



**AgEcon** SEARCH

RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*

# North Dakota Agriculture Industry

## Economic Contribution Analysis

### Summary Report

Dean Bangsund and Nancy Hodur, PhD

### Report Content

- ❖ Industry Highlights
- ❖ Understanding the Numbers
- ❖ Industry Composition
- ❖ Economic Output
- ❖ Employment
- ❖ Labor Income
- ❖ Value-added
- ❖ Government Revenues
- ❖ Share of the State Economy
- ❖ Supplemental Materials

### Preface

This report is one in a series of summary documents examining the role of agriculture in North Dakota.

Data for this study came from industry surveys, crop and livestock producer records, NDSU Extension, and other secondary sources,

The definition of the agriculture industry and methods used to estimate its economic contribution are consistent with studies examining the economic contribution of other industries in the state. As usual, these studies are snapshots in time and economic contributions often vary from year to year with commodity-based industries.

### Industry Highlights

The following figures combine all segments of the agriculture industry. Crop and livestock production are a three-year average from 2018 through 2020, all other industry segments represent a three-year average from 2015 through 2017, and economic metrics include direct and secondary economic effects.

#### Economic Metrics for North Dakota Agriculture

- ❖ \$30.8 billion gross business volume
  - ❖ \$18.2 billion from production
  - ❖ \$12.6 billion from commodity handling, transportation, processing, and manufacturing
- ❖ 110,500 jobs (direct and secondary)
  - ❖ 77,600 jobs supported by production
  - ❖ 32,800 jobs supported by commodity handling, transportation, processing, and manufacturing
- ❖ \$7 billion in labor income
- ❖ \$13.4 billion contribution to state gross product
- ❖ \$790 million in local and state government revenues

#### Share of State Economy

- ❖ 28.4% of the state's gross business volume
- ❖ 19.2% of all employment (wage/salary jobs and sole proprietors/self-employed)
- ❖ 20.6% of labor income
- ❖ 24.2% of state gross state product
- ❖ 9.0% of total state and local government revenues

## Understanding the Numbers

**Economic contribution** assessments measure the gross size of an industry or economic sector.

*Size* is estimated by combining *direct* or first-round effects (i.e., sales, spending, and/or employment) with economic modeling to estimate secondary effects of business-to-business transactions (*indirect*) and household spending for goods and services (*induced*).

Economic measures frequently used in economic contribution assessments:

- ❖ **Labor income** – earnings of workers and sole proprietors
- ❖ **Employment** – wage and salary jobs and sole proprietor/self-employed jobs
- ❖ **Gross business volume** – sum of all business-to-business and household-to-business transactions
- ❖ **Value-added** – represents share of gross state product

An overview and additional information on study methods, data sources, and economic definitions are appended to the end of this report.

## Composition of North Dakota Agriculture

**Crop Production:** sales, income, and expenditures for growing grains, oilseeds, and other crops. Businesses that supply inputs and services to crop production represent indirect effects for this segment of the industry.

**Livestock Production:** sales, income and expenditures to raise beef, swine, dairy, poultry, sheep, and other enterprises (e.g., epiculture, equine). Direct consumption of forage crops (e.g., hay, silage) and grain crops (e.g., corn) are included in livestock production. Businesses that supply inputs and services to livestock production represent indirect effects for this segment of the industry.

**Commodity Handling:** activities of local grain elevators and livestock exchanges/sale barns that collect and ship commodities/livestock to in-state and out-of-state markets.

**Commodity Shipment:** in-state expenditures for trucking and rail movement of raw commodities from local elevators to in-state and out-of-state markets.

**Commodity Processing:** sometimes referred to value-added processing, this segment contains a broad spectrum of activities that add value to a raw commodity (e.g., grading, cleaning, sorting, bagging), convert raw commodities into other commodities (e.g., vegetable oil, flour, pasta, biofuels), and food manufacturing (e.g., potatoes to potato chips, raw milk to butter, cream, and consumer milk products, sugar beets to bagged sugar).

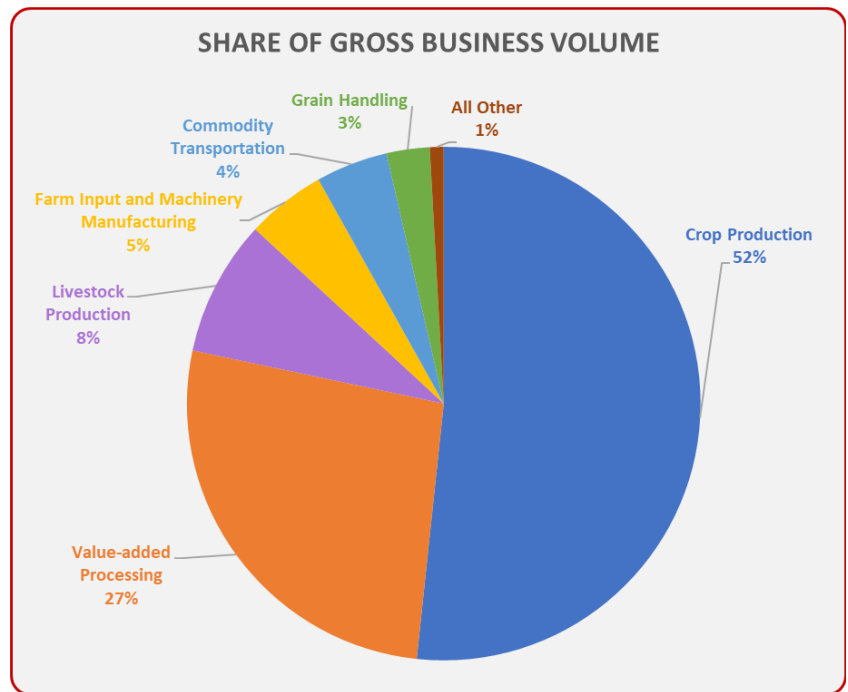
**Agricultural Manufacturing:** includes manufacturing of farm equipment, machinery and miscellaneous farm chemicals.

**All other segments:** comprised of forestry, forest products, timber tract production, greenhouse and nursery production, government conservation programs (e.g., conservation reserve program), and commodity associations.

## Industry Output

Direct output of the industry was estimated at nearly 18.8 billion. The biggest segment of the industry was crop production, with an average annual direct output of \$8.4 billion. Commodity processing was second with \$6.2 billion in output, followed by livestock (\$1.4 billion) and farm input and machinery manufacturing (\$1.2 billion).

Secondary economic effects followed a similar pattern as direct output with the largest additional industry output generated by crop production, followed by commodity processing and livestock production. Total secondary output was estimated at \$12 billion.



Combining all segments of the industry, the average annual gross business volume was estimated at \$30.8 billion. Production, commodity processing, and agricultural manufacturing each had gross business volumes over \$1 billion annually.

The gross business volume for crop production represented just over half of the industry. Commodity processing represented 27 percent of the industry, followed by livestock production (8 percent), agricultural manufacturing (5 percent), and commodity transportation (4 percent).

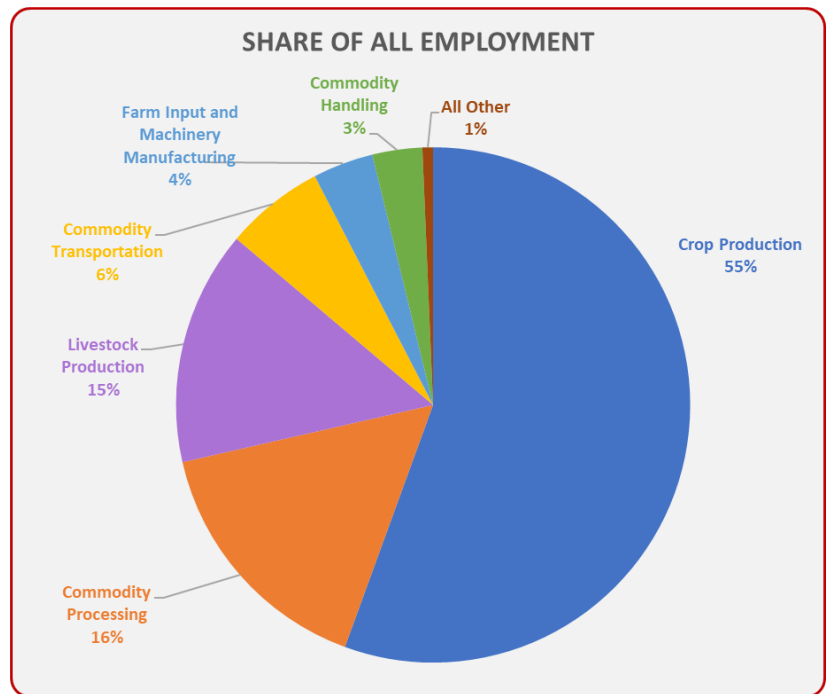
<b>AVERAGE ANNUAL INDUSTRY OUTPUT, North Dakota Agriculture</b>					
Industry Segments	Period	Direct Output	Secondary Output		Gross Business Volume
			Indirect Effects	Induced Effects	
----- millions \$ -----					
Crop Production	2018-2020	8,425.7	5,096.0	2,391.3	15,913.0
Livestock Production	2018-2020	1,401.3	898.1	335.1	2,634.6
Commodity Processing	2015-2017	6,222.7	1,344.4	635.7	8 202.8
Commodity Handling	2015-2017	542.8	155.5	136.6	834.9
Farm Input and Machinery Manufacturing	2015-2017	1,165.8	220.0	153.9	1,539.8
Commodity Transportation	2015-2017	830.6	279.1	286.8	1,396.4
All Other	2015-2017	183.1	42.5	43.2	268.8
<b>All Segments</b>		<b>18,772.1</b>	<b>8,035.4</b>	<b>3,982.7</b>	<b>30,790.2</b>

## Employment

The agriculture industry averaged 43,000 direct jobs over 2018 through 2020. Crop and livestock production had the greatest direct employment with 19,000 and 9,700 jobs, respectively. Commodity processing was estimated at 7,000 direct jobs, followed by commodity transportation (3,430 direct jobs) and agricultural manufacturing (1,940 direct jobs).

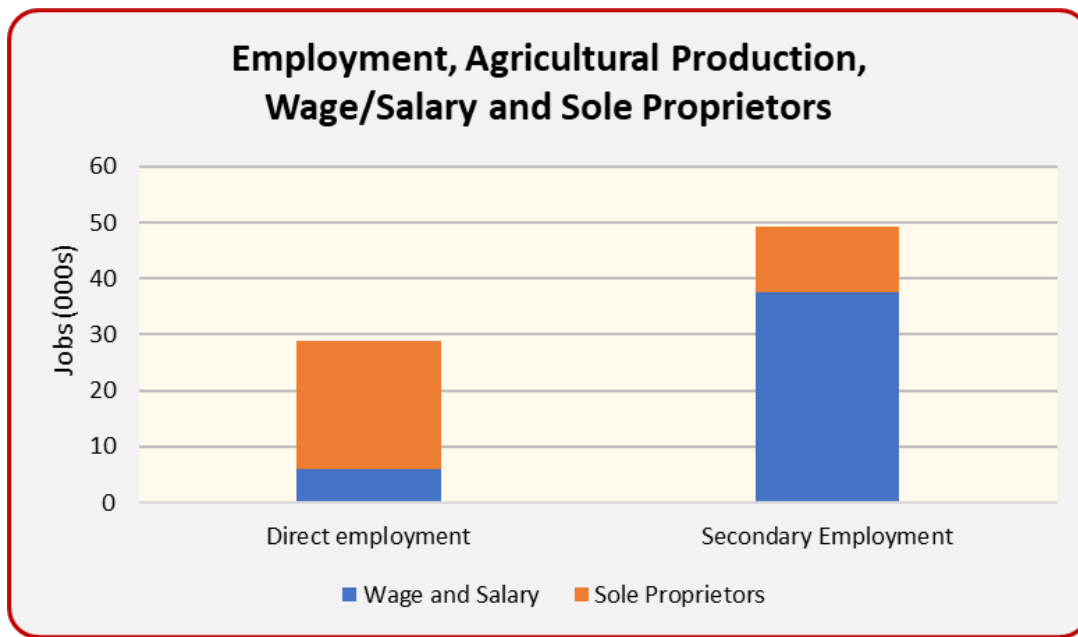
Combined secondary employment for all industry segments was estimated at 67,400 jobs. Crop and livestock production accounted for nearly 49,000 of the 67,400 secondary jobs. The next largest segment of the industry was value-added processing, with 10,560 secondary jobs.

Combined direct and secondary employment for the entire industry was estimated at 110,500 jobs. Crop production represented 55 percent of all industry-related employment. Following crop production, commodity processing and livestock production had near equal shares of industry employment (16 percent and 15 percent, respectively).



AVERAGE ANNUAL EMPLOYMENT, North Dakota Agriculture					
Industry Segment	Period	Direct Employment	Secondary Employment		All Employment
			Indirect Effects	Induced Effects	
----- jobs -----					
Crop Production	2018-2020	19,040	26,670	15,690	61,400
Livestock Production	2018-2020	9,690	4,310	2,260	16,260
Commodity Processing	2015-2017	6,960	6,010	4,550	17,520
Commodity Handling	2015-2017	1,760	740	960	3,460
Farm Input and Machinery Manufacturing	2015-2017	1,940	1,160	1,110	4,210
Commodity Transportation	2015-2017	3,430	1,380	2,080	6,890
All Other	2015-2017	240	210	290	740
All Segments		43,060	40,480	26,940	110,480

Production agriculture is somewhat unique among industries in that self-employment represents a sizeable share of overall employment (the summary addendum contains additional discussion on wage/salary and self-employment). By contrast, most economic sectors and industries are dominated by wage and salary employment. This relationship is observable when examining the direct and secondary employment for production agriculture.



Industry-wide, agriculture represents one-third of the state's self-employed jobs and over 15 percent of the state's wage and salary employment.

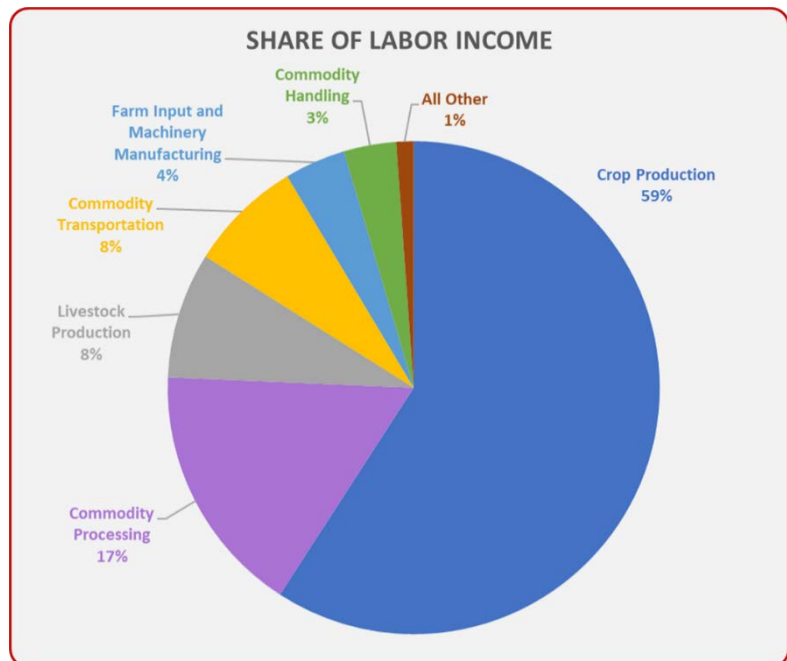
<b>AVERAGE ANNUAL EMPLOYMENT, By Type, North Dakota Agriculture</b>						
Industry Segment	Period	All Jobs	Employment by Type		Share of State	
			Wage and Salary	Self-employed	Wage and Salary	Self-employed
Crop Production	2018-2020	61,400	37,180	24,220	8.3%	18.8%
Livestock Production	2018-2020	16,260	5,960	10,300	1.3%	8.0%
Commodity Processing	2015-2017	17,520	13,360	4,160	2.9%	3.3%
Commodity Handling	2015-2017	3,460	2,980	480	0.7%	0.4%
Farm Input and Machinery Manufacturing	2015-2017	4,210	3,570	640	0.8%	0.5%
Commodity Transportation	2015-2017	6,890	5,410	1,480	1.2%	1.2%
All Other	2015-2017	740	570	170	0.1%	0.1%
<b>All Segments</b>		<b>110,480</b>	<b>69,030</b>	<b>41,450</b>	<b>15.1%</b>	<b>32.9%</b>

## Labor Income

Labor income is the financial compensation for all paid jobs in an industry. The agriculture industry averaged \$3 billion in direct compensation. Agriculture's uniquely high level of sole proprietorships drives greater income volatility than industries that are dominated by wage and salary employment. Wage and salary employment provide consistent financial compensation for the same job from year-to-year. Labor compensation for agriculture, by comparison, varies considerably from year-to-year as production agriculture is subject to yield and price volatility that substantially influences income to farmers and ranchers.

The agriculture industry supported about \$4 billion in labor income for secondary employment. Combining labor income from both direct and secondary labor resulted in an average annual compensation of \$7 billion.

Crop production represented 58 percent of the industry's labor income, followed by value-added processing (15 percent), livestock production (8 percent), transportation (8 percent), agricultural manufacturing (6 percent) and commodity handling (4 percent).



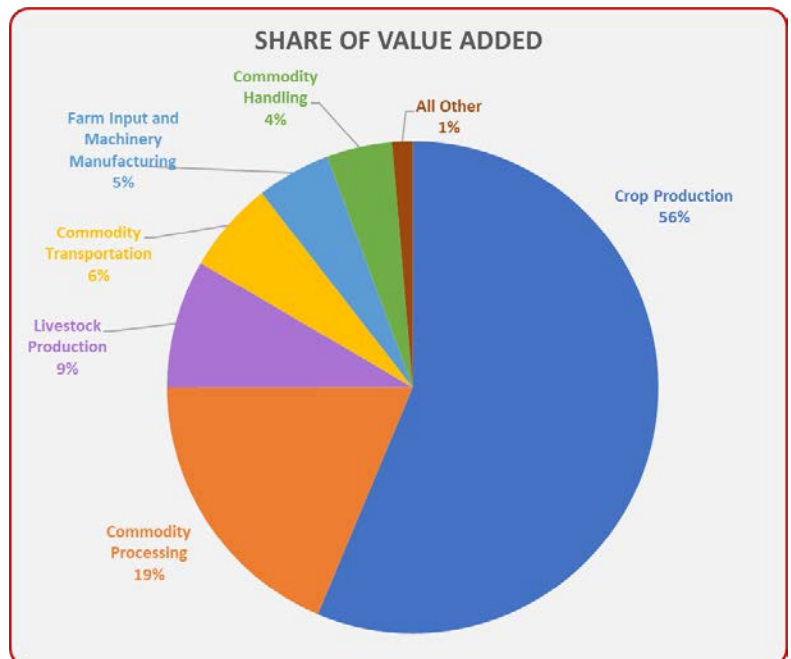
### AVERAGE ANNUAL LABOR INCOME, North Dakota Agriculture

Industry Segment	Period	Direct Labor Income	Secondary Labor Income		All Labor Income
			Indirect Effects	Induced Effects	
----- millions \$ -----					
Crop Production	2018-2020	1,607.4	1,758.1	752.4	4,117.9
Livestock Production	2018-2020	171.1	296.4	108.1	575.7
Commodity Processing	2015-2017	497.2	445.3	208.3	1,150.8
Commodity Handling	2015-2017	149.5	46.8	43.5	239.8
Farm Input and Machinery Manufacturing	2015-2017	152.0	76.5	50.6	279.1
Commodity Transportation	2015-2017	335.7	89.9	94.3	520.0
All Others	2015-2017	51.9	13.2	14.0	79.1
All Segments		2,964.8	2,726.3	1,271.2	6,962.3

## Value Added

The agriculture industry's contribution to gross state product (GSP) is represented by estimates of value added (supplemental appendix discusses value-added measures). Direct economic output for crop and livestock production contributed over \$4 billion to the state's GSP, followed by commodity processing (\$1.4 billion). Direct contributions to GSP were less than \$0.5 billion for all other industry segments. Average annual direct value-added summed for all segments contributed \$7 billion to GSP.

Combining direct and secondary economic output, the agriculture industry contributed \$13.4 billion to the state's GSP.



Crop production represented 56 percent of the agriculture industry's contribution to the GSP, followed by commodity processing (19 percent), livestock production (9 percent), commodity transportation (6 percent), agricultural manufacturing (5 percent) and commodity handling (4 percent).

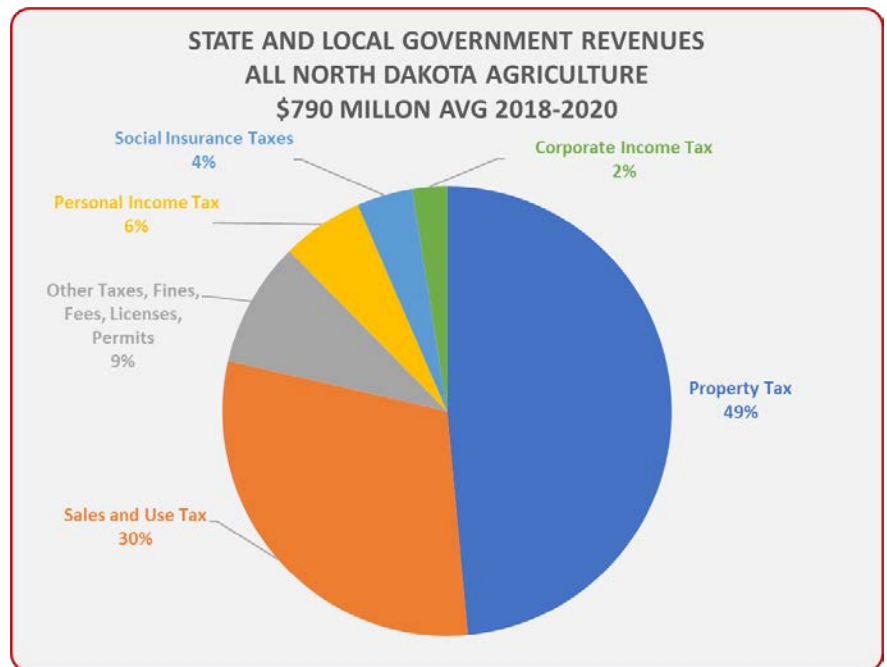
### AVERAGE ANNUAL VALUE ADDED, North Dakota Agriculture

Industry Segment	Period	Direct Value Added	Secondary Value Added		All Value Added
			Indirect Effects	Induced Effects	
----- millions \$ -----					
Crop Production	2018-2020	3,617.4	2,687.7	1,258.1	7,563.2
Livestock Production	2018-2020	471.3	482.5	180.8	1,134.6
Commodity Processing	2015-2017	1,404.4	742.5	358.5	2,505.4
Commodity Handling	2015-2017	422.6	81.8	75.3	579.6
Farm Input and Machinery Manufacturing	2015-2017	437.9	128.4	87.6	653.9
Commodity Transportation	2015-2017	495.9	153.0	163.3	812.1
All Other	2015-2017	136.4	21.3	23.4	181.1
All Segments		6,985.8	4,297.1	2,147.0	13,430.0



## Government Revenues

Government revenues represent payments (e.g., taxes, fees, licenses) made by an industry to local and state government. Some government revenues will have very little annual variation, such as periodic licenses, fees, and other taxes (e.g., fuel tax). However, other taxes, such as personal income and corporate income, will vary more for industries like agriculture where a high percentage of industry tax payments can be subject to the same factors affecting labor income. Basically, unprofitable years result in low-to no-income tax payments.



Over the 2018 through 2020 period, crop production accounted for about 70 percent of the industry's direct government revenues. Property tax payments were the dominant form of government revenue from crop production, and would represent a very consistent revenue stream to local governments (i.e., property tax on cropland and rangeland is paid regardless of producer profitability).

The agriculture industry, through direct and secondary output, contributed \$790 million in annual local and state government revenues. Over three-fourths of those revenues were generated by production agriculture.

<b>AVERAGE ANNUAL STATE AND LOCAL GOVERNMENT REVENUES, North Dakota Agriculture</b>					
Industry Segment	Period	Direct Payments	Secondary Payments		All Payments
			Indirect Effects	Induced Effects	
----- millions \$ -----					
Crop Production	2018-2020	249.0	209.8	68.5	527.3
Livestock Production	2018-2020	50.6	32.1	9.4	92.1
Commodity Processing	2015-2017	22.7	48.4	18.8	89.8
Commodity Handling	2015-2017	11.9	9.0	6.2	27.1
Farm Input and Machinery Manufacturing	2015-2017	5.2	11.9	5.2	22.3
Commodity Transportation	2015-2017	8.7	10.0	9.7	28.4
All Other	2015-2017	0.8	0.2	0.1	1.1
All Segments		349.1	322.3	118.8	790.2

## Share of the State Economy

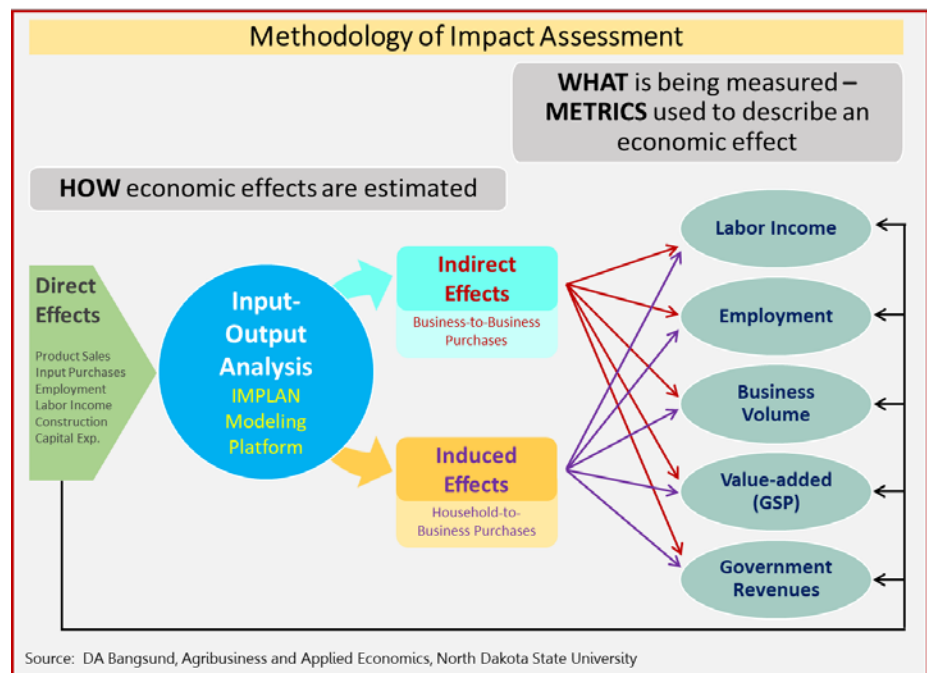
A key means of placing an industry contribution study into context is showing its share of a broader economy. Across all but one economic metric, the agriculture industry represented about 20 percent to 25 percent of the North Dakota economy. Crop production consistently represented about 10 to 14 percent of the state economy, which parallels crop production representing 50 percent or more of the overall industry. Commodity processing represented between 3 to 7 percent of the state economy, followed by livestock production representing 2 to 3 percent of the economy. The other key segments of the industry averaged around 1 percent of the state economy. Comparatively, the industry represents a lower share of government revenues, representing about 9 percent of all local and state government revenues.

AVERAGE ANNUAL SHARE OF STATE TOTALS, North Dakota Agriculture					
Industry Segment	Employment	Labor Income	Value-added	Total Output	State and Local Government Revenues
(State, avg 2018-2020)	576,808	\$33.8 billion	\$55.4 billion	\$108.5 billion	\$8.8091 billion
Crop Production	10.6%	12.2%	13.7%	14.7%	6.0%
Livestock Production	2.8%	1.7%	2.0%	2.4%	1.0%
Commodity Processing	3.0%	3.4%	4.5%	7.6%	1.0%
Commodity Handling	0.6%	0.7%	1.0%	0.8%	0.3%
Farm Input and Machinery Manufacturing	0.7%	0.8%	1.2%	1.4%	0.25%
Commodity Transportation	1.2%	1.5%	1.5%	1.3%	0.3%
All Other	0.1%	0.2%	0.3%	0.2%	0.03%
All Segments	19.2%	20.6%	24.2%	28.4%	9.0%

# Supplemental Materials

## Economic Contribution Analysis

An economic contribution assessment measures the gross size of some aspect or component of an economy, and is usually measured in conjunction with the overall size of a given economy over a specified period. Size is estimated by combining direct or first-round effects (e.g., industry expenditures, business sales, new employment) with economic modeling to estimate how those first round effects generate business-to-business transactions and household spending on consumer goods and services. Both of those conduits for economic output can be framed using labor income, employment, value-added, gross business volume and government revenues.



## Key Terms and Concepts

**Direct Effects:** First-round of payments for services, labor, and materials and/or sales of an industry's products.

**Indirect Effects:** Economic activity created through purchases of goods and services by businesses.

**Induced Effects:** Economic activity created through purchases of goods and services by households.

**Industry Output and Gross Business Volume:** Industry output is the value of all goods and services produced and supported by an industry. In most industries, output is largely synonymous with sales; however, for some sectors output also includes changes in product inventory. For production agriculture, direct output includes both sales and inventory adjustments.

When output from business-to-business transactions (*indirect*) and households-to-businesses (*induced*) are measured, they also are described as the *sum of gross receipts* as annual adjustments to inventories are largely unquantified and not distinguished from sales. *Gross business volume* (GBV) therefore includes direct output/sales and includes secondary sales from indirect and induced economic activity.

**Value-added:** Value-added is synonymous with measures of gross domestic product (GDP) and gross state product (GSP), are some of the most commonly used economic measures to indicate the economic size and change in economic output. However, official government estimates of GDP and GSP do not include secondary economic effects generated by any industry. For agriculture, official government estimates are primarily limited to crop, livestock, and forestry sectors. Economic contribution assessments include secondary economic effects, and include GSP from those effects, thereby providing a more realistic and representative portrait of an industry.

Key components of value-added include labor income, consumption of fixed capital, profits, business current transfer payments (net), income derived from dividends, royalties, and interest. In nontechnical terms, value-added is equal to product value minus production inputs. For example, value-added from growing wheat would be the value of wheat produced less the value of the inputs consumed in raising that crop, such as fertilizer, chemical, repairs, fuel, etc. Depreciation charged to durable assets (e.g., tractors) are not included in value-added measures.

Employment Compensation: Wages, salaries, and benefits earned by an employee.

Proprietor Income: Payments received by self-employed individuals and unincorporated business owner/operators.

Labor Income: Wages, salaries, and benefits for employees and compensation for self-employed individuals.

Input-output Analysis (I-O): Mathematical application of the interdependence among producing and consuming sectors in an economy.

I-O Matrix: Depiction of an economy using a grid of rows and columns that represents consumption and production for each economic sector in an economy.

Intermediate Inputs: Goods and services consumed in one year to produce another good or service. Intermediate inputs do not include expenditures for capital inputs used for multiple production seasons (e.g., machinery, buildings).

Capital Inputs: Represent the use of inputs to produce another good or service that are not consumed in one production season and are subject to depreciation. *Capital expenditures* represent the purchase of those depreciable assets.

Industry Balance Sheet: Dividing an industry or economic sector into various components for use in estimating the economic effects using input-output analysis. Components of the balance sheet include measures of output, wage and salary employment, self-employment, payroll and proprietor income, other property type income, taxes on production and imports, and intermediate inputs.

Institutions: Represent governments and other non-private entities consuming goods and services in an economy.

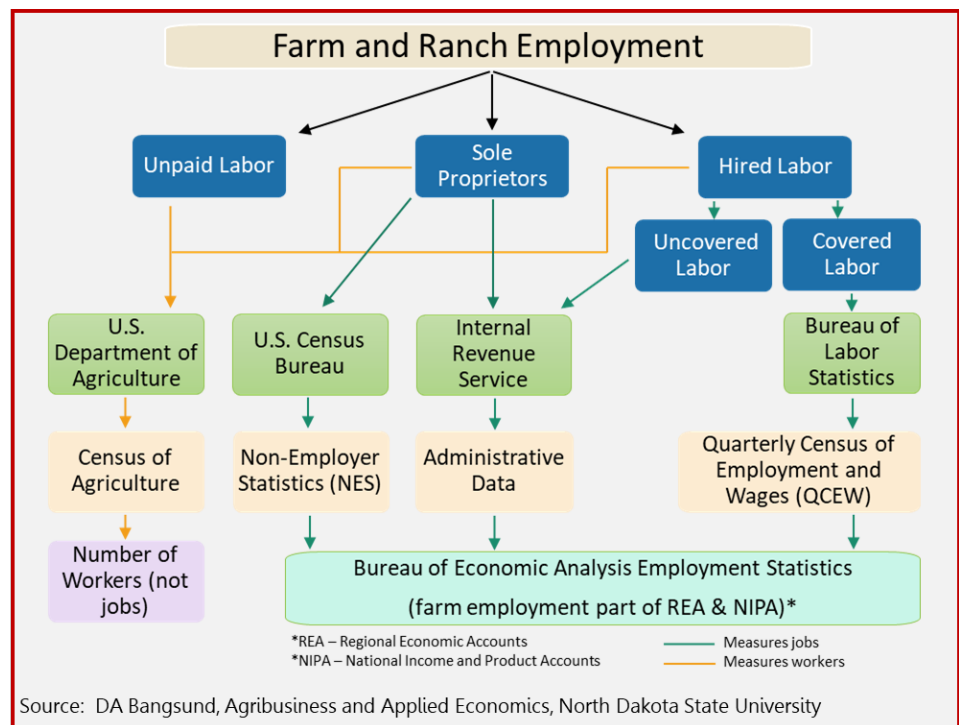
Households: Represent one or more individuals in a specific living arrangement for which income from all sources is used to purchase goods and services.

North American Industry Classification System (NAICS): Government classification system for all goods and services produced in the economy.

## Employment Sources and Measures

Employment is broadly measured in two distinct categories: covered and uncovered. Covered workers are those that are employed by a business, institution, or government agency, receive a wage or salary, and are subject to unemployment insurance (UI). Jobs that fall under an UI program are called 'covered' employment. Quarterly Census of Employment and Wages (QCEW) employment reported by Job Service North Dakota is 'covered' employment. QCEW data are collected for each state and reported by the U.S. Bureau of Labor Statistics (BLS). Therefore, employment statistics for self-employed farmers and ranchers cannot be derived from QCEW data.

By contrast, 'uncovered' employment largely includes self-employed and sole-proprietors not enrolled in a state's UI program (enrollment is voluntary for self-employed individuals). The majority of on-farm employment is self-employed with only a small portion of on-farm employment qualifying as covered employment. The U.S. Bureau of Economic Analysis (BEA) reports uncovered employment in conjunction with QCEW employment from BLS. The only source of on-farm employment that includes covered and



uncovered hired labor, self-employed, and sole proprietors is the BEA's Regional Economic Accounts. The U.S. Department of Agriculture's Census of Agriculture collects information on individuals, not jobs, and cannot be directly substituted for BEA employment statistics.

For most 'industries', sole proprietors are not the predominate form of employment, and QCEW is often used to measure employment in those industries. In some economic 'sectors', sole proprietors represent a meaningful level of employment, such as independent truckers, construction and repair, retail shops, personal service providers, among others, but do not represent a meaningful share of employment at a broader 'industry' level. Crop and livestock production are largely unique among industries in that the majority of employment is represented by sole proprietors.

## Developing Economic Sector Profiles

An industry balance sheet or economic profile is one of the most important elements in economic contribution studies. Nearly all key economic metrics have their origin within an industry's economic profile/sector. Information and data to create economic sector profiles were collected from surveys of industry firms, government agencies, and farm production records and statistics.

While the IMPLAN modeling platform provides baseline economic profiles generated from proprietary estimation techniques applied to government data, this study relied on state-sourced data and industry input to create a customized IO matrix. The process of developing study-specific economic profiles and then modifying an IO matrix is time consuming and requires considerable empirical analysis, but the results from those efforts produce a credible and transparent evaluation of an industry's role in an economy.

To the extent possible, other economic sectors (e.g., manufacturing) were customized using financial information from an industry-wide survey conducted in 2017-2018. Survey data also was used to estimate capital expenditures for various manufacturing and processing sectors. Ethanol producers were surveyed in 2022, and information from that survey provided a custom economic profile for ethanol production and produced a three-year average of capital expenditures.

Farm Production Records and Government Data	Components of IO Sector	General Function in IO Matrix
Yields	Output	-) Sets level of direct effects -) Counted in gross business volume
Prices	Payroll (wages, salaries, benefits)	-) Component of value-added -) Creates consumption of goods and services (household spending)
Insurance Indemnities	Proprietor Income	-) Driver of <b>Induced</b> effects -) Induced effects counted in gross business volume
Farm Program Payments	Other Property Type Income	-) Component of value-added -) No other economic effect in matrix
Disaster Payments	Taxes on Production and Imports	-) Component of value-added -) No other economic effect in matrix
Other Crop Income	Intermediate Inputs	-) Creates consumption of goods and services (business-to-business) -) Driver of <b>Indirect</b> Effects -) Counted in gross business volume
Gross Input Requirements (seed, fertilizer, etc.)		
Sourcing of Inputs (inside and outside of study region)		

Source: DA Bangsund, Agribusiness and Applied Economics, North Dakota State University

## What Economic Activities are Included in Crop and Livestock Production?

The following activities were included for crop and livestock sectors:

- ❖ Production
- ❖ Capital Expenditures
- ❖ Cash Rent
- ❖ Insurance Industry A&O

**Crop and livestock production** generate economic effects from spending of labor income and purchase of production inputs to produce a crop or raise livestock, and first-round effects are driven by the custom economic profiles.

By definition, **capital expenditures** would arise from use of Other Property Type Income (OPTI); however, OPTI does not generate any indirect or induced effects. Capital expenditures were modeled independently from the custom crop and livestock sectors to estimate the economic effects from purchases of new buildings and structures, tractors, combines, machinery, equipment, and other durable goods not consumed in one production cycle.

**Cash rent** can be included as proprietor income within an ag production sector, assigned to a real estate sector as an intermediate input, or placed in OPTI. Cash rent was placed in OPTI, and a share of cash rent paid by producers, net of property tax, was modeled as a revenue stream to in-state landowners.

The revenue stream to landowners was modeled as a labor income event within the custom IO matrix. Federal crop insurance generates additional revenue to the state from **Administrative and Operating (A&O) subsidies**. A&O subsidies were modeled as separate industry spending events since those revenue streams affect financial sectors and are not internally linked in the IO matrix to crop and livestock production sectors.

### Study Parameters

- ) Crop and livestock production was based on 2018 through 2020 data.
- ) All other segments of the industry were based on 2015 to 2017 data, except ethanol production, which was based on 2021 production.
- ) Expenses associated with summer fallow and prevent plant were included in crop production.
- ) Sale barns/livestock exchanges were estimated separately in the study, but are presented in this summary as part of commodity handling.
- ) Default IMPLAN data was used for all forestry activities in the state.
- ) Data for the study came from surveys of industry firms, state and federal government agencies, NDSU Extension, and other secondary sources. Survey and secondary data were used to develop industry balance sheets (i.e., profiles) for agriculture's numerous economic sectors.

### Treatment of Traditional Economic Sectors Supporting Production Agriculture

This summary omits specific details of how the secondary economic effects are distributed among the state's numerous sectors and sub-sectors. Several economic sectors support production agriculture by providing inputs and services to crop and livestock producers. Examples include implement sales, custom field work and applications, seed companies, and supply stores. Under some definitions, those activities and sectors are presented as "direct" segments of the agriculture industry, much like crop production and grain handling are considered stand-alone components of the industry. However, from the perspective of how this study's input-output analysis was structured, those sectors represent "indirect" economic output of the industry, meaning those sectors are supported and sustained from purchases relating to crop and livestock production.

Sectors traditionally considered core components of agriculture, but defined as indirect components of the industry in this assessment, are identified in the following table and with corresponding NAICS codes for those activities.

## Key Economic Sectors Representing Components of Production Agriculture Whose Output and Employment are Contained (grouped) within Indirect Economic Effects

Industry Segment	Economic Sector Description	NAICS <sup>1</sup>
<b>Agricultural Production</b>		
	Support activities for agriculture and forestry	115
	Construction of new commercial structures, including farm structures	2362
	Support activities for transportation	4882
	Warehousing and storage	4931
	Securities and commodity contracts intermediation and brokerage	5231
	Insurance agencies, brokerages, and related activities	5242
	Commercial and industrial machinery and equipment rental and leasing	5234
	Veterinary services	5419
	Commercial and industrial machinery and equipment repair and maintenance	8113
<b>Wholesale Trade</b>		
	Agricultural chemicals merchant wholesalers	424910
	Agricultural machinery and implement merchant wholesalers	423820
	Animal feeds (except pet food) merchant wholesalers	424910
	Auction markets, tobacco, horses, mules	424590
	Beans, dry, merchant wholesalers	424510
	Berries, fresh, merchant wholesalers	424480
	Cattle, hog, sheep merchant wholesalers	424520
	Doughs, frozen, merchant wholesalers	424420
	Dried foods (e.g., fruits, milk, vegetables) merchant wholesalers	424490
	Dry beans merchant wholesalers	424510
	Eggs merchant wholesalers	424440
	Elevators merchant wholesalers	423830
	Farm supplies merchant wholesalers	424910
	Feed additives merchant wholesalers	424910
	Fertilizer and fertilizer materials merchant wholesalers	424910
	Flour merchant wholesalers	424490
	Grain elevators, merchant wholesalers grain	424510
	Honey merchant wholesalers	424490
	Irrigation equipment merchant wholesalers	423820
	Land preparation machinery, construction, merchant wholesalers	423810
	Livestock equipment, merchant wholesalers	424470
	Storage bins merchant wholesalers	423820
	Veterinarians' equipment and supplies merchant wholesalers	423390
	Veterinarians' medicines merchant wholesalers	423490
	Wool, raw, merchant wholesalers	424210
<sup>1</sup> North American Industrial Classification System		



## Economic Sectors for Processing, Manufacturing, and Transportation included in the Agriculture Industry, Defined by North American Industry Classification System

Industry Segment	Sector Description	NAICS <sup>1</sup>
<b>Crop and Livestock Commodity Processing</b>		
	All other food manufacturing	3119
	Animal, except poultry, slaughtering	3116
	Beet sugar manufacturing	3113
	Bottled and canned soft drinks & water	3121
	Bread and bakery product, except frozen, manufacturing	3118
	Breweries	3121
	Canned fruits and vegetables manufacturing	3114
	Confectionery manufacturing from purchased chocolate	3113
	Creamery butter manufacturing	3115
	Dehydrated food products manufacturing	3114
	Distilleries	3121
	Dry pasta, mixes, and dough manufacturing	3118
	Fats and oils refining and blending	3112
	Flour milling	3112
	Fluid milk manufacturing	3115
	Frozen cakes and other pastries manufacturing	3118
	Frozen fruits, juices and vegetables manufacturing	3114
	Frozen specialties manufacturing	3114
	Malt manufacturing	3112
	Meat processed from carcasses	3116
	Nonchocolate confectionery manufacturing	3113
	Other animal food manufacturing	3111
	Other basic organic chemical manufacturing (ethanol)	3251
	Rendering and meat byproduct processing	3116
	Roasted nuts and peanut butter manufacturing	3119
	Soybean and other oilseed processing	3112
	Spice and extract manufacturing	3119
	Tobacco product manufacturing	3122
	Wet corn milling	3112
	Wineries	3121
<b>Agricultural Manufacturing</b>		
	Pesticide and other agricultural chemical manufacturing	3253
	Farm machinery and equipment manufacturing	3331
<b>Transportation</b>		
	Truck transportation	4841
	Railroad transportation	4821
<sup>1</sup> North American Industrial Classification System		

## Acknowledgments

Several organizations and individuals were instrumental in providing leadership throughout the study. The authors express their appreciation and thanks to the following individuals and organizations:

Nancy Johnson, North Dakota Soybean Growers Association  
 Stephanie Sinner, Executive Director, North Dakota Soybean Council  
 Deana Wiese, Executive Director, North Dakota Ethanol Council  
 Brenda Elmer, Executive Director, North Dakota Corn Growers Association  
 Matt Perdue, Government Relations Director, North Dakota Farmers Union  
 Mitch Coulter, Executive Director, Northharvest Bean Growers Association

The authors sincerely appreciate the financial support provided by the following organizations.

American Crystal Sugar Company  
 Minn-Dak Farmers Cooperative  
 North Dakota Corn Utilization Council  
 North Dakota Dry Bean Council  
 North Dakota Ethanol Council  
 North Dakota Farmers Union  
 North Dakota Soybean Council  
 North Dakota Stockmen's Association  
 Northern Canola Growers Association  
 Northern Pulse Growers Association  
 Red River Valley Sugarbeet Growers Association

The authors also wish to thank all the individuals, companies, organizations, and associations that participated in numerous capacities to make this study comprehensive and representative of the industry.

We wish to thank Edie Nelson, Department of Agribusiness and Applied Economics, for document preparation.

The authors assume responsibility for any errors of omission, logic, or otherwise. Any opinions, findings, and conclusions expressed in this publication are those of the authors and do not necessarily reflect the view of the NDSU Department of Agribusiness and Applied Economics or the NDSU Center for Social Research.

North Dakota State University does not discriminate on the basis of age, color, disability, gender expression/identity, genetic information, marital status, national origin, public assistance status, race, religion, sex, sexual orientation, or status as a U.S. veteran. This publication is available electronically at this web site: <http://ageconsearch.umn.edu/record/329989>. Please address your inquiries regarding this publication to: Department of Agribusiness & Applied Economics, P.O. Box 6050, Fargo, ND 58108 6050, Phone: 701 231 7441, Fax: 701 231 7400, Email: [ndsu.agribusiness@ndsu.edu](mailto:ndsu.agribusiness@ndsu.edu).

NDSU is an equal opportunity institution.

Copyright 2022 by Bangsund and Hodur. All rights reserved. Readers may make verbatim copies of the document for non-commercial purposes by any means, provided this copyright notice appears on all such copies.

