Economic Impact Study of Agriculture-Related Industries

12-County Area in Southwest Missouri

Presented by:

SPRINGFIELD AREA CHAMBER OF COMMERCE
AGRIBUSINESS ROUNDTABLE

SPRINGFIELD
Area Chamber Of Commerce
Springfield, Missouri U.S.A.

Economic Impact of Springfield Economic Region's Agriculture-Related Industries

Final Report

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EXECUTIVE SUMMARY

This study analyzed the size and economic contribution of agriculture-related industries in the Springfield economic region. The Springfield economic region was identified exclusively for the purpose of this study through discussions with members of the Agribusiness Roundtable at the Springfield Chamber of Commerce. It includes twelve counties in the center of southwest Missouri. Following a modified definition of agriculture, as recommended by the United State Department of Agriculture (USDA), agriculture-related industries were grouped into four groups: 1) *Farm Group*: All farm crops, livestock, horticultural and landscaping services, Christmas trees, vineyards, private woodlots and commercial forestry, 2) *Agricultural Inputs and Services Group*: Within the region production of goods and services for the farm and processing sectors, 3) *Processing Group*: Food and tobacco products, wineries, cotton textiles, products made of wood and other forest resource, and 4) *Distribution Group*: Transportation and warehousing. Firms providing transportation and warehousing services to food and fiber industries. Food wholesaling and retailing, including the food service sector, were not included. To be consistent with the definition of agriculture and to avoid double-counting, change in the demand for final goods and services instead of output was used to measure the impact on output, employment, value added, and income.

The *Implan* input-output analysis software and associated databases for 2002 relating to the twelve counties were used to create a single regional model and to estimate the total economic impacts due to the change in final demand for agricultural goods and services in terms of output, value-added, income and employment. The estimated impacts for the region were allocated to individual counties based on their baseline shares in gross output. The output and value-added impacts in the year 2002 were expressed in 2004 dollars.

The economic contributions of the Springfield region's agriculture-related industries are summarized as follows:

- Gross output of Springfield's agriculture-related industries totaled $3.9 billion, including 1.2 billion in intermediate output and $2.7 billion in final demand for goods and services.
- Regionwide direct economic impacts due to the change in final demand for agricultural goods and services were $2.7 billion output, 14,581 jobs and $658 million in value-added, including $440 million in labor income.
- When the multiplier effects on interindustry purchases and employee household spending were considered, the total economic impacts were estimated at $5.2 billion output, 42,307 jobs, and $1.9 billion value-added, including $1.1 billion in labor income.
- Output and value-added impacts per capita were $9,094 and $3,301 respectively. The employment impact was 75 jobs per 1000 people in the region.
- Greene County's contributions were highest in terms of total output, value added, jobs, and labor income.

- The Springfield region's agriculture-related industries produced 12% of the total final demand for goods and services.
- Agriculture-related industries were more significant in Cedar, Barry, Dade and Lawrence Counties based on their shares in the total value of final demand for all goods and services.
- The largest industry group in terms of total output and total value-added was the processing group. Processing industries contributed 72% of the total output.
- Cheese manufacturing and poultry processing were the two largest processing sectors in Springfield region with $1.7 billion and $1.1 billion respectively in total output.

INTRODUCTION

The Springfield region includes twelve counties (Table 1) located in the center of Southwest Missouri (Figure 1). As one of the fastest growing regions in the state of Missouri, it is experiencing rapid urbanization and changing land use patterns. In 2002, the population of Springfield region was 567,000, constituting 10% of the population of the State of Missouri. The population of each of the twelve counties in the Springfield region is given in Table 1. Greene County is the most populated county with over 240,000, followed by Christian, 57,000, and Taney, 40,000. In 2002, there were more than 12,000 households in the region, representing 10% of the households in Missouri. The area of the Springfield region is 7,229 square miles, which is approximately 11% of the area in Missouri. Barry County is the largest in terms of area with 779 square miles, followed by Laclede with 766 square miles. Stone County is the smallest in terms of area. In 2002, the average per capita income in the state of Missouri was $28,512. In 2002, the average per capita income in the Springfield region fell short of state average at $21,657. In terms of per capita income, Greene County was most prosperous at $28,122, followed by Stone, Christian, and Taney counties. Webster County had the lowest per capita income at $18, 606.

Table 1: Population, households, area and per-capita income, 2002[1]

Counties	Population	Households	Area (sq. m.)	Per Capita Income ($)
Barry	34,175	16,425	779	21,282
Cedar	13,883	6,943	476	19,510
Christian	57,032	23,386	563	23,449
Dade	7,905	3,810	490	21,295
Dallas	15,822	7,100	542	21,244
Greene	241,638	10,8416	675	28,122
Laclede	32,872	14,822	766	20,932
Lawrence	35,617	15,062	613	19,373
Polk	27,345	11,544	637	19,085
Stone	28,853	16,637	463	23,680
Taney	40,099	20,832	632	23,309
Webster	32,082	12,458	593	18,606
Springfield Region	567,323	257,435	7,229	21,657
Missouri	5,669,544	2,503,323	68,818	28,512

Source: Census Bureau, Regional Economic Information System, MIG, Inc
[1]Counties to be included in the Springfield economic region were identified by the Agribusiness Roundtable of the Springfield Area Chamber of Commerce

In 2002, the market value of the agricultural products sold within the region was $654 million, more than 13% of the value for the state of Missouri (Table 2). There are over 16,000 farms in the Springfield region which accounts for 15% of the number of farms and 10% of land in farms in the state of Missouri. Traditionally, the agricultural industries have been an important part of the economy of the region. These industries include a set of interlinked agribusiness enterprises associated with farming, processing, inputs and services, and distribution activities. In terms of farming, the Springfield region is predominantly a livestock region. There are more than 10,000 beef cow farms (approximately 20% of number of beef cow farms in Missouri) with an inventory of 380,000 animals. Although the dairy industry has been in decline, the region holds more than 1,100 milk cow farms (approximately 30% of number of milk

cow farms in Missouri) with more than 55,000 milk cows. There are 234 broiler and other meat chicken farms constituting approximately 30% of meat chicken farms in Missouri.

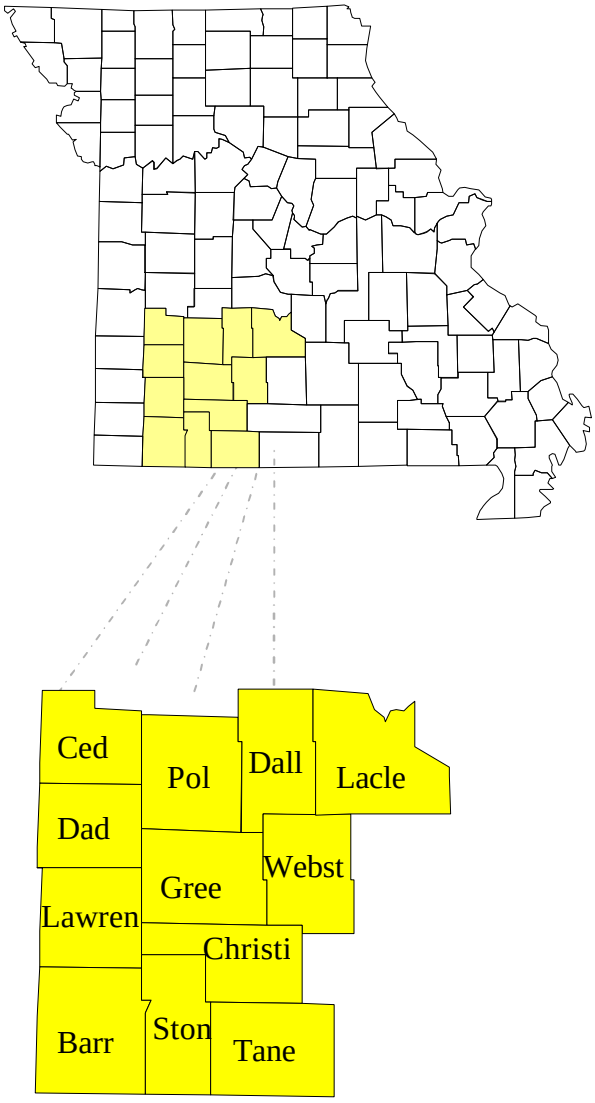

Figure 1: *Map of Southwest Missouri with Springfield Area Economic Region Highlighted*

Table 2: Number of Farms, Land in Farms, and Market Value of Agricultural Products

Counties	Number of Farms	Land in Farm (Acres)	Market Value of Agricultural Products Sold ($'000)
Barry	1,669	32,1319	201,339
Cedar	952	22,8063	23,576
Christian	1,294	21,3477	26,968
Dade	893	29,6167	41,098
Dallas	1,243	23,4739	36,670
Greene	2,122	27,4815	39,117
Laclede	1,394	31,8958	31,390
Lawrence	1,852	31,6410	109,894
Polk	1,768	36,9396	59,965
Stone	645	11,3801	12,379
Taney	512	15,4063	10,182
Webster	1,962	31,9883	61,745
Springfield Region	16,306	316,1091	654,323
Missouri	106,797	29, 946,035	4,983,255

Source: 2002 Census of Agriculture – County Data, USDA National Agricultural Statistics Service

Food processing sectors including meat product manufacturing, animal slaughtering and processing, poultry processing, cheese manufacturing, and bakery product manufacturing are important agriculture-related sectors in the Springfield region. According to the 1997 economic census, the Springfield metropolitan area alone had 35 food manufacturing establishments, generating nearly $1.8 billion in value of shipments and employing more than 4,000 people.

METHOD AND DATA

Defining Agriculture

In this study, the impacts of agriculture-related industries on the local economy are evaluated using a modified version of agriculture first defined by the Food and Fiber System (FFS) of the U.S. Department of Agriculture (USDA). The FFS definition

requires tracing the food and fiber products all the way to the final consumers. Hence, this definition of agriculture includes farms, inputs and services, and processing and distribution, including food wholesaling, retailing, and the food service sector. Studies have shown that the inclusion of sectors such as wholesale, retail, and food service sectors have demonstrated highly exaggerated results (Carter and Goldman, 1992; Holland, 1993). Also, FFS has been criticized for including wholesale, retail, and food service sectors because their presence is not necessarily linked to local food and fiber production (Sharma et al. 2003). Thus, for this study, we have defined agriculture-related industries to include farm, input supply, distribution (excluding food wholesale and retail), and food and fiber processing sectors.

The analysis was conducted with the *Implan Pro*™ software package originally developed by the USDA Forest Service in 1979 and later privatized by the Minnesota Implan Group (MIG, Inc.). The *Implan* system used in this study includes both database and software components. The *Implan* data is based on the North American Classification System (NAICS) consisting of 509 industrial sectors. These data are available at national, state, as well as county level. Data from the *Implan* database for the year 2002 was used to calculate the economic impacts. Monetary values were converted to year 2004 dollars using the U.S. Gross Domestic Product (GDP) Implicit Price Deflators (U.S. Department of Commerce). In addition to the *Implan* database, U.S. Census of Agriculture data and statistics available through the Bureau of Economic Analysis were also used.

Economic impacts for the Springfield region were estimated in two stages. First, the total impacts for the entire model area (twelve counties of the Springfield region) were estimated. Second, the estimated total impacts were allocated to each of

the twelve counties based on the individual county's share in baseline gross output, employment, and value-added.

AGRICULTURAL-RELATED INDUSTRIES IN THE SPRINGFIELD REGION

Agriculture-related sectors were identified from the 509 NAICS list. As discussed above, they were further grouped into four main sub-groups. These four groups capture almost all of the sectors linked with the agriculture business system except for the wholesale and retail food sector, including grocery stores and services. The four groups are listed as follows. A detailed list of industrial sectors included in each of the groups is shown in Appendix 1.1.

1. *Farm Group*: All farm crops, livestock, horticultural and landscaping services, Christmas trees, vineyards, private woodlots and commercial forestry.
2. *Agricultural Inputs and Services Group*: Production of goods and services for the farm and processing sectors within the region.
3. *Processing Group*: Food and tobacco products, wineries, cotton textiles, and products made of wood and other forest resource.
4. *Distribution Group*: Transportation and warehousing. Firms providing transportation and warehousing services to food and fiber industries also provide such services to other industries. Hence, only a portion of output, employment, and value-added created in the distribution sector is allocated to agriculture- related industries. The portion is calculated by dividing combined output, employment, and value-added created in farming, agricultural inputs and services, and processing sectors by the total output, employment, and value-added created by all sectors in the Springfield regional economy.

Output of Agricultural-Related Industries

Industry output represents the total value of sales plus the change in inventory. The output amounts presented in this section combine the intermediate output and final demand (Appendix 1.2). Output of Springfield's agriculture-related industries totaled $3.9 billion, including $1.2 billion representing intermediate outputs collectively for four groups of industries, and $2.7 billion representing the final demand for goods and services. The largest industry group was the processing industry with $2.6 billion, representing 69% of the total output (Figure 2). The second largest group was the farming sector ($698 million; 17.7%), followed by agricultural inputs and service ($178 million; 5%) and distribution ($407 million; 10%). It should be noted that the distribution group does not include food wholesaling and retailing or the hotel and restaurant industry. It is important to note that nearly 80% of the farm output constituted intermediate output which became inputs for the industries in the processing group and other value-adding industries. On the other hand, more than 80% of the output for the processing group represented final demand for good and services.

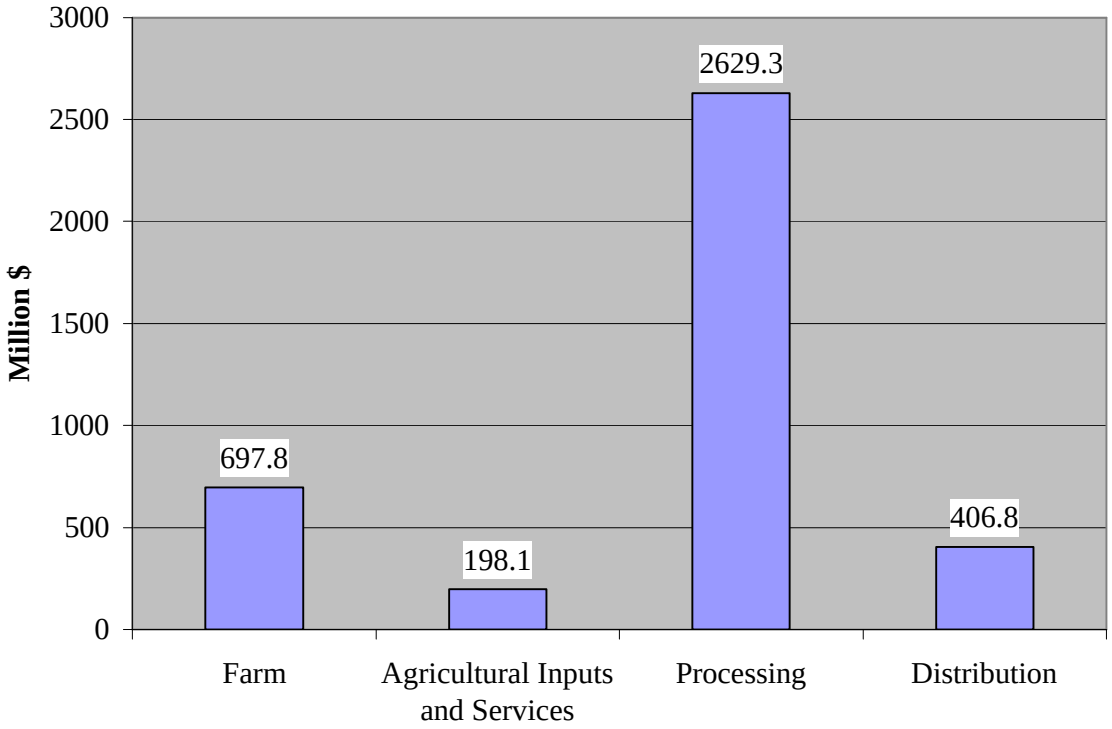

Figure 2: Distribution of total output among four groups of industries.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Greene County led the region with an output of nearly $2 billion (Figure 4), followed by Barry County ($819 million) and Lawrence County ($420 million). The remaining counties were similar in size in terms of the value of output generated for the agriculture-related industries (Figure 3).

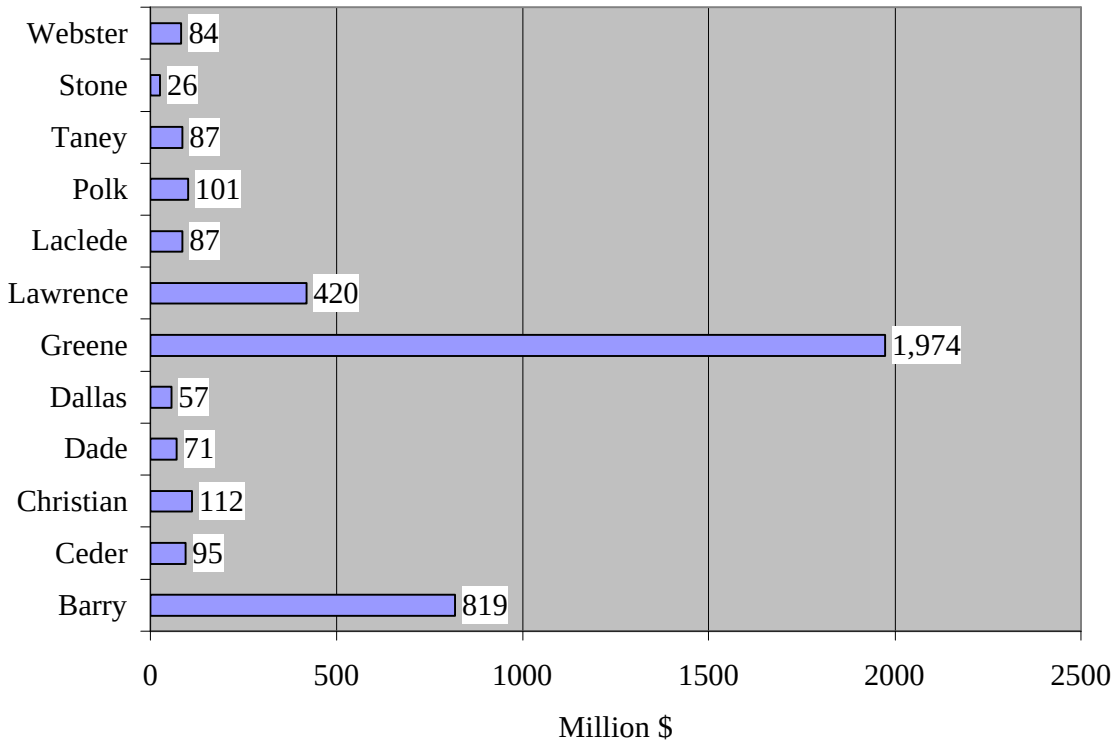

Figure 3: Value of total output produced by agriculture-related industries across counties in Springfield Region.
Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

As stated above, the livestock industry was the largest sector in the farm group. The livestock industries including cattle ranching and farming (including dairy cattle); poultry and egg production; and other animal production created output worth approximately $500 million, or 72% of the total farm output (Appendix 1.2). In terms of the value of output, the farming sector is led by Barry County ($194 million), followed by Lawrence County ($103 million). Greene County, which has the largest overall output, produced only $73 million in terms of farm output. Taney County was at the bottom of the list with $9 million in farm output (Figure 4).

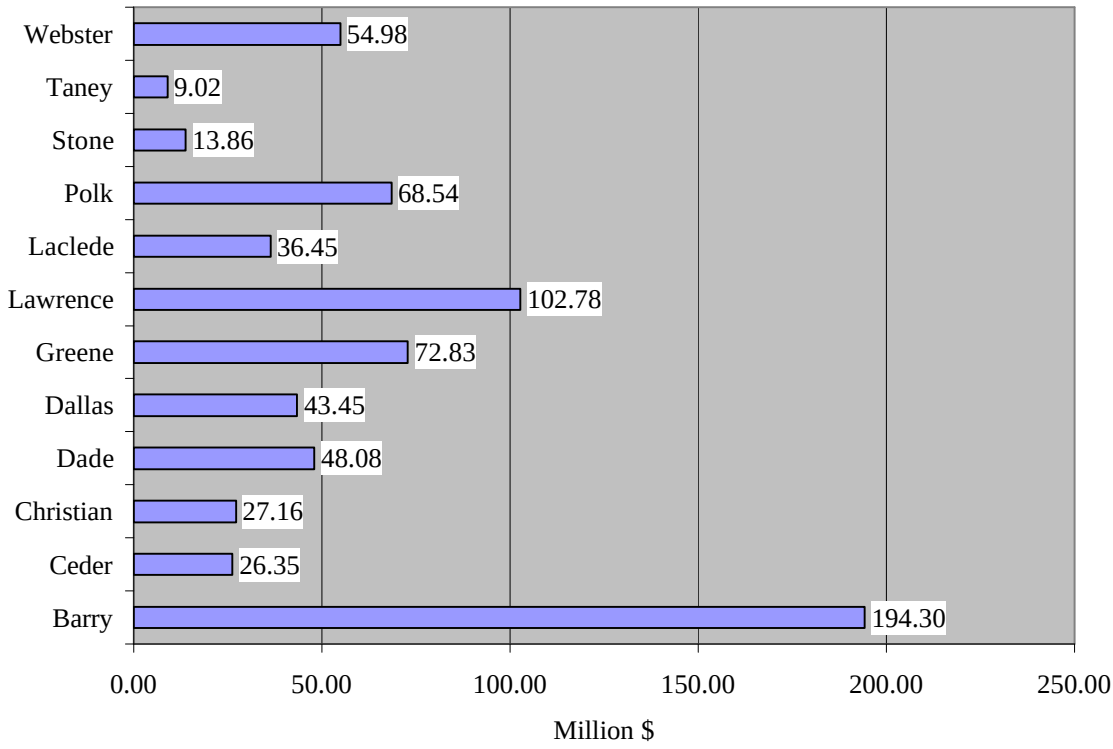

Figure 4: Farm output across counties in Springfield region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

The agricultural inputs and services group produced output worth $198 million, or 5% of the total output. Food product machineries and maintenance and repair of farm residences were the two principal sectors in the inputs and services group, representing 57% of the total value of output (Appendix 1.2). Greene County led the region with $94 million, followed by Christian County with $35 million (Figure 5)

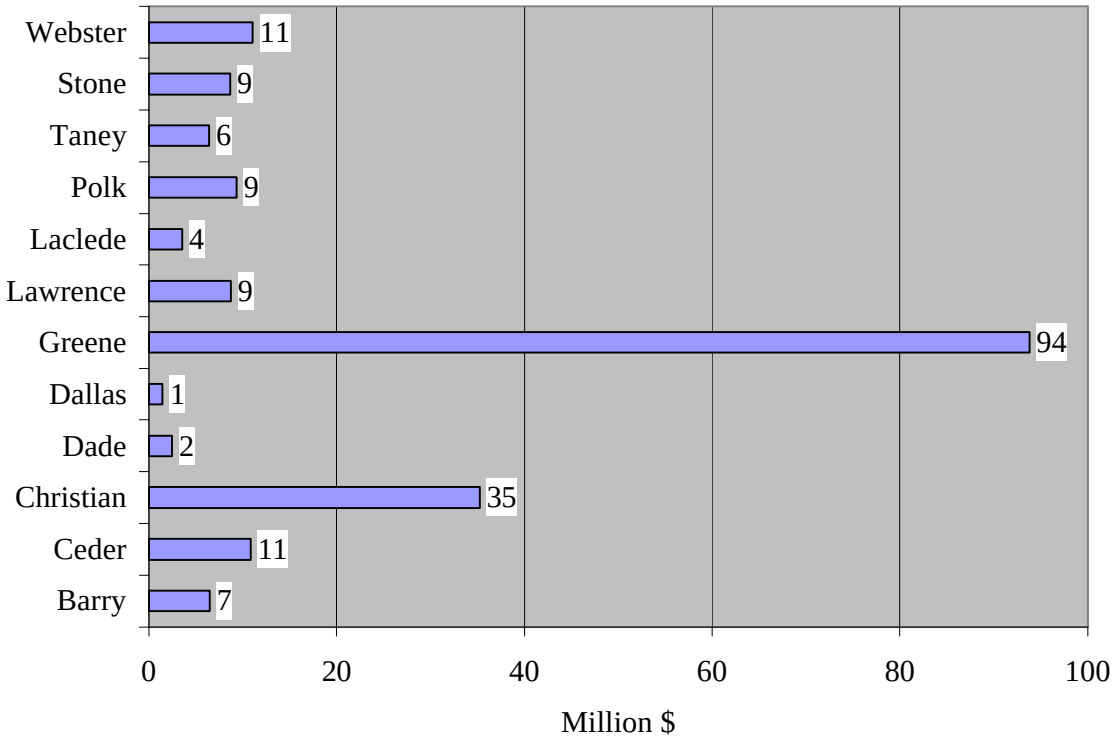

Figure 5: Distribution of output created by agricultural inputs and services across counties in Springfield region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Cheese manufacturing alone contributed approximately 40% ($1.03 billion) of the total processing output. The second largest industry sector within the processing group was poultry processing with $591 million output, representing 23% of the processing industry (Appendix 1.2). Dog and cat food, and other animal food manufacturing contributed nearly $300 million (11%) in output to the processing group, making it the third largest sector. Greene County led the processing group with $1.6 billion in output, followed by Barry County with $544 million (Figure 6). Lawrence County generated $262 million in output and was the third county in the region in terms of value of output through food and fiber processing activities.

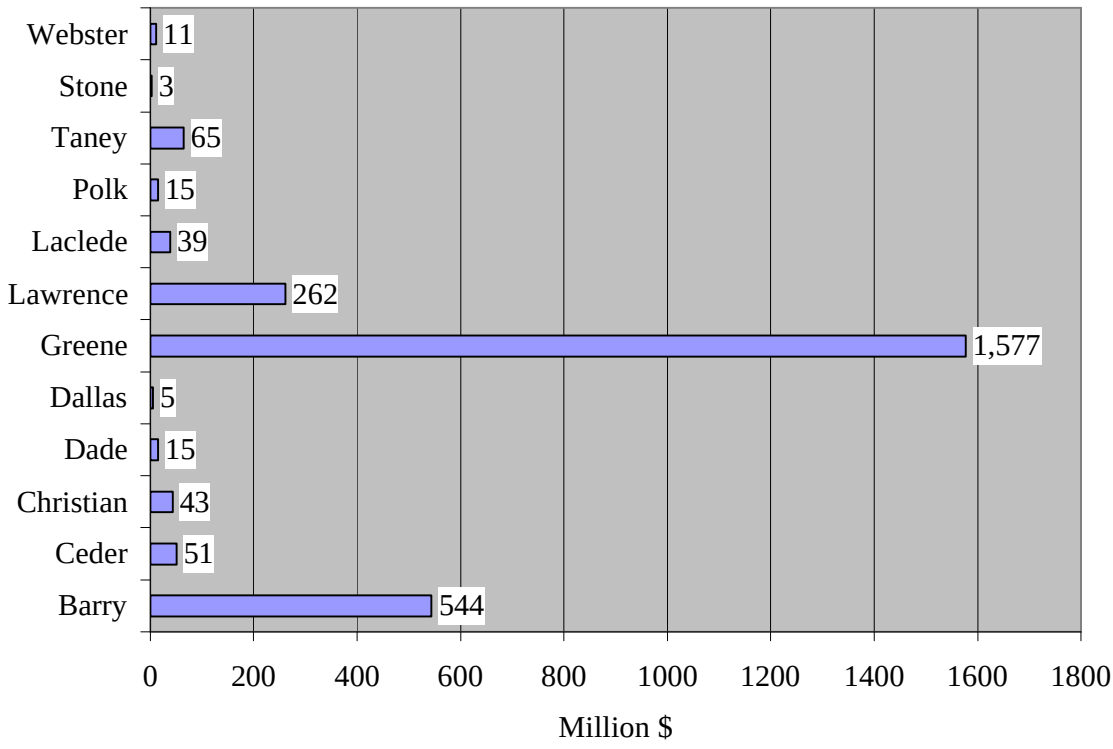

Figure 6: Distribution of output created by processing activities across counties in Springfield region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

MEASURING THE ECONOMIC IMPACT OF AGRICULTURE-RELATED INDUSTRIES

Economic impact analysis using the definition of agriculture discussed above requires tracing the food and fiber products from farm sectors to the processing sectors. Therefore, the analysis using the value of total output, including intermediate and final demand for each of the four groups of industries, is likely to create the problem of double counting. For example, more than 80% of outputs at the farm level are intermediate goods to be used as inputs by the processing sectors. The intermediate goods counted as output at the farm level become part of the total output again at the processing sector. In order to avoid this problem, only the value of final demand at each level is used to measure the economic impact of agriculture-

related industries in the Springfield region. The final demand-based approach measures the direct and indirect contribution to output, value-added, income and employment due to the final demand and services produced by a particular sector (Sharma, et al., 2003). Since industrial sectors in the vertical system are linked to each other, it is important to evaluate the food and fiber system as a whole, rather than individual groups of industries.

The economic impact analysis conducted in this study is based on the framework which stipulates that industrial activities stimulate a regional economy both directly and through purchases of inputs supplied form other industries (indirect effects), and personal consumption expenditures made by industry employees (induced effects). The *direct impact* is simply the value of the final demand of goods and services for each sector. For example, income generated by the sale of wine to the final consumers constitutes direct impact on the economy. Purchases of grapes, fuel and other inputs to conduct wine production constitute *indirect impact*. The last component of the economic impact considered is the *induced effect* of a change in the economic output associated with a final demand sector. Entrepreneurs (business firms) and the employees earn profits and wages, respectively. These employees and owners residing in the Springfield region spend money on household consumption which contributes to the ripple effect in the local economy.

Estimation of the indirect and induced effects is accomplished using economic multipliers. It is important to note that indirect and induced effects, as well leakages in the economy, are generally overstated. This study reports combined indirect and induced effects using Type II multipliers. A Type II multiplier accounts for both indirect

and induced effects, while a Type I multiplier accounts only for the input-flow linkages (the indirect effects).

ECONOMIC IMPACTS OF AGRICULTURE-RELATED INDUSTRIES

Economic impacts due to change in the final demand for goods and services produced by agriculture-related industries in the Springfield region were estimated in terms of output, employment, value added, and labor income. The total estimated impacts include direct, indirect, and induced impacts. As discussed above, the indirect impact represents the indirect effects of increased purchases of inputs from other industries. The induced impact reflects the effects of household spending of employees. The indirect and induced impacts were estimated using *Implan* computer software.

OUTPUT IMPACTS

Direct Output Impacts

The direct output impact of Springfield's agriculture-related industries due to final demand of goods and services totaled $2.7 billion. The processing group accounted for $2.17 billion, representing 82% of the total impact (Figure 7). The distribution sectors accounted for $251 million, or 9%, followed by the farm sectors ($144 million; 5%) and the agriculture inputs and services sectors ($121 million; 4%). As discussed above, a large proportion of the total output of farming, agriculture inputs, and distribution sectors include intermediate goods which are accounted for in the processing sectors.

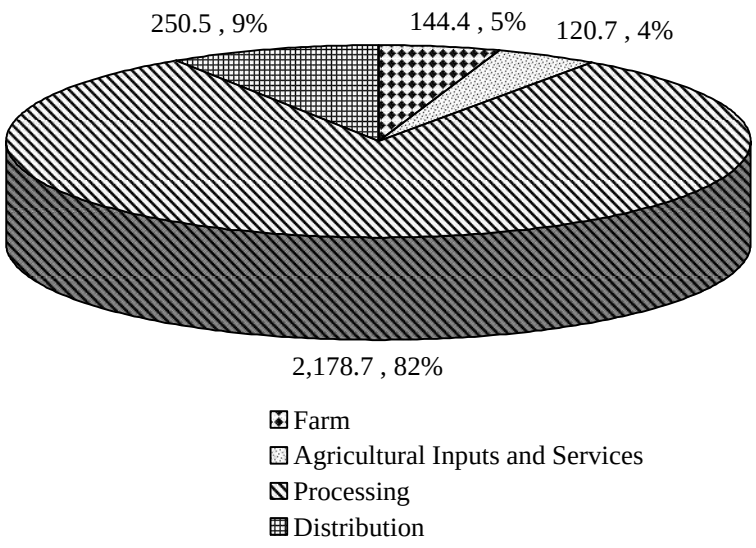

Figure 7: Distribution of direct output impacts due to final demand for agriculture related goods and services among four groups of industries (Million $).

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollars.

Greene County led the region with $1.6 billion in direct output impact (Figure 8), followed by Barry County, at $498 million, and Lawrence County, at $292 million. The remaining counties were similar in size in terms of the value of final demand generated for the agriculture-related industries (Figure 8).

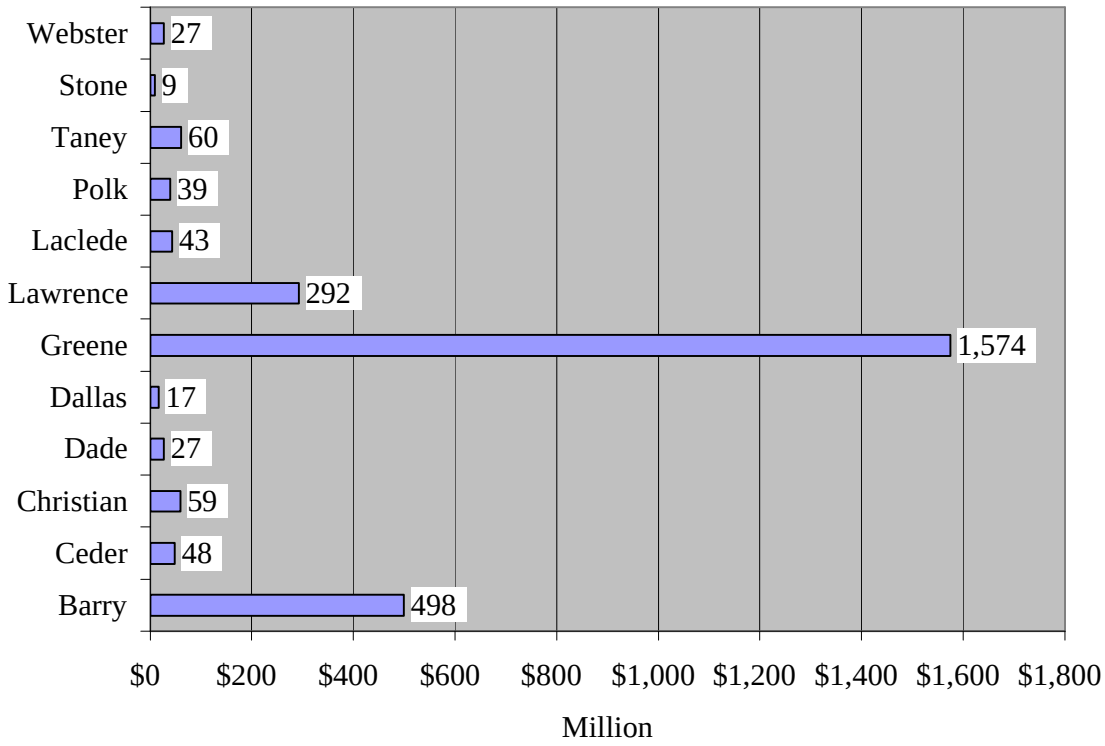

Figure 8: Direct output impact due to final demand for agriculture-related goods and services across counties in the Springfield Region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollars.

Total Output Impacts

The total output impact on the Springfield region due to the change in final demand of goods and services produced by agricultural-related industries in 2002 was estimated to be $5.2 billion expressed in year 2004 dollars (Table 3). The direct, indirect, and induced impacts were $2.7 billion, $1.6 billion and $782 million respectively.

The largest industry sectors were the processing industries, with a total output impact of $4.2 billion, representing 82% of the total for the region (Appendix 1.3). Cheese manufacturing ($1.5 billion) and poultry processing ($945 million) were the

two largest sectors in the processing group, accounting for more than half of the total output impact in the region and more than two-thirds of the impact created by the processing group. The farm sector contributed slightly more than $200 million in total output impact due to the final demand for goods and services in this sector. It is important to emphasize that a large portion of the farm sector output was intermediate goods.

Table 3: Total output impacts due to the final demand for goods and services produced by agricultural-related industries in the Springfield region (Million $).

Industry Groups	Direct	Indirect	Induced	Total
Farm	144.4 (5.4%)	46.9 (2.8%)	20.3 (2.6%)	211.6 (4.1%)
Agricultural Inputs and Services	120.7 (4.5%)	42.7 (2.5)	53.2 (6.8%)	216.5 (4.2)
Processing	2,178.7 (80.9%)	1,470.9 (87.4)	581.8 (74.4%)	4,231.5 (82.1%)
Distribution	250.5 (9.3)	122.9 (7.3)	126.5 (16.18%)	499.8 (9.7%)
	2,694.2	1,683.4	781.7	5,159.4

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollars.

Total output impacts were greatest in Greene County with over $3 billion, including $1.6 billion in direct impact, $1 billion in indirect impact and $470 million in induced impact (Figure 9). Barry County (over $1 billion) and Lawrence County ($514 million) represented the second tier of counties in terms of total output impacts. The remaining nine counties were nearly identical in terms of their performance in generating total output impacts.

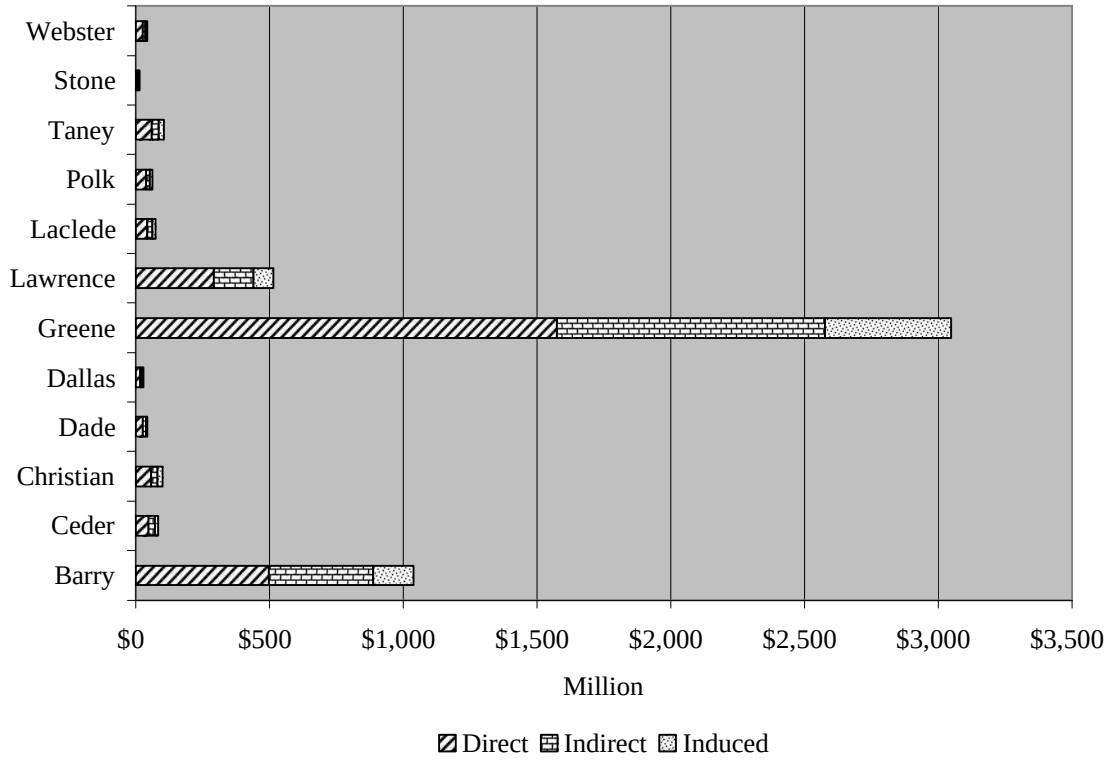

Figure 9: Output impacts of agriculture related industries across counties in Springfield region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollars.

EMPLOYMENT IMPACTS

Direct Employment Impacts

In 2002, the direct employment in agricultural-related industries due to the final demand for agriculture-related goods and services in the Springfield region represented a total of 14,581 jobs, including both full-time and part-time or seasonal positions (Figure 10). The largest industry group in terms of employment was the processing group with 7,410 jobs, followed by the farm group with 3,899 jobs. The inputs and services group and the distribution group created 967 and 2,306 jobs, respectively. The majority of jobs were concentrated in Greene County (Figure 11),

with 4,579 positions, followed by Barry County (2,366) and Lawrence County (1,337). Stone County created least number of jobs with 365 positions.

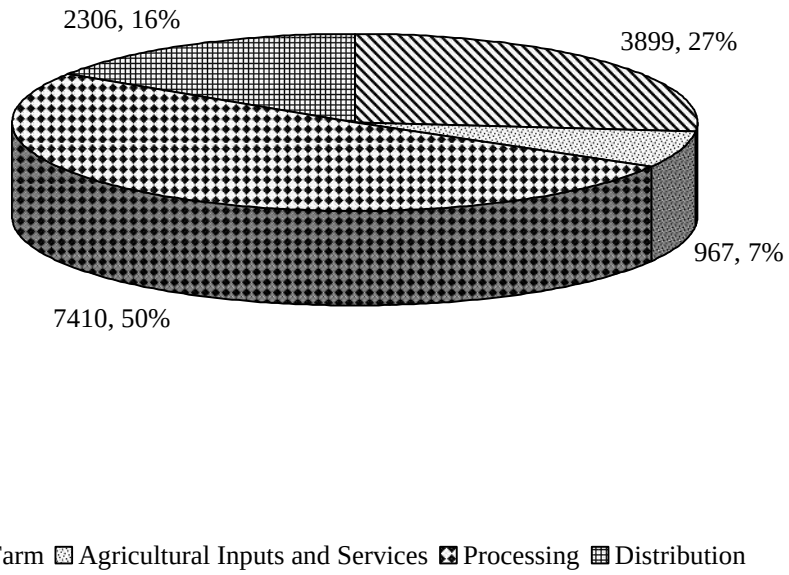

Figure 10: Distribution of direct employment due to the final demand for agriculture related goods and services four groups of industries (number of jobs).

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Agriculture and forestry support activities accounted for 346 jobs in the inputs and services sectors, representing more than one-third of the jobs created in the input sectors. Poultry processing and cheese manufacturing combined created nearly 5,000 positions in the processing sectors, representing approximately 60% of all processing jobs. The truck transportation sector was the single largest employer in the distribution group, accounting for 90% of all jobs created in the distribution group in 2002.

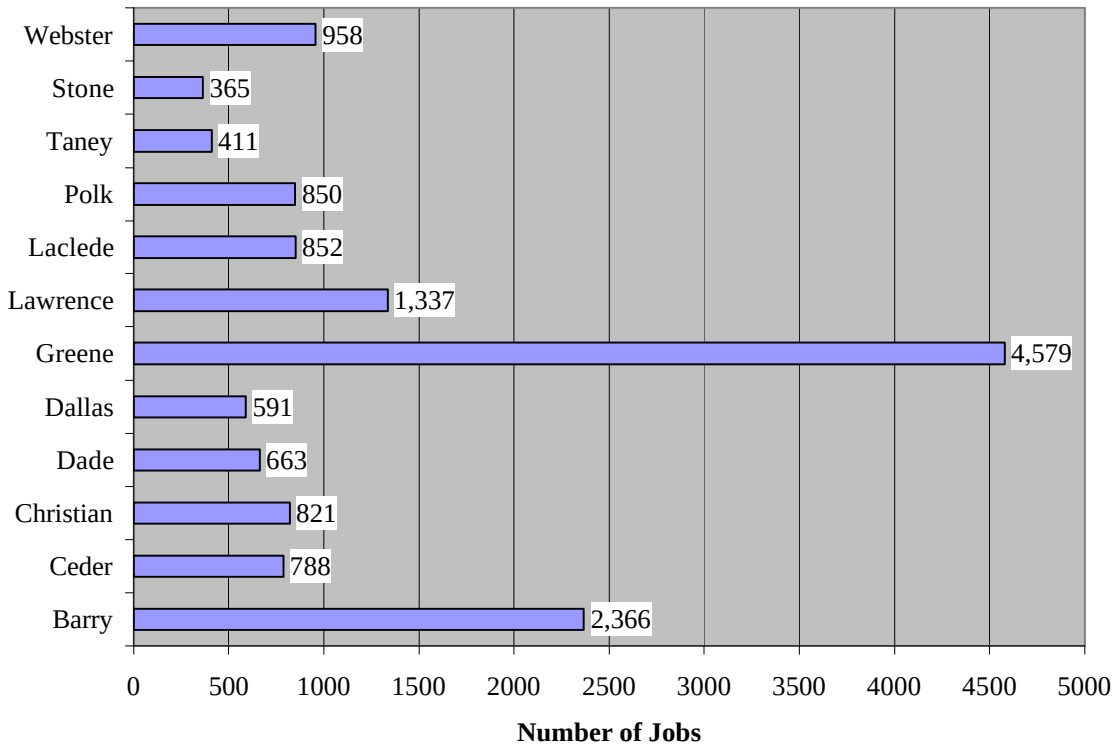

Figure 11: Direct employment in agriculture related industries across counties in Springfield region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Total Employment Impact

The Springfield economic region created a total of 42,308 jobs due to the final demand for agriculture-related goods and services (Table 4). Of the total, 14,587 jobs were created directly by the sectors producing final goods and services. Those industrial sectors which provide inputs to the primary sectors created 18,545 jobs (indirect impact). An additional 9,179 positions were created by industries serving the employees and owners of firms in agriculture-related industries (induced impact). The largest job creator was the processing group with 30,429 jobs, followed by the distribution sector (4,995 jobs). The farm group and inputs and service group created 4,862 and 2,022 jobs, respectively. Within the processing group, cheese manufacturing

activities created nearly 15, 000 jobs (Appendix 1.4), including 1,369 jobs directly in cheese manufacturing plants, nearly 9,000 jobs in sectors that supply inputs to cheese production, and 2,300 jobs in industries that serve the employees of cheese manufacturing plants and related industries.

Table 4: Total employment impacts due to the final demand for goods and services produced by agricultural related industries in Springfield region (number of jobs).

Industry Groups	Direct	Indirect	Induced	Total
	3,899	725	238	4,862
Farm	(26.7%)	(3.9%)	(2.6%)	(11.5%)
Agricultural Inputs and	967	430	624	2,022
Services	(6.6%)	(2.3%)	(6.8%)	(4.8)
	7,409	16,185	6,832	30,429
Processing	(50.8%)	(87.3%)	(74.4%)	(71.9%)
	2306	1,205	1,485	4995
Distribution	(15.8%)	(6.5%)	(16.2%)	(11.8%)
	14,581	18,545	9,179	42,308

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Greene County alone created over 13,000 jobs, followed by Barry County, with nearly 7,000 jobs, and Lawrence County, at approximately 4,000 jobs (Figure 12). Stone County created the fewest numbers of jobs in agriculture-related industries with slightly more than 1000 jobs.

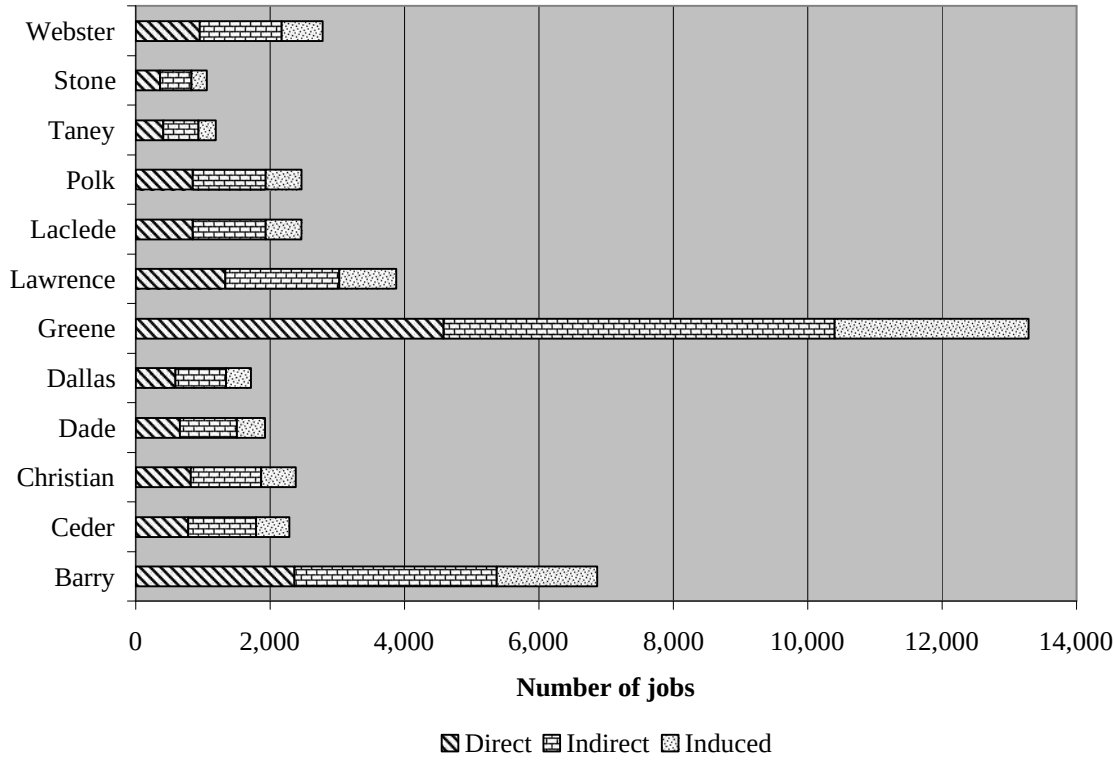

Figure 12: Total employment impacts across counties in Springfield region through agriculture related industries.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Total Value Added

The final measure of economic activity used in this study was value added, which is defined as a measure of personal and business net income, including labor income (employee compensation and proprietor's income), indirect business taxes paid and other property type income. The Springfield regional economy created $658 million in direct value added, $737 million in indirect value added and $478 million in induced value added due to the final demand for agriculture-related goods and services (Table 5). Among the four industry groups, value added was greatest in the processing group ($1.4 billion), followed by the distribution group ($259 million). The

farm group and agricultural inputs and services group created $109 million and $106 million, respectively.

Table 5: Total value added impacts due to the final demand for goods and services produced by agricultural related industries in Springfield region (in Million $).

	Direct	Indirect	Induced	Total
Farm	71 (10.7%)	27 (3.6%)	12 (2.5%)	109 (5.8%)
Agricultural Inputs and Services	49 (7.4%)	24 (3.3%)	33 (6.8%)	106 (5.7%)
Processing	424 (64.3%)	619 (84.1%)	356 (74.5%)	1399 (74.7%)
Distribution	115 (17.5%)	66 (9.0%)	77 (16.2%)	259 (13.8%)
	658	737	478	1873

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollars.

Total value added was greatest in Greene County ($851 million), followed by Barry County ($364 million) and Lawrence County ($199 million) (Figure 13). These three counties combined to create more than three-fourths of the total value added in agriculture-related industries in the Springfield region. The individual contributions of the remaining nine counties ranged from $17 million for Stone County to $77 million for Christian County.

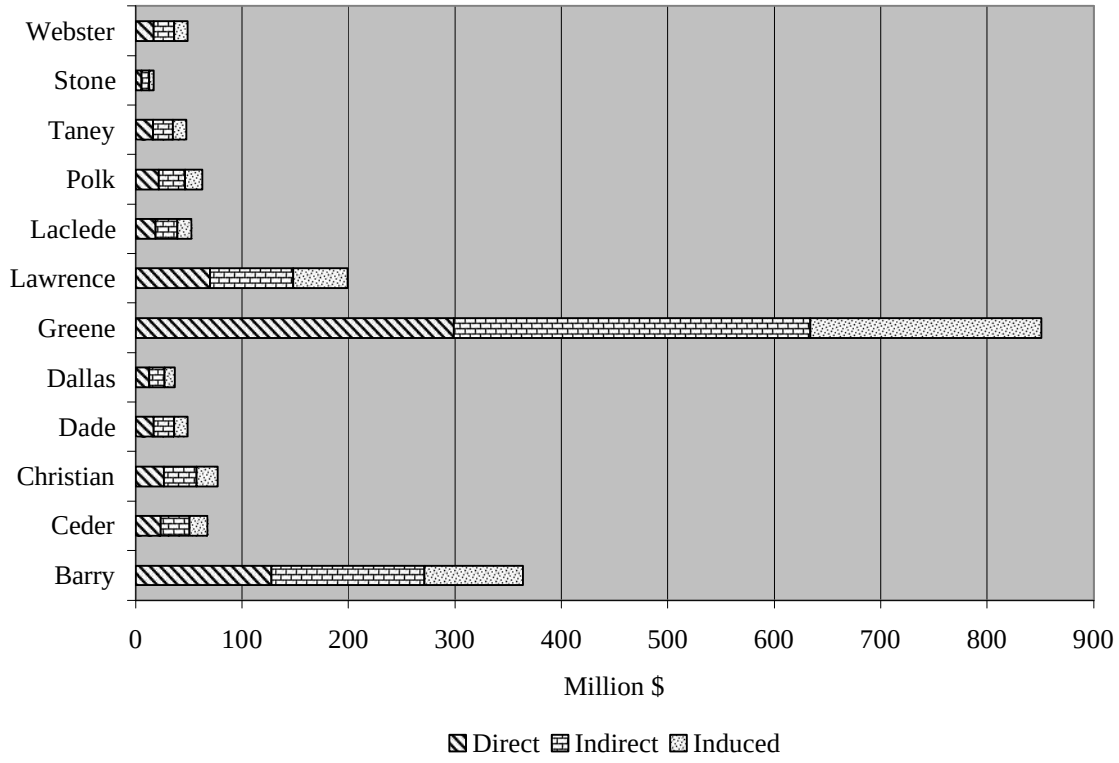

Figure 13: Value added impacts due to final demand of agriculture related goods and services across counties in Springfield region.

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollar.

Cheese manufacturing ($495 million) and poultry processing ($393 million) were the two leading sectors in the processing group in terms of total value added (Appendix 1.5). Animal food manufacturing, including dog, cat and other animals combined, created more than $140 million and bakery manufacturing created slightly more than $40 million in total value added. Truck transportation contributed $235 million in total value added.

Total Labor Income

Labor income is a part of value added, consisting of employee compensation and proprietary income. *Employee compensation* includes wage and salary payments,

as well as benefits, including health and life insurance, retirement payments, any other non-cash compensation. It includes all income to workers paid by employers. *Proprietary income* consists of payments received by self-employed individuals as income. In 2002, more than $1 billion was paid to employees and entrepreneurs (Table 6) resulting from the final demand for agriculture-related goods and services. Industrial sectors in the processing group paid $804 million to employees and firm owners, followed by the distribution group ($175 million), the agricultural inputs and services group ($73 million), and the farm group ($28 million). Labor income created by each sector is shown in Appendix 1.6.

Table 6: Total labor income impact due to the final demand for goods and services produced by agricultural-related industries in the Springfield region (in Million $).

Industry Groups	Direct	Indirect	Induced	Total
Farm	7	14	7	28
Agricultural Inputs and Services	40	16	18	73
Processing	303	308	193	804
Distribution	89	44	42	175
Total	440	381	259	1,080

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002 expressed in 2004 dollars

PER CAPITA IMPACTS

The twelve counties included in the Springfield region have varying population and area. Therefore, it is meaningful to analyze the impact of agriculture-related industries on the Springfield region on a per capita basis. Average per capita total output impacts for the Springfield region in 2002 was $9,094, expressed in year 2004 dollars (Table 3). Across the region, the total output impacts for Barry County ($30,367), Lawrence County ($15,628), and Greene County ($12,607) were above

average. While Barry County led the region in terms of per capita output impact, Stone County had the least impact at $382.

Table 7: Per capita impacts of agriculture-related industries on the Springfield region in 2002.

County	Output Impacts Per Capita ($*)	Employment Impacts Per 1000 Population (Jobs)	Value Added Impacts Per Capita ($*)
Barry	30,367	201	10,647
Cedar	6,081	165	4,887
Christian	1,790	42	1,349
Dade	5,462	243	6,174
Dallas	1,833	108	2,315
Greene	12,607	55	3,522
Lawrence	15,628	118	6,060
Laclede	2,126	69	1,485
Polk	2,299	90	2,284
Taney	3,634	41	1,649
Stone	382	26	424
Webster	1,375	87	1,515
Springfield Region	9,094	75	3,301

**Expressed in year 2004 based on US GDP Implicit Price Deflator*

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

The employment impact was expressed in terms of jobs per 1,000 of population. The average job creation for the Springfield region in agriculture-related industries was 75 jobs per 1,000 population (Table 7). Barry (201), Cedar (165), Dade (243), Dallas (108) and Lawrence (118) counties had above average total employment impacts. While Dade County created the largest number of jobs, Stone County created the fewest number with 26 jobs per 1,000 population.

Value added impacts per capita averaged $3,301 for the Springfield region (Table 7). Barry ($10,647), Cedar ($4,887), Dade ($6,174), Greene ($3,522), and Lawrence ($6,060) counties were above average counties in terms of value added per capita. The difference in value added impacts between Stone County with lowest amount of value added ($424) and Barry County with highest amount ($10,647) was significant.

Share of Regional Output

Regional Output (RO) represents the sum of the final demand for goods and services for all industries in the region. The share of regional output for the Springfield region's agriculture-related industries in the total RO is calculated by dividing output for agriculture-related industries by total RO for all industries in the region. The shares are shown in Table 8. In 2002, regional output for the Springfield region was $22 billion (year 2004 dollars). The value of output for agriculture-related industries was $2.7 billion dollars, representing approximately 12% of RO. Five out of twelve counties had shares that were greater than the regional average. Clearly, agriculture-related industries are critical for Barry, Cedar, Dade, and Lawrence counties whose shares in RO ranged from 14 to 31%. Despite having the highest amount of output ($1.6 billion), Greene County's share in regional output was similar to the average for the region, indicating a high level of industrial diversity in Greene County. Also, Greene, Christian, and Taney counties are more urbanized than other counties as reflected in their shares in RO.

Table 8: Gross Regional Output (GRO) of Springfield Region's Agriculture-Related Industries and All Industries, 2002

County	Regional Output[1] (Million $[2])	Agriculture Related Industries' Output[1] (Million $[2])	Share of Gross Regional Output
Barry	1,570	498	30.22%
Cedar	271	48	16.89%
Christian	1,217	59	4.62%
Dade	183	27	14.08%
Dallas	258	17	6.28%
Greene	12,476	1574	12.02%
Lawrence	1,331	292	30.91%
Laclede	900	43	3.08%
Polk	582	39	6.39%
Stone	662	9	1.30%
Taney	1,798	60	3.18%
Webster	558	27	4.61%
Springfield Region	21,805	2,693	11.77%

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.
[1]Value of final demand (excludes intermediate goods)
[2]Expressed in year 2004 based on US GDP Implicit Price Deflator

CONCLUSIONS

This study examined the impacts of agriculture-related industries on the economy of the Springfield region due to the final demand for agricultural goods and services. For purposes of this study, twelve counties in the center of Southwest Missouri were included. The Springfield region's agriculture-related industries produced a total gross output of $3.9 billion, including $1.2 billion intermediate output and $2.7 billion final demand for goods and services. The economic performance of agriculture-related industries was measured using the final demand

approach rather than the gross output approach to avoid potential double counting. The total output impacts of $5.2 billion due to the final demand for agricultural goods and services included $2.7 billion through direct impacts, $1.7 billion through indirect impacts, and $872 million through induced impacts. The economy created nearly 15,000 jobs directly in agriculture-related sectors due to the final demand for agricultural goods and services. Over 18,000 jobs were created in the sectors providing inputs. Just over 9,000 jobs were created by sectors serving the employees and entrepreneurs in agriculture-related industries. Using direct, indirect and induced multipliers, the estimated value of the Springfield region's agriculture-related industries resulted in a total impact of $2.3 billion in total value added, including $1.1 billion in labor income. Agriculture-related industries accounted for 12% of the total regional output for the Springfield region. The region's largest county in terms of agriculture-related industries was Greene County, with more than $3 billion in total output impact, followed by Barry County ($1 billion), and Lawrence County ($513 million). Greene, Christian, and Taney counties are more diversified counties with agriculture-related industries holding less importance as compared to other, more rural, counties. While Barry County led the region in terms of per capita output and value added impacts, and Dade County in terms of per capita job creation, Stone County had the least impacts in all three categories.

Appendix 1.1: *Sectors included in the economic analysis*

IMPLAN Code	
	Farms
1	Oilseed farming
2	Grain farming
3	Vegetable and melon farming
4	Tree nut farming
5	Fruit farming
6	Greenhouse and nursery production
7	Tobacco farming
8	Cotton farming
10	All other crop farming
11	Cattle ranching and farming
12	Poultry and egg production
13	Animal production, except cattle and poultry
14	Logging
	Agricultural Inputs and Services
18	Agriculture and forestry support activities
36	New farm housing units and additions and alterations
42	Maintenance and repair of farm and nonfarm residences
158	Fertilizer, mixing only, manufacturing
257	Farm machinery and equipment manufacturing
267	Food product machinery manufacturing
434	Machinery and equipment rental and leasing
	Processing Sector
46	Dog and cat food manufacturing
47	Other animal food manufacturing
58	Confectionery manufacturing from purchased chocolate
61	Fruit and vegetable canning and drying
62	Fluid milk manufacturing
64	Cheese manufacturing
65	Dry, condensed, and evaporated dairy products
66	Ice cream and frozen dessert manufacturing
67	Animal, except poultry, slaughtering
68	Meat processed from carcasses
69	Rendering and meat byproduct processing
70	Poultry processing
73	Bread and bakery product, except frozen, manufactured
79	Other snack food manufacturing
82	Mayonnaise, dressing, and sauce manufacturing
84	All other food manufacturing
85	Soft drink and ice manufacturing
87	Wineries
100	Curtain and linen mills
101	Textile bag and canvas mills

103	Other miscellaneous textile product mills
111	Other leather product manufacturing
112	Sawmills
113	Wood preservation
116	Engineered wood member and truss manufacturing
117	Wood windows and door manufacturing
118	Cut stock, resawing lumber, and planning
119	Other millwork, including flooring
120	Wood container and pallet manufacturing
123	Miscellaneous wood product manufacturing
126	Paperboard container manufacturing
	Distribution
392	Rail transportation
394	Truck transportation
400	Warehousing and storage

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Appendix 1.2: *Value of output across industry sectors in 2002 expressed in 2004 dollars.*

	Total Output		Intermediate Output		Final Demand	
	Million $*	Percentage of Total for Each Group	Million $*	Percentage of Total Output	Million $*	Percentage of Total Output
Farms						
Oilseed farming	6.5	0.9%	0.1	1.5%	6.4	98.5%
Grain farming	13.6	2.0%	4.7	34.2%	9.0	65.8%
Vegetable and melon farming	5.3	0.8%	0.8	15.5%	4.5	84.5%
Tree nut farming	0.1	0.0%	0.0	3.6%	0.1	96.4%
Fruit farming	2.3	0.3%	0.3	11.7%	2.0	88.3%
Greenhouse and nursery production	8.8	1.3%	2.4	26.8%	6.4	73.2%
Tobacco farming	0.0	0.0%	0.0	0.9%	0.0	99.1%
Cotton farming	0.0	0.0%	0.0	1.1%	0.0	98.9%
All other crop farming	125.5	18.0%	52.2	41.6%	73.3	58.4%
Cattle ranching and farming	240.0	34.4%	236.9	98.7%	3.1	1.3%
Poultry and egg production	241.5	34.6%	232.5	96.3%	9.0	3.7%
Animal production- except cattle and poultry	17.8	2.6%	8.0	45.1%	9.8	54.9%
Logging	36.4	5.2%	15.7	43.0%	20.8	57.0%
Total	**697.8**	**100.0%**	**553.4**	**79.3%**	**144.4**	**20.7%**
Agricultural Inputs and Services						
Agriculture and forestry support activities	21.5	10.9%	14.6	67.7%	7.0	32.3%
New farm housing units and additions and alteration	12.7	6.4%	0.0	0.0%	12.7	100.0%
Maintenance and repair of farm and nonfarm residences	45.4	22.9%	18.0	39.7%	27.4	60.3%
Fertilizer- mixing only- manufacturing	3.0	1.5%	0.4	13.3%	2.6	86.7%
Farm machinery and equipment manufacturing	5.7	2.9%	1.0	18.2%	4.7	81.8%
Food product machinery manufacturing	69.1	34.9%	7.1	10.2%	62.1	89.8%
Machinery and equipment rental and leasing	40.6	20.5%	36.4	89.6%	4.2	10.4%
Total	**198.1**	**100.0%**	**77.5**	**39.1%**	**120.7**	**60.9%**
Processing Sector						
Dog and cat food manufacturing	140.5	5.3%	0.0	0.0%	140.5	100.0%
Other animal food manufacturing	157.7	6.0%	4.2	2.6%	153.5	97.4%
Confectionery manufacturing from purchased chocolate	12.0	0.5%	0.0	0.1%	11.9	99.9%
Fruit and vegetable canning and drying	25.7	1.0%	0.3	1.3%	25.3	98.7%
Fluid milk manufacturing	81.7	3.1%	15.9	19.5%	65.7	80.5%
Cheese manufacturing	1,031.0	39.2%	193.5	18.8%	837.5	81.2%
Dry- condensed- and evaporated dairy products	56.8	2.2%	18.8	33.1%	38.0	66.9%

Ice cream and frozen dessert manufacturing	13.0	0.5%	5.5	42.5%	7.5	57.5%
Animal- except poultry-slaughtering	30.4	1.2%	9.4	30.8%	21.0	69.2%
Meat processed from carcasses	32.0	1.2%	6.4	20.1%	25.6	79.9%
Rendering and meat byproduct processing	21.3	0.8%	16.0	75.1%	5.3	24.9%
Poultry processing	591.5	22.5%	86.5	14.6%	505.0	85.4%
Bread and bakery product- except frozen- manufacturing	59.7	2.3%	16.8	28.2%	42.9	71.8%
Other snack food manufacturing	0.5	0.0%	0.1	12.0%	0.5	88.0%
Mayonnaise- dressing- and sauce manufacturing	63.9	2.4%	5.8	9.1%	58.1	90.9%
All other food manufacturing	29.9	1.1%	2.3	7.7%	27.6	92.3%
Soft drink and ice manufacturing	25.3	1.0%	0.4	1.6%	24.9	98.4%
Wineries	1.5	0.1%	0.1	3.5%	1.4	96.5%
Curtain and linen mills	1.4	0.1%	0.0	2.8%	1.3	97.2%
Textile bag and canvas mills	3.9	0.1%	0.0	0.8%	3.8	99.2%
Other miscellaneous textile product mills	11.1	0.4%	0.5	4.2%	10.6	95.8%
Other leather product manufacturing	2.0	0.1%	0.4	19.8%	1.6	80.2%
Sawmills	12.1	0.5%	11.0	90.4%	1.2	9.6%
Wood preservation	18.6	0.7%	6.3	34.1%	12.3	65.9%
Engineered wood member and truss manufacturing	26.7	1.0%	8.6	32.1%	18.2	67.9%
Wood windows and door manufacturing	25.9	1.0%	12.9	49.9%	13.0	50.1%
Cut stock- resawing lumber- and planing	5.7	0.2%	5.1	89.2%	0.6	10.8%
Other millwork- including flooring	10.1	0.4%	6.5	64.6%	3.6	35.4%
Wood container and pallet manufacturing	23.4	0.9%	7.1	30.4%	16.3	69.6%
Miscellaneous wood product manufacturing	27.0	1.0%	9.0	33.4%	18.0	66.6%
Paperboard container manufacturing	87.1	3.3%	1.1	1.3%	86.0	98.7%
Total	**2,629.3**	**100.0%**	**450.6**	**17.1%**	**2178.7**	**82.9%**
Distribution						
Rail transportation	14.8	3.6%	10.1	68.3%	4.7	31.7%
Truck transportation	346.7	85.2%	116.1	33.5%	230.5	66.5%
Warehousing and storage	45.3	11.1%	30.1	66.3%	15.3	33.7%
Total	**406.8**	**100.0%**	**156.3**	**38.4%**	**250.5**	**61.6%**
Grand Total	**3,932.0**	-	**1,237.8**	-	**2,694.2**	-

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002, expressed in year 2004 dollars.

Appendix 1.3: *Total output impact created by agriculture related industry sectors in 2002 expressed in 2004 dollars.*

Industry Sectors	Million $*
Farm	
Oilseed farming	9.5
Grain farming	13.1
Vegetable and melon farming	5.7
Tree nut farming	0.1
Fruit farming	2.8
Greenhouse and nursery production	7.7
Tobacco farming	0.0
Cotton farming	0.1
All other crop farming	102.7
Cattle ranching and farming	5.8
Poultry and egg production	12.1
Animal production- except cattle and poultry and e	16.2
Logging	35.8
Total	211.6
Agricultural Inputs and Services	
Agriculture and forestry support activities	14.2
New farm housing units and additions and alterations	23.3
Maintenance and repair of farm and nonfarm residences	49.6
Fertilizer- mixing only- manufacturing	3.9
Farm machinery and equipment manufacturing	7.5
Food product machinery manufacturing	110.0
Machinery and equipment rental and leasing	7.9
Total	216.5
Processing Sector	
Dog and cat food manufacturing	222.9
Other animal food manufacturing	235.8
Confectionery manufacturing from purchased chocolate	19.4
Fruit and vegetable canning and drying	40.8
Fluid milk manufacturing	122.5
Cheese manufacturing	1,746.5
Dry- condensed- and evaporated dairy products	66.8
Ice cream and frozen dessert manufacturing	13.3
Animal- except poultry- slaughtering	41.9
Meat processed from carcasses	47.3
Rendering and meat byproduct processing	9.6
Poultry processing	1,109.9
Bread and bakery product- except frozen- manufacturing	69.3
Other snack food manufacturing	0.8
Mayonnaise- dressing- and sauce manufacturing	87.5
All other food manufacturing	47.6
Soft drink and ice manufacturing	38.7

Wineries	2.3
Curtain and linen mills	2.0
Textile bag and canvas mills	6.2
Other miscellaneous textile product mills	16.9
Other leather product manufacturing	2.5
Sawmills	2.4
Wood preservation	22.5
Engineered wood member and truss manufacturing	30.6
Wood windows and door manufacturing	22.8
Cut stock- resawing lumber- and planning	1.1
Other millwork- including flooring	6.6
Wood container and pallet manufacturing	29.6
Miscellaneous wood product manufacturing	32.4
Paperboard container manufacturing	133.1
Total	4,231.5
Distribution	
Rail transportation	8.0
Truck transportation	463.5
Warehousing and storage	28.3
Total	499.8
Grand Total	5,159.4

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002, expressed in year 2004 dollars.

Appendix 1.4: *Total number of employment created agriculture related industry sectors in 2002*

Farm	Number
Oilseed farming	302
Grain farming	692
Vegetable and melon farming	128
Tree nut farming	4
Fruit farming	97
Greenhouse and nursery production	214
Tobacco farming	3
Cotton farming	5
All other crop farming	1,689
Cattle ranching and farming	120
Poultry and egg production	86
Animal production, except cattle and poultry	1,252
Logging	272
Total	**4,862**
Agricultural Inputs and Services	
Agriculture and forestry support activities	449
New farm housing units and additions and alterations	193
Maintenance and repair of farm and nonfarm residences	426
Fertilizer, mixing only, manufacturing	20
Farm machinery and equipment manufacturing	50
Food product machinery manufacturing	830
Machinery and equipment rental and leasing	54
Total	**2,022**
Processing Sector	
Dog and cat food manufacturing	1,050
Other animal food manufacturing	1,192
Confectionery manufacturing from purchased chocolate	160
Fruit and vegetable canning and drying	236
Fluid milk manufacturing	999
Cheese manufacturing	12,673
Dry, condensed, and evaporated dairy products	423
Ice cream and frozen dessert manufacturing	83
Animal, except poultry, slaughtering	708
Meat processed from carcasses	429
Rendering and meat byproduct processing	61
Poultry processing	8,376
Bread and bakery product, except frozen, manufacturing	579
Other snack food manufacturing	5
Mayonnaise, dressing, and sauce manufacturing	408
All other food manufacturing	346
Soft drink and ice manufacturing	211
Wineries	15
Curtain and linen mills	19

Textile bag and canvas mills	83
Other miscellaneous textile product mills	154
Other leather product manufacturing	60
Sawmills	18
Wood preservation	131
Engineered wood member and truss manufacturing	263
Wood windows and door manufacturing	193
Cut stock, resawing lumber, and planning	7
Other millwork, including flooring	47
Wood container and pallet manufacturing	346
Miscellaneous wood product manufacturing	270
Paperboard container manufacturing	886
Total	**30,429**
Distribution	
Rail transportation	44
Truck transportation	4,571
Warehousing and storage	380
Total	**4,995**
Grand Total	**42,308**

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002.

Appendix 1.5: *Value added across industry sectors in 2002 expressed in 2004 dollars.*

Farms	**Million $***
Oilseed farming	4.6
Grain farming	6.2
Vegetable and melon farming	4.0
Tree nut farming	0.0
Fruit farming	1.7
Greenhouse and nursery production	6.3
Tobacco farming	0.0
Cotton farming	0.0
All other crop farming	58.0
Cattle ranching and farming	2.1
Poultry and egg production	5.2
Animal production, except cattle and poultry	5.3
Logging	15.6
Total	**109.2**
Agricultural Inputs and Services	
Agriculture and forestry support activities	8.7
New farm housing units and additions and alterations	9.4
Maintenance and repair of farm and nonfarm residences	21.5
Fertilizer, mixing only, manufacturing	1.6
Farm machinery and equipment manufacturing	2.8
Food product machinery manufacturing	58.5
Machinery and equipment rental and leasing	3.5
Total	**106.0**
Processing Sector	
Dog and cat food manufacturing	76.0
Other animal food manufacturing	66.6
Confectionery manufacturing from purchased chocolate	8.4
Fruit and vegetable canning and drying	17.3
Fluid milk manufacturing	36.1
Cheese manufacturing	495.0
Dry, condensed, and evaporated dairy products	26.7
Ice cream and frozen dessert manufacturing	4.9
Animal, except poultry, slaughtering	10.9
Meat processed from carcasses	16.4
Rendering and meat byproduct processing	4.2
Poultry processing	393.2
Bread and bakery product, except frozen, manufacturing	41.1
Other snack food manufacturing	0.2
Mayonnaise, dressing, and sauce manufacturing	35.9
All other food manufacturing	17.3
Soft drink and ice manufacturing	18.1
Wineries	0.7
Curtain and linen mills	0.8
Textile bag and canvas mills	2.5

Other miscellaneous textile product mills	5.7
Other leather product manufacturing	1.8
Sawmills	0.8
Wood preservation	7.2
Engineered wood member and truss manufacturing	15.8
Wood windows and door manufacturing	10.4
Cut stock, resawing lumber, and planning	0.4
Other millwork, including flooring	2.5
Wood container and pallet manufacturing	14.9
Miscellaneous wood product manufacturing	13.8
Paperboard container manufacturing	53.2
Total	**1,398.8**
Distribution	
Rail transportation	5.6
Truck transportation	235.5
Warehousing and storage	17.7
Total	**258.8**
Grand Total	**1,872.7**

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002, expressed in year 2004 dollars.

Appendix 1.6: *Labor income earned across industry sectors in 2002 expressed in 2004 dollars.*

Farms	**Million $***
Oilseed farming	1.0
Grain farming	1.4
Vegetable and melon farming	0.5
Tree nut farming	0.0
Fruit farming	0.4
Greenhouse and nursery production	0.9
Tobacco farming	0.0
Cotton farming	0.0
All other crop farming	10.9
Cattle ranching and farming	1.0
Poultry and egg production	1.2
Animal production, except cattle and poultry	1.8
Logging	8.8
Total	**28.0**
Agricultural Inputs and Services	
Agriculture and forestry support activities	7.9
New farm housing units and additions and alterations	6.3
Maintenance and repair of farm and nonfarm residences	14.3
Fertilizer, mixing only, manufacturing	0.9
Farm machinery and equipment manufacturing	1.7
Food product machinery manufacturing	40.4
Machinery and equipment rental and leasing	1.9
Total	**73.5**
Processing Sector	
Dog and cat food manufacturing	42.3
Other animal food manufacturing	40.5
Confectionery manufacturing from purchased chocolate	4.2
Fruit and vegetable canning and drying	8.6
Fluid milk manufacturing	21.3
Cheese manufacturing	281.5
Dry, condensed, and evaporated dairy products	11.4
Ice cream and frozen dessert manufacturing	2.6
Animal, except poultry, slaughtering	6.0
Meat processed from carcasses	10.7
Rendering and meat byproduct processing	2.2
Poultry processing	227.7
Bread and bakery product, except frozen, manufacturing	23.3
Other snack food manufacturing	0.1
Mayonnaise, dressing, and sauce manufacturing	15.6
All other food manufacturing	9.4
Soft drink and ice manufacturing	10.9
Wineries	0.4
Curtain and linen mills	0.5

Textile bag and canvas mills	1.8
Other miscellaneous textile product mills	3.8
Other leather product manufacturing	1.0
Sawmills	0.5
Wood preservation	4.5
Engineered wood member and truss manufacturing	9.2
Wood windows and door manufacturing	6.3
Cut stock, resawing lumber, and planning	0.2
Other millwork, including flooring	1.5
Wood container and pallet manufacturing	10.0
Miscellaneous wood product manufacturing	8.0
Paperboard container manufacturing	37.7
Total	**803.6**
Distribution	
Rail transportation	3.7
Truck transportation	158.9
Warehousing and storage	12.2
Total	**174.8**
Grand Total	**1,079.9**

Source: Implan data for twelve counties in Springfield region, MIG, Inc., Stillwater, MN, 2002, expressed in year 2004 dollars.

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Economic Impact of the Beef Cattle Industry on the 12-County Area in Southwest Missouri

Prepared for:

SPRINGFIELD AREA CHAMBER OF COMMERCE
AGRIBUSINESS ROUNDTABLE

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Economic Impact of the Beef Cattle Industry on the 12-County Area in Southwest Missouri

EXECUTIVE SUMMARY

This study analyzed the size and economic contribution of the beef cattle industry on the economy of a 12-county area in southwest Missouri. This twelve-county area was identified exclusively for the purpose of this study through discussions with the Agribusiness Roundtable members of the Springfield Area Chamber of Commerce. The area includes twelve counties in the center of southwest Missouri. First, the profile and structural trends of the cattle industry in general, and beef cattle in particular, for the 12-county area were evaluated. Data used in the analysis were mainly from the National Agricultural Statistical Services (NASS) of the United States Department of Agriculture. The *Implan* input-output analysis software and associated databases for 2002 relating to the twelve counties studied were also used to create a single regional model and to estimate the total economic impact due to the change in gross receipts from beef cattle sales. The impacts were measured in terms of output, value-added, income and employment. The estimated impacts for the region were allocated to individual counties based on their baseline shares in gross cash receipts. The following are the key findings of the study:

1) The cattle industry represents a major economic sector in the 12-county area. Gross receipts from the sale of beef cattle in 2005 totaled $210 million, accounting for more than 25% of gross receipts from the agricultural commodities sold. This

percentage has increased from 23% in 2002, primarily due to the increase in cattle prices compared to crop prices.

2) Sales of beef cattle in the 12-county area represented more than 17% of the total sales in the state of Missouri in 2005. Five out of the twelve counties in the area (Polk, Webster, Lawrence, Barry and Greene) were among the top ten in Missouri in terms of number of cattle operations.

3) There are six farms and five cattle operations for every hundred households in the 12-county area, compared to only four and three, respectively, for the entire state of Missouri.

4) There are 66 head of cattle for every 100 people in the 12-county area. In Dade County, the number is 440 head of cattle for every 100 people.

5) In terms of the number of beef operations per thousand households, Dade County has the largest concentration of beef farms, followed by Dallas, Polk and Webster counties.

6) Although the beef cattle inventory in the state of Missouri has remained generally constant, numbers in the 12-county area continue to grow. From 2000 to 2005, the number of beef cattle in this area grew from 355,000 to 372,000.

7) Area-wide direct economic impact due to change in gross receipts from sales of beef cattle were $210 million output, 5,474 jobs and $40 million in value-added.

8) When the multiplier effect on inter-industry purchases was considered, the total economic impacts were estimated at $345 million in output, 7,825 jobs, and $113 million in value-added, including $49 million for labor income.

9) Polk County's contributions were the highest in terms of total output, value-added, jobs, and labor income.

10) Because of beef cattle operations, other economic sectors have experienced increases in output, income, value-added and job creation. Among them are transportation and warehousing ($17 million output increase and 179 jobs), and finance and real estate ($24 million output and 224 jobs).

Economic Impact of the Beef Cattle Industry on the 12-County Area in Southwest Missouri

I. INTRODUCTION

The 12-county area in Southwest Missouri includes counties (Table 1) located in the center of Southwest Missouri (Figure 1). In 2002, the market value of the agricultural products sold in this area was $654 million, more than 13% of the value for the state of Missouri. There are over 16,000 farms in the 12-county area accounting for 15% of the number of farms and 10% of the total land in farms in the state of Missouri. Traditionally, the agricultural industries in general, and the cattle industry in particular, have been an important part of the economy of this area.

Table 1: Number of Farms, Land in Farms, and Market Value of Agricultural Products

Counties	Number of Farms	Land in Farm (Acres)	Market Value of Agricultural Products Sold ($'000)
Barry	1,669	32,1319	201,339
Cedar	952	22,8063	23,576
Christian	1,294	21,3477	26,968
Dade	893	29,6167	41,098
Dallas	1,243	23,4739	36,670
Greene	2,122	27,4815	39,117
Laclede	1,394	31,8958	31,390
Lawrence	1,852	31,6410	109,894
Polk	1,768	36,9396	59,965
Stone	645	11,3801	12,379
Taney	512	15,4063	10,182
Webster	1,962	31,9883	61,745
12-County Area	16,306	316,1091	654,323
Missouri	106,797	29, 946,035	4,983,255

Source: 2002 Census of Agriculture – County Data, USDA National Agricultural Statistics Service

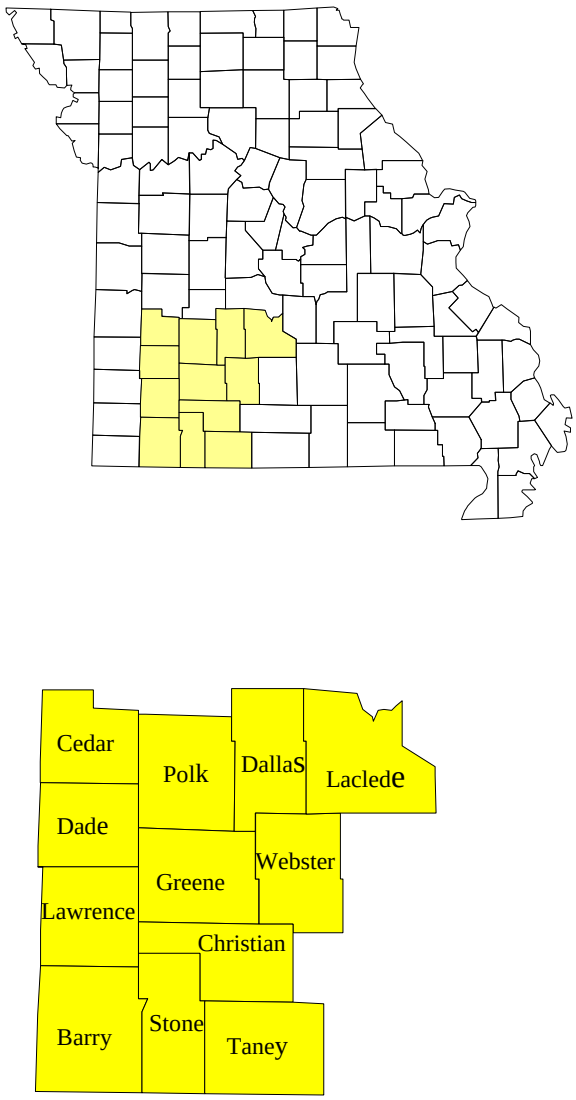

Figure 1: Map of Southwest Missouri with the 12-county Area Highlighted

The beef cattle industry represents a major economic activity in the economy of the 12-county area. Gross cash receipts from the sale of beef cattle in 2005 totaled $210 million, accounting for nearly 25% of the market value of all agricultural commodities sold. This percentage has increased from 23% in 2002, primarily due to the increase in cattle value compared to crop prices. The estimated gross receipts from beef cattle were nearly $150 million in 2002.

II. METHOD AND DATA

This study evaluates the role and economic importance of the beef cattle industry in the area in two sections. First, the profile and structural trends of the cattle industry are described. Data used in the analysis are mainly from the National Agricultural Statistics Services (NASS) and the USDA Census of Agriculture. The latest census was conducted in 2002. Second, the economic impact of the beef cattle industry on the 12-county economy was evaluated. The analysis was conducted with the *Implan Pro*™ software package originally developed by the USDA Forest Service in 1979 and later privatized by the Minnesota Implan Group (MIG, Inc.). The *Implan* input-output analysis software and associated databases for 2002 relating to the twelve counties were used to create a single regional model. Economic impacts due to the change in gross cash receipts from the sale of beef cattle on output, value-added, income and employment were estimated. The *Implan* data is based on the North American Classification System (NAICS) consisting of 509 industrial sectors. These data are available for national, state, as well as county level. Gross receipts from marketing of cattle in 2005 were used to estimate the economic impact in terms of output, value-added, income and employment. Employment impacts are reported in job units consistent with the definition of a job unit by U.S. Department of Commerce.

The economic impact analysis conducted in this study is based on the framework which stipulates that industrial activities stimulate a regional economy both directly and through purchases of inputs supplied form other industries (indirect effects). The *direct impact* is simply the gross income from the sale of cattle and calves. Purchases of feed, fuel and other inputs to conduct cattle operation as well as other intra-industry purchases

by industries in the economy constitute *indirect impact*. Estimation of the indirect effects is accomplished using economic multipliers. This study uses a Type I multiplier (Figure 3) accounting only for the input-flow linkages (the indirect effects). A Type II multiplier accounts for both indirect and induced effects. Entrepreneurs (business firms) and the employees earn profits and wages, respectively. Induced effects account for the personal consumption expenditures made by industry employees and often exaggerate the total impact. In this study, a conservative approach is used to estimate the economic impact by using a Type I multiplier.

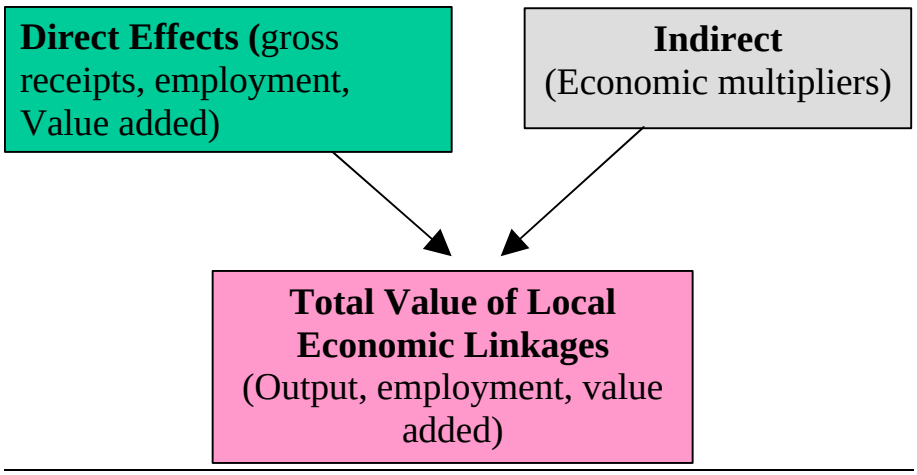

Figure 2: Counting Economic Impacts (A Type I Multiplier)

III. PROFILE OF CATTLE INDUSTRY IN THE 12-COUNTY AREA

Cow/Calf Capital of Missouri

Southwest Missouri is predominantly a cow/calf region. The region produces primarily feeder cattle which are then shipped to backgrounders or feedlots outside the region. There are more than 12,000 cattle farms (nearly 20% of the state's cattle inventory), including more than 10,000 beef cow farms, with an inventory of nearly 400,000 animals (Table 2). More than 75% of all farms raise cattle in the 12-county area, compared to only 60% for the state of Missouri. Nearly 90% of the cattle operators raise beef cattle. Although the dairy industry has been in decline, the area in Southwest Missouri holds over 1,000 milk cow farms (approximately 30% of the number of milk cow farms in Missouri) with more than 40,000 milk cows. Since five out of the top 10 cattle counties in the state of Missouri in terms of number of cattle farms belong to the 12-county area (Figure 3), the cattle industry of the state has been highly influenced by the trend set by this area. For example, the sharp decline in cattle inventory in the latter part of the 1990's and the subsequent recovery beginning in 2002 are virtually identical between the 12-county area and the state of Missouri (Figure 4).

Table 2: Cattle operation in the 12-County Economic Area

	Number of Cattle Operations[1]	Number of Beef Cow Operations[1]	Number of All Cattle[2]	Number of Beef Cattle[2]
Barry	1,352	1,206	94,000	47,500
Cedar	744	690	50,900	28,000
Christian	957	810	56,900	26,000
Dade	735	660	67,300	34,800
Dallas	956	774	60,300	23,100
Greene	1,442	1,222	72,200	34,900
Laclede	1,045	880	66,200	28,000
Lawrence	1,414	1,208	96,900	45,000
Polk	1,421	1,234	106,300	52,200
Stone	493	432	27,700	14,300
Taney	383	343	22,200	13,300
Webster	1,473	1,029	85,100	25,300
12-County Area	12,415	10,488	806,000	372,400
Missouri	64,862	56,057	4,400,000	2,121,000

Source: [1]Census of Agriculture, USDA, 2002
[2]National Agricultural Statistical Service (NASS), 2005

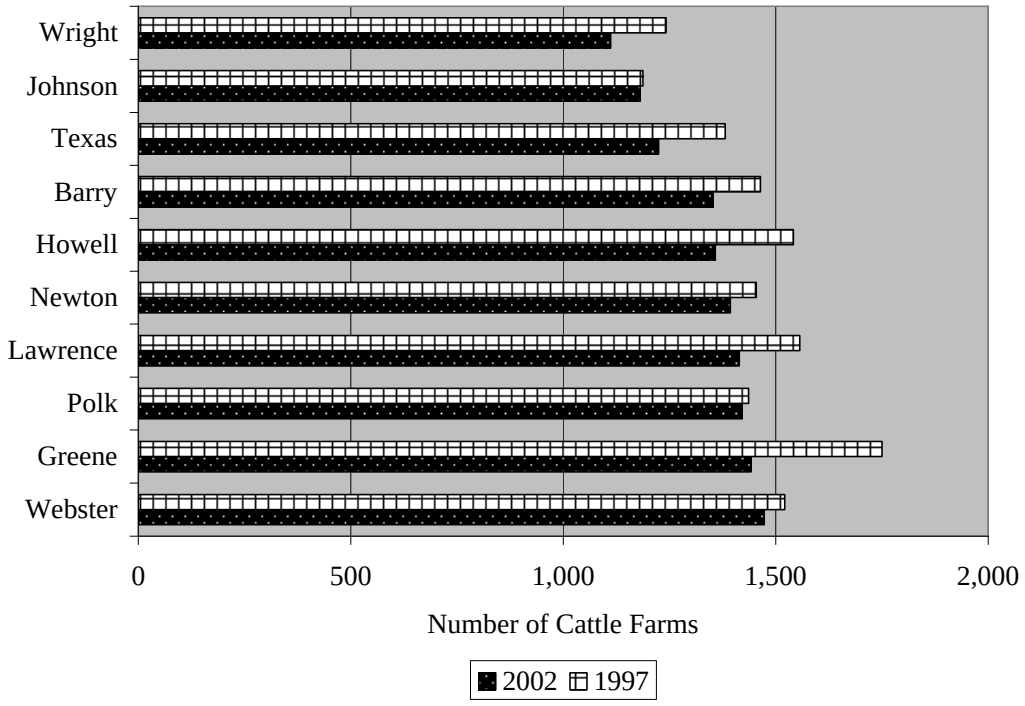

Figure 3: Top ten counties in Missouri in terms of number of cattle operations.

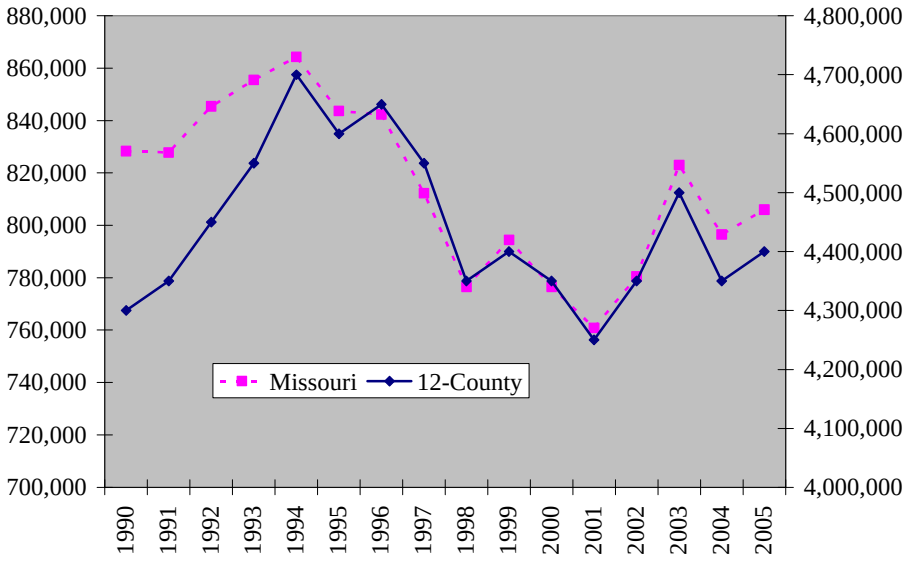

Figure 4: All Cattle Trend in Missouri and the 12-County Area

Cattle inventory numbers for Missouri and the 12-county area tend to have a similar 10 year-cycle (Figure 5). The inventory cycle for the last ten years shows that both the 12-county area and the state of Missouri as a whole have similar liquidation patterns. The lowest level of inventory for the 12-county area and for the state of Missouri occurred in the same year. However, farmers in the 12-county area have been increasing their inventory much more rapidly than those in the state. By 2006, the inventory level in the 12-county area had increased nearly 7% from the 1995 level, compared to only 4% for Missouri.

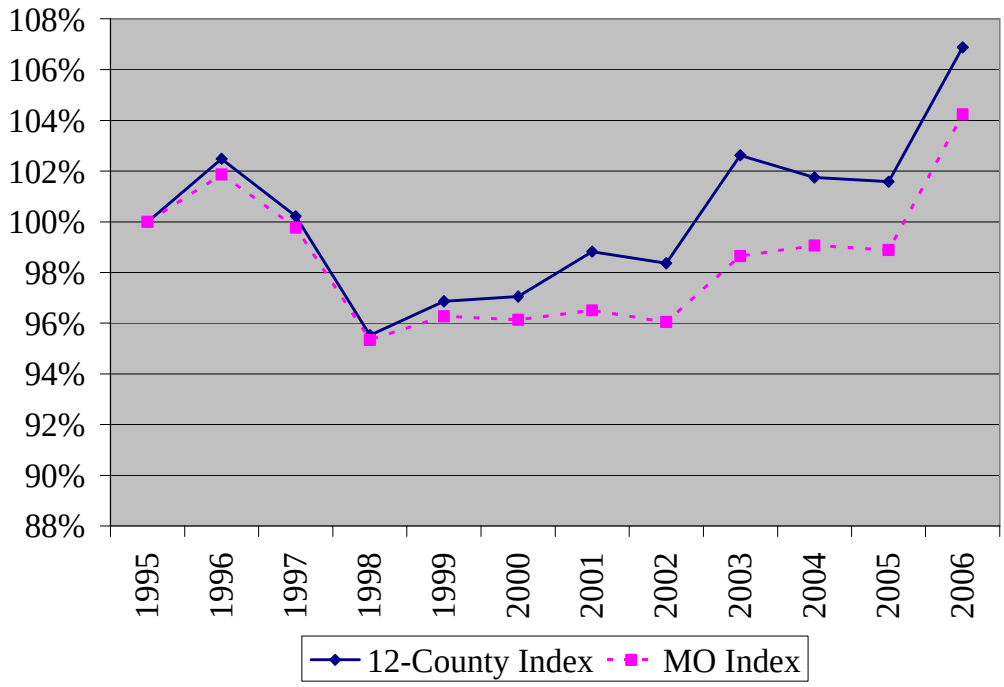

Figure 5: Beef cattle inventory cycle of the 12-county area and Missouri

Role of Cattle Farming

Farming in general and cattle operations in particular play an important role across the counties in the area studied. There are six farms and five cattle operations for every 100 households in the 12-county area, compared to only 4 and 3, respectively, for the state of Missouri (Figure 6). These numbers are considerably higher in Dade, Dallas, Webster and Polk counties as compared to the average for the area, as well as the state, hence underscoring the importance of cattle farming in these counties. For example, there are 23 farms and 19 cattle operations for every hundred households in Dade County. Counties with urban centers such as Greene (Springfield), Christian (Nixa), and Taney (Branson) counties have fewer farms and cattle operations in relation to the number of households. These counties have a diversified economy and less reliance on the cattle industry.

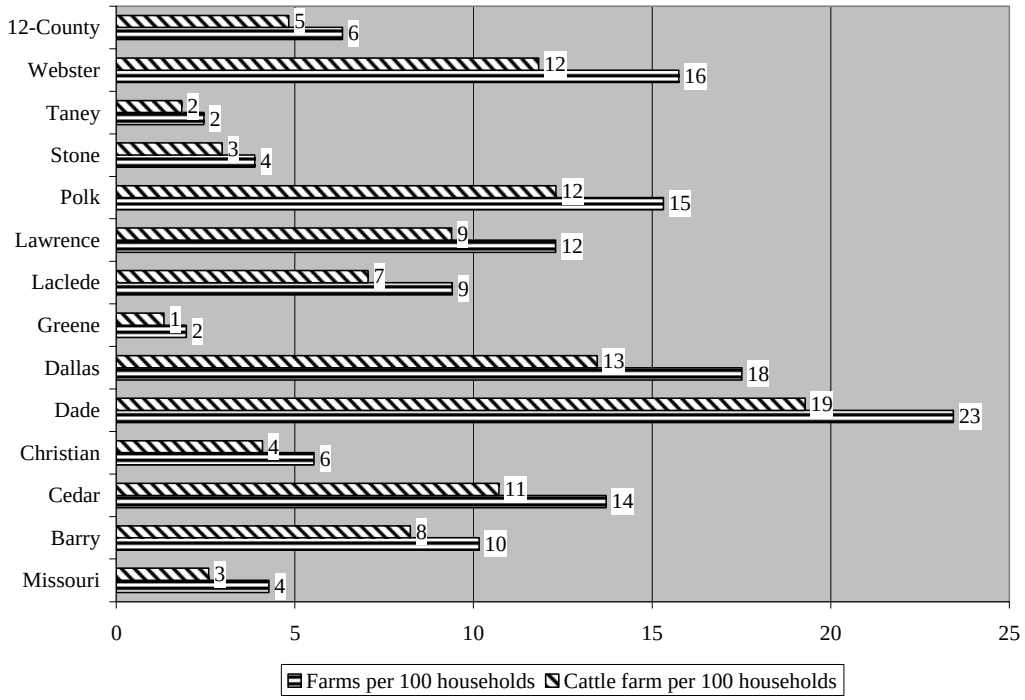

Figure 6: Intensity of cattle operations in the 12-county area

The relationship between population and number of beef cattle reported in Figure 7 depicts an interesting variation across counties in the 12-county area. While there are 66 head of beef cattle for every 100 people in the 12-county area, there are 440 cattle for every 100 people in Dade County. For Cedar and Polk counties, the number is 200 for every 100 people. Greene County represents the other end of the spectrum where for every 100 people there are only 14 beef cattle.

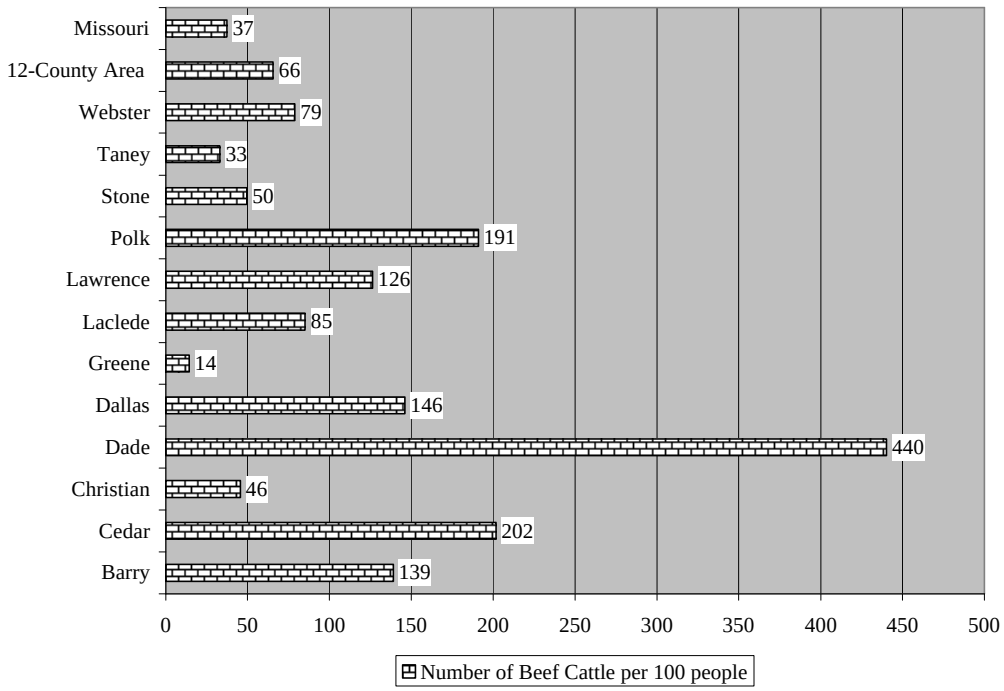

Figure 7: Number of beef cattle for every 100 people across counties in the area.

Size of 12-county Cattle Operations

The area's beef cattle industry is largely dominated by small operators. Nearly 80% of the beef cow farms have less than 50 head of cattle (Table 3). These small operators represent more than a third of the cattle inventory. Beef operators with 50 to 99 head herd size constitute 13% of the total and carry 27% of the inventory. These two groups combined make up 93% of the entire farms and carry nearly two-thirds of the inventory. Farms with 100 to 499 head herd size make up nearly 7% of the total operators and carry 32% of the inventory. There are only 30 large operators with more than 500 head of beef cows in the 12-county area. They represent less than half of one percent of all beef farms and carry an inventory of nearly five percent of the total inventory. Across the counties within the 12-county area, however, there is a wide variation in size distribution.

Table 3: Beef Cattle Operations, by Size and Inventory in 12-County Area

	1-49 head	50-99 head	100-499 head	Over 500 head
Number of Operations	8,342	1,391	725	30
Percent of Operations	79.54%	13.26%	6.91%	0.29%
Percent of Inventory	36.04%	27.23%	31.86%	4.87%

Source: Census of Agriculture, 2002

Beef cattle operations by size across counties in the area are reported in Table 4. While Greene County has the largest number of small operators, Dade County holds the largest number of commercial size operations with more than 500 head herds. The 12-county area as a whole has 30 large operations (more than 500 head); there are 100 such operations in the entire state.

Table 4: Beef Cattle Operation by Size across Counties in 12-County Area

Counties	1 to 49 head	50 to 99 head	100 to 499 head	over 500 head
Barry	939	173	87	7
Cedar	517	118	53	2
Christian	662	101	47	-
Dade	434	135	82	9
Dallas	626	94	53	1
Greene	1056	107	57	2
Laclede	710	123	47	-
Lawrence	934	164	107	3
Polk	947	176	106	5
Stone	363	46	22	1
Taney	276	47	20	-
Webster	878	107	44	-
12-County Total	8342	1391	725	30
Missouri Total	46,000	8,200	3,700	100

Source: Census of Agriculture, 2002

IV. ECONOMIC IMPACT OF THE BEEF CATTLE INDUSTRY

In 2005, the 12-county area's over 10,000 beef farms marketed nearly 312,000 head of beef cattle, resulting in total gross cash receipts of nearly $210 million (Figure8). That year, beef farmers in the area experienced the highest beef prices and, thus, the highest cash receipts despite a decline in the number of cattle sold compared to previous years. In 2005, the estimated gross cash receipts from beef operations in the area were nearly $210 million, an increase of 4% from 2004 and an increase of 45% from 2002 when price and income were the lowest in the last five years. A favorable income situation is expected to have made a favorable impact on the economy.

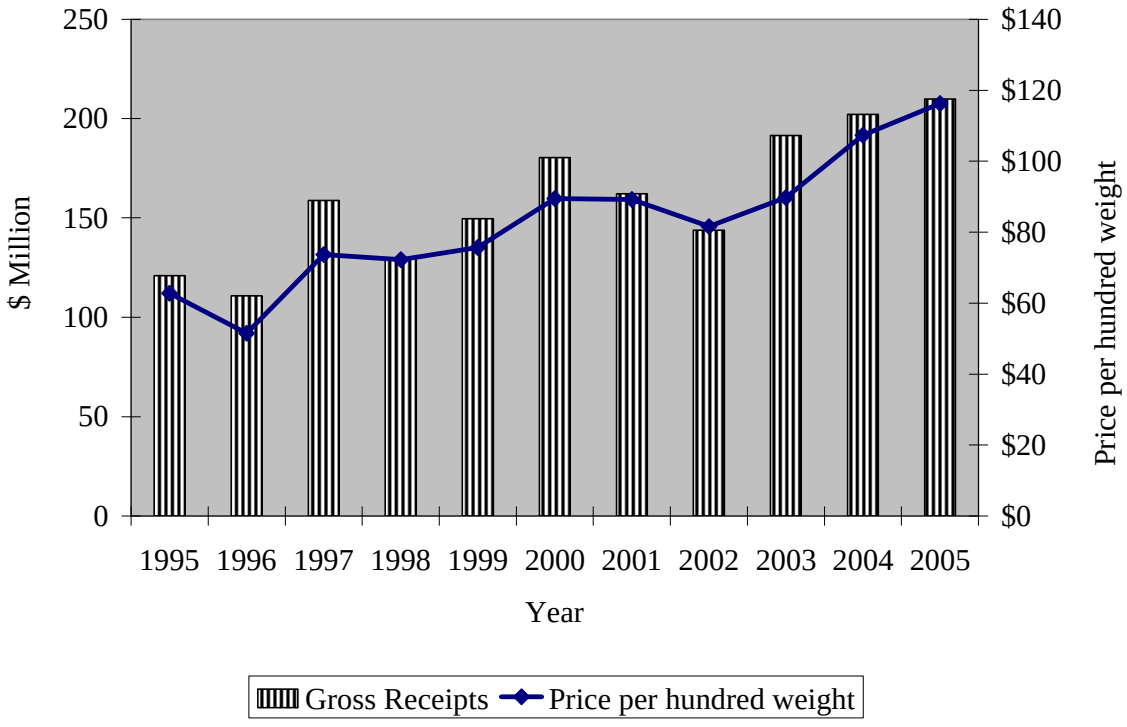

Figure 8: Gross Cash Receipts from Beef Cattle and Beef Cattle Price
Source: National Agricultural Statistics Services, 2006.

The economic impact due to change in the gross receipts from beef cattle sales by cattle producers was estimated in terms of output, employment, value-added, and labor income. The total estimated impact includes direct and indirect impacts. As discussed above, the indirect impact represents the indirect effects of increased purchases of inputs among related industries due to the beef cattle operation. The indirect impacts were estimated using *Implan* computer software.

Output Impacts

Direct Output Impacts

In 2005, the direct output impact of the 12-county area's beef cattle industry due to change in gross cash receipts was estimated to be $210 million. Polk County led the area with $31 million in direct output impact (Figure 9), followed by Webster ($30 million), Lawrence ($22 million), Barry ($21 million), Greene ($20 million) and Dade ($19 million). Among the remaining counties, Dallas, Christian, Laclede, and Cedar were similar in size in terms of gross receipts generated from the sale of beef cattle. Stone and Taney counties brought in the fewest dollars in beef cattle sales.

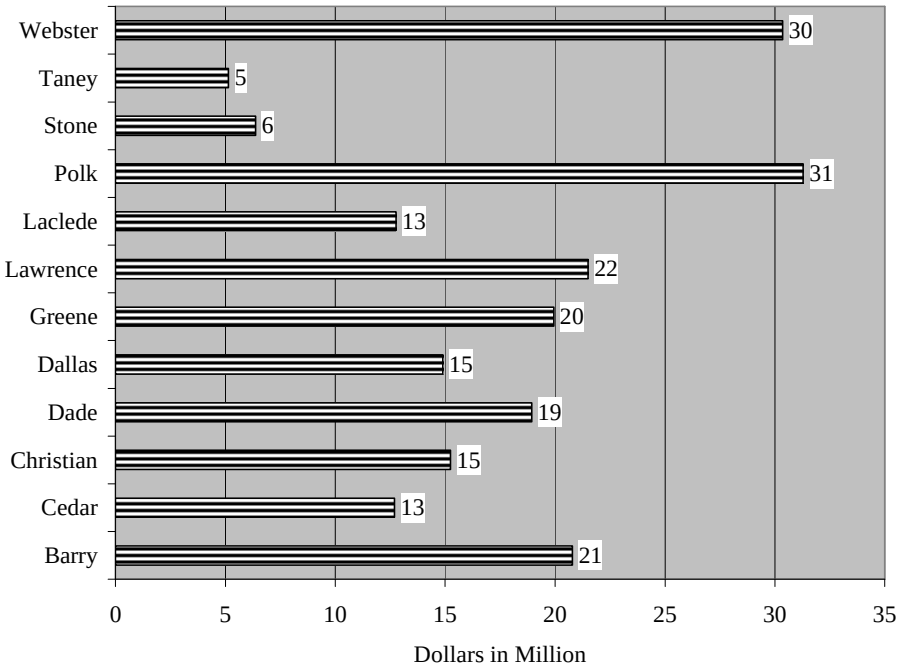

Figure 9: Direct output impact across counties in the 12-county area.

Source: National Agricultural Statistics Services and *Implan* data for twelve counties in Southwest Missouri, MIG, Inc., Stillwater, MN, 2005.

Total Output Impact

In 2005, the total output impact on the 12-county area due to the change in gross receipts from the sale of beef cattle was estimated to be $345 million, including $210 million in direct impact and $135 million in indirect impact on the sectors supporting the beef cattle industry.

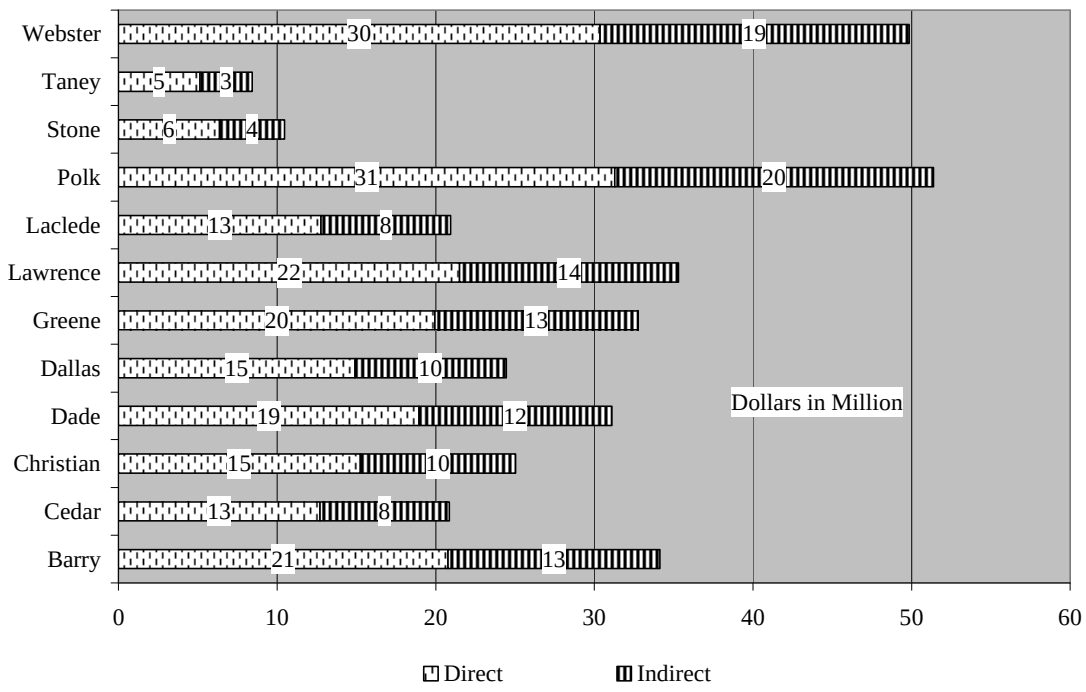

Figure 10: Estimated total output impact across counties in the 12-county area. Source: National Agricultural Statistics Services and *Implan* data for twelve counties in Southwest Missouri, MIG, Inc., Stillwater, MN, 2005.

The total output impact was the greatest in Polk County with over $51 million, including $31 million in direct impact and $20 million in indirect impact (Figure 10). Other counties with a significant output impact included Webster County ($$49 million), Lawrence County ($36 million), Barry County ($34 million), Greene County ($33 million) and Dade County ($31 million).

Employment Impact

Direct Employment Impact

The 12-county area created a total of 7,825 jobs as a result of the change in gross receipts from the beef cattle industry, including 5,474 jobs directly in the beef cattle

industry and 2,350 jobs in industries supporting beef cattle operations. The largest number of jobs was created in Polk County (Figure 11) with 1,156 positions, followed by Webster (1,132) and Lawrence (801). Taney County created least number of jobs with 192 positions.

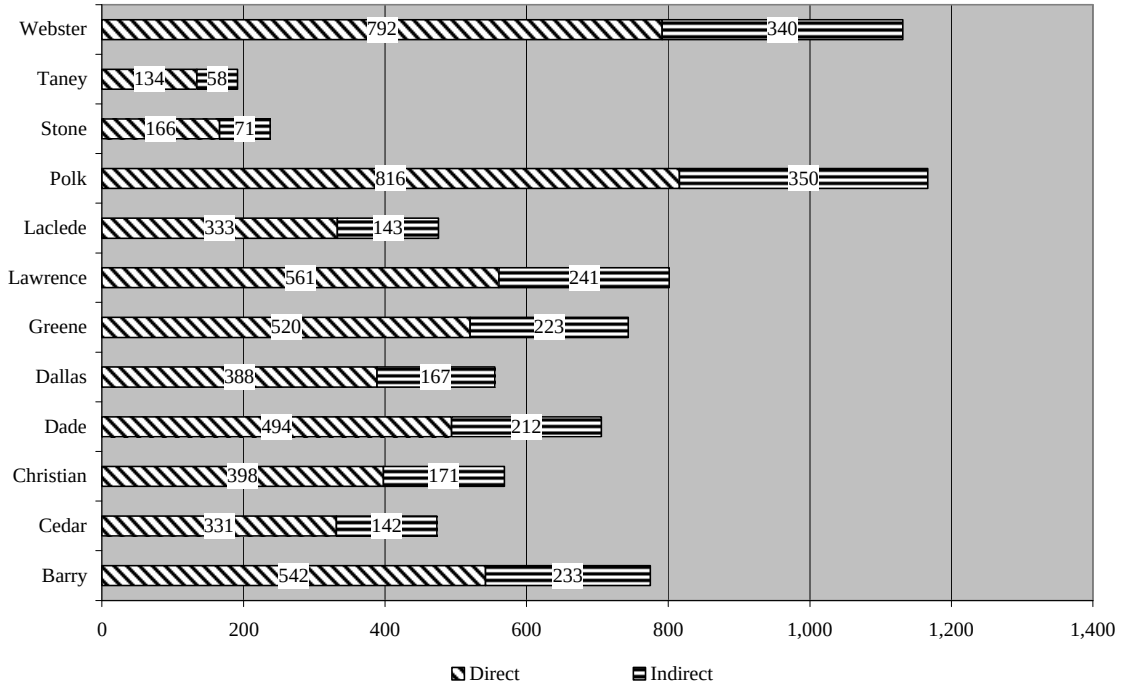

Figure 11: Estimated full-time equivalent employment created across counties in the 12-county area attributed to the beef cattle industry
Source: National Agricultural Statistics Services and *Implan* data for twelve counties in Southwest Missouri, MIG, Inc., Stillwater, MN, 2005.

Value Added Impact

The final measure of economic activity used in this study was value-added. Value-added is a measure of personal and business net income including labor income (employee compensation and proprietor's income), indirect business taxes paid and other property type income. The 12-county area's beef cattle industry created $113 million in

total value-added, including $40 million in direct value-added and $72 million in indirect value-added from gross receipts from the sale of beef cattle (Figure 12).

Figure 12: Estimated value-added created by the beef cattle industry in the 12-county area
Source: National Agricultural Statistics Services and *Implan* data for twelve counties in Southwest Missouri, MIG, Inc., Stillwater, MN, 2005.

The beef cattle industry created $49 million in labor income. Labor income is a part of value-added consisting of employee compensation and proprietary income. *Employee compensation* includes wage and salary payments, as well as benefits, including health and life insurance, retirement payments, and any other non-cash compensation. It includes all income to workers paid by employers. *Proprietary income* consists of payments received by self-employed individuals as income. In addition, $50

million in other property type income and $13 million in indirect business taxes, including excise and sales taxes, was created by the beef cattle industry.

The amount of valued-added created by beef cattle operations varied across counties in the area studied. Polk and Webster counties combined created $33 million in value- added, representing nearly one-third of the total amount of value-added in the 12-county area.

Table 5: Value-added impact across the 12-county area

	Labor Income	**Other Property Type Income**	**Indirect Business Tax**	**Total Value-Added**
Barry	$4,884,746	$4,972,066	$1,291,677	$11,148,488
Cedar	$2,984,762	$3,038,118	$789,263	$6,812,144
Christian	$3,583,993	$3,648,061	$947,718	$8,179,772
Dade	$4,450,343	$4,529,897	$1,176,807	$10,157,047
Dallas	$3,500,239	$3,562,810	$925,571	$7,988,620
Greene	$4,687,310	$4,771,101	$1,239,469	$10,697,879
Lawrence	$5,053,370	$5,143,705	$1,336,266	$11,533,340
Laclede	$2,998,163	$3,051,759	$792,806	$6,842,728
Polk	$7,354,255	$7,485,720	$1,944,690	$16,784,665
Stone	$1,496,848	$1,523,606	$395,813	$3,416,267
Taney	$1,207,172	$1,228,751	$319,213	$2,755,136
Webster	$7,133,815	$7,261,339	$1,886,399	$16,281,553
12-County Area	$49,335,015	$50,216,933	$13,045,691	$112,597,639

Source: National Agricultural Statistics Services and *Implan* data for twelve counties in Southwest Missouri, MIG, Inc., Stillwater, MN, 2005

Impact of the Beef Cattle Industry on the General Economy of the 12-County Area

The direct and indirect economic impacts need to be further analyzed to examine the forward and backward linkages of the beef industry with other industries in the 12-county area. The results of the input-output analysis are presented in Table 6 with

estimates of the total effects (direct plus indirect) presented for ten general sectors in the 12-county economy. These numbers show the magnitude of change stimulated by the beef industry across other industrial sectors in the 12-county area.

Table 6: Economic Impact of the Beef Cattle Industry on General Economic Sectors in the 12-County Area.

Industrial Sectors	**Output (Gross Receipt)**	**Income**	**Value-Added**	**Jobs**
Agriculture	$277,628,092	$29,486,167	$71,675,488	7,152
Mining	$4,996	$1,657	$2,947	0
Utilities	$2,426,871	$529,632	$1,709,381	8
Construction	$1,711,643	$784,491	$811,076	23
Manufacturing	$3,394,961	$676,709	$998,975	16
Transportation and Warehousing	$17,361,611	$7,270,761	$11,227,420	179
Retail Trade	$685,332	$312,727	$514,483	13
Information Services	$1,639,130	$456,622	$858,675	12
Finance, Insurance and Real Estate	$24,343,727	$4,529,694	$15,953,683	224
Professional and Technical Services	$7,759,237	$3,612,132	$4,242,036	133
Other Services	$3,628,278	$1,235,187	$1,504,817	55
Government	$4,078,657	$439,234	$3,098,658	9
Total for 12-County	$344,662,535	$49,335,014	$112,597,639	7,825

Source: National Agricultural Statistics Services and *Implan* data for twelve counties in Southwest Missouri, MIG, Inc., Stillwater, MN, 2005

The estimated increase in the value of output by production agriculture, including beef cattle operations, along with grain and other crop farming due to the beef operations in the 12-county area was $278 million. In addition, the total income increased by nearly $30 million, and more than seven thousand jobs were added. Nearly six thousand jobs are directly attributed to cattle ranching and farming. As discussed above, the estimated employment figures are based on a per job unit consistent with the definitions used by the

United States Department of Commerce. Since nearly 80% of the cattle operations in the area have less than 50 head of cattle, most of these jobs are likely to be less than full-time positions.

Due to a limited number of processing activities within the 12-county area, the estimated increase in output in manufacturing sectors, including animal food manufacturing and meat processing, was only $3.4 million. The increase in income was estimated be nearly $1 million.

Some of the other important sectors significantly linked with beef operations in the 12-county area were finance, insurance and real estate ($24 million in output; 224 jobs) and transportation and warehousing ($17 million in output; 179 jobs).