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by

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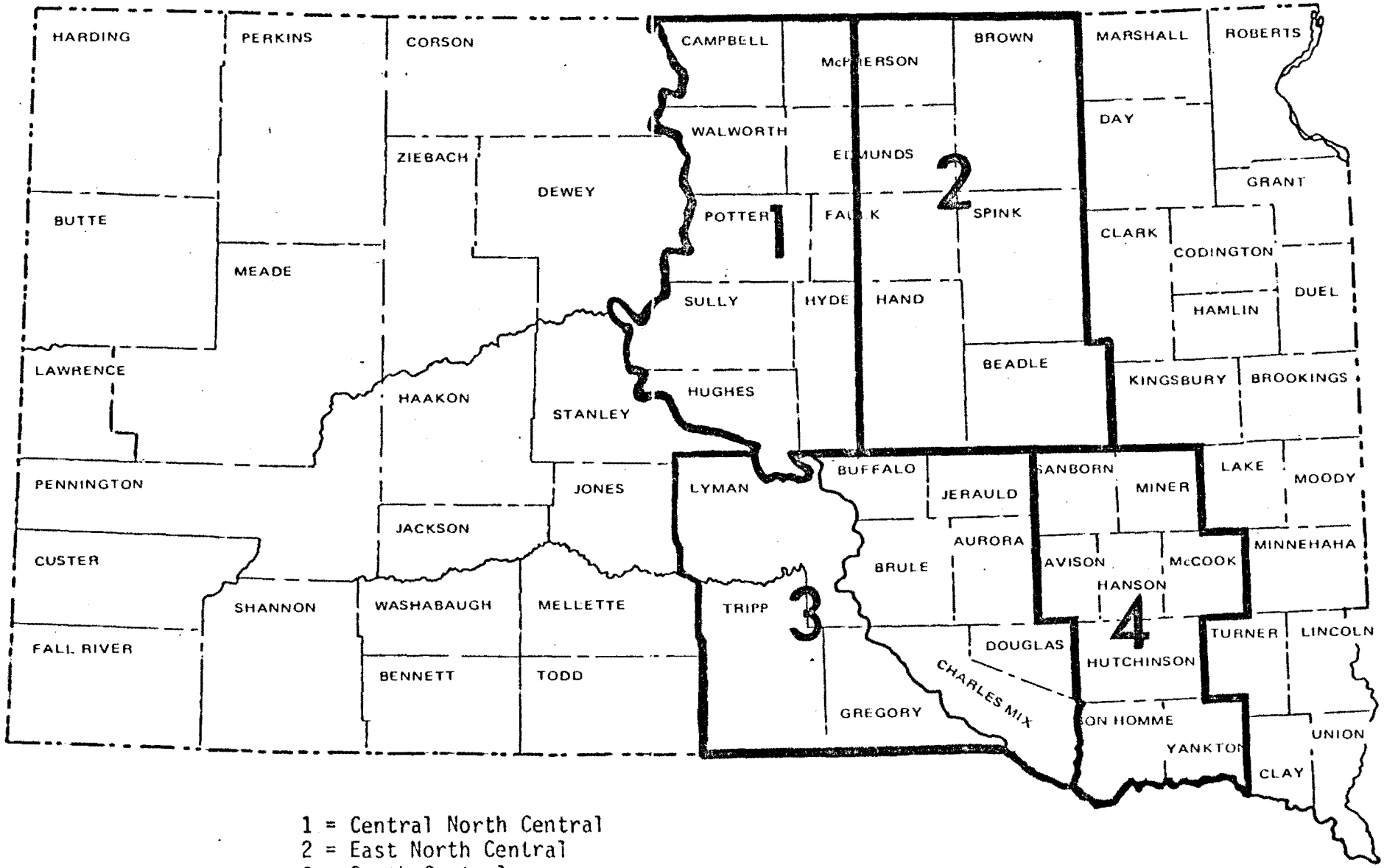
Irrigation development in all of South Dakota has received much attention in the past years. Today several major water development projects are being considered. These projects include both surface and groundwater resources. That some development, whether public or private, will take place seems to be a foregone conclusion.

In order for individual crop producers to decide whether to adopt irrigation technology or not requires an evaluation of profit potential with and without irrigation on their land resource. Most potential irrigators have personal records from which to derive dryland enterprise budgets to use in profit projections. Dryland producers with no irrigation experience, however, must obtain irrigated enterprise budgets from other sources. An individual irrigator is well-advised to obtain budgets from several sources, if possible, and synthesize the one which best fits his conditions. The purpose of this report is to provide one source of irrigated crop budgets for potential irrigators and others making decisions concerning irrigation technology adoption.

Irrigated crop production budgets for four areas in Central-East Central South Dakota are provided in the report. The four areas are designated on Figure 1 and cover a 29 county area. The four areas are Central North Central, East North Central, South Central and West Southeastern South Dakota. The areas vary markedly in soil types, irrigability, rainfall, and growing days. These factors were taken into account when choosing area boundaries.

FIGURE 1. Irrigated Crop Budget Areas



1 = Central North Central
2 = East North Central
3 = South Central
4 = West Southeastern

In addition, the boundaries were chosen to correspond with dryland budget area designations in studies published by the South Dakota State University Cooperative Extension Service.[1]

The four study areas each contain over two million cropland acres, see Table 1. However, after removing cropland pastured from total cropland the West Southeastern Area has only 1.6 million acres cropped and East North Central has the largest average cropped at 2.6 million acres. The amount of land irrigated as of the 1978 Agricultural Census is presented in Table 2. The East North Central Area has the most farmers irrigating and irrigated land at 188 and 40,603 acres, respectively.

Crop production by percentage of cropland devoted to each crop is presented in Table 3. The predominant dryland crop is wheat in Central North Central and East North Central and corn in South Central and West Southeastern South Dakota. Corn is the predominant irrigated crop in all study areas, with alfalfa the only other crop with a major portion of irrigated acres.

Therefore, irrigated crop production budgets were estimated for corn and alfalfa. Baseline irrigated crop budgets were obtained from the Economic Research Service, USDA in Lincoln, Nebraska. These budgets were derived using the system commonly known as the Oklahoma Budget Generator System or Feds Budgets.[2] The budgets thus obtained were adjusted for regional variations in yield and accompanying harvest and marketing costs. Then the adjusted budgets were taken directly to groups of irrigators from each area. Each individual cost item and yields were discussed by the groups and adjustments were made where necessary to reflect as carefully as possible actual estimated average conditions in each area.

Note that these budgets are averages for the areas. Individual irrigators did not incur identical costs for each expense item in the budget. In most cases, however, the total costs per acre of operation did not vary much

Table 1. Crop & Pasture Land by Area

	Area			
	Central North Central-1	East North Central-2	South Central-3	West South-eastern-4
	(1,000 acres)			
Cropland	2,128	2,963	2,502	2,005
Cropland Pastured	194	372	402	349
Land in Crops	1,934	2,591	2,100	1,656

Source: U.S. Department of Commerce, Bureau of the Census, "1978 Census of Agriculture". Volume 1, - State and County Data, Part 41 - South Dakota, 1981.

Table 2. Irrigated Cropland by Area, 1978[1/]

	Farms Irrigating	Irrigated[2/] Land
Central North Central - 1[3/]	137	35,607
East North Central - 2	188	40,603
South Central - 3	161	36,630
West Southeastern - 4	82	9,292

Source: U.S. Department of Commerce, Bureau of the Census, "1978 Census of Agriculture". Volume 1 - State and County Data, Part 41 - South Dakota, 1981.

[1/] Approximately 450,000 acres are currently irrigated in South Dakota.

[2/] Understates actual because county data were not given when individual irrigators' operations would have been divulged.

[3/] Includes all irrigation in Edmunds, Faulk, and McPherson Counties. Area 2 includes no irrigation data from these three counties.

Table 3. Percent of Dryland and Irrigated Crops Produced by Area

Crop	Area			
	Central North Central-1	East North Central-2	South Central-3	West South-eastern-4
		(Percent)		
Dryland				
Corn	14.6	19.6	23.1	44.0
Oats	12.8	10.9	15.5	25.1
Barley	5.8	6.7	3.8	*
Wheat	39.4	33.9	13.5	*
Alfalfa	15.2	16.3	19.9	13.3
Sorghum	*	*	12.0	*
Soybeans	*	*	*	4.2
Other	12.2	12.6	12.2	13.4
Irrigated				
Corn	68.7	70.0	85.4	83.1
Alfalfa	17.8	17.6	11.6	13.8
Wheat	7.5	11.0	--	--
Soybeans	6.0	D	*	3.1
Other	--	1.4	3.0	--

Source: U.S. Department of Commerce, Bureau of the Census, "1978 Census of Agriculture". Volume 1 - State and County Data, Part 41 - South Dakota, 1981.

*Included in other.

D - Withheld to avoid disclosure.

amongst participants. Those cost items that varied most amongst irrigators were chemical, fertilizer and ownership costs. Chemical costs varied with infestation rates of rootworm and grasshoppers which were not present at all locations in each area. Fertilization rates varied with soil types and ownership costs varied predominantly with the age or purchase date of equipment and land.

The budgeted costs of irrigated production for the North Central and East North Central Areas were very similar so they were combined for this report in Tables 4 and 5. The costs which were obtained from the farmers were collected for 1980 and are presented in the 1980 column. These costs were updated to 1982 by applying indexes of prices paid published by the United States Department of Agriculture.[3] These average base-line figures do not apply to every specific situation. Individual irrigators and potential irrigators will want to adjust these base-line figures in accordance with their own unique and other production conditions. The adjusted figures can be shown in the final column of this and the other tables.

Variable costs (operating costs) of producing corn for 1982 in North Central and East North Central South Dakota are $187.55 per acre (Table 4). If corn were to yield 130 bushels per acre, a price of $1.44 would cover these costs. Total costs exclusive of a return for land, water and operator labor and management are $315.55 and a price of $2.43 per bushel is required to breakeven with the 130 bushel average yield. The ownership costs do not include a distribution system to get water to the field. Whether an irrigator uses surface or well water, the cost of getting it to the pivot must be added to this cost. The estimated return with $2.70 per bushel corn is a negative $35.75 after removing a charge for land and operator time. Assigning a cost for the distribution system will make the loss even larger. With this budget,

TABLE 4. IRRIGATED CORN BUDGET - North Central and East North Central South Dakota, 1980 and 1982[1/]

	1980	1982	Your Estimate
Variable Costs			
Pre-harvest Costs			
Nitrogen 175#	$ 35.00	$ 36.55	
Phosphate 50#	14.00	14.60	
Potash 15#	1.80	1.90	
Seed 26 MVK	13.00	15.60	
Herbicide	15.00	16.30	
Insecticide	4.50	4.90	
Fuel & Lube	6.65	7.55	
Repair	3.85	4.20	
Irrigation			
Power	15.00	17.00	
Repair	3.25	3.55	
Insurance	1.25	1.45	
Labor (hired)	3.25	3.75	
Crop Insurance	10.50	12.15	
Miscellaneous (3%)	3.85	4.20	
Interest on Operating (15%, 6 months, 1980)	9.65	11.75	
TOTAL PREHARVEST COSTS	$140.55	$155.45	
Harvest Cost			
Fuel & Lube	6.85	7.75	
Repair	4.75	5.20	
Labor (hired)	2.85	3.30	
Drying	14.00	15.85	
TOTAL HARVEST COST	$ 28.45	$ 32.10	
TOTAL VARIABLE COSTS	$169.00	$187.55	
Ownership Costs			
Depreciation			
Machinery & Equipment	33.50	38.30	
System	15.00	16.90	
Interest			
Machinery & Equipment	36.75	44.75	
System	16.50	20.10	
Insurance	1.50	1.75	
Taxes	5.00	5.80	
TOTAL OWNERSHIP COSTS	$108.25	$127.60	
TOTAL COSTS	$277.25	$315.55	
Receipts $2.70 x 130 bu	$351.00	$351.00	
Return to Land, Operator Time & Water	$ 73.75	35.45	
Land Charge (6% of $600/A)	$ 36.00	$ 36.00	
Return to Operator Time & Water	$ 37.75	- .55	
Operator Management & Labor (10% of Receipts)	$ 35.10	$ 35.10	
Return to Water and Distribution System	$ 2.65	$-35.75	

[1/] Projected

TABLE 5. IRRIGATED ALFALFA BUDGET - North Central and East North Central South Dakota, 1980 and 1982[1/]

Variable Costs	1980	1982	Your Estimate
Pre-harvest Costs			
Seed (8 years)	$ 3.50	$ 4.20	
Phosphate 35#	7.00	7.30	
Application	2.00	2.10	
Fuel & Lube	2.30	2.60	
Repair	1.15	1.25	
Irrigation			
Power	17.50	19.80	
Repair	5.00	5.45	
Insurance	1.25	1.45	
Labor (hired)	2.75	3.20	
Miscellaneous (3%)	1.25	1.35	
Interest (15%, 6 mo., 1980)	3.25	4.00	
TOTAL PREHARVEST COSTS	$ 46.95	$ 52.70	
Harvest Costs			
Baler Twine	4.25	4.65	
Fuel & Lube	11.60	13.15	
Repair	8.40	9.20	
Labor (hired)	8.25	9.55	
Interest (15%, 6 mo., 1980)	1.65	2.00	
TOTAL HARVEST COSTS	$ 34.15	38.55	
TOTAL VARIABLE COSTS	$ 81.10	91.25	
Ownership Costs			
Depreciation			
Machinery & Equipment	$ 22.85	$ 26.15	
System	15.75	17.75	
Interest			
Machinery & Equipment	18.30	22.30	
System	16.70	20.35	
Insurance	1.50	1.75	
Taxes	5.00	5.80	
TOTAL OWNERSHIP COSTS	$ 80.10	$ 94.10	
TOTAL COSTS	$161.20	$185.35	
Receipts: $50 x 5 ton	$250.00	$250.00	
Return to Land, Operator Time & Water	$ 88.80	$ 64.65	
Land Charge (6% of $600/A)	$ 36.00	$ 36.00	
Return to Operator Time and Water	$ 52.80	$ 28.65	
Operator Management & Labor Charge (10% of Receipts)	$ 25.00	$ 25.00	
Return to Water and Distribution System	$ 27.80	$ 3.65	

[1/] Projected

a corn price of $2.97 will cover all costs but the distribution system. If a distribution system annual cost of 30 to 50 cents is included, the corn price required to cover all costs is $3.27 to $3.47 per bushel.

The alfalfa budget in Table 5 contains a variable cost estimate of $91.25 per acre. If the alfalfa price is $50 per ton, nearly two ton per acre are required to pay variable costs. With the inclusion of ownership costs including land, labor and management, 4.9 ton per acre are required to pay the costs when alfalfa is $50 per ton. This does not leave much to pay for the distribution system since the average yield is 5.0 ton per acre in this area of the state.

Corn and alfalfa irrigated crop budgets for South Central South Dakota are presented in Tables 6 and 7, respectively. Corn production total costs per acre are projected to average $305.80 for 1982. Yield is expected to average 130 bushel per acre as in North Central and East North Central South Dakota. The corn price required to cover total costs is $2.35 per bushel. If the producer includes a charge for land and his time, this breakeven price rises to $2.90 per bushel. This price does not include a cost for the distribution system which could add 30 to 50 cents to the breakeven price.

The South Central Area alfalfa costs of production in Table 7 are $199.45 per acre for 1982 and rise to 262.95 when land costs and operator time are added on. The breakeven price with a 5.5 ton per acre yield is $49 per ton with no cost included for a water distribution system.

The final two budgets in Tables 8 and 9 are for irrigated corn and alfalfa in West Southeastern South Dakota. Corn production costs are slightly higher in this area, but spare yields--namely, 140 rather than 130 bushels per acre. Breakeven price for corn is $2.29 before land, operator time, and water distribution costs are added in. With time and land costs included the break-

TABLE 6. IRRIGATED CORN BUDGET - South Central South Dakota, 1980 and 1982[1/]

Variable Costs	1980	1982	Your Estimate
Pre-harvest Costs			
Nitrogen 165#	$ 34.00	$ 35.50	
Phosphate 45#	12.50	13.05	
Potash 10#	1.20	1.25	
Seed	16.00	19.20	
Herbicide	10.00	10.85	
Insecticide	5.00	5.45	
Fuel & Lube	5.20	5.90	
Repair	5.05	5.55	
Irrigation			
Power	19.00	21.50	
Repair	2.20	2.40	
Insurance	1.25	1.45	
Labor (hired)	5.20	6.00	
Crop Insurance	15.00	17.35	
Miscellaneous (3%)	4.60	5.05	
Interest (15%, 6 mo., 1980)	11.85	14.45	
TOTAL PREHARVEST COSTS	$148.05	$164.95	
Harvest Costs			
Fuel & Lube	$ 5.30	$ 6.00	
Repair	4.95	5.40	
Labor (hired)	2.30	2.65	
Drying	9.50	10.75	
TOTAL HARVEST COST	$ 22.05	$ 24.80	
TOTAL VARIABLE COSTS	$170.10	$189.75	
Ownership Costs			
Depreciation			
Machinery & Equipment	$ 33,50	$ 38.30	
System	16.60	18.70	
Interest			
Machinery & Equipment	28.20	34.35	
System	14.10	17.15	
Insurance	1.50	1.75	
Taxes	5.00	5.80	
TOTAL OWNERSHIP COSTS	$ 98.90	$116.05	
TOTAL COSTS	$269.00	$305.80	
Receipts $2.70 x 130 bu.	$351.00	$351.00	
Return to Land, Operator Time and Water	$ 82.00	$ 42.20	
Land Charge (6%, $600/A)	$ 36.00	$ 36.00	
Return to Operator Time and Water	$ 46.00	$ 9.20	
Operator Labor and Management Charge (10% of Receipts)	$ 35.10	$ 35.10	
Return to Water and Distribution System	$ 10.90	$-25.90	

[1/] Projected

TABLE 7. IRRIGATED ALFALFA BUDGET - South Central South Dakota, 1980 and 1982[1/]

	1980	1982	Your Estimate
Variable Costs			
Pre-harvest Costs			
Seed (8 years)	$ 2.60	$ 3.10	
Phosphate 25#	6.60	6.90	
Application	2.00	2.10	
Fuel & Lube	2.30	2.60	
Repair	1.20	1.30	
Irrigation			
Power	20.00	22.65	
Repair	3.80	4.15	
Insurance	1.25	1.45	
Labor (hired)	1.00	1.15	
Miscellaneous (3%)	2.25	2.45	
Interest (15%, 6 mo., 1980)	3.25	3.95	
TOTAL PREHARVEST COSTS	$ 46.25	$ 51.80	
Harvest Costs			
Baler Twine	5.10	5.60	
Fuel & Lube	12.70	14.40	
Repair	12.10	13.25	
Labor (hired)	5.00	5.80	
Interest (15%, 6 mo., 1980)	2.60	3.15	
TOTAL HARVEST COSTS	$ 37.50	$ 42.20	
TOTAL VARIABLE COSTS	$ 83.75	$ 94.00	
Ownership Costs			
Depreciation			
Machinery & Equipment	$ 28.75	$ 32.90	
System	15.75	17.75	
Interest			
Machinery & Equipment	22.10	26.90	
System	16.70	20.35	
Insurance	1.50	1.75	
Taxes	5.00	5.80	
TOTAL OWNERSHIP COSTS	$ 89.80	$105.45	
TOTAL COSTS	$173.55	$199.45	
Receipts: $50 x 5.5 ton	$275.00	$275.00	
Return to Land, Operator Time and Water	$101.45	$ 75.55	
Land Charge (6% x $600/A)	$ 36.00	$ 36.00	
Return to Operator Time & Water	$ 65.45	$ 39.55	
Operator Labor and Management Charge (10% of Receipts)	$ 27.50	$ 27.50	
Return to Water and Distribution System	$ 37.95	$ 12.05	

[1/] Projected

TABLE 8. IRRIGATED CORN BUDGET - West Southeastern South Dakota, 1980 and 1982[1/]

	1980	1982	Your Estimate
Variable Costs			
Pre-Harvest Costs			
Nitrogen 175#	$ 35.00	$ 36.55	
Phosphate	14.00	14.60	
Potash 25#	3.00	3.15	
Seed 28 MVK	14.50	17.40	
Herbicide	15.50	16.85	
Insecticide	4.50	4.90	
Fuel & Lube	6.35	7.20	
Repair	4.30	4.70	
Irrigation			
Power	16.00	18.10	
Repair	3.80	4.15	
Insurance	1.25	1.50	
Labor (hired)	4.10	4.75	
Crop Insurance	15.00	17.40	
Miscellaneous (3%)	4.85	5.30	
Interest (15%, 6 mo., 1980)	$ 12.50	$ 15.25	
TOTAL PREHARVEST COSTS	$154.65	$171.80	
Harvest Costs			
Fuel & Lube	$ 6.15	$ 6.95	
Repair	5.00	5.50	
Labor (hired)	3.40	3.95	
Drying	10.00	11.30	
TOTAL HARVEST COSTS	$ 24.55	$ 27.70	
TOTAL VARIABLE COSTS	$179.20	$199.50	
Ownership Costs			
Depreciation			
Machinery & Equipment	$ 34.00	$ 38.90	
System	17.50	19.70	
Interest			
Machinery & Equipment	29.50	35.95	
System	15.50	18.90	
Insurance	1.50	1.75	
Taxes	5.00	5.80	
TOTAL OWNERSHIP COSTS	$103.00	$121.00	
TOTAL COSTS	$282.20	$320.50	
Receipts: $2.70 x 140	$378.00	$378.00	
Return to Land, Operator Time & Water	$ 95.80	$ 57.50	
Land Charge (6%, $600/A)	$ 36.00	$ 36.00	
Return to Operator Time & Water	$ 59.80	$ 21.50	
Operator Management and Labor Charge (10% of Receipts)	$ 37.80	$ 37.80	
Return to Water and Distribution System	$ 22.00	$-16.30	

[1/] Projected

TABLE 9. IRRIGATED ALFALFA BUDGET - West Southeastern South Dakota, 1980 and 1982[1/]

Variable Costs	1980	1982	Your Estimate
Pre-harvest Costs			
Seed (8 years)	$ 3.00	$ 3.60	
Phosphate	6.00	6.25	
Application	2.00	2.10	
Fuel & Lube	2.50	2.85	
Repair	1.25	1.40	
Irrigation			
Power	21.00	23.75	
Repair	3.50	3.85	
Insurance	1.25	1.45	
Labor (hired)	1.00	1.15	
Miscellaneous (3%)	2.25	2.45	
Interest (15%, 6 mo., 1980)	3.40	4.15	
TOTAL PREHARVEST COSTS	$ 47.15	$ 53.00	
Harvest Costs			
Baler Twine	$ 5.10	$ 5.60	
Fuel & Lube	12.50	14.15	
Repair	12.25	13.40	
Labor (hired)	5.00	5.80	
Interest (15%, 6 mo., 1980)	2.60	3.15	
TOTAL HARVEST COSTS	$ 37.45	$ 42.10	
TOTAL VARIABLE COSTS	$ 84.60	$ 95.10	
Ownership Costs			
Depreciation			
Machinery & Equipment	$ 31.00	$ 35.45	
System	16.00	18.00	
Interest			
Machinery & Equipment	25.00	30.45	
System	18.00	21.90	
Insurance	1.50	1.75	
Taxes	5.00	5.80	
TOTAL OWNERSHIP COSTS	$ 96.50	$113.35	
TOTAL COSTS	$ 181.10	$208.45	
Receipts: 5.5 x $50	$ 275.00	$275.00	
Return to Land, Operator Time & Water	$ 93.90	$ 66.55	
Land Charge (6%, $600/A)	$ 36.00	$ 36.00	
Return to Operator Time & Water	$ 57.90	$ 30.55	
Operator Management and Labor Charge (10% of Receipts)	$ 27.50	$ 27.50	
Return to Water and Distribution System	$ 30.40	$ 3.05	

[1/] Projected

even price is $2.82 per bushel. Cost of a distribution system would raise the breakeven price to $3.12 to $3.32 per bushel.

Alfalfa in this area can be produced for an average total cost of $208.45 per acre or at a breakeven price of $37.90 with a 5.5 ton per acre yield. With the addition of costs for land and operator time the breakeven price raises to $49.45 per ton. Costs of the water distribution system would increase this to $55.45 to $59.45 per ton.

In summary, the prices of corn and alfalfa required to cover costs of production exclusive of the water distribution system in the different areas are $2.82 to $2.97 per bushel and $45 to $50 per ton, respectively. To cover the water distribution costs also, the breakeven prices will increase 30 to 50 cents per bushel for corn and $6 to $10 per ton for alfalfa depending on the type of development undertaken by the producer.

FOOTNOTES

[1]Aanderud, Wallace G. and Herbert R. Allen. "Expected Production Costs for Major Crops for Six Production Areas in South Dakota--1980." EMC 864, Coop Ext. Serv. USDA, SDSU, Brookings.

[2]United States Department of Agriculture. Firm Enterprise Data System, Commodity Economics Division. ERS In cooperation with Oklahoma State University, Stillwater, Oklahoma, Lincoln, Nebraska, 1980. (Budgets prepared for research, not official USDA estimates).

[3]_____. Agricultural Prices. Statistical Reporting Service Washington, DC. Jan. 1982 and Summary 1980.

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