2020 Economic Contribution Study of Minnesota Agriculture and Forestry

September 2020

Prepared For:

AgriGrowth™
Growing MN Food & Agriculture℠

And Supporting Partners (see next page)

Prepared By:

Decision Innovation Solutions

Supporting Partners

The 2020 Economic Contribution Study of Minnesota Agriculture and Forestry was comprehensive not just from an analysis standpoint but also in the form of a very diverse set of partners, which includes the following fine Minnesota groups:

Ag Centric
Ag Utilization Research Institute
American Crystal Sugar
Econ Analytics
GreenSeam
Midwest Dairy
Midwest Food Processors Association
Midwest Forage Association
Minnesota AgriGrowth Council
Minnesota Beef Council
Minnesota Chicken and Eggs
Minnesota Corn Growers Association
Minnesota Crop Production Retailers
Minnesota Cultivated Wild Rice Council
Minnesota Department of Agriculture
Minnesota Farm Bureau Federation
Minnesota Farmers Union
Minnesota Forest Industries
Minnesota Grain and Feed Association
Minnesota Pork Producers Association
Minnesota Soybean Research and Promotion Council
Minn-Dak Farmer's Cooperative
Minnesota Wheat Growers Association
Red River Valley Sugarbeet Growers Association
Southern Minnesota Beet Sugar Cooperative
Southern Minnesota Center for Agriculture

11107 Aurora Ave | Urbandale, IA 50322 | 515.639.2900 | www.decision-innovation.com

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Table 1, Acronyms

Acronym	Description
USDA	United States Department of Agriculture
USDA/NASS	United States Department of Agriculture, National Agricultural Statistics Service
USDA/ERS	United States Department of Agriculture, Economic Research Service
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics

Executive Summary

The results of this study indicate that although there have been challenging times in the agriculture, agri-food, and forestry industry, it is still a significant part of Minnesota's economy, supporting about 1 in every 10 jobs across Minnesota.

This study is based on a combination of the USDA 2017 Census of Agriculture, USDA/NASS datasets, and the IMPLAN modeling system and data (2018). This analysis is patterned after other Agriculture Economic Contribution Studies completed by Decision Innovation Solutions (DIS) for the States of Alabama, Illinois, Iowa, Missouri, and South Dakota.

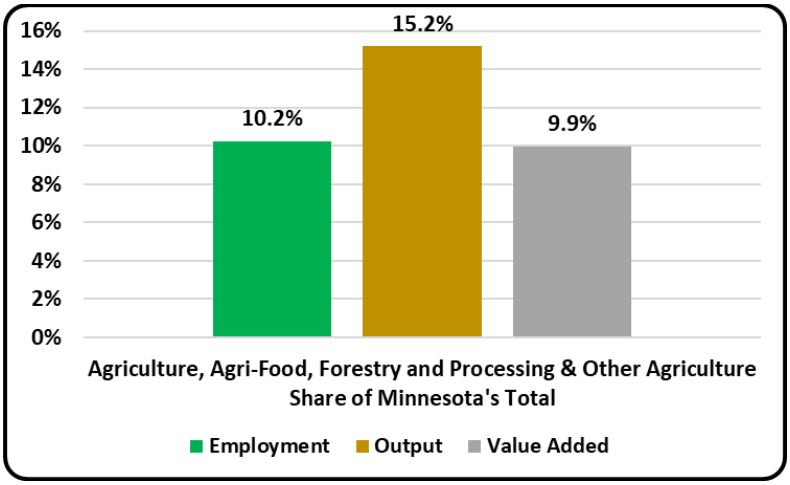
Key Findings[1]

In 2020, agriculture, agri-food, forestry, and related industries in Minnesota are estimated to contribute:

- **$37.1 billion** in total value added
- **388,134 jobs**
- **$105.6 billion** in output (sales)
- **$21.4 billion** in household income

Of the **$37.1 billion** in total value added and **388,134 jobs** from the agriculture, agri-food, forestry, and related economic activity:

- Crop production and related industries contributed:
  - **$8.7 billion** in value added
  - **84,648** jobs
- Livestock production and related industries contributed:
  - **$9.9 billion** in value added
  - **126,218** jobs
- Forestry production and related industries contributed:
  - **$7.3 billion** in value added
  - **67,956** jobs
- Processing & other agriculture and related industries contributed:
  - **$11.1 billion** in value added
  - **109,312** jobs



[1] For additional looks of the data view this link. 2018 IMPLAN data was adjusted to 2020 values.

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Background

This Minnesota Agriculture Economic Contribution Study quantifies agriculture and its related industries' contribution to the economy. This study relies heavily on the 2018 data from the IMPLAN modeling system, the USDA 2017 Census of Agriculture, and other USDA/NASS datasets. This study is patterned after similar studies completed by DIS for Iowa in 2009, 2014, and 2019, South Dakota in 2014 and 2019, Illinois in 2015 and 2019, Missouri in 2016, and Alabama in 2016.

1.1 Minnesota Agriculture

As of 2019, Minnesota was ranked among the top three states in the nation for[2]:

- Red Kidney Bean Production (#1)
- Sugar Beet Production (#1)
- Turkeys Raised (#1)
- Green Peas Production (#2)
- Hogs and Pigs Value (#2)
- Market Hog Inventory (#2)
- On-Farm Grain Storage Capacity (#2)
- Sweet Corn Production (#2)
- Wild Rice (#2)
- Turkeys Value of Production (#2)
- Oat Production (#3)
- Pig Crop (#3)
- Soybean Production (#3)
- Spring Wheat Production (#3)
- Sunflower for Oil Production (#3)
- Total Grain Storage Capacity (#3)
- Vegetables Area Harvested (#3)

The list above and the following rankings show Minnesota's ability to be a leading producer of various crops and livestock: These rankings demonstrate the importance of Minnesota to help feed, clothe, and fuel those beyond Minnesota and the U.S. According to 2019 data from the USDA National Statistics Service, Minnesota is currently ranked in the top ten states for:

- Canola Production
- Corn Production
- Barley production
- Dry Edible Beans Value of Production
- Principal Crops Total Value (2017)
- Barley Production
- Off-Farm Grain Storage Capacity
- Total Cash Receipts (2017)
- Total Value of Agricultural Exports (2017)
- Planted Acreage of Principal Crops
- Number of USDA Certified Organic Farms (2017)
- Harvested Acres of Principal Crops
- Milk Replacement Heifer Inventory
- Steers 500 pounds and over
- Red meat production
- All Wheat Production
- Milk Cows Inventory
- Milk Goats Inventory
- Honey Production
- Vegetable Production
- Potato production
- Cash Rent for Cropland
- Cattle on feed inventory
- Milk production
- Cheese Production
- Net Farm Income (2017)
- Number of farms
- Ethanol Production Capacity[3]

[2] https://www.nass.usda.gov/Statistics_by_State/Minnesota/Publications/Rankings/2019-MN-Rankings.pdf
[3] https://www.eia.gov/todayinenergy/detail.php?id=41393

1.2 Minnesota Farm Demographics

Figure 1 displays the breakdown of Minnesota farm operations by size, according to the 2017 Census of Agriculture. The smaller size farms are typically hobby or specialty farms, while the farm operations larger in size generally make up the majority of farm sales. The most common farm size in Minnesota is the 10 to 50-acre category with 14,618 farms, followed by 9,754 farms at 260 to 499 acres, and 7,164 farms with a size of 500 to 999 acres. There are only 2,245 farms in Minnesota in the largest size category of 2,000 or more acres.

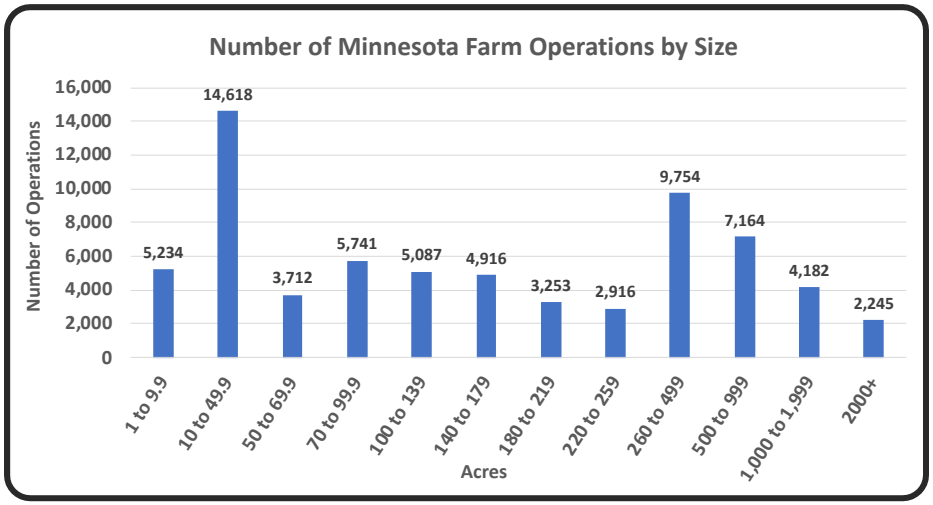

Figure 1, Number of Minnesota Farm Operations by Size[4]

Of the 68,822 farms in Minnesota, 86% are held by families and individuals, while an additional 5% are family-held corporations, and 7% in partnerships. Less than 1% of Minnesota farms are in a corporation that is not family-held.

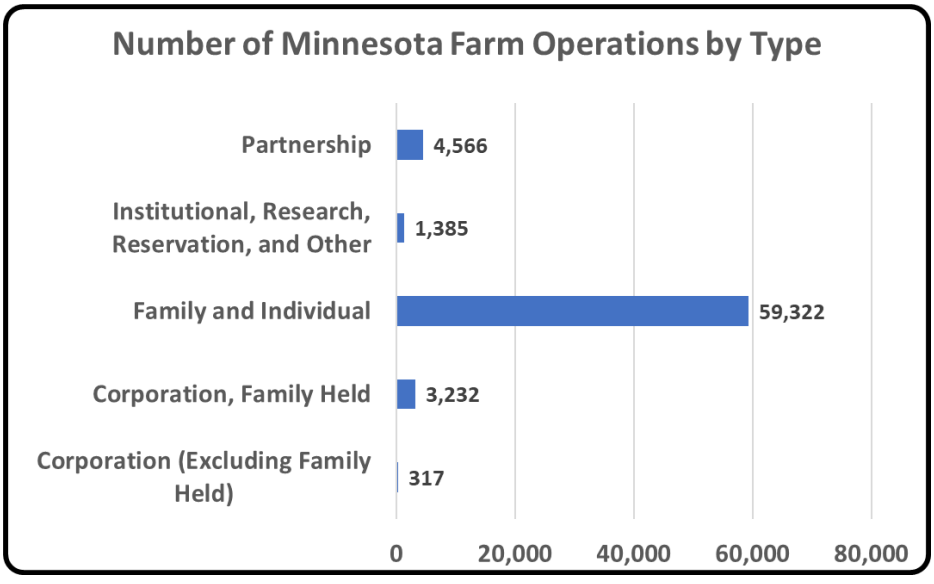

Figure 2, Number of Minnesota Farm Operations by Type[5]

[4] https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/8/state/MN/year/2017
[5] https://quickstats.nass.usda.gov/results/D6F93C41-C8E5-3C36-9F09-EBF35E5AC57C

The average Minnesota farm size is 371 acres, which is up from 21 acres in 1997, but well below the U.S. average of 441 acres. The 2017 average market value of all machinery and equipment per farm is $223,666, which is a 173% increase from the value of $81,809 in 1997. Additionally, the average market value of land and buildings per farm is $1,799,201, which is 4.5 times greater than the average value in 1997.

Table 2, Historical Minnesota USDA Census of Agriculture Data

	2017	2012	2007	2002	1997
Number of Minnesota farms	68,822	74,542	80,992	80,839	78,755
Average Minnesota farm size (acres)	371	349	332	340	350
Market Value (per farm)					
Land and Buildings ($)	1,799,201	1,474,057	853,968	517,132	398,576
Machinery and equipment ($)	223,666	197,715	131,698	86,369	81,809
Farm products sold ($)	267,289	285,479	162,738	106,083	106,720
Livestock Inventory					
Cattle and calves	2,337,505	2,412,684	2,395,217	2,265,997	2,399,617
Beef cows	368,214	357,286	399,768	403,594	395,059
Milk cows	457,801	463,312	459,752	478,248	554,274
Hogs and pigs	8,467,361	7,606,785	7,652,284	6,440,067	5,665,364
Laying chickens	10,849,607	9,693,648	10,596,573	11,576,411	11,969,935
Broilers	11,068,267	765,172	8,649,569	4,885,619	4,158,369
Turkeys	18,110,298	19,449,992	18,298,316	15,512,346	16,220,767
Cattle and calves sold	1,683,259	1,537,782	1,586,705	1,356,142	1,334,446
Hogs and pigs sold	27,228,111	22,154,443	22,815,512	18,618,300	12,814,319
Production (bushels)					
Corn for grain	1,464,241,562	1,297,767,570	1,138,660,229	989,887,877	796,829,406
Oats for grain	6,494,938	7,812,393	10,494,120	12,958,117	16,667,790
Soybeans	376,505,537	293,830,150	259,891,979	303,069,928	239,041,962
Wheat	79,313,793	76,133,135	82,488,109	64,609,805	83,878,930

As indicated in Table 3, the value of crop sales declined from 2012 to 2017 while livestock and poultry production sales have increased. Because of this, the percent of total sales by source has shifted some of agriculture and forestry's reliance on crops to livestock in the State of Minnesota, which is similar to 2002.

Table 3, Minnesota Farm Sales by Source[6]

Farm Sales by Source (Minnesota)	2017	% of 2017 Total	2012	% of 2012 Total	2007	% of 2007 Total	2002	% of 2002 Total
Total Sales ($1000)	$18,395,390	100%	$21,280,184	100%	$13,180,466	100%	$8,575,627	100%
Average per Farm	$267,289		$285,479		$162,738		$106,083	
Grains & Oilseeds ($1000)	$10,191,518	55.4%	$13,879,211	65.2%	$7,048,913	53.5%	$4,562,882	53.2%
Livestock, Poultry, and Their Products ($1000)	$8,203,872	44.6%	$7,400,974	34.8%	$6,131,554	46.5%	$4,012,745	46.8%
Poultry and Eggs ($1000)	$1,285,951	7.0%	$1,230,625	5.8%	$1,045,674	7.9%	$750,088	8.7%
Cattle and Calves ($1000)	$1,886,939	10.3%	$1,639,634	7.7%	$1,385,740	10.5%	$873,074	10.2%
Milk & Other Dairy Products from Cows ($1000)	$1,737,886	9.4%	$1,645,911	7.7%	$1,475,929	11.2%	$931,754	10.9%
Hogs and Pigs ($1000)	$3,165,075	17.2%	$2,783,049	13.1%	$2,139,877	16.2%	$1,398,234	16.3%
Sheep, Goats, and Their Products ($1000)	$26,154	0.1%	$25,603	0.1%	$18,725	0.1%	$13,351	0.2%
Other Animals and Their Products ($1000)	$76,204	0.4%	$48,271	0.2%	$41,692	0.3%	$22,584	0.3%

[6] https://quickstats.nass.usda.gov

1.3 Forestry

According to the most recent (2017) USDA Forest Resources of the United States report[7], forest land is estimated to make up about 34% (nearly 17.5 million acres) of Minnesota's land area. About 53% of the estimated forest land in Minnesota is publicly held, while the other 47% is privately held. Minnesota saw a very slight increase in forest land from 2012, increasing from an estimated 17.37 million acres in 2012 to 17.41 million acres in 2017. Since 1997 there has been a 5% increase in total forest land.

Table 4, Minnesota Forestry Acres

	Land Area (thousand acres)
Total Land Area	***50,961***
Total Forest Land	***17,413***
Total Timberland	15,703
Timberland- Planted	876
Timberland- Natural origin	14,827
Forest Land- Reserved	1,267
Forest Land- Other	443
Other Land	33,549

[7] https://www.fs.usda.gov/treesearch/pubs/57903

2 Methodology

The 2020 Economic Contribution Study of Minnesota Agriculture and Forestry was completed with a combination of the 2018 Minnesota IMPLAN dataset, data from the USDA 2017 Census of Agriculture and other USDA/NASS sources. The IMPLAN modeling system and Microsoft Excel were used for calculating and tabulating the results of this analysis. Results, shown as 2020 values throughout this report, are presented using these common economic modeling terms:

- **Value Added**
  - Sales (output) minus the cost of inputs
- **Sales (Output)**
  - The broadest measure of economic activity – sometimes referred to as "output"
- **Employment (Jobs)**
  - A measure of job positions without regard to whether they are full-time equivalents
- **Household Income**
  - Income from all sources that accrues to individuals as payment for personal employment (earnings or labor income), payment for ownership interests or capital provision (dividends, interest and rents), or as transfer payments (payments to individuals for which nothing is offered in return)

2.1 Defining Agriculture and Forestry

When completing an economic contribution study, there are generally questions as to what economic activity up and down the value chain should be included for a particular industry. Outlined below is the process used in this study for defining agriculture, and the same guidelines have been applied to the forestry industry.

There is usually considerable discussion regarding the blurred lines between production agriculture, processing and retail, and how agriculture should be defined. Agriculture can be defined as: 1) including only farm-level production, 2) including farm-level production, input manufacturing, and food processing, or 3) from the "farm to fork" perspective, which would also include distribution, restaurants and retail.

To strike middle (and defensible) ground between including more than just farm level production and seeking to attribute excess economic activity to the agriculture industry, this analysis includes production agriculture plus the first round of value added to the process. For example, in addition to the production of livestock and poultry, we have also included the industries that process them (i.e., production, processing, slaughtering, and rendering). As mentioned, we have followed this same pattern of analyzing other agricultural industries (e.g., crops), forestry production and further processing (sawmills, etc.)

Using the above rationale as a guide, the IMPLAN models were created and analyzed using the recommended methodology for a Multi-Industry Contribution Analysis. The IMPLAN modeling system uses more than 20,000 industries and classifies them according to the North American Industry Classification System (NAICS) and groups them into 546 industries. There were 101 IMPLAN sectors identified for this analysis to represent agriculture, forestry and related economic activities in the State of Minnesota (see Appendix A, IMPLAN Aggregation Scheme).

2.2 Economic Impact Study versus Economic Contribution Study

The term "Economic Impact Study" implies a change has taken place within a local economy. The change in a local economy typically comes from one of the following sources:

- Entrance/departure of a new business or industry
- Expansion/contraction of an existing business or industry

While estimating a change (economic impact study) such as the entrance or departure of industry activity is a worthwhile endeavor in many instances, this is not how the contribution of the agriculture and forestry sectors in this analysis were estimated. This analysis is an effort to evaluate the structure of existing industries within an existing economy. As a result, shocking the economy to create or eliminate parts of the industry is not appropriate. For that reason, this study is called an "economic contribution analysis"; in other words, we are interested in understanding what Minnesota agriculture currently contributes to the overall economy. This is a key difference from what is traditionally termed an "economic impact study". With a contribution analysis, the sum of individual industry estimates will never differ from the total of what actually exists in a given study area.

3 State Level Results[8]

The 101 IMPLAN sectors identified for this study were aggregated into four main categories to provide an overview of the economic contribution of these industries. These aggregated industries are:

- Crops
- Livestock
- Forestry
- Processing & Other Agriculture

Further details on the industries included in each of these categories are shown in the 'Detailed Results' section of the report and also in Appendix A, IMPLAN Aggregation Scheme.

3.1.1 State Value Added

Total value added refers to the portion of total sales that actually created additional value from the economic activity in an area and/or industry and is an accurate indicator of the ability of an industry to improve economic prospects in a given area. Total value added for an industry represents the value of the industry's total sales minus the value of any inputs used in the production process from other industries. Key components of value added are employee compensation (hired labor) and proprietor's income (self-employed), which is collectively known as 'household income'.

The agriculture industry and related economic activity add a significant contribution to the Minnesota economy with about $37.1[9] billion in value added. Of this amount, $11.1 billion comes from the Processing & Other Agriculture category, $9.9 billion from Livestock, $8.7 billion from the Crops, and $7.3 billion from Forestry (see Figure 3).

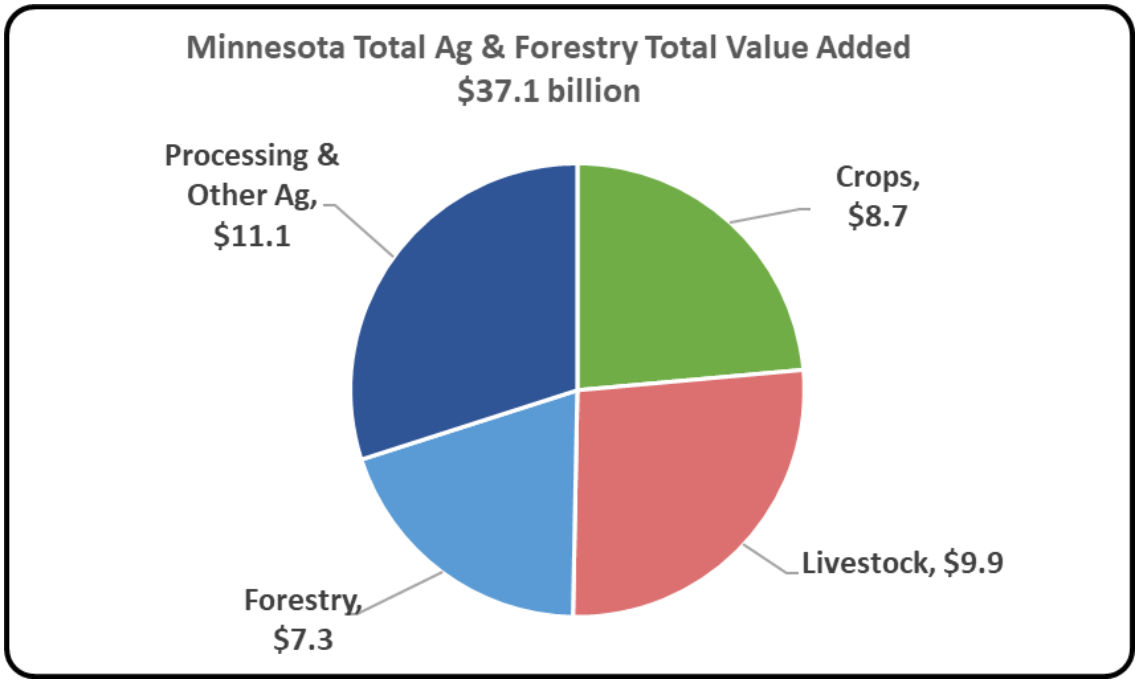

Figure 3, Minnesota Agriculture and Forestry Total Value Added

[8] For additional looks of the data view this link.
[9] Totals throughout the report may not sum due to rounding

3.1.2 State Jobs

Job numbers represent an estimate of the number of positions (jobs) currently filled in an area or industry. The estimates provided here originate from the state level IMPLAN input-output model. Jobs include positions whether they are full or part-time, so care must be used in making comparisons. "Jobs" does not count positions that are unfilled.

As shown in Figure 4, Minnesota's agriculture and forestry industries and related economic activities contribute a large number of jobs to the economy with 388,134 jobs. Of this amount, 126,218 jobs come from the Livestock category, 109,312 from Processing & Other Agriculture, 84,648 from Crops, and 67,956 from Forestry.

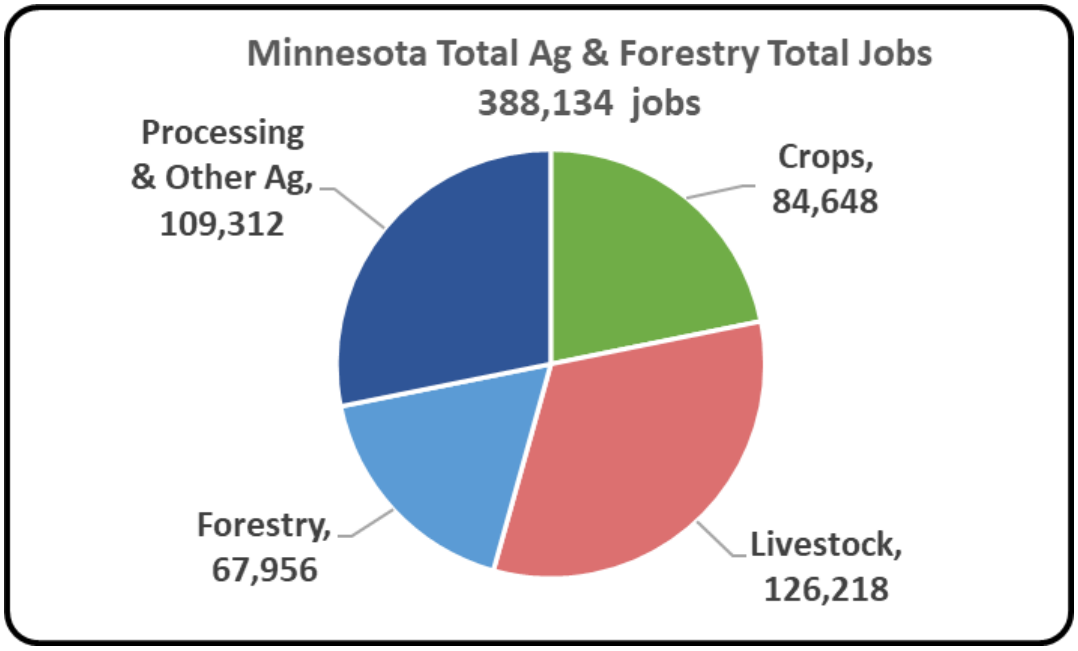

Figure 4, Minnesota Agriculture and Forestry Total Jobs

3.1.3 State Output

Total output (sales) refers to the total value of all production or sales of the identified industries within a study area. This is a total number that does not make deductions for the cost or origination of inputs that were used in the production process, which means that there is some double counting that occurs with this measure of economic activity.

Figure 5 illustrates the contribution of agriculture and related industries to Minnesota's economy. As shown, Minnesota's agriculture industry and related economic activities contribute significantly to the state economy with about $105.6 billion in total output. Of this amount, $33.0 billion comes from Livestock, $29.3 billion from Processing & Other Agriculture, $26.5 billion from Crops, and $16.8 billion from Forestry.

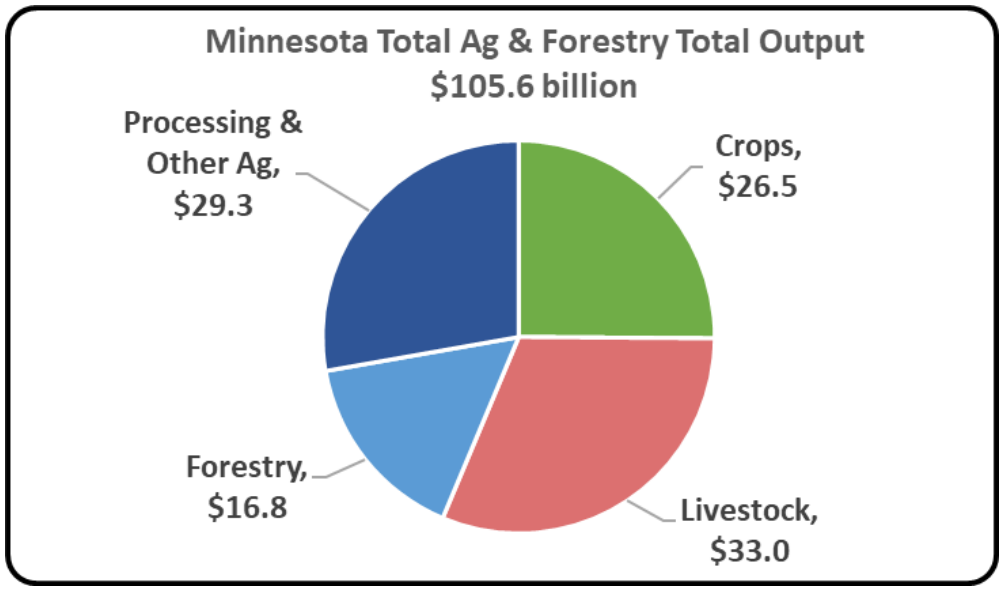

Figure 5, Minnesota Agriculture and Forestry Total Output

3.1.4 State Household Income

Household income is defined as income from all sources that accrues to individuals as payment for personal employment (earnings or labor income), payment for ownership interests or capital provision (dividends, interest and rents), or as transfer payments (payments to individuals for which nothing is offered in return).

Figure 6 illustrates the contribution of each of the four categories to Minnesota's total household income. As shown, Minnesota's agriculture and forestry industries and related economic activities contribute about $21.4 billion in household income to the economy. Of this amount, $7.2 billion comes from Processing & Other Agriculture, $5.8 billion from Livestock, $4.7 billion from Forestry, and $3.8 billion from Crops.

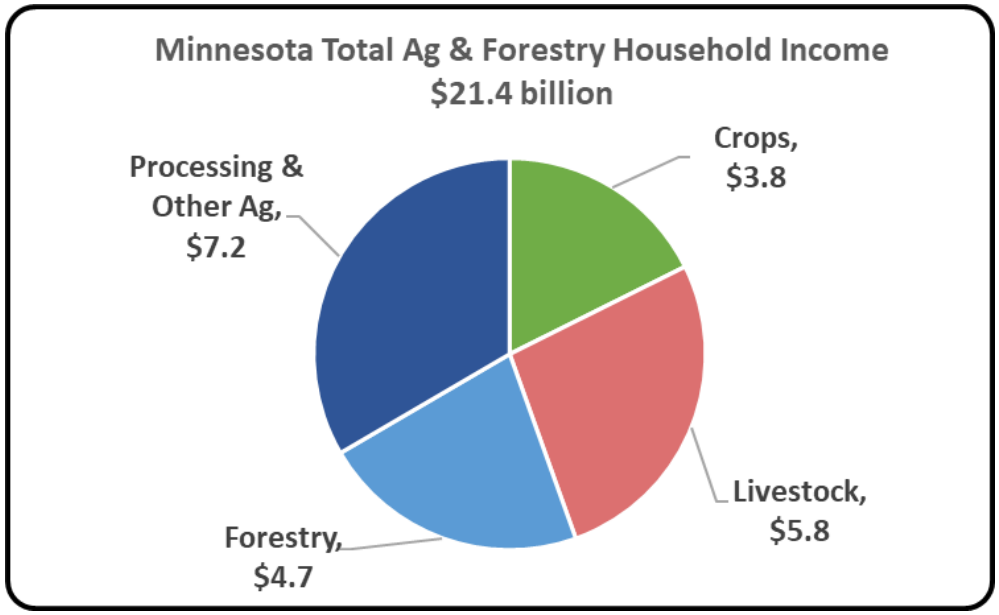

Figure 6, Minnesota Agriculture & Forestry Household Income

3.1.5 State Taxes

Minnesota's agriculture, forestry and related economic activities are also a significant source of tax revenue, contributing $7.5 billion in taxes at all taxing levels. About $3.0 billion of that tax revenue goes to the state and local level, as well as $4.5 billion to the federal level. Estimates of taxes paid by Minnesota agriculture, forestry, and related industries are shown in Figure 7.

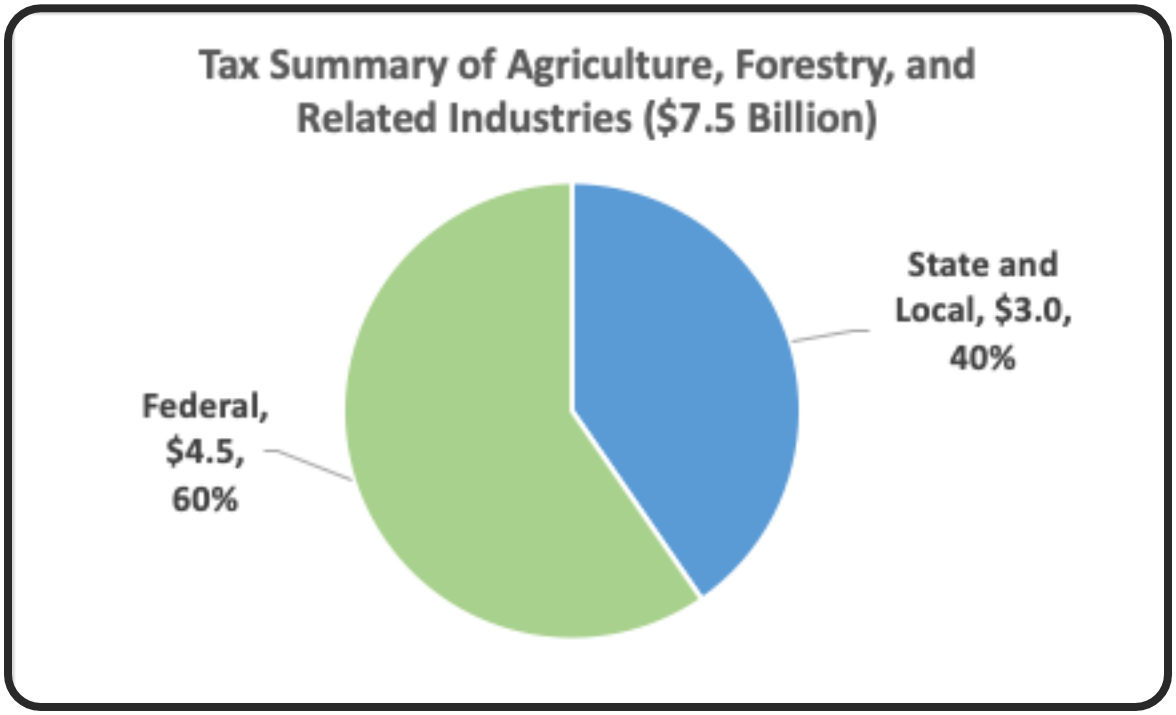

Figure 7, Tax Summary of Agriculture, Forestry, and Related Industries

4 Detailed Results

The previous section showed the state level results by the four major categories: 1) Crops, 2) Livestock 3) Forestry and 4) Processing & Other Agriculture. The following section shows the results by industry within each of the four major categories to show which specific industries are major contributors. Please note that goods and services used by the agriculture industry to operate (i.e., banking and insurance) are not specifically shown, but they are embedded as required inputs for the agriculture industry and related economic activities.

4.1 Crops

The Crops category includes industries such as grain and oilseed farming, soybean processing and more. Total value added contributed to the Minnesota economy from crops was $8.7 billion (Figure 8). Crop production and related economic activity in Minnesota also accounted for 84,648 jobs (Figure 9), $26.5 billion in output, and nearly $3.8 billion in household income. The 'Primary Food Processing – Crops' category was a major contributor in this area which shows how important processing is to the value chain. This category also includes items such as wet corn milling and soybean processing.

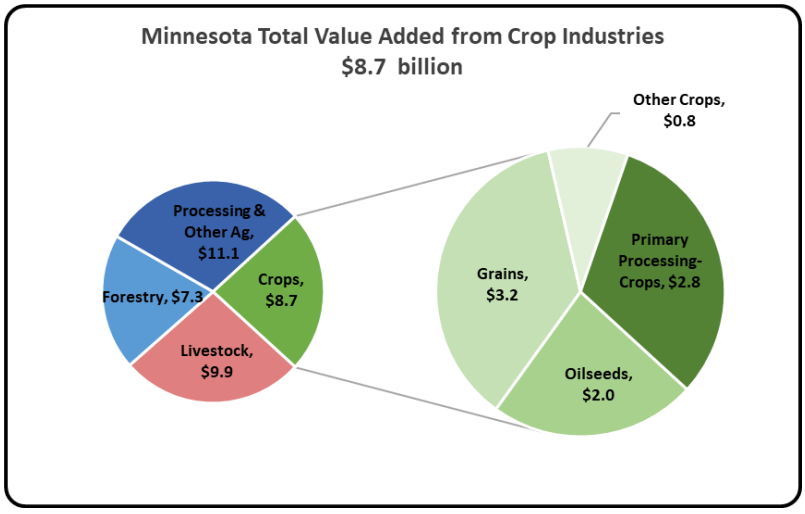

Figure 8, Economic Contribution of Minnesota's Crop Industries - Value Added

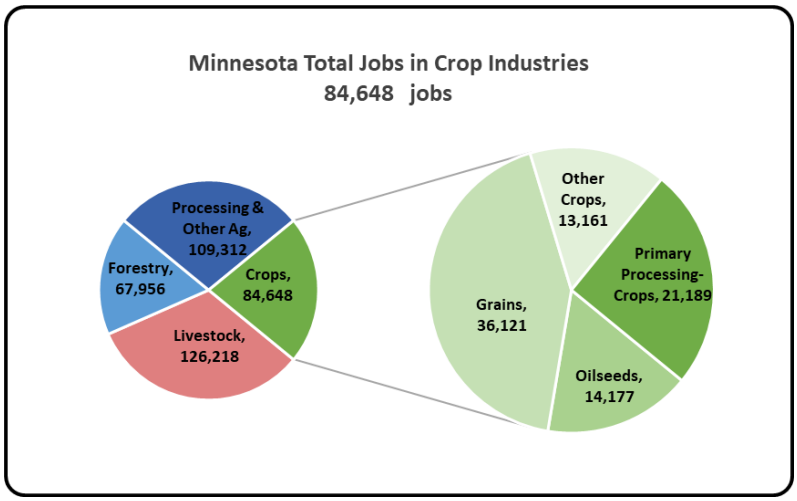

Figure 9, Economic Contribution of Minnesota's Crop Industries - Jobs

4.2 Livestock

The Livestock category includes industries such as beef cattle production, hog production, dairy cattle, poultry production (layers (egg production), broilers and turkeys), meat/poultry processing rendering and more. Total value added contributed to the economy from livestock and related economic activity in Minnesota was about $9.9 billion (see Figure 10).

Livestock production and related economic activity in Minnesota also accounted for 126,218 jobs (see Figure 11), $33.0 billion in output, and about $5.8 billion in household income. In addition to the production of livestock and poultry, meat processing is a large contributor to Minnesota's economy.

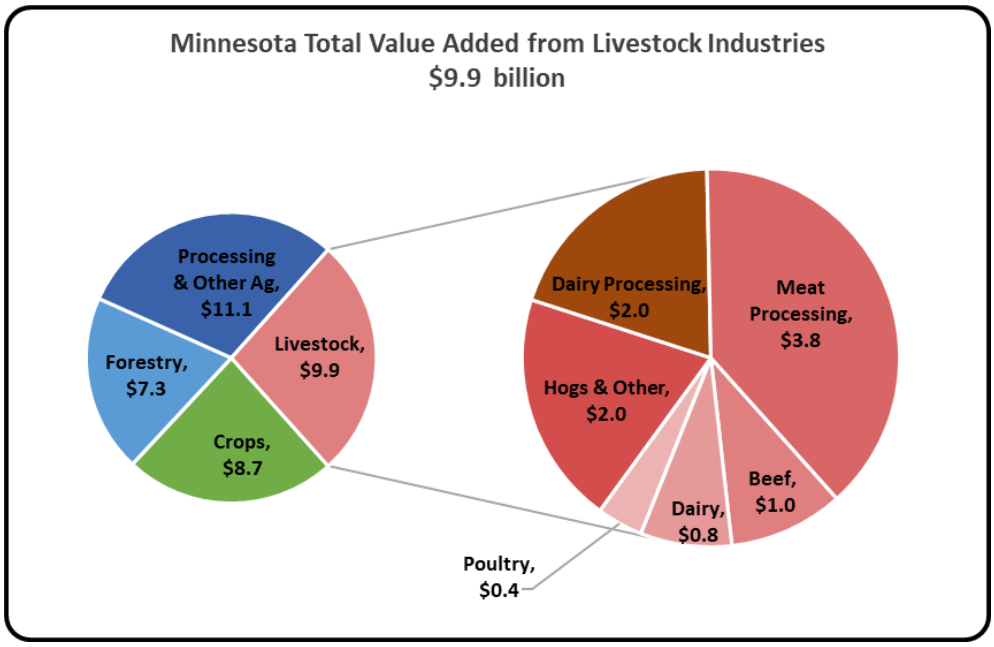

Figure 10, Economic Contribution of Minnesota's Livestock Industries - Value Added

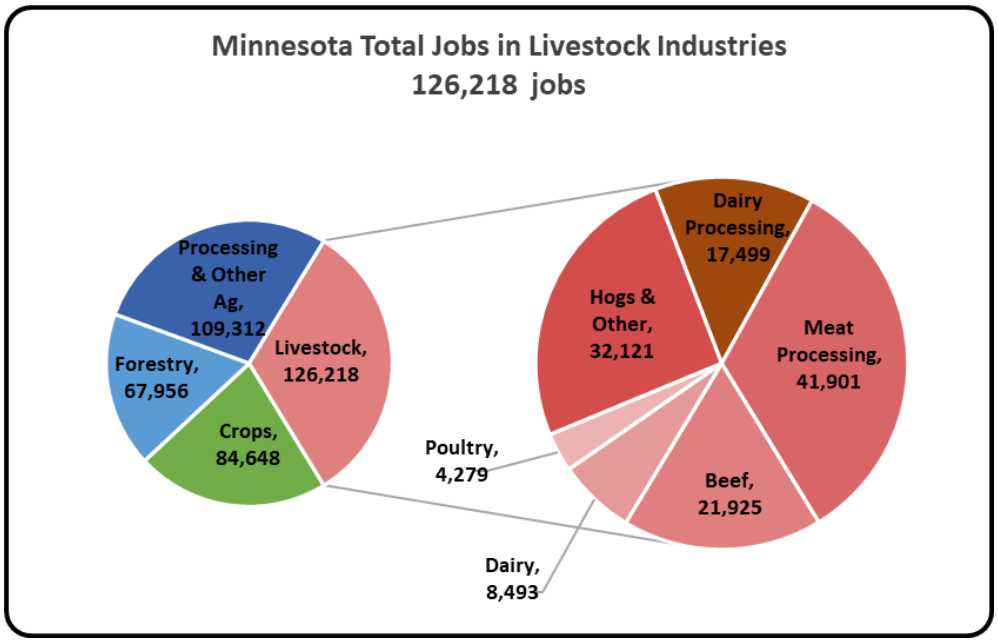

Figure 11, Economic Contribution of Minnesota's Livestock Industries - Jobs

4.3 Forestry

The forestry products manufacturing category includes industries such as sawmills, veneer and plywood manufacturing, paper mills, sawmill/woodworking and paper machinery, and many more. Total value added contributed to the economy from forestry was $7.3 billion, with the largest contributor in this category being secondary forestry products manufacturing (Figure 12). All forestry industries also accounted for 67,956 jobs (see Figure 13), 53,647 of which came from secondary forest products manufacturing sectors such as sawmills, papermills, and other miscellaneous wood product manufacturing.

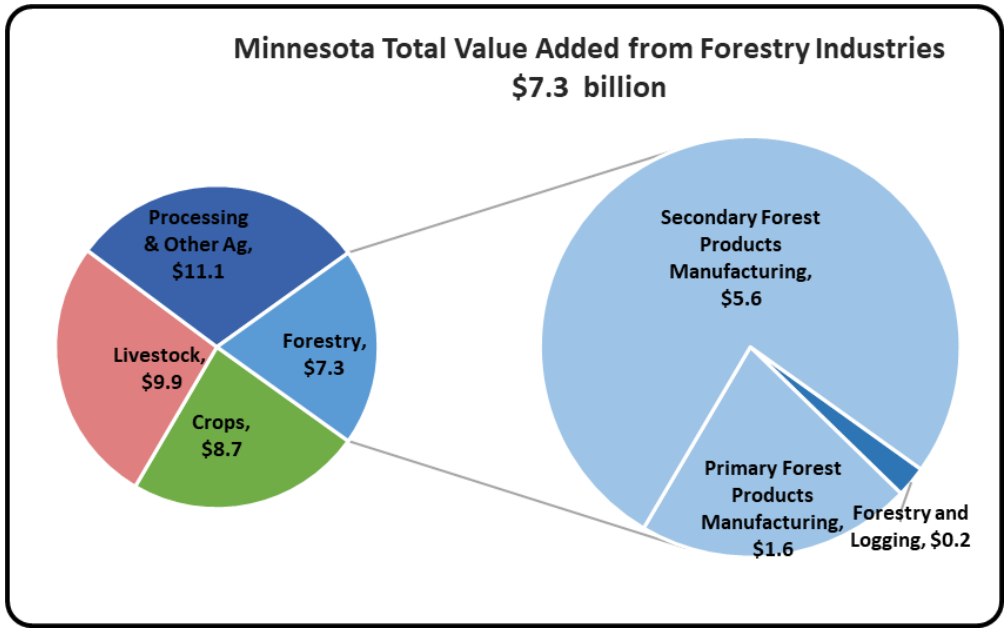

Figure 12, Economic Contribution of Minnesota's Forestry Industries - Value Added

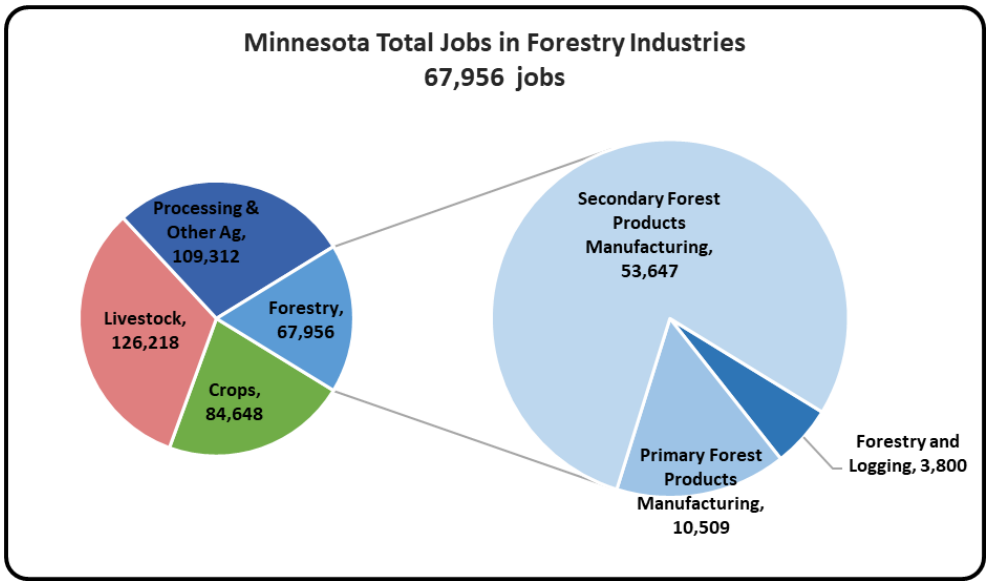

Figure 13, Economic Contribution of Minnesota's Forestry Industries - Jobs

4.4 Processing and Other Agriculture

The Processing & Other Agriculture category includes industries such as animal feed production, farm machinery and equipment manufacturing, ethanol production, dog and cat food manufacturing, veterinary services, many food manufacturing industries and more. Total value- added contributed to the economy from Processing & Other Agriculture was $11.1 billion (see Figure 14).

Processing and other agriculture and related economic activity in Minnesota also accounted for 109,312 jobs (see Figure 15), nearly $29.3 billion in output, and about $7.2 billion in household income. Other food processing and animal and pet food industries were major contributors to the Processing & Other Ag category.

Ethanol contributes significantly to the processing & other agriculture sectors and would make up a large portion of the ag chemical and fertilizer group which had a value added impact of $1.0 billion and 7,282 jobs. Of the IMPLAN sectors included in the ag chemical and fertilizer four of the eight sectors included in this group are not present in Minnesota. Of the remaining four sectors in the group, "other basic organic chemical manufacturing", which includes ethanol and biodiesel, makes up the overwhelming majority of the impacts from the group.

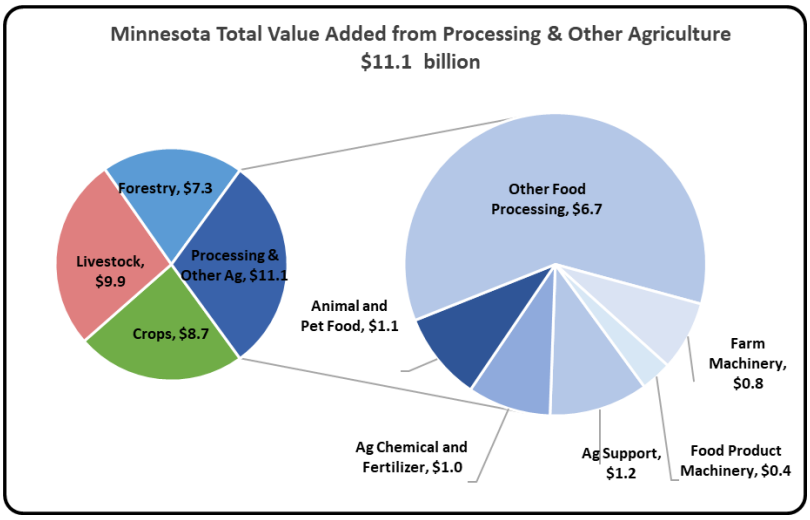

Figure 14, Economic Contribution of Minnesota's Processing & Other Agriculture Industries - Value Added

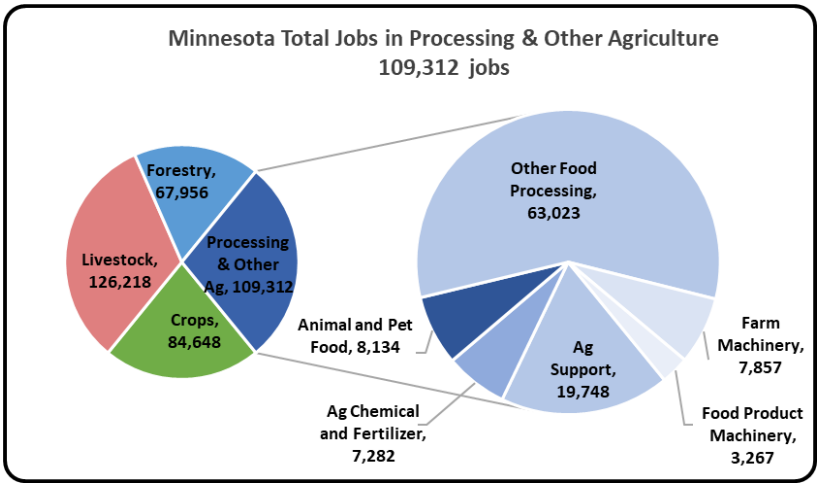

Figure 15, Economic Contribution of Minnesota's Processing & Other Agriculture Industries - Jobs

5 County Level Results

The results presented so far in this report have been focused on the state level; however similar analyses have been performed for all of Minnesota's eighty-seven counties. As one would expect, the contribution of agriculture varies widely, not just in terms of total contribution, but the degree to which some counties are more or less reliant upon agriculture in terms of the four primary measures of economic activity (value added, jobs, output, and household income). While there is variation across counties, a county that is very reliant upon agriculture in terms of value added is also more likely to be reliant upon agriculture in terms of jobs, output, and household income.

5.1 County Value Added

Figure 16 shows the ten counties with the greatest value added contributions from agriculture, forestry, and related industries. Hennepin County leads the way with over $4.3 billion in value added contribution. Major industry contributors are Other Food Processing with $1.9 billion, Secondary Forest Products Manufacturing with $1.0 billion, and Ag Chemical and Fertilizer with $0.2 billion in value added. Ramsey, Dakota, Stearns, Blue Earth, Rice, Rice, and Washington counties have value added contributions from agriculture and forestry industries of over $1 billion.

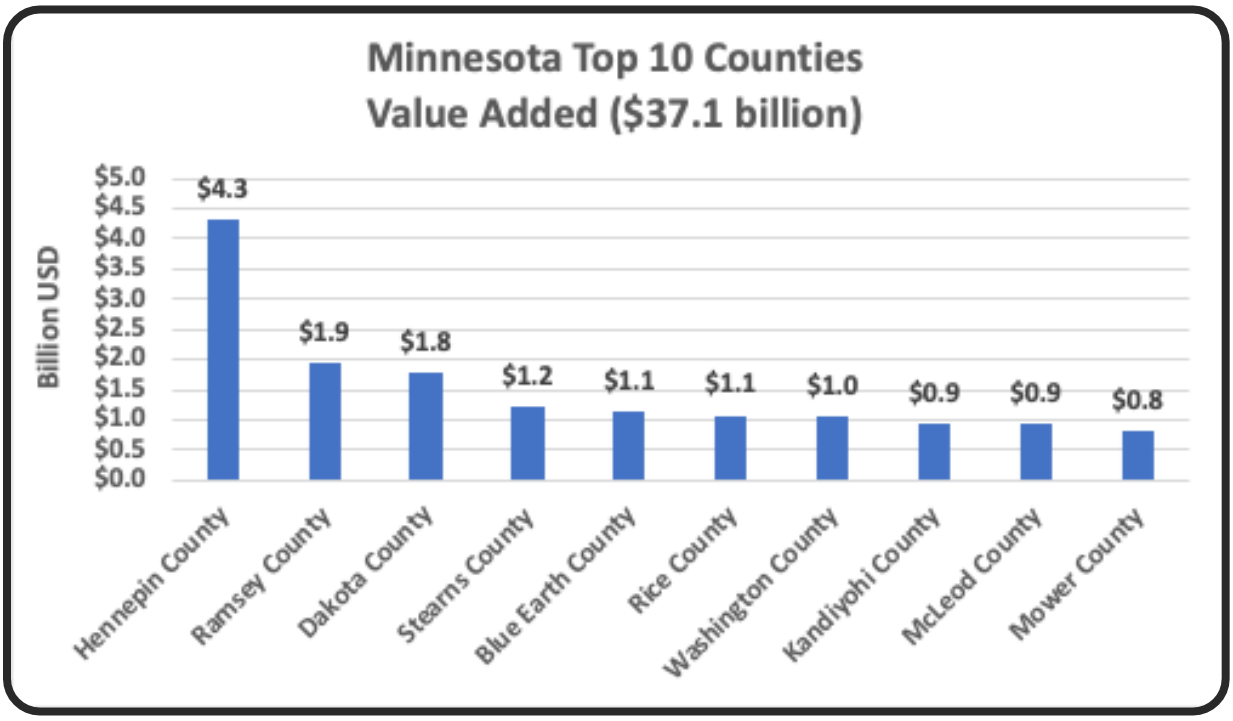

Figure 16, Minnesota Top 10 Counties, Value Added from Agriculture and Forestry Industries

The counties that derive the largest share of their total value added from agriculture, forestry, and related industries include Watonwan, Renville, Jackson, and Murray. All of these counties derive at least 60% of their total value added from agriculture and forestry, as shown in Figure 17 below.

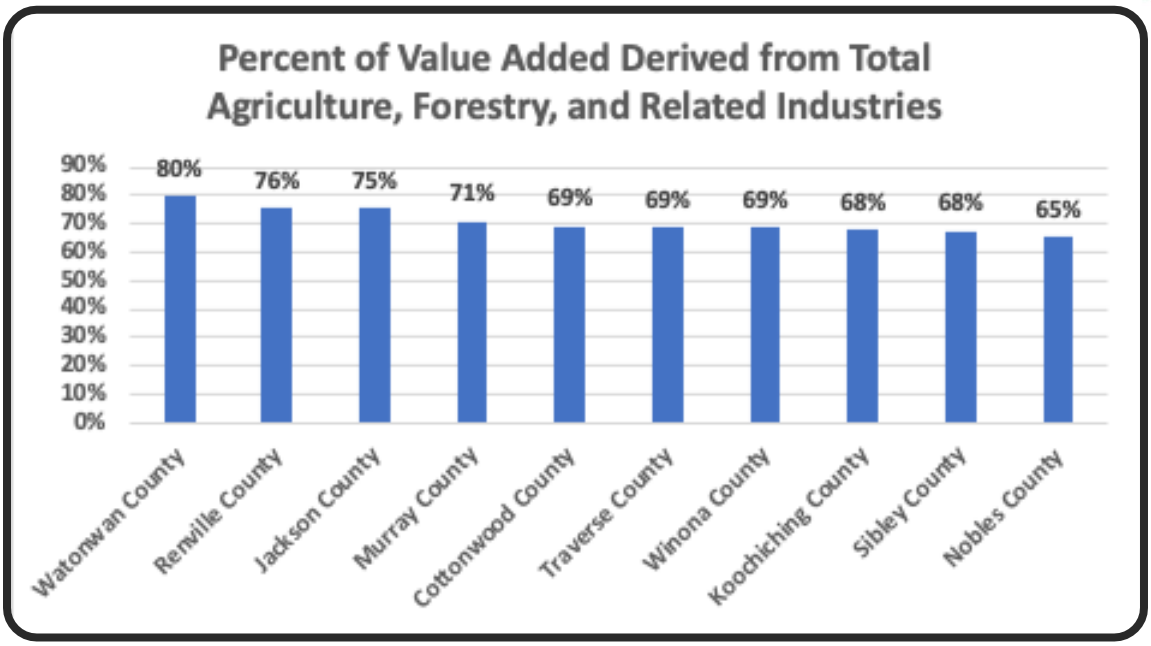

Figure 17, Minnesota Top 10 Counties, Percent Value Added from Agriculture and Forestry Industries

Figure 18 shows the number of counties that derive certain ranges of shares of value added in a local economy from agriculture and forestry activity. As shown below, 44 counties in Minnesota derive more than 30% of value added from agriculture, forestry, and related industries. About 10% of the State of Minnesota's value added activity is derived from agriculture and forestry.

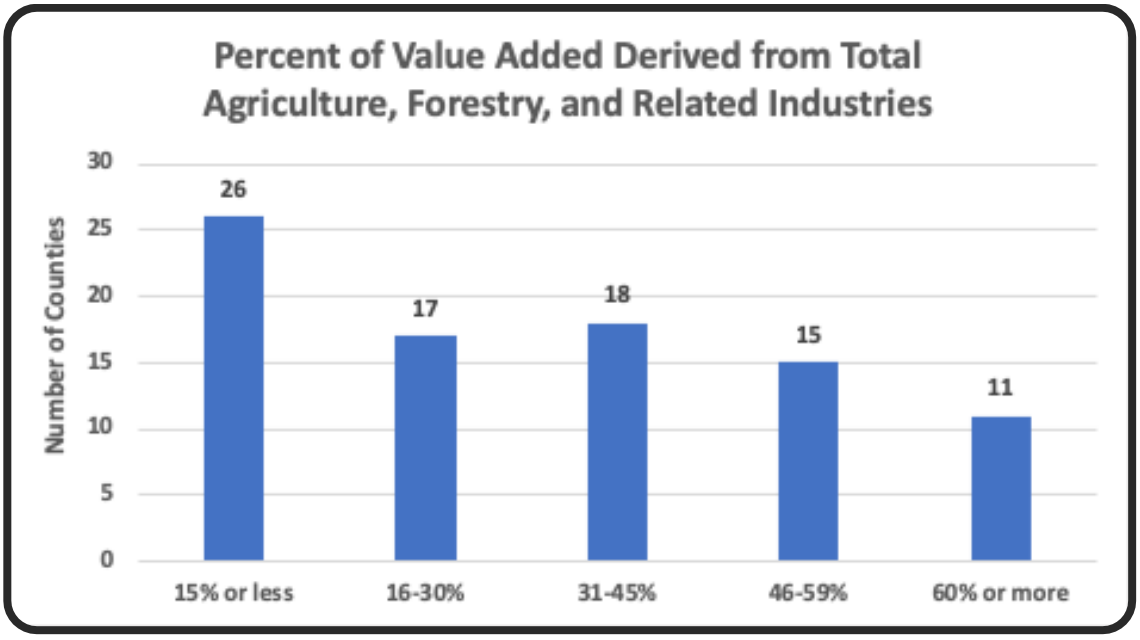

Figure 18, Percent of Value Added Derived from Agriculture and Forestry Industries

Figure 19 shows the amount of value added derived from ag and forestry and related industries for all of Minnesota's counties. On a percentage basis, the value added from the ag and forestry and related industries for each of Minnesota's counties are shown in Figure 20. See section 8.1 for detailed value added county maps for crops, livestock, forestry, and processing & other ag.

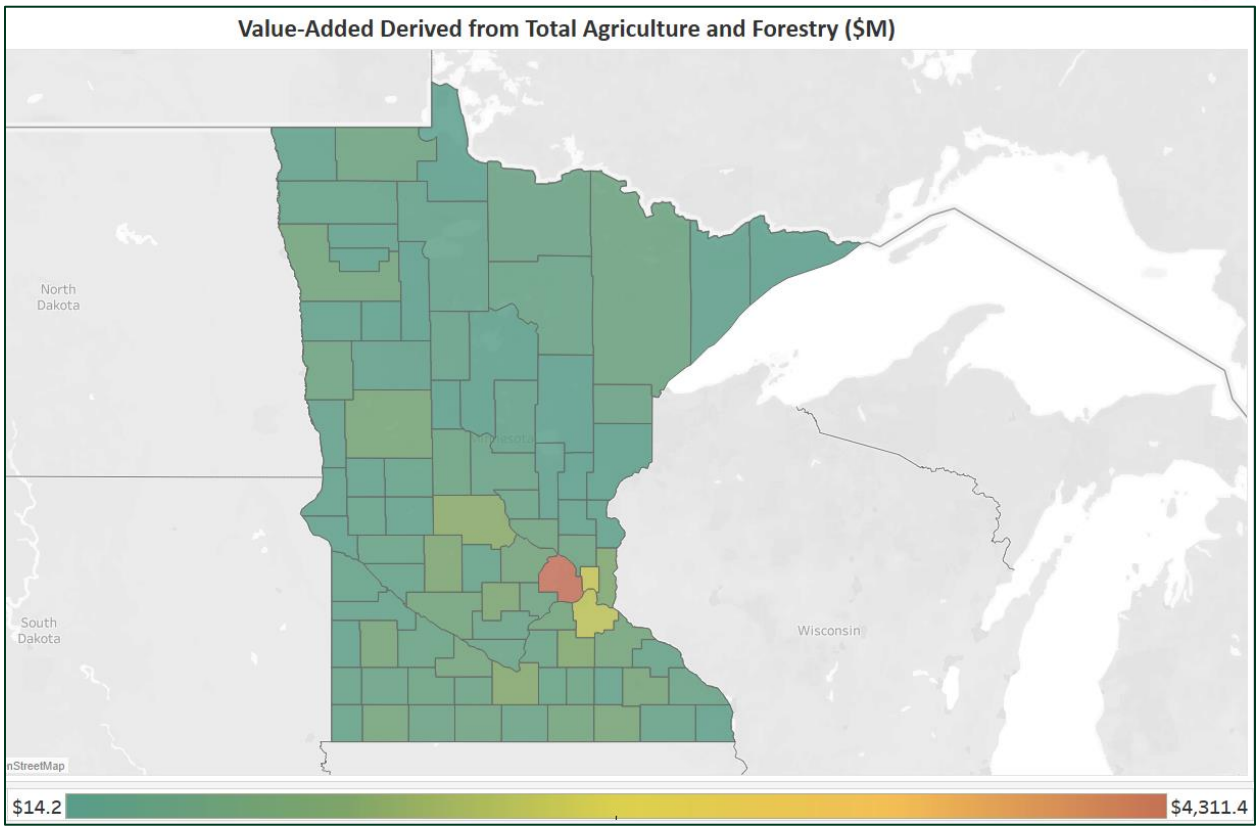

Figure 19, Value Added Derived from Total Agriculture & Forestry (by County) ($M)

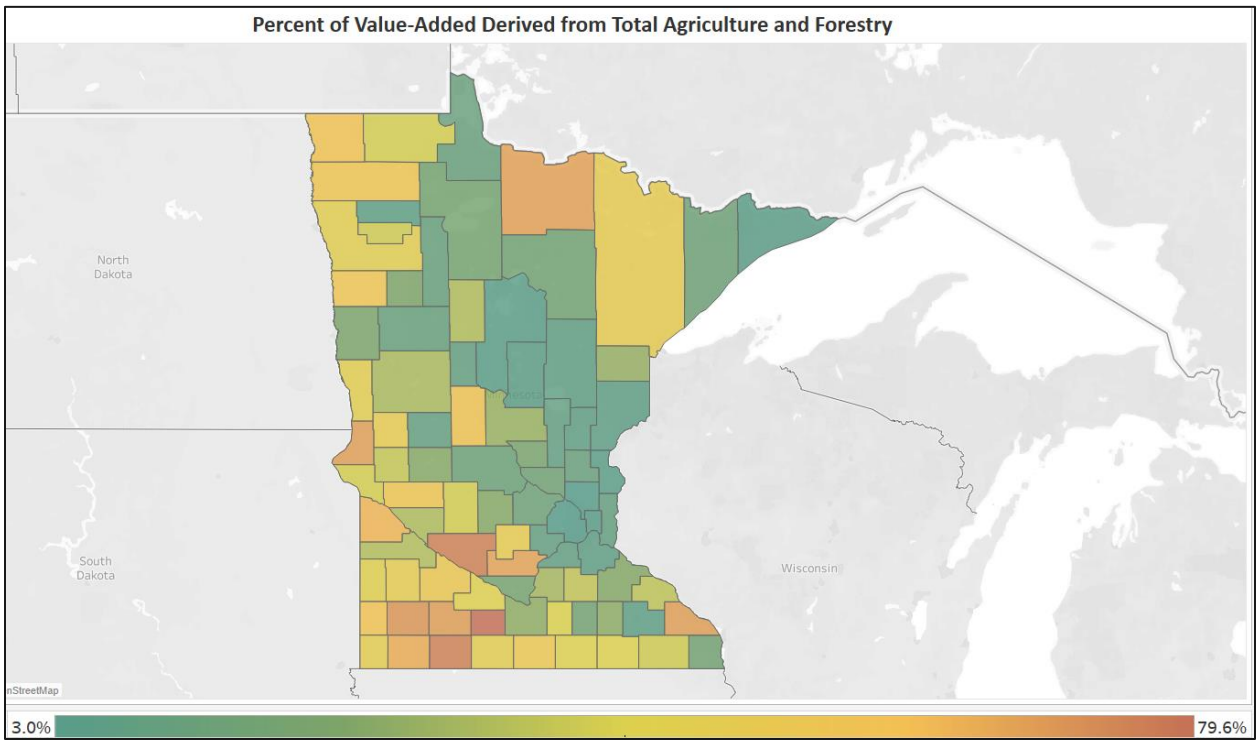

Figure 20, Percent of Value Added Derived from Total Agriculture & Forestry (by County)

5.2 County Jobs

Figure 21 shows the ten counties with the greatest number of jobs within agriculture, forestry, and related industries. Of the more than 388,000 jobs related to agriculture and forestry in Minnesota, Hennepin County accounts for 8.9% (more than 34,000). Within this county, there are over 21,000 people employed in processing & other agriculture industries and over 8,000 employed in the forestry sector. Ramsey County employs over 8,000 people in processing & other agriculture industries and Stearns County has over 10,500 jobs in the livestock sector.

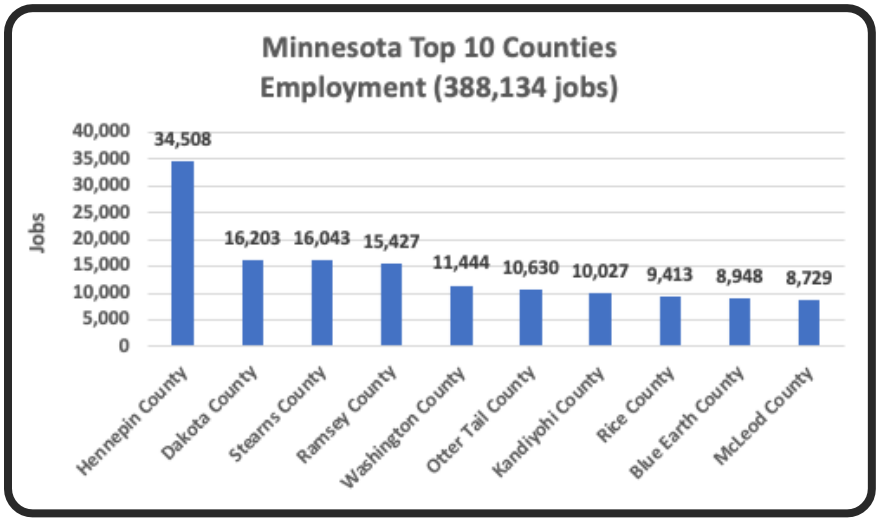

Figure 21, Minnesota Top 10 Counties, Jobs from Agriculture and Forestry Industries

Figure 22 depicts the ten counties most reliant (a higher share of total jobs derived from agriculture, forestry and related industries) on agriculture and forestry according to their share of the county's total employment. Although Hennepin, Dakota, and Stearns counties lead the state in number of jobs within agriculture and forestry, they drop off the list when viewed according to their reliance upon agriculture and forestry. The counties in the top 10 derive between 47% and 63% of total jobs from agriculture, forestry, and related industries.

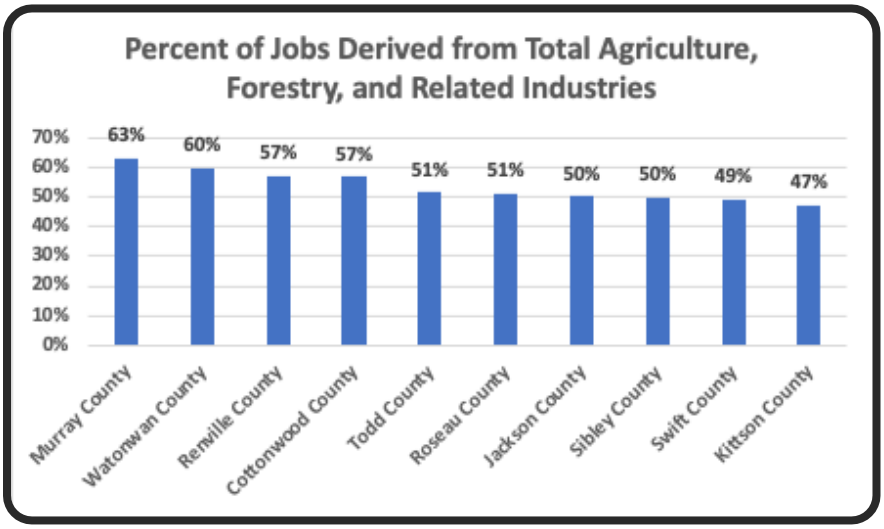

Figure 22, Minnesota Top 10 Counties, Percent of Jobs from Agriculture and Forestry Industries

Figure 23 creates a more complete picture of how many Minnesotan jobs are part of agriculture, forestry, and related industries. As shown, there are 37 counties that derive more than 30% of local jobs from agriculture, forestry and related industries. As a state, nearly 10% of jobs are derived from agriculture, forestry and related industries.

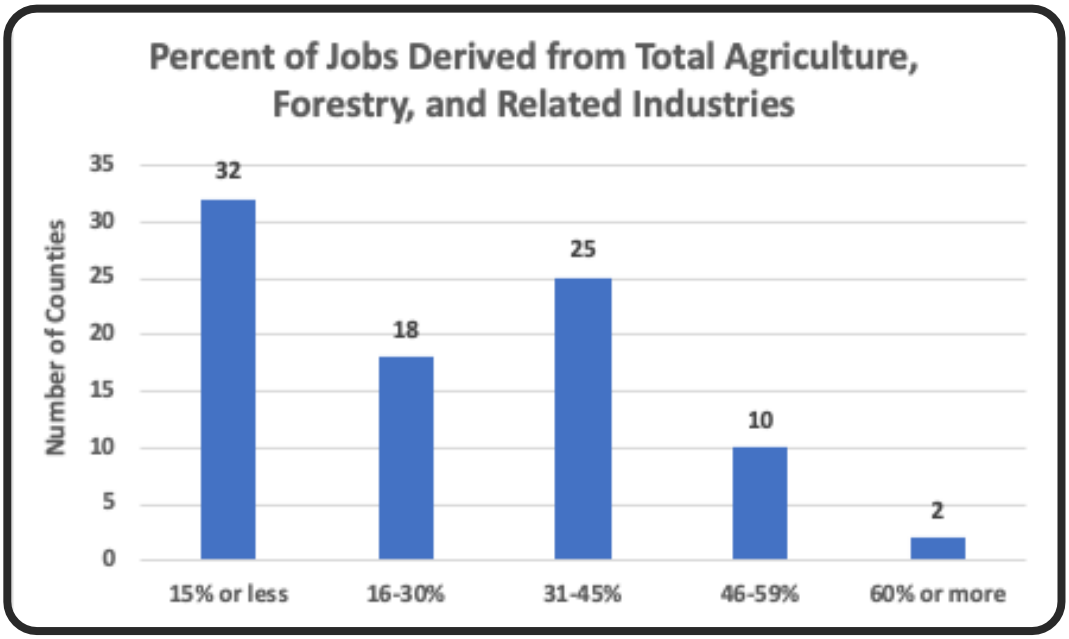

Figure 23, Percent of Jobs Derived from Agriculture and Forestry Industries

Figure 24 shows the total number of jobs derived from ag and forestry and related industries for each of Minnesota's counties. On a percentage basis, the total jobs derived from the ag and forestry and related industries for each of Minnesota's counties are shown in Figure 25. See section 8.2 for detailed county jobs maps for crops, livestock, forestry, and processing & other agriculture.

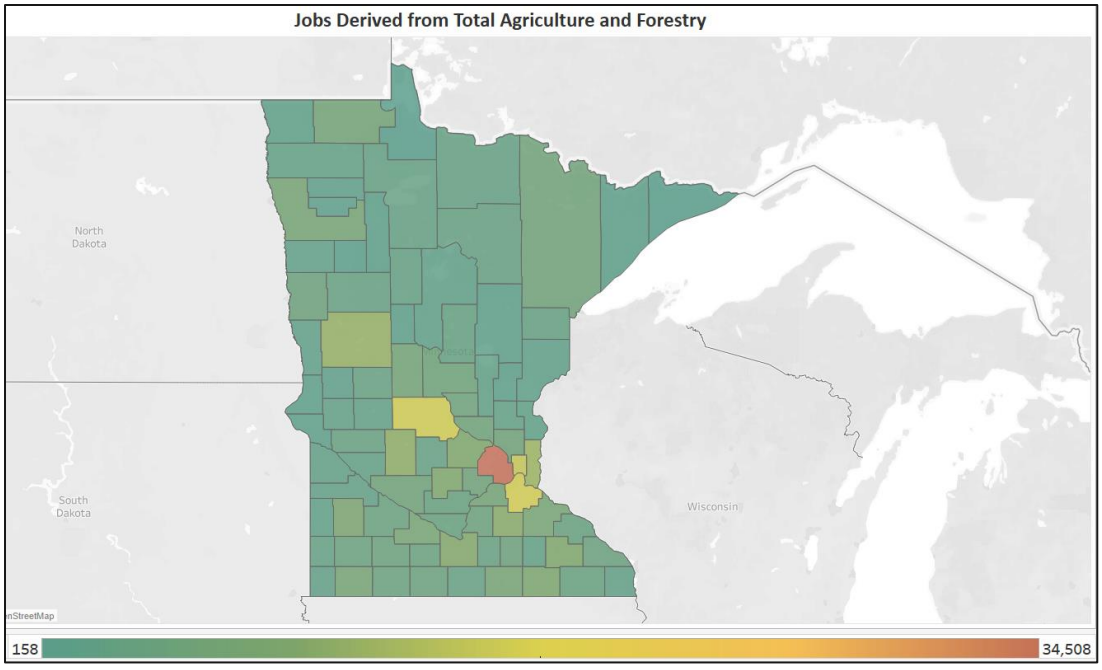

Figure 24, Jobs Derived from Total Agriculture and Forestry (by County)

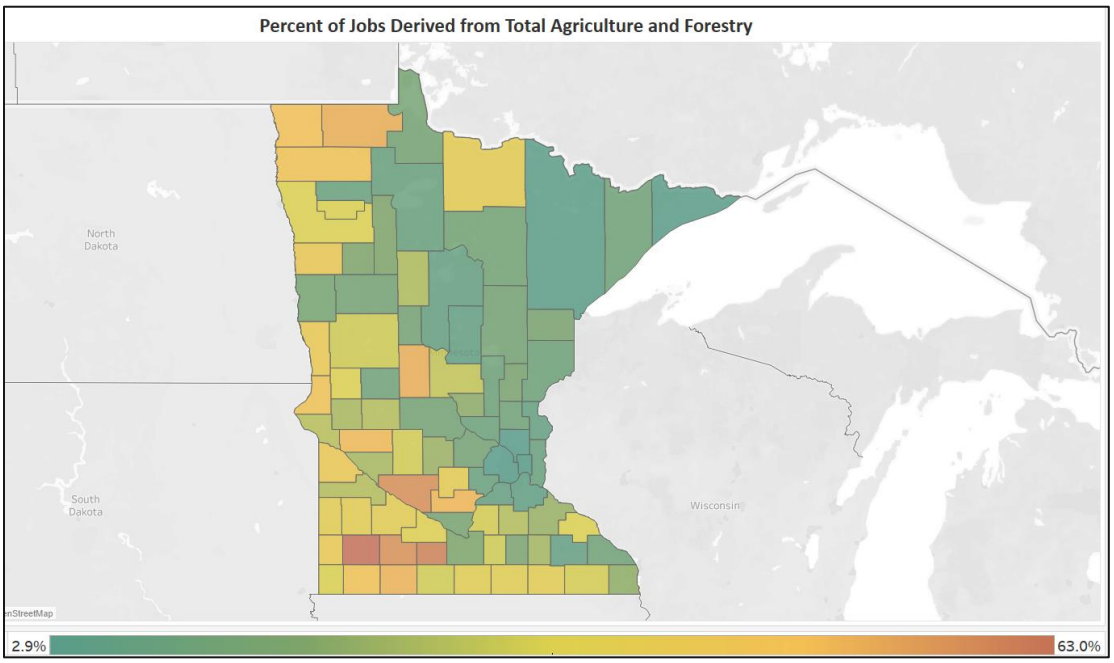

Figure 25, Percent of Jobs Derived from Total Ag and Forestry (by County)

5.3 County Output

Figure 26 shows the top 10 counties in terms of output from agriculture, forestry, and related industries. Hennepin county is the leader with over $9 billion in output being derived from agriculture and forestry. Ramsey ($4.8), Dakota ($4.3), Blue Earth ($4.2), and Stearns ($3.6) counties round out the top 5 contributors. Livestock and processing & other agriculture industries are the greatest sources of output for these counties.

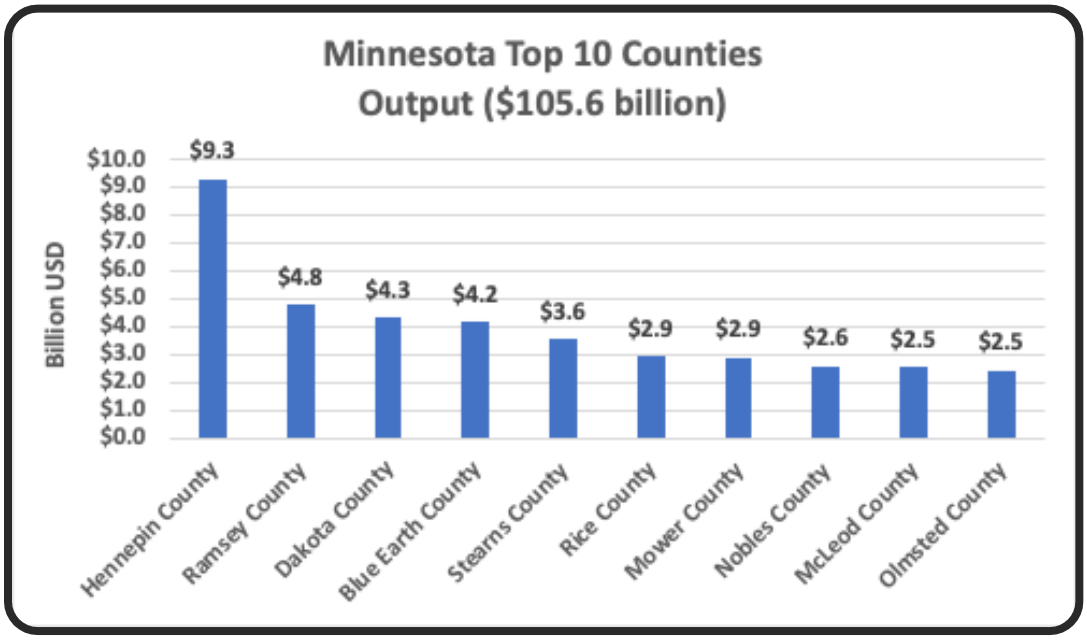

Figure 26, Minnesota Top 10 Counties, Output from Agriculture and Forestry Industries

Figure 27 shows the counties that rely most heavily on agriculture and forestry as a portion of their county output. The top five counties (Murray, Watonwan, Kittson, Lac qui Parle, and Nobles) all derive over 80% of output from these industries.

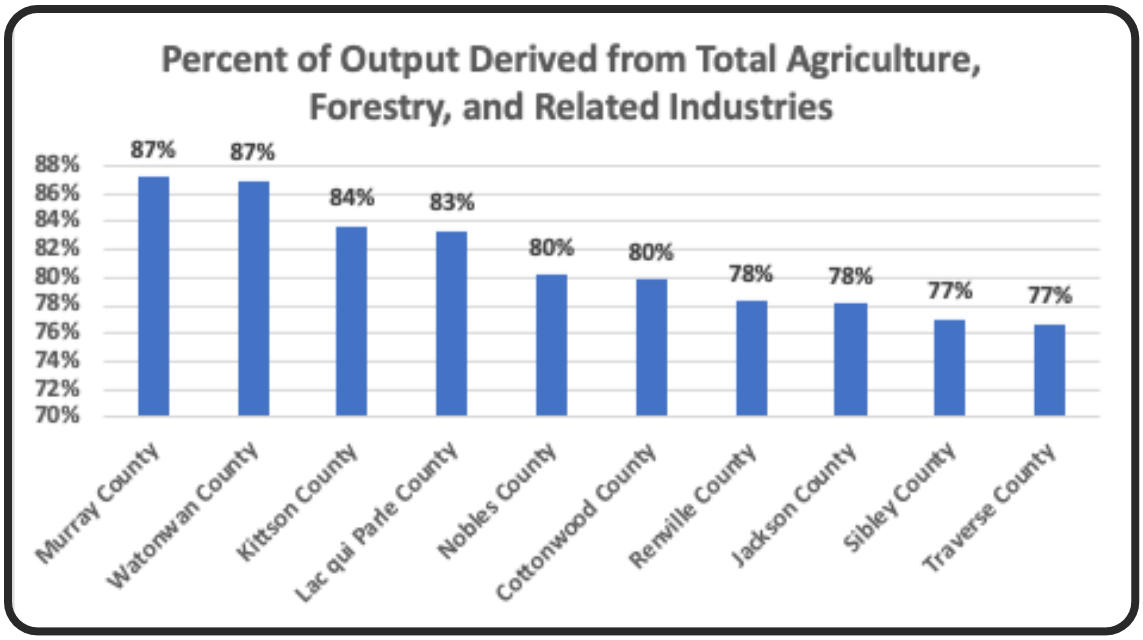

Figure 27, Minnesota Top 10 Counties, Output from Agriculture and Forestry Industries

Figure 28 shows that 49 counties in Minnesota rely on agriculture and forestry for more than 30% of their county output. As a state, nearly 15% of output is derived from agriculture, forestry, and related industries.

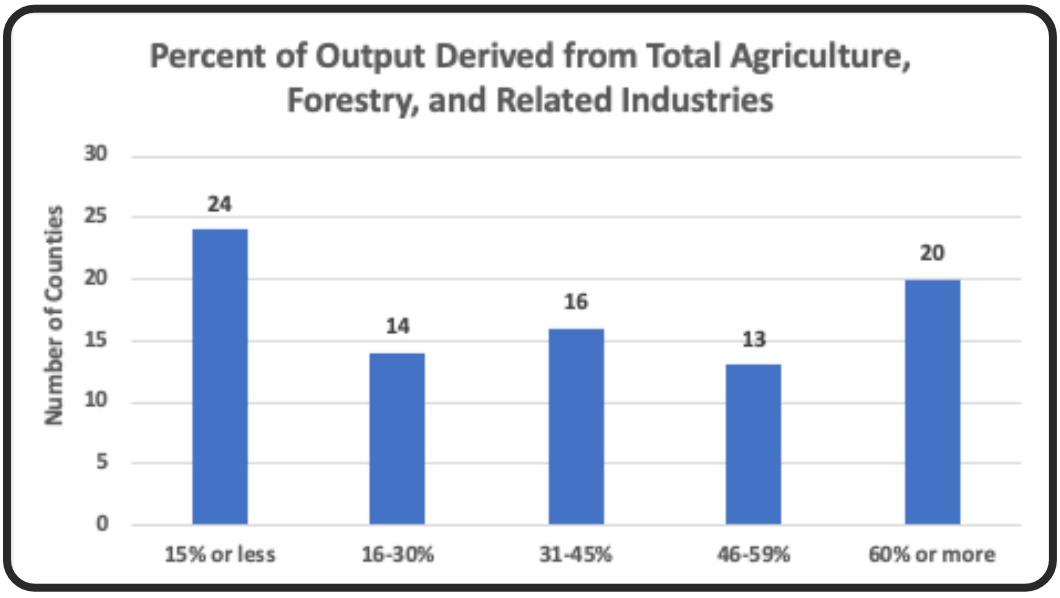

Figure 28, Percent of Output Derived from Agriculture and Forestry Industries

5.4 County Household Income

Figure 29 details the top 10 counties in terms of household income derived from agriculture, forestry, and related industries. Hennepin contributes $2.8 billion, Dakota ($1.2), Ramsey ($1.2), Stearns ($0.9),

Washington ($0.7), Blue Earth ($0.7), while McLeod, Kandiyohi, and Rice counties each contributed $0.6 billion.

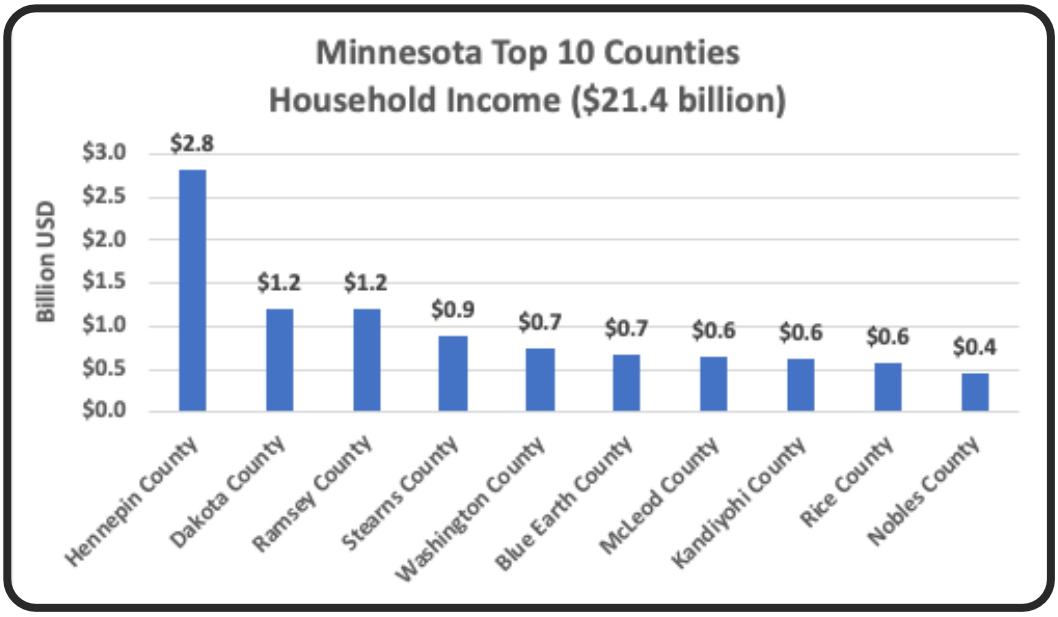

Figure 29, Minnesota Top 10 Counties, Household Income from Agriculture and Forestry Industries

6 Minnesota Agriculture Looking Ahead

6.1 Sugar Beet Industry

The sugar beet industry is a very important industry to the State of Minnesota and is unique in that the three sugar beet companies in Minnesota are 100% farmer-owned and operate as cooperatives. Yields for sugar beets (measured in pounds of sucrose per acre) have increased over the past couple of decades going back to 2000. In 2018, Minnesota's sugar beet yield was over 8,700 pounds of sucrose per acre which was an increase of over 1,000 pounds of sucrose per acre or a 13.6% increase from Minnesota's yield in 2000.

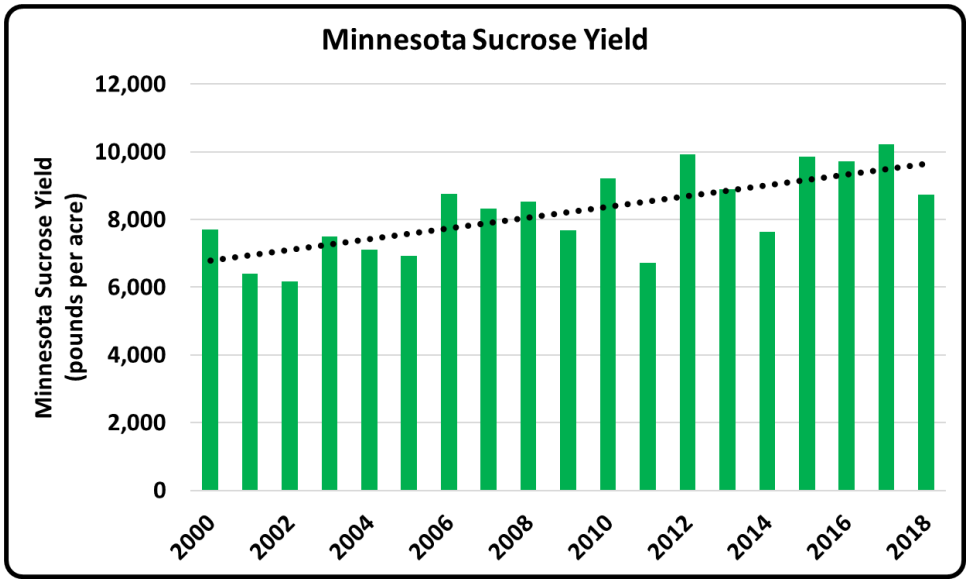

Figure 30, Minnesota Sucrose Yield (2000-2018)[10]

6.2 Forestry

Forestry continues to be an important contributor to Minnesota's economy and is especially important to specific regions of the state. Referring to Figure 31, Minnesota's forestry industry is concentrated in the northern part of Minnesota with all counties comprised of more than 50% forest land being in the northern part of the state. With such a large region being concentrated with forest land it is expected that the forestry industry will continue to be a key contributor to Minnesota's economy.

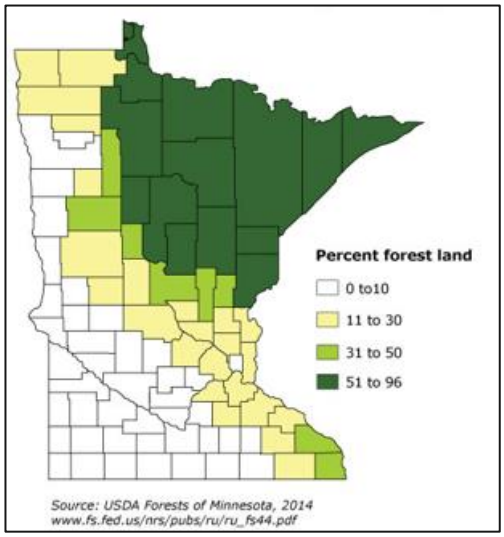

Figure 31, Percent of Forest Land by County, Minnesota, 2014[11]

[10] Source USDA NASS

[11] Source Minnesota Department of Employment and Economic Development

6.3 Trends in Consumer Preferences

Organic, Cage-Free, and Non-GMO are just some of the more frequently mentioned terms in changing consumer food preferences. The challenge faced by Minnesota's farmers can be captured in two words: communication and adaptation. On one hand it is important that the consumer hears and understands the farmers side of the food chain. At the same time, producers need to be ready to adapt to a changing market.

Minnesota could be well-situated geographically to be at the center of more production of niche, but growing, segments of consumer-led products. But for this to occur, there will likely need to be development of marketing and distribution channels to supply those developing markets. This may include more non-GMO and/or organic feed production, segregated feedstuff processing and handling and, in some ways, a mind-set change by producers who are willing to move out of low-cost, high-volume commodity production and embrace differentiated production and marketing.

6.4 Addressing Resistance to Livestock Production

A challenge for the Minnesota livestock industry that is likely to continue, if not get stronger, is local resistance to expansion of livestock production. Siting decisions may get more complex and pressures to install more structures or mechanisms to control water runoff, odor, and other characteristics of livestock production are all apt to gain more support, not only from urban dwellers, but also from rural, non-farm residents. Expansion of livestock production is likely to need more access to site planning and site selection analytic data. This may include interactive mappings and better access to libraries of federal, state and local regulations that can be overlaid onto siting maps. Additionally, using data developed in this study will help those in the livestock and poultry industries to better communicate their contributions to the local economy.

6.5 Technology Use and Access

Advancements in agricultural technology have allowed farmers and agricultural businesses to improve productivity, efficiency, and environmental sustainability. Examples of such advancements include GPS technology, temperature and moisture sensors, and advanced imaging technology.

Although USDA-NASS[12] reports that the majority of Minnesota farmers are above the age of 55, technology adaption rates appear to be steadily increasing. According to the same source[13], computer usage and reliance on technology for farm operations have increased over recent years. Minnesota is above the national average in terms of farm business computer, tablet, and smartphone use. Nearly 60% of farms are using computer technologies for their business, which is 10% greater than the national average. Internet access among agricultural businesses has also increased from 78% in 2017 to 82% in 2019. With rural Minnesota utilizing technology at a higher rate than the national average additional local, state and federal investment in rural broadband is warranted.

6.6 COVID-19

COVID-19 disrupted every industry in Minnesota agriculture, agri-food and forestry were no exception. Earlier in the year, large meat processing plants in Minnesota were shut down because of COVID-19 and

[12] https://quickstats.nass.usda.gov/results/B7198F44-E911-3230-AF96-8D4F81E97D27

[13] https://www.nass.usda.gov/Statistics_by_State/Minnesota/Publications/Other_Press_Releases/2019/MN-Farm-Computer-2019.pdf

disrupted supply chains. Pork producers struggled to euthanize hogs that could not be harvested due to constraints in the capacity to slaughter pigs. Unemployment has surged in much of America with workers being unable to perform their jobs because of physical distancing requirements. Some possible risk-mitigation strategies for strengthening agriculture, agri-food and forestry include:

- Insulating the food chain from interruptions by creating more redundancy on the supply side
- Increased support for local processing alternatives to large plants
- Assessing agri-food product markets to build redundancy on the demand side
- Expansion of rural broadband, enabling some farm-based workers to work remotely

7 Conclusions

The agriculture, agri-food, forestry, and related industries in Minnesota have a significant impact on the Minnesota's economy. These industries are important to Minnesota, with about 10% of the jobs being derived from the studied industries. In addition to having an impact on the state as a whole, agriculture, agri-food, forestry, and related industries impact each county in the state with the percentage of jobs derived from impacted industries in Minnesota's counties ranging from 3%-63%. Counties located in the metropolitan parts of Minnesota are composed of large numbers of jobs and value added activity that is supported by impacted industries in those counties.

Industries have faced significant challenges recently by market disruptions, plentiful stocks of commodities, tariffs of goods and then most recently with COVID-19, but the response and willingness to adapt shows the resilience and long-term sustainability of these sectors. Minnesota's agriculture, agri-food, forestry, and related industries is very diverse which can be seen in the 26 supporting partners that commissioned this study. Using this diverse group of perspectives, many issues facing these industries can be addressed with future analyses.

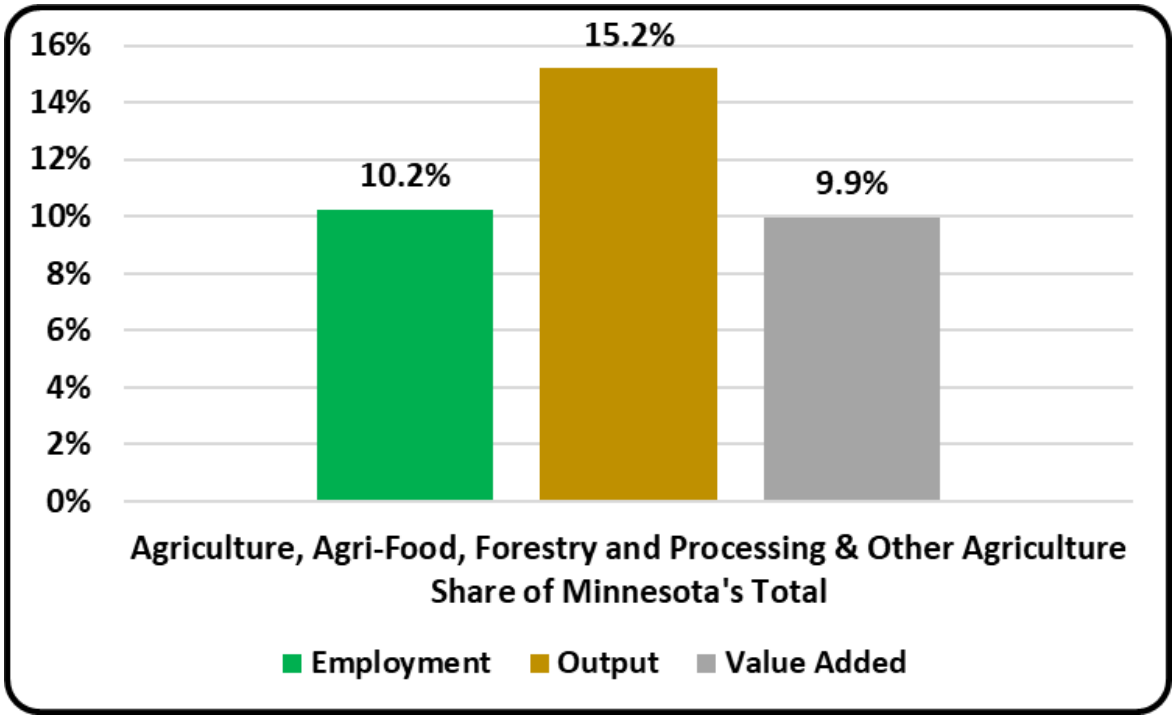

Figure 32, Agriculture, Agri-Food, Forestry and Processing & Other Agriculture Share of Minnesota's Total

8 Appendix A, IMPLAN Aggregation Scheme

IMPLAN Code	IMPLAN Description	Aggregation Description
1	Oilseed farming	Oilseeds
2	Grain farming	Grains
3	Vegetable and melon farming	Other Crop Production
4	Fruit farming	Other Crop Production
5	Tree nut farming	Other Crop Production
6	Greenhouse, nursery, and floriculture production	Other Crop Production
7	Tobacco farming	Other Crop Production
8	Cotton farming	Other Crop Production
9	Sugarcane and sugar beet farming	Other Crop Production
10	All other crop farming	Other Crop Production
11	Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming	Cattle
12	Dairy cattle and milk production	Dairy
13	Poultry and egg production	Poultry
14	Animal production, except cattle and poultry and eggs	Hogs and Other Livestock
17	Commercial fishing	Hogs and Other Livestock
18	Commercial hunting and trapping	Hogs and Other Livestock
15	Forestry, forest products, and timber tract production	Forestry and Logging
16	Commercial logging	Forestry and Logging
132	Sawmills	Primary Forest Products Manufacturing
133	Wood preservation	Primary Forest Products Manufacturing
134	Veneer and plywood manufacturing	Primary Forest Products Manufacturing
136	Reconstituted wood product manufacturing	Primary Forest Products Manufacturing
138	Cut stock, resawing lumber, and planing	Primary Forest Products Manufacturing
145	Paper mills	Primary Forest Products Manufacturing
267	Sawmill, woodworking, and paper machinery	Primary Forest Products Manufacturing
135	Engineered wood member and truss manufacturing	Secondary Forest Products Manufacturing
137	Wood windows and door manufacturing	Secondary Forest Products Manufacturing
139	Other millwork, including flooring	Secondary Forest Products Manufacturing
140	Wood container and pallet manufacturing	Secondary Forest Products Manufacturing
142	Prefabricated wood building manufacturing	Secondary Forest Products Manufacturing
143	All other miscellaneous wood product manufacturing	Secondary Forest Products Manufacturing
144	Pulp mills	Secondary Forest Products Manufacturing
146	Paperboard mills	Secondary Forest Products Manufacturing
147	Paperboard container manufacturing	Secondary Forest Products Manufacturing
148	Paper bag and coated and treated paper manufacturing	Secondary Forest Products Manufacturing
149	Stationery product manufacturing	Secondary Forest Products Manufacturing
150	Sanitary paper product manufacturing	Secondary Forest Products Manufacturing
151	All other converted paper product manufacturing	Secondary Forest Products Manufacturing
365	Wood kitchen cabinet and countertop manufacturing	Secondary Forest Products Manufacturing
367	Nonupholstered wood household furniture manufacturing	Secondary Forest Products Manufacturing
370	Wood office furniture manufacturing	Secondary Forest Products Manufacturing
371	Custom architectural woodwork and millwork	Secondary Forest Products Manufacturing
19	Support activities for agriculture and forestry	Ag Support
467	Veterinary services	Ag Support
31	Potash, soda, and borate mineral mining	Ag Chemical and Fertilizer
32	Phosphate rock mining	Ag Chemical and Fertilizer
33	Other chemical and fertilizer mineral mining	Ag Chemical and Fertilizer
163	Other basic organic chemical manufacturing	Ag Chemical and Fertilizer
167	Nitrogenous fertilizer manufacturing	Ag Chemical and Fertilizer
168	Phosphatic fertilizer manufacturing	Ag Chemical and Fertilizer
169	Fertilizer mixing	Ag Chemical and Fertilizer
170	Pesticide and other agricultural chemical manufacturing	Ag Chemical and Fertilizer

IMPLAN Code	IMPLAN Description	Aggregation Description
63	Dog and cat food manufacturing	Animal and Pet Food
64	Other animal food manufacturing	Animal and Pet Food
260	Farm machinery and equipment manufacturing	Farm Machinery
266	Food product machinery manufacturing	Food Product Machinry
70	Fats and oils refining and blending	Other Food Processing
71	Breakfast cereal manufacturing	Other Food Processing
74	Nonchocolate confectionery manufacturing	Other Food Processing
75	Chocolate and confectionery manufacturing from cacao beans	Other Food Processing
76	Confectionery manufacturing from purchased chocolate	Other Food Processing
77	Frozen fruits, juices and vegetables manufacturing	Other Food Processing
78	Frozen specialties manufacturing	Other Food Processing
81	Dehydrated food products manufacturing	Other Food Processing
87	Frozen cakes and other pastries manufacturing	Other Food Processing
93	Bread and bakery product, except frozen, manufacturing	Other Food Processing
94	Cookie and cracker manufacturing	Other Food Processing
95	Dry pasta, mixes, and dough manufacturing	Other Food Processing
96	Tortilla manufacturing	Other Food Processing
97	Roasted nuts and peanut butter manufacturing	Other Food Processing
98	Other snack food manufacturing	Other Food Processing
99	Coffee and tea manufacturing	Other Food Processing
100	Flavoring syrup and concentrate manufacturing	Other Food Processing
101	Mayonnaise, dressing, and sauce manufacturing	Other Food Processing
102	Spice and extract manufacturing	Other Food Processing
103	All other food manufacturing	Other Food Processing
104	Bottled and canned soft drinks & water	Other Food Processing
105	Manufactured ice	Other Food Processing
106	Breweries	Other Food Processing
107	Wineries	Other Food Processing
108	Distilleries	Other Food Processing
109	Tobacco product manufacturing	Other Food Processing
65	Flour milling	Primary Food Processing- Crops
66	Rice milling	Primary Food Processing- Crops
67	Malt manufacturing	Primary Food Processing- Crops
68	Wet corn milling	Primary Food Processing- Crops
69	Soybean and other oilseed processing	Primary Food Processing- Crops
72	Beet sugar manufacturing	Primary Food Processing- Crops
73	Sugar cane mills and refining	Primary Food Processing- Crops
79	Canned fruits and vegetables manufacturing	Primary Food Processing- Crops
80	Canned specialties	Primary Food Processing- Crops
82	Cheese manufacturing	Primary Food Processing- Dairy
83	Dry, condensed, and evaporated dairy product manufacturing	Primary Food Processing- Dairy
84	Fluid milk manufacturing	Primary Food Processing- Dairy
85	Creamery butter manufacturing	Primary Food Processing- Dairy
86	Ice cream and frozen dessert manufacturing	Primary Food Processing- Dairy
88	Poultry processing	Primary Food Processing- Meat
89	Animal, except poultry, slaughtering	Primary Food Processing- Meat
90	Meat processed from carcasses	Primary Food Processing- Meat
91	Rendering and meat byproduct processing	Primary Food Processing- Meat
92	Seafood product preparation and packaging	Primary Food Processing- Meat

9 Appendix B, Detailed County Level Results

9.1 Value Added

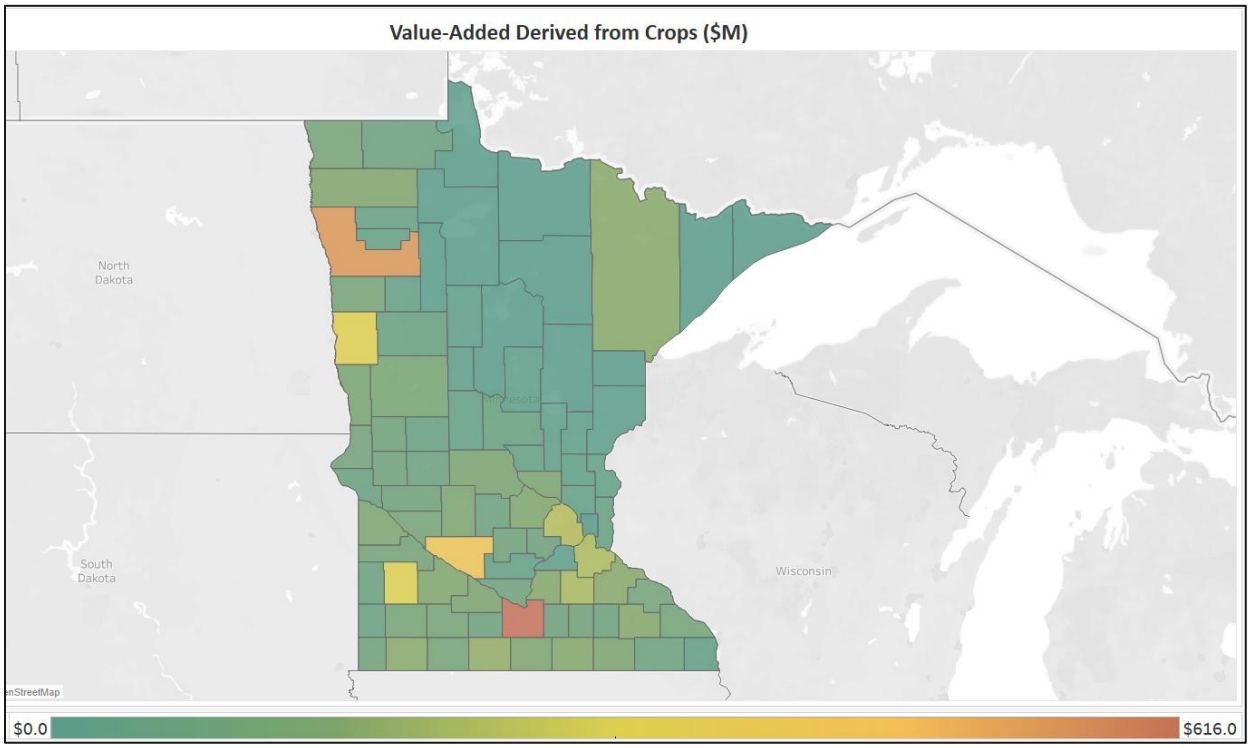

Figure 33, Value Added Derived from Crops (by County) ($M)

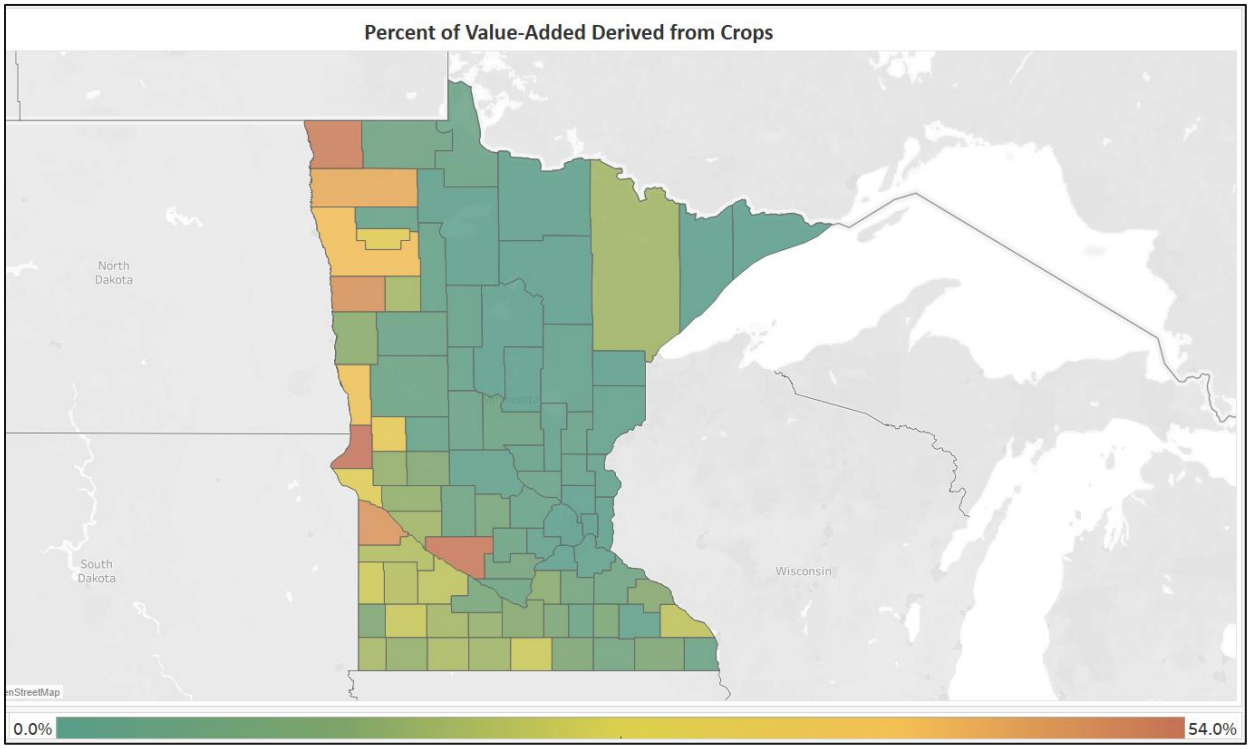

Figure 34, Percent of Value Added Derived from Crops (by County)

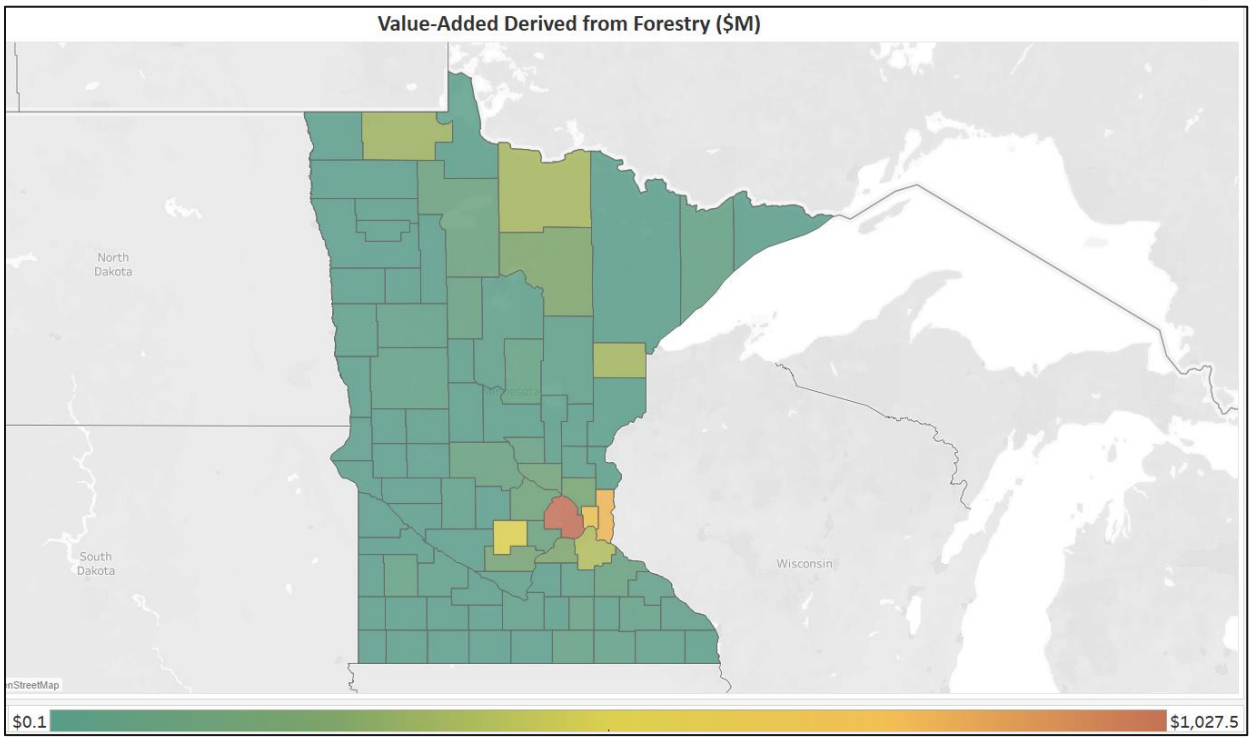

Figure 35, Value Added Derived from Forestry, (by County) ($M)

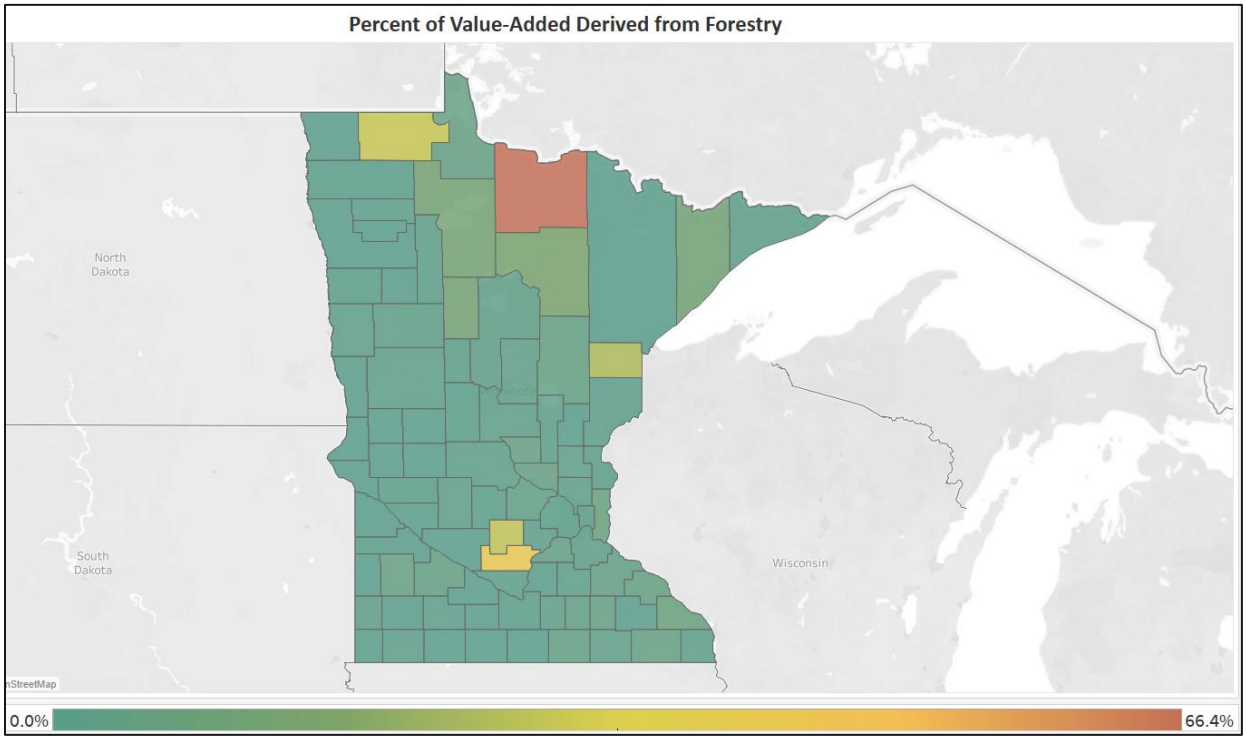

Figure 36, Percent of Value Added Derived from Forestry (by County)

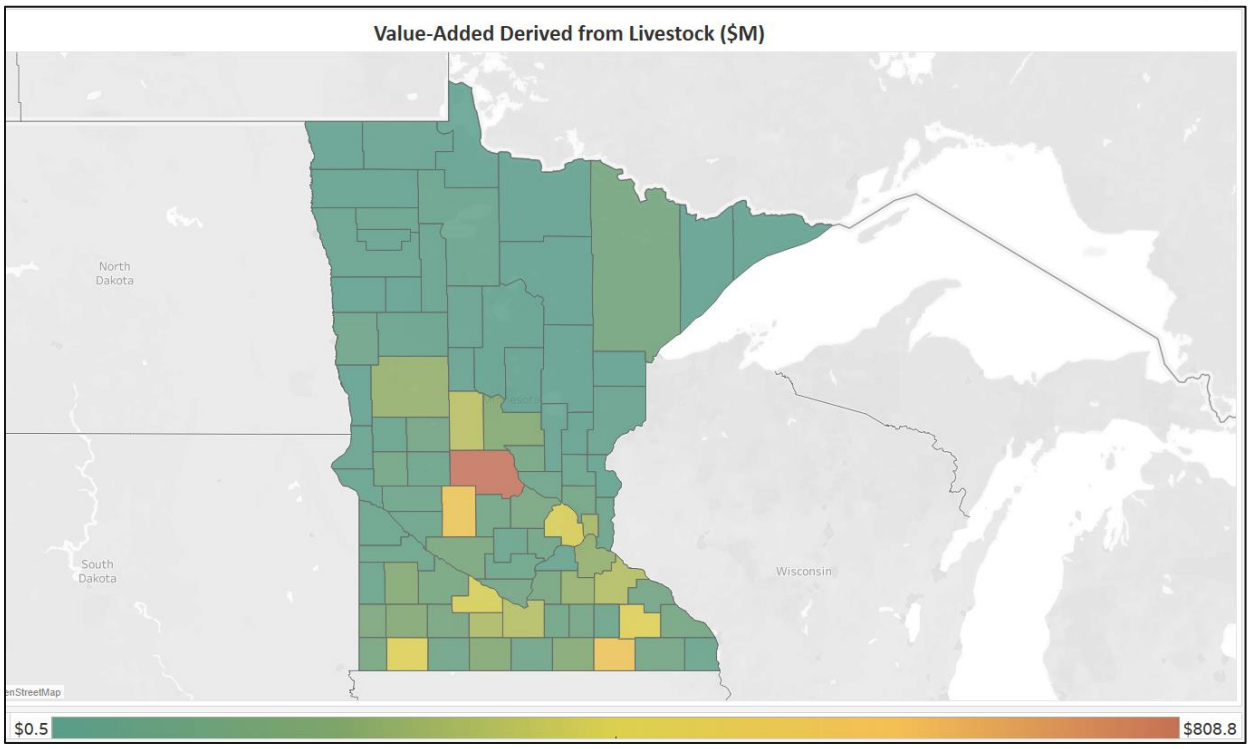

Figure 37, Value Added Derived from Livestock, (by County) ($M)

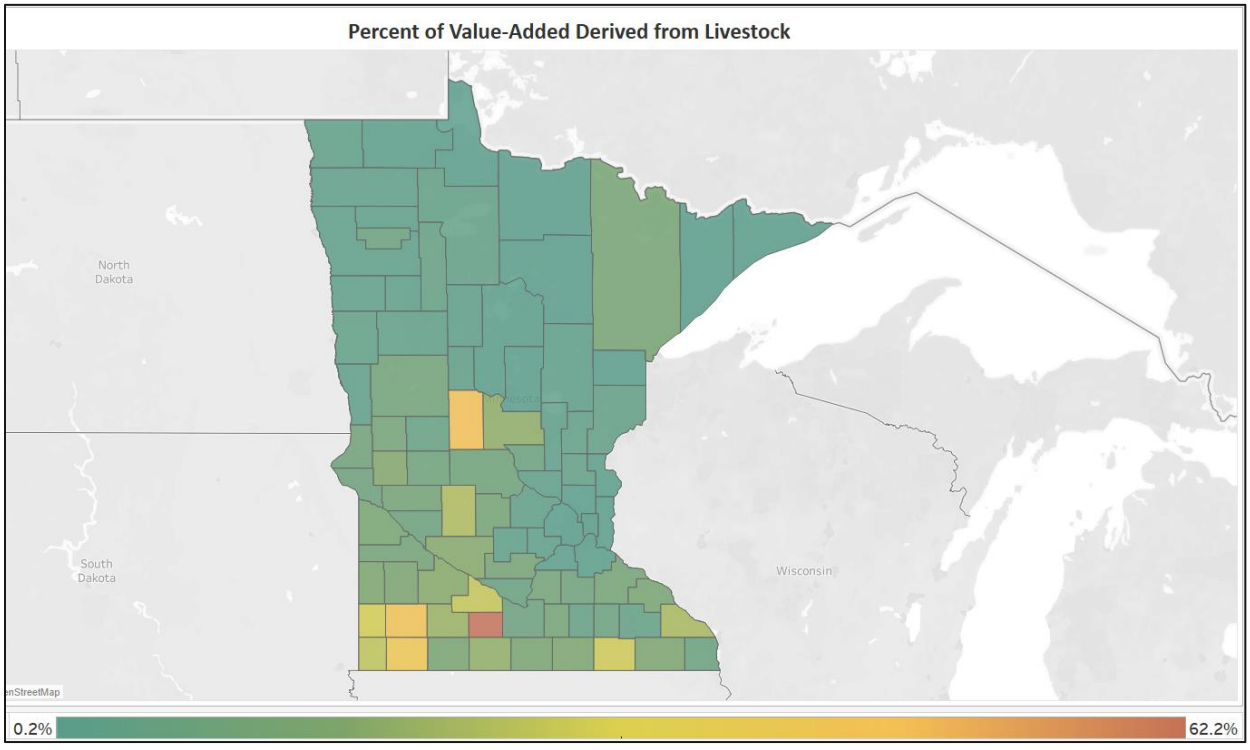

Figure 38, Percent of Value Added Derived from Livestock, (by County)

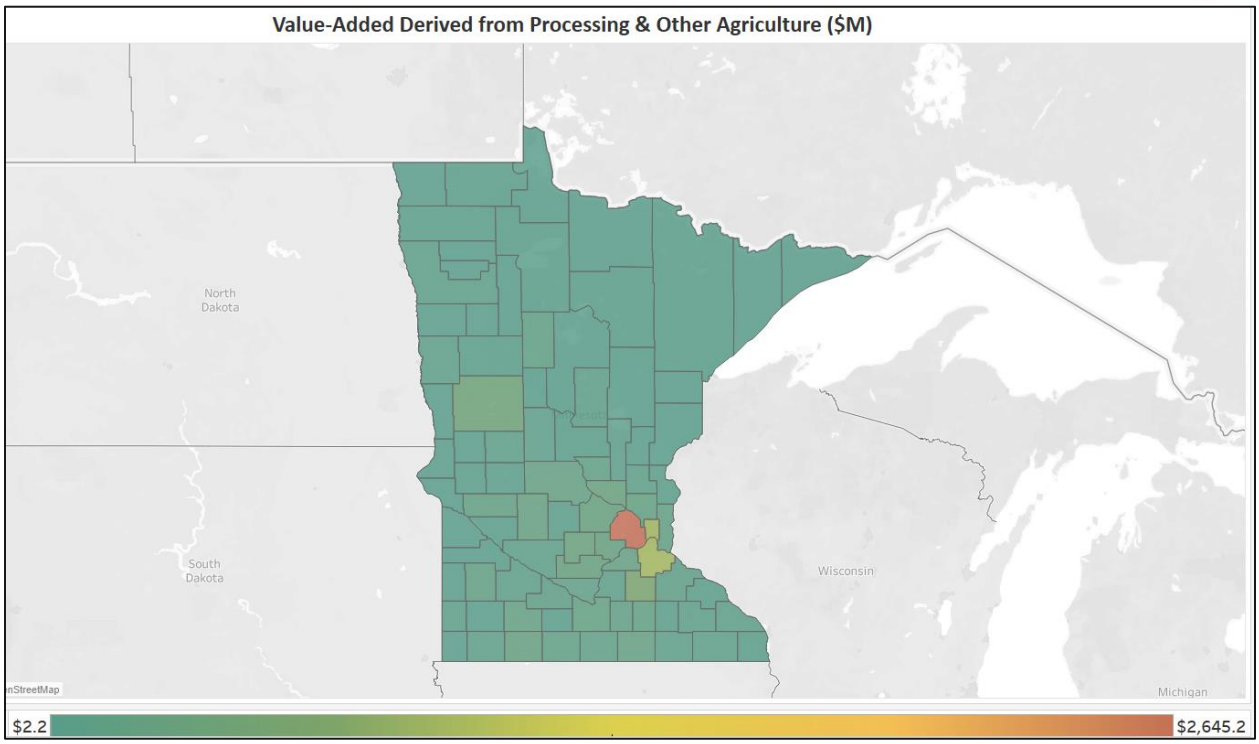

Figure 39, Value Added Derived from Processing & Other Agriculture, (by County) ($M)

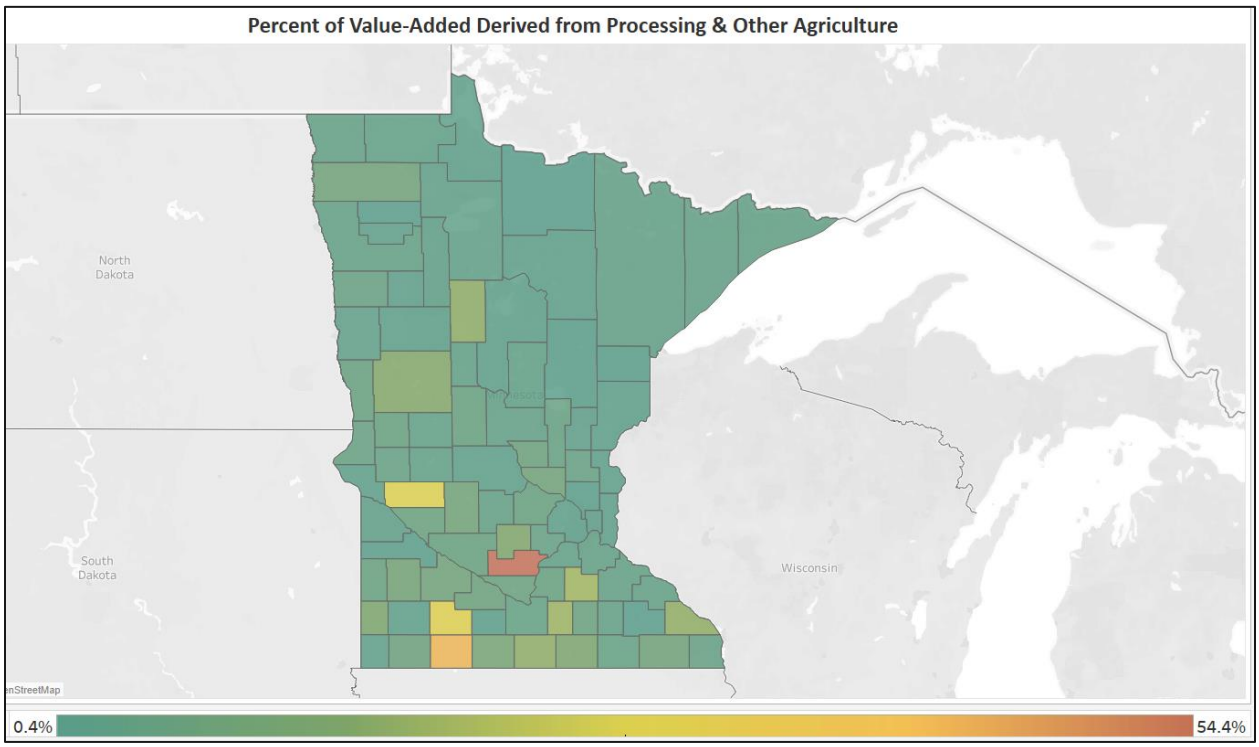

Figure 40, Percent of Value Added Derived from Processing & Other Agriculture, (by County)

9.2 Jobs

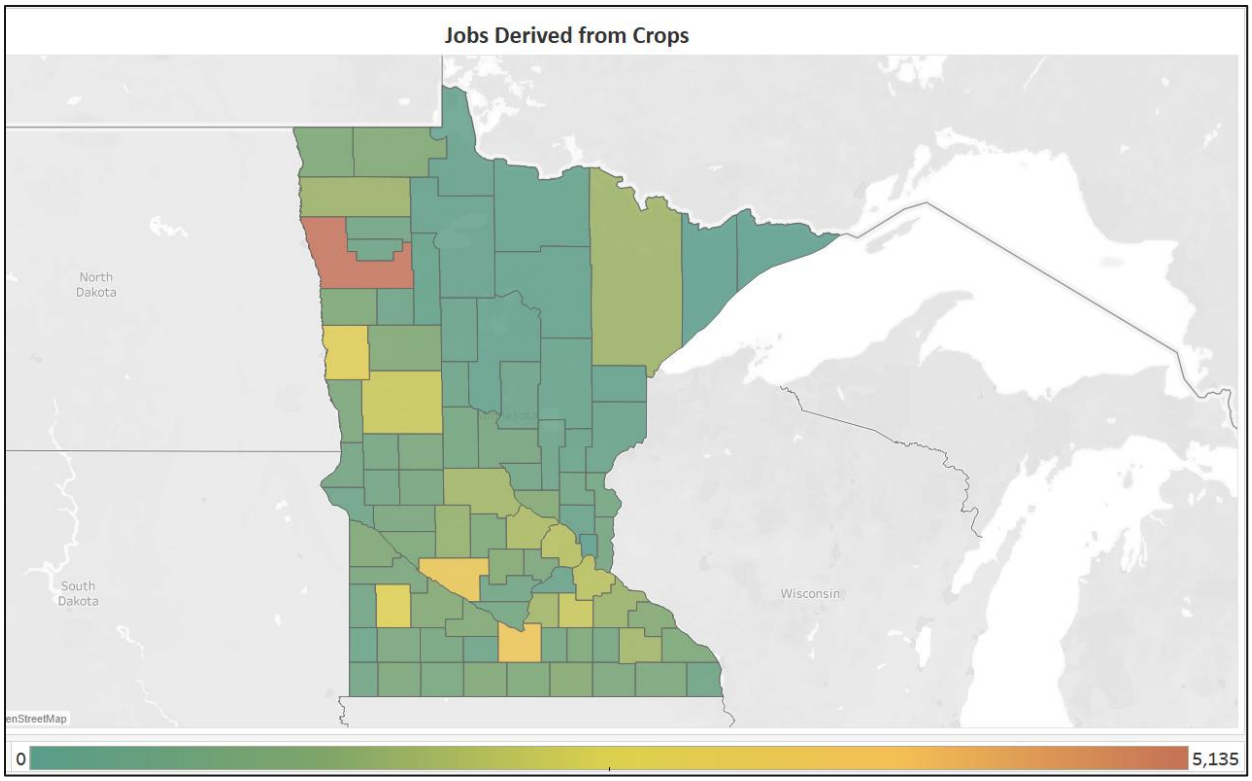

Figure 41, Jobs Derived from Crops, (by County)

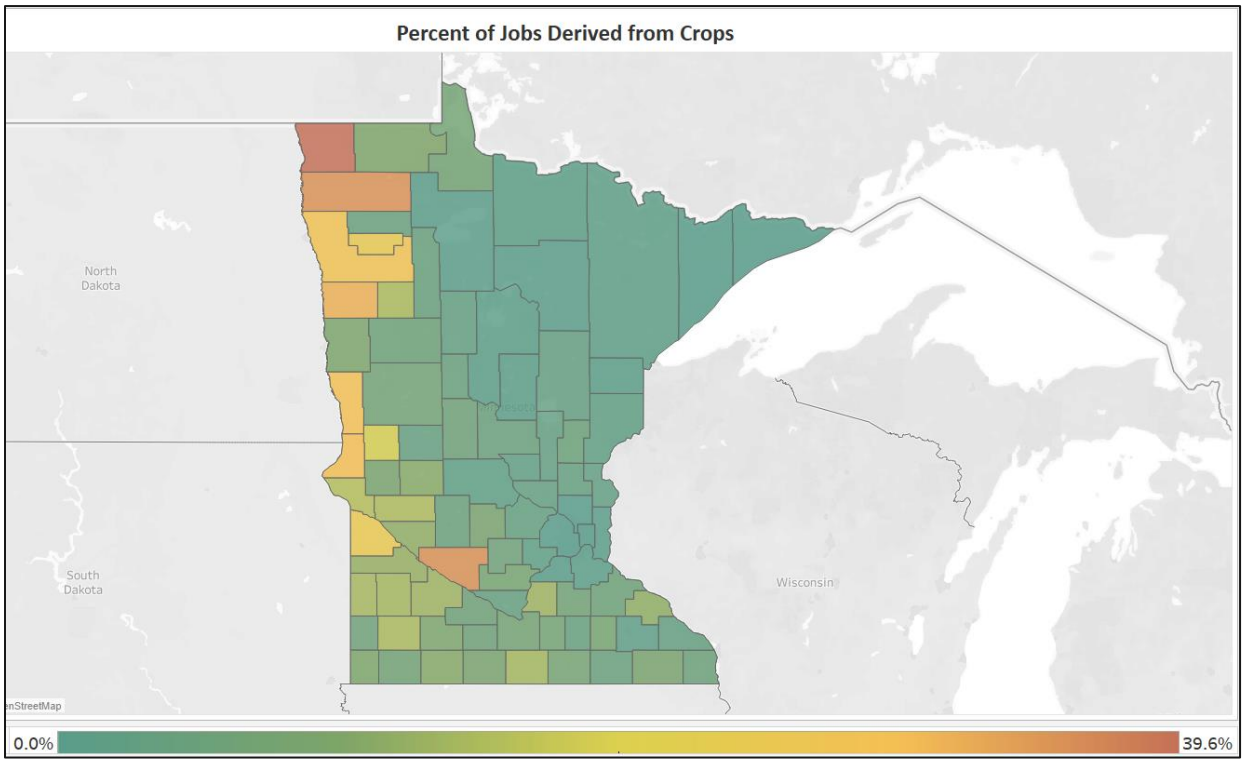

Figure 42, Percent of Jobs Derived from Crops, (by County)

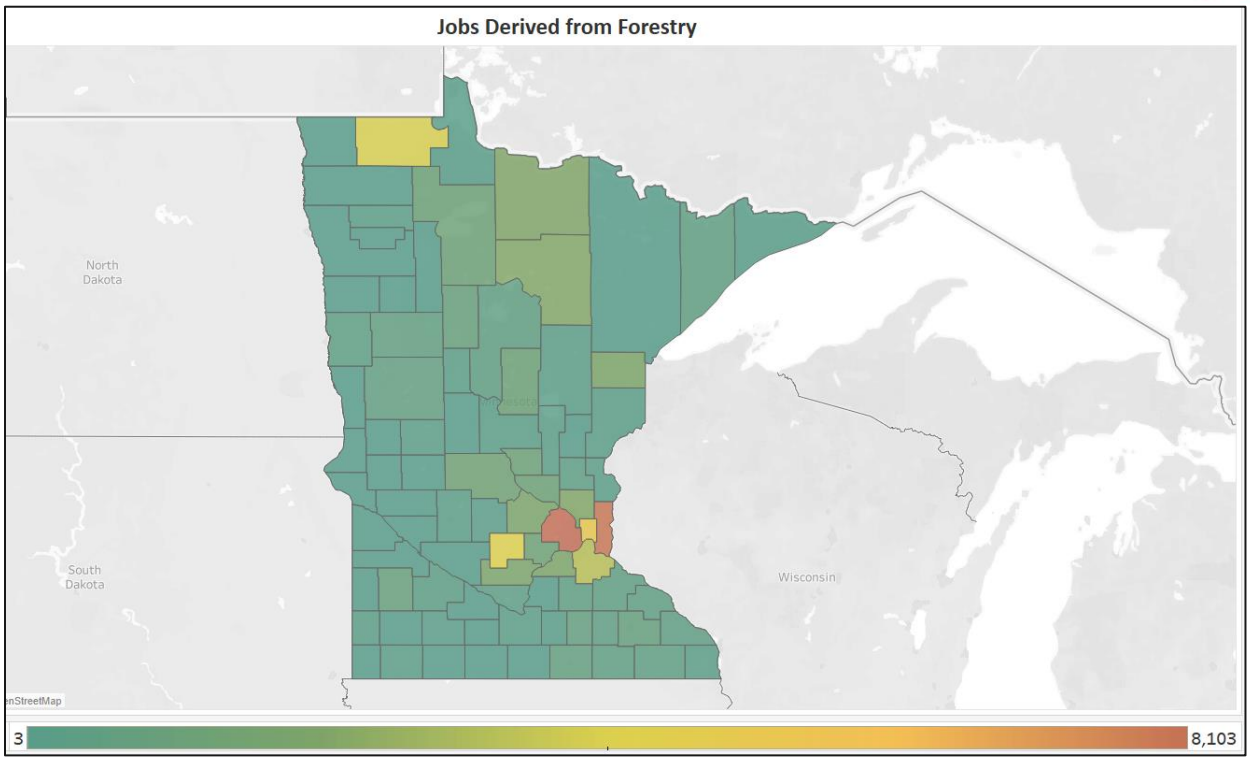

Figure 43, Jobs Derived from Forestry, (by County)

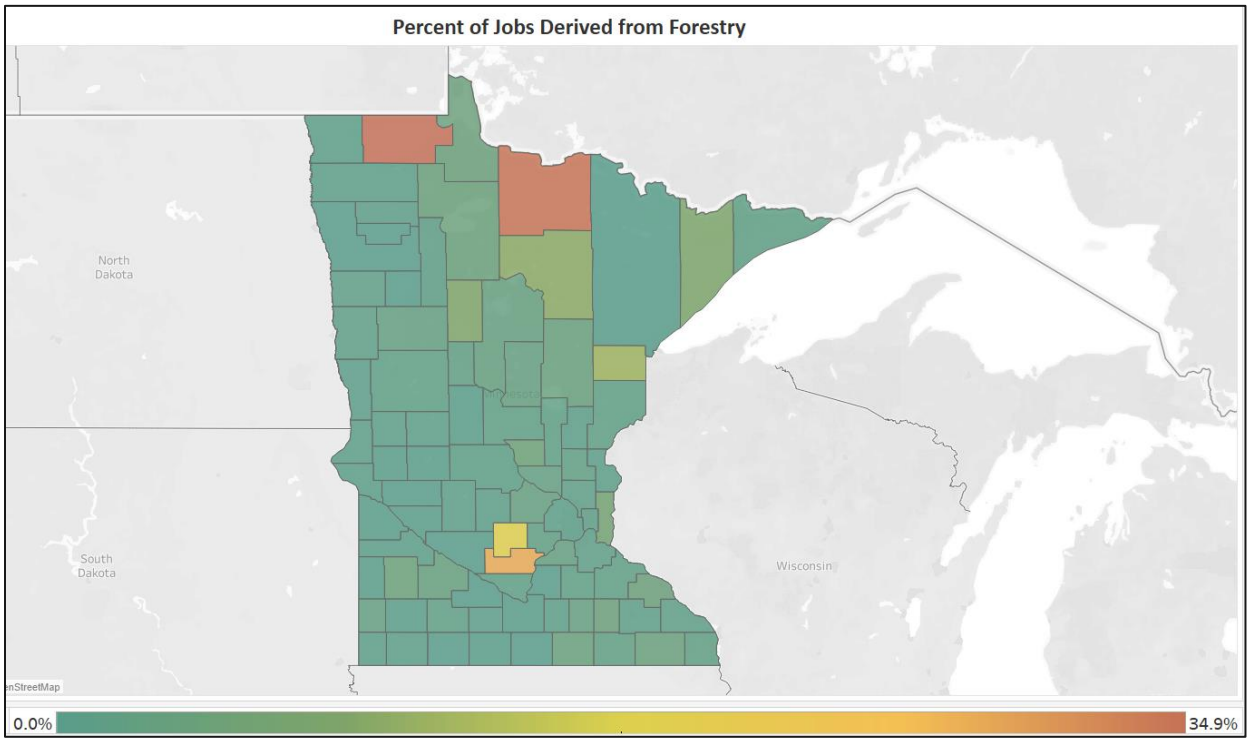

Figure 44, Percent of Jobs Derived from Forestry, (by County)

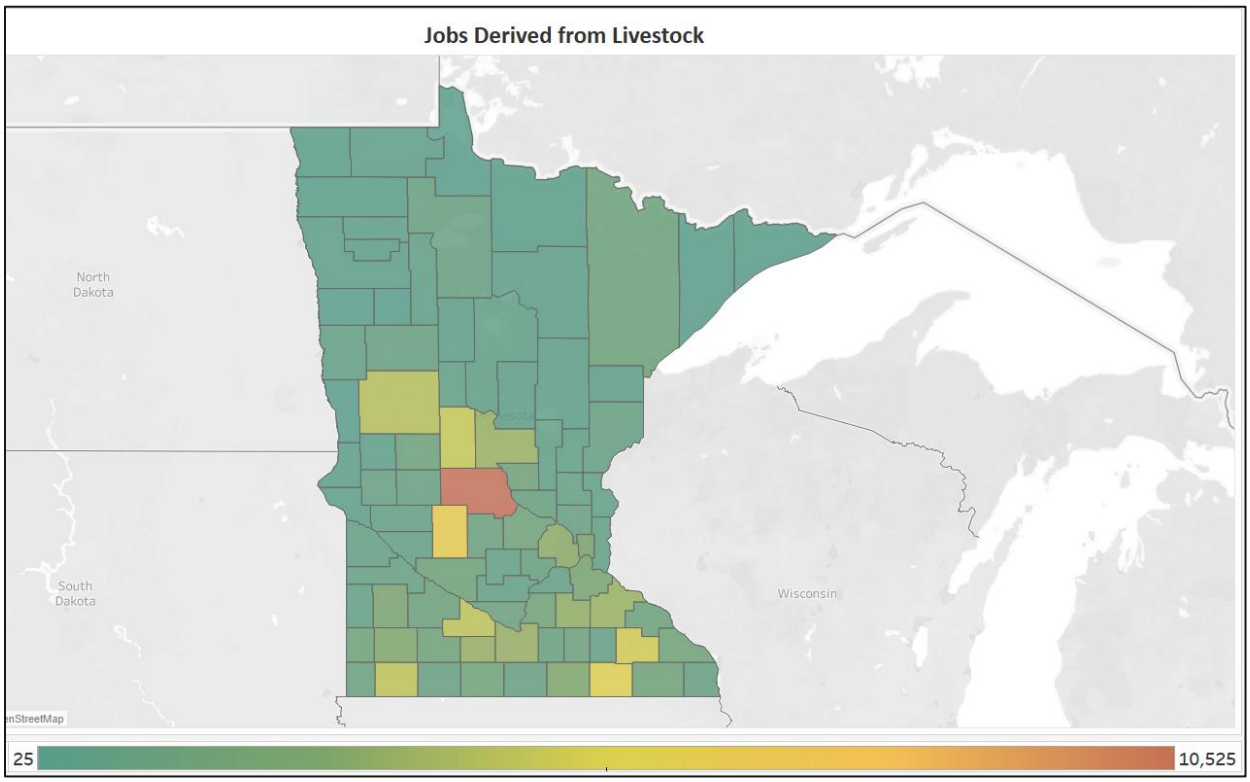

Figure 45, Jobs Derived from Livestock, (by County)

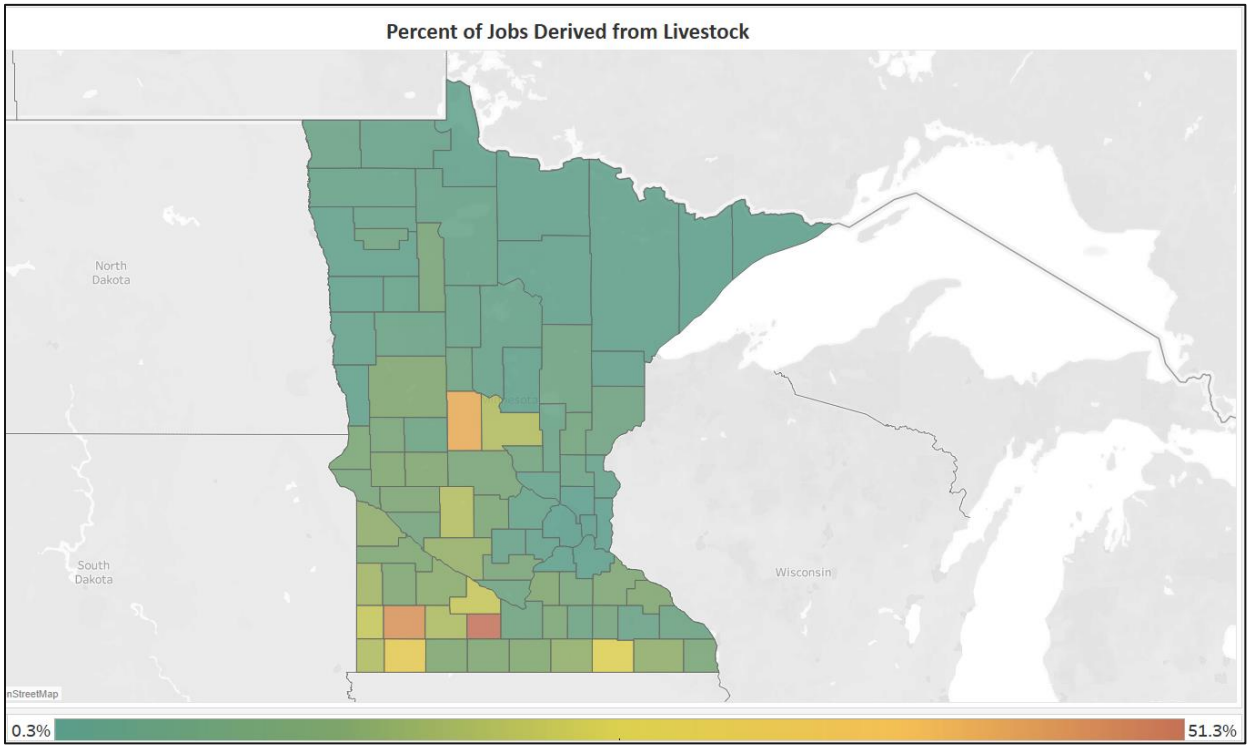

Figure 46, Percent of Jobs Derived from Livestock, (by County)

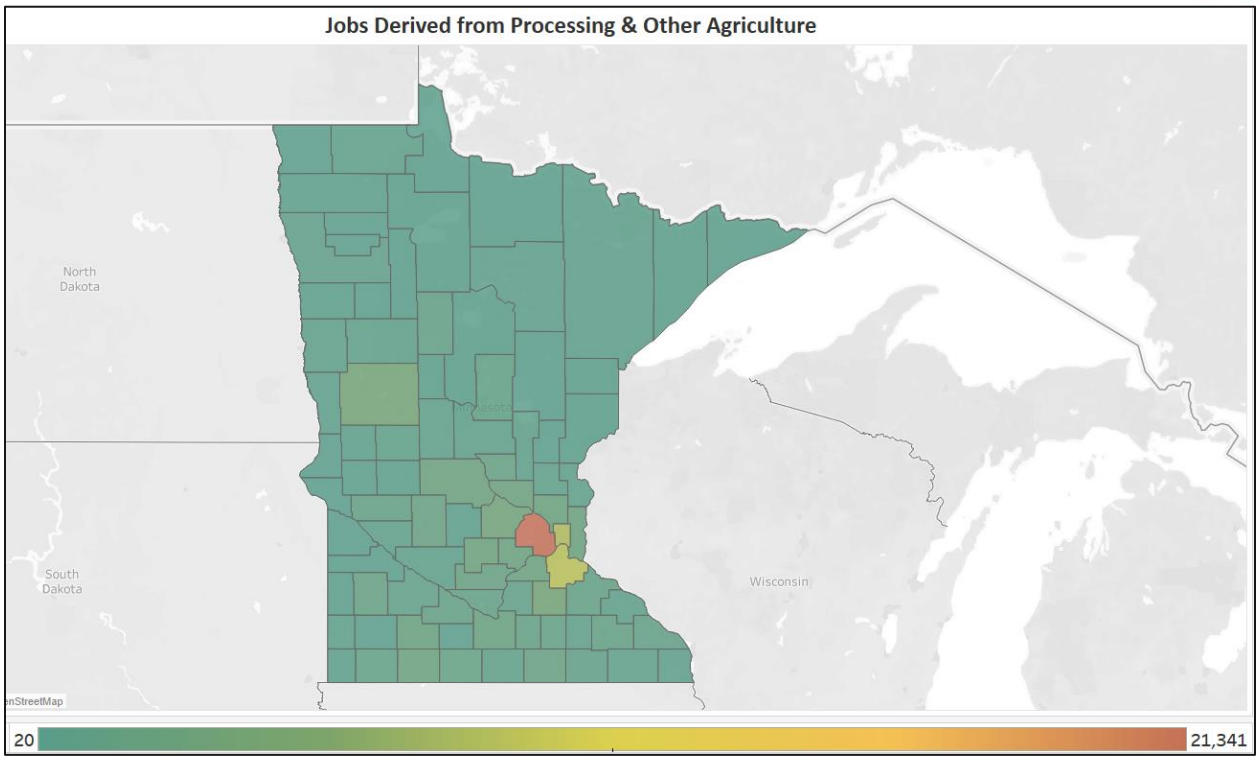

Figure 47, Jobs Derived from Processing & Other Agriculture, (by County)

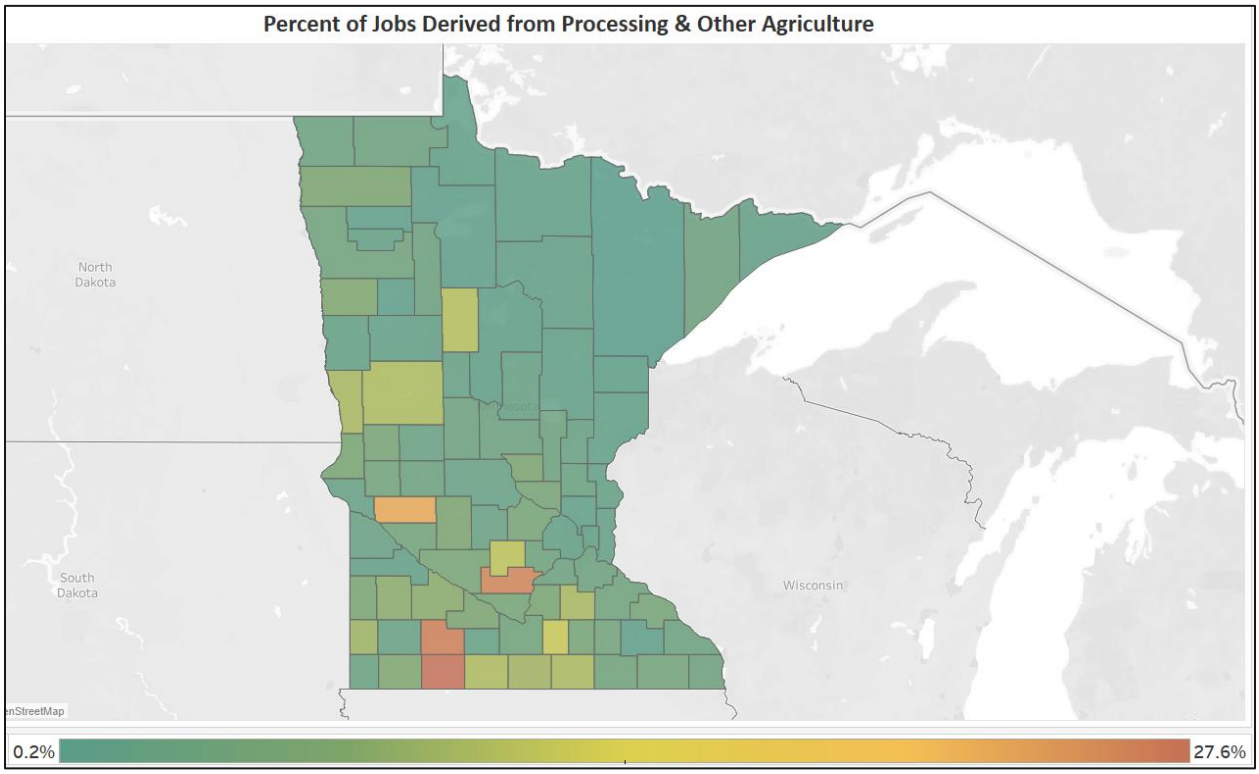

Figure 48, Percent of Jobs Derived from Processing & Other Agriculture, (by County)