# Economic Contributions of the US Beef Industry

Leah English, M.S. & Jennie Popp, PhD

National Cattlemen's Beef Association Meeting

November 16-17, 2020

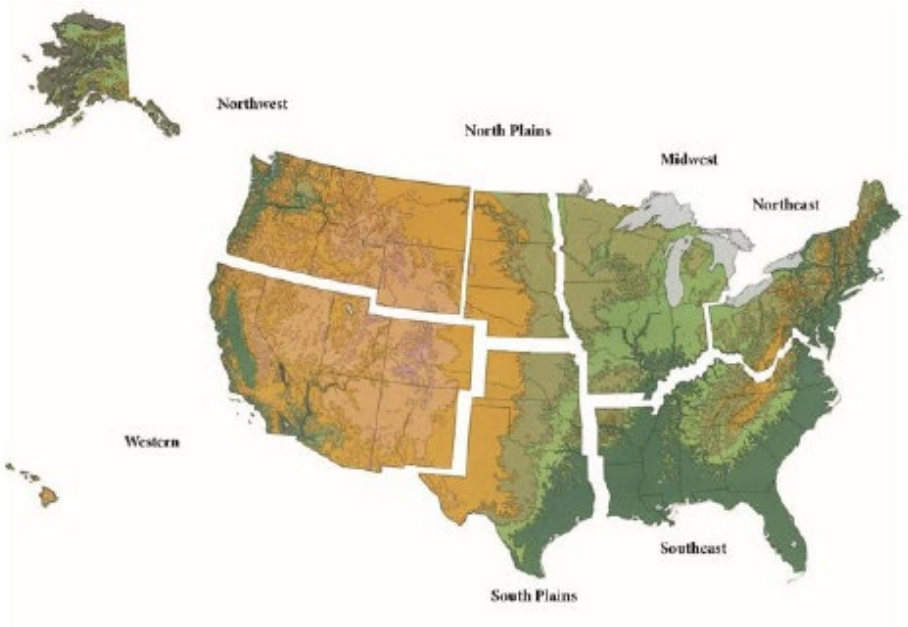
DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

# Economic Contributions of the US Beef Industry

- Study 1:
  - Method: Hypothetical Extraction (IMPLAN)
  - Completed: June 2017
  - Data Year: 2014

- Study 2:
  - Method: Economic Base Contribution (ASAM)
  - Completed: August 2019
  - Data Year: 2016

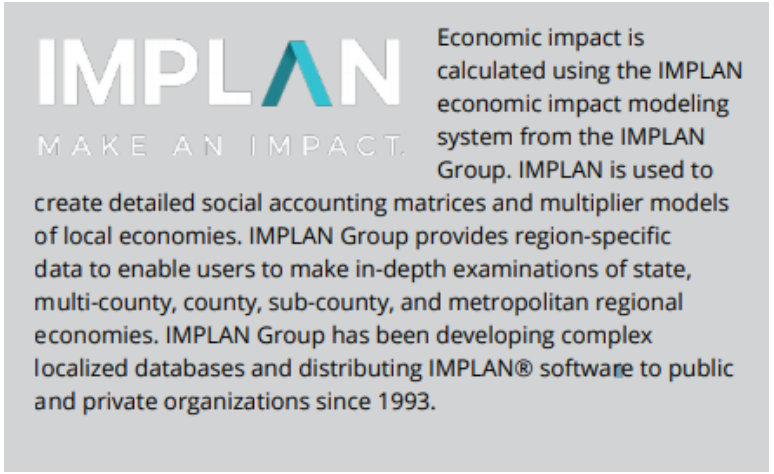



IMPLAN was primary data source for both studies

# Baseline Data: Overview

## IMPLAN Database

- Comprehensive economic dataset
  - Combine data from several sources
    - Bureau of Economic Analysis (BEA)
    - Agriculture: (“Special Sector”)
      - Census of Agriculture
      - ERS Annual Cash Receipts
      - NASS value of production
  - Output, employment, labor income, taxes, etc.
  - National, state, county, MSA, congressional districts




Source: Northstar Analytics/University of Wisconsin System, 2018.
https://www.wisconsin.edu/economic-development/download/Econ-Impact-web.pdf

# Baseline Data: Overview

## IMPLAN Database and Software

- Widely used:
  - Higher ed institutions
  - Economic development organizations
  - Governments
  - Advocacy groups
  - Corporations
  - Consulting

# Baseline Data: Overview

- Issues:
  - **Farm sector values difficult to estimate**:
    - Operation classification
      - Beef and Dairy Cattle
      - Cow-calf/Backgrounding
    - Farm Employment
      - Off-farm employment
      - Unpaid Labor
      - Seasonal Labor
    - Accuracy may decrease below national level
      - Annual values may be derived from non-annual sources
        - NASS and ERS to get some annual values (state-level)
        - Other values extrapolated from census of ag (county-level)

**These factors may cause issues when comparing values across different studies.**

# Baseline Data: IMPLAN Beef Sectors

- Beef Production (on-farm)
  - Sector 11 – “Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming”

- Beef Processing (post-farm)
  - Sector 89 – “Animal, except poultry, slaughtering”
  - Sector 90 – “Meat processed from carcasses”
  - Sector 91 – “Rendering and meat byproduct processing”

# Baseline Data: Beef Production (on-farm)

- Sector 11 – “Beef cattle ranching and farming, including feedlots and dual-purpose ranching and farming”

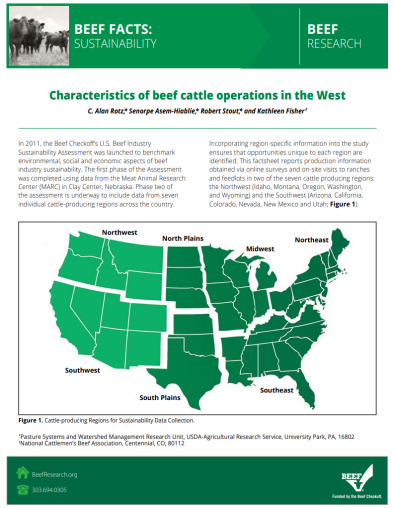
**Study 1**: All on-farm beef value was aggregated into one sector.

**Study 2**: On-farm beef was disaggregated into 3 sub-sectors:

- Cow-calf
- Backgrounding
- Feedlot

# Baseline Data: Beef Production (on-farm)

- Industry disaggregated using 2016 survey data provided by Dr. C. Alan Rotz
  - Rotz data provided estimations for # of head in different operations for each state


BEEF FACTS: SUSTAINABILITY | BEEF RESEARCH

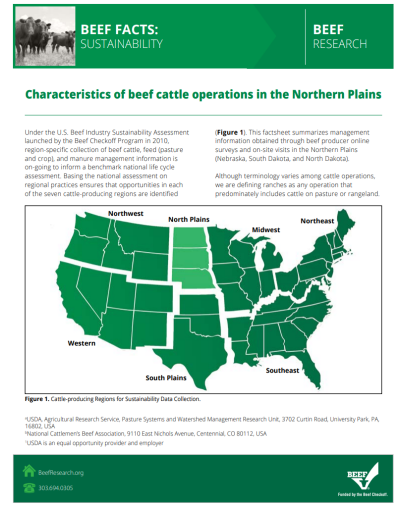
Characteristics of beef cattle operations in the West

C. Alan Rotz,* Senorpe Asem-Hiablie,* Robert Stout,* and Kathleen Fisher†

Northwest
North Plains
Midwest
Northeast
Southwest
South Plains
Southeast

Figure 1. Cattle-producing Regions for Sustainability Data Collection.

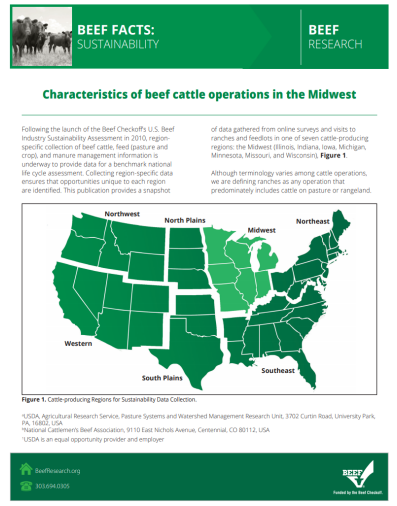
*Pasture Systems and Watershed Management Research Unit, USDA-Agricultural Research Service, University Park, PA, 16802
†National Cattlemen's Beef Association, Centennial, CO, 80112


BEEF FACTS: SUSTAINABILITY | BEEF RESEARCH

Characteristics of beef cattle operations in the Northern Plains

Northwest
North Plains
Midwest
Northeast
Western
South Plains
Southeast

Figure 1. Cattle-producing Regions for Sustainability Data Collection.


BEEF FACTS: SUSTAINABILITY | BEEF RESEARCH

Characteristics of beef cattle operations in the Midwest

Northwest
North Plains
Midwest
Northeast
Western
South Plains
Southeast

Figure 1. Cattle-producing Regions for Sustainability Data Collection.

- 2016 head of cattle numbers for each were translated to dollars using weight and average price data from USDA AMS

**Head of Cattle by Operation Type - Kansas (2013-2017)**

| Operation Type | Cows (# of head) | Stocker-Background (# of head) | Finished (# of head) |
|---|---|---|---|
| Cow-Calf | 411,939 | | |
| Cow-Calf/Stocker | 722,700 | 556,479 | |
| Cow-Calf/Finish | 310,761 | 239,286 | 233,304 |
| Stocker/Background | | 2,478,421 | |
| Finish | | | 3,962,582 |
| Dairy Cows | 44,711 | | |
| Holstein Finish | | 430,078 | 419,589 |
| NATIONAL TOTAL | 1,490,111 | 3,704,265 | 4,615,474 |

# Baseline Data: Beef Production (on-farm)

IMPLAN's sector 11 output value disaggregated into 4 production areas

- State values were aggregated by study region
- Values attributed to dairy farms were shifted from the beef to dairy sector

| REGION | Cow-Calf | Stockers and Backgrounding | Feedlot |
|---|---|---|---|
| Southern Plains | $6,536,000,000 | $3,618,000,000 | $7,940,000,000 |
| Northern Plains | $5,089,000,000 | $62,000,000 | $8,746,000,000 |
| Midwest | $3,697,000,000 | $1,482,000,000 | $3,240,000,000 |
| Northwest | $3,094,000,000 | $275,000,000 | $1,447,000,000 |
| Southwest | $2,323,000,000 | $40,000,000 | $2,804,000,000 |
| Southeast | $2,995,000,000 | $1,219,000,000 | $56,000,000 |
| Northeast | $789,000,000 | $298,000,000 | $173,000,000 |

# Baseline Data: Beef Processing (post-farm)

**Sector 89** – "Animal, except poultry, slaughtering" → Cattle Harvest

**Sector 90** – "Meat processed from carcasses" → Beef Processing

**Sector 91** – "Rendering and meat byproduct processing" → Beef By-Products

In addition to beef, these sectors include the value of other red meats such as pork, mutton, and lamb.

- Beef value was separated from other red meat using several sources:
  - NASS Livestock Slaughter Annual Summary
  - AMS 5 Area Weekly Direct Slaughter Cattle Report
  - AMS By-Product Drop Value Report
  - AMS Weekly Boxed Beef Cutout and Boxed Beef Cuts Report
  - Feedstuffs market price reports

# Baseline Data: Beef Processing (post-farm)

**Sector 89** – "Animal, except poultry, slaughtering" → Cattle Harvest

**Sector 90** – "Meat processed from carcasses" → Beef Processing

**Sector 91** – "Rendering and meat byproduct processing" → Beef By-Products

| REGION | Cattle Harvest (million $'s) | Beef Processing (million $'s) | Beef By-products (million $'s) |
|---|---|---|---|
| Southern Plains | 18,040 | 7,982 | 390 |
| Northern Plains | 16,081 | 2,897 | 148 |
| Midwest | 14,022 | 10,895 | 197 |
| Northwest | 2,793 | 1,774 | 95 |
| Southwest | 9,571 | 4,252 | 397 |
| Southeast | 4,611 | 3,787 | 695 |
| Northeast | 5,076 | 7,079 | 293 |
| **NATIONAL TOTAL** | **70,188** | **38,666** | **2,215** |

Output → jobs, employee compensation, value added

# Baseline Data: Disaggregation Results

Output (sales) ratios can be used to derive regional values for jobs, employee compensation, and value added for each of the beef sectors.

| Sector | Sales (million $'s) | Jobs | Employee Compensation (million $'s) | Total Value Added (million $'s) |
|---|---|---|---|---|
| Cow-Calf | 24,523 | 238,335 | 582 | 5,994 |
| Stocker/Backgrounding | 6,994 | 67,976 | 166 | 1,710 |
| Feedlot | 24,407 | 237,208 | 579 | 5,966 |
| ***On-farm Production Total*** | **55,924** | **543,519** | **1,327** | **13,669** |
| Cattle Harvest | 70,188 | 100,342 | 5,151 | 10,084 |
| Beef Processing | 38,666 | 73,269 | 4,065 | 5,964 |
| Beef By-products | 2,215 | 4,358 | 302 | 365 |
| ***Post-farm Harvest and Processing Total*** | **111,070** | **177,969** | **9,517** | **16,413** |
| ***BEEF INDUSTRY TOTAL*** | ***166,994*** | ***721,488*** | ***10,844*** | ***30,082*** |

Represent the actual value of sales, jobs, employee compensation, and value added by the beef industry in 2016.

# Baseline Data: What can you do with this?

Determine relative economic importance across regions:

Share of beef to the total regional value:

- Beef makes up a significantly larger share of the Northern Plains economy than any other region

| Region: | Sales | Jobs | Employee Compensation | Value Added |
|---|---|---|---|---|
| United States | 0.5% | 0.4% | 0.1% | 0.2% |
| Southern Plains | 1.2% | 1.2% | 0.3% | 0.4% |
| Northern Plains | 7.6% | 3.4% | 1.7% | 2.7% |
| Midwest | 0.6% | 0.4% | 0.2% | 0.2% |
| Northwest | 0.6% | 0.4% | 0.1% | 0.2% |
| Southwest | 0.3% | 0.2% | 0.1% | 0.1% |
| Southeast | 0.2% | 0.2% | 0.0% | 0.1% |
| Northeast | 0.2% | 0.1% | 0.0% | 0.0% |

# Baseline Data: What can you do with this?

<u>Determine relative economic importance across regions:</u>

Portion of U.S. beef industry total represented by each region

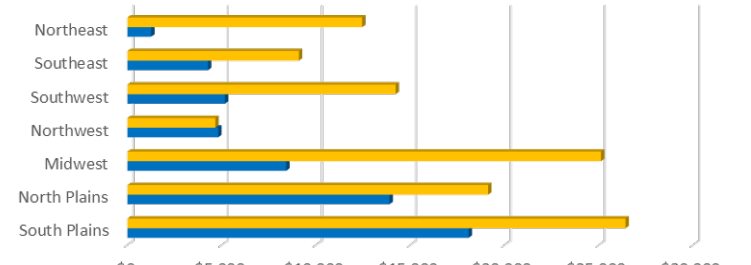
- **Southern Plains largest share across all categories**
- **Midwest 2nd largest share of sales, employee comp., and value added**
- **Northern Plains 3rd in sales, employee comp., and value added**

| Region: | Sales | Jobs | Employee Compensation | Value Added |
|---|---|---|---|---|
| Southern Plains | 26.7% | 33.6% | 23.4% | 28.3% |
| Northern Plains | 19.8% | 11.9% | 17.3% | 19.2% |
| Midwest | 20.1% | 18.0% | 23.0% | 21.2% |
| Northwest | 5.7% | 6.0% | 4.5% | 6.1% |
| Southwest | 11.6% | 8.5% | 12.3% | 9.5% |
| Southeast | 8.0% | 14.6% | 7.8% | 8.4% |
| Northeast | 8.2% | 7.0% | 11.4% | 7.4% |

# Baseline Data: What can you do with this?

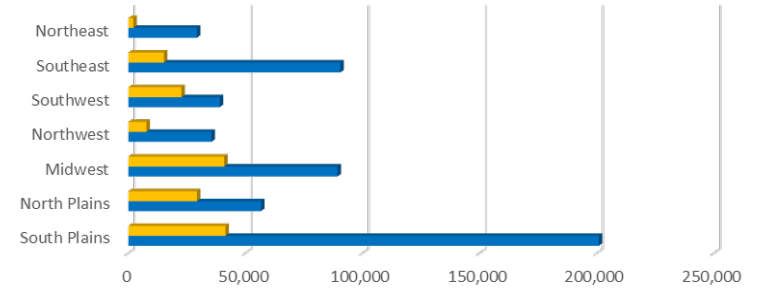
## Determine relative economic importance across regions:

### Sales (million $'s)



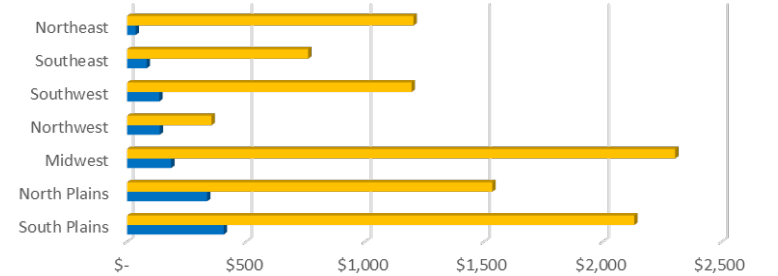

| | South Plains | North Plains | Midwest | Northwest | Southwest | Southeast | Northeast |
|---|---|---|---|---|---|---|---|
| Processing | $26,413 | $19,126 | $25,114 | $4,661 | $14,220 | $9,092 | $12,448 |
| Production | $18,095 | $13,898 | $8,420 | $4,815 | $5,168 | $4,270 | $1,259 |

### Jobs



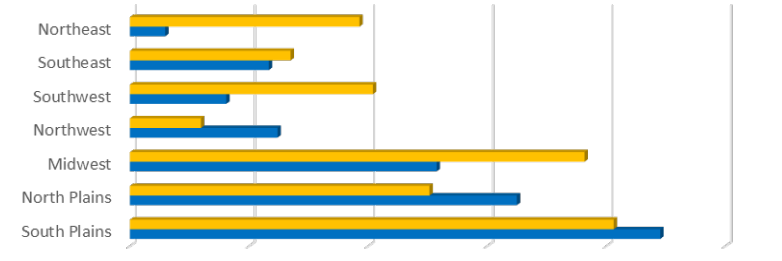

| | South Plains | North Plains | Midwest | Northwest | Southwest | Southeast | Northeast |
|---|---|---|---|---|---|---|---|
| Processing | 41,424 | 29,262 | 40,886 | 7,719 | 22,612 | 15,176 | 2,110 |
| Production | 200,802 | 56,601 | 89,274 | 35,486 | 39,012 | 90,469 | 29,231 |

### Employee Compensation (million $'s)




| | South Plains | North Plains | Midwest | Northwest | Southwest | Southeast | Northeast |
|---|---|---|---|---|---|---|---|
| Processing | $2,132 | $1,535 | $2,304 | $355 | $1,196 | $761 | $1,204 |
| Production | $406 | $336 | $185 | $137 | $135 | $82 | $36 |

### Total Value Added (million $'s)




| | South Plains | North Plains | Midwest | Northwest | Southwest | Southeast | Northeast |
|---|---|---|---|---|---|---|---|
| Processing | $4,062 | $2,515 | $3,817 | $596 | $2,040 | $1,349 | $1,927 |
| Production | $4,453 | $3,249 | $2,575 | $1,239 | $809 | $1,166 | $296 |

# Baseline Data: What can you do with this?

Determine relative economic importance:

- On-farm beef = 0.2% sales, 0.3% jobs
- Post-farm beef = 0.3% sales, 0.1% jobs
- **Beef Industry = 0.5% U.S. sales, 0.4% U.S. jobs**

| 2-Digit Code | NAICS Sector | Sales | Jobs | Employee Compensation | Value Added |
|---|---|---|---|---|---|
| 11 | Agriculture, Forestry, Fishing and Hunting | 1.3% | 1.9% | 0.6% | 0.9% |
| 21 | Mining, Quarrying, and Oil and Gas Extraction | 1.2% | 0.7% | 0.8% | 1.4% |
| 22 | Utilities | 2.0% | 0.3% | 0.8% | 1.5% |
| 23 | Construction | 5.2% | 5.4% | 4.2% | 4.5% |
| 31-33 | Manufacturing | 20.3% | 6.7% | 10.0% | 11.2% |
| 42 | Wholesale Trade | 4.9% | 3.5% | 5.2% | 5.8% |
| 44-45 | Retail Trade | 4.7% | 9.5% | 5.5% | 5.5% |
| 48-49 | Transportation and Warehousing | 3.4% | 3.5% | 3.3% | 3.0% |
| 51 | Information | 5.2% | 1.8% | 3.4% | 4.7% |
| 52 | Finance and Insurance | 7.6% | 5.0% | 7.4% | 7.4% |
| 53 | Real Estate and Rental and Leasing | 10.5% | 4.5% | 1.4% | 12.7% |
| 54 | Professional, Scientific, and Technical Services | 7.3% | 7.7% | 10.8% | 8.4% |
| 55 | Management of Companies and Enterprises | 1.8% | 1.3% | 3.0% | 2.0% |
| 56 | Administrative and Support and Waste Management and Remediation Services | 2.8% | 6.3% | 4.2% | 3.2% |
| 61 | Educational Services | 0.8% | 2.2% | 1.7% | 1.0% |
| 62 | Health Care and Social Assistance | 6.7% | 11.2% | 11.4% | 7.5% |
| 71 | Arts, Entertainment, and Recreation | 1.1% | 2.2% | 1.0% | 1.1% |
| 72 | Accommodation and Food Services | 3.1% | 7.8% | 3.5% | 3.2% |
| 81 | Other Services (except Public Administration) | 2.4% | 6.2% | 3.5% | 2.8% |
| 92 | Public Administration | 7.8% | 12.3% | 18.4% | 12.4% |
| | **Totals** | **100.0%** | **100.0%** | **100.0%** | **100.0%** |

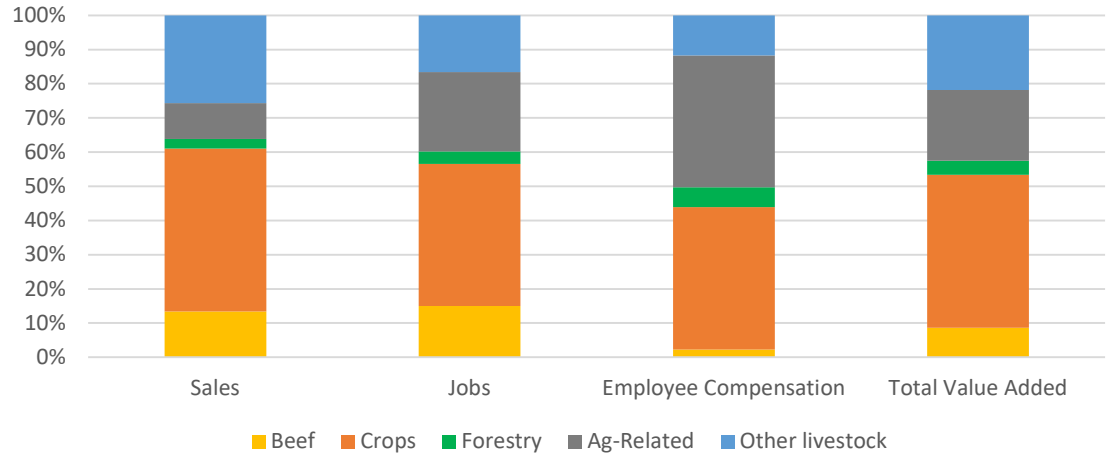
Source: IMPLAN, 2018

*Contain industries related to the beef industry. On-farm beef cattle production industries are included within *Agriculture, Forestry, Fishing and Hunting*. Post-farm cattle harvest and beef processing industries are included under *Manufacturing.*

# Baseline Data: What can you do with this?

Beef's Share of *Agriculture, Forestry, Fishing and Hunting* Value:

- **13.4% sales**
- **15.0% jobs**
- **2.3% employee compensation**
- **8.6% total value added**




Beef's Rank Across *Agriculture, Forestry, Fishing and Hunting* Industries:

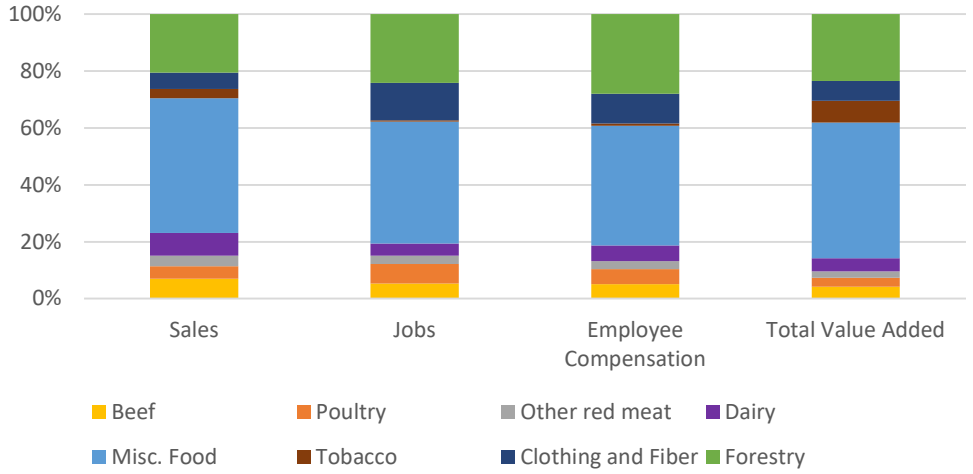
- **2nd in sales**
- **2nd in jobs**
- **12th in employee compensation**
- **2nd in total value added**

| Industry: | Sales | Jobs | Employee Compensation | Total Value Added |
|---|---|---|---|---|
| Grain farming | 1 | 6 | 13 | 8 |
| On-farm beef cattle production | 2 | 2 | 12 | 2 |
| Oilseed farming | 3 | 12 | 18 | 3 |
| Poultry and egg production | 4 | 11 | 8 | 10 |
| Support activities for agriculture and forestry | 5 | 1 | 1 | 1 |
| Dairy cattle and milk production | 6 | 10 | 9 | 6 |
| Animal production, except cattle and poultry and eggs | 7 | 5 | 10 | 4 |
| Fruit farming | 8 | 4 | 2 | 5 |
| Vegetable and melon farming | 9 | 9 | 5 | 7 |
| All other crop farming | 10 | 3 | 4 | 11 |

# Baseline Data: What can you do with this?

Beef's Share of Ag-Related Manufacturing:

- **7.0% sales**
- **5.3% jobs**
- **5.1% employee compensation**
- **4.2% total value added**




Beef's Rank Across Ag-Related Manufacturing Industries:

- **1st in sales**
- **3rd in jobs**
- **4th in employee compensation**
- **3rd in total value added**

| Industry: | Sales | Jobs | Employee Compensation | Total Value Added |
|---|---|---|---|---|
| Cattle harvest and beef processing | 1 | 3 | 4 | 3 |
| Bottled and canned soft drinks & water | 2 | 5 | 5 | 6 |
| Poultry processing | 3 | 2 | 3 | 9 |
| Paperboard container manufacturing | 4 | 4 | 2 | 4 |
| Bread and bakery product, except frozen, manufacturing | 5 | 1 | 1 | 2 |
| Other red meat harvest and processing | 6 | 6 | 6 | 8 |
| Paper mills | 7 | 13 | 40 | 1 |
| Tobacco product manufacturing | 8 | 65 | 22 | 22 |
| Other animal food manufacturing | 9 | 25 | 17 | 23 |
| Cheese manufacturing | 10 | 19 | 4 | 3 |

# Going Further: Contribution Analysis

Economic contribution analysis can show us how an industry interacts with other industries across the economy.

Input-Output based models.

Baseline values they are reported as:

- Direct Effects – (IMPLAN method)
- Gross Contributions – (ASAM method)

# Going Further: Contribution Analysis

**IMPLAN Method** – Hypothetical Extraction

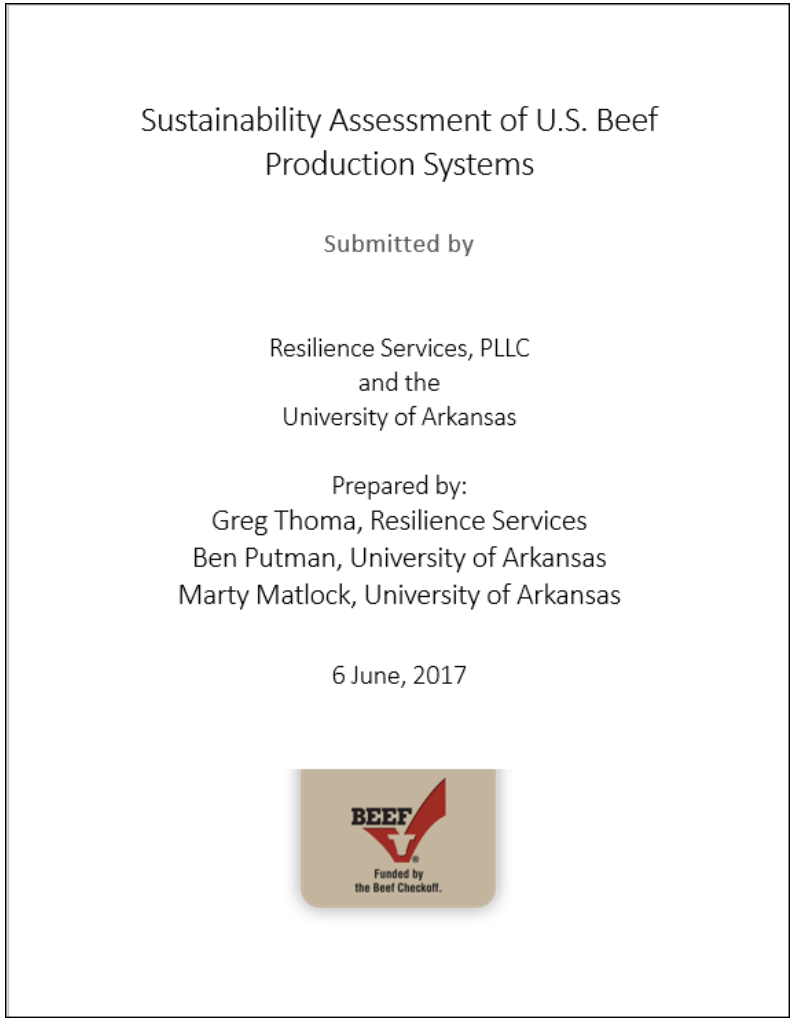
- What would happen if an industry were removed from the economy?

**ASAM Method** – Economic Base

- What role does an industry play in growing/supporting the economy? (i.e. supporting the economic base)

# Economic Contributions of the US Beef Industry

- **Study 1: IMPLAN Method**
  - Advantages:
    - Widely used
    - “Easy” (plug and go)
  - Issues:
    - Limitations to customization
    - Based on unrealistic situation – “hypothetical extraction”
      - Adjustments/substitutions
    - Results may be misleading (i.e. industry appears disproportionately large in relation to economy)


Sustainability Assessment of U.S. Beef Production Systems

Submitted by

Resilience Services, PLLC
and the
University of Arkansas

Prepared by:
Greg Thoma, Resilience Services
Ben Putman, University of Arkansas
Marty Matlock, University of Arkansas

6 June, 2017

BEEF
Funded by the Beef Checkoff.

# Economic Contributions of the US Beef Industry

## Study 1: IMPLAN Method

US Direct, Indirect, and Induced Contributions – Beef Industry (2014)

| **Impact Type** | **Employment** | **Labor Income** | **Total Value Added** |
|---|---|---|---|
| Direct Effect | 882,861.9 | 27,600,035,580.1 | 58,129,513,474.3 |
| Indirect Effect | 506,485.3 | 27,048,925,921.2 | 45,677,141,364.1 |
| Induced Effect | 709,756.2 | 37,263,144,088.9 | 61,597,775,670.1 |
| **Total Effect** | **2,099,103.5** | **91,912,105,590.2** | **165,404,430,508.4** |

# Economic Contributions of the US Beef Industry

## Kansas agriculture and the economy

BY BOB WEEKS ON SEPTEMBER 24, 2018

*What is the importance of agriculture to the Kansas economy?*

United States Representative Roger Marshall said: "My district is the largest ag-producing congressional district in the country, with 60 percent of the economy being ag related. Forty percent of the Kansas economy is ag related." [1]

The Kansas Hospital Association argues: "In Table 5, the total income impact of health care services resulted in an estimated $19.4 billion for the economy. Thus, health care is directly or closely related to about 11.6 percent of the state's total income." [2]

The Kansas Department of Transportation produced a study that finds: "In 2017, $20.6 billion in annual economic benefit was supported by aviation and aviation-related activities in Kansas, supported nearly 91,300 jobs, and generated more than $4.4 billion in annual payroll." [3] $20.6 billion is 14.9 percent of the $138.328 billion Kansas economy.

The nonalcoholic beverage industry says: "With a direct economic impact of $2.0 billion." Then "Factoring in this retail impact further broadens the economic reach of the nonalcoholic beverage industry by an additional $1.7 billion beyond what our industry generates directly." [4] The total of $3.7 billion is about 2.7 percent of the Kansas economy. That's coming just from nonalcoholic beverages.

All this is true. But we need to be careful when counting contributions to the whole. Here, when farmers eat at restaurants, that is counted as induced effects of agriculture contributing to Kansas GDP. But, the restaurant industry counts the production and serving of these meals as its own direct output to Kansas GDP.

Similarly, when the restaurant buys food from a farmer, the purchase counts as indirect effects of the restaurant industry as they purchase inputs and contribute to Kansas GDP. The farmer, of course, considers that as his direct output, again contributing to Kansas GDP.

This economic activity is good and natural, and the more, the better. But we can't count it twice when allocating GDP to industries.

# Economic Contributions of the US Beef Industry

**Georgia Farm Bureau**

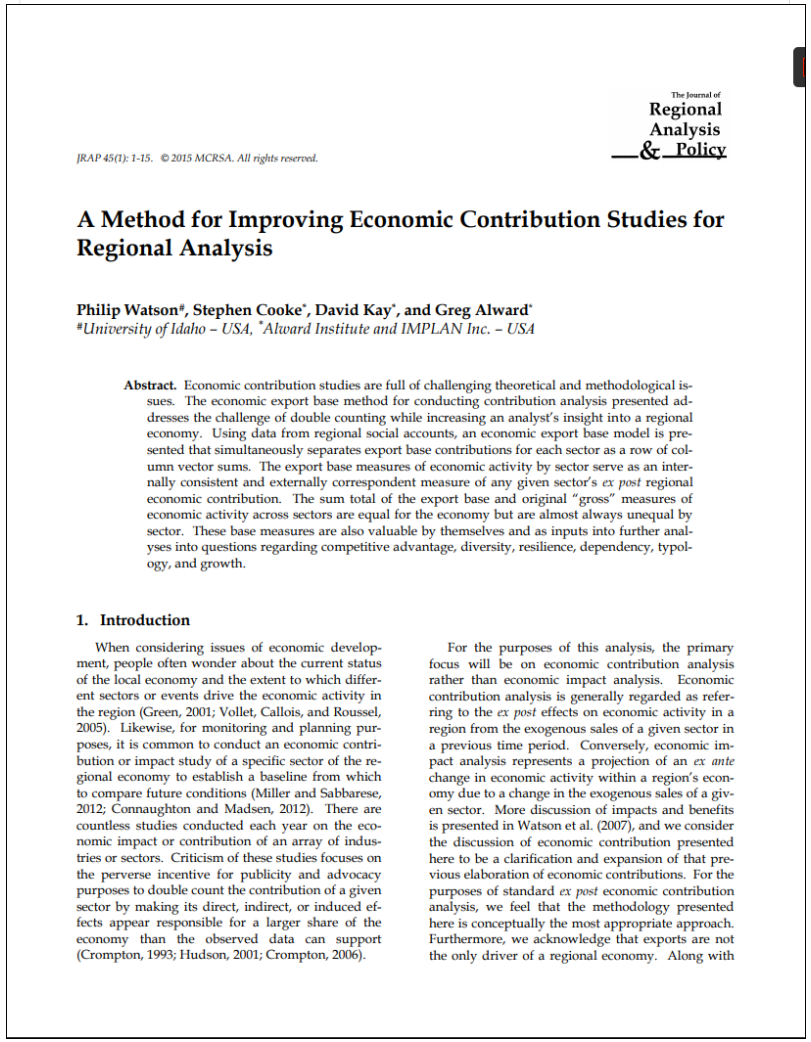
stated on January 8, 2015 in a statement on the Georgia Farm Bureau website:

> **Agriculture contributes $71 billion to Georgia's economy annually, making it the state's largest industry.**

# Economic Contributions of the US Beef Industry

- **Study 2: ASAM Method**

A comprehensive economic contribution study for all sectors of a region's economy performed simultaneously by using social accounting data within an economic base framework.



The Journal of Regional Analysis & Policy

JRAP 45(1): 1-15. 

**A Method for Improving Economic Contribution Studies for Regional Analysis**

**Philip Watson[#], Stephen Cooke[*], David Kay[*], and Greg Alward[*]**
*[#]University of Idaho – USA, [*]Alward Institute and IMPLAN Inc. – USA*

**Abstract.** Economic contribution studies are full of challenging theoretical and methodological issues. The economic export base method for conducting contribution analysis presented addresses the challenge of double counting while increasing an analyst's insight into a regional economy. Using data from regional social accounts, an economic export base model is presented that simultaneously separates export base contributions for each sector as a row of column vector sums. The export base measures of economic activity by sector serve as an internally consistent and externally correspondent measure of any given sector's *ex post* regional economic contribution. The sum total of the export base and original "gross" measures of economic activity across sectors are equal for the economy but are almost always unequal by sector. These base measures are also valuable by themselves and as inputs into further analyses into questions regarding competitive advantage, diversity, resilience, dependency, typology, and growth.

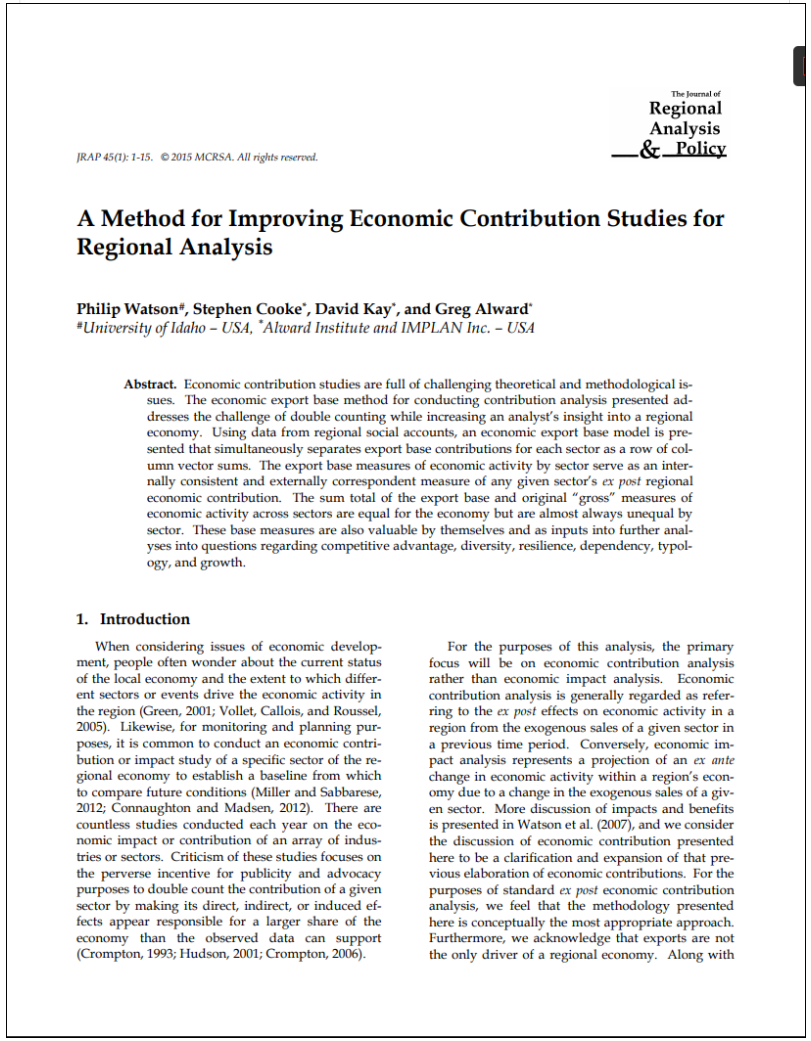
**1. Introduction**

When considering issues of economic development, people often wonder about the current status of the local economy and the extent to which different sectors or events drive the economic activity in the region (Green, 2001; Vollet, Callois, and Roussel, 2005). Likewise, for monitoring and planning purposes, it is common to conduct an economic contribution or impact study of a specific sector of the regional economy to establish a baseline from which to compare future conditions (Miller and Sabbarese, 2012; Connaughton and Madsen, 2012). There are countless studies conducted each year on the economic impact or contribution of an array of industries or sectors. Criticism of these studies focuses on the perverse incentive for publicity and advocacy purposes to double count the contribution of a given sector by making its direct, indirect, or induced effects appear responsible for a larger share of the economy than the observed data can support (Crompton, 1993; Hudson, 2001; Crompton, 2006).

For the purposes of this analysis, the primary focus will be on economic contribution analysis rather than economic impact analysis. Economic contribution analysis is generally regarded as referring to the *ex post* effects on economic activity in a region from the exogenous sales of a given sector in a previous time period. Conversely, economic impact analysis represents a projection of an *ex ante* change in economic activity within a region's economy due to a change in the exogenous sales of a given sector. More discussion of impacts and benefits is presented in Watson et al. (2007), and we consider the discussion of economic contribution presented here to be a clarification and expansion of that previous elaboration of economic contributions. For the purposes of standard *ex post* economic contribution analysis, we feel that the methodology presented here is conceptually the most appropriate approach. Furthermore, we acknowledge that exports are not the only driver of a regional economy. Along with

# Economic Contributions of the US Beef Industry

- **Study 2: ASAM Method**
  - Advantages:
    - Allows for broader customization
    - Views the economy "as is" (non-hypothetical)
      - No "double-counting"
    - Highlights industry role in bringing/keeping money in the economy
  - Issues:
    - Learning curve
      - Not "plug and go"
      - Interpreting/explaining results



The Journal of Regional Analysis & Policy

JRAP 45(1): 1-15. 

**A Method for Improving Economic Contribution Studies for Regional Analysis**

**Philip Watson[#], Stephen Cooke[*], David Kay[*], and Greg Alward[*]**
*[#]University of Idaho – USA, [*]Alward Institute and IMPLAN Inc. – USA*

**Abstract.** Economic contribution studies are full of challenging theoretical and methodological issues. The economic export base method for conducting contribution analysis presented addresses the challenge of double counting while increasing an analyst's insight into a regional economy. Using data from regional social accounts, an economic export base model is presented that simultaneously separates export base contributions for each sector as a row of column vector sums. The export base measures of economic activity by sector serve as an internally consistent and externally correspondent measure of any given sector's *ex post* regional economic contribution. The sum total of the export base and original "gross" measures of economic activity across sectors are equal for the economy but are almost always unequal by sector. These base measures are also valuable by themselves and as inputs into further analyses into questions regarding competitive advantage, diversity, resilience, dependency, typology, and growth.

**1. Introduction**

When considering issues of economic development, people often wonder about the current status of the local economy and the extent to which different sectors or events drive the economic activity in the region (Green, 2001; Vollet, Callois, and Roussel, 2005). Likewise, for monitoring and planning purposes, it is common to conduct an economic contribution or impact study of a specific sector of the regional economy to establish a baseline from which to compare future conditions (Miller and Sabbarese, 2012; Connaughton and Madsen, 2012). There are countless studies conducted each year on the economic impact or contribution of an array of industries or sectors. Criticism of these studies focuses on the perverse incentive for publicity and advocacy purposes to double count the contribution of a given sector by making its direct, indirect, or induced effects appear responsible for a larger share of the economy than the observed data can support (Crompton, 1993; Hudson, 2001; Crompton, 2006).

For the purposes of this analysis, the primary focus will be on economic contribution analysis rather than economic impact analysis. Economic contribution analysis is generally regarded as referring to the *ex post* effects on economic activity in a region from the exogenous sales of a given sector in a previous time period. Conversely, economic impact analysis represents a projection of an *ex ante* change in economic activity within a region's economy due to a change in the exogenous sales of a given sector. More discussion of impacts and benefits is presented in Watson et al. (2007), and we consider the discussion of economic contribution presented here to be a clarification and expansion of that previous elaboration of economic contributions. For the purposes of standard *ex post* economic contribution analysis, we feel that the methodology presented here is conceptually the most appropriate approach. Furthermore, we acknowledge that exports are not the only driver of a regional economy. Along with

# Economic Contributions of the US Beef Industry

**ASAM Method**

Economy is modeled in terms of exports.

- Contributions are distributed across industries in terms of how they contribute to the export demand of the beef industry.

  - Gross Contributions broken down into:
    - Direct Beef Export Contributions
      - *Economic activity generated WITHIN the beef industry as a result of beef exports*
    - Export Support and Local Consumption
      - *How does the beef industry support the production of exports made by other local industries while also providing beef products for local consumption?*

  - Indirect Beef Export Contributions
    - *Economic activity generated OUTSIDE OF the beef industry as a result of beef exports*

# Economic Contributions of the US Beef Industry

Important to consider how your region is defined:

# Economic Contributions of the US Beef Industry

Beef industry plays a larger role in providing products for consumption within the US, than exporting goods to other countries.

**Direct Export Activity – United States**

| Sector | Sales (million $'s) | Jobs | Employee Compensation (million $'s) | Total Value Added (million $'s) |
|---|---|---|---|---|
| Cow-Calf | 56 | 543 | 1 | 14 |
| Stocker/Backgrounding | 16 | 155 | 0 | 4 |
| Feedlot | 56 | 541 | 1 | 14 |
| ***On-farm Production Total*** | **127** | **1,239** | **3** | **31** |
| | | | | |
| Cattle Harvest | 13,095 | 18,720 | 961 | 1,881 |
| Beef Processing | 4,437 | 8,407 | 466 | 684 |
| Beef By-products | 308 | 606 | 42 | 51 |
| ***Post-farm Harvest & Processing Total*** | **17,839** | **27,733** | **1,469** | **2,616** |
| ***BEEF INDUSTRY TOTAL*** | ***17,967*** | ***28,973*** | ***1,472*** | ***2,648*** |

**Export Support and Local Consumption – United States**

| Sector | Sales (million $'s) | Jobs | Employee Compensation (million $'s) | Total Value Added (million $'s) |
|---|---|---|---|---|
| Cow-Calf | 24,467 | 237,792 | 580 | 5,980 |
| Stocker/Backgrounding | 6,978 | 67,821 | 166 | 1,706 |
| Feedlot | 24,351 | 236,667 | 578 | 5,952 |
| ***On-farm Production Total*** | **55,796** | **542,280** | **1,324** | **13,638** |
| | | | | |
| Cattle Harvest | 57,094 | 81,622 | 4,190 | 8,203 |
| Beef Processing | 34,230 | 64,862 | 3,598 | 5,280 |
| Beef By-products | 1,907 | 3,752 | 260 | 314 |
| ***Post-farm Harvest & Processing Total*** | **93,230** | **150,235** | **8,048** | **13,797** |
| ***BEEF INDUSTRY TOTAL*** | ***149,027*** | ***692,515*** | ***9,372*** | ***27,435*** |

# Economic Contributions of the US Beef Industry

Important to consider how your region is defined:

# Economic Contributions of the US Beef Industry

Regional comparisons can highlight the strength of an industry in supporting the economic base of a region.

### Direct Export Activity – Northern Plains

| Sector | Sales (million $'s) | Jobs | Employee Compensation (million $'s) | Total Value Added (million $'s) |
|---|---|---|---|---|
| Cow-Calf | 1,609 | 6,554 | 39 | 376 |
| Stocker/Backgrounding | 18 | 73 | 0 | 4 |
| Feedlot | 3,019 | 12,296 | 73 | 706 |
| ***On-farm Production Total*** | **4,646** | **18,923** | **112** | **1,086** |
| Slaughtering | 14,746 | 21,365 | 1,137 | 1,949 |
| Carcass Processing | 2,463 | 4,824 | 233 | 310 |
| Rendering and By-Products | 139 | 272 | 20 | 23 |
| ***Post-farm Harvest & Processing Total*** | **17,349** | **26,461** | **1,390** | **2,282** |
| ***BEEF INDUSTRY TOTAL*** | ***21,995*** | ***45,385*** | ***1,502*** | ***3,369*** |

### Export Support and Local Consumption – Northern Plains

| Sector | Sales (million $'s) | Jobs | Employee Compensation (million $'s) | Total Value Added (million $'s) |
|---|---|---|---|---|
| Cow-Calf | 3,480 | 14,175 | 84 | 814 |
| Stocker/Backgrounding | 44 | 180 | 1 | 10 |
| Feedlot | 5,727 | 23,323 | 138 | 1,339 |
| ***On-farm Production Total*** | **9,251** | **37,678** | **224** | **2,163** |
| Slaughtering | 1,334 | 1,933 | 103 | 176 |
| Carcass Processing | 434 | 850 | 41 | 55 |
| Rendering and By-Products | 9 | 17 | 1 | 1 |
| ***Post-farm Harvest & Processing Total*** | **1,777** | **2,801** | **145** | **232** |
| ***BEEF INDUSTRY TOTAL*** | ***11,028*** | ***40,478*** | ***369*** | ***2,396*** |

# Economic Contributions of the US Beef Industry

**Indirect Export Contributions**:

What sectors does the beef industry purchase from in order to produce their exports?

| | | | |
|---|---|---|---|
| **Sales** | **On-farm Production** | Wholesale trade | $502,889,000 |
| | | Grain farming | $293,800,000 |
| | | Other animal food manufacturing | $254,178,000 |
| | | Truck transportation | $241,468,000 |
| | | Real estate | $203,771,000 |
| | **Post-farm Harvest and Processing** | On-farm beef cattle production | $7,444,982,000 |
| | | Truck transportation | $1,822,853,000 |
| | | Wholesale trade | $1,371,393,000 |
| | | Animal production, except cattle and poultry and eggs | $929,365,000 |
| | | Owner-occupied dwellings | $615,389,000 |
| **Jobs** | **On-farm Production** | Wholesale trade | 2,095 |
| | | Support activities for agriculture and forestry | 1,677 |
| | | Truck transportation | 1,412 |
| | | Real estate | 1,145 |
| | | All other crop farming | 1,086 |
| | **Post-farm Harvest and Processing** | On-farm beef cattle production | 30,321 |
| | | Truck transportation | 10,656 |
| | | Animal production, except cattle and poultry and eggs | 5,916 |
| | | Wholesale trade | 5,714 |
| | | Real estate | 3,036 |
| **Value Added** | **On-farm Production** | Wholesale trade | $333,928,000 |
| | | Real estate | $137,826,000 |
| | | Truck transportation | $113,678,000 |
| | | Owner-occupied dwellings | $108,074,000 |
| | | Monetary authorities and depository credit intermediation | $92,259,000 |
| | **Post-farm Harvest and Processing** | On-farm beef cattle production | $1,740,735,000 |
| | | Wholesale trade | $910,630,000 |
| | | Truck transportation | $858,157,000 |
| | | Animal production, except cattle and poultry and eggs | $601,208,000 |
| | | Owner-occupied dwellings | $399,366,000 |

# Economic Contributions of the US Beef Industry

**Export Support and local Consumption Contributions**:

What industries are making purchases from beef to support their export production, or to be consumed locally?

| | | | |
|---|---|---|---|
| **Sales** | **On-farm Production** | Post-farm Harvest & Processing | $7,444,982,000 |
| | | Other red meat processing | $762,781,000 |
| | | Households | $121,589,000 |
| | | Dog and cat food manufacturing | $104,803,000 |
| | | Grain farming | $92,483,000 |
| | **Post-farm Harvest & Processing** | Dog and cat food manufacturing | $298,811,000 |
| | | Households | $291,879,000 |
| | | Other red meat processing | $159,213,000 |
| | | Government spending | $72,669,000 |
| | | Leather and hide tanning and finishing | $41,543,000 |
| **Jobs** | **On-farm Production** | Post-farm Harvest & Processing | 30,321 |
| | | Other red meat processing | 3,107 |
| | | Households | 495 |
| | | Dog and cat food manufacturing | 427 |
| | | Grain farming | 377 |
| | **Post-farm Harvest & Processing** | Dog and cat food manufacturing | 508 |
| | | Households | 466 |
| | | Other red meat processing | 243 |
| | | Government spending | 116 |
| | | Leather and hide tanning and finishing | 67 |
| **Value Added** | **On-farm Production** | Post-farm Harvest & Processing | $1,740,735,000 |
| | | Other red meat processing | $178,348,200 |
| | | Households | $28,429,000 |
| | | Dog and cat food manufacturing | $24,504,000 |
| | | Grain farming | $21,624,000 |
| | **Post-farm Harvest & Processing** | Dog and cat food manufacturing | $38,579,000 |
| | | Households | $38,109,000 |
| | | Other red meat processing | $20,930,000 |
| | | Government spending | $9,489,000 |
| | | Leather and hide tanning and finishing | $5,419,000 |

# Which Approach to Use?

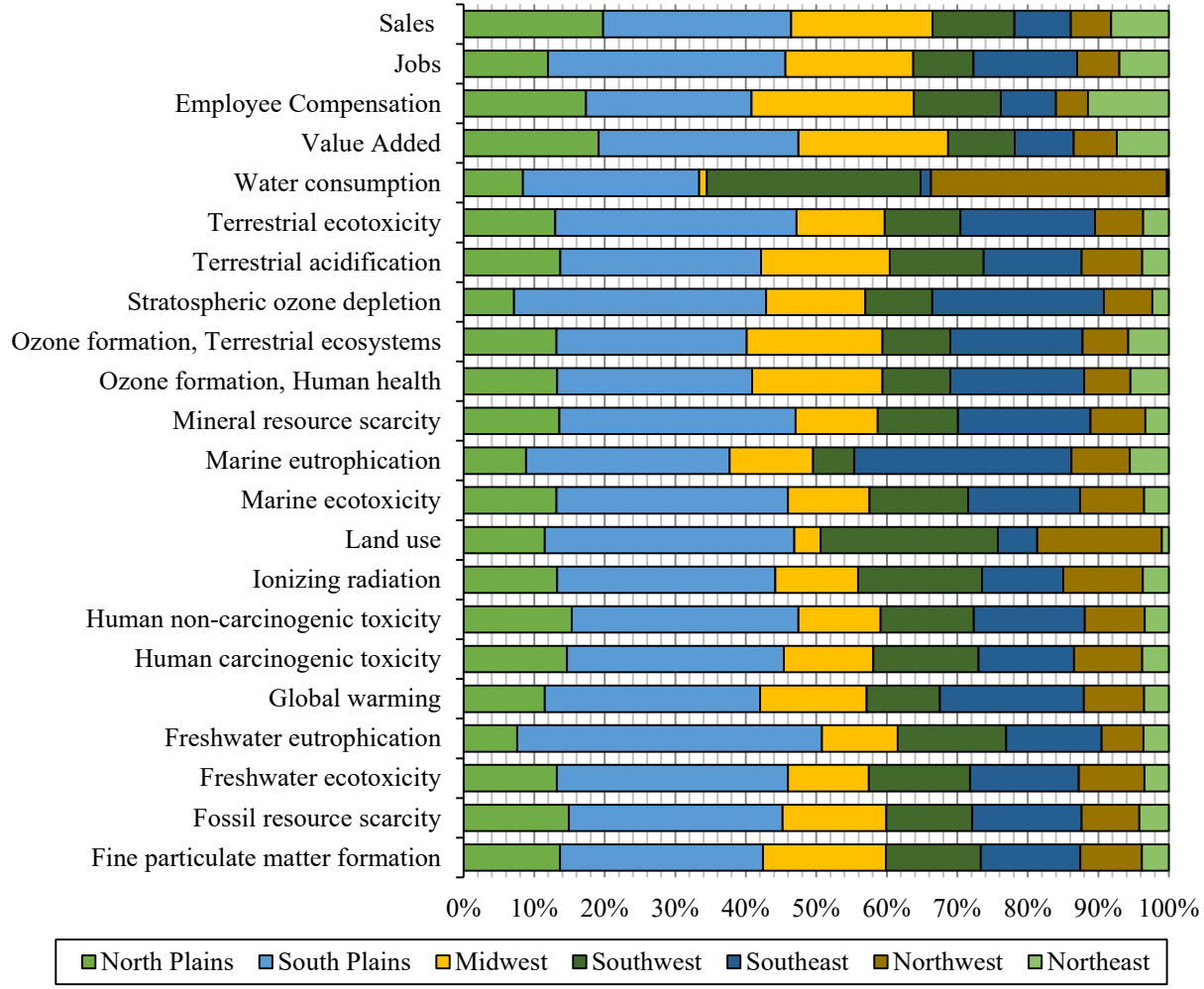
**Economic Sustainability** - both methods can highlight the role of the beef industry in supporting regional economies.

- <u>What question are you asking</u>?
  - What would happen if the beef industry were hypothetically removed from the economy?
    - IMPLAN Method
  - How does the industry serve to bolster and grow the economy?
    - ASAM

# Beef Economics and Environmental Sustainability

Compare regional economic contributions to environmental impacts.

- Dr. Greg Thoma (U of A) performed a regional environmental impact assessment.
  - Economics tended to mirror environmental impacts
  - Differences depending on the dominant type of beef activity in the region.
    - On-farm vs Post-farm



# Resources:


- Watson et al., 2007
  - http://www.jrap-journal.org/pastvolumes/2000/v37/F37-2-6.pdf
- Watson et al., 2015
  - http://www.jrap-journal.org/pastvolumes/2010/v45/jrap_v45_n1_a1_watson_etal.pdf
- Asem-Hiablie, S., C.A. Rotz, R. Stout, K. Stackhouse-Lawson. 2015. "Management Characteristics of Cow-Calf, Stokcer, and Finishing Operation in Kansas, Oklahoma, and Texas". The Professional Animal Scientist. 31: 1-10.
- Asem-Hiablie, S., C.A. Rotz, R. Stout, K. Stackhouse-Lawson. 2016. "Management Characteristics of beef cattle production in the Northern Plains and Midwest regions of the United States. The Professional Animal Scientist. 32: 736-749.
- Asem-Hiablie, S., C.A. Rotz, R. Stout, K. Fisher. 2017. "Management Characteristics of beef cattle production in the Western United States. The Professional Animal Scientist. 33: 461-471.
- Asem-Hiablie, S., C.A. Rotz, R. Stout, S. Place. 2018. "Management Characteristics of beef cattle production in the Eastern United States. The Professional Animal Scientist. 34: 311-325.

# Baseline Data: Potential IMPLAN Beef Sectors

- Leather Processing (value captured in rendering and by-products sector)
    - Sector 131 – “Leather and hide tanning and finishing”
    - Sector 132 – “Footwear manufacturing”
    - Sector 133 – “Other leather and allied product manufacturing”

- Beef Retail (NOT INCLUDED IN EITHER STUDY)
    - Wholesale Beef
        - Sector 395 – “Wholesale trade”
            - All wholesale is aggregated under this one sector
    - Retail Beef
        - Sector 400 – “Food and beverage stores”
        - Sector 403 – “Clothing and clothing accessories stores” – for leather goods
        - Sector 405 – “General merchandise stores” (e.g. Walmart)
        - Sector 406 – “Miscellaneous store retailers”
        - Sector 407 – “Nonstore retailers” (e.g. web retailers)

# Baseline Data: IMPLAN Beef Sectors

- Beef Retail (NOT INCLUDED IN EITHER STUDY)
  - More…
    - Sector 486 – “Community food, housing, and other relief services including rehabilitation”
    - Sector 501 – “Full-service restaurants”
    - Sector 502 – “Limited-service restaurants”
    - Sector 503 – “All other food and drinking places”
  - Government purchases??