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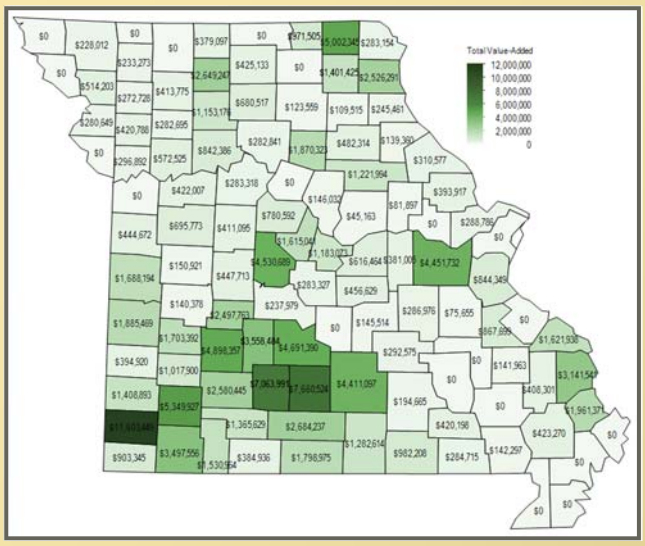


Missouri Dairy Industry Revitalization Study

Section 2: Economic Contribution

UNIVERSITY OF MISSOURI
Extension
Commercial Agriculture Program

Missouri Dairy Industry Revitalization Study – *Section 2: Economic Contribution*

The following authors contributed to this section:

Joe Horner	Agricultural Economist, Commercial Ag Program, MU Extension
Ryan Milhollin	Agricultural Economist, Commercial Ag Program, MU Extension
Alice Roach	Agribusiness and Agrimarketing Consultant

Other publications from this study include:

Executive Summary
A comprehensive overview of the overall Missouri Dairy Industry Revitalization study.

Section 1: Historical Perspective
Section 1 provides an in-depth discussion about Missouri's dairy industry historical trends concerning its dairy cow inventory, farms, production, prices, production economics and processing industry.

Section 3: Needs Assessment
A survey was conducted in fall 2014 to Missouri Grade A dairy farms and industry stakeholders. This survey was intended to gather their perspectives on producers' needs and characteristics of Missouri dairy farms. Section 3 provides a summary of all survey responses received.

Section 4: Value Chain, Marketing and Processing
Section 4 provides a discussion about dairy product demand and current opportunities to enhance the farmer's position in the value chain. Further processing opportunities and dairy niche marketing are discussed in this section.

Section 5: Comparative Analysis to Identify Gaps
What is the competiveness of Missouri's dairy industry versus other U.S. states? Section 5 seeks to create a common understanding of the Missouri dairy industry's competitive position, benchmark Missouri's dairy industry and environment against other states and look at ways that other states have attempted to revitalize their dairy industries.

Complete copies of all publications can be found at http://dairy.missouri.edu/revitalization/.

For further information about this report, please contact:
Joe Horner - (573) 882-9339 (phone) or HornerJ@missouri.edu (email)

Missouri Dairy Industry Revitalization Study – Section 2: Economic Contribution

Table of Contents

1. Overview and Methodology

Missouri dairy farm production and dairy product manufacturing both provide significant economic impacts to Missouri. The focus of this report section is to analyze the economic contributions of both industries and provide economic metrics that can be used to discuss the value that these industries provide to their various stakeholders or other interested parties.

Estimations were prepared based on the use of the IMPLAN economic impact software system. IMPLAN is an input-output model and includes economic data sets, multipliers and demographic statistics for the entire U.S. economic infrastructure. It is a robust tool that assesses the effects of changes in the economy by sector, and it is widely used by economists and analysts. Estimations in this report used the 2013 IMPLAN data set for Missouri and its counties.

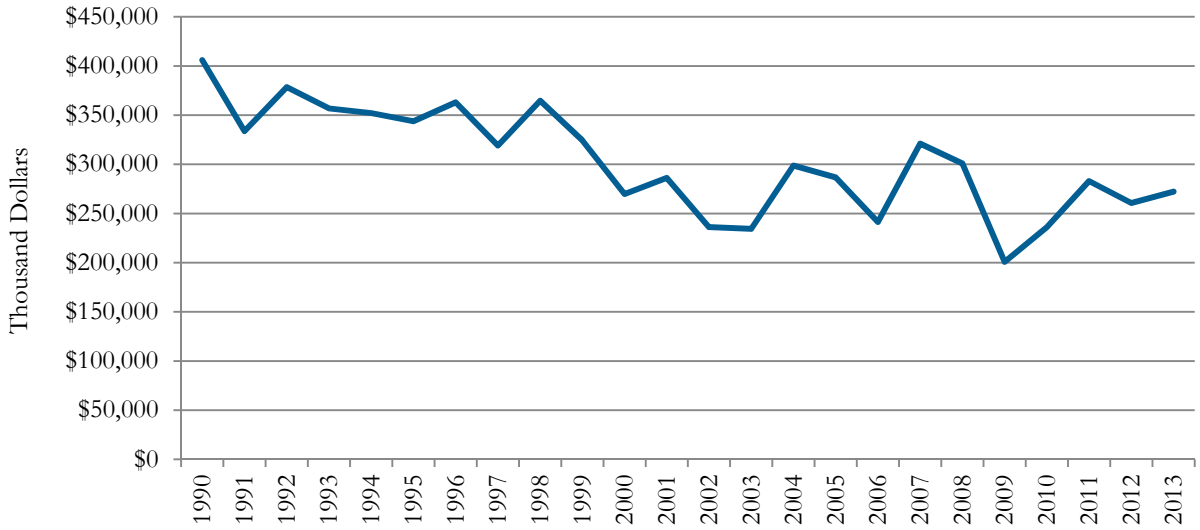
The IMPLAN impacts can be separated into three economic effects: direct, indirect and induced. A **direct** effect can be defined as a direct change in an area that occurs as a result of a change in an industry. For example, estimated sales revenue from dairy farms or dairy product manufacturing plants is a direct economic effect. Farms or plants create an **indirect** effect when they purchase goods or services from other industries (milk, transportation, utilities, repairs, etc.). **Induced** effects are changes in household spending that stem from income generated by direct and indirect effects. For instance, employees at dairy farms or processing facilities will spend their income to buy real estate, shop at grocery stores or spend on other goods or services in the local economy.

Economic impacts from IMPLAN are categorized by various indicators such as output, jobs and value-added. **Value-added** refers to the difference between the industry output (value of production) and the cost of the inputs used in its production. It can also be interpreted as the net gain or contribution to the state's gross domestic product. Salaries, wages, taxes and profit would be included in this value-added classification. Another economic indicator is the number of **jobs**, which can be either full-time or part-time, supported by the industry. **Output** reflects the total value of industry production or sales.

2. Missouri Dairy Farms – Economic Contribution

The dairy farming industry is an important contributor to Missouri's economy. During 2013, the state's dairy farms generated $272.2 million in cash receipts for milk. Of all Missouri livestock cash receipts collected in 2013, milk cash receipts represented 6.4 percent of the total. Missouri milk cash receipts have declined over time as dairy cows and farms maintained in the state have decreased. Exhibit 2.1 charts Missouri milk cash receipts from 1990 to 2013. These milk cash receipts generate economic activity throughout Missouri. However, note that Missouri milk cash receipts decreased 32.9 percent between 1990 and 2013.

Exhibit 2.1 – Missouri Milk Cash Receipts, 1990 to 2013



Source: USDA, Economic Research Service

For each county, economic contributions from Missouri dairy farms were estimated using 2013 IMPLAN county-level data. This information would include direct, indirect and induced economic effects from the operation of Missouri dairy farms. The Missouri dairy farming industry supported a total of 3,680 jobs in 2013 as shown in Exhibit 2.2. Exhibit 2.3 displays the value-added impact from these farms; the value-added impact measures an industry's contribution to Missouri's gross domestic product. In 2013, dairy farms added $131 million to Missouri's gross domestic product. Output or sales values from these operations by county are reported in Exhibit 2.4.

Exhibit 2.2 – Missouri Dairy Farm Economic Contribution, Jobs by County, 2013

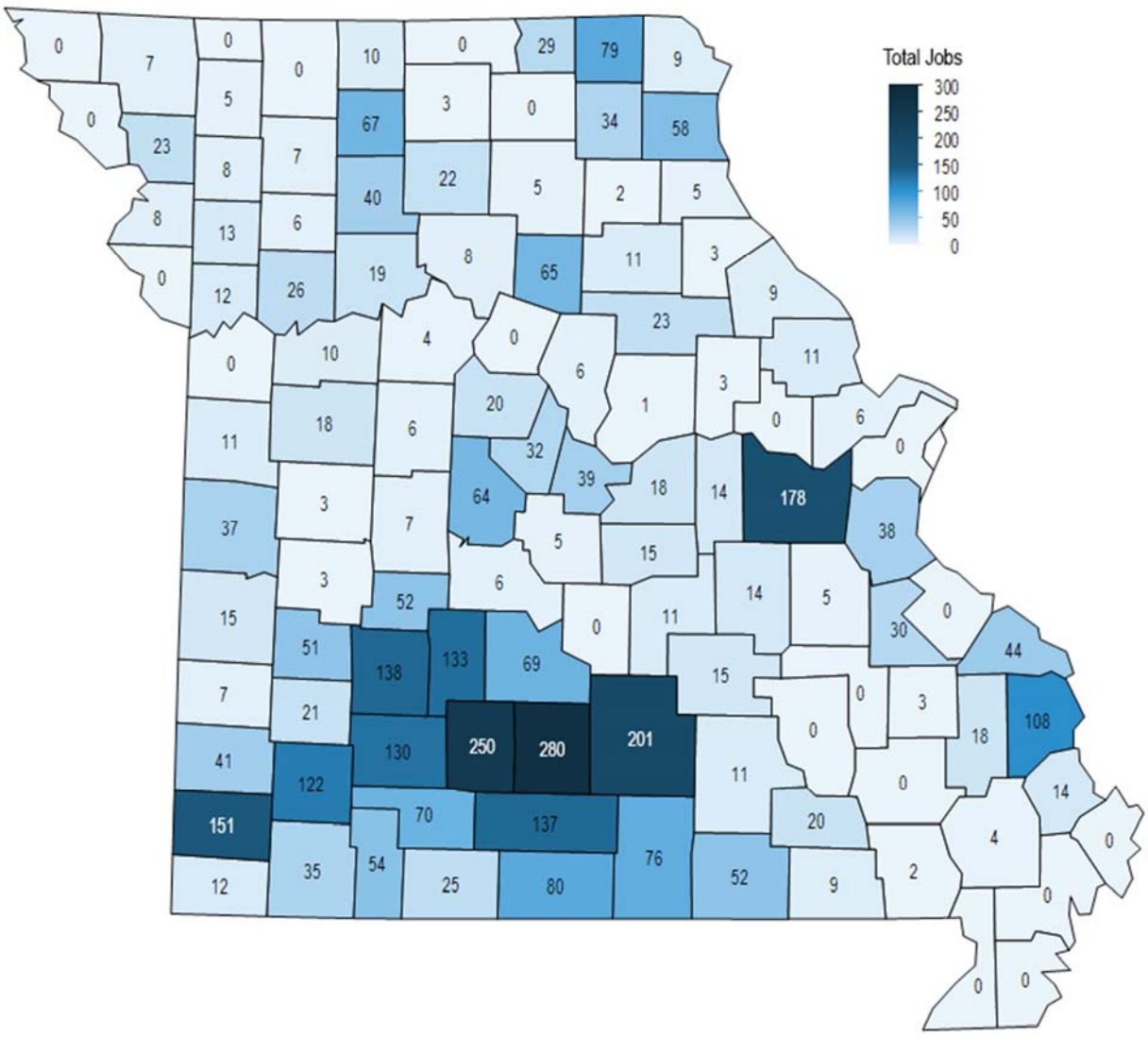


Exhibit 2.3 – Missouri Dairy Farm Economic Contribution, Value-Added by County, 2013

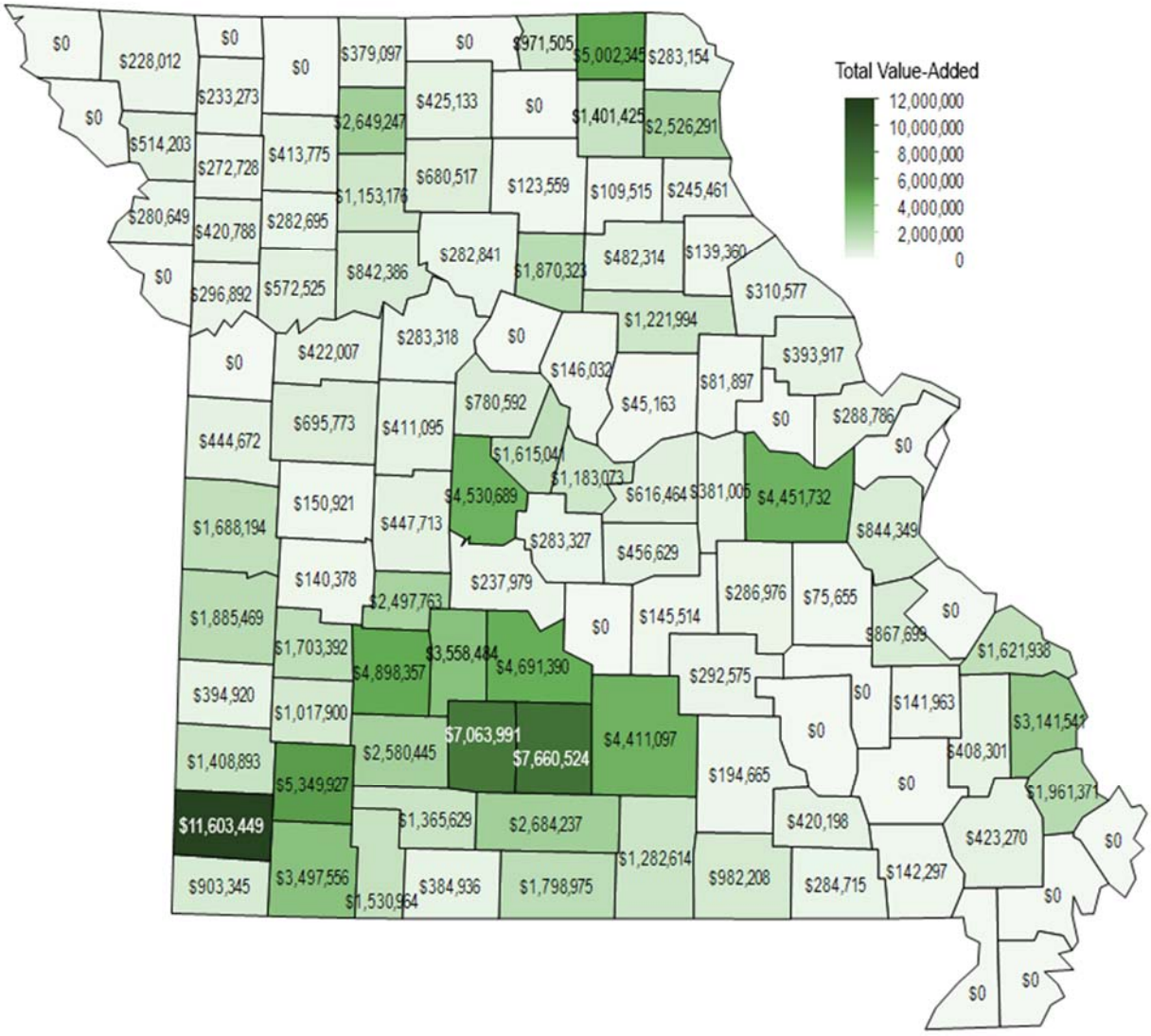


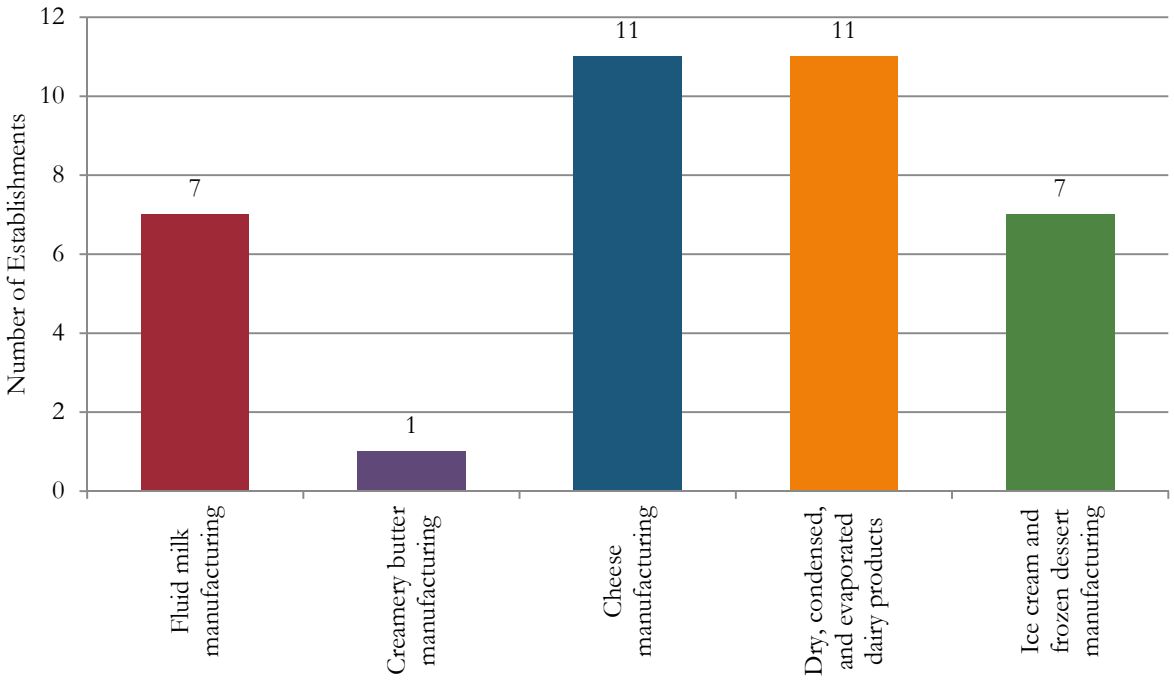
Exhibit 2.4 – Missouri Dairy Farm Economic Contribution, Output by County, 2013

County	Total Output		County	Total Output		County	Total Output
Adair	$0		Greene	$5,212,405		Ozark	$3,877,444
Andrew	$1,087,415		Grundy	$5,567,034		Pemiscot	$0
Atchison	$0		Harrison	$0		Perry	$3,508,263
Audrain	$2,633,163		Henry	$316,788		Pettis	$861,619
Barry	$7,293,996		Hickory	$5,307,890		Phelps	$298,265
Barton	$839,152		Holt	$0		Pike	$652,674
Bates	$3,579,179		Howard	$0		Platte	$0
Benton	$943,625		Howell	$2,654,507		Polk	$10,209,123
Bollinger	$894,795		Iron	$0		Pulaski	$0
Boone	$298,265		Jackson	$0		Putnam	$0
Buchanan	$596,530		Jasper	$2,867,946		Ralls	$298,265
Butler	$298,265		Jefferson	$1,732,226		Randolph	$3,877,444
Caldwell	$596,530		Johnson	$1,465,989		Ray	$1,193,060
Callaway	$94,362		Knox	$2,991,516		Reynolds	$0
Camden	$480,799		Laclede	$9,833,920		Ripley	$596,530
Cape Girardeau	$6,405,416		Lafayette	$894,795		St. Charles	$596,530
Carroll	$1,789,590		Lawrence	$11,348,212		St. Clair	$298,265
Carter	$894,795		Lewis	$5,368,769		Ste Genevieve	$0
Cass	$921,158		Lincoln	$826,795		St. Francois	$1,789,590
Cedar	$3,579,179		Linn	$1,421,054		St. Louis	$0
Chariton	$596,530		Livingston	$2,386,120		Saline	$596,530
Christian	$2,874,686		Macon	$1,880,510		Schuyler	$2,087,855
Clark	$596,530		Madison	$260,620		Scotland	$10,595,559
Clay	$596,530		Maries	$298,265		Scott	$4,075,561
Clinton	$894,795		Marion	$980,696		Shannon	$413,398
Cole	$2,438,821		McDonald	$508,883		Shelby	$229,166
Cooper	$1,637,863		Mercer	$775,120		Stoddard	$894,795
Crawford	$596,530		Miller	$596,530		Stone	$3,230,792
Dade	$2,162,474		Mississippi	$0		Sullivan	$894,795
Dallas	$7,417,566		Moniteau	$3,407,160		Taney	$780,737
Daviess	$870,606		Monroe	$1,022,260		Texas	$9,220,563
DeKalb	$596,530		Montgomery	$172,998		Vernon	$3,877,444
Dent	$596,530		Morgan	$9,471,073		Warren	$0
Douglas	$5,626,925		New Madrid	$0		Washington	$160,641
Dunklin	$0		Newton	$24,643,214		Wayne	$0
Franklin	$9,240,784		Nodaway	$479,676		Webster	$14,911,520
Gasconade	$798,711		Oregon	$2,087,855		Worth	$0
Gentry	$483,046		Osage	$1,451,385		Wright	$16,934,696

3. Missouri Dairy Product Manufacturing Industry – Economic Contribution

Dairy product manufacturing also provides valuable economic contributions to Missouri. The state's dairy product manufacturing industry processes dairy products from raw milk, processed milk and dairy substitutes. This industry can be divided into subsectors: fluid milk; creamery butter; cheese; dry, condensed and evaporated dairy; and ice cream and frozen desserts. Exhibit 3.1 shows the breakdown of dairy product manufacturing establishments in Missouri by industry sector.

Exhibit 3.1 – Missouri Dairy Product Manufacturing Establishments by Sector, 2013



Note: Dairy manufacturing plants may be engaged in multiple sectors.
Source: U.S. Bureau of Labor Statistics

The U.S. Bureau of Labor Statistics reports industry data on establishments, employment and wages for the dairy manufacturing sector. Exhibit 3.2 provides information concerning Missouri's dairy product manufacturing industry during 2013. Total wages paid to Missouri dairy manufacturing employees totaled $275 million. Overall, the dairy product manufacturing industry directly employed 5,354 people, and annual wages per employee averaged $51,340.

Exhibit 3.2 – Missouri Dairy Product Manufacturing, 2013

Metric	Dairy Product Manufacturing *(including ice cream and frozen desserts)*
Establishments	36
Employees (#)	5,354
Total wages (dollars)	$274,892,000
Average annual pay (dollars)	$51,340

Source: U.S. Bureau of Labor Statistics

Missouri's large milk bottling plants are owned by dairy farmers through their dairy cooperatives. The Prairie Farms cooperative runs these bottling plants directly or in joint ventures with the Dairy Farmers of America (DFA) cooperative. These same two cooperatives own other dairy processing plants that make soft products, specialty drinks and other custom dairy products. DairiConcepts, a national dairy ingredient company that's headquartered in Springfield and operates an El Dorado Springs plant, is also owned by dairy farmers via a joint venture between DFA and Fonterra cooperatives. Missouri's non-farmer-owned dairy product manufacturing facilities are owned by privately held companies and public corporations. Privately held companies include Schreiber Foods and Jasper Products. Public corporations include Kraft, Unilever, Smucker and DuPont.

Exhibit 3.3 details the 2013 economic contributions of Missouri dairy product manufacturers to the state. Missouri dairy manufacturing plants produced $5.1 billion in dairy product sales during 2013. After accounting for indirect and induced economic effects, dairy manufacturing plant estimated revenues in Missouri translate into total sales of $7.6 billion. Please note that an indirect effect would include the contribution from the Missouri dairy farms that supplied milk to these plants, so adding the previously reported economic contribution from the Missouri dairy farming industry would be considered double-counting some economic effects. The Missouri dairy product manufacturing industry supported a total 23,049 jobs when considering all economic effects. Total value-added impact or Missouri gross domestic product (GDP) contribution was nearly $2 billion in 2013.

Exhibit 3.3 – Economic Contributions of Missouri Dairy Manufacturing, 2013

Impact Type	Employment *(Jobs)*	Value-Added *(Dollars)*	Output *(Dollars)*
Direct effect	5,452	$656,581,450	$5,091,058,527
Indirect effect	11,496	$876,683,534	$1,715,051,609
Induced effect	6,101	$430,942,493	$754,675,618
Total effect	**23,049**	**$1,964,207,477**	**$7,560,785,754**

Note: May not sum due to rounding

A further breakdown of the leading industry sectors impacted economically by the Missouri dairy manufacturing industry can be seen in Exhibit 3.4. Please note that this information includes all direct, indirect and induced economic effects. Dairy cattle and milk production farms were the leading industry impacted based on total employment from dairy manufacturing. Cheese manufacturing and wholesale trade followed. In terms of total value-added impact, the sectors with the highest impact values were cheese manufacturing and wholesale trade, and with regard to total output, the sectors with the highest impact values were cheese manufacturing and dry, condensed and evaporated dairy product manufacturing.

Exhibit 3.4 – Top 10 Industries Affected by the Missouri Dairy Manufacturing Industry (Ranked Based on Total Employment), 2013

Industry Sector Description	Total Employment *(Jobs)*	Total Value-Added *(Dollars)*	Total Output *(Dollars)*
Dairy cattle and milk production	3,056	$105,702,637	$228,125,358
Cheese manufacturing	2,697	$318,528,368	$2,640,394,662
Wholesale trade	2,176	$294,791,967	$464,113,023
Truck transportation	1,523	$96,554,290	$228,209,850
Dry, condensed, and evaporated dairy product mfg.	1,159	$163,003,468	$1,608,134,842
Ice cream and frozen dessert manufacturing	1,028	$108,396,824	$397,981,749
Fluid milk manufacturing	559	$63,878,696	$429,318,394
Real estate	497	$51,237,042	$69,390,334
Full-service restaurants	428	$9,642,028	$19,802,494
Management of companies and enterprises	424	$56,384,046	$96,038,412

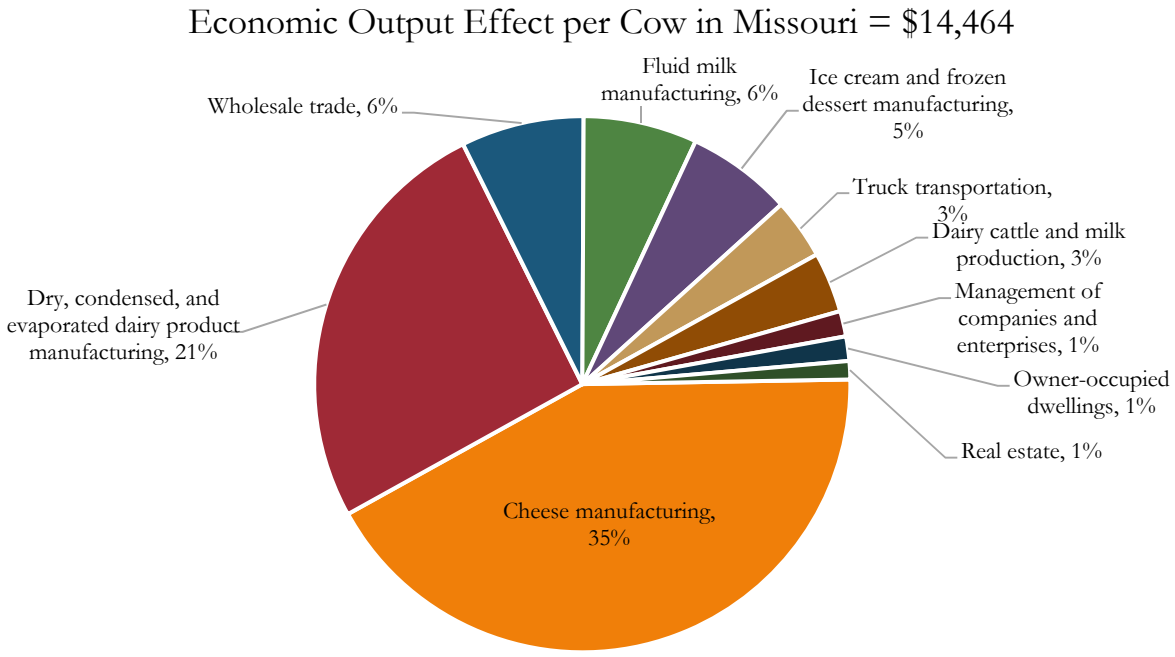
Other states have estimated the economic output effect of one dairy cow for their respective state. These studies typically calculate the total economic contribution from dairy farming and processing industries in a given state and simply divide that number by that given state's reported dairy cow inventory. Timms (2013) estimated that the economic output effect for Iowa dairy farming and processing industries was $23,445 per dairy cow. A study by Deller (2014) estimated the total economic impact for Wisconsin's dairy and dairy processing industry. That number was translated to approximately $34,000 per cow by the Wisconsin Milk Marketing Board. In states with a balanced processing and dairy farming industry, this simple economic impact/cow value is a reasonable metric in explaining the economic impact of a dairy cow. Missouri has a more unique situation, however, with its large processing industry and relatively small dairy cow inventory. A large amount of milk derivatives, cheese and other specialty dairy products are imported to Missouri from other states for further processing by existing Missouri dairy product manufacturers. Many of these manufacturers are located in Missouri due to the state's past legacy as a major dairy state. If Missouri followed the same methodology reported by other states for estimating economic impact per dairy cow, then the calculation would suggest that the economic output per Missouri dairy cow would have been $82,182 in 2013 ($7.5 billion in economic contribution from Missouri's dairy farm and dairy manufacturing industries divided by 92,000 dairy cow inventory reported by USDA-NASS).

An approach to adjust this number to more accurately estimate the economic impact per cow in Missouri is to multiply the state's economic output from dairy by the regional purchasing coefficient (RPC) factor. The RPC is the percentage of the total demand for a commodity that is supplied by

producers within a designated area. IMPLAN data report this factor by industry sector. Thus, in this case, the RPC for the dairy cattle and milk production industry sectors in Missouri can be used to derive the percentage of the value of the total dairy demand by product manufacturers being supplied by Missouri dairy farms. The three-year average (2011 to 2013) RPC for the Missouri dairy cattle and milk production industry in IMPLAN data is 17.6 percent. In other words, 17.6 percent of the total demand for milk and dairy ingredients from Missouri's dairy product manufacturers and other end-users is being met by the Missouri dairy farming industry. Adjusting the overall industry economic output by this RPC factor and then presenting it on a per-cow basis suggests that the economic output effect of one dairy cow in Missouri was $14,464 in 2013.

Exhibit 3.5 shows the top 10 industries economically impacted by Missouri dairy product manufacturing economic output and their percentage of the overall total output from direct, indirect and induced economic effects. Based on this graphic, cheese manufacturing and dry, condensed and evaporated dairy product manufacturing had the greatest annual impacts on average in 2013. This graphic demonstrates the industries impacted by each dairy cow. If Missouri increased its number of dairy farms and/or Missouri dairy producers increased their farms' milk production, then there would be further increases in the output effect from the dairy cattle and milk production industry sector. Additionally, these relationships would change if existing Missouri dairy product manufacturers were to cease operations.

Exhibit 3.5 – Top 10 Industries Affected by the Missouri Dairy Manufacturing Industry (Based on Total Output), 2013



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