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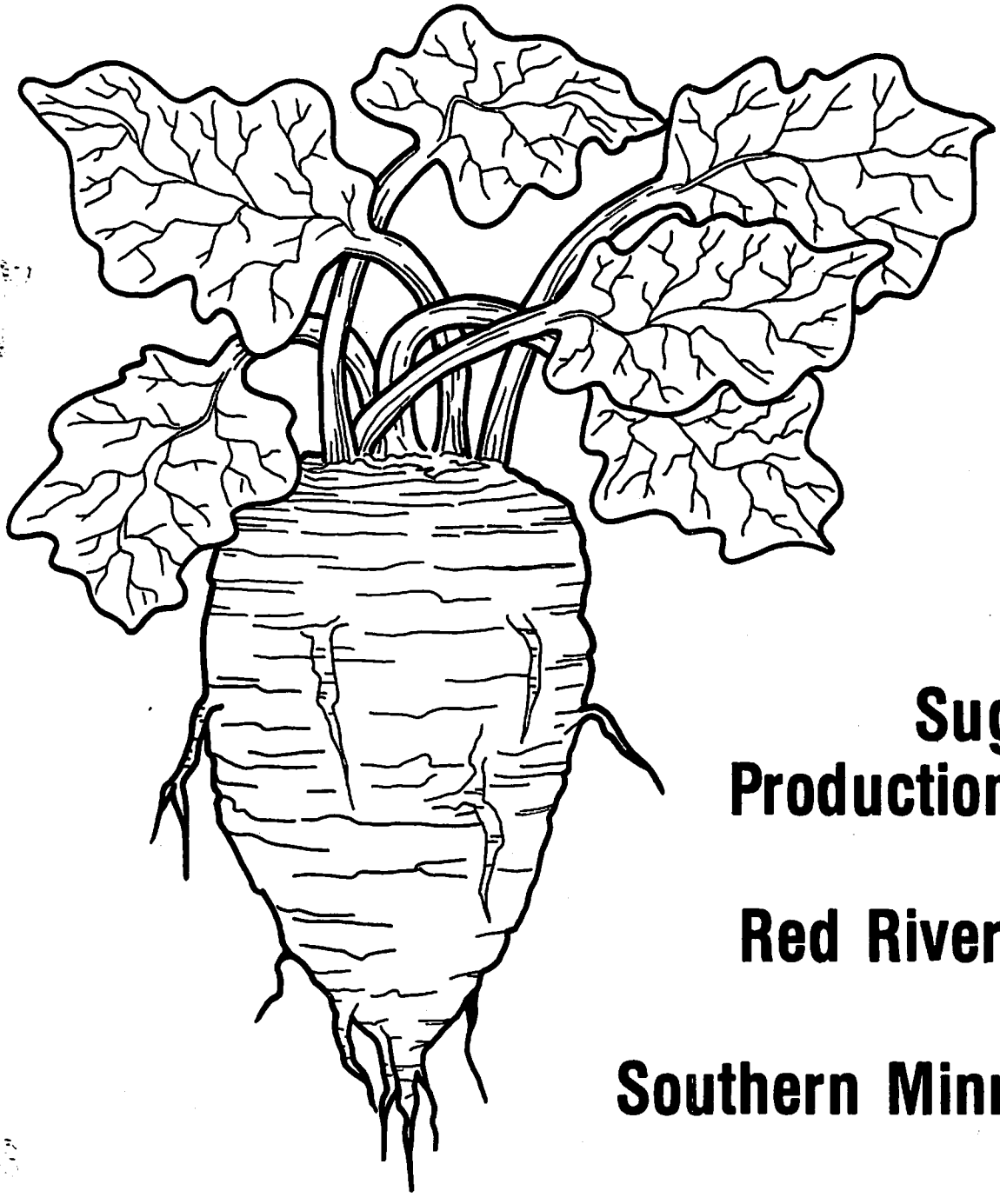

Sugarbeet Production Costs in the Red River Valley and Southern Minnesota-1982

by
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PREFACE

The authors thank the sugarbeet producers who gave information on costs and production practices. The full cooperation of the American Crystal Sugar Company, Minn-Dak Farmers Cooperative, and Southern Minnesota Beet Sugar Cooperative in providing information and lists of producers is appreciated. Dr. Allen Cattanach helped with technical information. The producer interviews were conducted by Andrew Swenson, Paul Deschene, Bob Zetocha, and Cynthia Bull.

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SUGARBEET PRODUCTION COST IN THE RED RIVER VALLEY AND SOUTHERN MINNESOTA - 1982

Andrew L. Swenson and Roger G. Johnson*

Introduction

The past decade has brought several changes in sugarbeet production practices. The trend has been away from raising sugarbeets on summer-fallowed land. Planting to stand, mechanical thinning, and increased use of herbicides have reduced the amount of labor hired for hand thinning and weeding. New or improved chemicals and equipment are being tried and adopted. These changes in production practices as well as price inflation necessitate a current cost of production study.

Personal interviews with 219 Red River Valley and southern Minnesota sugarbeet producers conducted during the summer of 1982 provided information on sugarbeet production costs and practices. Individual budgets were prepared for each cooperating beet producer. These budgets were then used to establish average costs per acre for beet operations in each factory area. Current production costs and revenues are presented to assist farmers in analyzing their costs and in planning future sugarbeet production. These data are also useful in developing sugar policy.

Sample Selection

Some beet contracts are held by individuals who farm together. Common examples are father-son and brother-brother partnerships. To get representative sugarbeet operations it was necessary to combine beet contracts before selecting a sample of producers.

A sugarbeet operation was defined as a farming unit in which members are jointly farming all their crop enterprises. Sugarbeet contract holders who own sugarbeet equipment together were considered separate sugarbeet operations if they owned most other machinery separately. Agricultural fieldmen from each sugarbeet factory grouped beet contracts using this definition to create a list of sugarbeet operations. A 15 percent random sample of these lists, stratified by sugarbeet acreage and factory area, was selected for the survey. The acreage stratification assured that proportional numbers of small and large enterprises were selected from each factory area. Table 1 presents the number of sugarbeet operations, number surveyed, average acreage by factory area, and percentage of sugarbeets grown on summer fallow.

The growers surveyed raised 49,951 acres of sugarbeets with an average of 255 acres of sugarbeets per operation. Sugarbeet enterprises ranged from 50 to 1,192 acres. Use of summer-fallowed land for sugarbeet production was minimal except in the Drayton area where 26.0 percent of the total sugarbeet

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*Swenson is former research assistant and Dr. Johnson is a professor, Department of Agricultural Economics.

TABLE 1. NUMBER OF SUGARBEET PRODUCERS, SIZE OF OPERATION, AND SUMMER FALLOW USE BY FACTORY AREA, 1982 SURVEY

Factory	Sugarbeet Operations	Sample Size	Operations Surveyed	
			Sugarbeets Per Farm	Beets on Fallow
	(Number)	(Number)	(Acres)	(Percent)
Renville	168	25	247	0.0
Wahpeton	200	30	303	3.9
Moorhead	240	36	296	1.1
Hillsboro	133	20	258	6.5
Crookston	167	25	287	0.9
East Grand Forks	227	34	227	7.6
Drayton	327	49	204	26.0
All Factory Areas	1,462	219	255	8.1

acreage was on fallowed land. The portion of sugarbeet acreage on fallowed land for the average Drayton farm was much higher, 40 percent, because producers with small operations planted a greater portion of sugarbeets on fallow than large producers.

Operations for Sugarbeet Production

The number and type of field operations used in sugarbeet production vary by area and producer. The average number of times over nonfallow sugarbeet ground for field operations before harvest are given in Table 2. All fields would be covered twice at harvest for rotobeating and lifting plus the trucking except in cases of crop failure.

Land levelers were used extensively by Minn-Dak growers but seldom by other producers. Southern Minnesota growers averaged about three less preplant field operations than Red River Valley growers. However, total number of operations were nearly equal because more intensive spraying activity and row crop cultivation was found in the southern Minnesota area.

Calculation of Costs

The interview schedule gathered information on all costs of producing sugarbeets including a share of farm overhead expense and noncash costs such as the value of the operator's labor. Production practices were recorded for each field to increase accuracy of cost determination. Information on all machinery used in sugarbeet production was gathered to estimate depreciation, interest, repair, fuel expense, and machinery labor.

TABLE 2. AVERAGE NUMBER OF PRE-HARVEST OPERATIONS FOR SUGARBEET PRODUCTION ON NONFALLOWED LAND BY COOPERATIVE AREA, 1982

Operation[1]	Growers[2] Southern Minnesota		Minn-Dak		American Crystal	
	n=25		n=25		n=129	
	times over field					
Fall						
Moldboard Plow	0.61		0.87		0.54	
Chisel Plow	0.45		0.19		0.37	
Disk	0.45		0.62		0.97	
Field Cultivator	0.43		2.07		1.75	
Anhydrous Applicator[3]	0.02		0.20		0.23	
Multiweeder	0		0.14		0.31	
Field Conditioner	0.01		0.04		1.13	
Harrow	0		0		0.22	
Land Leveler	0		1.34		0.23	
Fertilizer Applicator	0.56		0.90		0.64	
Herbicide Applicator	0.04		0.14		0.28	
Other	0.12		0.04		0.04	
Total Fall		2.69		6.55		5.71
Spring Preplant						
Chisel Plow	0.14		0		0.02	
Disk	0.14		0		0.01	
Field Cultivator	1.29		0.21		1.40	
Multiweeder	0.58		0.76		0.49	
Field Conditioner	0.20		0.60		0.33	
Harrow	0.08		0.16		0.94	
Fertilizer Applicator	0.16		0.28		0.18	
Other	0.24		0.09		0.13	
Total Spring Preplant		2.83		2.10		2.50
Planting[4]		1.02		1.00		1.03
Postplant Preharvest						
Band Spray	1.48		1.25		1.38	
Ground Broadcast Spray	0.96		0.13		0.16	
Aerial Spray	2.75		2.19		1.39	
Harrow	0.80		0.11		0.28	
Rotary Hoe	0.09		0.04		0.56	
Thinner	0.42		0.06		0.41	
Row Cultivator	3.83		3.37		3.49	
Other	0.14		0.08		0.07	
Total Postplant Preharvest		10.47		7.23		7.74
TOTAL PREHARVEST OPERATIONS		17.01		16.88		16.98

[1]Custom hired operations were included.
[2]Producers that grew any sugarbeets on fallow were omitted.
[3]Application of anhydrous with other tillage instruments such as chisel plows and field cultivators were recorded in their respective categories.
[4]Times over is greater than one if acreage was replanted.

A budget generator computer program provided individual budgets of costs for the sugarbeet operations surveyed. The costs of most operating inputs were determined directly from the survey. The budget generator program calculates costs associated with machinery operation and ownership by applying cost formulas and engineering coefficients to the data on individual machinery ownership and use.

Where producers were not able to recall what was paid for a given chemical, average prices from other farmers and retail outlets in the area were used. The price of anhydrous ammonia served as the price for dry nitrogen in ammonium phosphates such as diammonium phosphate (18-46-0). Annual cost of migrant housing consists of depreciation, interest on investment, utilities and upkeep expenses. Depreciation equaled the farmer's estimated market value of the housing divided by expected additional years of service. Interest was calculated as 8.3 percent of market value. The computer program added the costs of operating inputs on a monthly basis. A 16.6 percent interest rate was applied to calculate the interest on operating capital.

Machinery operating costs include repairs, fuel, and lubricants. Repair costs were based on studies by agricultural engineers concerning incidence of repairs for various types of machines. Fuel consumption was calculated from rates based on tractor horsepower and truck type. A price of $1.27 per gallon for gasoline and $1.13 per gallon of diesel was used. Lubricant costs were assumed to be 15 percent of fuel costs.

The amount of machinery labor was based on the type and width of machinery used and speed of travel. Hours of labor hired to operate machinery was subtracted from total hours of machine labor to determine unpaid (operator and family) machine labor time. Wage rate of hired labor was included in the survey. The average wage rate for hired labor, by factory, was charged to unpaid labor.

Machinery replacement cost was calculated like straightline depreciation, including a salvage value. However, replacement cost is based on current machinery prices in contrast to depreciation for income taxes, which uses cost at time of purchase. The interest cost was obtained by multiplying the average amount of capital invested in the ownership period by an 8.3 percent rate of interest.[1]

Prices paid for all used equipment and much of the new equipment were obtained in the survey. Machinery prices not obtained from farmers came from several sources. They included the Official Guide of Tractor and Farm Equipment, University of Minnesota price surveys from 1978 to 1982, USDA Agricultural Prices, four area truck dealers, ten implement dealers, and North Dakota State University cost studies. All machinery prices were indexed to 1982 dollars using the GNP implicit price deflator.

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[1]This was the real rate of interest computed by subtracting the rate of inflation in machinery values from the nominal interest rate (16.6 percent -8.3 percent = 8.3 percent).

The land charge for each factory area was the average cash rent recorded from farmers in the survey. Sugarbeets produced on summer fallow are charged two years of land cost. A cost was imputed to cover the value of management and investment in a sugarbeet contract.

Sugarbeet Costs and Returns

Average production costs per acre for 25 southern Minnesota and 194 Red River Valley area sugarbeet operations are presented in Table 3. Average quantities of inputs for all farmers surveyed included those not using that input. Farmers that actually used the input generally applied a rate higher than the average. Fertilizer price and quantity are in pounds of nitrogen, phosphate, and potash rather than pounds of fertilizer material.

Sugarbeet production requires a high degree of input management. Eighty-one percent of the sugarbeet producers surveyed applied both preplant incorporated and post-emergence herbicide. Some acreage was treated with pre-emergence herbicide on 19 percent of the beet operations. Fungicide was used on 78 percent of the farms. Only 35 of the 219 farms surveyed did not use any hand labor for either thinning or weeding. Hand weeding was employed on over twice the acreage as was hand thinning. Anhydrous, liquid, and dry forms of nitrogen were applied by 47, 23, and 69 percent of the producers, respectively. Some producers used more than one form of nitrogen. Phosphate fertilizer was used by 90 percent of the producers.

The higher variable costs of sugarbeet production in southern Minnesota compared to the Red River Valley can be explained by differences in the use of inputs. Southern Minnesota producers (Renville) often had input use that differed substantially from other factory areas. Only one Renville farmer applied insecticide whereas 71 percent of non-Renville growers used insecticide. Custom beet truckers were hired by 44 percent of the Renville growers at an average cost of $18.14 per acre. Custom trucking expense for the American Crystal and Minn-Dak producers in the survey averaged only $3.71 per acre. Fertilizer costs of Renville growers averaged $34.76 per acre compared to a range from $23.74 to $29.54 per acre for the other producing areas. Anhydrous ammonia was used by 12 percent of the Renville growers and 51 percent of the non-Renville producers.

The average sugarbeet operation had a total cost of $460.31 per acre or a $26.58 cost per ton of production. Opportunity costs for the operator's labor, managerial skills, and investment were included in the total cost figure. If total revenue covers total costs, the operator has received compensation for his efforts. Profits represent compensation for entrepreneurial risk taking.

Table 4 presents average per acre costs and revenues by factory and ranks factories by the average profit per acre of its producers. Table results should not be interpreted as representing different levels of efficiency because weather may be a more important factor than management in determining sugar yield for any given year. Itemized costs for Renville are in Table 2. Cost breakdowns for the other factory areas are presented in the Appendix.

Renville, Hillsboro, Drayton, and Wahpeton had substantially higher hand labor costs than either East Grand Forks or Moorhead. Expenditures on pesticides

TABLE 3. SUGARBEET PRODUCTION COSTS PER ACRE FOR THE AVERAGE SUGARBEET FARM SURVEYED IN SOUTHERN MINNESOTA AND THE RED RIVER VALLEY, 1982

Item	Southern Minnesota				Red River Valley[1]		
	Unit	Price	Quantity	Value	Price	Quantity	Value
Variable Cost							
Beet Seed	Lbs.	$11.86	1.77	$ 20.99	$11.86	1.70	$ 20.16
Anhydrous Nitrogen	Lbs.	0.158	7.36	1.16	0.140	34.03	4.78
Liquid Nitrogen	Lbs.	0.252	11.21	2.82	0.266	6.35	1.69
Dry Nitrogen	Lbs.	0.208	42.20	8.78	0.195	27.96	5.45
Phosphate	Lbs.	0.234	52.50	12.29	0.222	50.51	11.24
Potash	Lbs.	0.132	73.44	9.71	0.128	19.08	2.45
Custom Fert. Application	Acre	2.81	0.70	2.02	2.50	0.66	1.65
Insecticide	Lbs.	1.25	0.05	0.06	1.28	5.90	7.57
PPI Herbicide	Acre	14.71	0.94	13.83	18.33	0.91	16.68
Pre-emergence Herbicide	Acre	10.36	0.11	1.14	11.27	0.15	1.69
Post-emergence Herbicide	Acre	12.46	1.75	21.81	8.47	1.48	12.53
Fungicide	Acre	4.60	3.59	16.52	5.76	1.41	8.12
Custom Pesticide Application	Acre	3.76	2.95	11.09	3.15	1.57	4.95
Hand Thinning	Acre	32.19	0.37	11.91	31.70	0.30	9.51
Hand Weeding	Acre	19.37	0.90	17.43	21.16	0.64	13.54
Migrant Housing				5.53			3.51
Hired Machine Labor	Hour	5.25	1.79	9.40	5.63	2.51	14.11
Unpaid Machine Labor	Hour	5.25	2.41	12.65	5.63	2.50	14.07
Soc. Sec. & Workmen's Comp.				3.27			3.98
Custom Hauling				18.14			3.72
Fuel and Lube				27.57			35.53
Repair				15.83			19.12
Crop Insurance	Acre	15.28	0.36	5.50	12.92	0.26	3.36
Miscellaneous[2]				7.11			5.48
Interest on Operating Capital		16.6%		17.61	16.6%		17.11
Total Variable Costs				$274.17			$242.00
Fixed Cost							
Machinery Replacement				$ 40.00			$ 46.99
Interest on Machinery Investment				27.84			32.59
Farm Overhead[3]				8.40			8.49
Investment in Co-op[4]				8.30			26.85
Management Charge (10% of Total Costs Excluding Land)				35.94			35.69
Land Charge				93.00			$ 64.18
Total Fixed Costs				$213.48			$214.79
TOTAL COSTS				$487.65			$456.79
TOTAL REVENUE[5]	Tons	$31.27	20.69	$646.98	$32.43	16.88	$547.42
PROFIT (LOSS)				$159.33			$ 90.63

[1]Producers for American Crystal Company and Minn-Dak Farmers Cooperative.
[2]Includes soil sampling, crop monitoring service, beet hoes, interest and depreciation on nonused beet equipment, machine rent, nontruck custom work, and micronutrients.
[3]Includes insurance, utilities, vehicle license and tax, and bookkeeping.
[4]Interest of 8.3 percent was charged to the beet contract value.
[5]Price estimated as of August 1983. All sugar from 1982 crop had not been marketed but only minor revisions in payments to farmers were expected.

TABLE 4. AVERAGE SUGARBEET PRODUCTION COSTS AND REVENUE PER ACRE BY FACTORY, 1982

Item	Hillsboro[1]	Renville[2]	Crookston[1]	Wahpeton[3]	Moorhead[1]	East Grand Forks[1]	Drayton[1]
Variable Costs	$252.79	$274.17	$264.65	$253.73	$233.36	$212.64	$245.57
Fixed Costs	211.80	213.48	224.86	218.87	205.80	206.02	221.04
Total Costs	464.59	487.65	489.51	472.60	439.16	418.66	466.61
Total Revenue	628.45	646.98	625.68	593.83	548.13	468.53	504.43
Profit (Loss)	$163.86	$159.33	$136.17	$121.21	$108.97	$ 49.87	$ 37.82

[1]American Crystal Sugar Company.
[2]Southern Minnesota Beet Sugar Cooperative.
[3]Minn-Dak Farmers Cooperative.

were highest in Crookston ($55.84 per acre) and lowest in Drayton ($41.54 per acre). Several input costs were fairly consistent between factories. Beet seed cost ranged from $18.50 per acre at Wahpeton to $22.92 per acre at Drayton.

Machinery ownership expense was lowest in Renville due to the greater use of custom trucking. The land charge (average cash rent per acre) for Renville was $93.00 and ranged between $60.00 and $70.00 per acre for the other factory areas. Another fixed cost that differed by area was the cost of holding a share in a sugarbeet cooperative. The spring 1982 market value of a beet acre share was estimated to be $100, $300, and $450 for Southern Minnesota Beet Sugar, American Crystal, and Minn-Dak cooperatives, respectively.

Profitability Comparison

Red River Valley sugarbeet producers were ranked by net revenue per acre. Net revenue equals total revenue minus all costs except charges for land, management, and investment in a sugar processing co-op. All 17 producers surveyed in the Argyle, Warren, and Oslo pilers in the East Grand Forks factory area were omitted from the ranking because extreme weather conditions caused atypical production practices and yields. The southern Minnesota area was omitted because its lack of homogeneity with the Red River Valley would emphasize cost and revenue differences related to geographic area rather than management.

Average costs and revenues of producers in the upper and lower 25 percent of net return rankings are compared in Table 5. The average charge imputed to the Red River Valley producers for land, management, and investment in the sugar co-op was used.

TABLE 5. COMPARISON OF AVERAGE COSTS AND REVENUE PER ACRE OF PRODUCERS WITH NET REVENUE IN THE HIGHEST AND LOWEST 25 PERCENTILE OF RED RIVER VALLEY SUGARBEET FARMS, 1982.

Item	Unit	High Net Return		Low Net Return	
		Quantity	Value	Quantity	Value
		------- n=44	----------	-------- n=44	---------
Variable Costs					
Beet Seed	Lbs.	1.54	$ 18.70	$ 1.77	$ 20.83
Anhydrous Nitrogen	Lbs.	43.50	6.00	30.11	4.24
Liquid Nitrogen	Lbs.	5.00	1.33	4.29	1.14
Dry Nitrogen	Lbs.	20.48	3.99	31.59	6.32
Phosphate	Lbs.	46.53	10.65	54.98	12.20
Potash	Lbs.	21.52	2.78	18.00	2.22
Insecticide	Lbs.	6.04	7.44	6.53	8.17
PPI Herbicide	Acre	0.89	15.18	0.87	16.13
Pre-emergence Herbicide	Acre	0.12	1.10	0.13	1.72
Post-emergence Herbicide	Acre	1.60	12.97	1.63	13.30
Fungicide	Acre	2.03	11.76	1.05	5.72
Custom Chemical Application[1]	Acre	2.51	7.58	1.83	5.39
Hand Thinning	Acre	0.25	8.16	0.35	10.68
Hand Weeding	Acre	0.63	12.67	0.82	16.83
Migrant Housing			4.13		3.96
Hired Machine Labor	Hour	2.74	15.12	2.65	14.80
Unpaid Machine Labor	Hour	2.13	11.99	2.86	16.08
Soc. Sec. & Workmen's Comp.			4.13		4.31
Custom Hauling			4.54		4.71
Crop Insurance	Acre	0.36	4.51	0.24	3.40
Fuel and Lube			35.91		37.72
Repair			20.26		19.98
Miscellaneous[2]			5.04		6.39
Interest on Operating Capital			17.60		17.82
Total Variable Cost			$243.54		$254.06
Fixed Costs					
Machinery Replacement			$ 41.03		$ 53.11
Interest on Machinery Investment			29.10		36.78
Farm Overhead[3]			7.77		9.49
Charge for Land, Management, and Investment in Co-op[4]			$126.71		$126.71
Total Fixed Cost			$204.61		$226.09
TOTAL COSTS			$448.16		$480.15
Yield		20.08 tons		13.84 tons	
Price[5]		$33.29/ton		$31.27/ton	
TOTAL REVENUE			$668.46		$432.78
PROFIT (LOSS)			$220.30		($47.37)

[1]Includes custom fertilizer, herbicide, and fungicide application.
[2]Includes soil sampling, crop monitoring service, beet hoes, interest, and depreciation on nonused beet equipment, machine rent, nontruck custom work, and micronutrients.
[3]Includes insurance, utilities, vehicle license and tax, and bookkeeping.
[4]Red River Valley sugarbeet survey average of $64.18, $35.68, and $26.85 were charged, respectively.
[5]Based on estimated American Crystal price per pound of recoverable sugar (August 1983).

The producers with a high net return had a $267.67 larger profit than those with a low net return due to $235.68 larger gross revenues and $31.99 lower costs per acre. These figures show the importance of sugarbeet tonnage and quality in achieving profitable results. Although cost savings were of a smaller magnitude, they are more controllable by the producer.

The differences in total revenue were due to both higher yields and better quality beets. The yield and quality components of the higher gross revenue are shown below:

Factor	Quantity tons	Price $/ton	Value	%
Higher yield	6.24	$32.28	$201.42	85
Higher price (quality)	16.96	2.02	34.26	15
Total			$235.68	100

The higher production was the combined result of weather, soil productivity, and management practices. Weather and soil productivity data were not collected so the relative importance of each factor could not be determined.

Total variable costs were $10.52 lower for the high net return group. The only cost item substantially higher for the high net return farmers was for fungicide and its application. More replanting by the low net revenue group accounted for the difference in beet seed expense. Total pounds of nitrogen applied were similar for the two groups but the high net return producers saved by applying a larger proportion as anhydrous ammonia, a less expensive source. The largest variable cost saving by the high return group was in hand weeding and hand thinning. Lower hand labor costs were accomplished without higher herbicide costs.

The group of low net return farms averaged 211 acres of sugarbeets while the high net return group averaged 291 acres of sugarbeets. The larger machinery size associated with the bigger acreage of high net return producers explains the lower machine labor use. The larger acreages also contributed to lower fixed costs for replacement and interest on machinery and farm overhead costs. However, machinery management practices such as machine size selection and replacement policies were also important sources of machine cost variation.

Economics of Hand Labor Utilization

A trend in sugarbeet production is substitution of planting to stand or mechanical thinning for hand thinning and substitution of herbicide use for hand weeding. Table 6 presents figures on the average revenues and costs of the following extremes in hand labor use: a) no hand thinning or weeding, b) no acres hand thinned but all acres hand weeded, and c) all acres hand thinned and hand weeded. It was felt that a better comparison was achieved by omitting crop

TABLE 6. AVERAGE RED RIVER VALLEY SUGARBEET PRODUCTION COSTS AND REVENUE PER ACRE BY USE OF HAND LABOR, 1982

	No Hand Labor		No Hand Thinning All Hand Weeding		All Hand Labor	
	Times over Fields	Value	Times over Fields	Value	Times over Fields	Value
	n=32		n=39		n=35	
Variable Cost						
Beet Seed		$ 18.80		$ 17.57		$ 24.25
PPI Herbicide	0.85	15.10	0.98	17.93	0.90	16.80
Pre-emergence Herbicide	0.24	2.82	0.08	1.71	0.05	1.11
Post-emergence Herbicide	1.81	15.26	1.59	13.92	0.73	6.51
Other Chemicals[1]		43.29		50.17		51.55
Hand Thinning	0	0	0	0	1.00	32.05
Hand Weeding	0	0	1.22	25.42	1.00	21.72
Migrant Housing		0.16		4.31		8.23
Machinery Labor[2] & Operation[3]		79.38		79.25		84.28
Soc. Sec. & Workmen's Comp.		1.72		5.10		5.30
Miscellaneous[4]		10.99		7.41		12.92
Interest on Operating Capital		14.36		17.98		19.86
Total Variable Cost[5]		$201.88		$240.70		$284.58
Fixed Cost						
Machinery Ownership[6]		$ 74.72		$ 80.09		$ 80.14
Farm Overhead[7]		7.76		8.17		10.19
Charge for Land, Management and Investment in Co-op[8]		126.71		126.71		126.71
Total Fixed Costs		$209.19		$214.97		$217.04
TOTAL COSTS		$411.07		$455.67		$501.62
Yield (Ton)	15.46 tons		16.45 tons		17.84 tons	
Price ($/ton)[9]	$31.84/ton		$32.22/ton		$32.50/ton	
REVENUE		$492.35		$530.90		$580.62
PROFIT (LOSS)		$ 81.28		$ 75.23		$ 79.00

[1]Fertilizer, insecticide, fungicide, and custom chemical application.
[2]Hired machine labor is at individual rate and unpaid machine labor was charged $5.63 per hour.
[3]Repair, fuel, and lube.
[4]Includes soil sampling, crop monitoring service, beet hoes, interest, and depreciation on nonused beet equipment, machine rent, custom work (except chemical application) and micronutrients.
[5]Omits crop insurance expense.
[6]Replacement and interest on machinery investment.
[7]Includes insurance, utilities, vehicle license and tax, and bookkeeping.
[8]Red River Valley sugarbeet survey average of $64.18, $35.68, and $26.85 were charged, respectively.
[9]Based on estimated 1982 American Crystal price per pound of recoverable sugar (August 1983).

insurance expense and applying the average Red River Valley sugarbeet survey charge imputed for land, management, and investment in a sugar processing co-op.

Producers using all hand labor had variable costs 40 percent greater than farmers who raised sugarbeets without hand labor. Nearly all individual costs, except for pre-emergence and post-emergence herbicide, were higher for farmers who hired hand thinning and weeding on all acres. Greater input use by producers using all hand labor was reflected in the high average yield and high quality (shown by price) of sugarbeets.

Producers using no hand thinning but all hand weeding had revenue and costs between the all hand labor and no hand labor groups. The difference in profit among the three groups was not great. The average profit of Red River Valley sugarbeet producers was over 10 percent greater than any of these three groups representing extremes in hand labor utilization.

Planting to Stand

The practice of spacing sugarbeet seeds at planting so seedlings will not need thinning after emergence is called "planting to stand." This practice is becoming more popular among Red River Valley sugarbeet growers. Spacing large sugarbeet seed at 5.5 to 5.9 inch intervals is the preferred practice among producers who plant to stand (Table 7).

TABLE 7. SUGARBEET SEED SIZE AND SPACING INTERVALS USED BY RED RIVER VALLEY PRODUCERS WHO PLANTED TO STAND IN 1982[1]

Seed Size	Number of Producers[2]	Seed Planting Interval	Number of Producers[2]
		-- inches ---	
Small	19	less than 4.0	4
		4.0 - 4.4	9
Medium	9	4.5 - 4.9	8
		5.0 - 5.4	9
Large	29	5.5 - 5.9	18
		6.0 - 6.4	5
		greater than 6.4	4

[1]Only producers who did not use any hand thinning or mechanical thinners are included. However, some producers used rotary hoes or harrows which may have had a thinning effect.

[2]From survey of 194 producers. The 17 surveys from Oslo, Warren, and Argyle areas were omitted because wet conditions may have affected thinning plans.

The Wahpeton factory had the most growers, 57 percent, that planted to stand and the Drayton factory had the least, 14 percent. In Table 8, costs and revenue of Red River Valley sugarbeet farmers who plant to stand are compared with producers who planted more thickly and thinned. Growers who planted to stand on just a portion of their acres are omitted from the comparison. A better comparison was provided by omitting crop insurance expense and applying the average Red River Valley sugarbeet survey charge imputed for land use, management, and investment in a sugar processing co-op.

Neither planting technique showed a clear advantage in profit. Reduced costs of planting to stand were offset by the superior quantity and quality of yield for producers who did not plant to stand. Producers who planted to stand used only 1.32 pounds per acre of sugarbeet seed compared to 1.80 pounds per acre used by operators that did not plant to stand. Substantial savings in beet seed, hand thinning, and machine related costs gave plant to stand producers an average of $40.72 per acre cost advantage.

Machinery Costs

Specialized Beet Machinery

Information on all equipment used in sugarbeet production was gathered from farmers to calculate fuel, repair, depreciation, and interest costs. The average costs of a wide range of models and conditions of sugarbeet machinery and tractors used for specialized beet operations are given in Table 9.

The greatest cost of specialized beet machinery was for machine replacement and interest. High average fixed costs are often the result of low hours of annual use. Per acre costs associated with the operation of larger size sugarbeet machinery was usually less than smaller sugarbeet machinery because the increase in acres covered per hour reduces tractor costs. However, compared to four row lifters, the higher ownership cost of six row lifters offset the savings in tractor costs per acre.

Trucks

Most producers use their own trucks for hauling sugarbeets. The percentage of Southern Minnesota, Minn-Dak, and American Crystal growers who hired custom trucking was 44, 10, and 17, respectively. Five types of trucks were used during the 1982 sugarbeet harvest. The most common type of truck had dual rear axle drive (twin-screw tandem). The 219 producers owned and used 392 twin-screw tandems, 93 tag-axle tandems, 20 semi-tractors and trailers, 13 single-axle trucks, and 12 tri-axle trucks during sugarbeet harvest. Average costs and selected characteristics of truck types are given in Table 10.

A cost for insurance, road tax, and license is omitted because that expense was apportioned among different enterprises and included as part of general overhead expense in the survey. Small sample sizes may make the average costs of the semi, tri-axle, and single-axle truck types less reliable than the twin-screw and tag-axle truck figures. A possible example is the difference in wage rates producers paid workers to drive single-axle and tri-axle trucks.

TABLE 8. AVERAGE COSTS AND REVENUE PER ACRE OF PLANT TO STAND AND CONVENTIONAL PLANTING, RED RIVER VALLEY SUGARBEET PRODUCERS, 1982[1]

Item	Plant to Stand	Conventional Planting
	---- n=49 ----	------- n=65 -----
Variable Costs		
Beet Seed	$ 15.74	$ 21.92
Fertilizer	25.69	27.03
Pesticides[2]	49.51	49.40
Custom Chemical Application[3]	6.40	9.00
Hand Thinning	0	14.12
Hand Weeding	15.60	14.96
Migrant Housing	3.03	4.42
Soc. Sec. & Workmen's Comp.	4.01	4.86
Machine Labor[4]	26.76	28.58
Machine Operation[5]	54.22	55.89
Miscellaneous[6]	6.88	9.24
Interest on Operating Capital	16.55	19.03
Total Variable Costs[7]	$224.39	$258.45
Fixed Costs		
Machine Ownership[8]	$ 73.36	$ 79.00
Farm Overhead[9]	7.61	8.63
Charge for Land, Management, and Investment in Co-op[10]	126.71	126.71
Total Fixed Costs	$207.68	$214.34
TOTAL COSTS[7]	$432.07	$472.79
Yield (tons)	16.80	17.89
Price ($/ton)[11]	$ 32.41	$ 33.38
TOTAL REVENUE	$544.49	$597.17
PROFIT (LOSS)	$112.42	$124.38

[1]Survey of 194 Red River Valley farms yielded 45 plant to stand and 65 conventional planting producers after all 49 Drayton surveys and 17 East Grand Forks surveys were omitted. Drayton growers showed a strong preference not to plant to stand; therefore, differences due to area rather than planting technique would dominate the averages. Unusual precipitation adversely affected yields and may have disrupted normal production plans of the producers for three East Grand Forks piling stations.

[2]Includes insecticide, herbicide, and fungicide.

[3]Custom application of fertilizer, insecticide, herbicide, and fungicide.

[4]Hired labor is at individual rate and unpaid labor was charged $5.63 per hour.

[5]Includes repair, fuel, and lube.

[6]Includes soil sampling, crop monitoring service, beet hoes, interest and depreciation on nonused beet equipment, machine rent, custom work and micronutrients.

[7]Omits crop insurance.

[8]Includes replacement and interest.

[9]Includes insurance, utilities, vehicle license and tax, and bookkeeping.

[10]Red River Valley sugarbeet average of $64.18, $35.68, and $26.85 were charged, respectively.

[11]Based on estimated 1982 American Crystal price per pound of recoverable sugar (August 1983).

TABLE 9. AVERAGE COSTS PER ACRE FOR SPECIALIZED SUGARBEET MACHINERY FOR RED RIVER VALLEY AND SOUTHERN MINNESOTA GROWERS IN 1982

Beet Machine	No. of Obs.	Acres Per Hour[1]	Machine Cost		Tractor Cost		Labor Cost[3]	Total Cost
			Repair	Ownership[2]	Repair Fuel, Lube	Ownership[2]		
			dollars per acre					
Planter[4]								
12 row	55	7.40	0.21	4.12	1.38	1.10	0.91	7.72
Thinner[5]								
6 row	22	2.85	0.75	9.33	3.63	2.84	2.36	18.91
12 row	43	5.38	0.71	8.83	2.20	1.91	1.25	14.90
Rotobeater[6]								
4 row	68	2.34	2.21	4.09	4.09	3.08	2.87	16.34
6 row	77	4.10	1.63	4.37	2.61	2.13	1.64	12.38
Lifter[6]								
4 row	125	3.15	4.06	9.11	3.73	2.90	2.13	21.93
6 row	20	5.14	3.24	11.95	2.52	2.22	1.31	21.24

[1]Multiply acres per hour by costs per acre to get costs per hour.
[2]Replacement and interest.
[3]Assumes 20 percent additional labor above actual field operations for preparing machine, travel time to and from the field, etc. All labor at $5.60 per hour.
[4]Random sample of 25 percent of the 219 surveys.
[5]Only thinners used on 50 percent or more of owners' acreage.
[6]Only rotobeaters and lifters that were both used on 100 percent of owners' acreage.

The semi-tractors and trailers had the highest average load, 21.83 tons, and distance to piler, 15.04 miles, while single-axle trucks were lowest in these categories with 9.41 tons and 8.38 miles. Semi-trucks had the highest hourly costs but lowest cost per ton and cost per ton per loaded mile.

Hourly cost of tag-axle and twin-screw tandem trucks purchased new averaged over $2.00 more than the same type of truck purchased used. A reduction in repair expense of the trucks purchased new was more than offset by higher depreciation and interest costs.

TABLE 10. AVERAGE TRUCKING COSTS OF RED RIVER VALLEY AND SOUTHERN MINNESOTA SUGARBEET PRODUCERS, 1982[1]

Item	Truck Type				
	Twin-Screw[2]	Tag-Axle	Semi	Single-Axle	Tri-Axle
	n=114	n=95	n=20	n=13	n=12
Percent purchased new	67%	57%	20%	100%	0%
Tons per trip	14.95	13.74	21.83	9.41	19.92
Loaded miles per trip	10.87	10.51	15.04	8.38	10.67
Hours per trip	1.36	1.34	1.52	1.37	1.63
Replacement and interest ($/hr)	17.72	13.25	22.65	11.80	17.61
Repair, fuel, and lube ($/hr)	12.42	11.91	12.58	9.41	12.41
Labor price[3] ($/hr)	5.59	5.62	5.69	5.94	5.46
Cost per hour	$36.84	$31.90	$42.06	$28.34	$35.22
Cost per ton	$ 3.31	$ 3.08	$ 2.84	$ 4.12	$ 2.89
Cost per ton per loaded mile	$ 0.41	$ 0.37	$ 0.21	$ 0.65	$ 0.34

[1]Costs of insurance, road tax, and license were not included.
[2]Average from 114 of the 392 twin-screw tandem trucks owned by surveyed sugarbeet producers.
[3]An additional 20 percent labor was added to these prices when determining cost per hour of truck use. This allows for truck preparation and other non-trip labor time.

APPENDIX

APPENDIX TABLE 1. RED RIVER VALLEY SUGARBEET PRODUCTION COSTS AND REVENUE PER ACRE BY FACTORY AREA, 1982

Item	Wahpeton	Moorhead	Hillsboro	Crookston	East Grand Forks	Drayton
Variable Cost						
Beet Seed	$ 18.50	$ 18.51	$ 20.74	$ 20.66	$ 18.80	$ 22.92
Anhydrous Nitrogen	5.60	5.86	4.38	4.49	4.94	3.70
Liquid Nitrogen	0.91	1.17	0.84	4.15	2.61	1.02
Dry Nitrogen	6.49	4.63	6.29	4.67	4.02	6.46
Phosphate	12.61	10.22	11.00	10.32	10.95	11.91
Potash	3.93	1.98	1.53	3.17	1.69	2.43
Custom Fert. Application	1.35	2.32	1.64	1.71	1.30	1.55
Insecticide	5.27	5.56	6.64	8.80	8.43	9.66
PPI Herbicide	18.44	16.05	18.19	21.14	14.31	14.91
Pre-emergence Herbicide	3.88	2.07	0.11	1.12	1.76	.93
Post-emergence Herbicide	12.32	14.51	10.46	13.48	12.16	11.82
Fungicide	10.98	10.16	10.52	11.30	5.34	4.22
Custom Pesticide Application	7.02	5.35	6.23	7.26	3.77	2.52
Hand Thinning	8.80	6.11	14.07	9.59	4.20	14.22
Hand Weeding	19.25	11.76	15.13	13.53	9.75	13.34
Migrant Housing	4.21	2.79	6.51	3.15	1.29	4.15
Hired Machine Labor	10.50	12.07	12.58	18.58	13.70	16.43
Nonhired Machine Labor	15.85	14.25	16.74	11.62	13.43	13.15
Soc. Sec. & Workmen's Comp.	4.00	4.18	4.42	5.39	3.42	3.33
Custom Hauling	2.13	4.95	0.82	2.54	3.23	5.91
Fuel and Lube	36.08	31.94	36.83	37.44	35.12	36.65
Repair	19.56	18.76	20.13	21.09	18.12	18.44
Crop Insurance	3.92	4.33	5.65	3.68	2.35	1.85
Miscellaneous[1]	2.55	7.00	3.06	6.68	4.07	7.46
Interest on Operating Capital	19.58	16.79	18.28	19.09	13.88	16.59
Total Variable Costs	$253.73	$233.36	$252.79	$264.65	$212.64	$245.57
Fixed Cost						
Machinery Replacement	$ 44.75	$ 42.92	$ 45.63	$ 49.47	$ 47.56	$ 50.01
Interest on Machinery Investment	30.90	29.90	30.93	35.18	32.84	34.99
Farm Overhead[2]	5.98	8.05	10.73	8.89	8.01	9.59
Investment in Co-op[3]	37.00	25.00	25.00	25.00	25.00	25.00
Management Charge (10% of Total Costs Excluding Land)	37.24	33.92	36.51	38.32	32.61	36.45
Land Charge	63.00	66.00	63.00	68.00	60.00	65.00
Total Fixed Costs	$218.87	$205.80	$211.80	$224.86	$206.02	$221.04
TOTAL COSTS	$472.60	$439.16	$464.59	$489.51	$418.66	$466.61
TOTAL REVENUE[4]	$593.81	$548.13	$628.45	$624.68	$468.53	$504.43
PROFIT (LOSS)	$121.21	$108.97	$163.86	$136.17	$ 49.87	$ 37.82

[1]Includes soil sampling, crop monitoring service, beet hoes, interest and depreciation on nonused beet equipment, machine rent, nontruck custom work, and micronutrients.
[2]Includes insurance, utilities, vehicle license and tax, and bookkeeping.
[3]Interest rate of 8.3% was charged on spring 1982 beet contract price estimate of $300/acre for American Crystal Growers and $450/acre for Minn-Dak growers.
[4]Average yields of surveyed producers, in tons per acre, were 17.61 for Wahpeton, 16.52 for Moorhead, 18.09 for Hillsboro, 18.92 for Crookston, 14.95 for East Grand Forks, and 16.49 for Drayton. Price estimates from sugarbeet cooperative as of August 1983 are used. All sugar from 1982 crop had not been marketed but only minor revisions in payments were expected.