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# Economic Contribution of the Sugarbeet Industry to Eastern Montana and Western North Dakota



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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 on relatively limited acreage in eastern Montana and western North Dakota. These factors, along with continued debate over policies affecting domestic sugar industries and recent industry expansions have prompted an analysis of the economic importance of the sugarbeet industry to the regional economy.

Revenues from sugarbeet production and expenditures by processors to Montana and North Dakota entities in fiscal 2011 represented the direct economic impacts from the industry. Expenditure information was provided by Sidney Sugars Inc. and marketing cooperatives. Secondary economic impacts were estimated using input-output analysis.

The sugarbeet industry, which included the growing regions in eastern Montana and western North Dakota and the Sidney, MT processing facility, planted 31,107 acres and processed 798,624 tons of sugarbeets in fiscal 2011. Production, processing, and marketing activities generated \$73.9 million in direct economic impacts. Gross business volume (direct and secondary effects) from the sugarbeet industry in that region was estimated at \$212.4 million. Direct and secondary employment in the industry was 186 and 805 full-time equivalent jobs, respectively. The industry paid \$474,000 in property taxes and was estimated to generate another \$1.8 million in sales and use, personal income, and corporate income taxes in Montana and North Dakota.

In real terms, gross business volume of the sugarbeet industry in eastern Montana and western North Dakota increased 4 percent since 2003. Increases in business activity from the industry have resulted from an increase in expenditures and also were influenced by relatively high sugar prices during fiscal 2011.

Key words: sugarbeet industry, western North Dakota, eastern Montana, economic impact

## *Highlights*

The sugarbeet industry, as described in this report, included production and processing facilities in eastern Montana and western North Dakota. The purpose of this report was to estimate the economic contribution of sugarbeet production, processing, and marketing associated with Sidney Sugars, Inc. in Sidney, Montana.

Sidney Sugars, Inc. was surveyed to obtain estimates of expenditures made within Montana and North Dakota in fiscal 2011. In addition, United Sugars Corporation, which markets sugar for Sidney Sugars, Inc., and Midwest Agri-Commodities, which markets sugarbeet pulp and molasses, also were surveyed to obtain estimates of expenditures made within the two-state region.

A sugarbeet 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 average \$1,626 per acre or \$50.6 million. Direct impacts from processing and marketing activities were estimated at \$23.3 million in fiscal 2011. About 65 percent of total direct impacts were generated in Montana.

Total direct economic impacts from sugarbeet production, processing, and marketing were estimated at \$73.9 million in fiscal 2011. The North Dakota Input-Output Model was used to estimate the secondary economic impacts. The \$73.9 million in direct impacts generated another \$138.5 million in secondary economic impacts. Total economic activity (direct and secondary impacts, also termed gross business volume) was estimated at \$212.4 million in the two-state region. Tax collections generated by the sugarbeet industry from sales and use, personal income, and corporate income taxes in the two-state region were estimated at \$1.8 million in fiscal 2011. The industry also paid about \$474,000 in property taxes. All tax revenue attributable to the industry was estimated at \$2.3 million. Sidney Sugars, Inc. employed an equivalent of 186 full-time workers and the industry indirectly supported an additional 805 full-time equivalent jobs in the two-state region.

The economic contribution of sugarbeet production, processing, and marketing activities of Sidney Sugars, Inc. were included in a previous estimate of the Red River Valley sugarbeet industry in Minnesota and North Dakota. Adjusting previous estimates of industry size for inflation revealed that the sugarbeet industry in eastern Montana and western North Dakota exhibited real growth (size has increased after adjusting for inflation) from 2003. Acreage and tons of sugarbeets processed both declined, but gross business volume increased. As a result, impact per ton and impact per planted acreage also increased over the period.

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 eastern Montana and western 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, and overall business activity) when placed on a per-acre or per-ton basis, clearly indicates that the industry contributes substantially to the regional economy.

# **Economic Contribution of the Sugarbeet Industry to the Economy of Eastern Montana and Western North Dakota**

Dean A. Bangsund, Nancy M. Hodur and F. Larry Leistritz\*

## **INTRODUCTION**

Agriculture has historically been a major component of the economies of North Dakota and Montana (Coon and Leistritz 2011; National Agricultural Statistics Service 2011). Despite the historical importance of agriculture, agriculture is no longer the single largest sector in North Dakota (Coon and Leistritz 2011) and agriculture's relative share of the economy in Montana also has decreased slightly in recent years. Generally, the agriculture sector has not decreased in size as much as other sectors of the economy have increased in size. While the role of agriculture in the regional economy may be, in relative terms, smaller than in the past decades, specific industries within the agriculture sector often find it advantageous to describe their activities in economic terms.

The economic contribution of the sugarbeet industry in Minnesota and North Dakota has been periodically assessed since 1987. Coon and Leistritz (1988), Bangsund and Leistritz (1993), and Bangsund and Leistritz (1998) estimated the economic contribution of the sugarbeet industry in North Dakota and Minnesota. Bangsund and Leistritz (2004) also estimated the economic contribution of the sugarbeet industry in Minnesota and North Dakota, but expanded on previous analyses by adding the economic contribution of sugarbeet activities in eastern Montana and western North Dakota to the industry assessment.

Continued debate over the future of national sugar policies have prompted a re-evaluation of the industry's economic importance. A reassessment of the industry's economic importance to the region will illustrate the potential economic implications of future policy changes affecting domestic sugar industries and document the economic effect of recent industry activities.

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## **OBJECTIVES**

The purpose of this report was to estimate the economic contribution (direct and secondary effects) of the sugarbeet industry to the economy of eastern Montana and western North Dakota. Specific objectives include:

- 1) quantify sugarbeet acreage and production in eastern Montana and western North Dakota,
- 2) estimate the direct economic impacts of the sugarbeet industry to the state economies of Montana and North Dakota,
- 3) estimate the secondary economic impacts of the sugarbeet industry to the state economies of Montana and North Dakota.

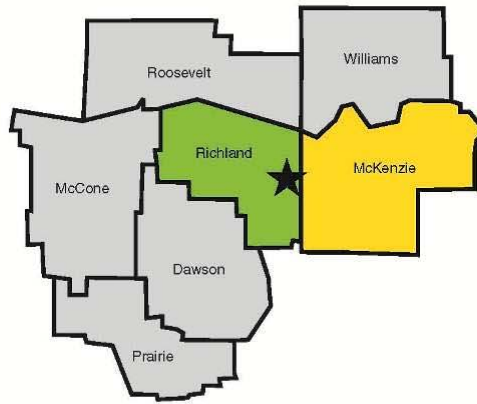
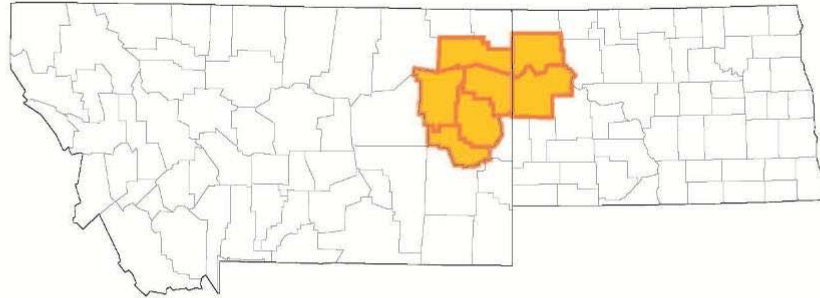
## **PROCEDURES**

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, processing, transportation, and marketing). The economic contribution approach to estimating economic activity has been used for several similar studies (Bangsund et al. 2011, Bangsund and Leistritz 2010, and Bangsund and Leistritz 2005). The methods and analyses used in this report paralleled those used by Bangsund and Leistritz (2004).

Analysis of the sugarbeet industry required several steps: (1) estimate sugarbeet production in eastern Montana and western North Dakota, (2) estimate sugarbeet production expenditures, (3) estimate sugarbeet processor and marketing alliance expenditures, and (4) application of input-output analysis to generate secondary impacts.

### **Sugarbeet Production**

Sugarbeet production and associated processing are concentrated in a handful of counties surrounding Sidney, Montana (Figure 1). Generally, the growing conditions in that region are conducive to sugarbeet production under irrigation. 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 accentuates the industry's economic impact on local economies.



**Figure 1. Distribution of Sugarbeet Production and Processing Facilities in eastern Montana and western North Dakota, 2010**

Source: National Agricultural Statistics Service (2011).

Seven counties in western North Dakota and eastern Montana collectively produced about 815,000 tons of sugarbeets in 2010 (Table 1). The combined growing regions in western North Dakota and eastern Montana planted over 30,000 acres of sugarbeets in 2010 (National Agricultural Statistics Service 2011). About 41 percent of the region's planted acreage was in North Dakota and 59 percent in Montana. Sidney Sugars, Inc. reported processing about 799,000 tons of sugarbeets and reported 31,107 planted acres of sugarbeets in 2010.

**Table 1. Sugarbeet Production, by County, Eastern Montana and Western North Dakota, 2010**

State/County	Acreage		Yield <sup>a</sup> - tons/acre -	Production ----- tons -----
	Planted ----- acres -----	Harvested -----		
North Dakota				
McKenzie	9,200	9,200	26.52	244,000
Williams	<u>3,200</u>	<u>3,200</u>	<u>27.813</u>	<u>89,000</u>
<b>Regional Total</b>	<b>12,400</b>	<b>12,400</b>	<b>26.85</b>	<b>333,000</b>
Montana				
Dawson	1,700	1,600	24.12	41,000
McCone	na	na	na	na
Prairie	1,100	1,100	28.18	31,000
Richland	12,600	12,600	27.83	351,000
Roosevelt	<u>2,200</u>	<u>2,200</u>	<u>26.82</u>	<u>59,000</u>
<b>Regional Total</b>	<b>17,600</b>	<b>17,500</b>	<b>27.39</b>	<b>482,000</b>
Combined Regions	30,000	29,900	27.17	815,000

<sup>a</sup> Yield per planted acre.

Source: National Agricultural Statistics Service (2011).

### Sugarbeet Production Expenditures

Crop expenses were obtained from the Farm Business Management Program in North Dakota (North Dakota Farm and Ranch Business Management Education 2011) and from the Williston Experiment Station, Williston, ND. Revenues from sugarbeet production were derived from the survey of processors and from the Farm Business Management Program in North Dakota.

Cash outlays by sugarbeet farmers represent money spent for fuel, seed, fertilizer, chemicals, machinery, and other production inputs. The budget also contained some noncash expenditures, which are considered valid production costs, but do not represent a cash expenditure. Non-cash expenditures were treated as proxies for the collective purchases of various production related inputs (e.g., machinery depreciation, building depreciation, management charges) by producers in the region.

## Sugarbeet Processor Expenditures

Sidney Sugars, Inc. provided the amount of processing, research, distribution, and administrative cash expenditures made within Montana and North Dakota in the last fiscal year (Appendix B). Expenditures made in Montana and North Dakota linked to the Sidney processing plant by United Sugars Corporation and Midwest Agri-Commodities were also obtained. Non-cash outlays or expenditures made to entities outside of the two-state area were not included.

### 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 first-round effects of a project, program, or event. Secondary impacts (sometimes further categorized as 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 I-O Model is accurate in estimating economic impacts in neighboring states (Coon and Leistritz 2011; Coon et al. 1984; Leistritz et al. 1990).

## ECONOMIC IMPACTS

The economic contribution from the sugarbeet industry was estimated from production, processing, and marketing expenditures, which 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. Each of the following will be discussed: (1) direct impacts, (2) secondary impacts, (3) tax revenue, (4) total economic impacts, and (5) previous industry impacts.

### Direct Impacts

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 local economies in eastern Montana and western North Dakota include (1) expenditures and returns from the production of sugarbeets, (2) expenditures from processing sugarbeets into refined sugar, and (3) expenditures from marketing activities. 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 from production (Appendix A). The sugarbeet production budget contained estimates of gross 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 processing plant to the growers) by planted sugarbeet acreage reported by the processing plant and adding farm program payments and crop insurance indemnities on sugarbeet acreage (estimates were obtained from the Farm Business Management Program in North Dakota). Production expenses were generated assuming owned land by the producer.

Cash and non-cash expenses (e.g., depreciation) from sugarbeet production represented direct impacts. Returns to invested resources (i.e., unpaid labor, management, and equity) also were considered direct impacts, even though net returns do not represent a cash expenditure. Net returns were considered retained by the producer, eventually resulting in personal or business purchases in the regional economy.

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 two-state economy. All expenses and returns associated with sugarbeet production in 2010 were assumed to be made to entities within the two-state economy. Production inputs are assumed to be made from entities located near the producer's residence or farming enterprise. Total direct impacts from sugarbeet production were estimated at \$1,626 per acre or \$50.6 million (Table 2).

Total direct impacts of \$1,626 per planted acre were further divided into variable costs, fixed costs, and returns to unpaid labor, management, and equity. Variable costs (i.e., outlays for seed, herbicide, fertilizer, chemical, custom hire, etc. that change with the level of production) were estimated at \$740.22 per acre. Fixed costs (i.e., expenses that do not change with the level of production, such as interest on land debt payments, farm utilities, and machinery overhead) were estimated to be \$220.58 per acre. Total expenses were estimated at \$960.80 per acre. Net returns were estimated at \$665.32 per acre (Table 2).

## Sugarbeet Processing and Marketing

Sugarbeet processing facilities impact local economies through expenditures for production and processing inputs, such as labor, and investment in facilities and capital. Sidney Sugars, Inc., United Sugars Corporation, and Midwest Agri-Commodities were surveyed to estimate their fiscal 2011 cash expenditures in eastern Montana and western North Dakota (Appendix B). Only cash expenditures and outlays made within the two-state economy were included.

Total cash expenditures made to entities in the two-state region by the processing plant and sugar marketing alliances were \$73.2 million in fiscal 2011. However, over \$49.9 million

represented payments to growers and was included in the estimate of direct impacts attributable to sugarbeet production. Direct economic impacts from the processing and marketing activities were estimated at \$23.3 million (Table 3). Approximately 80 percent of the direct impacts from the processing and marketing component of the industry were generated in Montana. The processing cooperatives and marketing companies employed 186 full-time equivalent jobs in fiscal 2011.

**Table 2. Direct Economic Impacts from Sugarbeet Production in Eastern Montana and Western North Dakota, Fiscal 2011<sup>a</sup>**

Expense/Returns <sup>b</sup>	Direct Impacts	
	Per Acre	Total
Payments to Growers		\$49,873,260
Misc Farm Program Payments		\$462,561
Misc Revenue and Insurance Indemnities		\$247,923
Planted Acreage		31,107
Revenue per Acre		\$1,626.12
	---- \$ ----	--- 000s \$ ----
Variable Costs	740.22	23,026
Fixed Costs	220.58	6,862
Total Costs	960.80	29,887
Net Returns	665.32	20,696
Direct Impacts	1,626.12	50,584

<sup>a</sup> While some production expenses occur in the spring of calendar year 2010, all expenditures were treated as part of the industry's economic contribution in fiscal 2011.

<sup>b</sup> See Appendix A for complete budget.

### Direct Impacts by State

Total direct impacts from the sugarbeet industry (production, processing, and marketing) in eastern Montana and western North Dakota were estimated at \$73.9 million in fiscal 2011<sup>1</sup> (Table 4). Sugarbeet production accounted for 68 percent (\$50.6 million) of all direct impacts, while sugarbeet processing and marketing accounted for 32 percent (\$23.3 million) of all direct impacts. Based on planted sugarbeet acreage in the study region, about 59 percent and 41

<sup>1</sup>While some production expenses occur in the spring of calendar year 2010, all expenditures relating to sugarbeet production were treated as part of the industry's economic contribution in fiscal 2011.

percent of the direct impacts from sugarbeet production were generated in Montana and North Dakota, respectively. Similarly, based on expenditures made in each state by the processing cooperatives and marketing companies, about 80 percent and 20 percent of the direct impacts from processing were captured in Montana and North Dakota, respectively (Table 4).

Total direct impacts in Montana were estimated at \$48.3 million (\$18.6 million from processors and \$29.7 million from growers). Total direct impacts in North Dakota were estimated at \$25.6 million (\$4.7 million from processors and \$20.9 million from growers).

#### Direct Impacts by Economic Sector

Sugarbeet production expenditures, returns to sugarbeet growers, and production outlays by sugarbeet cooperatives were allocated to various economic sectors of the North Dakota I-O Model. Seed, herbicide, fungicide, insecticide, fertilizer, fuel, lubrication, repairs, and machinery depreciation were allocated to the *Retail Trade* sector. Custom hire expenses were allocated to the *Business and Personal Services* sector. Crop insurance, interest expense, and machinery and building leases 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. Labor expenses and net returns were allocated to the *Households* sector. Dues and fees were allocated to the *Professional and Social Services* sector.

The survey of processors was designed to collect information on expenditures made by processing and marketing activities in the two-state region. Both individual expenditures and expenses that can be grouped together into broad categories, based on Standard Industrial Classification (SIC) codes, were included in the survey. Major expense types based on SIC codes were organized to match several existing sectors in the North Dakota I-O Model. Those expenditure categories were directly allocated to the same sectors in the North Dakota I-O Model (see Appendix B for more detail). The remaining expenses collected from the survey of processing and marketing activities were allocated to appropriate sectors of the North Dakota I-O Model in the same manner as production outlays.

Miscellaneous manufacturing, wholesale trade, and 40 percent of plant maintenance and overhaul expenses were allocated to the *Agricultural Processing and Miscellaneous Manufacturing* sector. Twenty percent of plant maintenance and overhaul expenses were allocated to *Business and Personal Services* sector. Forty percent of plant maintenance and overhaul expenses were allocated to the *Retail Trade* sector. Expenses for petroleum, natural gas, coal, and communications 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 workman's 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 about 65 percent of all direct impacts (Table 5). The *Communications and Public Utilities* sector accounted for 10 percent, while the *Finance, Insurance, and Real Estate* sector accounted for 9 percent of the direct impacts (Table 5).

**Table 3. Direct Economic Impacts from Sugarbeet Processing and Marketing Activities in Eastern Montana and Western North Dakota, Fiscal 2011**

Expenditure Category	Expenditures in Montana and North Dakota <sup>a</sup>
	-- 000s \$ --
Total payments to sugarbeet growers	49,873
Contract construction	440
Plant maintenance and overhaul	1,237
Transportation	4,966
Communication	51
Public Utilities	3,375
Miscellaneous Manufacturing	320
Wholesale trade	1,411
Retail trade	247
Finance, insurance, and real estate	8
Business and personal services	371
Professional and social services	55
Coal	911
State and local taxes <sup>b</sup>	534
Labor <sup>c</sup>	9,365
Total cash expenditures	73,164
Direct impacts from processors <sup>d</sup>	23,291
Full-time equivalent jobs	186

<sup>a</sup> Only expenditures made within the two-state region were included.

<sup>b</sup> Included sales and use, property, and miscellaneous taxes.

<sup>c</sup> Included wages and salaries and employee benefits.

<sup>d</sup> 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.

**Table 4. Total Direct Impacts of the Sugarbeet Industry, by State and Industry Component, Fiscal 2011**

Industry Component	Montana	North Dakota	Totals <sup>a</sup>	
			000s \$	
Processing/Marketing	18,595	4,699	23,294	31.5%
State Share	79.8%	20.2%		
Production <sup>b</sup>	29,674	20,908	50,582	68.5%
State Share	58.7%	41.3%		
Total (all activities) <sup>a</sup>	48,269	25,607	73,876	
State Share	65.3%	34.7%		

<sup>a</sup> Columns and rows may not sum due to rounding.

<sup>b</sup> Calendar year 2010 expenses treated as part of fiscal 2011 industry impacts.

**Table 5. Direct Economic Impacts of Sugarbeet Industry in Eastern Montana and Western North Dakota, by Economic Sector, Fiscal 2011**

Economic Sector	Industry Activity		Total
	Production	Processing and Marketing	
	000s \$		
Construction	132	308	440
Transportation	0	4,966	4,966
Communication and Public Utilities	4,393	2,800	7,193
Ag Processing and Misc Mnfg	604	1,622	2,226
Retail Trade	6,924	10,313	17,237
Finance, Insurance, and Real Estate	1,274	5,541	6,815
Business and Personal Services	1,217	2,032	3,249
Professional and Social Services	56	131	187
Households (personal income)	10,943	19,939	30,882
Government	64	617	681
<b>Total</b>	<b>25,607</b>	<b>48,269</b>	<b>73,876</b>

## Secondary Impacts

The secondary impacts of the sugarbeet industry 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). The model uses interdependence coefficients or multipliers that measure the level of total gross business volume (gross receipts) generated in each sector of the regional economy from an additional dollar of sales to final demand in a given sector. The model was developed from primary data from North Dakota firms and households and is closed with respect to households (measurements of economy-wide personal income are included within the model). The input-output model applies the expenditures from the sugarbeet industry to these interdependence coefficients. Resulting levels of business activity were used to estimate secondary (indirect and induced) employment, based on historic relationships.

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), part to pay the store employee (*Households* sector) who shelved or sold the sugar, and part to pay operating expenses for the store (*Communications and Public Utilities, Business and Personal Services, Finance, Insurance, and Real Estate*); the sugar processor uses part of that dollar to pay for the sugarbeets used to make the sugar (*Agriculture-Crops* sector); the sugarbeet grower in turn uses a portion of the sugarbeet payment to purchase production inputs (*Retail Trade* and *Business and Personal Services* sectors)... and so on.

Total direct impacts of \$73.9 million from the sugarbeet industry in eastern Montana and western North Dakota generated about \$138.6 million in secondary impacts (Table 6). Secondary economic impacts were greatest in the *Households* (\$46 million), *Retail Trade* (\$41 million), *Finance, Insurance, and Real Estate* (\$9 million), and *Communications and Public Utilities* (\$7 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 an additional \$1.88 in secondary impacts.

## Tax Revenue

Tax collections are another measure of the economic impact of an industry. 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 tax revenue 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 \$475,000 in property taxes in Montana and North Dakota in 2011. Property taxes were included in the direct impacts.

**Table 6. Direct, Secondary, and Total Economic Impacts of the Sugarbeet Industry in Eastern Montana and Western North Dakota, Fiscal 2011**

Economic Sector	Industry Impacts		
	Direct	Secondary	Total
	----- 000s \$ -----		
Construction	440	4,955	5,395
Transportation	4,966	757	5,723
Communication and Public Utilities	7,193	6,789	13,982
Ag Processing and Misc Mnf	2,226	4,596	6,822
Retail Trade	17,237	41,281	58,518
Finance, Insurance, and Real Estate	6,815	9,275	16,090
Business and Personal Services	3,249	3,504	6,753
Professional and Social Services	187	5,017	5,204
Households (personal income)	30,882	46,371	77,253
Government	681	7,213	7,894
Other sectors <sup>a</sup>	0	8,798	8,798
<b>Total</b>	<b>73,876</b>	<b>138,556</b>	<b>212,432</b>
<b>Direct Employment (full-time jobs)</b>	<b>186</b>		
<b>Secondary Employment (full-time)</b>		<b>805</b>	

<sup>a</sup> Includes Agriculture and Mining sectors.

Tax collections were estimated separately for Montana and North Dakota. 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 \$639,000 in sales and use taxes, \$199,000 in personal income taxes, and \$80,000 in corporate income taxes in fiscal 2011 (Table 7). The sugarbeet industry in eastern Montana generated \$757,000 in personal income taxes and \$212,000 in corporate income taxes in fiscal 2011 (Table 7). Total tax collections generated by the sugarbeet industry in fiscal 2011 from sales and use, personal income, and corporate income taxes in the two-state region were about \$1.8 million (Table 7). Total tax revenue attributable to the industry was estimated at \$2.3 million, which included property, sales and use, personal income, and corporate income taxes.

**Table 7. Estimated Tax Collections and Direct Taxes Paid by the Sugarbeet Industry in Eastern Montana and Western North Dakota, Fiscal 2011**

Tax	Montana	North Dakota	Total
----- 000s \$ -----			
<u>Estimated Tax Collections</u>			
Sales and Use	na	639	639
Personal Income	757	199	956
Corporate Income	<u>132</u>	<u>80</u>	<u>212</u>
Sub-total	889	918	1,807
<u>Direct Tax Payments</u>			
Property	410	64	474
<b><u>Grand Total</u></b>	<b>1,299</b>	<b>982</b>	<b>2,281</b>
na=not applicable.			

#### Total Economic Impacts

Total business activity from sugarbeet industry expenditures and returns in eastern Montana and western North Dakota was estimated at nearly \$212 million in fiscal 2011 (see Table 6). The sectors of the two-state economy with the greatest total economic impact included the *Households* (economy-wide personal income) (\$77 million), *Retail Trade* (\$58 million), *Finance, Insurance, and Real Estate* (\$16 million), and *Communications and Public Utilities* (\$14 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 the secondary economic activity. The sugarbeet cooperatives and marketing alliances employed 186 full-time equivalent jobs and indirectly supported an additional 805 full-time equivalent jobs. The sugarbeet industry also generated about \$982,000 in tax revenue in North Dakota and another \$1.3 million in tax revenue in eastern Montana.

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 and harvesting. Thus, estimating full-time employment equivalents is difficult. While 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 secondary 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

The sugarbeet industry in eastern North Dakota and Minnesota has been assessed in five separate studies going back to 1987. However, the economic contribution of the sugarbeet industry in western North Dakota and eastern Montana was only recently included the 2003 assessment of the industry and was combined with estimates for Red River Valley and West-Central Minnesota (Bangsund and Leistriz 2004). The economic contribution of sugarbeet production, processing, and marketing for Sidney Sugars, Inc. in the Bangsund and Leistriz (2004) study were extracted and compared to current findings (Table 8). Estimates from Bangsund and Leistriz (2004) were adjusted using the Gross Domestic Product–Implicit Price Deflator (U.S. Department of Commerce 2011) to reflect 2011 equivalent dollars.

**Table 8. Economic Size of the Sugarbeet Industry in Eastern Montana and Western North Dakota, 2003 and 2010**

Economic Indicators	Sugarbeet Industry Activity in Various Years <sup>a</sup>	
	2003	2010
Gross Business Volume (000s nominal \$)	173,918	212,432
Gross Business Volume (000s 2010 \$) <sup>b</sup>	204,385	212,432
Direct Employment (full-time jobs)	250	186
Secondary Employment (full-time jobs)	979	805
Tax Revenue Generated (000s 2010 \$)	1,679,000	1,807,000
Planted Acreage	41,000	31,107
Economic Impact per Acre (2010 \$)	4,985	6,829
Tons of Sugarbeets Processed	985,000	798,624
Economic Impact per Ton (2010 \$)	207.50	266.00
Gross Business Volume by State (000s 2010 \$)		
Montana	140,472	140,799
North Dakota	63,913	71,633

<sup>a</sup> Estimates for sugarbeet production, processing, and marketing were extracted from data obtained in the 2003 industry assessment (Bangsund and Leistriz 2004).

<sup>b</sup> Adjusted for inflation using the Gross Domestic Product–Implicit Price Deflator (U.S. Department of Commerce 2011).

Adjusting previous estimates of industry size for inflation revealed that the sugarbeet industry in eastern Montana and western North Dakota exhibited real growth (size has increased after adjusting for inflation) from 2003. Acreage and tons of sugarbeets processed both declined, but gross business volume increased. As a result, impact per ton and impact per planted acreage also increased over the period.

Changes in direct employment decreased between the two studies. Direct jobs in full-time equivalents went from 250 in 2003 to 186 in 2010. The number of full-time equivalent jobs supported by secondary business activity generated by the sugarbeet industry also decreased from 979 to 805 from 2003 to 2010. The decrease in secondary employment from 2003 to 2010 was not due to less economic activity (e.g., secondary economic impacts increased by 5.5 percent in real terms over the same period), but rather the decrease was reflective of changes in productivity ratios<sup>2</sup> used to estimate secondary employment. The relative change in productivity ratios from 2003 to 2010 was greater than the relative change in the industry's secondary economic activity. For example, the average amount of economy-wide business activity required to support one secondary job rose from \$124,476 (average of all sectors influenced by the sugarbeet industry) in 2003 to \$153,325 in 2010, a 23 percent increase. Thus, even though the industry generated a 5.5 percent increase in inflation-adjusted secondary business volume, the number of secondary jobs supported by the industry decreased because, in percentage terms, the average amount of business activity required to support a secondary job increased by 23 percent.

The economic size of the industry over time has been adjusted to reflect changes in the purchasing power of the dollar (inflation). If the same correction for inflation is performed on wholesale prices of refined beet sugar in the Midwest, average annual sugar prices show a 16 percent decrease from 1997 to 2003 (U.S. Department of Agriculture 2011). However, prices have increased 74 percent from 2003 through 2010. The dramatic rise in wholesale refined beet sugar prices in the Midwest is perhaps the largest single driver of the substantial increase in the sugarbeet industries gross business volume since 2003.

The sugarbeet industry in eastern Montana and western North Dakota decreased in physical terms such as planted acreage and tons processed, but has a greater economic contribution now than in previous years. Future changes in the economic importance of the sugarbeet industry not only hinge on physical size, such as acreage and tonnage produced, but will also rely on prices received for industry outputs and spending patterns by industry processors within the regional economy.

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<sup>2</sup> A measure of the amount of economic activity needed in an economic sector to support one full-time job within that sector.

## SUMMARY and CONCLUSIONS

The sugarbeet industry analyzed in this study is geographically limited to a handful of counties in eastern Montana and western North Dakota that are associated with Sidney Sugars, Incorporated located in Sidney, Montana. 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 study region, 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 associated with Sidney Sugars, Inc. to the economies in Montana and North Dakota in 2010. An economic contribution analysis represents an estimate of all relevant expenditures by a specific industry and the subsequent secondary economic effects of those expenditures.

Sugarbeet production budgets were developed to estimate costs of production and returns from growing sugarbeets in the each state. Sidney Sugars, Inc., United Sugars, and Midwest Agri-Commodities were surveyed to obtain estimates of their expenditures in Montana and North Dakota. Expenditures from processing and marketing activities and combined expenditures and net returns from sugarbeet production in the two-state region were estimated at \$73.9 million in fiscal 2011. The \$73.9 million in direct impacts, based on input-output analysis, generated another \$138.5 million in secondary impacts. The sugarbeet industry employed 186 full-time equivalent workers and, based on secondary business activity, supported an additional 805 full-time equivalent jobs in the two-state region. Total economic activity (direct and secondary impacts) was estimated at \$212.4 billion in 2010, including \$77 million in economy-wide personal income and \$58 million in annual retail sales. Also, the sugarbeet industry generated about \$1.8 million in sales and use, personal income, and corporate income taxes and paid \$474,000 in property taxes. Total tax collections were \$1.3 million in Montana and \$982,000 in North Dakota. Montana had the largest share of the industry's gross business volume (\$140.8 million or 66 percent) with North Dakota having \$71.6 million in gross business volume.

For every dollar the sugarbeet industry spent in Montana and North Dakota an additional \$1.88 in business activity was generated within the regional economy. Each acre of sugarbeets planted generated about \$6,830 in total business activity (production, processing, marketing, and secondary impacts) or, expressed alternatively, each ton of sugarbeets processed generated about \$266 in total business activity.

Examinations of previous studies of the economic contribution of the sugarbeet industry revealed that the industry has experienced modest real growth (i.e., effects of inflation were removed) from 2003 to 2010 despite reductions in planted acreage and tons processed. In real terms, gross business volume generated by the industry in eastern Montana and western North Dakota increased 4 percent since 2003. Some of the increase can be attributable to substantial increases in wholesale refined beet sugar prices in fiscal 2010 and fiscal 2011, which have in the Midwest region of the U.S. increased about 74 percent from average prices received from 2005 through 2009. Also, a portion of the growth in gross business volume was associated with increases in local expenditures associated with Sidney Sugars, Inc.

The sugarbeet industry in eastern Montana and western North Dakota contributes substantially to the regional economy despite its relatively small physical footprint in the region as production, storage, transportation, processing, and marketing activities are all concentrated in a relatively small area. Expenditures for crop inputs and returns to growers, which represent a majority of the economic activity, are 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 eastern Montana and western 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. Few agricultural industries in the region can demonstrate the economic activity per acre as the sugarbeet industry.

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**APPENDIX A**

**Sugarbeet Production Budgets**

## **Budget Sources and General Composition**

A sugarbeet production budget was compiled for eastern Montana and western North Dakota. The sugarbeet enterprise budget was used to estimate the economic contribution of sugarbeet production, and was used to allocate production expenses to various sectors of the North Dakota I-O Model.

### Revenues

Data on payments to farmers and planted acreage were obtained from the survey of Sidney Sugars, Incorporated (Appendix B). Estimates of per-acre federal farm program payments, miscellaneous revenues, and crop insurance indemnities were obtained from the North Dakota Farm and Ranch Business Management Education (2011). Payments from sugarbeet processors, farm program payments, and insurance indemnities were combined to estimate gross revenues from sugarbeet production.

### Expenses

Expenses for sugarbeet production were obtained from North Dakota Farm Business Management Education (2011), Hill (2011), and Montana State University, Richland County Extension Service (2008). Variable expenses obtained from Montana State University were adjusted to reflect 2010 dollar values by using the Gross Domestic Product-Implicit Price Deflator (U.S. Department of Commerce 2011). Expenses available from the Farm Business Management Education programs represented an average of actual production costs incurred by the farmers/producers who are enrolled in the program.

### Net Returns

Producer net returns from sugarbeet production were estimated by subtracting variable and fixed costs from gross revenue. All expenses represented cash costs, except depreciation charges, which were used as a proxy for machinery purchases. As a result, the budgets excluded non-cash costs associated with owned land, return on invested equity, management charges, and income tax liability. The producer net returns estimated in the budgets should not be confused with economic profit. Instead, the returns to unpaid labor, management, and equity simply represent gross revenues less cash expenses. Economic costs of production were not estimated.

Sugarbeet Production Budget, Northwestern North Dakota/Northeastern Montana, 2010

Sugarbeet payments to growers	\$49,873,260
Planted acreage in northwestern ND/northeastern MT	31,107
	Owned Land
Farm program payments	\$14.87
Miscellaneous income	\$1.45
Insurance indemnities	\$6.52
Payments from sugarbeet processors	\$1,603.28
Gross revenue (\$/planted acre)	\$1,626.12
Variable Expenses (\$/planted acre)	
Seed	58.76
Fertilizer	179.74
Chemical	71.50
Irrigation Water	34.00
Fuel and Lubrication	103.32
Repairs	55.09
Irrigation Repairs	14.13
Custom Hire	15.31
Crop Insurance	24.91
Hired Labor	112.05
Interest	11.20
Utilities	50.00
Miscellaneous	10.20
Total Variable Costs	<u>740.22</u>
Fixed Costs (\$/planted acre)	
Dues/Fees	3.96
Utilities	7.80
Property Tax	5.00
Insurance	12.90
Interest	31.76
Overhead labor	44.00
Machinery & Building Depreciation	94.70
Machinery & Building Lease	8.42
Miscellaneous	12.07
Total Fixed Costs	<u>220.58</u>
Total Costs	960.80
Returns to Unpaid Labor, Management, and Equity	665.32

**APPENDIX B**

**Sugarbeet Processor Expenditures Survey**

## Instructions for Sugarbeet Processor Expenditures Survey

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

1. Use information for Fiscal Year 2011.
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)
5. If you cannot identify whether expenditures were made to North Dakota or Montana entities, please include the expenditure but note the lack of breakdown between states.
6. Do not include expenditures for pre-paid inputs/services purchased this year for next year's campaign.
7. When exact information is not available, please estimate.
8. Definitions for selected expenditure items and their corresponding Standard Industrial Classification (SIC) code listing are included to help in determining allocation of expenditures.
9. Please complete the survey by **July 22** and mail the questionnaire to the address below.
10. If you have questions, please contact:

Dean Bangsund (701-231-7471)

[d.bangsund@ndsu.edu](mailto:d.bangsund@ndsu.edu)

Dr. Nancy Hodur (701-231-7357)

[nancy.hodur@ndsu.edu](mailto:nancy.hodur@ndsu.edu)

### Mailing Address

Dept # 7610

PO Box 6050

North Dakota State University

Fargo, ND 58108-6050

## DEFINITIONS FOR EXPENDITURE CATEGORIES

The following definitions are derived from Standard Industrial Classification Manual (SIC codes) and have been provided to assist in allocating expenses into common categories. If needed, please refer to the following web site for additional examples of the expenses included in each category: [http://www.osha.gov/pls/imis/sic\\_manual.html](http://www.osha.gov/pls/imis/sic_manual.html) Each category has several Major Group numbers, which contain additional detail on the type of activities in each category.

**Construction:** Includes expenses for construction projects, such as construction (including new work, additions, alterations, remodeling, and repairs) of residential, industrial, public, office, warehouse, and other buildings and structures. (Major Groups 15, 16, and 17)

**Transportation:** Includes expenses for railroad, motor freight, water transportation, air transportation, 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 expenditures for telephone, telegraph, radio, television, satellite services, Internet transactions, and other communication services. (Major Group 48)

**Public Utilities:** Includes expenses for natural gas, electricity, water supply, and sanitary (sewer & garbage) services. (Major Group 49)

**Wholesale Trade:** Expenses paid to 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 expenses for building materials, hardware, food, general merchandise, office supplies, automobile fuel, computers, eating and drinking establishments, work uniforms, and most other business and office-related supplies. (Major Groups 52, 53, 54, 55, 56, 57, 58, and 59)

**Finance, Insurance, and Real Estate:** Includes expenses for loan service, interest on loans, investment counseling, insurance, real estate transactions, brokerage fees, and any other financial service expenditures. (Major Groups 60, 61, 62, 63, 64, 65, 66, and 67)

**Business and Personal Services:** Examples of business and personal services include expenses for advertising, collection services, photocopying/duplication/printing services, equipment rental, computer services, computer software, security services, tax preparation, automotive/equipment/miscellaneous repairs, entertainment, janitorial services, and overnight lodging. (Major Groups 70, 72, 73, 75, 76, 78, 79, and 87)

**Professional and Social Services:** Includes expenses for health/pharmaceutical, medical, legal, educational, research and development, child care, vocational training, and other professional services. (Major Groups 80, 81, 82, 83, 84, 86, 88, and 89)

## SUGARBEET PROCESSOR EXPENDITURES QUESTIONNAIRE

Cooperative: \_\_\_\_\_

Location: \_\_\_\_\_

Contact Person: \_\_\_\_\_

### I. Listing of expenditures made in FY 2011

Expenditure Categories	<u>Estimated Annual Expenditure In</u>	
	North Dakota	Montana
	dollars	
Payments to sugarbeet growers (sugarbeet production)		
Other payments to sugarbeet growers (capital returns, etc.)		
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		
Wages and salaries		
Benefits		
Sugarbeet research funded		

Items For Which Expenditures were Made	Estimated Annual Expenditure In	
	North Dakota	Montana
	dollars	
Government (taxes paid in ND and MT only)		
Property taxes		
Sales and use taxes		
Unemployment		
Other taxes (please specify)		
Other Expenses (please specify nature of expense)		

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

III. Number of employees in full-time equivalents: \_\_\_\_\_

IV. Sugarbeets processed: \_\_\_\_\_ tons

V. Sugarbeet acreage: \_\_\_\_\_ acres planted  
 \_\_\_\_\_ acres harvested

VI. Comments/further explanations (attach supporting material if needed):

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