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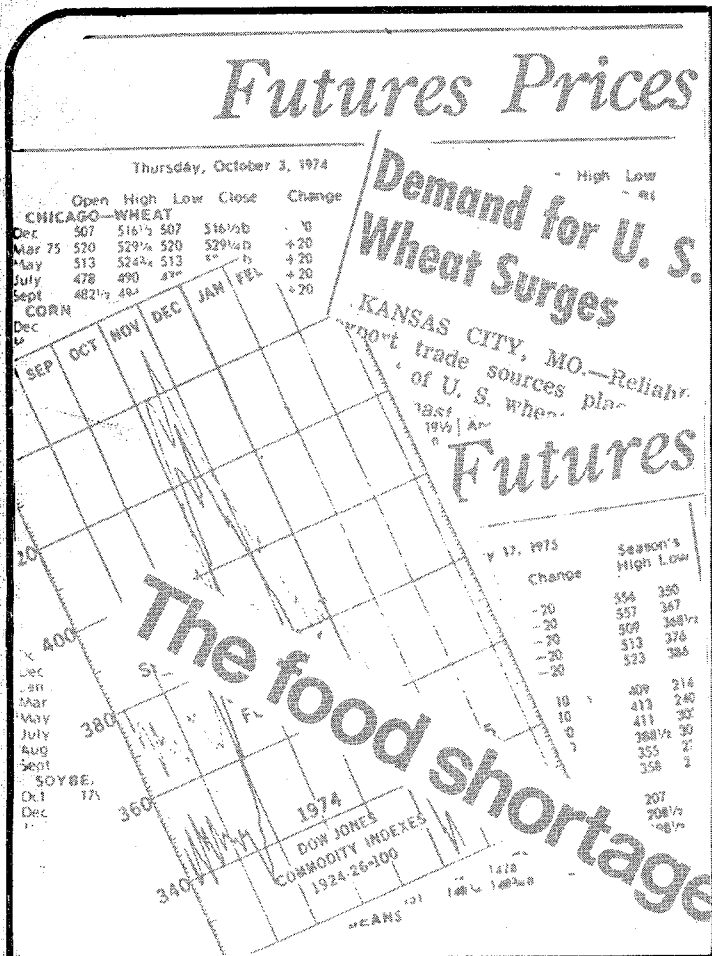
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COMPARING INCOME POTENTIAL FROM COMPETING CROPS AT ANY PRICE

DAVID W. COBIA

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World Fuel Crisis

■ "We're down to the moment truth on fuel..."

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EQUIPMENT PRICES SPIRAL twenty-five Cts.

Fertilizer Shortage in United States Seen for '74-'75

farmers will supply seasons.

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COMPARING INCOME POTENTIAL FROM COMPETING CROPS AT ANY PRICE¹

David W. Cobia²

Since farmers' planting intentions are influenced by current prices, most production projections are reduced to rubble because of the current wild and unpredictable price situation. With traditional cost and return relationships between competing crops destroyed, it has even become difficult to visualize their relative profitability. Information in this report introduces a method to help overcome these difficulties. The approach is to estimate crop budgets and to compare the impact of commodity prices on each crop's profitability. Projected costs and yields for 1975 for six crops in eight North Dakota regions (see Figure 1) are used to illustrate the approach.

Net income or profit is the result of yield times the selling price less the cost of inputs (land, labor, fertilizer, etc.). Although these factors vary from farm to farm, averages are used in this report to indicate the overall impact of the relative profitability of crops. Individual farmers should use their own cost and yield data.

Basic information used to compare income potential for hard red spring (HRS) wheat, durum wheat, barley, flax, oats, and sunflowers is summarized in Table 1. These data illustrate what can be expected, on the average, on non-fallow land, except for the southwest and northwest regions which are for crops produced on summer fallow. The basic yield and cost data were taken from the Farm Management Planning Guide.³ The yields are a one-year extension of a five-year trend line of average yields per planted acre. Production expenses given in the Farm Management Planning Guide are inflated to reflect expected cost increases for the 1975 crop year. Marketing costs include elevator margins and winter rail rates to Minneapolis from a central point in each region. All costs and commodity prices are put on a Minneapolis base because most North Dakota crops are sold on the basis of Minneapolis prices and this approach also makes direct interregional comparisons possible. Break-even and \$100 per acre profit prices at the farm are included in Table 2.

The impact of costs and commodity prices on profitability can be visualized from Figure 2. Flax in the southeast central region is used as an example. The horizontal axis in Figure 2 indicates the net profit (or loss) per acre. (Again, profit means net returns above all costs including land, labor, and interest.) The vertical axis is the price per bushel required to achieve a given level of profit per acre. At the extreme left-hand side at a zero price, the cost per

¹The concept presented in this report was originally developed for the 43rd Annual Flax Institute held at Fargo, North Dakota, December, 1974. Appreciation is extended to Agricultural Economics staff members for their construction reviews. This work was funded by Project 3306 (Service Activities and Pilot Studies) of the North Dakota Agricultural Experiment Station.

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³Rice, Billy; L. W. Schaffner; and Roger G. Johnson, Farm Management Planning Guide: Yield and Production Costs, Revised Section VI, Cooperative Extension Service, North Dakota State University, Fargo, North Dakota, March, 1974.

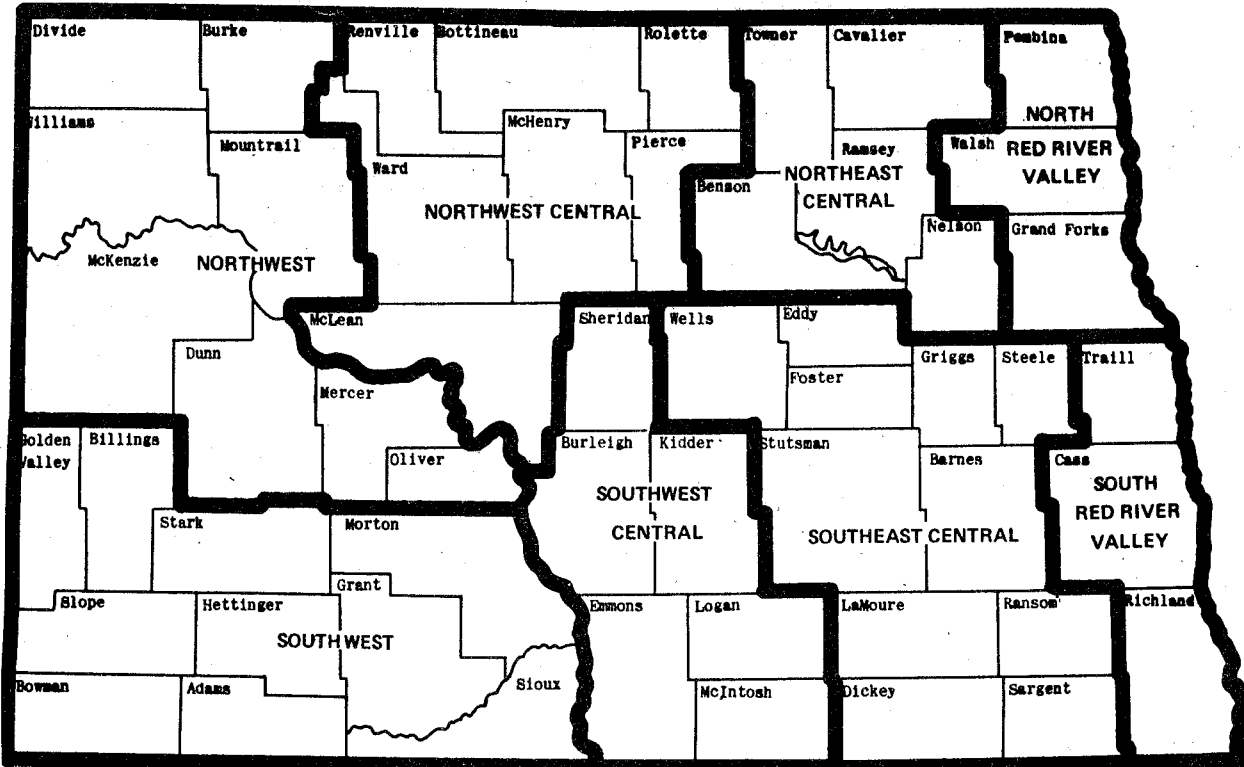


FIGURE 1. EIGHT REGIONS OF NORTH DAKOTA FOR WHICH COST AND YIELD DATA ARE AVAILABLE

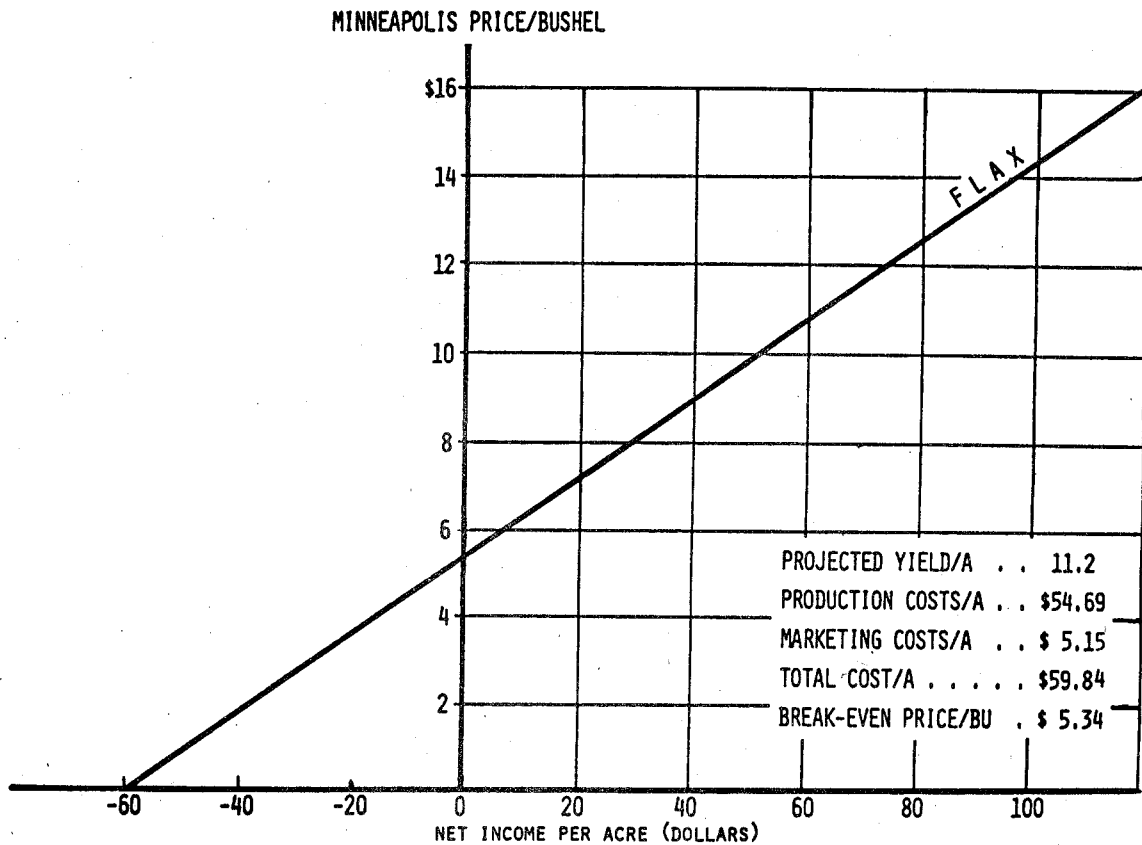


FIGURE 2. ESTIMATED 1975 PRICE-PROFIT CHART FOR FLAX IN SOUTHEAST CENTRAL NORTH DAKOTA

TABLE 1. AVERAGE YIELDS, PRODUCTION COSTS, MARKETING COSTS, AND BREAK-EVEN PRICE OF SPECIFIED CROPS PROJECTED TO THE 1975 CROP YEAR FOR EIGHT NORTH DAKOTA REGIONS

Region	Average Projected Per Acre Yield and Costs				Break-Even Price**
	Yield	Costs			
		Production	Marketing*	Total	
	- bu. -	- - - - - dollars - - - - -			
Hard Red Spring Wheat					
NW	27.0	79.57	13.23	92.80	3.44
NWC	20.2	57.36	8.69	66.05	3.27
NEC	26.7	61.08	9.61	70.69	2.65
NRRV	33.1	82.48	10.92	93.40	2.82
SW	25.2	70.74	11.34	82.08	3.26
SWC	19.4	49.25	7.18	56.43	2.91
SEC	27.1	66.53	8.67	75.20	2.77
SRRV	34.0	87.25	10.20	97.45	2.87
Durum Wheat					
NW	28.2	83.09	13.82	96.91	3.44
NWC	21.2	60.70	9.12	69.82	3.29
NEC	23.4	64.19	8.42	72.61	3.10
NRRV	26.9	85.65	8.88	94.53	3.51
SW	26.8	73.31	12.06	85.37	3.19
SWC	19.2	52.06	7.10	59.16	3.08
SEC	23.4	69.58	7.49	77.07	3.29
SRRV	28.0	90.85	8.40	99.25	3.54
Barley					
NW	41.0	79.01	21.32	100.33	2.45
NWC	34.7	59.96	17.35	77.31	2.23
NEC	38.6	62.49	17.37	79.86	2.07
NRRV	43.6	84.37	18.75	103.12	2.37
SW	39.6	68.58	20.59	89.17	2.25
SWC	31.0	48.00	13.95	61.95	2.00
SEC	41.1	66.65	16.03	82.68	2.01
SRRV	45.0	86.66	16.65	103.31	2.30
Flax					
NW	12.3	76.26	7.75	84.01	6.83
NWC	10.8	49.34	6.16	55.50	5.14
NEC	11.2	51.90	5.60	57.50	5.13
NRRV	11.4	63.11	4.79	67.90	5.96
SW	12.0	67.02	6.84	73.86	6.16
SWC	9.0	43.02	4.50	47.52	5.28
SEC	11.2	54.69	5.15	59.84	5.34
SRRV	12.3	69.67	4.92	74.59	6.06

TABLE 1. AVERAGE YIELDS, PRODUCTION COSTS, MARKETING COSTS, AND BREAK-EVEN PRICE OF SPECIFIED CROPS PROJECTED TO THE 1975 CROP YEAR FOR EIGHT NORTH DAKOTA REGIONS (CONTINUED)

Region	Average Projected Per Acre Yield and Costs				Break-Even Price**
	Yield	Costs			
		Production	Marketing*	Total	
	- bu. -	----- dollars -----			-----
Oats					
NW	46.2	74.04	17.56	91.60	1.98
NWC	44.2	51.99	15.47	67.46	1.53
NEC	45.1	52.95	13.53	66.48	1.47
NRRV	52.6	72.95	13.15	86.10	1.64
SW	46.6	65.98	16.31	82.29	1.77
SWC	38.7	45.16	11.61	56.77	1.47
SEC	50.9	60.67	14.25	74.92	1.47
SRRV	60.3	81.39	14.47	95.86	1.59
Sunflower Seeds***					
	- cwt. -				-- per cwt. --
NRRV	10.25	75.83	12.10	87.93	8.58
SEC	9.50	60.90	8.46	69.36	7.30
SRRV	11.40	80.33	8.89	89.22	7.83

*Includes elevator margin and rail rate from central point in regions to Minneapolis.

**Minneapolis price to pay for projected average production and marketing costs.

***Sunflower yield and production cost estimates are not available for the other five regions.

acre to grow and deliver flax to Minneapolis from southeast central North Dakota is indicated as \$59.84 for an average yield of 11.2 bushels per acre. The amount includes \$54.69 to grow the crop and \$5.15 marketing costs including \$1.68 (15¢/bu.) elevator margin and \$3.47 (31¢/bu.) transportation expense. The zero profit or break-even price is \$5.34 per bushel. (These data are from Table 1.)

Changes in estimated yields affect the slope of the price-profit line. The result for flax of increasing or decreasing yield by five bushels per acre is illustrated in Figure 3. Changes in production and marketing costs change the intercept or move the price-profit line up or down in parallel as illustrated in Figure 4.

In Figure 5, price-profit lines for HRS wheat, durum, barley, oats, flax, and sunflowers are shown on charts for the eight North Dakota regions. The charts show relative profitability of each crop at any price mix. For example, on December 2, 1974, Minneapolis per bushel prices were in the neighborhood of

TABLE 2. ESTIMATED 1975 MINNEAPOLIS AND FARM PRICES* REQUIRED TO BREAK-EVEN AND TO MAKE \$100 PER ACRE PROFIT FOR SPECIFIED CROPS IN EIGHT NORTH DAKOTA REGIONS

Region	HRS Wheat		Durum Wheat		Barley		Flax		Oats		Sunflowers	
	Break- Even	\$100 Profit	Break- Even	\$100 Profit	Break- Even	\$100 Profit	Break- Even	\$100 Profit	Break- Even	\$100 Profit	Break- Even	\$100 Profit
	----- dollars per bushel -----										dollars per cwt.	
NW	3.44 (2.95)	7.14 (6.65)	3.44 (2.95)	6.98 (6.49)	2.45 (1.93)	4.89 (4.37)	6.83 (6.20)	14.96 (14.33)	1.98 (1.60)	4.15 (3.77)		
NWC	3.27 (2.84)	8.22 (7.79)	3.29 (2.86)	8.01 (7.58)	2.23 (1.73)	5.11 (4.61)	5.14 (4.57)	14.40 (13.83)	1.53 (1.18)	3.79 (3.44)		
NEC	2.65 (2.29)	6.39 (6.03)	3.10 (2.74)	7.38 (7.02)	2.07 (1.62)	4.66 (4.21)	5.13 (4.63)	14.06 (13.56)	1.47 (1.17)	3.69 (3.39)		
NRRV	2.82 (2.49)	5.84 (5.51)	3.51 (3.18)	7.23 (6.90)	2.37 (1.94)	4.66 (4.23)	5.96 (5.54)	14.73 (14.31)	1.64 (1.39)	3.54 (3.29)	8.58 (7.40)	18.33 (17.15)
SW	3.26 (2.81)	7.23 (6.78)	3.19 (2.74)	6.92 (6.47)	2.25 (1.73)	4.77 (4.26)	6.16 (5.59)	14.49 (13.92)	1.77 (1.42)	3.91 (3.56)		
SWC	2.91 (2.54)	8.06 (7.69)	3.08 (2.71)	8.29 (7.92)	2.00 (1.55)	5.22 (4.77)	5.28 (4.78)	16.39 (15.89)	1.47 (1.17)	4.05 (3.75)		
SEC	2.77 (2.45)	6.46 (6.15)	3.29 (2.97)	7.57 (7.25)	2.01 (1.62)	4.44 (4.05)	5.34 (4.88)	14.27 (13.81)	1.47 (1.19)	3.44 (3.16)	7.30 (6.41)	17.83 (16.94)
SRRV	2.87 (2.57)	5.81 (5.51)	3.54 (3.24)	7.12 (6.82)	2.30 (1.93)	4.52 (4.15)	6.06 (5.66)	14.19 (13.79)	1.59 (1.35)	3.25 (3.01)	7.83 (7.05)	16.60 (15.82)

*Farm prices are in parentheses.

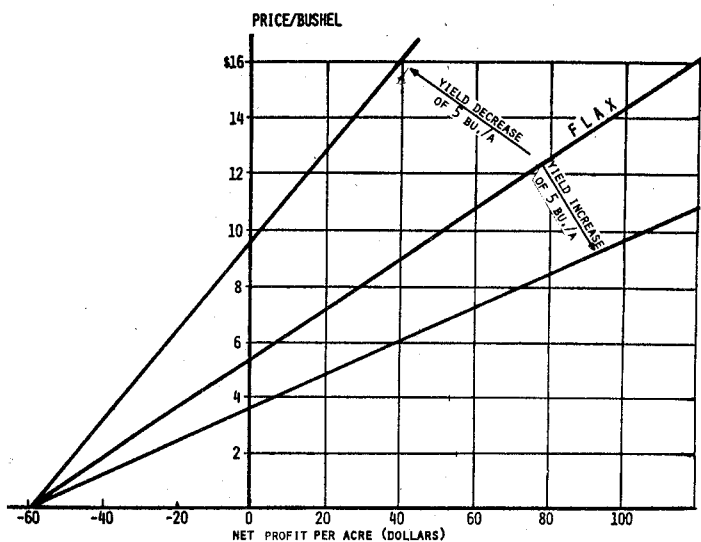


FIGURE 3. EFFECT OF A CHANGE IN YIELD ON A PRICE-PROFIT LINE

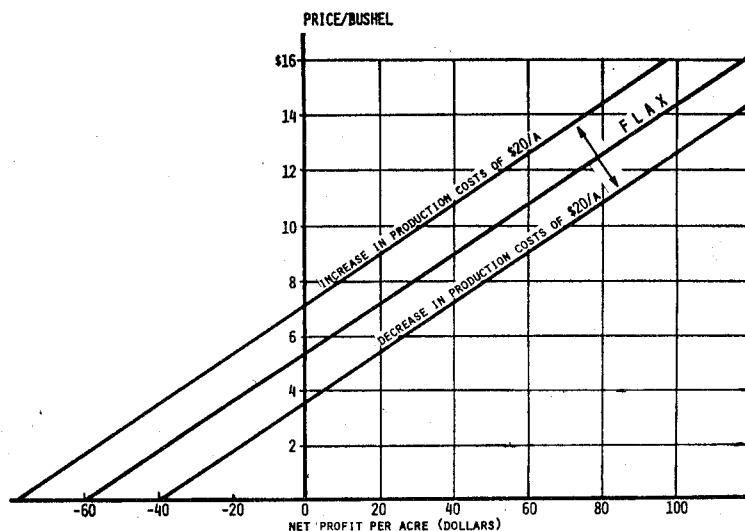


FIGURE 4. EFFECT OF A CHANGE IN PRODUCTION COSTS ON A PRICE-PROFIT LINE

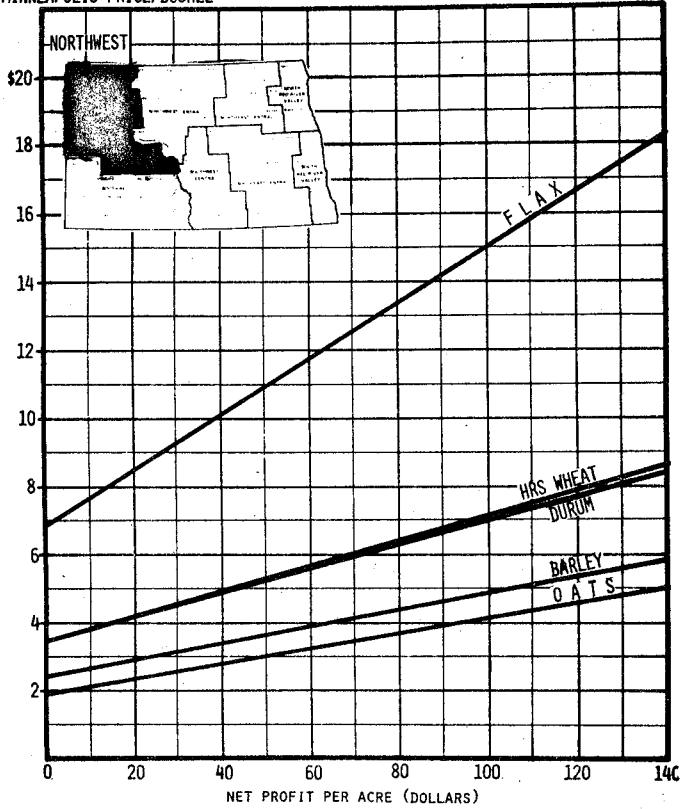
\$11.35 for flax, \$5.50 for HRS wheat, \$7.10 for durum, \$4.50 for barley, \$1.80 for oats, and \$19.50 per cwt. for sunflowers. These prices, indicated by the symbol "●" for the southeast central region, would yield the following net profit per acre in the region: flax--\$67, HRS--\$74, durum--\$89, barley--\$102, oats--\$17, and sunflowers--\$116 (see Figure 5 and Table 3).

TABLE 3. ESTIMATED AVERAGE NET PROFIT PER ACRE FROM SELECTED CROPS IN EIGHT NORTH DAKOTA REGIONS WITH DECEMBER 2, 1974, MINNEAPOLIS PRICES

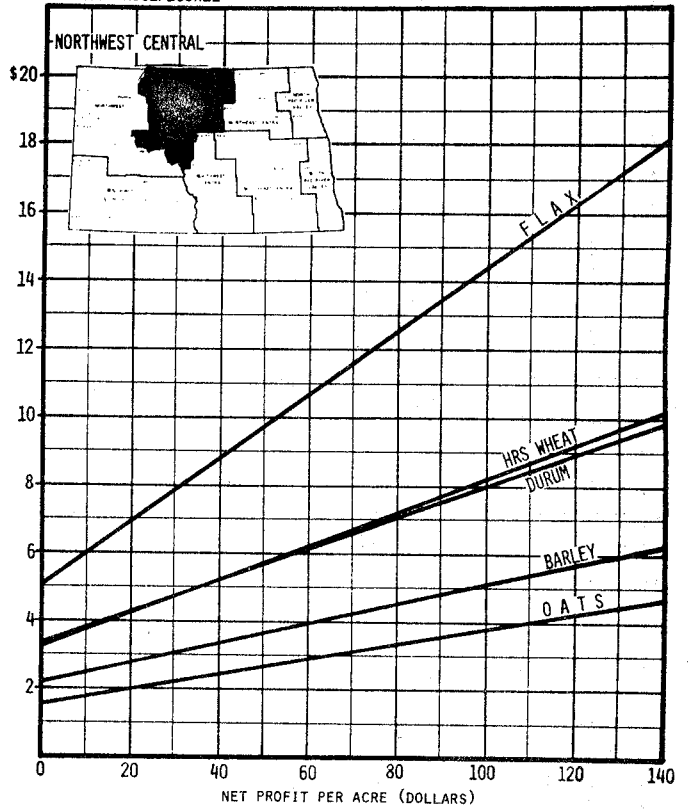
Region	Crop					
	Flax	HRS	Durum	Barley	Oats	Sunflowers
	----- dollars per acre -----					
NW	56	56	103	84	-8	
NWC	67	45	81	79	12	
NEC	70	76	94	94	15	
NRRV	78	89	96	93	9	112
SW	62	57	105	89	2	
SWC	55	50	77	78	13	
SEC	67	74	89	102	17	116
SRRV	65	90	100	99	13	133
Price (Dec. 2)	11.35	5.50	7.10	4.50	1.80	19.50

The difference in estimated 1975 net profit per acre between flax and other crops at December 2, 1974, prices is given in Table 4. In the southeast central region, farmers raising flax would, on the average, net \$7 less per acre than with HRS wheat, \$22 less than with durum, \$35 less than with barley, \$50 more than with oats, and \$49 less than with sunflowers.

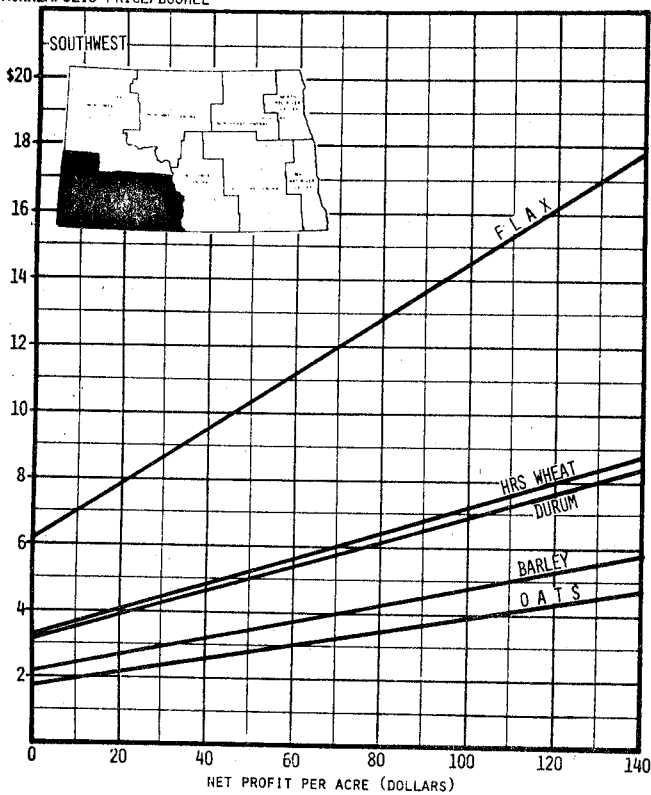
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MINNEAPOLIS PRICE/BUSHEL



MINNEAPOLIS PRICE/BUSHEL



MINNEAPOLIS PRICE/BUSHEL

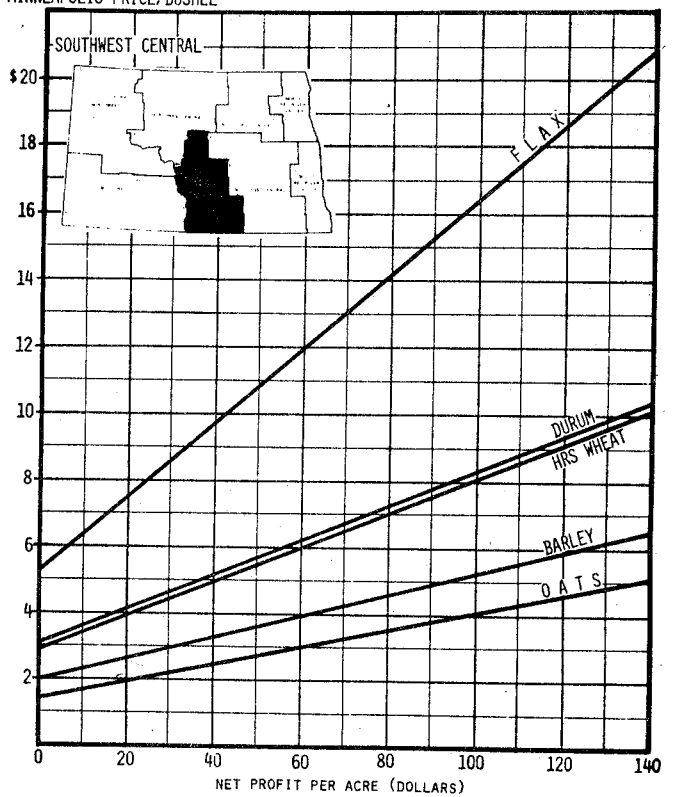
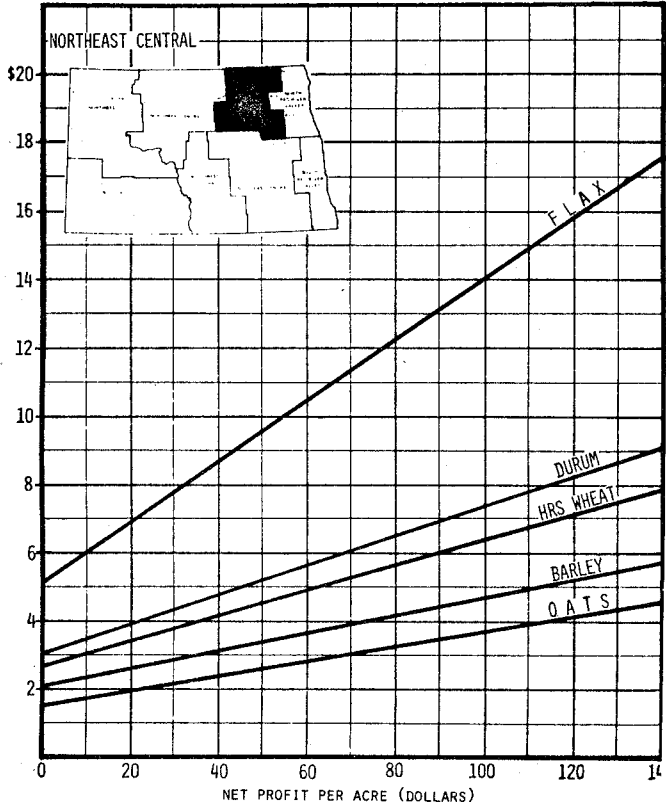


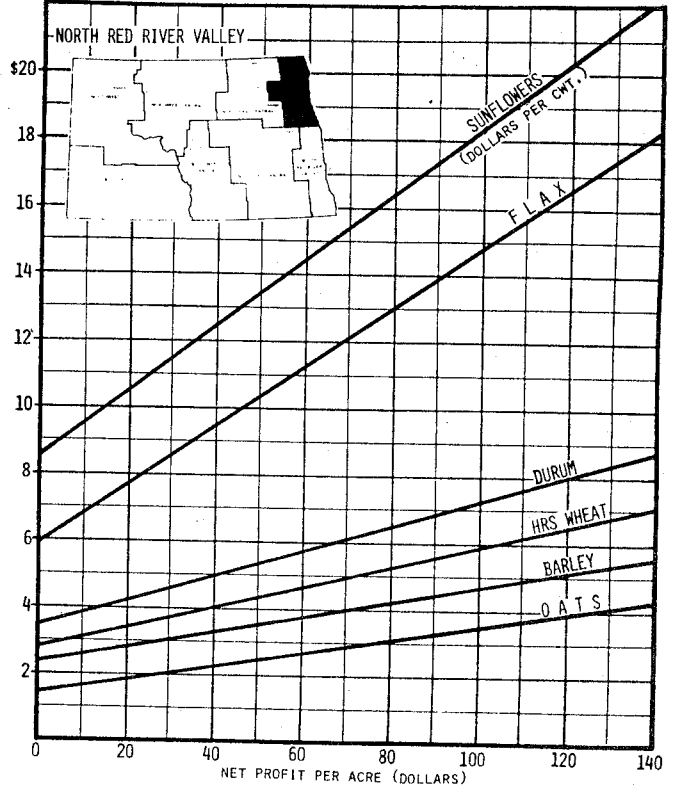
FIGURE 5. ESTIMATED 1975 PRICE-PROFIT CHARTS FOR SELECTED CROPS FOR EIGHT NORTH DAKOTA REGIONS

Figure 5 (continued)

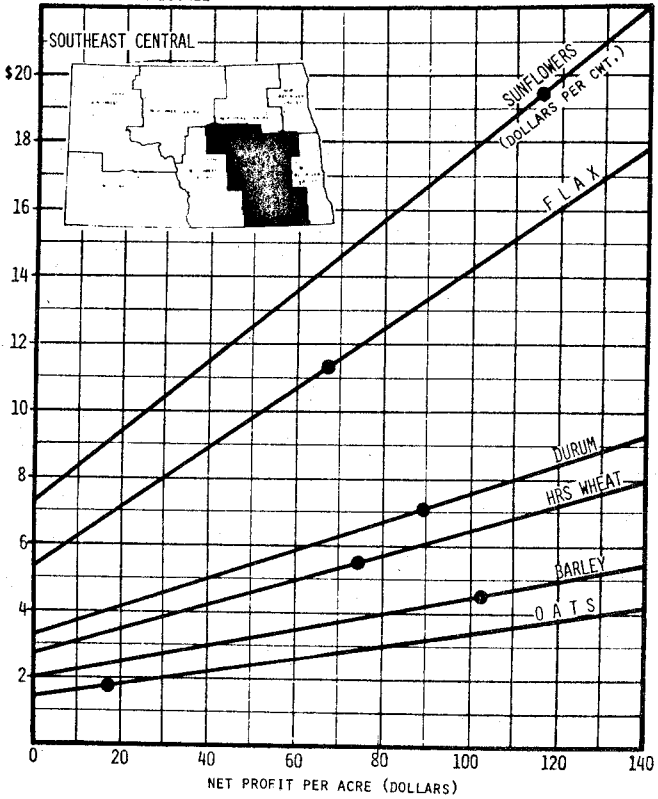
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MINNEAPOLIS PRICE/BUSHEL



MINNEAPOLIS PRICE/BUSHEL



MINNEAPOLIS PRICE/BUSHEL

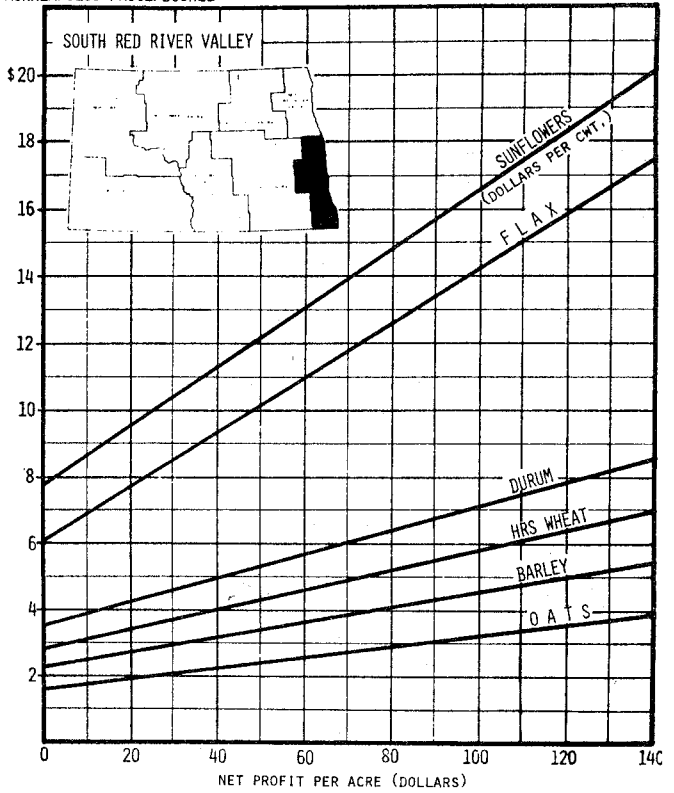


TABLE 4. DIFFERENCE IN NET PROFIT PER ACRE BETWEEN FLAX AND SPECIFIED CROPS ESTIMATED FOR 1975 AT DECEMBER 2 PRICES FOR EIGHT NORTH DAKOTA REGIONS

Region	Crop				
	HRS	Durum	Barley	Oats	Sunflowers
	----- dollars per acre -----				
NW	0	+47	+28	-64	----
NWC	-22	+14	+12	-55	----
NEC	+6	+24	+24	-55	----
NRRV	+11	+18	+15	-69	+34
SW	-5	+43	+27	-60	----
SWC	-5	+22	+23	-42	----
SEC	+7	+22	+35	-50	+49
SRRV	+25	+35	+34	-52	+68

Another approach is to determine the prices needed for other crops to return the same profit per acre as flax at the current or expected price of flax. In the southeast central region with flax at \$11.35, HRS wheat would have to be priced at \$5.25, durum--\$6.16, barley--\$3.64, oats--\$2.79, and sunflowers--\$14.35 in order to bring the same \$67 per acre profit (see Table 5).

TABLE 5. ESTIMATED PRICES OF SPECIFIED CROPS REQUIRED TO PROVIDE THE SAME AVERAGE NET PROFIT PER ACRE AS \$11.35 PER BUSHEL FLAX IN EIGHT NORTH DAKOTA REGIONS

Region	Crop				
	HRS	Durum	Barley	Oats	Sunflowers*
	----- dollars per bushel -----				- \$/cwt. -
NW	5.51	5.42	3.81	3.19	----
NWC	6.59	6.45	4.16	3.04	----
NEC	5.27	6.09	3.88	3.03	----
NRRV	5.18	6.41	4.15	3.12	16.19
SW	5.72	5.50	3.82	3.10	----
SWC	5.74	5.95	3.77	2.89	----
SEC	5.25	6.16	3.64	2.79	14.35
SRRV	4.78	5.87	3.74	2.67	13.53

*Yield and cost data for sunflowers in several regions are not available.

A third way to view the situation is to determine the price required for a crop to provide the same profit as from other crops at their expected prices. Using December 2 prices as expected prices and the southeast central region as an example, flax would have to be priced at \$11.95 to compete with HRS, \$13.29 to compete with durum, \$14.45 to compete with barley, \$6.86 to compete with oats, and \$15.70 to compete with sunflowers. Equivalent prices for this comparison for all eight North Dakota regions are given in Table 6.

TABLE 6. ESTIMATED FLAX PRICES TO YIELD THE SAME PROFIT AS FROM OTHER CROPS AT THEIR DECEMBER 2, 1974, PRICES FOR EIGHT NORTH DAKOTA REGIONS

Region	Crop				
	HRS	Durum	Barley	Oats	Sunflowers
	----- dollars per bushel -----				
					- \$/cwt. -
NW	11.38	15.20	13.66	6.18	---
NWC	9.31	12.64	12.45	6.25	---
NEC	11.92	13.53	13.53	6.47	---
NRRV	13.76	14.38	14.11	6.75	15.78
SW	10.91	14.91	13.57	6.32	---
SWC	10.84	13.84	13.95	6.72	---
SEC	11.95	13.29	14.45	6.86	15.70
SRRV	13.38	14.19	14.11	7.12	16.88

Equal profit prices for competing crops can be visualized as in Figure 6 for the SEC Region. In this case, flax is compared to the other crops. The horizontal axis measures the price of flax while the vertical axis measures the price of competing crops required to produce the same net profit per acre given the cost and yield data in Table 1. Prices required to return the same profit from flax compared to the others can be observed from the chart. For example,

the symbol "●" indicates the price of other crops required to compete with \$11.35 flax. The symbol "X" indicates the flax prices required to compete with December 2 prices of the other crops. This chart highlights comparative prices but only for comparing one crop with others.

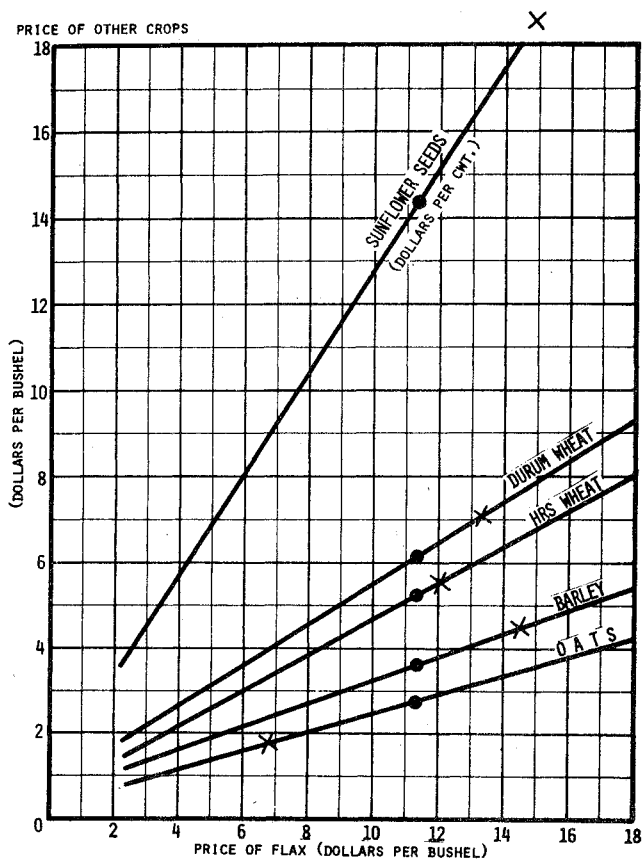


FIGURE 6. ESTIMATED 1975 EQUAL PROFIT-PRICE LINES COMPARING FLAX TO OTHER CROPS IN SOUTHEAST CENTRAL NORTH DAKOTA

Other types of analyses may be used employing the basic data presented in Tables 1 and 2 and in Figure 5. For example, regional differences in break-even prices and land values could be compared.

Summary

Rough approximations of price changes required to make common competing crops equally profitable for farmers can be made for a given set of initial prices. With comparisons made on the basis of December 2, 1974, prices, the competitive position of flax in relation to other crops statewide in North Dakota was as follows:

1. Cash HRS wheat prices were on a par with flax. The September futures prices for HRS wheat closed at \$4.87 on December 5. To be on a par with this HRS price, the flax price could fall 12 percent to \$10.50.
2. Durum prices would have to decline 16 percent to \$5.98 or flax prices increase 22 percent to \$13.81 for these crops to be on a par.
3. Barley prices could decline 26 percent to \$3.80 and still compete with \$11.35 flax or flax would have to increase 21 percent to \$13.77 to compete with the December 2 price of \$4.50 for barley.
4. Oat prices would have to increase to \$2.97 from \$1.80 to compete with \$11.35 flax or the flax price could drop to \$6.38. (The Chicago December 5 closing price December 5 for September oats was \$1.70.)
5. For the eastern part of the state, sunflower prices could fall 24 percent to \$14.85 per cwt. to be on a par with \$11.35 per bushel flax or flax would have to increase to \$15.50 to compete with \$19.50 sunflowers.

On a regional basis, break-even prices for flax are lowest in the NRRV and NEC regions and highest in the NW and SW regions. However, at December 2 prices, flax is in the best competitive position in the NWC, NRRV, and NEC. Flax is least competitive in the SRRV, SEC, and NW regions. Given that farmers grow the most profitable crops and make decisions on current prices, we will see a substantial reduction in flax acreage.

Any statement regarding the most profitable crops based on December 2 prices will certainly be invalid by the time farmers make their decisions since these prices will not persist. However, the data and charts presented in this paper can aid in estimating the impact of any given set of prices. Relative profitability of crops is one of several criteria farmers may use in their decision-making process.

The procedure outlined in this bulletin may be followed by farmers to select the most profitable crops as long as their own yields and production costs are used. Though the Planning Guide budgets are helpful in establishing general trends, they are not intended to represent any particular farm.