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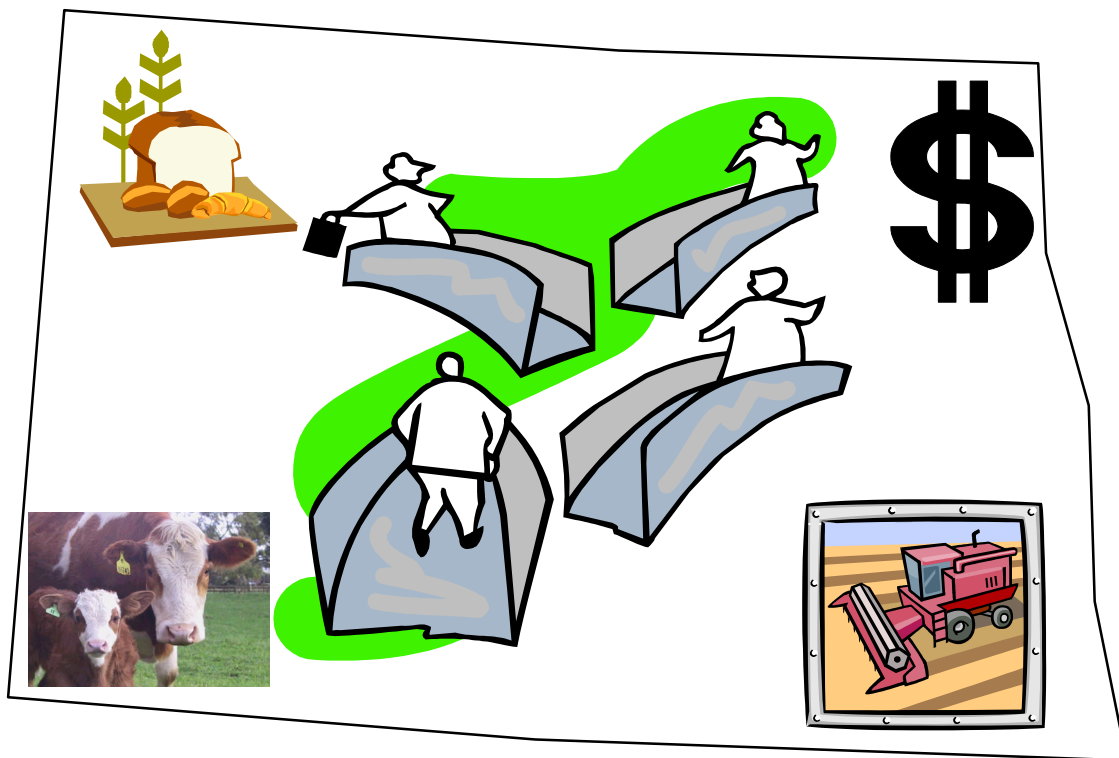
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The Role of Agricultural Processing and Farm Input Manufacturing in the North Dakota Economy



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Abstract

The purpose of this report is to estimate the economic impact of farm input manufacturing and value-added agricultural processing in the North Dakota economy. Economic impacts for these agriculturally-linked sectors are in addition to those for direct agricultural (crops and livestock) production. This analysis will provide state-level estimates of key economic indicators including levels of business activity, retail trade, personal income, secondary employment and tax revenues associated with these agriculturally-linked sectors.

A survey of the 76 farm input manufacturing and 160 agricultural processing firms in North Dakota was conducted to obtain expenditure patterns. In-state outlays by these firms were allocated to sectors of the economy and divided by their respective number of employees to obtain a per employee expenditure for each economic sector. Per worker expenditures for the farm input manufacturing sector were multiplied by that sector's total employment (2,418) to estimate the industry's total expenditures. Agricultural processing per worker outlays were also multiplied by total employment (7,104) to estimate the total expenditures for this sector. Total expenditures for farm input manufacturing were estimated to be \$146.8 million in 2002, and total agricultural processing expenditures were \$361.9 million. These expenditures were applied to the North Dakota Input-Output Model to estimate economic impacts. The North Dakota Input-Output Model is a tool for tabulating and describing the linkages or interdependencies between various industrial groups within an economy. This model uses interdependence coefficients, or multipliers, to measure the total level of economic activity generated in each sector from an additional dollar of expenditures in a given sector.

Total business activity generated from the in-state expenditures amounted to \$482.2 million for the farm input manufacturing firms and \$1,201.4 million for agricultural processing firms, giving a total of \$1,683.6 million. Retail sales for the farm input manufacturing and agricultural processing firms were \$105.2 million and \$243.2 million, respectively. Total retail sales were estimated to be \$348.4 million for the two agriculturally-linked sectors. Another indicator of the economic impact, personal income, was estimated to be \$174.3 million for farm input manufacturing, \$380.9 million for agricultural processing, with a total of \$555.2 million. In addition to the 9,522 direct workers employed by these firms, another 16,272 secondary (indirect and induced) jobs were created. State revenue was enhanced by \$27.4 million as the result of sales and use, personal income, and corporate income tax collections resulting from the business activity for the farm input manufacturing and agricultural processing firms.

Key words: economic impact, farm input manufacturing, value-add agricultural processing, economic indicators

The Role of Agricultural Processing and Farm Input Manufacturing in the North Dakota Economy

by
Randal C. Coon and F. Larry Leistritz¹

Agriculture is an important component of the North Dakota economy. Its relative importance has been previously analyzed (see Coon et al. 1992), and again as part (Phase I) of this research project (see Leistritz et al. 2002). From 1990 to 2000 direct agricultural (crops and livestock) production declined from 37 percent to 25 percent of North Dakota's economic base. Several explanations for this decline exist and include: (1) low commodity prices, (2) production problems associated with weather and crop diseases, (3) cropland being enrolled in the Conservation Reserve Program (CRP), and (4) diversification of the North Dakota economy.

North Dakota farmland acreage has remained virtually unchanged between 1990 and 2000, but during that period some parts of the state have had large acreages enrolled in the CRP program. Part of the reason for agriculture's declining share of the state economy is because of how CRP payments are handled. These payments are included in the household sector rather than the agricultural sector of the state's economic base. The reason for this is that these payments are believed to work their way through the state's economy (i.e., the multiplier process) more like wages and salaries or transfer payments, than like money received from the sale of crops. This methodology has contributed to agriculture's declining share of the state's economy.

Economic base for agriculture essentially comes down to production multiplied by price. As previously mentioned, increasing the number of acres in production would be very difficult, so to increase the value of output for this sector, there must be higher prices, higher yields, or some combination of the two. Because of growth limitations in the agricultural sector, in order for the North Dakota economy to grow, economic diversification is essential. Many areas of the state's economy, such as exported services (see Coon and Leistritz 2001), have been expanded through diversification efforts. One area of diversification often overlooked is industries related to agriculture, such as value-added agricultural processing and farm input manufacturing. North Dakota agriculture provides an adequate supply of raw materials for agricultural processing and a good source of demand for farm input manufacturing (farm machinery). Value-added agricultural processing has become quite prevalent in North Dakota, with many ventures organized as cooperative businesses. Many of the farm input products manufactured were developed by a farmer who "had a better idea". The role of these secondary agricultural industries indicates that the economic impact of agriculture goes beyond crop and livestock production.

Objective

This report is Phase II of the study to analyze the *Economic Impact of Agriculture in North Dakota*. Phase I has been completed and analyzes the relative importance of direct agricultural production in the state's economy. This report will estimate the additional economic impacts that have resulted from value-added agricultural processing and farm input manufacturing.

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Economic impacts estimated in this analysis will be at the state level. Secondary data to estimate in-state expenditures by agricultural processing and farm input manufacturing firms were not available, so a survey was conducted to obtain expenditure data. Survey results provided in-state outlays that were applied to the North Dakota Input-Output Model to estimate the economic impacts for agricultural processing and farm input manufacturing firms. These economic impacts included estimates of personal income, retail trade volume, business volume for all business sectors, and total gross business volume. These measures can be used to estimate additional economic measures, such as indirect and induced employment and revenues from selected state taxes.

Procedures

Estimating the economic impacts for value-added agricultural processing and farm input manufacturing follows methodology similar to that used for the exported services sector (see Coon and Leistritz 1997). While a large number of firms exist for each of these sectors in North Dakota, no expenditures data were available. A list of firms had to be identified and a sample surveyed to obtain their in-state expenditures. These expenditures were converted to a per employee basis, which were applied to the total number of workers to obtain estimates of total statewide agricultural processing and farm input manufacturing outlays. These outlays were applied to the North Dakota Input-Output Model to estimate the economic impacts.

Agricultural Processing and Farm Input Manufacturing Firms

Firms involved in value-added agricultural processing and farm input manufacturing were identified using Standard Industrial Classification (SIC) Codes. Farm input manufacturing entities were firms that had a SIC code of 3523 (Manufacturing: farm machinery and equipment). A larger number of SIC codes were included in the agricultural processing group because of the wide range of products processed, including meat products, dairy products, fruits and vegetables, grain, bakery products, sugar, beverages, and food preparations. SIC codes included were 2011 and 2013 (meat products); 2021, 2022, 2023, 2024, and 2026 (dairy products); 2034, 2035, 2036, 2037, and 2038 (fruits and vegetables); 2041, 2043, 2045, 2046, and 2048 (grain milling); 2051 and 2053 (bakery products); 2063, 2064, 2066, and 2068 (sugar); 2076 and 2077 (fats and oils); 2083, 2086, and 2087 (beverages); and 2092, 2097, 2098, and 2099 (miscellaneous food preparations).

A listing of North Dakota manufacturers by SIC codes was last published in 1995 (see North Dakota Department of Economic Development & Finance 1995). This publication had not been updated since 1995, but the *Growing North Dakota* web site provided a search engine that listed company profiles by SIC code. (The address for this web site is: <http://www.growingnd.com/>). Each of the appropriate SIC codes was searched and a listing of firms was established. Additional information for each company was also available on the web site, including address, product descriptions, employment, and other SIC codes if production crossed over into other areas. From information provided by the website, a listing of farm input manufacturing and value-added agricultural processing firms was compiled (North Dakota Economic Development & Finance Internet Website 2002). It consisted of 76 farm input manufacturing and 160 agricultural processing firms (Table 1). Farm input manufacturing firms had employment ranging from 1 to 800 full-time equivalent workers, and a total workforce for that industry of 2,418 full-time equivalent workers. More agricultural processing firms existed

(160), with employment ranging from 1 to 500 full-time equivalent workers. Total employment by this type of firm was 7,104 full-time equivalent workers.

Table 1. Numbers of Firms, Total Employment, and Employment Ranges for Farm Input Manufacturing and Value-Added Agricultural Processing Firms in North Dakota, 2002

Item	Farm Input Manufacturing	Value-Added Ag Processing
Number of Firms	76	160
Total Employment	2,418	7,104
Minimum Employment	1	1
Maximum Employment	800	500

Source: North Dakota Economic Development & Finance Internet Website. 2002. Company Profiles by SIC codes. Bismarck: North Dakota Department of Commerce

A complete listing of all farm input manufacturing firms is presented in Appendix A, Table 1. This table also includes the firm's SIC codes, location, and employment. Appendix A, Table 2 contains similar information for value-added agricultural processing firms. Appendix A, Table 3 contains the definitions for the farm input manufacturing firms, and Appendix A, Table 4 has those for the agricultural processing entities. Many of the firms have more than one SIC code listed. This results when a company manufactures products that cross SIC code lines. For example, Amity Technology LLC has a 3523 SIC code because it manufactures sugarbeet equipment, but also a 3449 SIC code because it also has contracts to make fabricated structural metal products for other manufacturers. Similar situations exist for the value-added agricultural processing companies. Some of these firms have a Major Group 51 (Wholesale Trade) SIC code. This would indicate that part of the work force was involved in the wholesale trade or marketing of the product. It was virtually impossible to determine if any, or how many, of these workers should not be included as either farm input manufacturing or value-added agricultural processing employees. The company search was conducted for the SIC codes of interest, so it is unlikely many of the workers were allocated to secondary SIC code jobs.

Expenditures Survey

In order to estimate the economic impact of the farm impact manufacturing and agricultural processing sectors, an estimate of the in-state expenditures by these industries was required. Estimates of these expenditures could not be obtained from secondary data. A survey of firms in these two agriculturally-linked sectors was done to obtain estimates of in-state outlays. (A copy of the survey instrument is presented in Appendix B.)

A mail-out survey was conducted for a cross-section of firms in each of the two sectors. This approach was employed so the respondents would represent all types of farm input manufacturing and agricultural processing. If respondents were biased toward one specific area of the sectors, for example dairy processing, the resulting expenditures estimates might not represent the sector as a whole. Fifteen farm input manufacturing firms were selected for the survey, with a 33 percent return rate for useable responses. A larger number of agricultural

processing firms were selected for the survey (35) because of the larger number of businesses in this sector and the number of different types of products involved. The response rate for the agricultural processing firms was 26 percent.

Expenditure data were allocated to sectors of the North Dakota economy on a per employee basis. This methodology is similar to that employed for previous analyses (see Coon and Leistriz 1997; Coon and Leistriz 2001). Expenditures obtained from the survey were allocated to nine sectors of the North Dakota economy. A complete listing of the economic sectors and the definition for each is presented in Appendix A, Table 5. The common denominator for converting survey results to industry-level expenditures was employment. Survey data were allocated to economic sectors and totaled for each economic sector. These totals were divided by the corresponding total employment to obtain an estimated expenditure per worker for the nine sectors involved. This process was done for farm input manufacturing and the value-added agricultural processing firms, with resulting per worker expenditures being \$60,672.38 and \$50,954.36, respectively (Table 2). These expenditure levels were compared to those obtained from a 1997 survey (Coon and Leistriz 1997). The 1997 study estimated in-state expenditures per worker for manufacturing, exportable services, and agricultural processing firms. Total per worker expenditures for the two industry types were higher for the 2002 data, as would be expected, but otherwise appear to be consistent with the earlier data base.

Table 2. Expenditures In North Dakota Per Worker for Farm Input Manufacturing and Value-Added Agricultural Processing Firms, Based on Survey Results, 2002

Sector	Farm Input Manufacturing	Value-Added Ag Processing
	-----\$-----	
Construction	122.25	2,857.51
Transportation	3,342.30	5,282.37
Communications & Public Utilities	1,982.88	4,217.68
Ag Processing & Misc Manufacturing	8,557.46	10,728.03
Retail Trade	4,425.43	3,420.18
Finance, Insurance, Real Estate	11,317.85	7,339.91
Business & Personal Services	2,635.70	862.71
Professional & Social Services	305.62	185.65
Households	<u>27,982.89</u>	<u>16,060.32</u>
Total	60,672.38	50,954.36

In order to estimate the economic impact of each industry, the total in-state expenditures for farm input manufacturing and value-added agricultural processing had to be calculated. Per worker outlays for each industry type were multiplied by the respective number of employees to obtain an estimate of the total. Expenditures were estimated for farm input manufacturing and agricultural processing respectively, then these two were summed to get an agriculturally-linked industry total (Table 3). (A table showing the detailed calculations is presented in Appendix A, Table 6.) In-state expenditures for farm input manufacturing were estimated to be \$146.8 million in 2002; agricultural processing outlays were estimated to be \$361.9 million. The total of the two

sectors was \$508.7 million. Expenditures were kept separate for the two company types so their respective economic impacts could be presented. Farm input manufacturing firms had higher levels of per worker expenditures, but that industry had fewer firms and employees than the agricultural processing enterprises.

Table 3. Estimated In-State Direct Expenditures by Economic Sector for Firms Involved in Farm Input Manufacturing and Value-Added Agricultural Processing, North Dakota, 2002

Sector	Farm Input Manufacturing	Value-Added Ag Processing	Total
	-----million \$-----		
Construction	0.3	20.3	20.6
Transportation	8.1	37.5	45.6
Communications & Public Utilities	4.8	30.0	34.8
Ag Processing & Misc Manufacturing	20.7	76.2	96.9
Retail Trade	10.7	24.3	35.0
Finance, Insurance, Real Estate	27.4	52.1	79.5
Business & Personal Services	6.4	6.1	12.5
Professional & Social Services	0.7	1.3	2.0
Households	<u>67.7</u>	<u>114.1</u>	<u>181.8</u>
Total	146.8	361.9	508.7

Input-Output Analysis

Economic impact analysis requires choosing a technique for estimating the indirect and induced effects an industry's expenditures will have on economic activity, employment, and income. The alternatives considered typically include the economic base approach, econometric estimation based on time-series or cross-sectional data, and input-output analysis. Input-output (I-O) analysis was selected as the economic impact assessment method for this study. The primary reasons were that, compared to the economic base approach, I-O analysis provides considerably more detailed estimates (i.e., business volumes and employment by sector) and I-O allows the analyst to take explicit account of differences in wage rates and local input purchasing patterns in estimating the impacts of various industries or development proposals (Lewis 1968; Richardson 1972). Econometric techniques were thought to be inappropriate for this application because data available for this nonmetropolitan area were of insufficient detail for such analysis (Glickman 1972).

Input-output analysis is a technique for tabulating and describing the linkages or interdependencies between various industrial groups within an economy. The economy considered may be the national economy or an economy as small as that of a multicounty area served by one of the state's major retail trade centers. Input-output models have previously been developed and updated for the state and substate areas of North Dakota (Leistriz et al. 1982; Coon and Leistriz 1987, 2002a). A microcomputer version of the North Dakota Input-Output Model has been developed and was used in this analysis (Coon et al. 1988).

The North Dakota Input-Output Model has been used extensively to estimate the economic impact of a wide range of industrial sectors, including the recreation industry (Mittleider and Leitch 1984), and recently the lignite industry (Coon and Leistritz 2002b), and the role of agriculture in the state (Leistritz et al. 2002). For a complete discussion of input-output theory and methodology, as well as a review of the North Dakota Input-Output Model, see Coon et al. (1985), Leistritz et al. (2002), and Coon and Leistritz (2002a).

The North Dakota Input-Output Model uses interdependence coefficients, or multipliers, to measure the total level of economic activity generated in each sector from an additional dollar of expenditures in a given sector. Expenditures made by the farm input manufacturing and agricultural processing industries were for the year 2002, but are assumed to be annually recurring outlays for processing or production. These two industries will be analyzed separately to determine the economic impacts. Application of these respective expenditures to the input-output model's interdependence coefficients provides an estimate of the levels of economic activity associated with the industry. The economic impacts of the industry are measured by the changes in indicators such as personal income, retail trade volume, gross business volume (gross receipts) for all business sectors, and total gross business volume. These measures can also be used to estimate additional economic measures, such as indirect and induced employment and revenues from selected state taxes, based on historic relationships (Coon et al. 1985).

Results

Expenditure estimates were applied to the North Dakota Input-Output Model's coefficients to determine the economic impact for farm input manufacturing, agricultural processing, and the total for the two agriculturally-linked sectors. Business activity resulting from in-state expenditures was \$482.2 million for the farm input manufacturing firms and \$1,201.4 million for the agricultural processing firms, which resulted in a total of \$1,683.6 million (Table 4). Retail sales activity for the farm input manufacturing firms amounted to \$105.2 million, and \$174.3 million of personal income was generated. Total business activity for all business sectors for these firms was estimated at \$263.6 million. Corresponding numbers for value-added agricultural processing were \$243.2 million of retail trade activity, \$380.9 million of personal income, and \$693.1 million of business activity for all business sectors. Total retail trade activity generated by the two agriculturally-linked sectors was \$348.4 million, and the level of personal income was \$555.2 million. Both sectors combined for \$956.7 million in business activity for all business sectors. These impacts were based on expenditures for 2002, and this annual level of economic activity would continue as long as outlays remain at that level. To put the economic impact of farm input manufacturing and value-added agricultural processing firms into perspective, the nearly \$1.7 billion in total business activity generated by these enterprises was slightly greater than the estimated \$1.6 billion generated by the lignite energy industry (i.e., coal mining and conversion) in 2002 (Coon and Leistritz 2002b).

Table 4. Estimated Direct Plus Indirect Personal Income, Retail Sales Activity, Business Activity for All Business Sectors, and Total Business Activity for Farm Input Manufacturing and Value-Added Agricultural Processing Firms, North Dakota, 2002

Item	Farm Input Manufacturing	Value-Added Ag Processing	Total
	-----million \$ -----		
Personal Income	174.3	380.9	555.2
Retail Sales	105.2	243.2	348.4
Business Activity for all Business Sectors ^a	263.6	693.1	956.7
Total Business Activity	482.2	1,201.4	1,683.6

^aIncludes all sectors except agriculture (livestock and crops), households, and government.

Direct employment by these two agriculturally-linked sectors totaled 9,522 workers. In addition to these workers, indirect and induced business activity creates secondary jobs. Secondary jobs are calculated using productivity ratios, a methodology where a given level of business activity in a given sector will create an additional job in that sector. Secondary employment created by the farm input manufacturing and agricultural processing enterprises was 16,272 workers (Table 5). These jobs were created in the state's economic sectors as they serve and support the basic industry and worker needs. Secondary jobs created amounted to 4,440 for the farm input manufacturing firms and 11,832 for the agricultural processing businesses.

Table 5. Estimated Direct and Secondary Employment for Firms Involved in Farm Input Manufacturing and Value-Added Agricultural Processing, North Dakota, 2002

Employment	Farm Input Manufacturing	Value-Added Ag Processing	Total
Direct	2,418	7,104	9,522
Secondary	4,440	11,832	16,272

Agriculturally-related industries also contribute substantially to state tax revenues. Total taxes attributed to these two sectors were estimated to be \$27.4 million. This total is comprised of \$16.2 million in sales and use tax collections, \$8.3 million in personal income tax collections and \$2.9 million in corporate income taxes (Table 6). Farm input manufacturing generated an estimated \$8.3 million in taxes, with sales and use taxes accounting for \$4.9 million, personal income \$2.6 million, and corporate income \$0.8 million of the total. Business activity associated with agricultural processing generated \$11.3 million in sales and use taxes, \$5.7 million in personal income tax and \$2.1 million of corporate income tax. Total tax collections associated with agricultural processing firms totaled \$19.1 million in 2002. Tax revenue estimations were based on historic relationships between business activity and tax revenue collections.

Table 6. Estimated State Tax Revenue Resulting from the Activities of Firms Involved in Farm Input Manufacturing and Value-Added Agricultural Processing, North Dakota, 2002

Tax Revenue	Farm Input Manufacturing	Value-Added Ag Processing	Total
	-----million \$ -----		
Sales & Use	4.9	11.3	16.2
Personal Income	2.6	5.7	8.3
Corporate Income	<u>0.8</u>	<u>2.1</u>	<u>2.9</u>
Total	8.3	19.1	27.4

Conclusions

Agriculture in North Dakota has experienced tough economic times in recent years. This has caused agriculture’s role in the state economy to decline, a fact that was well documented in Phase I of this study. Direct agricultural (crops and livestock) production often depends on external factors such as weather, crop disease, and commodity prices. This results in crop and livestock economic base levels that may not grow over time, or a year with extreme growth may be followed by a period with no growth, or even a period of decline. To combat these problems the state has tried to diversify its economy. The result has been many farm input manufacturing and agricultural processing firms coming into existence. These firms are directly related to agriculture and provide an economic impact beyond that of crops and livestock production.

The economic impact of these agriculture-related businesses has been substantial. Total business activity generated by these firms was nearly \$1.7 billion in 2002. This resulted in \$348.4 million in additional retail sales activity, and an increased level of personal income of \$555.2 million. Additional impacts include 16,272 secondary jobs and tax revenues amounting to \$27.4 million. These agriculturally-linked businesses are an important component of North Dakota’s economy.

Agriculture’s role in North Dakota has declined in recent years. Part of this trend is due to factors affecting crop and livestock production, but efforts to diversify the state’s economy also have contributed. A great emphasis has been placed on value-added agriculture, or processing the raw materials agriculture produces. Many new ventures have sprouted up in the state, some large and some small. These enterprises directly related to agriculture are often overlooked when analyzing agriculture’s role in the state. This study quantifies the economic impacts of these agriculturally-linked businesses in North Dakota. Direct agricultural production is still very important to the North Dakota economy. When farm input manufacturing and value-added agricultural processing are added to the impact assessment, it further highlights the importance of agriculture’s role in the North Dakota economy.

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Appendix A

Appendix Table 1. Farm Input Manufacturing Firms and Employment, North Dakota, 2001

SIC Code	Firm	Location	Employment
3523	Agricon Inc.	Grand Forks	2
3523	Air Tram	Michigan	3
3523	Amber Waves Inc.	Richardton	9
3523, 3449	Amity Technology LLC	Fargo	40
3523, 3599, 7692	Arena Welding & Manufacturing	Arena	5
3517, 3523	B L Industries Inc.	Walhalla	8
3523, 3714, 3479	BUZ Manufacturing Inc.	Carrington	12
3523	Bourgault Industries Inc.	Minot	10
3523	Bowerman Industries Inc.	Tappen	2
3523	Burvee Manufacturing	Fairmount	3
3523	Carlos Manufacturing Inc.	Hope	22
3523, 7699	CJ Welding Co.	Dickinson	2
3523, 3531	CNH Global NV	Fargo	800
3599, 3523	Countryside Equipment	Hope	12
3524, 3523	Crary Company	West Fargo	181
3523, 7699, 3715	DJ Mfg. Inc.	New Salem	3
3523	Dakota Manufacturing	Williston	5
3523	Double L Manufacturing Inc.	Grand Forks	4
3523, 3569	Duratech Industries International Inc.	Jamestown	160
3523	Ecological Chambers Inc.	Pembina	10
3523	F & S Manufacturing Inc.	West Fargo	17
3523	Fargo Products LLC	Fargo	9
3523	Faul Manufacturing	Harvey	3
3523	Fertilizer Equipment Inc.	Valley City	27
3713, 3523, 3715	Frontier Inc.	Wahpeton	15
3523	Gates Manufacturing	Lansford	13
3523	Ham's Well Service	Westhope	3
3523	Harriston Industries Inc.	Minto	53
3523	Hart Machine & Manufacturing Co.	Grafton	8
3523	Hills Inc.	Grafton	10
3523, 5083	Horvick Manufacturing Co. Inc.	Fargo	15
3523	Inforcer, Inc.	Newburg	3

SIC Code	Firm	Location	Employment
3523, 3089	John Deere Seeding Group	Valley City	118
3523, 7538	Johnson Manufacturing Inc.	Kulm	5
3523	K & E Pick-N-Roll Inc.	Hebron	N/A
3523	Kanzelman Repair	Maddock	3
3523	Kerian Machines Inc.	Grafton	20
7699, 3523	Kringstad Iron Works	Hoople	12
3523	Lockwood Manufacturing	West Fargo	97
3523, 7699	Mar-Del's Mfg. & Repair	Wishek	1
7699, 3523	Midwestern Machine	Jamestown	4
7692, 3523, 5191	Mollers Inc.	York	6
3523	Morris Industries Ltd.	Minot	11
3089, 3523	Mor-Tech Fab. Inc.	Williston	13
3523, 3559	National Feeding Systems Inc.	Valley City	32
3523	Nissen Manufacturing and Sales Inc.	Larimore	N/A
3523, 7699, 3949	Prairie-Bilt Industries	Page	3
3523	Pro-Ag Equipment	Grand Forks	10
3523, 3554	Quality Dry Systems	Cando	3
3523	Randean Inc.	Hannaford	3
3523	Ray-Mac Inc.	Gwinner	80
3523	Ray-Mac Inc.	Gwinner	55
3523	Rem Mfg. Inc.	Fargo	1
3523, 3423	Rolin Manufacturing Inc.	New Salem	11
3523	Scott's Mfg.	Landa	3
3523	Sheyenne Forming Inc.	West Fargo	12
3537, 3599, 3523, 3531	Sheyenne Tooling & Mfg. Inc.	Cooperstown	60
3523	Sky Manufacturing	Deering	1
3523	Spring Creek Industries Inc.	Taylor	2
3523, 7699	SSR Pump Co.	Michigan	5
3523	Stevens & Son Welding	Lignite	1
7692, 3523, 3533	Stevens Welding Service Inc.	Glenburn	20
3523	Stur-D Products Co. Inc.	Carson	17
3523	Summers Manufacturing Co. Inc.	Devils Lake	50

SIC Code	Firm	Location	Employment
3523	Summers Manufacturing Co. Inc.	Maddock	40
3523	Sund Manufacturing Co. Inc.	Newburg	20
3523, 3599	T.A. Moen Inc.	Mayville	6
3523, 7692	Tough-T Manufacturing	Glenfield	9
3523	Town & Country Research & Development	Marion	9
3523	Tri Steel Manufacturing Co.	Grand Forks	20
3523	Triangle Industries Inc.	Cooperstown	9
3523	Tuff-E Mfg.	Carson	9
3559, 3523	Vulcan Iron Works Inc.	Bisbee	4
3523	Weisgram Metal Fabrication	West Fargo	32
3523	Wil-Rich LLC	Wahpeton	92
3523, 3531, 3593	Wishek Steel & Mfg. Co.	Wishek	40

Source: North Dakota Economic Development & Finance Internet Website. 2002. Company Profiles by SIC Codes. Bismarck: North Dakota Department of Commerce.

Appendix Table 2. Value-Added Agricultural Processing Firms and Employment, North Dakota, 2001

SIC Code	Firm	Location	Employment
2011, 3199	Big Sky Buffalo Ranch	Granville	5
2011	Cloverdale Packing	Minot	47
2011, 2013	Dakota Halal Processing	Harvey	22
2011	Dakota Packing Company	Hettinger	4
2011	Davidson's Processing Plant	Bottineau	6
2013, 2011	Double R Meats	Carson	3
2011, 2013	Kramlich's Locker	Medina	4
5147, 2011	Larry's Meat Processing	Mott	2
2011	M & W Beef Packers Co. Inc.	Mandan	13
2011, 2013	Maple Valley Locker Inc.	Enderlin	8
2011	Missouri Valley Meat Co. Inc.	Mandan	10
2011	North American Bison Cooperative	New Rockford	81
2011, 2013, 5146, 5147	Quality Boneless Beef Company Inc.	West Fargo	93
2011	Siouxland Buffalo	Grand Forks	3
2013	Bloms Locker & Meat Processing Plant	Minot	1
2013, 5411	Bowdon Locker & Grocery	Bowdon	6
2013	Cloverdale Foods Company	Mandan	250
2013	Dakota Country Meats	Jamestown	5
2013	Dean's Meat Market	Dickinson	3
2013	Don's Meat Market	Richardton	7
2013	Hazen Custom Meats	Hazen	9
2013	John's Meat Market	Bismarck	6
2013	Krause's Smokehouse	Hazen	6
2013	Myers Meats and Specialties	Parshall	7
2013	Rolling Hills Premium Ranch Beef	Medina	2
2013	S & K Processing	Minot	6
2013	Schmaltz Meats	Linton	3
5421, 2013	Skyberg's Meats Inc.	Devils Lake	5
2013	Wurst Shop in Dickinson LLC	Dickinson	3
2021, 2026	Cass Clay Creamery	Mandan	36
2026, 2024, 2021	Cass Clay Creamery	Fargo	135
2026, 2024, 2021, 2064	Pride Dairies	Bottineau	11

SIC Code	Firm	Location	Employment
2048, 2022	Dakota Country Cheese Co. Inc.	Mandan	35
2022, 2023	Winger Cheese Inc.	Towner	40
2023	Intercell Impact	Bismarck	1
2024	Dean Foods/LOL	Minot	23
2024, 2026, 2033	Land-O-Lakes Inc.	Grand Forks	210
2026, 5143	Dean Foods North Central	Bismarck	82
2026	New England Creamery	New England	1
2032	Patrie's Raspberries on the Prairie	Bowden	6
2034, 2033	Amberland Foods Inc.	Harvey	10
2033	Berry Dakota	Jamestown	1
2033, 2099	Karl's Dakota	Cooperstown	4
2033	Light Line Inc.	Regent	1
2033, 2045, 2087, 2099	Mabel's Taste of Home	Fargo	1
2045, 2053, 2099, 2033, 2051	Wild Prairie Products	Carson	5
2034	ADM Edible Bean Specialties	Casselton	9
2034	ADM Edible Bean Specialties	Cavalier	6
2034	ADM Edible Bean Specialties	Galesburg	6
2038, 2099, 2034	Custom Enterprises	Hatton	30
2034	RDO Foods Company	Grand Forks	106
2035, 2034	Thunderbird Ranch Enterprises LLC	Ray	N/A
2041, 2035	Baltimore Spice	Grand Forks	20
2035	Bonnie's Country Classics	Fargo	1
2038, 2035	Boyko Inc.	Stanton	17
2035, 2099	Clemco Inc.	Larimore	3
2035	ERL Inc.	Fargo	59
5085, 2035	Fiesta Hot Sauce	Fargo	7
2035	House of Wu	Bismarck	1
2035	Mexican Village Wholesale Foods	Hillsboro	18
2035	Village Hot Sauce Company Inc.	Grand Forks	1
2037	Cavandish Farms	Jamestown	250
5142, 2037	JR Simplot Co.	Grand Forks	500

SIC Code	Firm	Location	Employment
2037, 2038	Paul's Pintos	Buxton	2
2038	Pizza Corner Frozen Pizza	Valley City	85
2038	Valley Specialty Foods	Grand Forks	2
2041	AGP Grain	Larimore	3
2068, 2041, 2048, 5153	Harvest States Sunflower	Grandin	100
2041	Heart of Valley LLC	Mayville	10
2041	Horizon Milling	Fairmount	20
2041	Minn Dak Growers LTD	Dickinson	7
2041, 2068	Minn Dak Growers LTD	Grand Forks	39
2041	Minot Milling	Minot	31
2041, 2045	ND Mill & Elevator Association	Grand Forks	121
2045, 2041, 2043	Pemri Enterprises Inc.	New Leipzig	1
2043, 2045, 2041	Roman Meal Milling Company Inc.	Fargo	79
2041	Summer's Harvest	Hope	2
2043	Carlisle Inc.	Bismarck	6
2045	Big Dog Cuisine	Pingree	1
2045	Drayton Enterprises LLC	Fargo	100
2046	Cargill Inc. (ProGold)	Wahpeton	150
2048	Circle K Feed & Grain Inc.	Glen Ullin	5
2048	Cow Chow Corp.	Regent	1
2048, 5153	G & R Grain and Feed Inc.	New Rockford	5
2048	Gold Label Feeds	Bismarck	6
2048	Harvest Fuel Inc.	Walhalla	9
2048	Harvest States Feed Plant	Dickinson	18
2048	Heartland Inc.	Bismarck	25
2048	Hubbard Feed Inc.	Grandin	14
2048	LaMoure Feed & Seed Inc.	LaMoure	9
2048	Land O'Lakes Harvest States	Dickinson	18
2048	Land O'Lakes/Harvest States Cooperative	Edgeley	12
2048	Larimore Sunflower Inc.	Larimore	10
2048	Mayville Pelleting Co.	Mayville	3

SIC Code	Firm	Location	Employment
2048	Midcontinental Livestock Supplements of Dakota Inc.	Ellendale	10
2048	Northwest Alfalfa Products	Tioga	N/A
2048	Prairie Nutrition Center Inc.	Hebron	3
2068, 2048	Red River Commodities Inc.	Fargo	150
2048	Shafer Seed Co.	Oakes	28
2099, 2048	Sun Pro Inc.	Grand Forks	6
2048	Westway Trading Corp.	Mapleton	11
2048	Woody's Feed and Grain	Dickinson	10
2051, 2053, 5149	Baker Boy Supply	Dickinson	250
2051	Dakota Brands Int'l. Inc.	Jamestown	35
2051	Freddy's Lefse Bakery Inc.	West Fargo	12
2051	Harvey Bakery Company	Harvey	3
2051	Kickapoo Country Inc.	Plaza	6
2051	Pan-O-Gold Baking Co.	Fargo	150
2051	Top Taste Inc.	Finley	51
2063	American Crystal Sugar Co.	Hillsboro	300
2063	American Crystal Sugar Co.	Drayton	245
2063, 2099	Minn-Dak Farmers Cooperative	Wahpeton	340
2064	Mikey's Country Candy	Hannover	2
2064	Widman's Candy Shop	Grand Forks	10
2066	Honey Lover's Company	Shields	6
2066	Lindy Sue's Candies	Mandan	6
2068, 2099	Dahlgren & Company Inc.	Crookston, MN	20
2068	Dakota Natural Foods Inc.	Fargo	9
2068	SIGCO Sun Products Inc.	Breckenridge, MN	98
2068	Sonne Labs Inc.	Wahpeton	24
2068	Sun Valley Products Inc.	Fargo	90
2076	Archer Daniels Midland Co.	Enderlin	112
2076	Archer Daniels Midland Co.	Velva	50
2077, 3111	Northwest Rendering Co.	Minot	4
2083	Cargill Malt	Spiritwood	74

SIC Code	Firm	Location	Employment
2086	Coca-Cola Bottling Company	Grand Forks	125
2086	Crystal Creek Bottling Inc.	Wahpeton	5
2086	Midwest Coca-Cola Bottling	Bismarck	125
2086	Northern Bottling Co. Inc.	Minot	80
2086	Pepsi Americas	Fargo	600
2086	Pepsi-Cola Btlg. Co. of Fargo	Fargo	100
2086	United Bottling	Hillsboro	N/A
2092	North Star Caviar	Williston	6
2097	Arctic Glacier	Fargo	3
2097	Arctic North Dakota Inc.	Bismarck	10
2097	Cal's Ice Service	Mayville	8
2097	Granite Springs Water & Ice Co.	Williston	6
2097	Tour Ice of Dickinson	New England	3
2098	Dakota Growers Pasta Company	Carrington	278
2098	Noodles by Leonardo Inc.	Devils Lake	50
2098	Noodles by Leonardo Inc.	Cando	90
2098	Philadelphia Macaroni Co.	Grand Forks	75
3556, 2099, 3082	Born's Spices and Casing Company	Bismarck	1
2099	Copper Kettle Korn	Mandan	N/A
2099	Dakota Flax	Minot	2
2099	Dakota Fresh Inc.	Medina	2
2099, 3999	Dakota Honey LLP/Dakota Candles	Larimore	N/A
2099	Dakota Lakes Products Inc.	Kensal	1
2099, 5148	Garske Produce Sales Inc.	Bismarck	6
5499, 2099	Golden Flax 4U Inc.	Denhoff	7
2099	Golden Valley Omega Flax	Park River	N/A
2099	Master Potatoes Inc.	Hatton	15
2099	MenUSAver Inc.	West Fargo	140
2099	Minn-Dak Yeast Company Inc.	Wahpeton	20
2099	Nancy's Pantry	Minot	1
2099	Northern Plains Nutritional Grains	Lakota	N/A
2099	O'Connors Pembina Mustard	Grand Forks	1

SIC Code	Firm	Location	Employment
2099	Pugsley's Sandwiches	Devils Lake	47
2099, 5812	Schepps Dakota Deli Inc.	Lansford	22
2099	Woodworth Honey & Bee	Halliday	10

Source: North Dakota Economic Development & Finance Internet Web Site. 2002. Company Profiles by SIC Codes. Bismarck: North Dakota Department of Commerce.

Appendix Table 3. SIC Codes and Associated Descriptions for Entities Identified as Farm Input Manufacturing Firms, North Dakota, 2002

SIC Codes	Description
3089	Manufacturing: Rubber and miscellaneous plastic products
3423	Manufacturing: Fabricated metal products, except machinery and transportation equipment
3449	Manufacturing: Fabricated structural metal products, miscellaneous metal work
3479	Manufacturing: Fabricated structural metal products, coating, engraving, and allied services, not elsewhere classified
3517	Manufacturing: Machinery, except electrical
3523	Manufacturing: Farm machinery and equipment
3524	Manufacturing: Farm machinery and equipment including garden tractors, lawn mowers, and other lawn and garden equipment
3531	Manufacturing: Construction, mining, and materials handling machinery and equipment
3533	Manufacturing: Construction, mining, and materials handling machinery and equipment including oil field machinery and equipment
3537	Manufacturing: Construction, mining, and materials handling machinery and equipment including industrial trucks, tractors, trailers, and stackers
3554	Manufacturing: Special industry machinery, except metal working machinery, including paper industries machinery
3559	Manufacturing: Special industry machinery, except metalworking machinery, not elsewhere classified
3569	Manufacturing: General industrial machinery and equipment, not elsewhere classified
3593	Manufacturing: Miscellaneous machinery, except electrical, including machine repair and equipment parts
3599	Manufacturing: Miscellaneous machinery, except electrical not elsewhere classified
3713	Manufacturing: Motor vehicles and motor vehicle equipment, including truck and bus bodies
3714	Manufacturing: Motor vehicle and motor vehicle equipment, including motor vehicle parts and accessories
3715	Manufacturing: Motor vehicles and motor vehicle equipment, including truck trailers
3949	Manufacturing: Toys and amusement, sporting and athletic goods, not elsewhere classified
5083	Wholesale Trade: Farm and garden machinery and equipment
5191	Wholesale Trade: Miscellaneous nondurable goods including farm supplies
7538	Services: Automotive repair, services, and garages, general automotive repair shops
7692	Services: Miscellaneous repair shops and related services including welding repair
7699	Services: Miscellaneous repair shops and related services, not elsewhere classified

Source: Executive Office of the President - Office of Management and Budget. 1972. Standard Industrial Classification Manual. Washington, D.C.: U.S. Government Printing Office.

Appendix Table 4. SIC Codes and Associated Descriptions for Entities Identified as Value-Added Agricultural Processing Firms, North Dakota, 2002

SIC Codes	Description
2011	Manufacturing: Meat products including meat packing plants
2013	Manufacturing: Meat products, including sausages and other prepared meat products
2021	Manufacturing: Dairy products including creamery butter
2022	Manufacturing: Dairy products including cheese, natural and processed
2023	Manufacturing: Dairy products including condensed and evaporated milk
2024	Manufacturing: Dairy products including ice cream and frozen desserts
2026	Manufacturing: Dairy products including fluid milk
2032	Manufacturing: Canned and preserved fruit and vegetables including canned specialties
2033	Manufacturing: Canned fruits, vegetable preserves, jams and jellies
2034	Manufacturing: Canned and preserved fruits and vegetables including dried and dehydrated fruits, vegetables, and soup mixes
2035	Manufacturing: Canned and preserved fruits and vegetables including pickled fruits and vegetables, vegetable sauces and seasonings, and salad dressings
2037	Manufacturing: Canned and preserved fruits and vegetables including frozen fruits, fruit juices and vegetables
2038	Manufacturing: Canned and preserved fruits and vegetables including frozen specialties
2041	Manufacturing: Grain mill products including flour and other grain mill products
2043	Manufacturing: Grain mill products including cereal breakfast foods
2045	Manufacturing: Grain mill products including blended and prepared flour
2046	Manufacturing: Grain mill products including wet corn milling
2048	Manufacturing: Grain mill products including prepared feeds and feed ingredients for animals and fowls, not elsewhere classified
2051	Manufacturing: Bakery products including bread and other bakery products, except cookies and crackers
2053	Manufacturing: Bakery products including cookies, crackers, pretzels, and similar dry bakery products
2063	Manufacturing: Sugar and confectionery products including beet sugar
2064	Manufacturing: Sugar and confectionery products including candy and other confectionery products
2066	Manufacturing: Sugar and confectionery products including chocolate and cocoa products
2068	Manufacturing: Sugar and confectionery products not elsewhere classified
2076	Manufacturing: Fats and oils including vegetable oil mills, except corn, cottonseed, and soybean

Appendix Table 4 continued

SIC Codes	Description
2077	Manufacturing: Fats and oils including animal and marine fats and oils
2083	Manufacturing: Beverages including malt and malt by-products from barley or other grains
2086	Manufacturing: Beverages including bottled and canned soft drinks and carbonated waters
2087	Manufacturing: Beverages including flavoring extracts and flavoring syrups, not elsewhere classified
2092	Manufacturing: Miscellaneous food preparations and kindred products including fresh or frozen fish and seafoods
2097	Manufacturing: Miscellaneous food preparations and kindred products including manufactured ice
2098	Manufacturing: Miscellaneous food preparations and kindred products including macaroni, spaghetti, vermicelli, and noodles
2099	Manufacturing: Miscellaneous food preparations and kindred products including food preparations, not elsewhere classified
3082	Manufacturing: Fabricated plastic products not elsewhere classified
3111	Manufacturing: Leather and leather products including leather tanning and finishing
3199	Manufacturing: Leather and leather products including leather goods, not elsewhere classified
3556	Manufacturing: Special industry machinery including printing trades machinery and equipment, not elsewhere classified
3999	Manufacturing: Miscellaneous manufacturing industries, not elsewhere classified
5085	Wholesale Trade: Machinery, equipment, and supplies including industrial supplies
5142	Wholesale Trade: Groceries and related products including frozen foods
5143	Wholesale Trade: Groceries and related products including dairy products
5146	Wholesale Trade: Groceries and related products including fish and seafood
5147	Wholesale Trade: Groceries and related products including meats and meat products
5148	Wholesale Trade: Groceries and related products including fresh fruits and vegetables
5149	Wholesale Trade: Groceries and related products, not elsewhere classified
5153	Wholesale Trade: Farm-products raw materials including grain
5411	Retail Trade: Food stores including grocery stores
5421	Retail Trade: Food stores including meat and fish (seafood) markets, including freezer provisions
5499	Retail Trade: Miscellaneous food stores
5812	Retail Trade: Eating and drinking places including establishments primarily engaged in the retail sale of prepared food and drinks for consumption on the premises

Source: Executive Office of the President - Office of Management and Budget. 1972. Standard Industrial Classification Manual. Washington, D.C.: U.S. Government Printing Office.

Appendix Table 5. Economic Sectors and Associated Standard Industrial Classification Codes for the North Dakota Input-Output Model

Economic Sector	SIC Codes
1. Agriculture, Livestock	Major Group 02 - Agricultural Production, Livestock
2. Agriculture, Crops	Major Group 01 - Agricultural Production, Crops
3. Nonmetallic Mining	Major Group 14 - Mining and Quarrying of Nonmetallic Minerals, Except Fuels
4. Contract Construction	Major Group 15, 16, 17 - Contract Construction
5. Transportation	Major Groups 40, 41, 42, 43, 44, 45, 46, and 47 - Transportation
6. Communication and Utilities	Major Group 48 - Communication, and Major Group 49 - Electric, Gas, and Sanitary Services, Except Industry No. 491
7. Agricultural Processing and Miscellaneous Manufacturing	Major Group 50 and 51 - Wholesale Trade, Major Group 20 - Food and Kindred Products Manufacturing
8. Retail Trade	Major Groups 52, 53, 54, 55, 56, 57, 58, and 59 - Retail Trade
9. Finance, Insurance, and Real Estate	Major Group 60, 61, 62, 63, 64, 65, 66, and 67 - Finance, and Insurance, and Real Estate
10. Business and Personal Services	Major Groups 70, 72, 73, 75, 76, 78, and 79 - Business and Personal Services
11. Professional and Social Services	Major Groups 80, 81, 82, 83, 84, 86, 88, and 89 - Professional and Social Services
12. Households	Not Applicable
13. Government	Major Groups 91, 92, 93, 94, 95, 96, and 97 - Government
14. Coal Mining	Major Group 12 - Bituminous Coal and Lignite Mining
15. Thermal-Electric Generation and Coal Conversion	Major Group 491 - Electric Companies and Systems
16. Petroleum and Natural Gas Exploration and Extraction	Major Group 13 - Crude Petroleum and Natural Gas
17. Petroleum Refining	Major Group 20 - Petroleum Refining and Related Industries

SOURCE: Executive of the President. Office of Management and Budget. 1972. Standard Industrial Classification Manual. Washington, D.C.: U.S. Government Printing Office.

Appendix Table 6. Estimated In-State Expenditures by Economic Sector For Farm Input Manufacturing and Value-Added Agricultural Processing Firms, North Dakota, 2002

Sector	<u>Farm Input Manufacturing</u>			<u>Value-Added Ag Processing</u>		
	Expenditures Per Worker	Workers	Total	Expenditures Per Worker	Workers	Total
	-----\$-----		-----\$-----	-----\$-----		-----\$-----
Construction	122.25	2,418	295,600.50	2,857.51	7,104	20,299,751.04
Transportation	3,342.30	2,418	8,081,681.40	5,282.37	7,104	37,525,956.48
Communications & Public Utilities	1,982.88	2,418	4,794,603.84	4,217.68	7,104	29,962,398.72
Ag Processing & Misc Manufacturing	8,557.46	2,418	20,691,938.28	10,728.03	7,104	76,211,925.12
Retail Trade	4,425.43	2,418	10,700,689.74	3,420.18	7,104	24,296,958.72
Finance, Insurance, Real Estate	11,317.85	2,418	27,366,561.30	7,339.91	7,104	52,142,720.64
Business & Personal Service	2,635.70	2,418	6,373,122.60	862.71	7,104	6,128,691.84
Professional & Social Service	305.62	2,418	738,989.16	185.65	7,104	1,318,857.60
Households	27,982.89	2,418	67,662,628.02	16,060.36	7,104	114,092,797.40

Appendix B

Agricultural Processing and Manufacturing Questionnaire

Business Name: _____

Contact Person: _____

Phone Numbers: _____

Describe product(s) produced: _____

If not all production is agriculture related, what percent of total is ag. related: _____%

Number of full-time equivalent employees: _____.

Estimate percentage of production sold in North Dakota: _____%

Please estimate the expenditures made in North Dakota for goods and services for the most recent business year.

Category	In-State Expenditure -----\$-----
Payroll (wages, salaries)	
Worker benefits	
Utilities (electricity, natural gas)	
Communications	
Transportation (freight)	
Wholesale Trade	
Retail Trade	
Finance	
Real Estate	
Business & Personnel Service	
Professional & Social Services	
Construction, Repair, Maintenance Contracts	
Machinery & Equipment	
Other (specify: _____)	

THANK YOU FOR YOUR HELP!

Appendix C

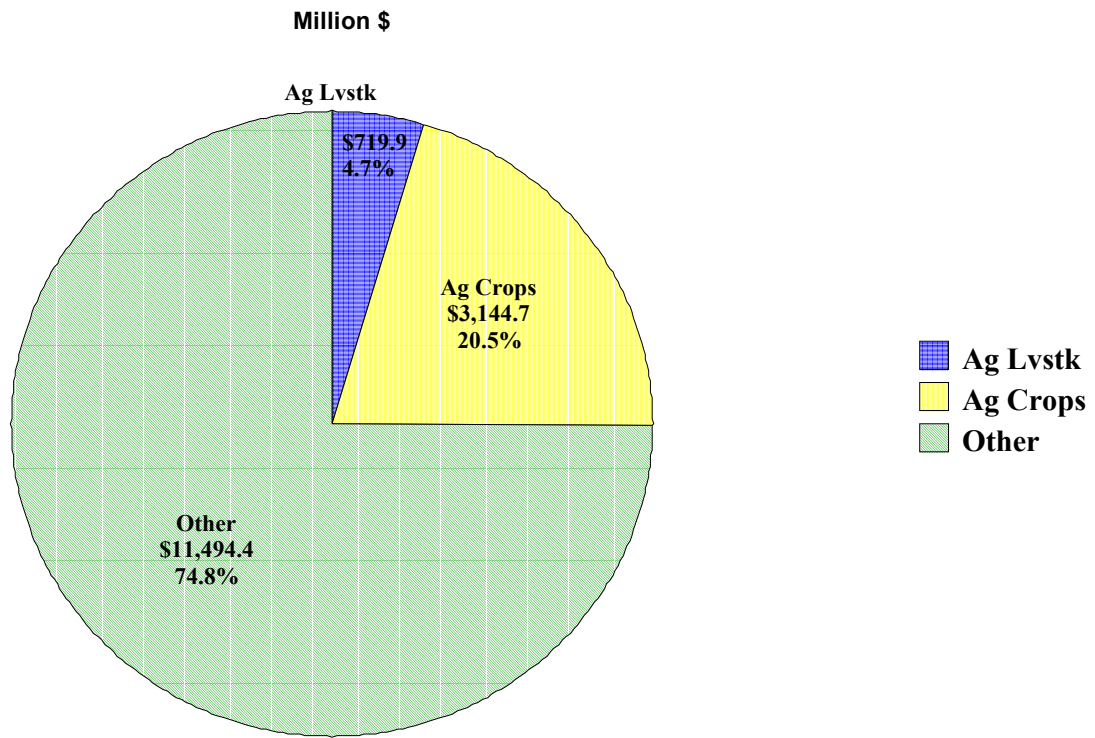


Figure 1. Production Agriculture's Contribution to North Dakota's Economic Base, 2000

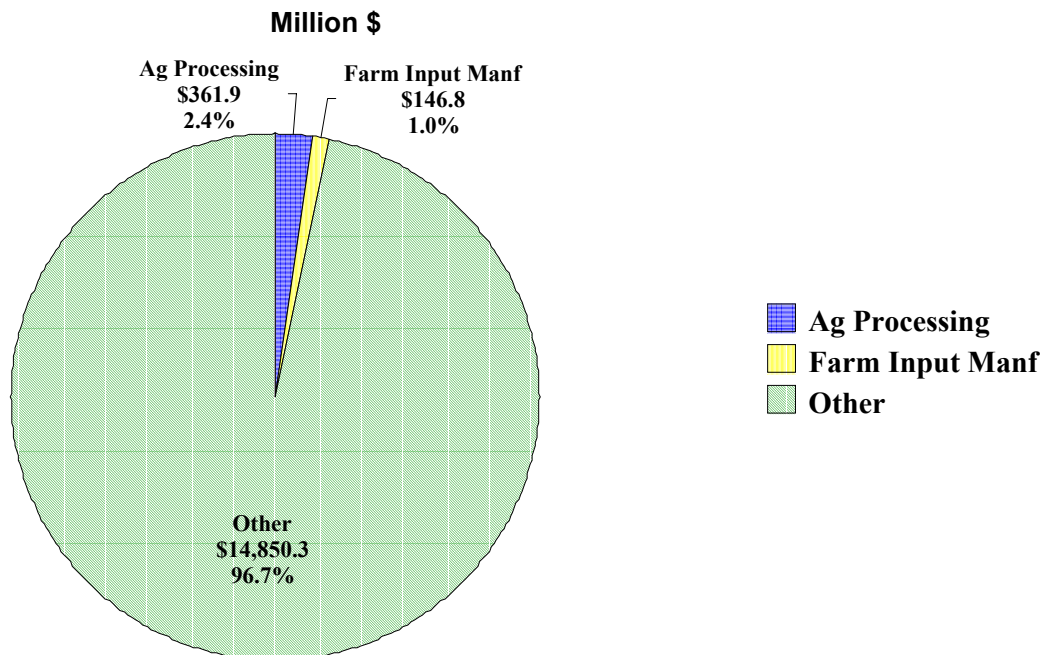


Figure 2. Value-Added Agriculture Processing and Farm Input Manufacturing's Contribution to North Dakota's Economic Base, 2000

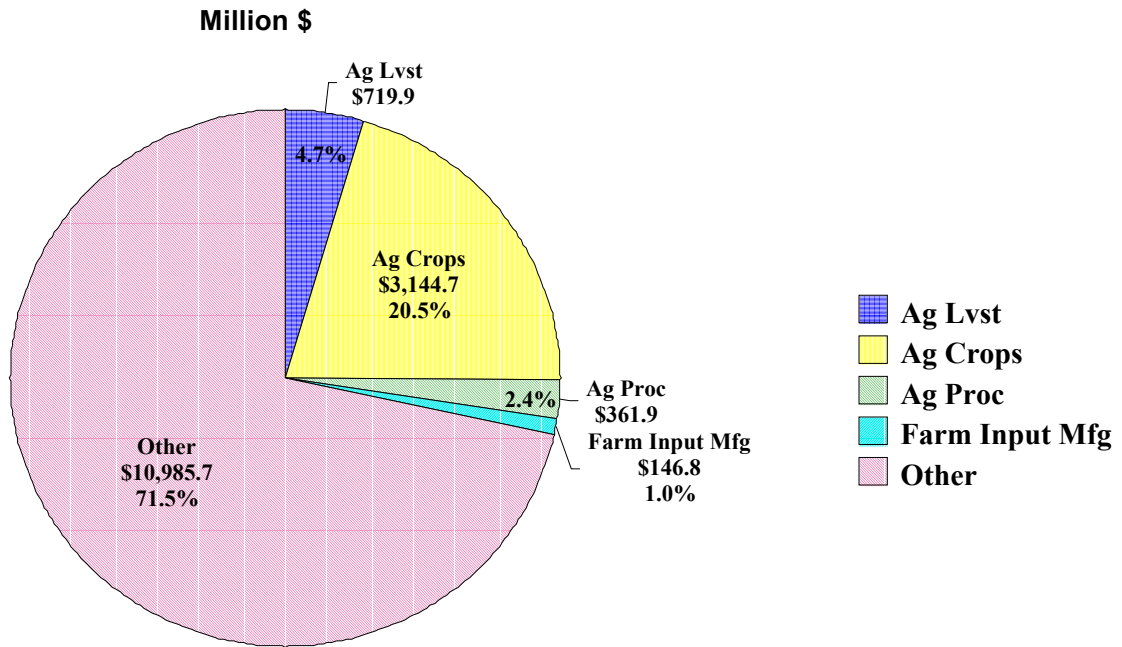


Figure 3. Production Agriculture, Value-Added Agricultural Processing, and Farm Input Manufacturing's Contribution to North Dakota's Economic Base, 2000

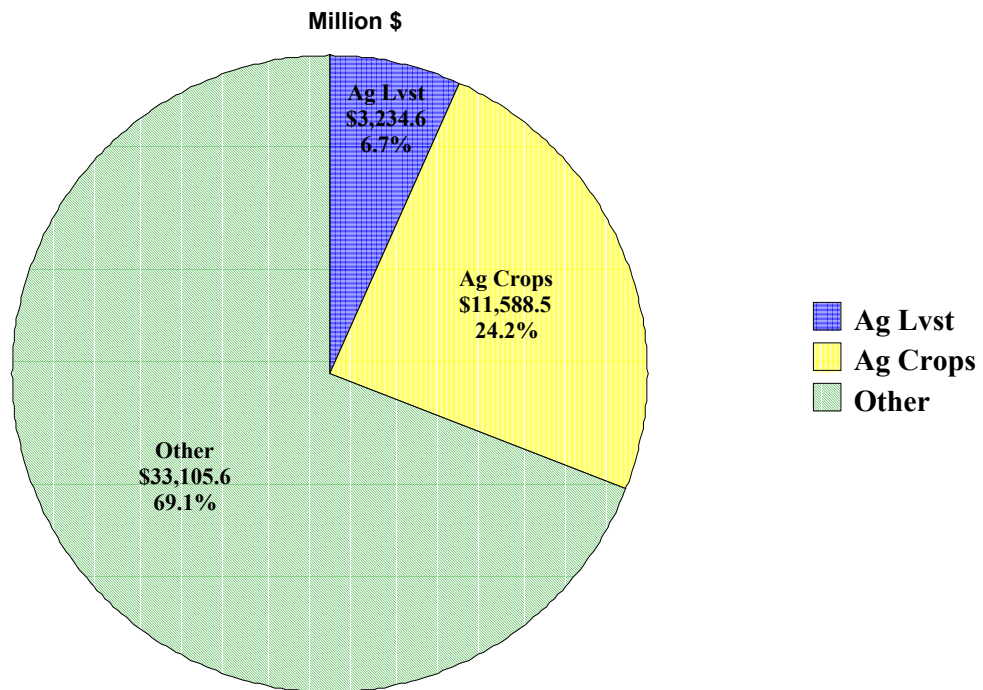


Figure 4. Production Agriculture's Share of North Dakota's Total Gross Business Volume, 2000

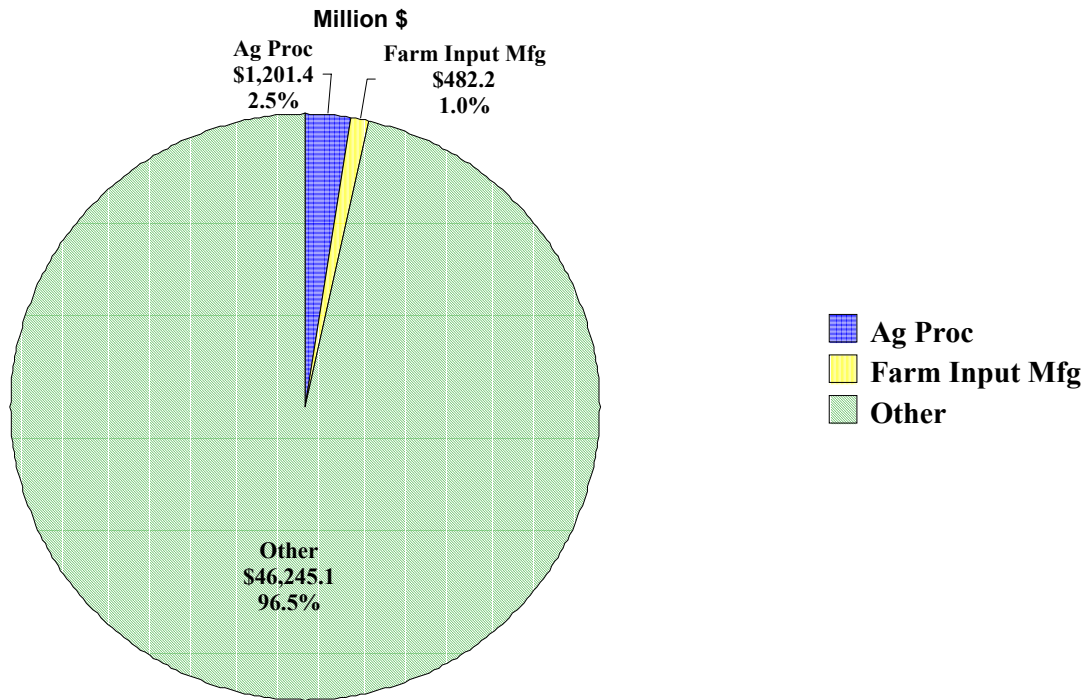


Figure 5. Value-Added Agricultural Processing and Farm Input Manufacturing's Share of North Dakota's Total Gross Business Volume, 2000

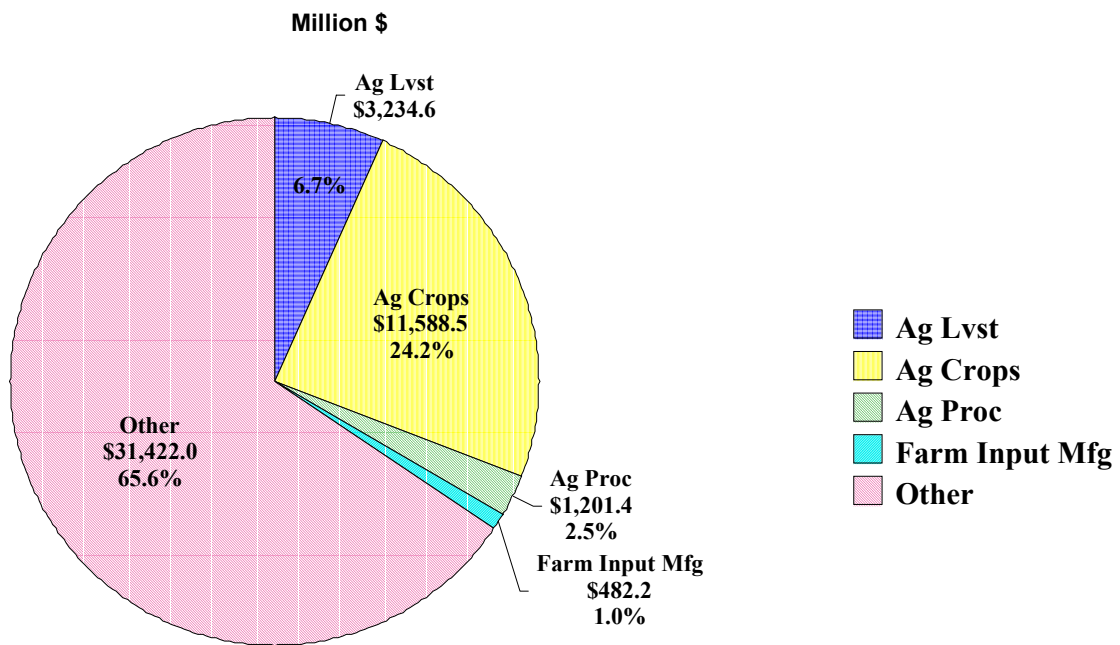


Figure 6. Production Agriculture, Value-Added Agricultural Processing and Farm Input Manufacturing's Share of North Dakota's Total Gross Business Volume, 2000