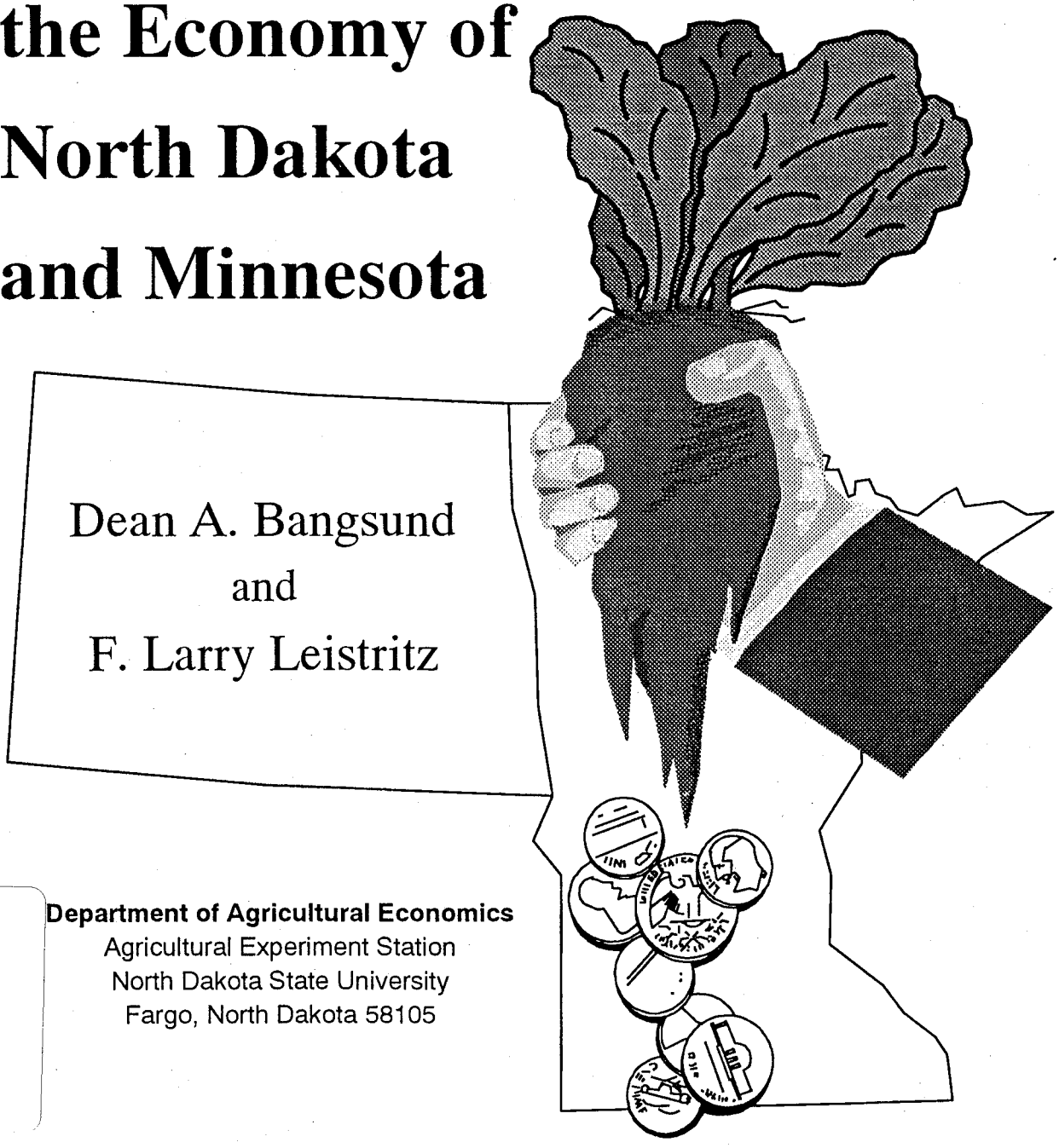
Agricultural Economics Report No. 305 September 1993

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



Dean A. Bangsund
and
F. Larry Leistritz

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

ACKNOWLEDGMENTS

Our appreciation and thanks are extended to Mark Dillon, American Crystal Sugar Company; Jim Widner and Jeff Plathe, Southern Minnesota Beet Sugar Cooperative; Tom Knudsen and Bruce Fronning, Minn-Dak Farmers Cooperative; and Matthew Smith, Minnesota Department of Revenue for their cooperation and efforts in providing financial information. The information supplied by the sugarbeet cooperatives provided the basis for much of this study's analysis.

Thanks are given to Carol Jensen for document preparation, JoAnn Thompson for cover design, Charlene Lucken and Rita Hamm for editorial assistance, and to our colleagues who reviewed this manuscript.

Financial support was provided by the Sugarbeet Research and Education Board of Minnesota and North Dakota. We express our appreciation to this organization for their support.

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

TABLE OF CONTENTS

List of Tables

List of Figures

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, the contribution of sugarbeets to the agriculture sector is often overlooked partially because of the sheer acreage of traditional crops (small grain and row crops) and the level of livestock production in the two states. However, Minnesota has been the leading sugarbeet-producing state 8 out of the last 10 years, while North Dakota has been ranked fourth during the same period. Minnesota and North Dakota produced over one-third of the nation's sugarbeet crop in 1992 on only 550,000 acres.

Sugarbeet production and processing facilities are concentrated in the Red River Valley of North Dakota and Minnesota and in westcentral 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) returns to unpaid labor and investment. 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 $676 per acre or $374.6 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 last fiscal year. Direct impacts from the cooperatives were estimated at $200.9 million in 1992, with about 33 and 67 percent of the direct impacts generated in North Dakota and Minnesota, respectively.

Direct economic impacts from the sugarbeet industry (sugarbeet production and processing) were estimated at $575.5 million in 1992. An input-output model was used to estimate the secondary economic impacts. The $575.5 million in direct impacts generated another $1.06 billion in secondary impacts. Total economic activity (direct and secondary impacts) was estimated to be $1.635 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 $33.6 million in 1992. The cooperatives also employed an equivalent of 2,410 full-time workers and indirectly supported an additional 20,942 full-time equivalent jobs in the two-state area.

*The characteristics of the sugarbeet-growing area suggest most of its 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 been historically the largest single 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 increased dramatically, agriculture still comprised over 41 percent of total sales to final demand from 1985 to 1989 (Leistritz and Coon 1991). As a result, the economy of North Dakota still depends upon the agriculture sector for a large portion of its economic activity.

Minnesota also relies heavily upon 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 nearly 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 ranks third or better nationally in all categories of small grain production, with the exception of winter wheat. North Dakota also is the leading state in the production of all sunflower and dry edible beans and ranks in the top ten in potato production (North Dakota Agricultural Statistics Service 1993). Minnesota, most of which is part of the corn belt production area 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 1993).

---

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

Sugarbeet production is often overlooked in its contribution to the agriculture sector, due partially to the sheer acreage of small grain in North Dakota and the acreage of corn and soybeans and livestock production in Minnesota. For example, North Dakota in 1992 planted about 11.6 million acres of wheat, while Minnesota planted 12.7 million acres of corn and soybeans (North Dakota Agricultural Statistics Service 1993; Minnesota Agricultural Statistics Service 1993). In comparison, North Dakota and Minnesota planted about 200,000 and 370,000 acres of sugarbeets, respectively. However, Minnesota has been the leading sugarbeet-producing state since 1989 and the leading state 8 out of the last 10 years, while North Dakota has been ranked fourth for the last 10 years. Minnesota and North Dakota produced over one-third of the nation's sugarbeet crop in 1992. Thus, these basic statistics suggest that sugarbeet production in the two states contributes to the agriculture sector and to the overall economy.

Sugarbeet production is generally 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) estimated the economic contribution of the sugarbeet industry in eastern North Dakota and Minnesota. Using a survey of area cooperatives to obtain processing, research, and distribution expenditures and crop budgets to estimate farmers' production expenditures, Coon and Leistritz (1988) estimated the overall business activity generated from the sugarbeet industry in the two states was about $986 million in 1987. Total employment, both directly and indirectly related to the economic activity the sugarbeet industry generated in 1987, was estimated at about 17,000 full-time jobs.

Information from an impact or contribution study can be valuable for industry, educational, and public relations efforts. Determining the economic contribution of a given industry provides information about its importance to local economies. For the sugarbeet industry, this type of analysis is beneficial because the industry is geographically concentrated. Thus, the purpose of this study is to estimate the economic contribution of the sugarbeet industry to the North Dakota and Minnesota economy in 1992.

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 economy, and

3) estimating the secondary economic impacts of the sugarbeet industry to the North Dakota and Minnesota economy.

PROCEDURES

An economic contribution analysis, as defined in this study, represents an estimate of all local expenditures 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 in North Dakota (Bangsund and Leistritz 1992; Coon and Leistritz 1988; Coon and Leistritz 1986; Coon et al. 1986). The methods and analysis used in this report parallel those used by Coon and Leistritz (1988).

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 generate secondary impacts.

Sugarbeet Production

Sugarbeet production and processing facilities are concentrated in the Red River Valley of North Dakota and Minnesota and in westcentral 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 westcentral 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, and have limited storage life). As a result, several processing facilities have been established in the sugarbeet-producing areas. The geographic concentration of sugarbeet production and processing in eastern North Dakota and Minnesota makes the industry's economic impact more recognizable.

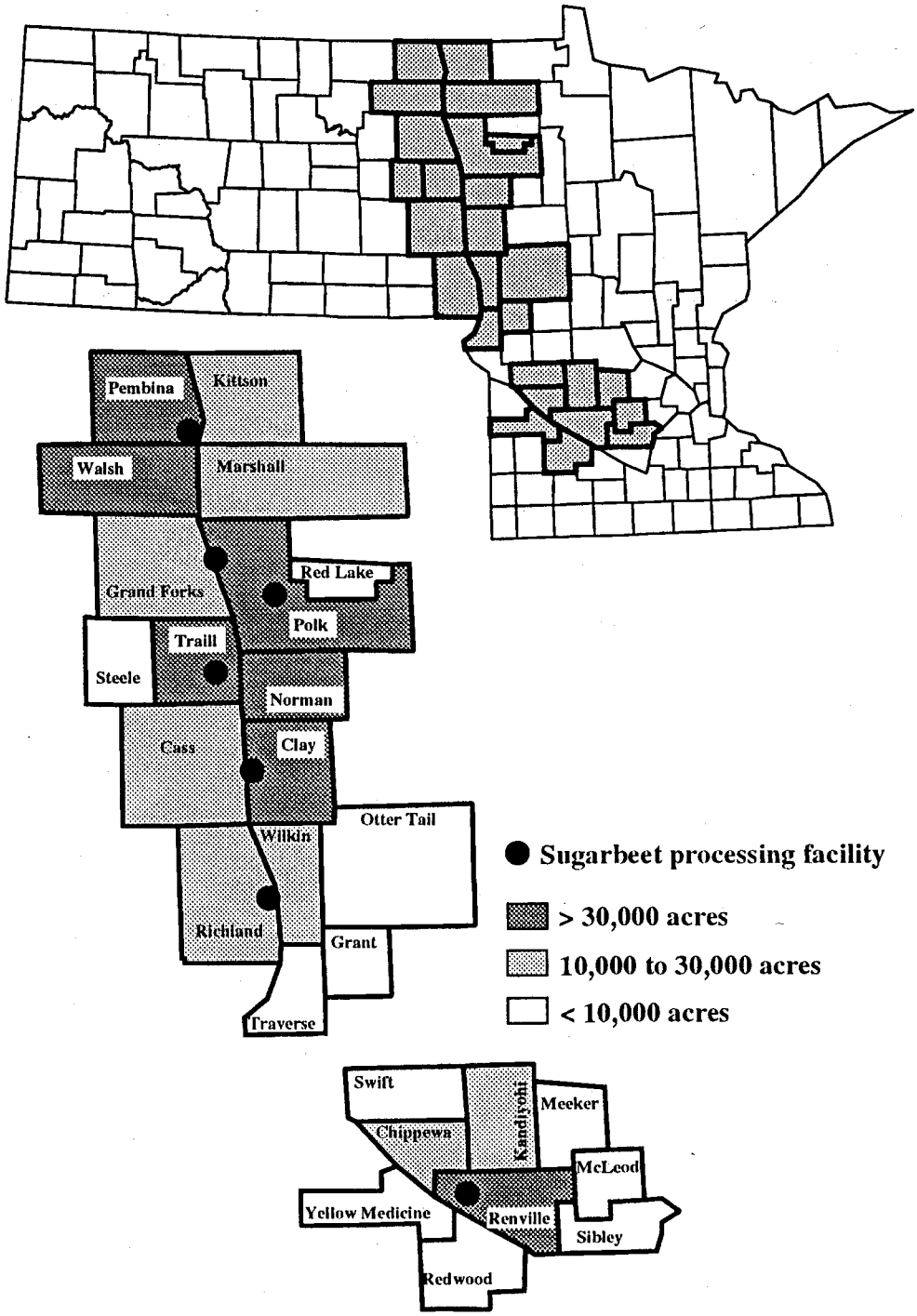


Figure 1. Geographic Distribution of Sugarbeet Production and Processing Facilities in Eastern North Dakota and Minnesota, 1992

SOURCE: North Dakota Agricultural Statistics Service 1993; Minnesota Agricultural Statistics Service 1993.

North Dakota had seven counties that collectively produced about 3.1 million tons of sugarbeets for American Crystal Sugar Company and Minn-Dak Farmers Cooperative in 1992 (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 19 counties that collectively produced about 6.8 million tons of sugarbeets in 1992 (Table 1). The two states had over 550,000 acres of sugarbeets in 1992, with about two-thirds of the acres in Minnesota. The three sugar cooperatives processed about 9.3 million tons of sugarbeets in 1992. 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.

Sugarbeet Production Expenditures

A sugarbeet production budget was estimated using secondary information (Appendix A). Johnson and Coon (1990) estimated separate sugarbeet production budgets of growers for American Crystal Sugar Company and Minn-Dak Farmers Cooperative, based on information and procedures from Johnson and Clow (1988). Johnson and Clow (1988) developed budgets based on a survey of sugarbeet growers in the Red River Valley. The sugarbeet production budget used in this report was based on the budgets published by Johnson and Coon (1990) and adjusted to reflect 1992 production costs.

Sugarbeet budgets that Johnson and Coon (1990) developed were adjusted for inflation to reflect 1992 production costs using an agricultural cost of production index (National Agricultural Statistics Service 1993). After adjusting for cost of production increases, the budgets (one for each cooperative) were weighted by an estimate of the number of acres planted by growers in each cooperative. The composite budget was used to estimate cash outlays by sugarbeet farmers in both North Dakota and Minnesota, since published sugarbeet budgets for growers of Southern Minnesota Beet Sugar Cooperative were unavailable. Cash outlays by sugarbeet farmers represent money spent for fuel, seed, fertilizer, chemicals, machinery, and other items which impact local economies. The composite budget contained some noncash expenditures, which are considered appropriate economic costs, but do not represent a cash expenditure. Noncash expenditures are actually part of returns to unpaid labor, management, and equity, which represent money retained by the producer.

TABLE 1. SUGARBEET PRODUCTION BY COUNTY IN NORTH DAKOTA AND MINNESOTA, 1992

State/County	Acreage Planted	Acreage Harvested	Yield	Total Production
North Dakota[a]	---------- acres ----------		- tons/acre -	---- tons ----
Cass	20,600	20,500	18.2	373,400
Grand Forks	20,800	20,800	17.7	368,100
Pembina	45,600	45,200	15.4	697,000
Richland	23,900	23,700	19.5	462,300
Steele	600	600	16.3	9,800
Traill	34,100	34,100	18.3	623,300
Walsh	36,800	36,700	16.0	587,100
State	182,400	181,600	17.2	3,121,000
Minnesota				
Chippewa	27,900	27,500	21.5	591,800
Clay	57,000	56,800	17.2	974,200
Grant	7,400	7,300	21.8	158,800
Kandiyohi	10,200	10,100	21.8	219,900
Kittson	22,600	22,600	14.3	323,200
Marshall	27,900	27,900	16.1	449,300
McLeod	1,200	1,200	23.9	28,700
Meeker	1,800	1,700	22.7	38,600
Norman	34,800	34,700	17.7	615,800
Otter Tail	1,100	1,100	20.6	22,700
Polk	94,700	94,600	17.2	1,624,500
Red Lake	1,700	1,700	16.8	28,500
Redwood	2,100	2,100	22.5	47,300
Renville	32,800	32,500	21.8	707,200
Sibley	2,700	2,600	24.8	64,600
Swift	4,800	4,700	19.9	93,400
Traverse	5,900	5,800	21.5	124,800
Wilkin	29,600	29,600	20.8	616,200
Yellow Medicine	2,300	2,200	22.6	49,800
Other Counties[b]	3,500	3,300	21.8	65,700
State	372,000	370,000	18.5	6,845,000
North Dakota and Minnesota	554,400	551,600	18.1	9,966,000

[a]Does not include sugarbeet production in Williams and McKenzie Counties.
[b]A breakdown of the counties in this category was not published.

SOURCES: North Dakota Agricultural Statistics Service 1993; Minnesota Agricultural Statistics Service 1993.

Some budget items, such as land charges and interest on operating capital, were calculated separately. Land expenses were estimated for three possible production situations: (1) sugarbeets raised on owned land financed with long-term debt, (2) sugarbeets raised on owned land that is debt free, and (3) sugarbeets produced on rented land paid with cash rent payments (Appendix A). The land charge used in the budget was based on a weighted average of economic and cash land expenses for debt-free owned land, debt-financed owned land, and rented land. The budget expense for cropland was used to estimate returns over costs. Producer returns would be overstated without including land expenses, potentially misallocating the economic impacts from sugarbeet production. When allocating land expenses to various economic sectors, the land costs (i.e., their direct impacts) were calculated separately (Appendix A).

To estimate economic and cash land costs, information from several secondary sources was used. All land payments (debt financing and rental payments) were assumed to be made to institutions or individuals in either North Dakota or Minnesota. Also, economic and cash land costs were assumed to be similar for producers in Minnesota and Eastern North Dakota, even though most of the land cost information was available only for cropland in the North Dakota Red River Valley. The percent of owned versus rented land used to raise sugarbeets was obtained from Johnson and Clow (1988). The proportion of owned cropland in the North Dakota Red River Valley financed with long-term debt was obtained from Leistritz et al. (1990). Long-term payments for cropland in the North Dakota Red River Valley (only sugarbeet producing counties were used) were estimated using secondary information (Bangsund and Olson 1993). Cash rent payments for sugarbeet cropland in North Dakota and Minnesota were obtained from Clauson et al. (1993) and adjusted to reflect 1992 dollars using the Consumer Price Index (U.S. Bureau of Economic Analysis).

Interest on variable costs was based on assuming one-half of all variable costs (except unpaid machine labor) were borrowed for six months at an interest rate of 9.6 percent. The average interest rate North Dakota and Minnesota farmers paid in 1992 for short-term farm loans from commercial lenders was used (Ag Week 1993).

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). Noncash outlays or expenditures outside of the two-state area were not included. Itemizations of the

expenditures for each cooperative were not included in this report because of disclosure concerns and sensitivity of the information.

Input-output Analysis

Economic activity from a project, program, or policy can be categorized into direct and secondary impacts. The direct impacts are those changes in output, employment, or income that represent the initial or direct effects of the project or program. The secondary impacts (sometimes further categorized into indirect and induced effects) result from subsequent rounds of spending and respending within the 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 (which means that 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 gross business volume, personal income, retail activity, and other major economic sectors in North Dakota (Coon et al. 1985). The North Dakota Input-Output Model was considered appropriate for measuring impacts in Minnesota because (1) the economic structure of western Minnesota is similar to that of North Dakota and (2) empirical testing has indicated that the North Dakota I-O coefficients are accurate in estimating changes in levels of economic activity in Minnesota (Coon et al. 1984).

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 four major parts: (1) direct impacts, (2) secondary impacts, (3) tax revenue, and (4) total economic 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 activity. 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) returns to investment and risk. 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, equity, and risk (Appendix A). Gross revenue per acre was calculated by dividing sugarbeet payments (i.e., payments made by the cooperatives to the growers) by an estimate of planted sugarbeet acres. Variable and fixed costs were estimated by adjusting 1990 sugarbeet production budgets for inflation. Net returns were subsequently estimated as the difference between 1992 sugarbeet revenue and estimated production expenses.

Production outlays were used as part of the direct impacts generated by sugarbeet growers in eastern North Dakota and Minnesota. Returns to invested resources (i.e., unpaid labor, management, and equity) and returns to risk were also considered direct impacts generated by sugarbeet producers. Cash expenses, variable and fixed, were included in production outlays.

Noncash expenses were included in the budget for economic completeness; however, noncash costs were assumed to represent money retained by producers. For example, interest on machinery investment, which is considered an opportunity cost of machinery ownership, was considered a noncash expense. Thus, since no cash was spent for this expense, the money remained with the producers as part of their returns to equity. Similarly, management expenses, interest on shares of cooperative stock, unpaid machine labor, and opportunity cost of land ownership were treated as noncash expenses, representing money retained by producers. Noncash expenses for machinery and shares of cooperative stock probably represent cash expenses for some producers who have financed machinery purchases and shares of cooperative stock (i.e., money spent on interest payments for financed machinery and shares of stock). However, information on machinery debt and shares of cooperative stock purchased on borrowed funds was not available.

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 management, equity, and risk) remains in the North Dakota and Minnesota economy. All expenses and returns associated with sugarbeet production in 1992 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 to be $675.72 per acre or $374.6 million (Table 2).

Total direct impacts of $675.72 per planted sugarbeet acre were divided out according to cash variable costs, cash fixed costs, cash land costs, and returns to unpaid labor, management, equity, and risk. Variable cash costs (i.e., outlays for seed, herbicide, fertilizer, etc. that change with the level of production) were estimated to be $252.57 per acre. Fixed cash 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 $87.55 per acre. Variable and fixed cash expenditures, not including land costs, were estimated to be $340.12 per acre (Table 2).

Cash expenditures for land expenses included property taxes, interest and principal payments, and cash rent payments. Property taxes in the North Dakota Red River Valley were estimated to be about $5.86 per cropland acre in 1992 (Bangsund and Olson 1993). Property taxes for cropland in the sugarbeet-producing counties of Minnesota were estimated to average $8.98 per acre (Minnesota Department of Revenue 1993). An overall average property tax ($7.96 per acre) was estimated by weighting the average tax in each state by sugarbeet acreage in each state.

Interest and principal payments were estimated to be $49.50 and $30 per acre, respectively. Cash rent payments were estimated to be $81 per acre (Clauson et al. 1993). Cash land expenses were multiplied by appropriate sugarbeet acreage to obtain an estimate of the direct impacts (Appendix A contains land expense calculations). Total direct cash expenditures for land expenses paid by North Dakota and Minnesota sugarbeet growers were estimated to be $34.4 million in 1992. Cash rental rates were used as a proxy to estimate noncash land expenses. Noncash land expenses were estimated to be about $12.5 million.

TABLE 2. DIRECT ECONOMIC IMPACTS TO THE TWO-STATE ECONOMY FROM SUGARBEET PRODUCTION IN EASTERN NORTH DAKOTA AND MINNESOTA, 1992

Expense\Returns	Direct Impacts	
	Per Acre	Total
	---------- $ ----------	
Cash Expenses		
Variable	252.57	140,024,808
Fixed	87.55	48,537,720
Land	xx.xx[a]	34,385,757
Return to investment[b]	133.85	74,206,440
Return to owned land	xx.xx[a]	12,483,979
Return over costs	117.20	64,975,680
Total Economic Impact	675.72	374,619,636

[a]Land expenses were calculated separately and included in the budget as a weighted average of cash and noncash expenditures. The per acre expense is only valid for the number of acres for which that expense applies. For example, cash rent expenses were different from the weighted average and only apply to the number of acres rented.

[b]Included noncash expenditures for opportunity cost of machinery ownership, management charges, ownership cost of shares of cooperative stock, and unpaid machine labor.

Total non-land cash expenditures were estimated at $188.6 million in 1992 ($340.12 per acre multiplied by 554,400 planted acres). Total direct impacts from production expenditures (variable, fixed, and cash land expenses) were estimated at $223 million ($188.6 million in variable and fixed costs and $34.4 million in cash land expenses) (Table 2). Returns to unpaid labor, management, equity, and risk were estimated to be $251.05 per acre. Noncash land expenses were calculated separately and re-allocated to producers' returns. Total returns to unpaid labor, management, equity, and risk were $151.7 million ($251.05 per acre multiplied by 554,400 acres added to $12.5 million in noncash land expenses). 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 1992 cash expenditures (Appendix B). Only cash expenditures and outlays made within the two-state economy were included.

Expenditures were combined for the three cooperatives. Total cash expenditures, not including noncash and cash expenditures made out of the two-state economy, for the three cooperatives in North Dakota and Minnesota were $575.5 million in 1992. However, $374.6 million represented payments to growers and was reflected in the direct impacts from sugarbeet production. Direct economic impacts from the cooperatives were $200.9 million in 1992 (Table 3). Approximately 33 and 67 percent of the direct impacts from the cooperatives were generated in North Dakota and Minnesota, respectively. The three cooperatives also were directly responsible for an equivalent of 2,410 full-time jobs in 1992.

Total direct impacts from the sugarbeet industry (production and processing) in North Dakota and Minnesota were estimated at $575.5 million in 1992. Sugarbeet production accounted for 65 percent ($374.6 million) of all direct impacts, while sugarbeet processing accounted for 35 percent ($200.9 million) of all direct impacts. Total direct impacts in Minnesota were estimated at $385 million ($133.7 million from cooperatives and $251.3 million from growers). Total direct impacts in North Dakota were estimated at $190.5 million ($67.2 million from cooperatives and $123.3 million from growers). Minnesota sugarbeet growers, sugarbeet processing in Minnesota, North Dakota sugarbeet growers, and sugarbeet processing in North Dakota accounted for 43.7 percent, 23.2 percent, 21.4 percent, and 11.7 percent of all direct impacts in the two-state economy in 1992, respectively.

TABLE 3. DIRECT ECONOMIC IMPACTS TO THE TWO-STATE ECONOMY FROM THREE SUGARBEET COOPERATIVES IN EASTERN NORTH DAKOTA AND MINNESOTA, 1992

Expenditure Category	Total Expenditures in North Dakota and Minnesota[a]
Payments to sugarbeet growers	$374,619,636
Contract construction	18,860,900
Plant maintenance and overhaul	13,764,924
Transportation	22,925,937
Communication	657,271
Public utilities	652,069
Miscellaneous manufacturing	22,270,996
Wholesale trade	4,685,646
Retail trade	2,718,997
Finance, insurance, and real estate	11,403,596
Business and personal services	554,566
Professional and social services	6,149,694
Energy[b]	7,258,355
Federal, state, and local taxes[c]	5,370,852
Labor[d]	81,661,174
Other expenses	1,729,000
Total cash expenditures	$575,527,304
Direct impacts from cooperatives[e]	$200,907,668
Full-time equivalent jobs	2,410

[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]Energy expenses included outlays for electricity, natural gas, and petroleum.
[c]Taxes paid included sales and use, property, and other taxes.
[d]Labor expenses 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.

Secondary Impacts

The secondary impacts of the sugarbeet industry on the economy of 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).

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. Ten of the 17 sectors of the North Dakota Input-Output Model were used to allocate the direct impacts (Table 4).

Seed, herbicide, fungicide, insecticide, fertilizer, fuel, lubrication, repairs, and machinery replacement expenses were allocated to the **Retail Trade** sector. Custom fertilizer, herbicide, and fungicide application; custom hauling; and miscellaneous costs were allocated to the **Business and Personal Services** sector. Crop insurance, interest on variable costs, migrant housing, and land interest payments were allocated to the **Finance, Insurance, and Real Estate** sector. Social security and property taxes were allocated to the **Government** sector. General farm utilities were allocated to the **Communication and Public Utilities** sector. Hand weeding, hired machine labor, interest on machinery ownership, interest on shares of cooperative stock, management charge, principal payments for land, cash rent payments, opportunity cost of land ownership, and returns to risk 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 and wholesale trade expenses were allocated to the **Agricultural Processing and Miscellaneous Manufacturing** sector. Half of plant maintenance and overhaul expenses was allocated to **Business and Personal Services** sector, and the remaining half was allocated to the **Retail Trade** sector. Other items allocated to the **Retail Trade** sector included expenses for petroleum and natural gas. Communication, public utility, and electricity expenses were allocated to the **Communications and Public Utilities** sector. Employee benefits were allocated to the **Finance, Insurance, and Real Estate** sector. Sugarbeet research was allocated to the **Professional and Social Services** sector. All taxes were allocated to the **Government** sector.

TABLE 4. ALLOCATION OF DIRECT ECONOMIC IMPACTS TO THE APPROPRIATE SECTORS OF THE NORTH DAKOTA INPUT-OUTPUT MODEL

Economic Sector	Itemization of Direct Expenditures
Agriculture-livestock	NA[a]
Agriculture-crops	NA
Nonmetal Mining	NA
Construction[b]	
Transportation[b]	
Communications and Public Utilities[b]	Electricity and General Farm Utilities
Agricultural Processing and Miscellaneous Manufacturing[b,c]	Wholesale Trade and Other Expenses
Retail Trade[b]	Seed, Herbicide, Fungicide, Insecticide, Fertilizer, Fuel and Lubrication, Repairs, Machinery Replacement, Plant Maintenance and Overhaul, Petroleum, and Natural Gas
Finance, Insurance, and Real Estate[b]	Interest on variable costs, Crop Insurance, Land Interest Payments, Migrant Housing, and Employee Benefits
Business and Personal Services[b,d]	Custom Fertilizer, Herbicide, Insecticide, and Hauling Applications, Plant Maintenance and Overhaul, and Miscellaneous Crop Expenses
Professional and Social Services[b]	Sugarbeet Research
Households	Hand Weeding, Hired Machine Labor, Cash Rent, Land Principal Payments, Wages and Salaries, and Sugarbeet Grower Returns to Unpaid Labor, Management, Equity, and Risk
Government	Property, Sales and Use, Workman's Compensation, Unemployment, Social Security, and Other Taxes
Coal Mining	NA
Electricity Generation	NA
Petroleum Exploration and Extraction	NA
Petroleum Refining	NA

[a]Not applicable--no direct impacts were allocated to these sectors.
[b]The expenditure questionnaire listed these economic sectors as separate expense categories. The respondents were instructed to include all expenditures that met standard industrial classifications for that economic sector. Other expenditures listed separately by the respondents were included in this category when appropriate (see Appendix B for clarification).
[c]Other expenses were allocated to this sector based on survey responses.
[d]Miscellaneous crop expenses were primarily composed of soil sampling, crop monitoring, and other items appropriate to the Business and Personal Services sector.

After the sources of direct impacts were allocated to the appropriate economic sectors, the dollar amount of those impacts was determined (Table 5). The **Households** and **Retail Trade** sectors collectively accounted for 65 percent of all direct impacts. Noticeable direct impacts were also generated in the **Finance, Insurance, and Real Estate** and **Agricultural Processing and Miscellaneous Manufacturing** sectors.

TABLE 5. DIRECT, SECONDARY, AND TOTAL ECONOMIC IMPACTS FROM THE SUGARBEET INDUSTRY IN MINNESOTA AND NORTH DAKOTA, 1992

Economic Sector	Economic Impacts of the Sugarbeet Industry		
	Direct	Secondary	Total
	---------- dollars (000s) ----------		
Agriculture-livestock	0	41,916	41,916
Agriculture-crops	0	32,894	32,894
Nonmetal Mining	0	3,208	3,208
Construction	18,861	38,543	57,404
Transportation	22,926	5,671	28,597
Communication and Public Utilities	19,139	50,429	69,568
Agricultural Processing and Miscellaneous Manufacturing	28,686	43,370	72,056
Retail Trade	141,168	322,450	463,618
Finance, Insurance, and Real Estate	30,683	71,836	102,519
Business and Personal Service	17,715	26,651	44,366
Professional and Social Service	6,393	39,409	45,802
Households	274,928	332,351	607,279
Government	15,029	51,571	66,600
TOTALS	575,527	1,060,301	1,635,828
Number of secondary jobs generated			20,942

Total direct impacts of $575.5 million from the sugarbeet industry in North Dakota and Minnesota generated about $1.06 billion in secondary impacts (Table 5). Secondary economic impacts were greatest in the **Households** ($332.4 million), **Retail Trade** ($322.4 million), **Finance, Insurance, and Real Estate** ($71.8 million), and **Government** ($51.6 million) sectors. Secondary industry impacts also affected the **Agriculture-Crops** and **Agriculture-Livestock** sectors, two sectors that had no direct impacts, but had noticeable secondary impacts. The economic activity in the **Households** sector represents economy-wide personal income resulting from industry expenditures and their subsequent secondary effects.

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 local 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 $6.5 million in property taxes in North Dakota and Minnesota in 1992. 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 $6.0 million in sales and use taxes, $2.7 million in personal income taxes, and $0.9 million in corporate income taxes in 1992 (Table 6). The sugarbeet industry in Minnesota generated $7.9 million in sales and use taxes, $13.9 million in personal income taxes, and $2.2 million in corporate income taxes in 1992 (Table 6). Total tax collections from these three taxes alone in North Dakota and Minnesota generated by the sugarbeet industry in 1992 were about $33.6 million.

TABLE 6. ESTIMATED TAX COLLECTIONS GENERATED BY THE SUGARBEET INDUSTRY IN NORTH DAKOTA AND MINNESOTA, 1992

Tax	North Dakota	Minnesota	Total
	million dollars		
Sales and Use	6.0	7.9	13.9
Personal Income	2.7	13.9	16.6
Corporate Income	0.9	2.2	3.1
Total Taxes	9.6	24.0	33.6

Total Economic Impacts

Total business activity from sugarbeet industry expenditures and returns in Minnesota and North Dakota was estimated at $1.64 billion in 1992 (Table 5). The economic areas of the two-state economy with the greatest total economic impact included the **Households** ($607.3 million), **Retail Trade** ($463.6 million), **Finance, Insurance, and Real Estate** ($102.5 million), **Agricultural Processing and Miscellaneous Manufacturing** ($72.1 million), **Communications and Public Utilities** ($69.6 million), and **Government** ($66.6 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 2,410 full-time equivalent jobs and indirectly supported an additional 20,942 full-time equivalent jobs. The sugarbeet industry also generated about $9.6 million in tax revenue in North Dakota and another $24 million in tax revenue in Minnesota.

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 weeding, thinning, and harvest situations. 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 migrant workers, extra harvest laborers, and truck drivers are employed for short time periods.

CONCLUSIONS

The sugarbeet industry analyzed in this study is geographically limited to the Red River Valley of North Dakota and Minnesota and to westcentral Minnesota. Within this area, sugarbeets are produced and processed into refined sugar. The industry is concentrated geographically and structurally, which helps to boost local economies. However, because sugarbeets are produced in a relatively small area (i.e., 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.

The purpose of this study was to estimate the economic contribution of the sugarbeet industry to the North Dakota and Minnesota economy in 1992. An economic contribution analysis, as used in this study, represents in absolute terms, an estimate of all local expenditures and their subsequent effects associated with an industry.

A sugarbeet production budget was developed to estimate cost of production and returns from growing sugarbeets in the two states. The three sugarbeet cooperatives in Minnesota and North Dakota were surveyed to obtain in-state expenditures for 1992. Combined expenditures and returns from sugarbeet production and processing were estimated at $575.5 million in 1992. The direct impacts were used with an input-output model to estimate the secondary economic impacts. The $575.5 million in direct impacts generated another $1.06 billion in secondary impacts. The sugarbeet industry employed 2,410 full-time equivalent workers and based on total business activity, supported an additional 20,942 full-time equivalent jobs in the two-state area. Total economic activity (direct and secondary impacts) was estimated at $1.64 billion, including $607.3 million in economy-wide personal income and $463.6 million in retail sales. Also, the sugarbeet industry in 1992 generated about $33.6 million in tax revenue, including tax collections of $9.6 million in North Dakota and $24 million in Minnesota. About one-third of the economic impacts were generated in North Dakota and two-thirds in Minnesota.

For every dollar the sugarbeet industry spent in North Dakota and Minnesota, $1.84 in additional business activity was generated. Each acre of sugarbeets planted generated about $2,950 in total business activity (production, processing, and secondary impacts) or, expressed alternatively, each ton of sugarbeets processed generated about $176 in total business activity.

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 most 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.

REFERENCES

Ag Week. 1993. Published interest rates for North Dakota and Minnesota. Vol. 9, No. 1, page 29.

Bangsund, Dean A. and F. Larry Leistritz. 1992. Contribution of Public Land Grazing to the North Dakota Economy. Agricultural Economics Report No. 283, Agricultural Experiment Station, North Dakota State University, Fargo.

Bangsund, Dean A. and Frayne E. Olson. 1993. North Dakota Value-Added Agriculture Regional Assessment Model--Version 1--Documentation and User's Guide. Agricultural Economics Software Series No. 7, Agricultural Experiment Station, North Dakota State University, Fargo.

Clauson, Annette L., Ron Lord, and Frederic L. Hoff. 1993. "1991 Crop Sugarbeet and Sugarcane Production and Processing Costs." Sugar and Sweetener. pp. 16-22.

Coon, Randal C. and F. Larry Leistritz. 1986. North Dakota Lignite Industry's Contribution to the State Economy. Agricultural Economics Miscellaneous Report No. 99, Agricultural Experiment Station, North Dakota State University, Fargo.

Coon, Randal C. and F. Larry Leistritz. 1988. The Economic Contribution of the Sugarbeet Industry of Eastern North Dakota and Minnesota. Agricultural Economics Miscellaneous Report No. 115, Agricultural Experiment Station, North Dakota State University, Fargo.

Coon, Randal C., Donald F. Scott, and F. Larry Leistritz. 1986. The Contribution of the Road Construction and Maintenance Industry to the North Dakota Economy. Agricultural Economics Miscellaneous Report No. 104, Agricultural Experiment Station, North Dakota State University, Fargo.

Coon, Randal C., Carlena F. Vocke, and F. Larry Leistritz. 1984. Expansion and Adaptation of the North Dakota Economic-Demographic Assessment Model (NEDAM) for Minnesota: Technical Description. Agricultural Economics Miscellaneous Report No. 76, Agricultural Experiment Station, North Dakota State University, Fargo.

Coon, Randal C., F. Larry Leistritz, Thor A. Hertsgaard, and Arlen G. Leholm. 1985. The North Dakota Input-Output Model: A Tool for Analyzing Economic Linkages. Agricultural Economics Report No. 187, Agricultural Experiment Station, North Dakota State University, Fargo.

Johnson, Roger G. and Bradley B. Clow. 1988. Sugarbeet Production Costs in the Red River Valley, 1987. Agricultural Economics Miscellaneous Report No. 121, Agricultural Experiment Station, North Dakota State University, Fargo.

Johnson, Roger G. and Randal C. Coon. 1990. Sugarbeet Production Costs in the Red River Valley for 1990. Paper prepared for American Crystal Sugar Company and Minn-Dak Farmers Cooperative. Agricultural Experiment Station, North Dakota State University, Fargo.

Leistritz, F. Larry and Randal C. Coon. 1991. The Changing Composition of North Dakota's Economic Base. Agricultural Economics Statistical Series No. 48. Agricultural Experiment Station, North Dakota State University, Fargo.

Leistritz, F. Larry and Steve H. Murdock. 1981. Socioeconomic Impact of Resource Development: Methods for Assessment. Westview Press, Boulder, Colorado.

Leistritz, F. Larry, David L. Watt, and Janet K. Wanzek. 1990. Entering the 1990s: An Update of the Financial Status of North Dakota Farm and Ranch Operators. Agricultural Economics Report No. 260, Agricultural Experiment Station, North Dakota State University, Fargo.

Minnesota Agricultural Statistics Service. 1993. Minnesota Agricultural Statistics 1993. Minnesota Agricultural Statistics Service, Minnesota Department of Agriculture and U.S. Department of Agriculture, St. Paul.

Minnesota Department of Revenue. 1993. Unpublished property tax information. Minnesota Department of Revenue, St. Paul.

National Agricultural Statistics Service. 1993. Agricultural Prices: 1992 Summary. National Agricultural Statistics Service and U.S. Department of Agriculture, Washington, D.C.

North Dakota Agricultural Statistics Service. 1993. North Dakota Agricultural Statistics 1992. Agricultural Statistics Report No. 62. North Dakota Agricultural Statistics Service, North Dakota State University, and U.S. Department of Agriculture, Fargo.

Senf, Dave, Wilbur Maki, and James Houck. 1993. "Measuring the Size of Minnesota's Agricultural Economy." Minnesota Agricultural Economist. No. 672, Minnesota Extension Service, University of Minnesota, St. Paul.

U.S. Bureau of Economic Analysis. Various years. Survey of Current Business. U.S. Government Printing Office, Washington, D.C.

APPENDIX A

Sugarbeet Production Budget

Estimated Sugarbeet Production Expenses per Planted Acre, North Dakota and Minnesota, 1992

	American Crystal	Minn-Dak Farmers	Composite Budget
REVENUE			
Sugarbeet payments to growers			$374,619,636
Total planted acreage in eastern North Dakota and Minnesota			554,400
Total revenue per planted acre			$675.72
VARIABLE COSTS			
Seed	$34.30	$34.27	$34.30
Herbicides	41.28	61.98	44.30
Fungicides	3.20	7.16	3.86
Insecticides	14.29	8.79	13.48
Fertilizer	14.28	30.59	16.66
Custom fertilizer application	1.05	0.68	1.00
Custom herbicide application	1.92	0.53	1.72
Custom fungicide application	1.58	5.28	2.12
Hand thinning and weeding	29.39	42.28	31.28
Migrant housing	2.67	5.03	3.02
Hired machine labor	20.98	16.95	20.39
Unpaid machine labor	11.53	16.67	12.28
Social security	1.60	1.30	1.56
Custom hauling	5.06	2.46	4.68
Crop insurance	2.67	5.64	3.10
Fuel and lubrication	29.50	27.93	29.27
Repairs	27.04	26.45	26.96
Miscellaneous[a]	8.24	13.60	9.02
Interest[b]	5.68	6.91	5.86
Total Variable Costs	$256.37	$314.49	$264.85
FIXED COSTS[c]			
Machinery replacement	$63.75	$72.73	$65.06
Interest on machinery investment	38.62	41.29	39.01
Co-op share	43.25	43.80	43.33
Utilities	21.27	29.63	22.49
Management charge	38.00	46.42	39.23
Land charge	84.54	84.54	84.54
Total Fixed Costs	$289.44	$318.41	$293.67
TOTAL COSTS	$545.81	$632.90	$558.52
RETURN OVER COSTS			$117.20
RETURNS TO UNPAID LABOR, MANAGEMENT, EQUITY, AND RISK			$251.05

[a]Miscellaneous costs included soil sampling, crop monitoring, beet hoes, interest and depreciation on unused equipment, machine rent, other custom work, and micronutrients.

[b]Interest on variable costs was based on one-half of all variable expenses (excluding unpaid machine labor) financed for 6 months at 9.6 percent interest. The loan rate was an average of interest rates farmers received for short-term loans from commercial lenders in North Dakota and Minnesota during 1992 (Ag Week 1993).

[c]Explanations for fixed expenses have been provided for each cost.

Machinery replacement costs were based on depreciation of machinery complements valued at their current value, not original purchase price (Johnson and Clow 1988). This expense represents an average proxy for the dollar amount of machinery purchased by operators maintaining a constant value in their machinery complement.

Interest on machinery investment represents an opportunity cost of the money tied up in the machinery complement (i.e., a charge for the returns the money could have earned had it been invested in the next best alternative use). This expense was assumed to be an economic cost, not a cash expense. Although considered an economic cost of ownership, some machinery is financed with short, intermediate, and/or long-term debt. Information on the amount and characteristics of machinery financing by sugarbeet growers was not available. Opportunity costs represent a legitimate expense for budget purposes; however, the amount of the expense remains with the producer.

Co-op share represents the opportunity cost of money tied up in shares of cooperative stock. This expense was assumed to be an economic cost. Information on the amount and characteristics of stock purchased with borrowed funds was not available.

Utilities include general farm insurance, utilities, vehicle license and tax, bookkeeping, and other miscellaneous overhead expenses. Utilities were considered a cash expense.

Land charge is a combination of economic and cash land expenses. Separate calculations were used to divide out the appropriate cash expenses for the direct impacts.

Budget Sources and General Composition

The composite budget was estimated from budgets developed by Johnson and Coon (1990). Johnson and Coon (1990) estimated separate sugarbeet production budgets of growers for American Crystal Sugar Company and Minn-Dak Farmers Cooperative, based on information and procedures used by Johnson and Clow (1988). Budgets developed by Johnson and Clow (1988) were based on a survey of sugarbeet growers in the Red River Valley. The sugarbeet production budgets for American Crystal Sugar Company and Minn-Dak Farmers Cooperative growers were based on the budgets published by Johnson and Coon (1990) and were modified using an agricultural cost of production index to reflect 1992 production costs (National Agricultural Statistics Service 1993). Revenues were estimated by dividing total sugarbeet payments to growers of all three cooperatives by total planted acres in both states.

After adjusting for cost of production increases, the budgets (one for American Crystal growers and one for Minn-Dak growers) were weighted by an estimate of the number of acres planted by growers in the two cooperatives. Published sugarbeet production budgets for growers of Southern Minnesota Beet Sugar Cooperative were not available. Thus, the composite budget was used to estimate cash outlays by sugarbeet farmers in both North Dakota and Minnesota (i.e,. the composite budget, which was a weighted average of two budgets, was used to estimate expenditures and returns for growers in all three cooperatives).

Land Charge Calculations and Explanations

Planted sugarbeet acres 554,400	Land Ownership Classification		
	Owned Land		Rented Land
	Debt	Non-debt	
Breakdown of sugarbeet acreage	20.60%	27.80%	51.60%
Sugarbeet acreage by land tenure	114,206	154,123	286,070
Appropriate land charges		costs per acre	
Interest payment	$49.50	not applicable	not applicable
Principal payment	$30.00	not applicable	not applicable
Cash rent	not applicable	not applicable	$81.00
Opportunity cost of land ownership	not applicable	$81.00	not applicable
Property taxes	$7.96	$7.96	not applicable
Total land cost	$87.46	$88.96	$81.00
Weighted average land charge		$84.54	
		total costs	
Land expenses by category	$9,987,956	$13,710,077	$23,171,702
Total cash and noncash land expenditures		$46,869,736	

Direct Impacts from Land Expenses

Cash and Noncash Expenditures		Economic Sector
Interest payments	$5,653,217	Finance, Ins., & Real Estate
Principal payments	$3,426,192	Households
Cash rent	$20,895,923	Households
Property taxes	$4,410,425	Government
Opportunity cost	$12,483,979	Households
Total	$46,869,736	

Explanation of the Breakdown of Sugarbeet Acreage

The breakdown of owned versus rented land was obtained from Johnson and Clow (1988). They estimated, based on a survey of sugarbeet producers in the Red River Valley, that 51.6 percent of the land used to raise sugarbeets was rented. The remaining 48.4 percent of the land with sugarbeets was assumed to be owned by the operator. Leistritz et al. (1990) estimated the proportion of owner-operated land with debt in the Red River Valley. The debt structure of rented land was unknown, and so it was assumed to be debt free. Of the land operated by owners, an estimated 42.6 percent was debt financed. The remaining 57.6 percent was considered debt free. Thus, of the estimated 48.4 percent of owner-operated sugarbeet land, about 20.6

percent (48.4% multiplied by 42.6% debt financed), was assumed to be financed with long-term debt.

Note: Obviously, not all rented land is debt free. However, the breakdown of cash rent payments, by the land owner, into principal and interest payments would not materially improve the impact assessment. Dollars would be somewhat reallocated among the economic sectors (i.e., instead of cash rent, less property taxes, allocated to the **Households** sector, it would be allocated to the **Households** and **Finance, Insurance, & Real Estate** sectors).

Explanation of Estimated Land Charges by Category

Expenses for owned land were based on hypothetical land payments estimated from an average of three-year, county-wide cropland values for six counties in the North Dakota Red River Valley (Bangsund and Olson 1993). Land values were weighted by the number of sugarbeet acres in each county. Payments (principal and interest) were based on a 25-year loan at an interest rate of 9.5 percent. These estimated land payments were used to allocate money to the **Households** and **Finance, Insurance, and Real Estate** sectors. Determining actual land payments by sugarbeet producers in North Dakota and Minnesota was beyond the scope of this study and would not necessarily improve the impact assessment.

Opportunity cost of land ownership was assumed to be equal to cash rental rates (i.e., the next best economic alternative, if the land was not used by the owner for farming, would be to rent the land to another sugarbeet producer). An average rental rate by county for only sugarbeet acreage was not obtained. However, an estimate of average cash rent expenses for eastern North Dakota and Minnesota in 1991 was obtained from Clauson et al. 1993, and adjusted to reflect 1992 dollars.

Property taxes were considered a cash expense on owned land; however, they are typically considered part of the cash rent payment on rented land. Property taxes represented an overall weighted average of (1) *estimated* property taxes paid in the Red River Valley of North Dakota (Bangsund and Olson 1993) and (2) *actual* property taxes paid in counties of Minnesota where sugarbeets were raised in 1992 (Minnesota Department of Revenue 1993). Property taxes in both states were weighted at the county level to obtain an average for the state and then weighted by state acreage to obtain an overall weighted average.

Explanation of the Weighted Average Land Charge

A weighted average land charge was estimated for budget purposes. The average amount of land expense was used within the budget to determine returns over costs. Without a land charge, net returns in the budget would be overstated, and allocation of that money would misrepresent the economic impact. The budget expense for land multiplied by the number of planted acres determined the total direct impact from land charges.

Explanation of Direct Impacts from Land Expenses

Allocation of direct impacts from land expenses were calculated separately, based on the different land expenses, and allocated to the appropriate economic sectors. Allocation of interest expense was calculated by multiplying the acres of owned land with debt by the interest payment. Allocation of principal payments was similar to that of interest payments. Total property taxes paid were estimated by multiplying total acreage by the average property tax payment (Note: property taxes were subtracted from cash rent payments when total cash rent payments were calculated and allocated to the appropriate economic sector).

APPENDIX B

Sugarbeet Processor Expenditures Survey

INSTRUCTIONS

Data provided from this survey will be used to help 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 in completing the questionnaire.

1. Use your records from the most recently completed fiscal year.
2. Information should be recorded in dollar terms.
3. If the cooperative you process for operates more than one establishment, please include the information for all your plants on this questionnaire.
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:

Larry Leistritz (701-237-7455)
or Dean Bangsund (701-237-7471)
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	Estimated Annual Expenditure In North Dakota	Minnesota
	dollars	
Payments to sugarbeet growers		
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		
Sales and use		
Workman's compensation		
Unemployment		
Other taxes (please specify)		
Other (please specify)		

II. Total annual revenue: $_____.

III. Number of workers in full-time equivalents: _____ workers

IV. Sugarbeets processed: _____ tons

V. Sugarbeet acreage: _____ acres planted

_____ acres harvested