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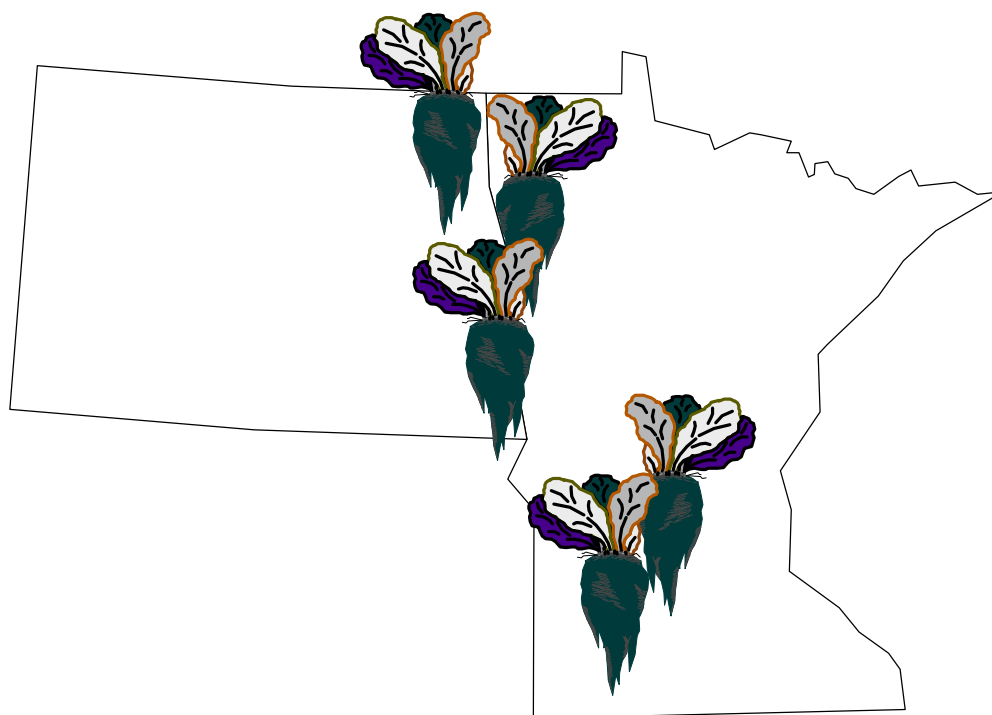
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Economic Contribution of the Sugarbeet Industry to North Dakota and Minnesota



Dean A. Bangsund

F. Larry Leistritz

Department of Agricultural Economics
Agricultural Experiment Station
North Dakota State University
Fargo, North Dakota 58105

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The authors assume responsibility for any errors of omission, logic, or otherwise.

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Abstract

Agricultural industries in small geographical areas with limited acreage tend to be overlooked by those not associated with the growing region or industry. Sugarbeets continue to be produced in a relatively small geographic area and with relatively limited acreage in North Dakota and Minnesota. These factors, along with continued debate over policies affecting domestic sugar industries and recent industry expansions, help justify a continued assessment of the economic importance of the sugarbeet industry to the regional economy.

Revenues from sugarbeet production and expenditures by processors to North Dakota and Minnesota entities in fiscal 1997 represented the direct economic impacts from the industry. Expenditure information was provided by sugarbeet processing and marketing cooperatives. Secondary economic impacts were estimated using input-output analysis.

The sugarbeet industry planted 654,400 acres and harvested 11.9 million tons in 1996. Production and processing activities generated \$831.1 million in direct economic impacts. Total (direct and secondary) annual economic impacts from the sugarbeet industry were estimated at \$2.3 billion. Direct and secondary employment in the industry was 2,486 and 30,436 full-time equivalent jobs, respectively. Tax revenues generated by the industry in North Dakota and Minnesota were \$51 million.

In real terms, gross business volume of the sugarbeet industry in the two states has increased 74 percent since 1987. Increases in business activity from the industry have resulted from expanded acreage and increased processing activities. The sugarbeet industry remains an important agricultural industry in North Dakota and Minnesota.

Key words: sugarbeet industry, North Dakota, Minnesota, economic impact

Highlights

Agriculture has remained a dominant economic sector in North Dakota due to crop production and in Minnesota due to crop and livestock production. Unlike most traditional crops, sugarbeets are produced on relatively few acres and in limited geographic areas. However, Minnesota and North Dakota produced over 45 percent of the nation's sugarbeet crop in 1996.

Sugarbeet production and processing facilities are concentrated in the Red River Valley of North Dakota and Minnesota and in west central Minnesota. Sugarbeets, unlike most traditional crops, are difficult and expensive to transport long distances and have unique storage problems. As a result, several processing facilities have been established in the sugarbeet-producing areas.

Farmers and producers generate direct economic impacts to the area economy through (1) expenditures for production outlays and (2) spending net returns from enterprise operations. A crop production budget was developed to estimate the direct economic impacts from sugarbeet production. Total direct impacts from sugarbeet production in the two states were estimated to be \$832 per acre or \$544.6 million.

Similarly, sugarbeet cooperatives and their processing facilities impact local economies through expenditures for processing inputs, labor, and investment in facilities and capital. Three sugarbeet cooperatives located in eastern North Dakota (Minn-Dak Farmers Cooperative) and Minnesota (American Crystal Sugar Company and Southern Minnesota Beet Sugar Cooperative) were surveyed to obtain cash expenditures made within North Dakota and Minnesota in the 1997 fiscal year. Direct impacts from the cooperatives were estimated at \$286.5 million in fiscal 1997, with about 42 and 58 percent of the direct impacts generated in North Dakota and Minnesota, respectively.

Total direct economic impacts from the sugarbeet industry (sugarbeet production and processing) were estimated at \$831 million in 1997. An input-output model was used to estimate the secondary economic impacts. The \$831 million in direct impacts generated another \$1.5 billion in secondary impacts. Total economic activity (direct and secondary impacts) was estimated at \$2.3 billion in Minnesota and North Dakota. Total collections generated by the sugarbeet industry from sales and use, personal income, and corporate income taxes were estimated at \$51 million in 1997. The cooperatives also employed an equivalent of 2,486 full-time workers and indirectly supported an additional 30,400 full-time equivalent jobs in the two-state area.

Examinations of previous studies of the economic contribution of the sugarbeet industry revealed that the industry has experienced substantial real growth (inflation removed) in the last decade. Since 1987, planted acreage and tons processed have increased 42 percent and 67 percent, respectively. Correspondingly, in real terms, gross business volume generated by the sugarbeet industry in North Dakota and Minnesota has increased 24 percent since 1992 and nearly 74 percent since 1987.

The characteristics of the sugarbeet-growing area suggest most of the industry's economic activity affects local economies, since expenditures for crop inputs (**Retail Trade** sector) and returns to growers (**Households** sector), which represent a majority of the economic activity, are evenly distributed throughout the growing area. Although the sugarbeet industry in Minnesota and North Dakota is not large in terms of acres or geographic area, the magnitude of key economic measures (i.e., retail trade activity, personal income, business activity, and secondary employment) clearly indicates that the industry contributes substantially to local economies and the two-state economy.

Economic Contribution of the Sugarbeet Industry to the Economy of North Dakota and Minnesota

Dean A. Bangsund and F. Larry Leistritz*

INTRODUCTION

Agriculture has historically been the largest component of North Dakota's economic base. During the 1980s, in the face of severe drought and reduced commodity prices, agriculture continued to be the single most important basic sector in the North Dakota economy. Even though other sectors of North Dakota's economy have recently increased, agriculture still comprises over 35 percent of total sales to final demand (Coon and Leistritz 1998). As a result, the economy of North Dakota still depends on the agriculture sector for a large portion of its economic activity.

Minnesota also relies heavily on agriculture for much of its economic activity. Agriculture in Minnesota, not including the forest industry, accounted for 22 percent of all out-of-state sales in 1990 (Senf et al. 1993). Agriculture was the single largest sector, contributing more to out-of-state sales than high technology manufacturing, durable goods, or forest products. Measured in terms of overall economic activity, agriculture generated 13 percent of all economic activity in Minnesota in 1990.

Agriculture in North Dakota is dominated by crop production, while in Minnesota crop and livestock production are more equal in importance. North Dakota typically is considered a small grain-producing state. The reputation as a small grain-producing state is justified, since the state has consistently been ranked third or better nationally in nearly all categories of small grain production. In addition to small grains, North Dakota also is a national leader in the production of sunflower and dry edible beans and annually ranks in the top ten in potato production (North Dakota Agricultural Statistics Service *various years*). Minnesota, much of which is part of the corn belt region of the Midwest, ranks in the top five states for the production of corn, soybeans, sunflowers, navy beans, spring wheat, and alfalfa hay. Also, Minnesota ranks nationally in several livestock categories (dairy, turkeys, hogs, and cattle) (Minnesota Agricultural Statistics Service *various years*).

Sugarbeet production is often overlooked in its contribution to the agriculture sector, due partially to the sheer acreage of other crops in the two states. For example, North Dakota in 1996 planted about 12.7 million acres of wheat, while Minnesota planted 13.5 million acres of corn and soybeans (North Dakota Agricultural Statistics Service *various years*; Minnesota Agricultural Statistics Service *various years*). In comparison, North Dakota and Minnesota planted about 227,000 and 441,000 acres of sugarbeets, respectively. However, both Minnesota and North Dakota have been national leaders in sugarbeet production for several decades.

*Research scientist and professor, respectively, Department of Agricultural Economics, North Dakota State University, Fargo.

Minnesota has been the leading sugarbeet-producing state since 1989 and the leading state 12 out of the last 15 years, while North Dakota has been ranked in the top five for the last 10 years. In 1996, Minnesota and North Dakota produced nearly 45 percent of the nation's sugarbeet crop and accounted for about 48 percent of the nation's planted sugarbeet acreage.

Sugarbeet production is more capital intensive and geographically concentrated than small grains and most row crops; this, along with local processing facilities, has historically contributed to the industry's impact on the two-state economy. Coon and Leistritz (1988) and Bangsund and Leistritz (1993) estimated the economic contribution of the sugarbeet industry in North Dakota and Minnesota in previous years. However, continued debate over the future of national sugar policies and recent expansions by the industry, both in acreage and processing capacity, has prompted a reevaluation of the industry's economic importance.

Often agricultural commodities that are contained in geographically concentrated areas with limited acreage tend to be overlooked by those not associated with the growing region or industry. Sugarbeets continue to be produced in a relatively small geographic area with relatively limited acreage. These factors, along with continued debate over the future of federal farm programs, help to justify a continued assessment of the economic importance of the sugarbeet industry to the regional economy. A reassessment of the industry's economic importance to the region would be helpful to (1) demonstrate the economic significance of future policy changes affecting domestic sugar industries and (2) document the economic effect of recent industry expansions. Information from an impact or contribution study can be valuable for industry, educational, and public relations efforts.

OBJECTIVES

The purpose of this report was to estimate the economic contribution (direct and secondary effects) of the sugarbeet industry to the economy of North Dakota and Minnesota.

Specific objectives include:

- 1) quantifying sugarbeet acreage and production in eastern North Dakota and Minnesota,
- 2) estimating the direct economic impacts of the sugarbeet industry to the North Dakota and Minnesota economies, and
- 3) estimating the secondary economic impacts of the sugarbeet industry to the North Dakota and Minnesota economies.

PROCEDURES

An economic contribution analysis, as defined in this study, represents an estimate of all relevant expenditures and returns associated with an industry (i.e., economic activity from sugarbeet production and processing). The economic contribution approach to estimating economic activity has been used for several similar studies (Bangsund and Leistritz 1998; Bangsund and Leistritz 1995; Coon and Leistritz 1988). The methods and analysis used in this report paralleled those used by Bangsund and Leistritz (1993).

Analysis of the sugarbeet industry required several steps. Discussion of the procedures used in the study was divided into the following sections: (1) sugarbeet production in eastern North Dakota and Minnesota, (2) sugarbeet production expenditures, (3) sugarbeet cooperative expenditures, and (4) application of input-output analysis to estimate secondary impacts.

Sugarbeet Production

Sugarbeet production and processing facilities are concentrated in the Red River Valley of North Dakota and Minnesota and in west central Minnesota (Figure 1). Sugarbeet production is centered around processing plants operated by three producer-owned cooperatives: American Crystal Sugar Company with headquarters in Moorhead, Minnesota; Minn-Dak Farmers Cooperative located in Wahpeton, North Dakota; and Southern Minnesota Beet Sugar Cooperative located in Renville, Minnesota. Generally, the growing conditions in the Red River Valley and west central Minnesota are conducive to sugarbeet production. Sugarbeets, unlike most traditional crops (e.g., small grains, corn, beans), are difficult and expensive to transport long distances. They also have unique storage problems not found with most crops (i.e., they are bulky, require specialized handling equipment, have limited storage life, and must be stored in cold conditions). As a result, processing facilities and sugarbeet production are located in close proximity to each other. The geographic concentration of sugarbeet production and processing in eastern North Dakota and Minnesota accentuates the industry's economic impact.

North Dakota had seven counties that collectively produced about 3.9 million tons of sugarbeets for American Crystal Sugar Company and Minn-Dak Farmers Cooperative in 1996 (Table 1). Two western counties in North Dakota produced a small amount of irrigated sugarbeets; however, those sugarbeets were transported to Montana for processing, and the acreage and production from those counties were not included in this study. Minnesota had over 20 counties that collectively produced nearly 8 million tons of sugarbeets in 1996 (Table 1). The two states had over 654,000 acres of sugarbeets in 1996, with about two-thirds of the acreage in Minnesota. The three sugar cooperatives processed about 11.7 million tons of sugarbeets from the 1996 crop. The difference between tons processed and total yield reported by North Dakota and Minnesota Agricultural Statistics Services is probably attributable to differences in measurement techniques, storage and transportation loss, and shrink.

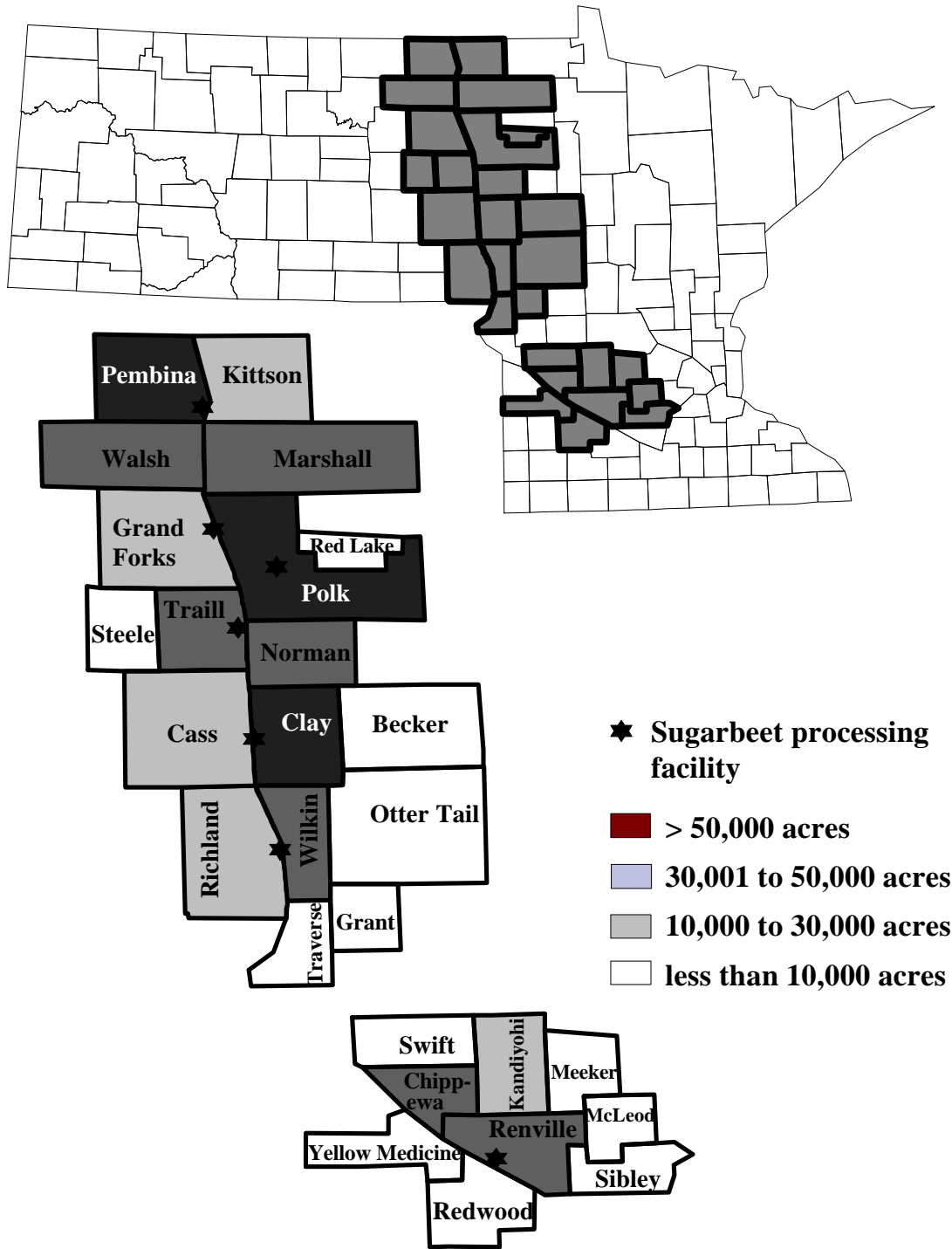


Figure 1. Distribution of Sugarbeet Production and Processing Facilities in Eastern North Dakota and Minnesota, 1996

Sources: North Dakota Agricultural Statistics Service (*various years*) and Minnesota Agricultural Statistics Service (*various years*).

Table 1. Sugarbeet Production, by County, North Dakota and Minnesota, 1996

State/County	Acreage		Yield	Production
	Planted	Harvested		
North Dakota ^a	----- acres -----	-----	- tons/acre -	---- tons ----
Cass	23,100	23,000	19.7	454,100
Grand Forks	26,400	26,200	18.4	482,800
Pembina	57,400	57,000	19.0	1,080,900
Richland	29,900	29,800	17.9	534,000
Steele	900	900	19.0	17,100
Traill	31,600	31,200	19.1	594,700
Walsh	44,100	44,000	17.6	774,400
State	213,400	212,100	18.6	3,938,000
Minnesota				
Becker	2,400	2,400	22.7	54,400
Chippewa	33,300	33,100	18.5	613,600
Clay	62,500	62,400	18.4	1,145,800
Grant	9,200	9,100	18.3	166,600
Kandiyohi	13,500	13,500	20.3	273,700
Kittson	28,200	28,000	15.8	443,400
Marshall	33,700	33,200	16.7	553,900
McLeod	1,000	900	20.1	18,100
Meeker	1,600	1,600	19.1	30,500
Norman	42,200	41,600	19.7	821,100
Otter Tail	2,400	2,400	19.0	45,700
Polk	103,100	102,900	17.4	1,794,800
Red Lake	1,700	1,700	16.8	28,600
Redwood	3,500	3,400	18.3	62,300
Renville	40,200	39,900	19.5	777,000
Sibley	6,200	6,100	20.9	127,200
Swift	4,700	4,700	16.8	79,000
Traverse	7,900	7,800	17.5	136,700
Wilkin	36,900	36,600	18.3	668,700
Yellow Medicine	3,600	3,500	20.4	71,300
Other Counties ^b	3,200	3,200	18.3	58,600
State	441,000	438,000	18.2	7,971,000
North Dakota and Minnesota	654,400	650,100	18.3	11,909,000

^a Does not include sugarbeet production in Williams and McKenzie Counties.

^b A breakdown of the counties in this category was not available.

Sources: North Dakota Agricultural Statistics Service (*various years*) and Minnesota Agricultural Statistics Service (*various years*).

Sugarbeet Production Expenditures

Crop expenses were obtained from the Farm Business Management Programs in North Dakota and Minnesota (Minnesota and North Dakota Farm Business Management 1997). Budgets obtained were for sugarbeet production on owned land and rented land in the Red River Valley in North Dakota and Minnesota. Expenses were averaged between budgets for sugarbeets produced on owned land and rented land by the ratio of owned and rented farm land in each state (U.S. Department of Commerce 1994a, 1994b). Revenues from sugarbeet production were estimated from payments made to producers by the sugarbeet cooperatives.

Cash outlays by sugarbeet farmers represent money spent for fuel, seed, fertilizer, chemicals, machinery, and other items which impact local economies. The budget contained some noncash expenditures, which are considered appropriate production costs, but do not represent a cash expenditure. Non-cash expenditures were treated as revenues retained by the producer.

Sugarbeet Cooperative Expenditures

The three sugarbeet cooperatives located in eastern North Dakota (Minn-Dak Farmers Cooperative) and Minnesota (American Crystal Sugar Company and Southern Minnesota Beet Sugar Cooperative) were asked to provide the amounts of processing, research, distribution, and administrative cash expenditures made within North Dakota and Minnesota in the last fiscal year (Appendix B). Expenditures made in North Dakota and Minnesota by United Sugars were also obtained. Non-cash outlays or expenditures made to entities outside of the two-state area were not included. Itemizations of the expenditures for each cooperative were not included due to confidentiality.

Input-output Analysis

Economic activity from a project, program, or policy can be categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or direct effects of a project, program, or event. Secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within an economy. This process of spending and respending is sometimes termed the multiplier process, and the resultant secondary effects are sometimes referred to as multiplier effects (Leistritz and Murdock 1981).

Input-output (I-O) analysis is a mathematical tool that traces linkages among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). The North Dakota I-O Model has 17 economic sectors, is closed with respect to households (households are included in the model), and was developed from primary (survey) data from firms and households in North Dakota. Empirical testing has shown the North Dakota Input-Output Model is sufficiently accurate in estimating economic impacts in neighboring states (Coon and Leistritz 1994; Coon et al. 1984; Leistritz et al. 1990).

ECONOMIC IMPACTS

The economic contribution from the sugarbeet industry was estimated from production and processing expenditures. Both production and processing expenditures represent the direct economic impacts from the sugarbeet industry. Subsequently, the direct impacts were used with an input-output model to estimate the secondary impacts. Secondary impacts result from the turnover or respending of direct impacts within the area economy. The following section is divided into five major parts: (1) direct impacts, (2) secondary impacts, (3) tax revenue, (4) total economic impacts, and (5) previous industry impacts.

Direct Impacts

From an economic perspective, direct impacts are those changes in output, employment, or income that represent the initial or direct effects of a project, program, or event. The direct impacts from the sugarbeet industry on the economy of North Dakota and Minnesota include (1) expenditures and returns in the production of sugarbeets and (2) expenditures and returns from processing sugarbeets into refined sugar. The following sections describe these direct economic impacts.

Sugarbeet Production

Farmers and producers generate direct economic impacts to the area economy through (1) expenditures for production outlays and (2) net returns. Direct economic impacts from sugarbeet production (i.e., production outlays and producer returns) were estimated by developing a crop production budget. The sugarbeet production budget contained estimated revenue, variable and fixed costs, and returns to unpaid labor, management, and equity (Appendix A). Gross revenue per acre was calculated by dividing sugarbeet payments (i.e., payments made by the cooperatives to the growers) by estimated planted sugarbeet acreage. Variable and fixed costs were estimated by averaging expenses from owned and rented land in 1996. Net returns were defined as the difference between revenue and estimated production expenses.

Production outlays were handled as direct impacts generated by sugarbeet growers in eastern North Dakota and Minnesota. Returns to invested resources (i.e., unpaid labor, management, and equity) were considered direct impacts generated by sugarbeet producers even though they did not represent a cash expenditure. These items were considered retained by the producer, eventually resulting in personal or business purchases. Cash and non-cash expenses from sugarbeet production, variable and fixed, were considered as direct impacts.

Total direct impacts per acre from sugarbeet production should be equal to the gross revenue per acre, providing all economic activity (production expenses and returns to unpaid labor, management, and equity) remains in the North Dakota and Minnesota economies. All expenses and returns associated with sugarbeet production in 1996 were assumed to remain within the two-state economy (i.e., there were no economic leakages associated with the

production of sugarbeets). Total direct impacts from sugarbeet production were estimated at \$832.22 per acre or \$544.6 million (Table 2).

Table 2. Direct Economic Impacts from Sugarbeet Production in Eastern North Dakota and Minnesota, 1996

Expense\Returns ^a	Direct Impacts	
	Per Acre	Total
Payments to Growers		\$544,602,326
Planted Acreage		654,400
Revenue per Acre		\$832.22
	--- \$ ---	-- 000s \$ --
Variable Costs	412.53	269,961
Fixed Costs	170.07	111,292
Total Costs	582.60	381,253
Net Returns	249.62	163,350
Direct Impacts	832.22	544,602

^a See Appendix A for complete budget.

Total direct impacts of \$832 per planted acre were divided out according to variable costs, fixed costs, and returns to unpaid labor, management, and equity. Variable costs (i.e., outlays for seed, herbicide, fertilizer, etc. that change with the level of production) were estimated at \$412.53 per acre. Fixed costs (i.e., expenses that do not change with the level of production, such as land debt payments, utilities, and machinery purchases) were estimated to be \$170.07 per acre. Total expenses were estimated at \$582.60 per acre. Net returns were estimated at \$249.62 per acre (Table 2). Based on planted sugarbeet acreage in the two states, about two-thirds of the direct impacts from sugarbeet growers were generated in Minnesota.

Sugarbeet Processing

Sugarbeet cooperatives and their processing facilities impact local economies through expenditures for production and processing inputs, labor, and investment in facilities and capital. American Crystal Sugar Company, Minn-Dak Farmers Cooperative, and Southern Minnesota Beet Sugar Cooperative were surveyed to estimate their fiscal 1997 cash expenditures (Appendix B). Expenditures from United Sugars were obtained through contacts at American Crystal Sugar Company. Only cash expenditures and outlays made within the two-state economy were included.

Total cash expenditures made to entities in the two-state economy by the processing cooperatives and sugar marketing alliances in North Dakota and Minnesota were \$831.1 million in fiscal 1997. However, \$544.6 million represented payments to growers and was reflected in the direct impacts from sugarbeet production. Direct economic impacts from the cooperatives were \$286.5 million (Table 3). Approximately 42 and 58 percent of the direct impacts from the cooperatives were generated in North Dakota and Minnesota, respectively. Processing and marketing cooperatives also were directly responsible for 2,486 full-time equivalent jobs in fiscal 1997.

Table 3. Direct Economic Impacts from Sugarbeet Processing in North Dakota and Minnesota, 1997

Expenditure Category	Expenditures in North Dakota and Minnesota ^a
	-- 000s \$ --
Payments to sugarbeet growers	524,876
Other payments to growers	19,726
Contract construction	50,304
Plant maintenance and overhaul	10,019
Transportation	28,009
Communication	459
Public utilities	55
Miscellaneous manufacturing	11,935
Wholesale trade	3,196
Retail trade	434
Finance, insurance, and real estate	11,099
Business and personal services	493
Professional and social services	768
Energy ^b	11,460
State and local taxes ^c	4,063
Labor ^d	120,339
Other expenses	33,589
Total cash expenditures	831,075
Direct impacts from cooperatives ^e	286,473
Full-time equivalent jobs	2,486

^a Only expenditures made within the two states were included. Substantial expenditures for coal, limerock, coke, chemicals, shipping, and plant equipment were made to entities outside of the two-state area.

^b Included electricity, natural gas, and petroleum.

^c Included sales and use, property, and miscellaneous taxes.

^d Included wages and salaries, workman's compensation, unemployment contributions, and employee benefits.

^e Direct impacts were calculated by subtracting payments to sugarbeet growers from total expenditures. Payments made to sugarbeet growers were considered direct impacts attributable to sugarbeet production.

Total direct impacts from the sugarbeet industry (production and processing) in North Dakota and Minnesota were estimated at \$831.1 million in fiscal 1997. Sugarbeet production accounted for 66 percent (\$544.6 million) of all direct impacts, while sugarbeet processing accounted for 34 percent (\$286.5 million) of all direct impacts. Total direct impacts in Minnesota were estimated at \$535.6 million (\$164.8 million from cooperatives and \$370.8 million from growers). Total direct impacts in North Dakota were estimated at \$295.5 million (\$121.6 million from cooperatives and \$173.8 million from growers). Minnesota sugarbeet growers, sugarbeet processing in Minnesota, North Dakota sugarbeet growers, and sugarbeet processing in North Dakota accounted for 44.6 percent, 19.8 percent, 20.9 percent, and 14.6 percent of all direct impacts in the two-state economy in fiscal 1997, respectively.

Secondary Impacts

The secondary impacts of the sugarbeet industry in North Dakota and Minnesota were estimated using the North Dakota Input-Output Model. The North Dakota Input-Output Model traces linkages among sectors of an economy and calculates total business activity resulting from a direct impact in a basic sector (Coon et al. 1985).

This process of spending and respending can be explained by using an example. A single dollar from an area sugarbeet producer (**Households** sector) may be spent for a bag of sugar at the local store (**Retail Trade** sector); the store uses part of that dollar to pay for the next shipment of sugar (**Transportation** and **Agricultural Processing** sectors) and part to pay the store employee (**Households** sector) who shelved or sold the sugar; the sugar processor uses part of that dollar to pay for the sugarbeets used to make the sugar (**Agriculture-Crops** sector) ... and so on.

Sugarbeet production expenditures, returns to sugarbeet growers, and production outlays by sugarbeet cooperatives were allocated to various economic sectors of the North Dakota Input-Output Model. Seed, herbicide, fungicide, insecticide, fertilizer, fuel, lubrication, repairs, and machinery expenses were allocated to the **Retail Trade** sector. Custom hire expenses were allocated to the **Business and Personal Services** sector. Crop insurance and interest expenses were allocated to the **Finance, Insurance, and Real Estate** sector. Property taxes were allocated to the **Government** sector. Utility expenses were allocated to the **Communication and Public Utilities** sector. Hired labor, land rent, beet stock charges, and net returns were allocated to the **Households** sector.

The sugarbeet cooperatives' expenditures were allocated to sectors of the North Dakota Input-Output Model in the same manner as production outlays. Contract construction was allocated to the **Construction** sector. Transportation expenses were allocated to the **Transportation** sector. Miscellaneous manufacturing, wholesale trade expenses, and 20 percent of plant maintenance and overhaul expenses were allocated to the **Agricultural Processing and Miscellaneous Manufacturing** sector. Twenty percent of plant maintenance and overhaul and one-third of "other" expenses were allocated to **Business and Personal Services** sector. Expenses allocated to the **Retail Trade** sector included 40 percent of plant maintenance and overhaul and two-thirds of "other" expenses. Expenses for petroleum, natural gas,

communications, and other utilities were allocated to the **Communications and Public Utilities** sector. Employee benefits, insurance, and interest expenses were allocated to the **Finance, Insurance, and Real Estate** sector. Sugarbeet research was allocated to the **Professional and Social Services** sector. All taxes, unemployment, and workmens compensation were allocated to the **Government** sector. Salary and wage expenses were allocated to the **Households** sector.

The **Households** and **Retail Trade** sectors collectively accounted for 41 percent of all direct impacts (Table 4). The **Construction** sector accounted for 18 percent of direct impacts, reflecting recent plant expansions by the cooperatives. Noticeable direct impacts were also generated in the **Finance, Insurance, and Real Estate** (13 percent of total) and **Agricultural Processing and Miscellaneous Manufacturing** (10 percent of total) sectors.

Total direct impacts of \$831.1 million from the sugarbeet industry in North Dakota and Minnesota generated about \$1.5 billion in secondary impacts (Table 4). Secondary economic impacts were greatest in the **Households** (\$496 million), **Retail Trade** (\$452 million), **Finance, Insurance, and Real Estate** (\$100 million), **Communications and Public Utilities** (\$73 million) and **Government** (\$72 million) sectors. The economic activity in the **Households** sector represents economy-wide personal income resulting from industry expenditures and their subsequent secondary effects. Each dollar of direct impacts generated \$1.79 in secondary impacts.

Table 4. Direct, Secondary, and Total Economic Impacts from the Sugarbeet Industry in North Dakota and Minnesota, 1997

Economic Sector	Economic Impacts of the Sugarbeet Industry		
	Direct	Secondary	Total
	----- (000s) \$ -----		
Agriculture-livestock	0	57,575	57,575
Agriculture-crops	0	32,891	32,891
Nonmetal Mining	0	5,127	5,127
Construction	52,307	53,953	106,260
Transportation	28,009	8,260	36,269
Communication and Public Utilities	15,895	72,635	88,530
Agricultural Processing and Miscellaneous Manufacturing	17,135	46,916	64,051
Retail Trade	228,189	452,157	680,346
Finance, Insurance, and Real Estate	90,220	99,947	190,167
Business and Personal Service	26,740	38,223	64,963
Professional and Social Service	3,252	54,956	58,208
Households	349,618	496,161	845,779
Government	19,708	71,669	91,377
Totals	831,073	1,490,470	2,321,543
Direct employment (FTE)			2,486
Secondary employment (FTE)			30,436

Tax Revenue

Tax collections are another important measure of the economic impact of an industry on an economy. Tax implications have become an increasingly important measure of local and state-level impacts. Some of the interest in estimating tax revenue generated by an industry has stemmed from public awareness of the importance of tax revenue to local and state governments. In an era of reduced federal funding, revenue shortfalls, and growing public demand on governments to balance their budgets while providing constant or increased levels of services and benefits, tax collections have become an important factor in assessing economic impacts.

Business activity alone does not directly support government functions; however, taxes on personal income, retail trade, real estate property, and corporate income are important revenue sources for local and state governments. Total economic impacts in the **Retail Trade** sector were used to estimate revenue from sales and use taxes. Economic activity in the **Households** sector was used to estimate personal income tax collections. Similarly, corporate income was estimated from the economic activity in all business sectors (excluding the **Households**, **Government**, and **Agriculture** sectors). The sugarbeet cooperatives and growers paid an estimated \$12.6 million in property taxes in North Dakota and Minnesota in 1997. Property taxes were included in the direct impacts.

Tax collections were estimated separately for North Dakota and Minnesota. Direct economic impacts, those from sugarbeet production and processing, were estimated for each state. I-O analysis was used to estimate total business activity in each state. Total business activity, which is comprised of personal income, retail trade, and other business activity, was used to estimate tax revenue. Tax revenue generated by the sugarbeet industry in North Dakota included \$11 million in sales and use taxes, \$4 million in personal income taxes, and \$1.4 million in corporate income taxes in fiscal 1997 (Table 5). The sugarbeet industry in Minnesota generated \$12.7 million in sales and use taxes, \$18.9 million in personal income taxes, and \$3 million in corporate income taxes in fiscal 1997 (Table 5). Total tax collections generated by the sugarbeet industry in fiscal 1997 from these three taxes alone in North Dakota and Minnesota were about \$51 million.

Table 5. Estimated Tax Collections Generated by the Sugarbeet Industry in North Dakota and Minnesota, 1997

Tax	North Dakota	Minnesota	Total
	----- million dollars -----		
Sales and Use	11.0	12.7	23.7
Personal Income	4.0	18.9	22.9
Corporate Income	1.4	3.0	4.4
Total Taxes	16.4	34.6	51.0

Total Economic Impacts

Total business activity from sugarbeet industry expenditures and returns in Minnesota and North Dakota was estimated at \$2.3 billion in fiscal 1997 (Table 4). The economic areas of the two-state economy with the greatest total economic impact included the **Households** (\$846 million), **Retail Trade** (\$680 million), **Finance, Insurance, and Real Estate** (\$190 million), **Construction** (\$106 million), **Government** (\$91 million), and **Communications and Public Utilities** (\$89 million) sectors.

The North Dakota I-O Model also estimates secondary employment. Employment estimates represent the number of full-time jobs generated as a result of total business activity. The sugarbeet cooperatives were directly responsible for 2,486 full-time equivalent jobs and indirectly supported an additional 30,436 full-time equivalent jobs. The sugarbeet industry also generated about \$16.4 million in tax revenue in North Dakota and another \$34.6 million in tax revenue in Minnesota (not including property taxes).

The number of jobs created directly from sugarbeet production is difficult to estimate because most sugarbeet farmers also raise other crops. This complicates the employment estimate since if they did not raise sugarbeets, they likely would remain employed raising other crops. Also, sugarbeet labor requirements are seasonal, requiring substantial additional labor during planting, weeding, thinning, and harvesting. Thus, estimating full-time employment equivalents is difficult. Although full-time employment equivalents for additional part-time hired labor are unknown, most of the seasonal employment (i.e., migrant workers, harvest labor, and truck drivers) is captured in the input-output analysis. Secondary employment was calculated based on total business activity and expressed in full-time equivalents. Seasonal employment, measured in terms of individuals employed, would be higher than the number of full-time equivalents, since those workers are employed for short time periods.

Previous Industry Impacts

Previous estimates of the economic contribution of the sugarbeet industry were compared to analyze the changing economic importance of the industry. Two prior studies examining the economic contribution of the sugarbeet industry in North Dakota and Minnesota have employed similar methodologies at various points in time. Thus, valid comparisons of previous estimates can be made by adjusting previous industry estimates to reflect real dollars (effects of inflation removed). Previous estimates from Coon and Leistriz (1988) and Bangsund and Leistriz (1993) were adjusted using the Consumer Price Index (U.S. Department of Labor 1998) to reflect 1997 equivalent dollars.

Using a survey of area cooperatives to obtain processing, research, and distribution expenditures and using crop budgets to estimate farmers' production expenditures, Coon and Leistriz (1988) estimated the overall business activity generated from the sugarbeet industry in North Dakota and Minnesota in 1987. Using similar methodologies, Bangsund and Leistriz

(1993) also surveyed sugarbeet cooperatives to obtain their operating expenditures and producer payments in North Dakota and Minnesota. However, Bangsund and Leistriz (1993) included producer (grower) net returns and land expenses associated with sugarbeet production in their study, two items not included in the study by Coon and Leistriz (1988). This study differs from the study by Bangsund and Leistriz (1993) by including expenditures by United Sugars to entities in North Dakota and Minnesota. All other aspects of the three studies remained similar.

Adjusting previous estimates of industry size for inflation revealed that the sugarbeet industry exhibited real growth (size has increased after adjusting for inflation) over the last decade (Table 6). Since 1987, planted acreage and tons processed have increased 42 percent and 67 percent, respectively. Planted acreage in 1987 was about 460,000 acres, while planted acreage in 1996 increased to 654,000 acres. Correspondingly, in real terms (inflation removed), gross business volume generated by the sugarbeet industry in North Dakota and Minnesota has increased 24 percent since 1992 and nearly 74 percent since 1987. Other economic indicators also have shown real growth since 1987, such as a 72 percent increase in tax revenue generated by the industry and a 14 percent increase in direct employment within the industry.

Recent changes in the economic impact of the industry have not been proportional in North Dakota and Minnesota. The economic size of the sugarbeet industry in North Dakota increased 32 percent in real terms since 1992, while the sugarbeet industry in Minnesota increased 20 percent during the same period. Estimates of the economic impact of the sugarbeet industry by state were not available for 1987. North Dakota currently captures about 36 percent of the industry's economic activity, up from 33 percent in 1992.

Although this assessment represents the most comprehensive economic study of the sugarbeet industry to date, previous studies have been sufficiently similar in approach that valid comparisons were made of industry size over time. The economic size and importance of the sugarbeet industry in North Dakota and Minnesota has increased dramatically in the last decade, with subtle shifts in economic growth favoring North Dakota over Minnesota.

CONCLUSIONS

The sugarbeet industry analyzed in this study is geographically limited to the Red River Valley of North Dakota and Minnesota and to west central Minnesota. Within this area, sugarbeets are produced and processed into refined sugar. The industry is concentrated geographically and structurally, which boosts the economic effect of the industry on local economies. However, because sugarbeets are produced in a relatively small area compared to other traditional crops and livestock within the two states and with relatively few acres, the economic impact generated by the industry can be overlooked or underestimated.

Table 6. Economic Size of the Sugarbeet Industry in North Dakota and Minnesota, Selected Years

Economic Indicators	Sugarbeet Industry Activity in Various Years		
	1987 ^a	1992 ^b	1997 ^c
Gross Business Volume (nominal dollars)	985,709,000	1,635,800,000	2,321,500,000
Gross Business Volume (1997 dollars) ^d	1,337,300,000	1,871,300,000	2,321,500,000
Direct Employment	2,175	2,410	2,486
Secondary Employment	14,898	20,942	30,436
Tax Revenue Generated (1997 dollars)	29,700,000	38,400,000	51,000,000
Planted Acreage	460,000	554,400	654,400
Economic Impact per Acre (1997 dollars)	2,907	3,375	3,548
Tons of Sugarbeets Processed ^e	7,000,000	9,273,819	11,690,823
Economic Impact per Ton (1997 dollars)	191.04	201.78	198.57
Gross Business Volume by State (1997 dollars)			
North Dakota	na	626,886,000	825,357,000
Minnesota	na	1,244,414,000	1,496,186,000

na--not available.

^a Coon and Leistritz (1988).

^b Bangsund and Leistritz (1993).

^c Current figures include producer net returns, land expenses in sugarbeet production, and expenditures from associated marketing efforts. All three items were excluded from Coon and Leistritz (1988). Expenditures from associated marketing efforts (i.e., United Sugars) were excluded from Bangsund and Leistritz (1993).

^d Adjusted using the Consumer Price Index (U.S. Department of Labor 1998).

^e Exact amount of sugarbeets processed was not available from Coon and Leistritz (1988).

The purpose of this study was to estimate the economic contribution of the sugarbeet industry to the North Dakota and Minnesota economy in 1997. An economic contribution analysis, as used in this study, represents in absolute terms an estimate of all relevant expenditures and their subsequent effects associated with an industry.

A sugarbeet production budget was developed to estimate costs of production and returns from growing sugarbeets in the two states. The sugarbeet processing cooperatives and joint marketing entities in Minnesota and North Dakota were surveyed to obtain in-state expenditures. Combined expenditures and returns from sugarbeet production and processing in North Dakota

and Minnesota were estimated at \$831.1 million in fiscal 1997. The \$831.1 million in direct impacts, based on input-output analysis, generated another \$1.5 billion in secondary impacts. The sugarbeet industry employed 2,486 full-time equivalent workers and, based on total business activity, supported an additional 30,436 full-time equivalent jobs in the two-state area. Total economic activity (direct and secondary impacts) was estimated at \$2.3 billion annually, including \$846 million in economy-wide personal income and \$680 million in annual retail sales. Also, the sugarbeet industry generated about \$51 million in tax revenue, including tax collections of \$16.4 million in North Dakota and \$34.6 million in Minnesota. About 36 percent of the economic impacts were generated in North Dakota and 64 percent in Minnesota.

For every dollar the sugarbeet industry spent in North Dakota and Minnesota, \$1.79 in additional business activity was generated. Each acre of sugarbeets planted generated about \$3,550 in total business activity (production, processing, and secondary impacts) or, expressed alternatively, each ton of sugarbeets processed generated about \$198 in total business activity.

Examinations of previous studies of the economic contribution of the sugarbeet industry revealed that the industry has experienced substantial real growth (inflation effects removed) in the last decade. Since 1987, planted acreage and tons processed have increased 42 percent and 67 percent, respectively. Correspondingly, in real terms, gross business volume generated by the industry in North Dakota and Minnesota has increased 24 percent since 1992 and nearly 74 percent since 1987.

The sugarbeet industry in Minnesota and North Dakota contributes substantially to the two-state economy. Not only was the dollar volume of business activity considerable, but most processing plants are located in rural areas of the two states. Even though the sugarbeet industry has processing plants located throughout the sugarbeet-growing area, the size of the sugarbeet-growing area suggests much of its economic activity affects local economies. Expenditures for crop inputs and returns to growers, which represent a majority of the economic activity, are evenly distributed throughout the growing area. Substantial impacts in two major sectors of the economy, **Households** and **Retail Trade**, help to support this conclusion. In contrast, economic activity in other sectors of the economy may represent a concentration of economic activity in one or two major cities or with a few large firms (e.g., **Communications and Public Utilities**).

Although the sugarbeet industry in Minnesota and North Dakota is not large in terms of acres or geographic area, if measured in terms of personal income, retail sales, total business activity, tax revenue collections, and employment (direct and secondary), its economic contribution is highly apparent. The industry is an important and substantial contributor to both local economies and the two-state economy.

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APPENDIX A

Sugarbeet Production Budget

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Sugarbeet Production Expenses per Planted Acre, North Dakota and Minnesota, 1996

Gross Revenue

Sugarbeet payments to growers	\$544,602,326
Total planted acreage in eastern North Dakota and Minnesota	654,400
Total revenue per planted acre	<u>\$832.22</u>

Variable Costs (\$/acre)	Owned Land	Rented Land	Average
Seed	38.05	38.73	38.37
Chemicals	84.58	84.06	84.34
Fertilizer	29.91	34.76	32.17
Custom Hire	18.95	20.00	19.44
Hired Labor	25.04	27.35	26.12
Insurance	15.51	13.73	14.68
Fuel and lubrication	27.14	28.44	27.75
Repairs	51.08	50.98	51.03
Leases	0.30	0.20	0.25
Land Rent*	0.0	59.60	27.81
Interest	17.32	21.87	19.44
Beet Stock Charge	67.03	64.34	65.77
Miscellaneous	3.23	7.79	5.36
Total Variable Costs	<u>378.14</u>	<u>451.85</u>	<u>412.53</u>

Fixed Costs (\$/acre)

Machinery & Building Depr.	44.06	38.73	41.57
Interest	62.52	19.37	42.39
Custom Hire	0.53	0.83	0.67
Utilities	6.38	5.55	5.99
Insurance	5.21	5.33	5.27
Property Tax*	16.97	16.97	16.97
Dues and Professional Fees	3.43	3.39	3.41
Repairs	2.34	0.0	1.25
Hired Labor	28.16	25.92	27.11
Leases	11.26	11.39	11.32
Miscellaneous	12.20	16.30	14.11
Total Fixed Costs	<u>193.06</u>	<u>143.78</u>	<u>170.07</u>

Total Costs 571.20 595.63 582.60

Returns to Unpaid Labor, Management, and Equity 261.02 236.59 249.62

*Property tax expense for owned land was subtracted from cash rent. Property tax expense was not listed in the budget for rented land. By incorporating charges for property taxes on rented land, variable expenses were reduced by the amount of property tax and subsequently, fixed costs on rented land were increased by the same amount. This was done to account for property tax expense for all land used to produce sugarbeets.

Budget Sources and General Composition

Expenses for sugarbeet production on owned land and rented land were obtained from Minnesota and North Dakota Farm Business Management (1997). Expenses represented an average of production costs for sugarbeet production in the Red River Valley for both North Dakota and Minnesota. Expenses for the Red River Valley were used for sugarbeet production in south central Minnesota (Southern Minnesota Beet Sugar Cooperative acreage). Budgets for owned and rented land were averaged by the amount of owned-to-rented farmland in North Dakota and Minnesota (U.S. Department of Commerce 1994a, 1994b). Per acre revenue was determined by dividing total grower payments (sugarbeet payments and other payments) by total planted acreage.

APPENDIX B

Sugarbeet Processor Expenditures Survey

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INSTRUCTIONS

Data provided from this survey will be used to estimate the contribution the sugarbeet industry makes to the economies of North Dakota and Minnesota. All the information you provide will be kept strictly confidential. The following general instructions are suggested for completing the questionnaire.

1. Use information from the most recently completed fiscal year.
2. Information should be recorded in dollar terms.
3. Include information for all of the organization's processing facilities on this questionnaire.
4. Include relevant information from all business ventures and other cooperative arrangements (United Sugars, Midwest Agri-Commodities, ProGold, others)
4. If you cannot identify whether expenditures were made to North Dakota or Minnesota entities, please indicate this on the form.
5. When exact information is not available, please estimate.
6. Definitions for selected expenditure items and their corresponding Standard Industrial Classification (SIC) code listing are included to help in determining allocation of expenditures.
7. If you have questions, please contact:

Dean Bangsund (701-231-7471 fax 701-231-7400)
Larry Leistritz (701-231-7455)
Department of Agricultural Economics
North Dakota State University
Fargo, ND 58105-5636

DEFINITIONS FOR EXPENDITURE ITEMS
(According to the Standard Industrial Classification Manual)

Construction: Includes building construction--general contractors engaged in construction of residential, farm, industrial, public, and other buildings. (Major Groups 15, 16, and 17)

Transportation: Includes railroad, motor freight, water transportation, air transportation, pipeline transportation of petroleum, and other transportation to include packing and crating services, and rental of transportation equipment. (Major Groups 40, 41, 42, 43, 44, 45, 46, and 47)

Communications: Includes establishments engaged in telephone, telegraph, radio, television, and other communication services. (Major Group 48)

Public Utilities: Includes natural gas companies engaged in the transmission, storage, or distribution of natural gas. Also, water supply and sanitary services are included. (Major Group 49 except Group 491)

Wholesale Trade: Includes establishments primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers, or acting as agents in buying merchandise for or selling merchandise to such persons or companies. (Major Groups 50 and 51)

Retail Trade: Includes establishments engaged in selling merchandise for personal, household, or farm consumption, and rendering services incidental to the sale of goods. (Major Groups 52, 53, 54, 55, 56, 57, 58, and 59)

Finance, Insurance, and Real Estate: Includes institutions engaged in banking or other financial institutions, insurance, and real estate. (Major Groups 60, 61, 62, 63, 64, 65, 66, and 67)

Business and Personal Services: Includes firms operating lodging services, repair, laundry, entertainment, other personal services predominantly to private individuals, credit collectional, janitorial, and stenographic services. (Major Groups 70, 72, 73, 75, 76, 78 and 79)

Professional and Social Services: Includes establishments engaged in furnishing health, medical, legal, educational, research and development, and other professional services. (Major Groups 80, 81, 82, 83, 84, 86, 88, and 89)

SUGARBEET PROCESSOR EXPENDITURES SURVEY

Cooperative: _____

Location: _____

I. Expenditures (_____ year).

Items For Which Expenditures are Made	<u>Estimated Annual Expenditure In</u>	
	North Dakota	Minnesota
	dollars	
Payments to sugarbeet growers (sugarbeet production)		
Other payments to sugarbeet growers (capital returns, etc.)		
Contract construction		
Plant maintenance and overhaul		
Transportation		
Communications		
Public utilities		
Miscellaneous manufacturing		
Wholesale trade		
Retail trade		
Finance, insurance, and real estate		
Business and personal services		
Professional and social services		
Coal		
Electricity		
Petroleum/natural gas		
Wages and salaries		
Benefits		
Sugarbeet research funded		
Government (taxes paid in ND and MN only)		
Property taxes		
Sales and use taxes		

Workman's compensation		
Unemployment		
Other taxes (please specify)		
Other Expenses (please specify)		

II. Total annual revenue (from all ventures): \$ _____

III. Number of employees in full-time equivalents: _____ full-time equivalent jobs

IV. Sugarbeets processed: _____ tons

V. Sugarbeet acreage: _____ acres planted _____ acres harvested

VI. Comments:
