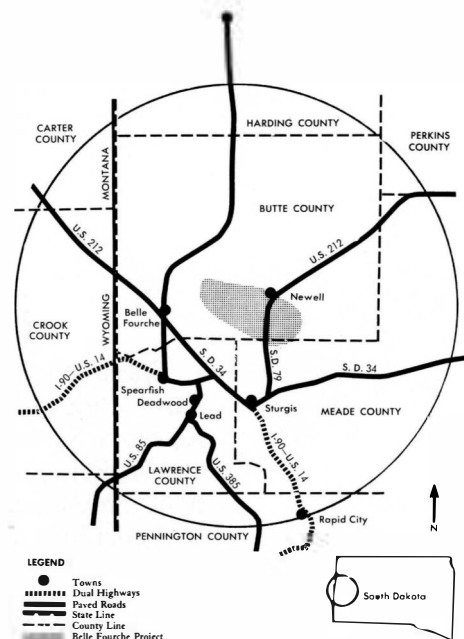
It is planned that the information in this report will be combined with other available data for use in a report that would indicate the best development of the agricultural resources of the area from the viewpoint of both the irrigation and the dryland farmers and ranchers and the associated economy.

Area of study—The area upon which this report is based is the Belle Fourche Irrigation project and the surrounding dryland ranch and farming area within a radius of approximately 50 miles from the project (Figure 1). The Belle Fourche Irrigation Project is located immediately north of the Black Hills in northwest South Dakota. The project lies in the valley of the Belle Fourche River extending about 30 miles below the city of Belle Fourche and is about 12 miles wide on the average. The irrigated area consists of the valley of the main stream, the narrow valleys and terraces of the smaller streams, and the high river terraces along with the rolling foothills. Most of the project lies within Butte County. The irrigable acreage is 57,157 acres (reported in 1965), but the total land area included within the project boundaries is much larger. Irrigable land at one time was listed as 81,870 acres, but eliminations have taken place for various reasons.¹

The soils of the project can be divided into the heavy clay soils and the lighter loam and sandy types. In general, the clay soils are north of the Belle Fourche River and the loamy and sandy soils south of the river. More than one-half of the project soils are the heavy clay type. The clay soils are quite difficult to irrigate and require excellent management to produce a profit. The irrigable land falls into four land classes, ranked according to the suitability for irrigation from land class 1 to 4. The irrigable land is divided among these four classes in the following percentages:

- Class 1 — 11%
- Class 2 — 22%
- Class 3 — 31%
- Class 4 — 36%

Figure 1. Belle Fourche Irrigation Project and surrounding dryland farm and ranch area.



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¹Water shortage, soil not suitable for irrigation, etc.

Table 1. Percentage Distribution of Acres of Major Crops on the Belle Fourche Project Area, 1960-65.

Year	Alfalfa	Sugar beets	Corn	Pasture	Other				Total*
					hay	Barley	Oats	Wheat	
					Percent				
1960	40.4	8.0	11.2	21.8	4.9	3.2	3.6	1.9	95.0
1961	38.5	5.7	9.0	16.6	5.1	1.5	1.0	.5	77.9
1962	44.5	5.7	5.2	13.7	5.9	3.0	9.0	1.4	88.4
1963	41.8	6.0	9.0	16.1	4.8	3.6	8.7	2.0	92.0
1964	35.9	6.4	17.5	17.1	5.7	3.0	8.6	2.0	96.2
1965	40.2	0†	18.3	15.8	6.5	4.4	10.1	1.4	96.7

*Idle land, land in government programs and other crops made up the remainder of the cropland.

†Sugarbeet production discontinued with the 1964 crop when the sugar refinery ceased operation.

Source: Annual Project History, Belle Fourche Project, 1965.

Table 2. Land Distribution on Representative Farms and Ranches, 1963.

Number in Sample	Representative Size in Acres	Land Distribution in Acres					
		Cropland		Pasture			Other
		(Irrigated—Dryland)	(Irrigated—Dryland*)	(Range)			
Irrigated:							
6 Farms	240	60	50	5	120	0	5
11 Farms	480	145	115	25	185	0	10
10 Farms	720	265	95	15	330	0	15
4 Farms	2,140	245	385	25	325	1,145	15
Irrigated:							
6 Ranches	7,700	265	75	0	35	7,300	25
Dryland:							
6 Farms	935	0	175	0	0	745	15
4 Farms	3,100	0	820	0	0	2,265	15
Dryland:							
8 Ranches	4,080	0	105	0	0	3,960	15
8 Ranches	9,560	0	165	0	0	9,380	15
6 Ranches	15,840	0	45	0	0	15,775	20

*"Dryland" pasture is all unirrigated pasture on the irrigated farms, while "range" pasture refers to native pasture or dryland range.

The clay soils make up most of the Class 3 and 4 lands. They are much more difficult to work, especially during wet seasons. Also, more time must be allowed after irrigations before this land can be cultivated.

The principal crops grown on the project area in recent years are shown in Table 1.

The dryland area included in this study comprises an area within a radius of approximately 50 miles of the irrigation project. These were assumed to be the boundaries of the area which would influence the agricultural economy of the project and vice versa. This influence was assumed to be derived from sales of hay by irrigators to dryland operators, feed grain sales by dryland farms to feeders within the project boundaries, and sales of feeder livestock to the project feeders.

Source of Information—The information was obtained primarily through a farm survey conducted during 1963 and 1964 with most information pertaining to 1963 crop and livestock year. Information was obtained from 69 farmers and ranchers, including 37 who maintained headquarters within the project boundaries.² Thirty-two off-project dryland farmers

or ranchers³ were interviewed within the 50-mile radius of the irrigation project.

The principal crops produced on the dryland in this area are wheat, oats, barley, corn, and alfalfa. However, the cultivated cropland is a small percentage of the total land in the farms and ranches. Over 95% of the land in the survey of dryland farms and ranches was rangeland pasture for cattle or sheep.

Characteristics of Representative Farms and Ranches

The information is presented in terms of representative farms and ranches based on a sample survey. The arithmetic mean was used as the major basis for specifying the representative farm and ranch situations. On both the irrigated and the dryland farms and ranches, most of the operators relied upon livestock sales and livestock products for a major share of their income.

²This is approximately a 10% sample. It was randomly drawn from the list of water users on the Belle Fourche Project. The number of farms on the project ranged from 360 to 365 during 1961 through 1964.

³This is approximately a 3% sample of the dryland farms and ranches within a 50-mile radius. "Block" sampling areas were selected by township, range and section on a random basis. Soil Conservation Service records and maps were used to locate the farmer or rancher on the selected section. This area lies mostly in South Dakota.

The irrigated farms were classified into four size groups: 240 acres, 480 acres, 720 acres, and 2,140 acres. Farms in the sample ranged from 112 acres with 40 acres of irrigated cropland to a unit of 2,340 acres with 525 acres of irrigated cropland. The land distribution, for the representative irrigated farms and the other representative farms and ranches, is shown in Table 2. All sizes of irrigated farms include dry cropland and pasture as an integral part of the units. The large 2,140-acre farms also include an average of 1,145 acres of range pasture, usually at a considerable distance from the irrigated headquarters unit. This type of operation is an example of close interdependence of irrigated and dryland within individual units.

Another type of operation representative of the area is the ranch with irrigated cropland. A unit of this type averages about 7,700 acres with 265 acres of irrigated cropland and 7,300 acres of off-project dryland range. This type of unit also is an example of interdependence between the dryland and irrigated areas. On the irrigated ranch, however, the main part of the unit is the rangeland. The irrigated land is used primarily as a feed base and wintering area for the livestock. Both the ranch and the 2,140-acre farm maintain their primary headquarters on the irrigated land.

The dryland farms in the area are represented by two sizes. One, a relatively small unit, has 935 total acres with about 175 acres of dry cropland. The larger unit has an average of 3,100 acres, of which about 820 acres are dry cropland.

Three sizes of operation represent the majority of the ranches in the dryland area. The representative sizes are 4,080 acres, 9,560 acres, and 15,840 acres. The main enterprise is livestock production on all ranches, but some crops are produced on some units.

Livestock on Representative Farms and Ranches

Livestock, either sheep or cattle,⁴ are important on most of the irrigated farms and on all of the ranches. On the representative farms and ranches, the animal units of livestock (primarily sheep or beef cattle) vary almost in direct proportion to the total amount of pasture available (Table 3).

Stocking Rate on Representative Farms and Ranches

Generally, as the farm or ranch increases in size, the acres per animal unit (either pasture or on the whole farm) also increases (Table 3). This appeared to be the rule for all except the 720-acre irrigated farm

Table 3. Animal Units and Acres per Animal Unit on Representative Farms and Ranches, 1963.

Number in Sample	Representative Size in Acres	Total Animal Units	Acres/A.U.*	
			Whole Farm	Pasture
Irrigated:				
6 Farms	240	50	4.8	2.5
11 Farms	480	56	8.6	3.8
10 Farms	720	120	6.0	2.9
4 Farms	2,140	179	12.0	8.4
6 Ranches	7,700	400	19.2	18.3
Dryland:				
6 Farms	935	72	13.0	10.3
4 Farms	3,100	172	18.0	13.2
8 Ranches	4,080	179	22.8	22.1
8 Ranches	9,560	393	24.3	23.9
6 Ranches	15,840	463	34.2	34.1

*Dairy cattle, beef cattle, and sheep numbers converted to animal units. One thousand pounds of body weight is considered an animal unit.

and the 7,700-acre ranch with irrigated cropland. This may be due to the fact that the 720-acre irrigated farm has more dryland pasture, which may have a greater carrying capacity than the range pasture.⁵ The representative ranch with irrigated cropland can support more animal units, partly because of the hay and forage produced on the irrigated cropland and because some of these ranches are located in the foothills of the Black Hills, where weather and soil conditions are more favorable for grass and forage production.

Livestock Systems on Representative Farms and Ranches

Irrigated Farms and Ranches—All irrigated farms and ranches in the project area have at least one class of livestock and many have two (Table 4). Many of the representative irrigated farms and ranches reported dairy cattle. Although there are several farms in the project on which dairy is the major enterprise, on most farms dairy is a very minor enterprise, producing mainly for home use.

More irrigated farms and ranches reported sheep than beef cattle for all representative sizes except the 2,140-acre farm. In the representative group of large ranches with irrigated cropland, five ranches raised sheep, three reported beef cattle, and one reported dairy cattle. Three of these ranches raised sheep exclusively.

Dryland Farms and Ranches—Livestock production is an important part of the farm or ranch business on the dryland in this area. Dairying is relatively unimportant, but more than half of the dryland farms

⁴Slightly over 25% of all sheep and almost 9% of all cattle in South Dakota were produced in the five-county area in 1959, according to the U. S. Census.

⁵"Dryland" pasture is all unirrigated pasture on the irrigated farms, while "range" pasture refers to native pasture or dryland range.

Table 4. Number of Farms or Ranches Reporting Selected Livestock Systems, by Size and Class of Farm or Ranch, 1963.

Farm-Ranch Class and Size in Acres	Number Reporting	Livestock Systems						
		Beef Only	Sheep Only	Dairy Only	Beef and Dairy	Beef and Sheep	Sheep and Dairy	Sheep, Beef, and Dairy
Irrigated Farms:								
240	6	0	2	0	1	0	2	1
480	11	3	2	1	1	0	3	1
720	10	0	2	1	0	1	3	3
2,140	4	0	0	0	3	0	1	0
Irrigated Ranches:								
7,700	6	0	3	0	1	1	0	1
Dryland Farms:								
935	6	2	0	1	1	0	1	1
3,100	4	0	1	0	2	0	0	1
Dryland Ranches:								
4,080	8	1	1	0	1	1	2	2
9,560	7	2	1	0	1	2	0	1
15,840	6	2	0	0	1	1	0	2

and ranches keep some dairy animals (Table 4). These farms and ranches produce dairy products primarily for home use and, on some sheep ranches, milk for the extra twin or triplet and orphan lambs.

More of the small dryland farms (935 acres) reported beef cattle than sheep as their main livestock enterprise. The larger dryland farms (3,100 acres) were evenly divided between sheep and beef cattle. Two of the 3,100-acre farms raised beef cattle and a few dairy cows, one raised sheep only, and one produced all three, with beef and sheep of almost equal importance.

Five of the eight ranches in the 4,080-acre ranch group raised some dairy cows, five kept beef cattle, and six had sheep. The five ranches with beef cattle averaged about 60 beef cows per ranch, and the six with sheep averaged about 500 ewes per ranch.

The beef cow and calf enterprise was the most common on the eight ranches in the 9,560-acre ranch size. Six ranches in this size group raised beef cattle, with an average of about 64 cows per ranch. Sheep were also important on four ranches in this group. These four ranches averaged 523 ewes per ranch in 1963.

The large ranch of 15,840 acres is based on six ranches in the study sample. All of these ranches raised beef cattle. Beef cattle were the only livestock on two ranches. The average cow herd on the six ranches was about 192 cows. Three ranches produced sheep in addition to dairy cows and/or beef cows, with the average ewe flock consisting of 1,182 head.

Tenure on Representative Farms and Ranches

The tenure of the representative farms and ranches on the project and the surrounding area appears to follow the pattern of the rest of the state and of

the Northern Plains, as indicated in the 1964 U. S. Census of Agriculture. The greatest concentration of full-owner⁶ farms and ranches is in the smaller units (Table 5). On the irrigated farms, the smallest representative units (240 acres) were all full-owner operated, but the other sizes were about one-half full-owner operated. Only in the 480-acre and 2,140-acre size groups were there any full-tenant operated units.

Five of the six ranches with irrigated cropland were part-owner operated. This type of unit has an owned headquarters unit on the irrigated ground with partially owned or fully rented rangeland some distance away. Lands controlled by the state, the Bureau of Land Management, or other government agencies usually make up much of these units. Dryland farms were one-half part-owner operated for the

⁶Full-owner—owns all land operated.

Part-owner—owns part of the land and rents the remainder.

Full-tenant—rents all land operated.

Table 5. Number of Farms and Ranches by Tenure Class in Each Representative Size Group, 1963.

Farm-Ranch Size in Acres	Number of			
	Farms—Ranches	Full-Owner	Part-Owner	Full-Tenant
Irrigated Farms:				
240	6	6	0	0
480	11	6	3	2
720	10	5	5	0
2,140	4	1	2	1
Irrigated Ranches:				
7,700	6	1	5	0
Dryland Farms:				
935	6	1	3	2
3,100	4	1	3	0
Dryland Ranches:				
4,080	8	2	6	0
9,560	8	2	5	1
15,840	6	0	6	0

935-acre representative size and about three-fourths part-owner for the larger 3,100-acre unit.

Dryland ranches are operated largely on a part-owner basis. The 4,080-acre and the 9,560-acre representative units are about one-fourth full-owner operated. Only one ranch of the 22 in the three size groups was a full-tenant unit. The largest representative ranch group was entirely part-owner operated. Again, the headquarters unit — which included the winter feed unit and usually winter and spring ranges — was owned by the operator.

Although more of the farms and ranches, with the exception of the irrigated farms, are part-owner operated (Table 5), the greater part of most of the representative farm and ranch units was owned by the operator. The only exceptions appear to be the 935-acre dryland unit and the 480-acre irrigated farm. The owned land and rented land on these units is almost evenly divided. At least 65 percent of the land in the unit is operator-owned on all other representative units (Table 6).

Use of Cropland

Irrigated Farms and Ranches — Cropland on the irrigated farms is used primarily to produce crops for livestock feed on the farm or for sale to other operators in the area. Crops grown primarily for cash sale out of the area include wheat and a relatively few acres of edible beans. Sugarbeets were a cash crop on the project from 1927 until 1964, when the sugar processing plant was closed.

The cropping pattern on the irrigated cropland is nearly the same for all sizes of irrigated farms. Small grains (oats, barley, and wheat) occupy 15 to 24% of the irrigated land, row crops 12 to 23%, and tame hay approximately 50%. Small grains are raised on 40 to 50% of the dry cropland on the irrigated

farms. Rotation pasture is raised on 6 to 12% of the irrigated cropland on all irrigated farms, but very little on ranches with irrigated cropland (Table 7).

Approximately 25% of the irrigated cropland on the irrigated ranches is used for row crops and small grains. Most of the remainder is used for tame hay. The row crops are often utilized as dry forage or silage, or are grazed by livestock. The small grain acreage is sometimes used as a hay crop and as a nurse crop for new seedings of alfalfa. Dry cropland on the irrigated ranches is used largely for small grain and tame hay production (Table 7).

Dryland Farms and Ranches — Dryland farms in the area classify from 15 to slightly over 25% of their total units as cropland. Slightly over 80% of the cropland in the 935-acre group is used to raise small grains, row crops, and hay. The remainder is idle or fallow or in various government programs. Slightly over 60% of the cropland in the 3,100-acre size group is used to produce crops; the remainder is idle or fallow or in government programs (Table 8).

The cropland on the ranches is used almost entirely for small grain and tame hay production. Some of the small grain acreage is used in many years as a nurse crop for new alfalfa and grass seedings and is also cut for hay.

Yields of Selected Crops — Average annual yields and five-year averages (1961-1965) of selected crops under irrigated and dryland conditions are shown in Table 9. These data indicate that crops such as corn and alfalfa show the greatest response to the application of irrigation water and other changes in management. Wheat yields are increased only slightly by the addition of water and other practices, including increased fertilizer use.⁷

⁷Average yields for farms and ranches in the study sample for 1963 are shown in appendix Table 1.

Table 6. Percentage of Land Owned and Rented on Representative Farms and Ranches.

Farm-Ranch Class and Size in Acres	Percent of Cropland				Percent of Pasture				Percent of All Land	
	Irrigated		Dry		Irrigated		Dry		(Owned—Rented)	
	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)	(Owned—Rented)
Percent										
Irrigated Farms:										
240	100	---	100	---	100	---	100	---	100	---
480	66	34	22	78	100	---	55	45	54	46
720	87	13	93	7	100	---	86	14	88	12
2,140	76	24	78	22	100	---	74	26	75	25
Irrigated Ranches:										
7,700	100	---	100	---	---	---	72	28	74	26
Dryland Farms:										
935	---	---	59	41	---	---	45	55	48	52
3,100	---	---	75	25	---	---	81	19	79	21
Dryland Ranches:										
4,080	---	---	100	---	---	---	82	18	83	17
9,560	---	---	89	11	---	---	64	36	65	35
15,840	---	---	100	---	---	---	73	27	73	27

Table 7. Percentages of Specific Cropland Use on Irrigated Farms and Ranches.

Type of Crop	Size of Farms and Ranches									
	240 Acres		480 Acres		720 Acres		2,140 Acres		7,700 Acres	
	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)
	Percent									
Small Grain	24	44	18	44	18	40	15	51	23	47
Row Crops	21	16	17	0	23	2	20	0	12	12
Tame Hay	43	20	50	12	43	14	55	17	59	41
Rotation Pasture*	12	0	7	0	11	0	6	0	0	0
Idle or Fallow	0	14	5	37	3	39	4	16	1	0
Other†	0	6	3	7	2	5	0	16	5	0
Total	100	100	100	100	100	100	100	100	100	100

*Legumes and grasses in regular rotation used as pasture.
 †Mostly in government programs.

Financial Status of Representative Farms and Ranches

Number With Debt—Twenty-four of 30 irrigated farms reporting listed either real estate or chattel debts or both. Five of the six ranches with headquarters on irrigated land reported debts of some kind; four of the six reported real estate debt and three reported chattel debt. All of the 720-acre and 2,140-acre farms reported debts. Half of the 240-acre units reported debts and eight of 11 reporting in the 480-acre group had either real estate or chattel debts or both (Table 10).

Twenty-three of the 28 dryland farms and ranches reporting listed real estate or chattel debts or both. One-half of the ranches in the 15,840 acre group re-

ported real estate debt, but none reported chattel debt. All small 4,080-acre and the medium 9,560-acre ranches had chattel or real estate debts or both.

Three out of four dryland farms had debts in both the 935-acre and the 3,100-acre representative farm sizes (Table 10).

Assets, Debt, and Net Worth — The average investment, average debt, net worth, and ratio of debt-to-assets on the representative farms and ranches are shown in Table 11. These figures indicate the situation on the farms and ranches of various sizes at the beginning of 1964. Land and improvements are included at the average estimated sales value per acre.⁸ The total investment in land and improvements is adjusted according to the actual land ownership or tenure pattern on the farms and ranches in the sample. The machinery investment was calculated on the basis of the machinery reported on the farm and ranches in each representative size group. Value of machinery and equipment was the inventory value (55% of purchase price), and it was assumed that half of the machinery on all farms and ranches was used when purchased. No rental of machinery was assumed.

⁸Value of land and improvements per acre for the area were estimated as follows: Cropland—Irrigated, \$135, and Dryland, \$35; Pasture—Irrigated, \$65, and Dryland, \$30; Range, \$25; and Other Land, \$30.

Values per acre were based on actual sales of land in area. Estimates and opinions of farmers, ranchers, county agents, commercial bankers, and Federal Land Bank Association personnel were adjusted to represent a composit of soils in the area.

Table 8. Percentages of Specific Cropland Use on Dryland Farms and Ranches.

Type of Crop	Size of Farms and Ranches				
	Farms		Ranches		
	935 Acres	3,100 Acres	4,080 Acres	9,580 Acres	15,840 Acres
Small Grain	14	29	19	25	22
Row Crops	5	1	5	6	0
Tame Hay	63	32	48	64	78
Idle or Fallow	12	35	28	5	0
Other	6	3	0	0	0
TOTAL	100	100	100	100	100

Table 9. Yields of Selected Crops, Butte County, S. D., 1961-65.

Year	Yields Irrigated and Dry—Butte County, 1961-1965									
	Corn		Barley		Oats		Wheat		Alfalfa	
	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)	(Irrig.—Dry)
	Bushels per Acre									
1961	39.0	12.5	16.0	7.5	20.0	8.4	14.0	12.5	1.8	.6
1962	51.0	29.3	44.0	40.7	59.0	42.0	20.6	14.7	2.3	1.7
1963	67.3	30.5	38.5	28.5	46.0	45.0	20.4	27.5	2.8	1.0
1964	47.0	26.0	34.0	25.8	40.0	40.0	14.0	18.9	2.5	.9
1965	64.0	13.5	43.0	34.0	58.0	29.9	14.0	14.7	2.6	1.2
Ave.	58.8	25.3	37.6	30.7	50.2	38.9	17.0	18.0	2.4	1.0

Source: Butte County Agriculture, S. D. Crop and Livestock Reporting Service and Annual Project History, Belle Fourche Project, Volume CCXVII, 1965. U. S. Department of the Interior, Bureau of Reclamation.

The livestock investment consists of the number of production units (cow and replacements plus share of bull, for example) on the average representative farm or ranch on January 1, 1964, at the following values per unit:

	(Dryland)	(Irrigated)
Dairy Unit	\$250.00	\$275.00
Beef Unit	220.00	220.00
Sheep Unit	21.85	21.85

Net worth is almost the same for all of the representative irrigated farms regardless of size, partly because the smaller farms tend to be more fully owner-operated and the larger units have greater debt load. However, the farms in the 720-acre group owned almost 88% of the land operated. Their net worth was more than \$10,000 greater than that of the other irrigated farms.

Table 10. Number of Irrigated and Dryland Farms and Ranches Reporting Debt on Representative Units, January 1, 1964.*

Farm-Ranch Class and Size in Acres	Total Number Reporting	Number with Debt		
		Real Estate	Chattel	Total
Irrigated Farms:				
240	6	2	3	3
480	11	5	6	8
720	10	9	9	10
2,140	3	3	3	3
Irrigated Ranches:				
7,700	6	4	3	5
Dryland Farms:				
935	4	2	2	3
3,100	4	3	1	3
Dryland Ranches:				
4,080	7	7	4	7
9,560	7	5	4	7
15,840	6	3	0	3

*Five farms or ranches in the sample of 69 did not provide information on their debt status.

Table 11. Assets, Debts, Net Worth, and Ratio of Debts to Assets on Representative Farms and Ranches, January 1, 1964.*

Farm-Ranch Class and Size in Acres	Assets	Debts	Net Worth	Ratio of Debts to Assets
Irrigated Farms:				
240	\$ 24,330	\$ 4,200	\$ 20,130	17.3%
480	33,840	11,895	21,945	35.2
720	66,775	31,100	35,675	46.6
2,140	92,355	68,400	23,955	74.1
Irrigated Ranches:				
7,700	213,310	27,420	185,890	12.9
Dryland Farms:				
935	25,230	4,405	20,825	17.5
3,100	98,570	23,115	75,455	23.5
Dryland Ranches:				
4,080	109,770	28,300	81,470	25.8
9,560	188,090	19,005	169,085	10.1
15,840	355,875	14,375	341,500	4.0

*Land and improvement investment based on actual ownership-rental ratios; livestock and machinery assumed to be fully owned.

The net worth increases quite uniformly with the increase in size of the unit among all other sizes of representative farms and ranches — both dryland and irrigated.

Ratio of Debt to Assets — The ratio of debt (both real estate and non-real estate) to assets controlled often is used as an indicator of the condition of the farm and ranch business. The ratio of debt to assets on all farms and ranches in the sample was 18.6% on January 1, 1964. This ratio increased with the size of the unit on the representative irrigated farms. As the unit increased in acres, the size of the debt increased faster than the value of the assets controlled (Table 11). The ratio of debts to assets controlled ranged from 17.3% to 74.1% in this group.

The ratio on the dryland farms also increased as the size of unit increased. With the dryland ranches, however, there is a reverse relationship between size of unit and ratio of debt to assets. The ratio of 25.8% for the small 4,080-acre dryland ranch dropped to only 4% for the relatively large 15,840-acre representative units.⁹

Age of Farm and Ranch Operators

The average age of farm and ranch operators is increasing. The average age of farm and ranch operators in South Dakota was 47.5 years in 1959; by 1964, this average had increased to 48.6 years. The average age of operators in Butte County was 47.9 in 1959 and 49.0 in 1964.¹⁰ The age of the farm and ranch operators on the representative size units averaged 47.9 on the irrigation project and 49.2 in the dryland area (Table 12).

For both the dryland and irrigated farms, the oldest operators were usually on the smallest units. The average age of the operator on the 240-acre irrigated farms was 62.5, compared with 47.9 for all irrigated units. The youngest operator on the small 240-acre unit was 55 years old, while the youngest on the 7,700-acre irrigated ranch was 32. The average age of the operator on the 935-acre dryland farm was 58.3, compared with 49.2 for all dryland farms and ranches. The youngest operator, 26 years of age, was on a small 4,080-acre ranch, while there were operators on both the 935-acre farms and the 9,560-acre ranches who were 82 years old.

Education of Operators and Wives

The number of years of formal education of the farm and ranch operators in the study sample averaged slightly above that for the state and the county. The average number of years of education of farm and ranch operators in South Dakota was 9.6 in 1964 and in Butte County, about 9.9.¹¹

⁹These ratios are based on the actual ownership-rental ratio for the farms and ranches in the area.

¹⁰U. S. Census of Agriculture, 1959 and 1964.

¹¹U. S. Census of Agriculture, 1964.

Table 12. Average Age and Range in Age of Irrigated and Dryland Farm and Ranch Operators, 1964.

Size of Operation in Acres	Age of Operators		
	Low	High	Average
Irrigated Farms and Ranches:			
240	55	68	62.5
480	35	56	46.6
720	29	52	43.3
2,140	35	59	44.8
7,700	32	65	46.6
	(Average for Irrigated) 47.9		
Dryland Farms and Ranches:			
935	37	82	58.3
3,100	34	60	45.0
4,080	26	57	43.9
9,560	33	82	48.2
15,840	40	57	50.3
	(Average for Dryland) 49.2		
	(Average Age Operator, All Farms-Ranches) 48.4		

The operators of the irrigated farms and ranches averaged 10 years of education, with a range of 5 through 13 years. The educational level of the dryland operators was almost the same — 10.4 years with a range of 6 through 17 years. Wives of the farm and ranch operators have slightly more education than their husbands. The wives on irrigated farms and ranches averaged 11.4 years and those on the dryland farms and ranches, 12.3 years. Range in educational level for wives living on irrigated farms and ranches was from 5 through 16 years. The range was 8 through 16 years on dryland farms and ranches (Table 13).

Off-Farm Work and Income of Operators and Wives

Thirteen operators and four wives on a total of 37 irrigated farms and ranches reported income from off-farm¹² employment in 1963 (Table 14). No differences in off-farm work could be detected due to differences in size or type-of-farming operations. Operators of irrigated farms and ranches who were working off the farm earned approximately \$1,695 from such labor in 1963. The four wives who worked off the farm earned considerably more, an average of approximately \$3,129. Their work was almost entirely on a full-time basis. There were no instances in which both the husband and wife on a farm or ranch worked at an off-farm job.

Off-farm income of the dryland farm and ranch operators and their wives averaged approximately \$2,365 for men and \$3,400 for the women. Fewer dryland operators and wives worked off the farm than did those on the irrigated units, partly because the dryland farms and ranches are not conveniently near the points where off-farm employment is available.

Table 13. Average and Range in Years of Formal Education of Operators and Wives on Irrigated and Dryland Farms and Ranches, 1964.

Size of Operation in Acres	Years of Education					
	Operators (Low—High)		Average	Wives (Low—High)		
					Average	
Irrigated Farms and Ranches:						
240	6	12	8.2	8	16	11.2
480	5	12	9.2	5	14	10.5
720	8	12	11.1	8	14	12.7
2,140	8	13	11.0	8	14	11.8
7,700	9	12	10.8	8	13	11.0
			(Overall Average) 10.0			(Overall Average) 11.4
Dryland Farms and Ranches:						
935	8	12	9.7	9	16	12.3
3,100	9	14	12.3	12	15	13.5
4,080	6	12	9.2	8	16	11.3
9,560	9	17	12.8	10	15	12.6
15,840	8	10	8.5	12	13	12.4
			Overall Average) 10.4			(Overall Average) 12.3
			(Combined Dry-Irrig. Average) 10.2			(Combined Dry-Irrig. Average) 11.8

Table 14. Number of Dryland and Irrigated Farm and Ranch Operators and Wives Reporting Off-Farm Work and Average Off-Farm Income Earned, 1963.

	Number Farms-Ranches Reporting	Number Reporting Off-Farm Work		Average Off-Farm Income	
		Operators	Wives	Operators	Wives
Irrigated Farms and Ranches:					
	37	13	4	\$1,695.00	\$3,129.00
Dryland Farms and Ranches:					
	32	5	3	2,365.20	3,400.00
All Farms and Ranches:					
	69	18	7	1,881.10	3,245.15

Eighteen of the 69 farm or ranch operators reporting had some off-farm work and earned over \$1,881 each per year. Each of the seven wives who worked earned approximately \$3,245 per year.¹³

Problems Reported by Operators

Irrigated Farms and Ranches — The farm and ranch operators interviewed were asked to list the major problems encountered in the operation of their unit. Many operators reported more than one problem. The responses for the irrigated farms and ranches are shown in Table 15. The major problem reported by irrigated farms and ranches of all sizes was the shortage of irrigation water. This water shortage for the individual operator may be due to lack of water in the reservoir, canal capacity or other reasons. However, for the project as a unit, the water shortages are

¹²Any paid work off the farm or ranch operated (exchange labor and custom work are not included).

¹³Average income from off-farm wages and salaries for South Dakota was about \$784 per household in 1964—U. S. Census of Agriculture, 1964.

Table 15. Frequency of Problems Reported by Representative Irrigated Farms and Ranches.*

Problem	Frequency of Problem					Total
	240- Acre Farms	480- Acre Farms	720- Acre Farms	2,140- Acre Farms	7,700- Acre Ranches	
Irrigation Water Shortage	4	10	7	2	4	27
Low Prices and High Costs	3	0	4	4	5	16
Operation Too Small	3	0	2	1	2	8
Rainfall Shortage	0	2	2	1	2	7
Labor Shortage	0	2	1	1	2	6
Soil Quality and Land Development	0	3	2	1	0	6
Credit Shortage	0	0	1	1	0	2
Insect, Parasites	0	1	0	1	0	2
None	1	0	0	0	0	1
Other†	0	1	1	0	1	3
Total	11	19	20	12	16	78

*Reported by 37 farms and ranches. Most operators reported several problems of varying importance.

†Health, distance to market, adverse weather.

largely due to lack of runoff on the contributing watersheds; for example, the runoff or stream flow does not fill the storage reservoir. The other problem most often reported was low prices received relative to costs. More farms and ranches in the 2,140-acre and 7,700-acre groups felt that the cost-price squeeze was a more serious problem than the shortage of water for irrigation.

The shortage of rainfall and the small size of operation ranked about equally as the third most important problem. The shortage of rainfall was given as a separate problem from the shortage of irrigation water, because many irrigated farms and ranches rely heavily upon rangeland production for summer grazing of livestock wintered on feeds grown on the irrigated land. If range production is poor, the number of livestock usually will have to be reduced even though there is no shortage of irrigation water or winter feed produced on irrigated land.

Dryland Farms and Ranches—The major problems reported by the dryland farms and ranches are shown in Table 16. In all size groups of dryland farms or ranches, the rainfall shortage was the most important problem. The next most frequently stated

problem was low prices relative to costs. The small size of the unit was listed as a serious problem by ranchers in the 4,080-acre ranch group.

Opinions of Operators on Size of Unit and Stocking Capacity

Size of Unit — The operators of farms and ranches on the irrigated and dryland areas were asked if they thought their farm or ranch was large enough to be operated as an economic unit. Seventy-five percent of the dryland unit operators and 78% of the irrigated unit operators believed that their units were large enough to produce a satisfactory income¹⁴ under normal or average conditions (Table 17).

¹⁴No definition was given for a "satisfactory income" or "normal or average conditions." Both descriptions were left entirely to the operator.

Table 17. Operators' Opinions on Size of Dryland and Irrigated Farms or Ranches

Type of Farm or Ranch	Is Your Unit Large Enough?*			
	Yes		No	
	Number	%	Number	%
Irrigated	29	78	8	22
Dryland	24	75	8	25

*Large enough to be an economic unit.

Table 16. Frequency of Problems Reported by Representative Dryland Farms and Ranches.*

Problem	Frequency of Problem					Total
	935- Acre Farms	3,100- Acre Farms	4,080- Acre Farms	9,560- Acre Farms	15,840- Acre Farms	
Rainfall Shortage	6	4	7	5	5	27
Low Prices, High Costs	2	3	5	3	1	14
Operation Too Small	1	0	6	1	0	8
Labor Shortage	0	1	0	0	2	3
Soil Quality and Land Development	2	0	0	0	0	2
None	0	0	0	2	0	2
Other†	1	0	1	0	1	3
Total	12	8	19	11	9	59

*Reported by 32 farms and ranches. Most operators reported several problems of varying importance.

†Weeds, wool imports, and spring storms.

Those operators of dryland units who believed that their units were not large enough to be operated as an economic unit were asked why they had not enlarged their operation. The main reason, as shown below, was that the land for expansion was not available:

Reason	Number Responding
Land not available	5
Off-farm work	1
Livestock prices too low	1
Do not want to go into debt	1

The operators of irrigated farms and ranches who believed that their units were too small (8 of 37) also were asked to give their reasons for not enlarging. Their reasons are shown below:

Reason	Number Responding
Irrigated land not available at a reasonable price	2
Rangeland not available	5
Returns would not cover enlargements costs	1

All reasons above involve an attitude that land costs are high. Two operators were interested in more irrigated cropland, but could not locate any at prices they considered reasonable. The five irrigation farm operators, who would have liked to expand by enlarging their range pasture, felt that either the rangeland was not available or it would have cost too much. Another reason given was that land prices were much too high in relation to the prices received for products sold from the farms and ranches. Although only one person cited the latter as a reason for not enlarging his operation, it is closely related to the other two reasons concerning the availability of rangeland and irrigated cropland.

Under irrigated conditions, there seems to be little association between the actual size of a unit in acres and what the operators think is a unit large enough to be an economic operation. More than 60% of the operators who thought their units were too small operated units of 720 acres or over.

Stocking Capacity — Another question asked the farm and ranch operators was whether they believed they ran the maximum capacity of livestock that their farm or ranch could sustain over a relatively long period (Table 18).

Twenty-three dryland farm and ranch operators among a total of 32 answering this question felt that their units sustained the maximum number of livestock the land could handle.¹⁵ The reasons given by nine operators as to why their units did not have the maximum capacity of livestock include:

Reason	Number Responding
Unfavorable prices	2
Previous drought	5
Labor shortage	1
Health of operator	1

Table 18. Operators' Opinions on Stocking Capacity on Farm or Ranch.

Type of farm or Ranch	Is Your Unit Stocked to Capacity?			
	Yes		No	
	Number	%	Number	%
Irrigated	25	68	12	32
Dryland	23	72	9	28

“Unfavorable prices” given by two operators refers to what they thought were too-low prices received for their sheep or cattle in comparison to prices which they had to pay for items purchased. The major reasoning for not having the maximum number of livestock that the land could possibly sustain was: That cattle numbers had been reduced because of the recent drought; many of the operators planned to or had started to build up their livestock numbers as rapidly as possible. In most cases, this buildup was being accomplished without incurring additional indebtedness.

Twenty-five of the 37 operators on the irrigated farms and ranches believed they had enough livestock. The other 12 gave the following reasons for not having the maximum amount they could have run:

Reason	Number Responding
Good ewe lambs not available	1
Not able to finance without further debt	1
Labor shortage	5
Land needs leveling and fertilizer	1
Poor health of operator and lack of credit	1
More time needed to build up herd	1
Unit not balanced—need more pasture	1
Price-cost ratio not favorable	1

As illustrated above, the major reason given by the irrigation farm and ranch operators for not running a maximum number of livestock was the shortage of reliable labor. This reason, of course, should be qualified by the statement “at a reasonable cost.”

The cost factor also enters into consideration of all the other reasons given. The operator, who stated that good ewe lambs were not available for expansion, no doubt felt that the price for the type of lamb he wanted was too high. The operator who gave “unit not balanced — need more pasture,” felt that he could produce grains and hay to feed considerably more

¹⁵Based entirely on the operator's knowledge of his unit. No standards or stocking rates for the area were followed.

livestock during the winter and for the slaughter market. However, because his farm did not have the dryland or range pasture for summer feeding, he felt it was more profitable for him to sell some feed grains and hay and reduce his livestock numbers.

Operators who listed "not able to finance without further debt" and "more time needed to build up herd" were planning to increase livestock numbers but preferred to do so without incurring any more debt.

Economic Interdependency of Irrigated and Dryland Areas

The possibility of exchange or cooperation between irrigated farms and farms and ranches on the surrounding range or dryland area has earned considerable interest in recent years. This section indicates the extent of the interdependency of the irrigated and dryland areas (from data obtained from 37 irrigated farms and ranches and 32 dryland farms and ranches).

One transaction that could be of mutual benefit to both the dryland and irrigated units is the sale of feed grain and hay — in most instances from the irrigated to the dryland units. The production and disposition of hay and feed grains on irrigated farms and ranches in the area are shown in Table 19. As indicated, relatively little feed (either hay or feed grain) moved off the particular farm or ranch where it was produced. The only feed sold on dryland farms and ranches was hay, and this accounted for only about 1% of the total hay production.

Some hay, corn, and oats moved off irrigated farms and ranches. Approximately 8% of the hay crop produced by irrigated farms and ranches was sold in 1963. Over one-third of these sales were to other irrigation farmers or ranchers and almost 40% were to hay dealers. This hay was not resold to ranchers to any extent, but to dairy farmers in the Black Hills foothill

Table 19. Production and Disposition of Hay and Feed Grains by Irrigated Farms and Ranches, 1963.

Type of feed	Amount produced	Disposition			
		On-farm use	Sold to		
			Dealers	Irrigat. Farmers	Dryland Farmers
		Tons			
Hay*	11,093	10,278	321†	312	182
Barley	365	361		4	
Corn	1,479	1,116	20	70	273
Oats	558	504	3	19	32
		Percent			
Hay	100	92	3	3	2
Barley	100	99		1	
Corn	100	76	1	5	18
Oats	100	90	1	3	6

*Mostly alfalfa but includes small amounts of native and grain hay.
†One sale of landlord's share was 273 tons. Bought by commercial feedlot or dairy.

area and to commercial feeders. Approximately 25% of the corn crop was sold — 5% to other irrigated farms and ranches and 18% to dryland farms and ranches. Of the 558 tons of oats raised on the irrigated farms and ranches surveyed, almost 90% remained on the producing farms for feed or seed. More than one-third of other amount — 10% sold — went to other irrigation farmers or ranchers on the project.

These data indicate that for 1963, which is probably a typical year for exchanges, the possibility of any great exchange between dryland and irrigated farms and ranches in feed grain or hay was improbable, because most feeds were used on the farms where they were produced. Also, because the removal of hay and feed grains tends to reduce organic matter on farms and fertility of soils, the operators of irrigated units prefer not to produce grains and hay solely for cash sale.

Irrigation and dryland operators were asked to indicate the kind of feed they bought in 1963 and from whom it was purchased. Twenty-two dryland farm or ranch operators and 23 irrigation farm or ranch operators in 1963 bought feed grains (Tables 20 and 21). Sixteen dryland farmers and 17 irrigation farmers bought feed grains from dealers. Three dryland farmers and four irrigation farmers bought feed grains from other sources east of the Missouri River. Only two dryland farmers in the sample bought from an irrigated farm and only one irrigation farmer bought feed grains from a dryland unit.

Table 20. Amount and Source of Selected Feeds Bought by Irrigation Farmers and Ranchers, 1963.

Type of Feed	Number Buying*	Tons Feed Bought	Tons Bought from		
			Area Dealers	Irrigated Farms	Dryland Farms Other†
Alfalfa	7	400		400	
Barley	2	7.5	7.5		
Corn	16	635	382	7	246
Oats	5	144	40	61	43
Total		1,186.5	429.5	468	43

*Twenty-three farmers and ranchers bought feed. Several bought more than one kind of feed. Commercial feeds are not included.
†Usually farmers or dealers east of the Missouri River.

Table 21. Amount and Source of Selected Feeds Bought by Dryland Farmers and Ranchers, 1963.

Type of Feed	Number Buying*	Tons Feed Bought	Tons Bought from		
			Area Dealers	Irrigated Farms	Dryland Farms Other†
Alfalfa	3	243		143	100
Barley	4	99	50		34
Corn	12	280	255		25
Oats	11	171	93	39	39
Total		793	398	182	173

*Twenty-two farmers and ranchers bought feed. Several bought more than one kind of feed. Commercial feeds are not included.
†Usually farmers or dealers east of the Missouri River.

More corn is purchased by the irrigated and dryland farms than all other feed grains combined. Almost all of the corn was purchased from elevators in the area or from dealers and farmers east of the Missouri River. Very little of the feed grains sold by the local elevators or dealers is of local origin (within 50 miles of the irrigation project).¹⁶

Only three dryland units bought hay in 1963, and two of them bought it from irrigated units. The movement of hay from the irrigated to the dryland area may be much greater during some years than on others. This movement, however, depends upon several factors: (1) water supply for irrigation, (2) moisture conditions on the dryland units, (3) length of drought conditions, and (4) price level of feeder cattle during the drought emergency and estimated price level in the immediate future.

As indicated above, not much hay was sold from either dryland or irrigated units. It is possible that more hay could be produced on the irrigated units; if this were done, however, it may result in more livestock being fed on the irrigated farm. Marketing their hay through livestock would be the recommended farm management practice for the irrigation project.

Another measure of the amount of interdependence between the dryland and irrigation operations is indicated in Tables 22 and 23. These data on various transactions of the farms and ranches on the irrigation project area and on the dryland area are based on the operators' recollections of a 10-year period. The tables indicate that for the dryland units, the most important types of transactions with irrigated units were feed grains, hay, and feeder livestock. Even in these areas, less than one-third of those interviewed

Table 22. Number of Dryland Farmers and Ranchers and Number of Their Transactions with Irrigated Farmers and Ranchers, 1954-63.

Transaction	Number of Operators Involved*	Total Number of Transactions†
Buy Feed Grain	6	33
Sell Feed Grain	1	2
Sell Hay	1	1
Buy Hay	10	25
Exchange Labor	1	10
Work for	3	6
Hire	0	0
Contract Feeding	1	1
Contract Wintering	3	5
Buy Feeders	0	0
Sell Feeders	7	26

*Number of farms or ranches that engaged in the specified transaction at least once in the 10-year period (32 farms and ranches reporting). Commercial feeds are not included.
†Number of transactions in the 10-year period.

Table 23. Number of Irrigation Farmers and Ranchers and Number of Their Transactions with Dryland Farmers and Ranchers, 1954-63.

Transaction	Number of Operators Involved*	Total Number of Transactions†
Buy Feed Grain	7	31
Sell Feed Grain	9	30
Buy Hay	6	17
Sell Hay	12	52
Exchange Labor	2	11
Work for	0	0
Hire	2	7
Contract Feeding	5	16
Contract Wintering	9	24
Buy Feeders	15	79
Sell Feeders	0	0

*Number of farms or ranches that engaged in the specified transaction at least once in the 10-year period (37 farms and ranches reporting).
†Number of transactions in 10-year period.

(32 reporting) indicated that they bought feed grains or hay or sold feeder livestock directly to operators of irrigated units. Only the six of the farms and ranches that bought feed grains did so for at least 50% of the years in the 10-year period. The 10 that bought hay from irrigated units during the 10-year period did so for only about one-fourth of the years.

Seven ranchers — about 20% of those reporting — sold feeder livestock directly to irrigation farmers at least once during the 10-year period. These seven ranchers sold feeders to irrigation farmers 26 times during the 10-year period. This is not a definite indication that no more feeder livestock or hay or grain was moved from dryland to irrigated land, or the reverse. The data indicates only that there was little direct contact between the two areas.¹⁷

The number of irrigation farmers and ranchers involved in direct transactions with the dryland farmers and ranchers during the 10-year period are shown in Table 23. In this instance, as would be expected, the sales of feed grain and hay and the purchase of feeder livestock were the most frequent. Nine out of our sample of 37 sold feed grain, 12 sold hay, and 15 bought feeder livestock direct from dryland farmers or ranchers at least once during the 10-year period. However, seven indicated they had bought feed grains and six had bought hay at least once from dryland farmers during the 10-year period.

Five operators of irrigated units entered into contract feeding 16 times during the 10-year period. Nine irrigation farmers or ranchers were engaged in con-

¹⁶Elevator operators in the area indicated that almost 100% of the corn they sold originated east of the Missouri River. The source of most of the oats and barley sold by elevator operators was also obtained more than 50 miles from the project.

¹⁷No information is available on the destination or source of livestock sold through the local auctions except in isolated instances.

tract wintering of livestock for dryland operators 24 times during the 10-year period. Only one dryland operator fed livestock on contract for an operator of an irrigated farm, and that was on a single occasion. Three dryland farms or ranches wintered livestock for irrigated farms for a total of five times during the 10-year period.

Other transactions in which dryland farmers and ranchers were directly involved with irrigated farms to any extent included buying of feed grains and hay and the selling of feeder livestock.

Six dryland farmers or ranchers bought feed grain 33 times during the 10-year period. Ten bought hay 25 times during the 10-year period. Seven sold feeder livestock directly to an irrigation farmer on 26 occasions during the 10-year period. Even those involved in these direct transactions did not do so each year and — perhaps more importantly — in no instance did as many as 30% of the dryland operators engage in direct purchase or sales with operators of irrigated units.

APPENDIX

Appendix Table 1. Yields of Major Crops on Irrigated and Dryland, Belle Fourche Irrigation Project and Surrounding Area, 1963.*

Type of Crop	Unit of Measure	Irrigated Farms								
		On Irrigated Cropland			On Dry Cropland			Dryland Farms		
		Average	(Low—High)		Average	(Low—High)		Average	(Low—High)	
Per Acre Yields										
Corn Grain	Bu.	88.6	36.0	120.0						
Corn Silage	Ton	11.2	8.0	15.0						
Barley	Bu.	39.5	11.0	65.0				20.0	19.0	24.0
Oats	Bu.	49.9	11.0	90.0	39.2	21.0	50.0	26.9	15.0	60.0
Wheat	Bu.	14.6	5.0	42.0	31.2	10.0	42.0	29.6	15.0	40.0
Alfalfa	Ton	2.8	1.2	5.5	1.4	1.0	2.0	1.2	0.5	3.0

*Based on sample data from 37 irrigated farms and ranches and 32 dryland farms and ranches.