

CROP PRODUCTION COSTS AND PROFIT RETURNS

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Wheat is the number one crop in each county of North Dakota with nine out of 10 North Dakota farmers growing wheat. Three out of 10 plant durum or hard red winter wheat in addition to hard red spring wheat. In 1970, North Dakota ranked number one in the nation in the production of hard red spring wheat, durum, barley, and flaxseed and second in oats and rye.

The proportion of the gross cash farm income by commodities for 1970 shown in Table 1 will give an overall view of the importance of the sources of income from marketings for North Dakota and Minnesota. About 61 per cent of the cash income from marketings comes from crops in North Dakota, while in Minnesota only 32 per cent is from crops. Wheat accounts for one-third of the income in North Dakota with barley and flaxseed combined accounting for 11 per cent. In Minnesota, corn and soybeans are the major cash crops.

What are the costs of producing small grains in North Dakota? This will vary with practice used

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Table 1. Proportion of gross cash farm income by commodities for North Dakota and Minnesota, 1970.

Commodity	North Dakota	Minnesota
	Per cent	
Wheat	34.4	1.8
Rye	.5	.1
Barley	5.9	.7
Oats	4.4	2.0
Hay	.8	1.0
Corn	.3	10.8
Flaxseed	5.6	.5
Soybeans	.9	9.7
Potatoes	3.7	1.0
Dry Beans	.3	
Other Vegetables		1.1
Fruits		.1
Sugarbeets	2.3	1.3
Other Crops	2.2	1.0
Total Income From Crops ¹	61.3	31.9
Cattle and Calves	26.8	24.4
Hogs	3.3	13.2
Sheep and Lambs	.8	.6
Dairy Products	5.9	22.1
Poultry and Eggs	1.3	6.9
Miscellaneous Livestock	.6	.9
Total Income from Livestock	38.7	68.1
Total Cash Farm Income	100.0	100.0

¹Items may not add due to rounding.

and the area of the state. In North Dakota, two types of cropping systems are used: crops planted on land that was summer fallowed the previous year and crops planted on land that was cropped the previous year. In 1970, for example, 86 per cent of the spring wheat and durum and 47 per cent of the barley was planted on summer-fallow land. The proportion of land in summer fallow increases from southeast to northwest. Year-to-year variations in the amount of summer fallow can largely be explained by the provisions of the farm program for wheat and feed grains.

The per-acre cost of production for small grains increases from west to east in the state. This is chiefly due to the greater numbers of field operations involved and the higher land value in the eastern part of the state compared to the west. The rainfall increases from west to east and more tillage operations are required for weed control. Tillage for summer fallow may require a minimum of three operations in the west compared to a minimum of about seven in the east.

Table 2 presents the itemized cost of production for small grains in North Dakota. The costs of production in Table 2 assume better than average management. The inputs used are what are recom-

mended to achieve the optimum output. The cost for the summer-fallow budget involves two acres of land—the year of fallow and the year of crop. The costs of production include a charge for all resources used to produce small grains except management. The costs are broken down into two groups—direct or variable costs and fixed costs.

The land cost includes a charge for land at 7.3 per cent of the current market value plus the land tax. Interest on machinery, housing, and insurance was calculated on the basis of 10 per cent of the average machinery investment. Machinery depreciation is based on normal machinery life using the straight-line method.

Labor was calculated at \$2.00 per hour for the direct hours to prepare the seedbed, seed, harvest, and store or market the grain. The summer-fallow labor cost includes the time for both the year of fallow and the crop year.

Total cost of production, including labor, for small grains varies from a low of \$32.92 for oats to a high of \$37.04 for durum, assuming the continuous cropping practice. The reason durum costs are higher is that the production area is different from the other crops shown in Table 2. Otherwise there

Table 2. Small grain production costs per acre for North Dakota, above average management assumed.

Production Inputs	HRS Wheat		Durum ¹		Barley	Oats	Flax	
	Fallow ²	Continuous	Fallow ²	Continuous	Fallow ²	Continuous	Continuous	
Direct Production Costs								
Seed	\$ 2.50	\$ 2.50	\$ 2.80	\$ 2.80	\$ 2.10	\$ 2.10	\$ 2.10	\$ 3.75
Fertilizer	2.16	4.60	2.16	4.96	2.32	4.54	4.60	3.09
Chemical & Application	2.60	2.60	2.60	2.60	2.60	2.60	1.40	2.05
Machinery Repair	3.50	3.03	3.69	3.09	3.52	3.03	3.04	3.13
Fuel, Grease & Oil	1.37	.97	1.45	1.03	1.40	.98	1.05	1.09
Crop Insurance	2.00	1.63	1.86	1.45	2.46	1.87	1.24	1.39
Interest on Operating Capital	.76	.67	.77	.74	.76	.68	.61	.65
TOTAL DIRECT COSTS	\$14.89	\$16.00	\$15.33	\$16.67	\$15.16	\$15.80	\$14.04	\$15.15
Fixed Costs								
Land Cost	\$18.83	\$ 9.42	\$21.62	\$10.81	\$18.83	\$ 9.42	\$ 9.42	\$ 9.42
Machinery Depreciation	3.83	3.49	4.02	3.58	3.84	3.49	3.50	3.54
Interest, Insurance & Housing for Machinery	3.81	2.75	4.05	2.72	3.85	2.75	2.74	3.20
TOTAL FIXED COSTS	\$26.47	\$15.66	\$29.69	\$17.11	\$26.52	\$15.66	\$15.66	\$16.16
Total Production Cost Except Labor	\$41.36	\$31.66	\$45.02	\$33.78	\$41.68	\$31.46	\$29.70	\$31.31
Labor	\$ 4.22	\$ 3.12	\$ 4.46	\$ 3.26	\$ 4.22	\$ 3.12	\$ 3.22	\$ 3.14
Total Production Cost Including Labor	\$45.58	\$34.78	\$49.48	\$37.04	\$45.90	\$34.58	\$32.92	\$34.45
Expected Yield	34 Bu.	26 Bu.	37 Bu.	29 Bu.	51 Bu.	40 Bu.	62 Bu.	12.5 Bu.
Break-Even Price	\$ 1.34	\$ 1.34	\$ 1.34	\$ 1.28	\$.90	\$.87	\$.53	\$ 2.76

¹Eighteen counties in western North Dakota not included.

²Costs include one acre of fallow and one acre of crop on fallow.

is very little difference in costs between small grain crops.

If, for the wheat-fallow budget, the gross income is assumed to be \$45.58, this would indicate that all resources except management would receive their market value. This amount of gross income would cover all direct costs, depreciation, labor, and give a return to all capital utilized in producing an acre of wheat. If the gross income was \$50.00, there would be a residual of \$4.42 which would be the return for management.

The expected yield shown in Table 2 is the level of output that growers, using the level of inputs indicated in the budgets, can expect to receive. The break-even price is the price needed to cover all production costs except management, assuming the yield and costs shown in Table 2. Table 3 compares the returns from each of the five crops using the 1966-1970 five-year average price and the yield and cost data from Table 2. Oats and flax show a negative return to management. Wheat and durum are the high-return crops with \$4.04 and \$6.36 return to management, respectively.

Table 3. Per-acre costs and returns for small grains in North Dakota with above average management and 1966-1970 average prices.

	Wheat ¹	Durum ¹	Barley ²	Oats	Flax
Expected Yield	32.0	35.0	43.0	62.0	12.5
1966-70 Average Price	\$ 1.47	\$ 1.51	\$.86	\$.53	\$ 2.70
Gross Income	\$47.04	\$52.85	\$36.98	\$32.86	\$33.75
Direct Cost	15.16	15.65	15.67	14.04	15.15
Net Cash Income	\$31.88	\$37.20	\$21.31	\$18.82	\$18.60
Fixed Cost	23.88	26.67	17.94	15.66	16.16
Return to Labor and Management	\$ 8.00	\$10.53	\$ 3.37	\$ 3.16	\$ 2.44
Labor Cost	3.96	4.17	3.35	3.22	3.14
Return to Management	\$ 4.04	\$ 6.36	\$.02	\$(-.06)	\$(-.70)

¹Seventy-six percent of the acreage was assumed to be summer fallow.

²Twenty-one percent of the acreage was assumed to be summer fallow.

Table 4 shows the returns by crops using 1971 yields, which are adjusted to above average management, and September 15, 1971, prices. This comparison shows wheat and barley as the only crops giving a return to management. Flax is still the lowest return crop.

When comparing the return to management in Tables 3 and 4, one should keep in mind that land investment is receiving a 7.3 per cent return, operating capital and machinery investment 9 per cent, and labor is receiving \$2.00 per hour. The present rates for capital are 7.5 per cent, which is the federal land bank rate for real estate, and 7.65 per cent which the Fargo PCA charges for operat-

Table 4. Per-acre costs and returns for small grains in North Dakota using 1971 yields adjusted to above average management and September 15, 1971, prices.

	Wheat ¹	Durum ¹	Barley ²	Oats	Flax
1971 Yield for Above Average Management	36.0	38.0	52.0	68.0	13.0
September 15, 1971, Price	\$ 1.23	\$ 1.22	\$.73	\$.45	\$ 2.25
Gross Income	\$44.28	\$26.36	\$37.96	\$30.60	\$29.25
Direct Cost	15.16	15.65	15.67	14.04	15.15
Net Cash Income	\$29.12	\$30.71	\$22.29	\$16.56	\$14.10
Fixed Cost	23.88	26.67	17.94	15.66	16.16
Return to Labor and Management	\$ 5.24	\$ 4.04	\$ 4.35	\$.90	\$(-2.06)
Labor Cost	3.96	4.17	3.35	3.22	3.14
Return to Management	\$ 1.28	\$(-.13)	\$ 1.00	\$(-2.32)	\$(-5.20)

¹Seventy-six percent of the acreage was assumed to be summer fallow.

²Twenty-one percent of the acreage was assumed to be summer fallow.

ing loans. Table 4 indicates that with the September level of prices the management resource does not receive the market rate of return. Durum, oats, and flax did not receive the full return to labor at the \$2.00 per hour rate.

Wheat certificate payments were not included in the return estimates, because these vary from farm to farm and from year to year. Also, with the substitution provision between crops it is not relevant to tie payments to a particular crop. In 1971, the value of the wheat certificate payment is estimated to be about \$4.38 per crop-acre.

Other areas not touched upon are returns from storage payments for crops under loan or the added return in market price if the crop was stored to take advantage of the seasonal price trends.

Row crops are also grown as a cash crop in eastern North Dakota and account for about 8.5 per cent of the total gross cash farm income in 1970. Table 5 shows the production costs, expected yields and break-even price for soybeans, pinto beans, corn grain, sunflowers, and sugarbeets. Pinto beans, sunflowers, and sugarbeets have a limited market and are generally grown under contract.

Sunflowers are grown in the eastern half of the state. At today's prices and yields they will give as high or higher return than wheat and the production cost is similar to small grains.

Soybeans and corn grain are grown largely in the southeastern part of North Dakota. Current costs of production are not available for potatoes so this crop was not included with the row crops shown in Table 5.

Costs and returns comparisons for row crops are shown in Table 6. The prices used are planning

Table 5. Production costs per acre for row crops grown in eastern North Dakota.

Crop Production Inputs	Soybeans ¹	Pinto Beans ²	Corn Grain		Sunflowers		Sugar-Beets ⁴
			Richland Co.	Southeast ³	Nonoilseed	Oilseed	
Direct Production Costs							
Seed	\$ 4.10	\$ 7.50	\$ 4.80	\$ 4.00	\$ 1.60	\$ 2.00	\$ 4.21
Fertilizer	1.95	1.95	13.15	9.95	3.35	3.35	8.75
Chemical	1.40	3.15	4.40	.40			4.61
Variable Machine Costs	4.97	5.88	5.95	6.13	4.94	4.94	18.06
Labor	4.00	5.12	4.54	4.34	3.94	3.94	31.00
Leasing & Custom							3.88
Crop Insurance	2.02	3.45	2.48	1.77	1.52	1.44	2.90
Miscellaneous							5.21
Interest on Operating Capital	.87	1.32	1.85	1.33	.68	.70	3.54
TOTAL DIRECT COSTS	\$19.31	\$28.37	\$37.17	\$27.92	\$16.03	\$16.37	\$82.16
Fixed Costs							
Land Use	\$17.60	\$17.60	\$17.60	\$12.31	\$17.60	\$17.60	\$35.20
Machine Ownership	7.38	8.05	10.86	10.73	7.13	7.13	20.97
Housing Ownership							1.98
TOTAL FIXED COSTS	\$24.98	\$25.65	\$28.46	\$23.04	\$24.73	\$24.73	\$58.15
Total Production Cost Including All Labor	\$44.29	\$54.02	\$65.63	\$50.96	\$40.76	\$41.10	\$140.31
Expected Yield	22 Bu.	12.0 Cwt.	80 Bu.	57 Bu.	10.8 Cwt.	12.7 Cwt.	12.2 T.
Break-Even Price	\$ 2.01 Bu.	\$ 4.50 Cwt.	\$.82 Bu.	\$.89 Bu.	\$ 3.77 Cwt.	\$ 3.24 Cwt.	\$ 11.50 T.

¹Southern Red River Valley.

²Red River Valley.

³Southeastern North Dakota counties except Richland.

⁴Includes one acre of fallow and one acre of sugarbeets.

prices based upon past price relationships and future outlook. If government payments were included, sugarbeets would give the highest returns of the row crops compared. In 1969, sugar payments amounted to \$2.29 per ton of beets produced. Corn grain in Richland county was the second highest return crop and pinto beans third. The labor cost was included with the direct costs because hired labor is generally used during the season and it was difficult to break the cost data down into operator and hired labor.

The procedure to determine the cropping system that will return the highest farm income includes:

- (1) Compare alternative crops from a crop cost-return analysis.
- (2) Select the combination of high income per-acre crops, taking into consideration such factors as government allotments, set-asides, regulations, subsidies, rotational requirements, weed control needs, and potential livestock or alternative systems.
- (3) Determine most economic fertilizer program and full history for these particular crops.
- (4) Plan the use of forage crops, permanent pasture, etc., that enter into the rotation sequence.
- (5) Determine the final labor requirements and distribution.

Table 6. Per-acre costs and returns for row crops in eastern North Dakota.

	Soybeans	Pinto Beans	Corn Grain		Sunflowers		Sugar-Beets
			Richland Co.	Southeast	Nonoilseed	Oilseed	
Expected Yield	22 Bu.	12.0 Cwt.	80 Bu.	57 Bu.	10.8 Cwt.	12.7 Cwt.	12.2 T.
Unit Price ¹	\$ 2.50	\$ 6.15	\$ 1.10	\$ 1.10	\$ 5.15	\$ 4.20	\$ 13.20 ²
Gross Income	\$55.00	\$73.80	\$88.00	\$62.70	\$55.62	\$53.34	\$161.04
Direct Costs, Including Labor	19.31	28.37	37.17	27.92	16.03	16.37	82.16
Net Cash Income	\$35.69	\$45.43	\$50.83	\$34.78	\$39.59	\$36.97	\$ 78.88
Fixed Costs	24.98	25.65	28.46	23.04	24.73	24.73	58.15
Return to Management	\$10.71	\$19.78	\$22.37	\$11.74	\$14.86	\$12.24	\$ 20.73

¹These are planning prices, based upon past price relationships and future outlook.

²Government payments not included.