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# ECONOMIC PROFILE OF FOOD & BEVERAGE, FEED & GRAIN MANUFACTURING IN IOWA

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## INDUSTRY DEFINITION

The food manufacturing industrial subsector transforms livestock and agricultural products into products for intermediate or final consumption. The food products manufactured in these establishments are typically sold to other manufacturers as inputs, to wholesalers or to retailers for distribution to consumers. This includes establishments primarily engaged in retailing bakery and candy products made on the premises not for immediate consumption. This industry produces food products for humans and animals, as well as byproducts that may be used in other industrial applications such as pharmaceuticals, fertilizers, and cosmetics. This sector includes beverage production, to include soft drinks, brewed beverages, wines, and spirits.


### **31111 ANIMAL FOOD MANUFACTURING**

- Manufacture food and feed for animals from animal and vegetable sources
- Products: Milled grains, seeds, bagged and canned animal and pet food products

 92 establishments with 2,874 payroll employees in 2014


### **31121 FLOUR MILLING AND MALT MANUFACTURING**

- Mill flour or meal from grains or vegetables, polish rice, or produce malts
- Products: Grain flours, doughs, other polished or processed grains, or barley or rye malts

 210 establishments with 536 payroll employees in 2014


### **31122 STARCH AND VEGETABLE FATS AND OILS MANUFACTURING**

- Wet milling corn, crushed oils seeds, and nuts, and vegetable oil refining and blending
- Products: Vegetable oils, margarine, cooking oil, vegetable byproducts for other industrial uses, corn sweeteners

 37 establishments with 3,482 payroll employees in 2014


#### **311221 WET CORN MILLING**

- Process raw corn using wet milling processes
- Products: Corn sweeteners, glucose, dextrose, corn oil, starches, gluten feed and flour, maltodextrins, syrups, and tapioca.

 12 establishments with 2,422 payroll employees in 2014


#### **311224 SOYBEAN AND OTHER OILSEED PROCESSING**

- Crushes oilseeds such as soybean, cottonseed, linseeds, peanuts, and sunflower seeds.
- Products: Oilseed cakes, oils, meals, and protein isolates; canola oil, castor oil, flaxseed oil, soybean flour and grits, soybean oil, vegetable oils.

 19 establishments with 939 payroll employees in 2014


### **31123 BREAKFAST CEREAL MANUFACTURING**

- Breakfast cereal foods
- Products: Cereals, farina, granola, hominy grits, infant cereals, and hot cereals

 6 establishments with 1,908 payroll employees in 2014


### **31131 SUGAR MANUFACTURING**

- Manufacture raw sugar or liquid sugar from sugarcane, raw cane sugar, and sugar beets
- Products: Powdered sugar, liquid sugar, and sugar solids

 2 establishments with 25 payroll employees in 2014


### **31134 NONCHOCOLATE CONFECTIONARY MANUFACTURING**

- Nonchocolate confectionaries including products not meant for immediate consumption
- Products: Breakfast bars, cakes, candy bars, candied fruits, cough drops, gum, soft and hard candies, lozenges, marshmallows, marzipan, and toffee

 5 establishments with 329 payroll employees in 2014


### **31135 CHOCOLATE AND CONFECTIONARY MANUFACTURING**

- Products manufactured from cacao beans or from chocolates manufactured elsewhere
- Products: Candy bars or other chocolate candies, liquid and powdered chocolates, sweetened and unsweetened chocolate for baking and other uses.

 14 establishments and 148 payroll employees in 2014


### **31141 FROZEN FOOD MANUFACTURING**

- Frozen fruit, juice, vegetables, and dinners.
- Products: Frozen fruit juice, vegetable side dishes, meal entrees, pizzas, whipped toppings, waffles, pancakes, and French toast.

 14 establishments and 1,653 payroll employees in 2014


### **31142 FRUIT AND VEGETABLE CANNING, PICKLING, AND DRYING**

- Produced canned, pickled, and dried fruits, vegetables, and specialty foods.
- Products: Canned juices, baby foods, soups, tomato-based sauces and catsup, salsa, chili, spaghetti, pickles, relishes, jams and jellies, dried soup mixes, and sauerkraut.

 7 establishments and 337 payroll employees in 2014


### **31151 DAIRY PRODUCT (EXCEPT FROZEN) MANUFACTURING**

- Manufacture dairy products from raw milk, dairy substitutes from soybeans, and dry, condensed, or evaporated milk products.
- Products: Liquid milk and cream, butter, whey powder, dried or evaporated milk, soy milk, and dairy substitutes

 20 establishments and 2,178 payroll employees in 2014


### **31152 ICE CREAM AND FROZEN DESSERT MANUFACTURING**

- Manufacture frozen dairy and related confections
- Products: Ice cream, frozen yogurts, ices, sherbets, frozen tofu, juice pops, ice milk, and ice cream specialties

 3 establishments and 1,381 payroll employees in 2014


### **31161 ANIMAL SLAUGHTERING AND PROCESSING**

- Slaughter animals, prepare meat and meat byproducts, render animals, and package meat
- Products: Cleaned animal carcasses and slaughtering byproducts, boxed or packaged meat, processed meat, and finished meat cuts.

 159 establishments and 26,399 payroll employees in 2014


#### **311611 ANIMAL (EXCEPT POULTRY) SLAUGHTERING**

- Establishments primarily engaged in slaughtering animals (except poultry and small game).
- Products: Beef, poultry, and lamb carcasses, hides, and by products; boxed meats, other inedible products, casings, lard, luncheon meats, hot dogs, and tallow

 80 establishments and 14,788 payroll employees in 2014


#### **311612 MEAT PROCESSED FROM CARCASSES**

- Process and preserve meat and meat byproducts from purchased meats.
- Products: Bacon, beef stew, bologna, cooked meats, corned meats, dried and frozen meats, hams, cooked or pickled pigs' feet, other cooked or processed meats, salted or smoked meats, and variety meats.

 55 establishments and 8,686 payroll employees in 2014


#### **311615 POULTRY PROCESSING**

- Slaughtering, processing, and preparing poultry and small game
- Products: Canned poultry, fresh or frozen chickens, waterfowl, rabbits, small game, fresh or frozen turkeys, hot dogs and luncheon meats.

 8 establishments and 2,829 payroll employees in 2014


### **31181 BREAD AND BAKERY PRODUCT MANUFACTURING**

- Firms manufacturing fresh and frozen bread and other bakery products, this includes both retail bakeries and commercial bakeries
- Products: Breads, rolls, pastries, and frozen bread and cake products

 51 establishments and 703 payroll employees in 2014


### **31182 COOKIE, CRACKER, AND PASTA MANUFACTURING**

- Firms manufacturing cookies and crackers, preparing flour and dough mixes, manufacturing dry pasta
- Products: Cookies, crackers, and pasta

 13 establishments and 1,361 payroll employees in 2014


### **31183 TORTILLA MANUFACTURING**

- Firms manufacturing flour, corn, or other grain tortillas
- Products: Tortillas

 1 establishments and 16 payroll employees in 2014


### **31191 SNACK FOOD MANUFACTURING**

- Firms salting, roasting, drying or cooking nuts; processing seeds into snacks; and manufacturing other snack foods
- Products: Roasted or canned nuts, peanut butter, potato and corn chips, popped popcorn, pretzels, pork rinds, and cheese curds

 3 establishments and 170 payroll employees in 2014


### **31192 COFFEE AND TEA MANUFACTURING**

- Firms roasting coffee, manufacturing coffee and tea from concentrates (including freeze-dried and instant)
- Products: Bean, ground, or instant coffee, tea and herbal tea, coffee extracts and syrups, and other tea or coffee extracts

 2 establishments and 30 payroll employees in 2014


### **31193 FLAVORING SYRUP AND CONCENTRATE MANUFACTURING**

- Firms manufacturing flavoring syrup drink concentrates and related products for soda fountain use or for the manufacture of soft drinks.
- Products: Beverage bases, flavorings, and syrups; non frozen concentrates; flavoring pastes, powders, and syrups for soft drink manufacturing; fruit syrups and flavorings; and soft drink concentrates

 1 establishments and 321 payroll employees in 2014


### **31194 SEASONING AND DRESSING MANUFACTURING**

- Firms roasting coffee, manufacturing coffee and tea from concentrates (including freeze-dried and instant)
- Products: Bean, ground, or instant coffee, tea and herbal tea, coffee extracts and syrups, and other tea or coffee extracts

 1 establishments and 321 payroll employees in 2014


### **31199 ALL OTHER FOOD MANUFACTURING**

- Firms making all other food and food-related products, to include those mixing dried or dehydrated ingredients.
- Products: Baking powder, dessert puddings, egg substitutes, fresh pasta or pizza, honey, popcorn, powdered drinks, and sweetening syrups

 35 establishments and 3.056 payroll employees in 2014


### **31311 SOFT DRINK AND ICE MANUFACTURING**

- Firms that make soft drinks, ice, or bottled water
- Products: Carbonated and noncarbonated beverages, fruit and vegetable drinks, pop or soda, iced coffee, iced tea, flavored water, purified or carbonated water, block and cube ice.

 *6 establishments and 655 payroll employees in 2014*


### **31213 WINERIES**

- Firms growing grapes and manufacturing wines and brandies, firms manufacturing wines and brandies from externally sourced feedstock, and firms blending wines and brandies
- Products: brandy distilling, wines, blended wines, cider, nonalcoholic wines, wine coolers, cooking wines.

 *29 establishments and 249 payroll employees in 2014*

### **31214 DISTILLERIES**

- Firms distilling potable liquors (excluding brandies), distilling and blending liquors, and blending liquors with other ingredients
- Products: Alcoholic beverages, liquors, eggnog, potable ethyl alcohol, alcoholic mixed drinks, blended distilled beverages, neutral spirits, and distilled spirits.

 *6 establishments and 52 payroll employees in 2014*

## INDUSTRY SIZE AND COMPOSITION

### GROSS DOMESTIC PRODUCT (GDP)

Iowa's food and beverage manufacturing is a major nondurable goods sector in the Iowa economy and produced \$6.59 billion in GDP and accounted for 21.4 percent of Iowa's manufacturing GDP and 4.0 percent of its total GDP for all industries in 2013. Nationally, food and beverage manufacturing contributed 21.8 percent of manufacturing GDP and 1.4 percent of national GDP in 2013.

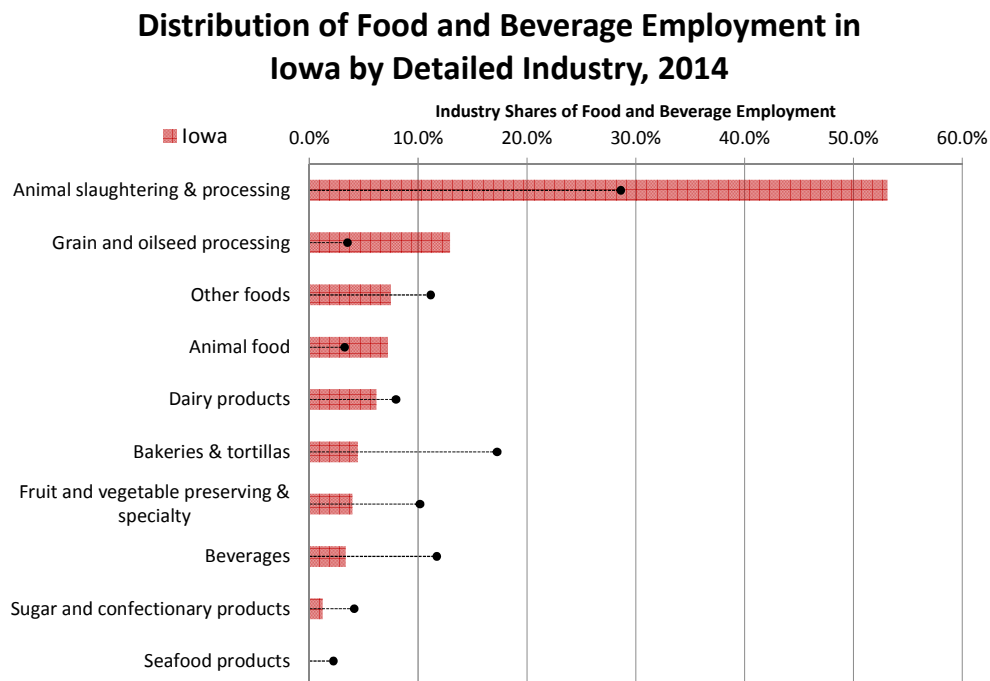
### JOBS

Food and beverage manufacturing's 52,071 jobs represented 24.0 percent of Iowa's manufacturing payroll employment and 3.4 percent of its total employment in 2014. In the U.S., food and beverage manufacturing accounted for 12.4 percent of manufacturing sector jobs and 1.1 percent of all jobs.

**IOWA'S FOOD AND BEVERAGE MANUFACTURING ACTIVITIES ARE MOSTLY DISTRIBUTED ACROSS ANIMAL SLAUGHTERING AND PROCESSING (AT 53.1 PERCENT OF JOBS), GRAIN AND OILSEED PROCESSING (12.9 PERCENT), ALL OTHER FOODS (7.5 PERCENT), AND ANIMAL FOOD PROCESSING (7.2 PERCENT). THESE SUBSECTORS COMBINED ACCOUNTED FOR MORE THAN 81 PERCENT OF TOTAL EMPLOYMENT IN THIS SECTOR. U.S. JOBS IN THOSE SUBSECTORS ARE DISTRIBUTED SOMEWHAT DIFFERENTLY. ANIMAL SLAUGHTERING AND PROCESSING ACCOUNTED FOR MOST U.S. JOBS AT 28.6 PERCENT, FOLLOWED BY BAKERIES AND TORTILLA PRODUCTS AT 17.3 PERCENT, BEVERAGES AT 11.7 PERCENT, AND ALL OTHER FOODS AT 11.2 PERCENT. SEE**

Figure 1.

FIGURE 1



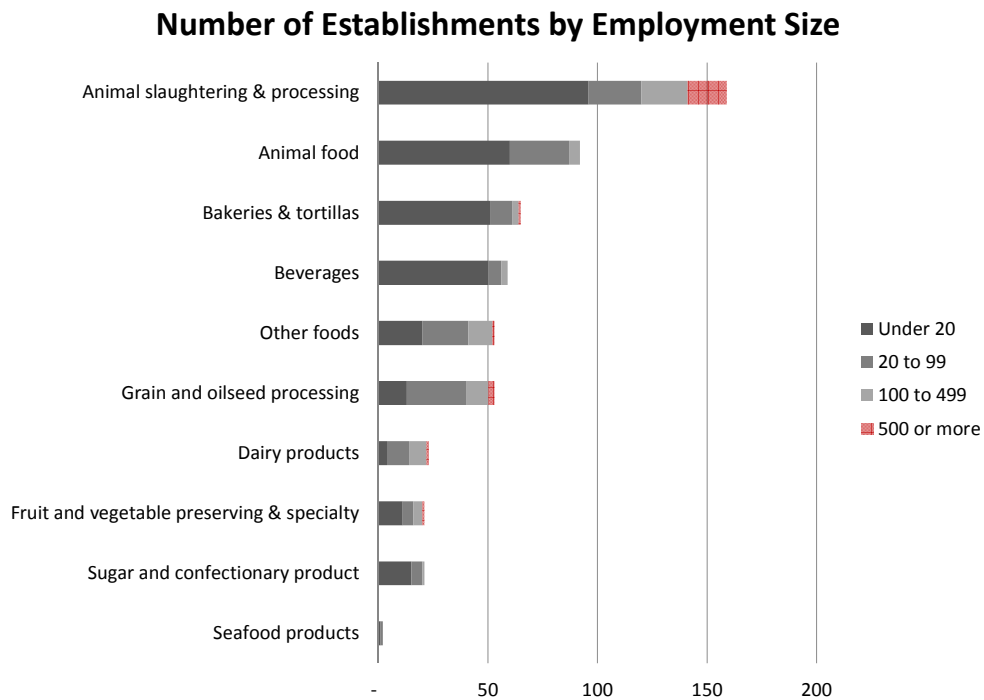
**BUSINESS ESTABLISHMENTS**

Iowa had 548 food and beverage manufacturing establishments in 2014. The largest number were in animal slaughtering and processing firms with 159, followed by animal food processors, bakeries, other foods, and grain and oil seed processors.

County Business Pattern data from 2014 show establishments with 500 or more workers accounting for 4.6 percent of all establishments. About 12 percent had 100 to 499 workers. Nearly 59 percent of Iowa’s food and beverage manufacturing establishments had fewer than 20 employees.

Animal slaughtering averaged 174 workers per establishment, followed by dairy products at 140 workers and grain and oilseed processing at 127. The smallest number of employees per firm is found in seafood products at 18. Iowa’s overall food and beverage manufacturing sector averaged 95 workers per establishment. Figure 2 shows the distribution of Iowa’s food and beverage manufacturing establishments by size and detailed industry. Figure 3 maps the approximate distribution of establishments by employment size across the state.

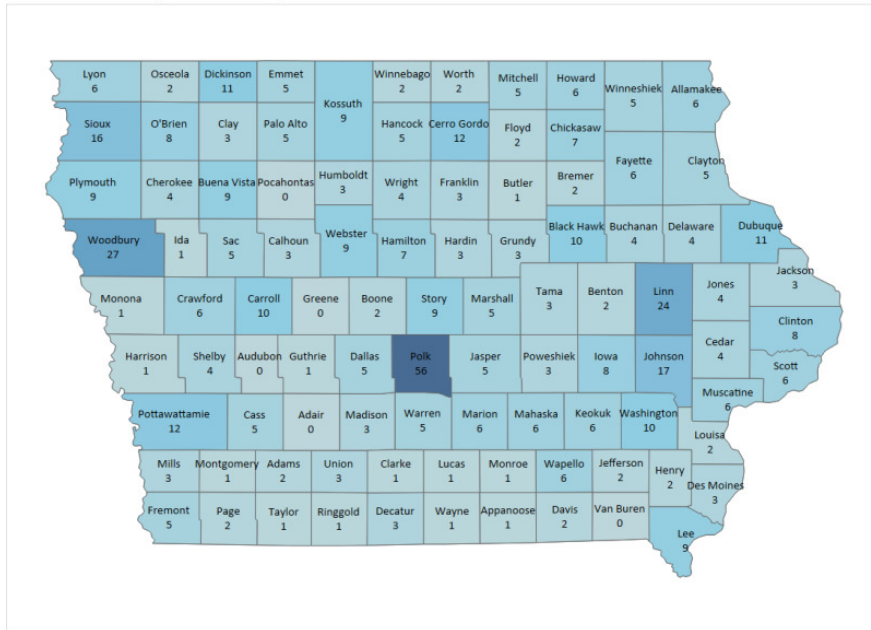
**FIGURE 2**



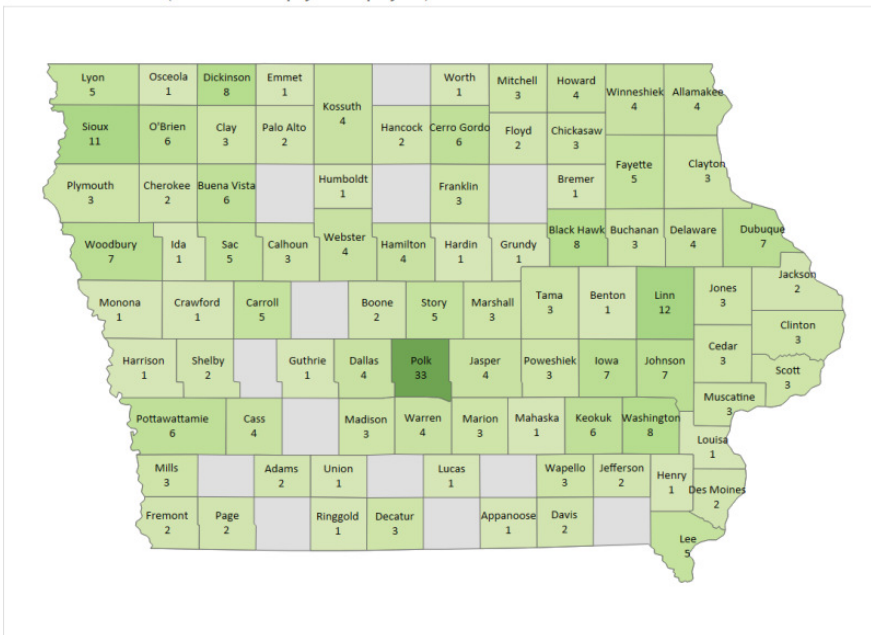


**FIGURE 3. FOOD AND BEVERAGE ESTABLISHMENTS BY EMPLOYMENT SIZE**

All Food and Beverage Manufacturing Establishments

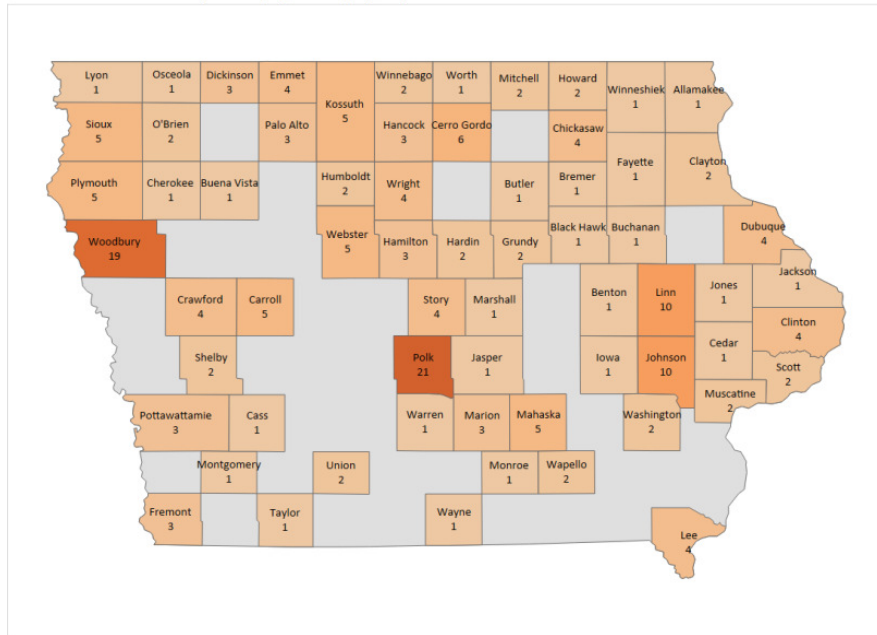


Small Establishments (Fewer than 10 payroll employees)

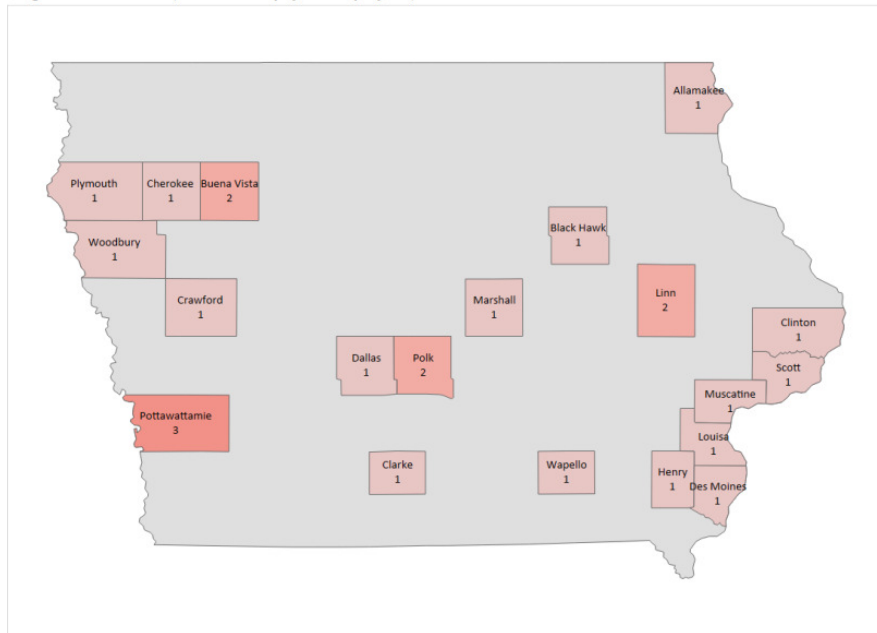


**FIGURE 3 CONTINUED. FOOD AND BEVERAGE MANUFACTURING ESTABLISHMENTS BY EMPLOYMENT SIZE**

Mid-Sized Establishments (10-499 payroll employees)



Large Establishments (500 or more payroll employees)



## IOWA’S COMPETITIVE POSITION

### EMPLOYMENT CONCENTRATION

Iowa demonstrates a strong competitive advantage in food and beverage manufacturing: In 2014, 3.5 percent of the nation’s food and beverage manufacturing jobs were located in Iowa, while Iowa had just 1.1 percent of U.S. jobs across all industries. Figure 4 shows Iowa’s percentage of food and beverage manufacturing employment by detailed industry. Iowa’s prominence in grain and oilseed processing, animal food manufacturing, and animal slaughtering and processing is demonstrable.

Location quotients, which measure the state’s share of national employment in a particular industry in relation to the state’s share of all U.S. jobs, show that Iowa has about 2.8 times more food and beverage sector employment than the U.S. average (LQ=2.79, where 1.0 = the U.S. average). Iowa’s strongest competitive advantages are in animal foods processing and in animal slaughtering and processing. Iowa also has strong competitive advantages in dairy products and all other foods. Iowa does not demonstrate production dominance in sugar and confectionary products, beverages, bakery goods, and seafood products. Figure 5 illustrates Iowa’s food and beverage location quotients by industry.

FIGURE 4

### Iowa Percentage Share of U.S. Employment by Detailed Industry, 2014

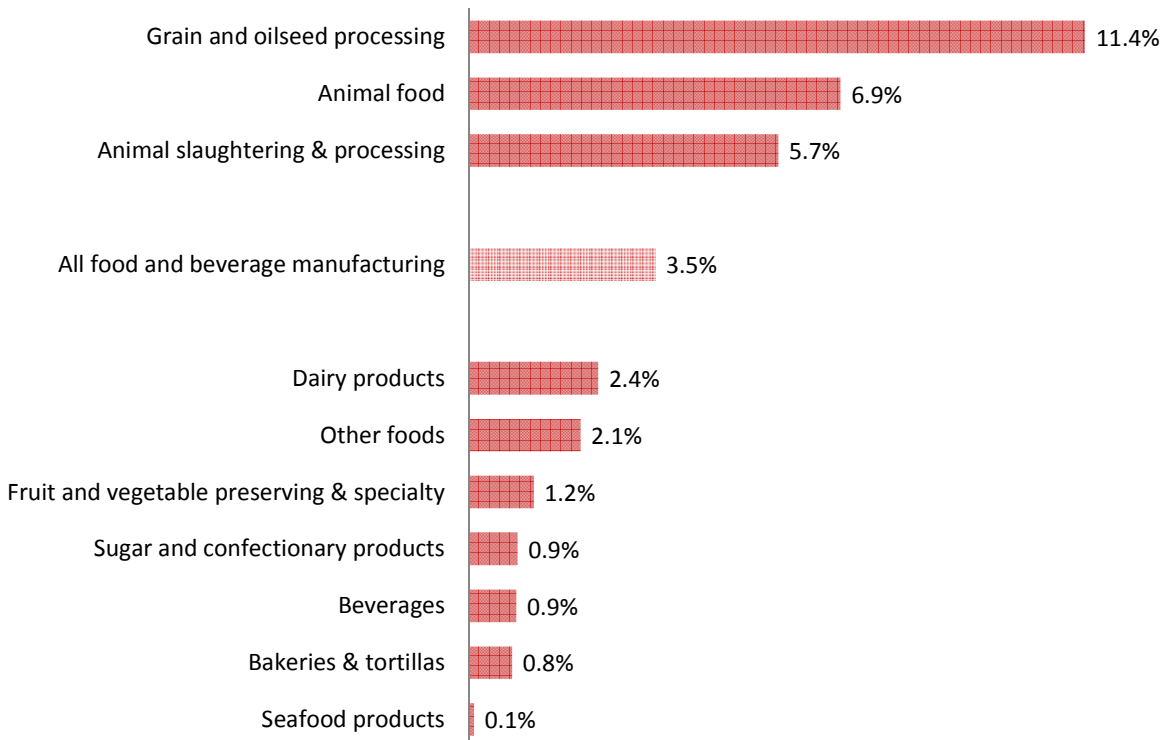
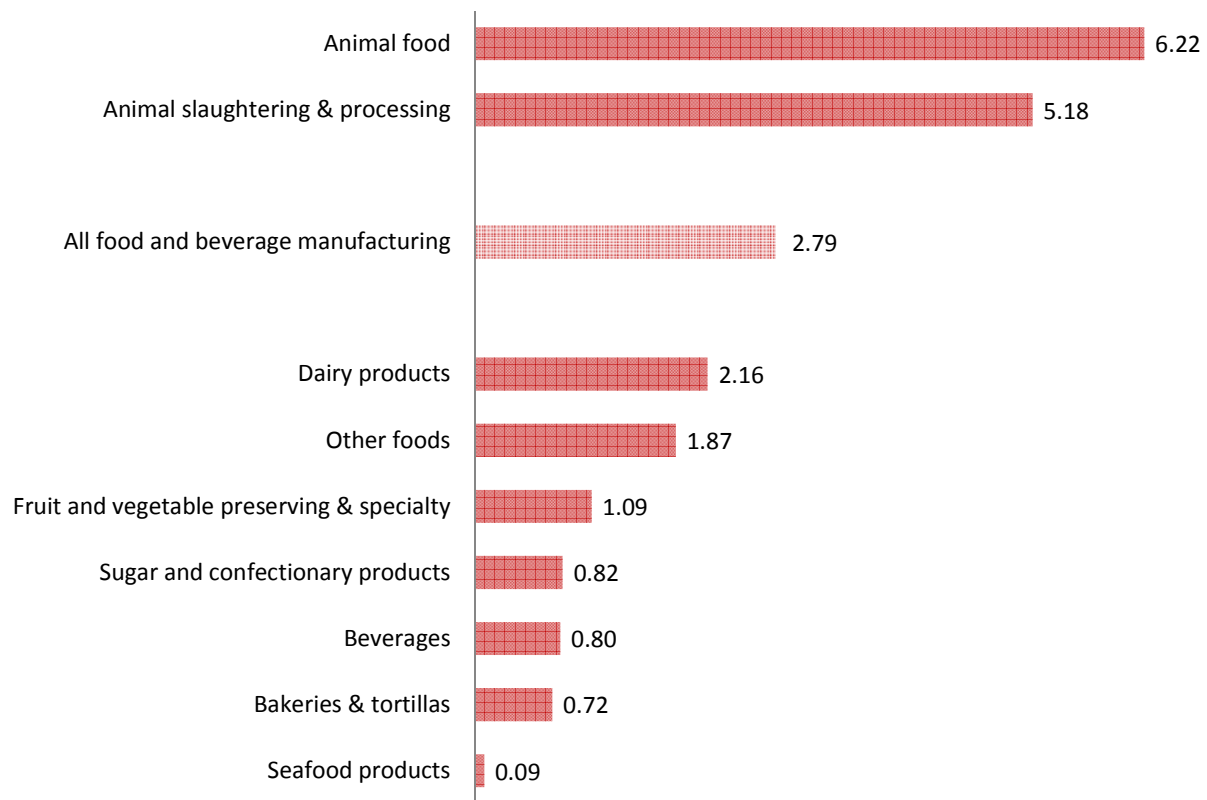


FIGURE 5

### Location Quotients by Detailed Industry

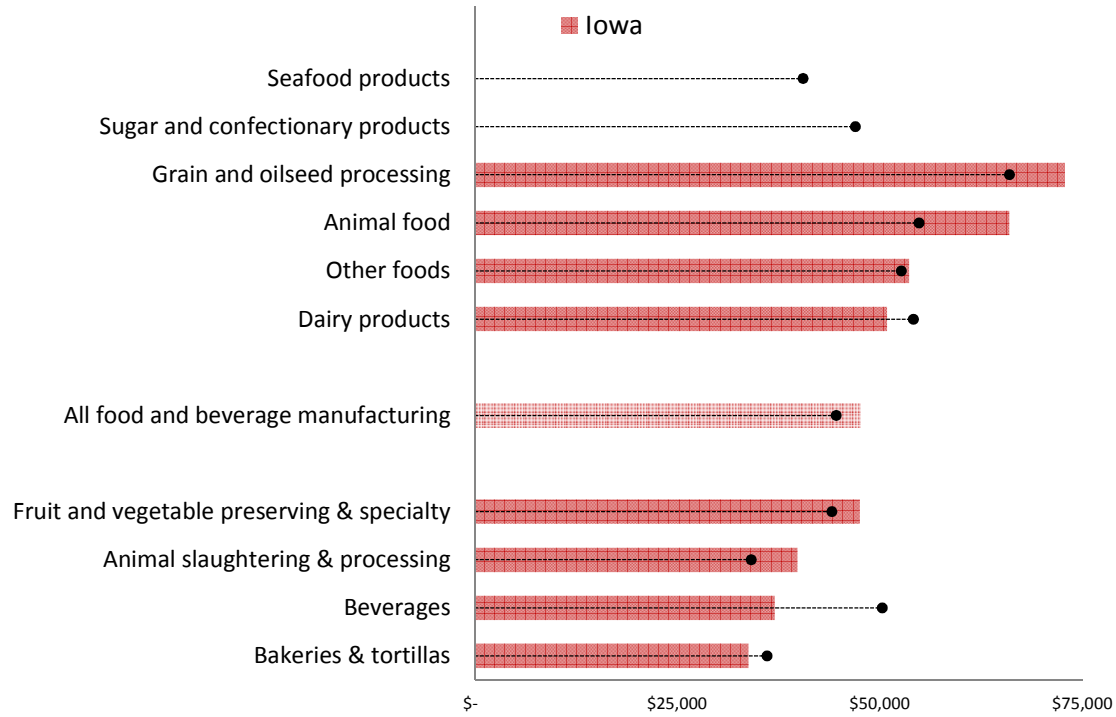


#### AVERAGE EARNINGS

Iowa's food and beverage manufacturing workers earned \$47,580 in wages and salaries per job in 2014, which was 6.5 percent higher than the national average for the subsector. The highest pay was found in the grain and oilseed processing industries at \$72,834 where U.S. pay in that sector was just \$66,012. Overall, Iowa pay exceeded or matched U.S. pay in five subsectors. Average earnings per job by detailed industry are shown in Figure 6. Two sectors, which are comparatively small, reported no data for Iowa.

FIGURE 6

### Average Wage and Salary Per Job by Detailed Industry, 2014, Iowa and the U.S.

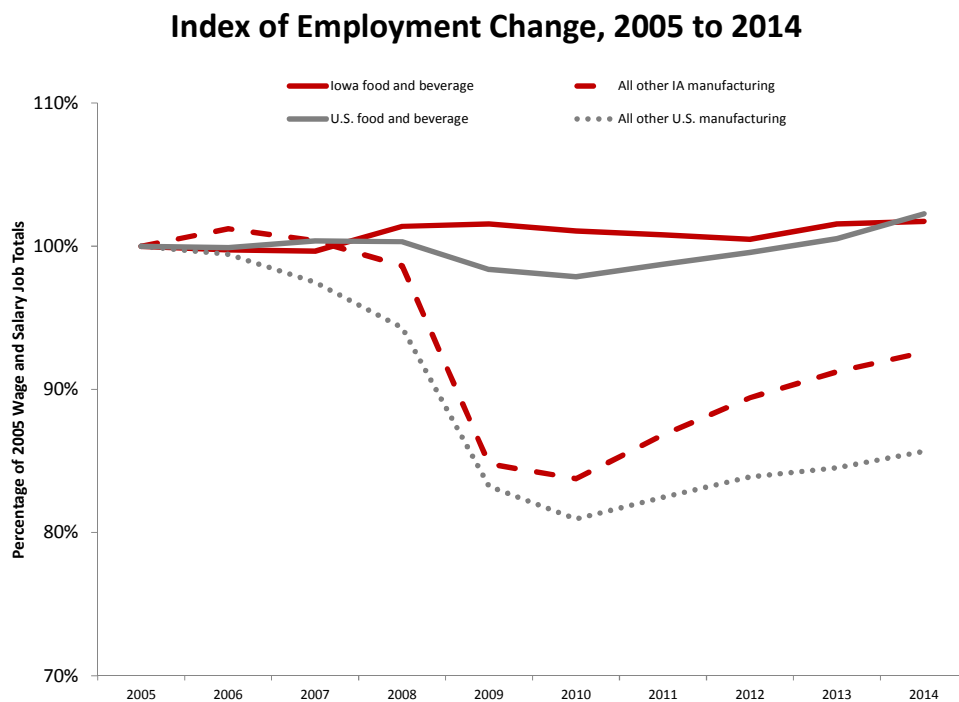


## EMPLOYMENT TRENDS

### OVERALL TREND

The U.S. food and beverage sectors had 1,681,568 jobs in 2014. Nationally, the sector is 2.3 percent larger than it was in 2005. Iowa's food and beverage sectors grew by 1.7 percent over 2005 levels. Both in Iowa and nationally, the food and beverage sectors have mostly remained comparatively stable over time. Though the U.S. did see a dip in employment coincident with the Great Recession and recovery, Iowa employment, in distinction, actually improved during that time. The stability of the food and beverage sectors compared to all other manufacturing in the U.S. and in Iowa is stark. The remaining manufacturing sectors contracts sharply during the Great Recession and have not returned to 2005 levels. Figure 7 shows recent state and national employment trends. Employment values are indexed to base year levels in 2005.

FIGURE 7

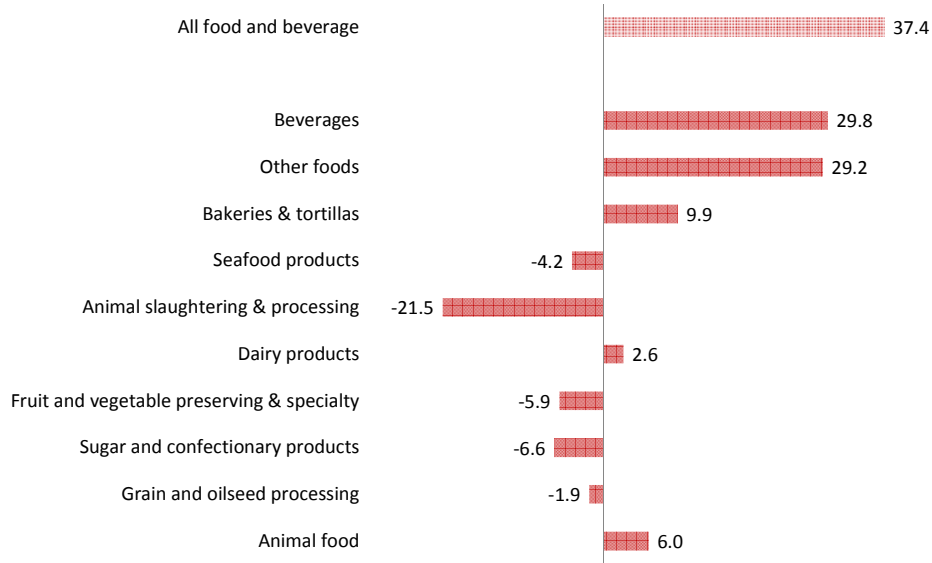


### COMPOSITION OF CHANGE

The composition of recent food and beverage job changes by subsector in the U.S. and in Iowa since 2005 are substantially similar. The U.S. realized a gain of 37,400 jobs, while Iowa gains were about 890. Minor to sharp losses were realized in all other areas of this subsector. Both the U.S. and Iowa realized increases in beverage, other foods, and bakery products. Both saw declines in animal slaughtering and processing. Iowa stands out more in the gain in animal food related jobs. It also saw a comparatively strong reduction in dairy products whereas that sector posted minor gains at the U.S. level. Finally, two minor sectors in Iowa, seafood products and the sugar and confectionary products, had suppressed job totals and could not be compared to the U.S.

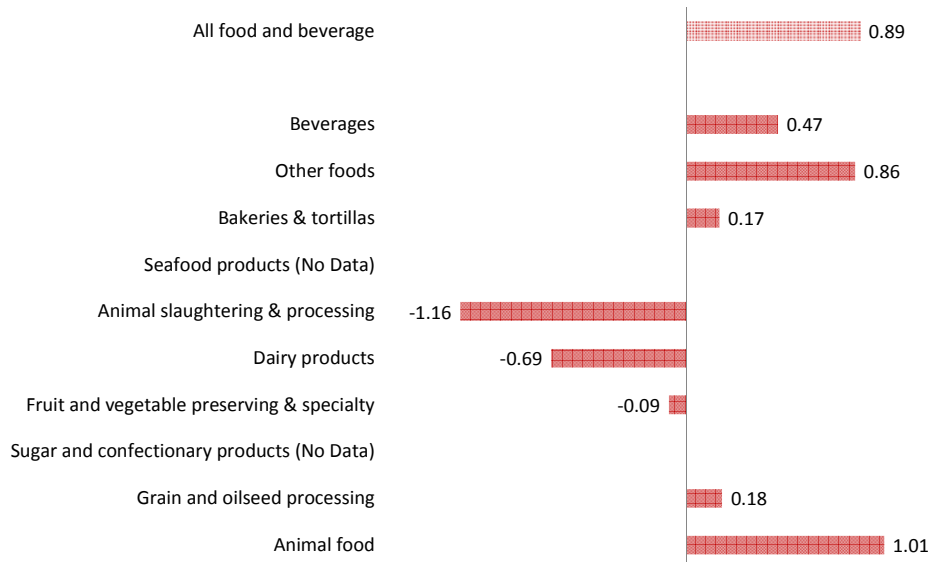
**FIGURE 8.**

**Distribution of Recent U.S. Job Gains and Losses by Detailed Industry, 2005 - 2014**  
 (Amounts in 000s)



**FIGURE 9.**

**Distribution of Recent Iowa Job Gains and Losses by Detailed Industry, 2005 - 2014**  
 (Amounts in 000s)

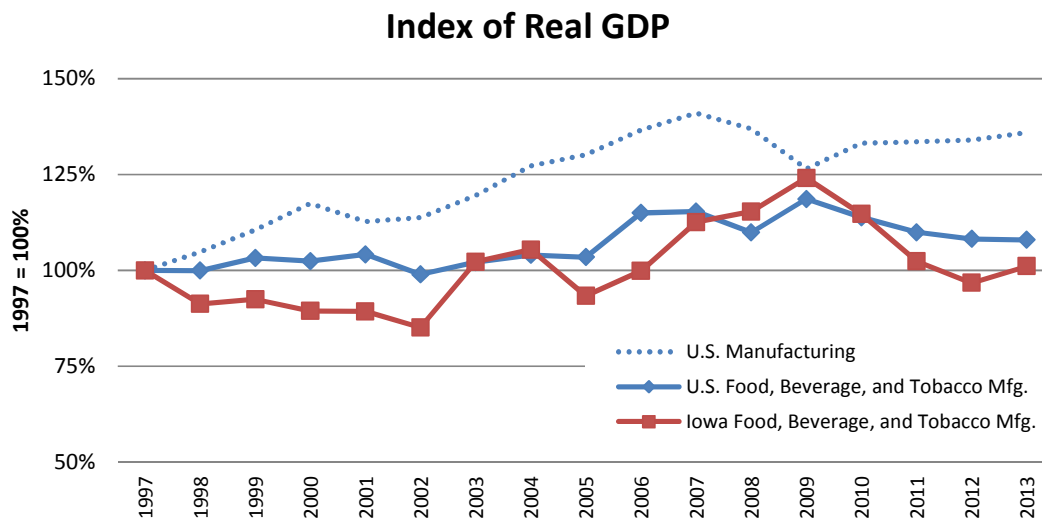


## GDP TRENDS

### REAL GDP

Gross domestic product (GDP) at the industry level measures the market value of industry production less the value of intermediate inputs used during the production process. Changes in real GDP over time reflect trends internal to the industry, such as productivity gains, as well as external factors such as regional or global business cycles. Figure 10 shows trends in real GDP for food, beverage, and tobacco manufacturing industries in the U.S. and Iowa since 1997. Nationally, these industries fared better during the 2007-2009 recession than the manufacturing sector as a whole; however, they later experienced real declines in GDP while other manufacturing industries recovered. Iowa's GDP trends for these industries have generally followed the national pattern.

FIGURE 10.



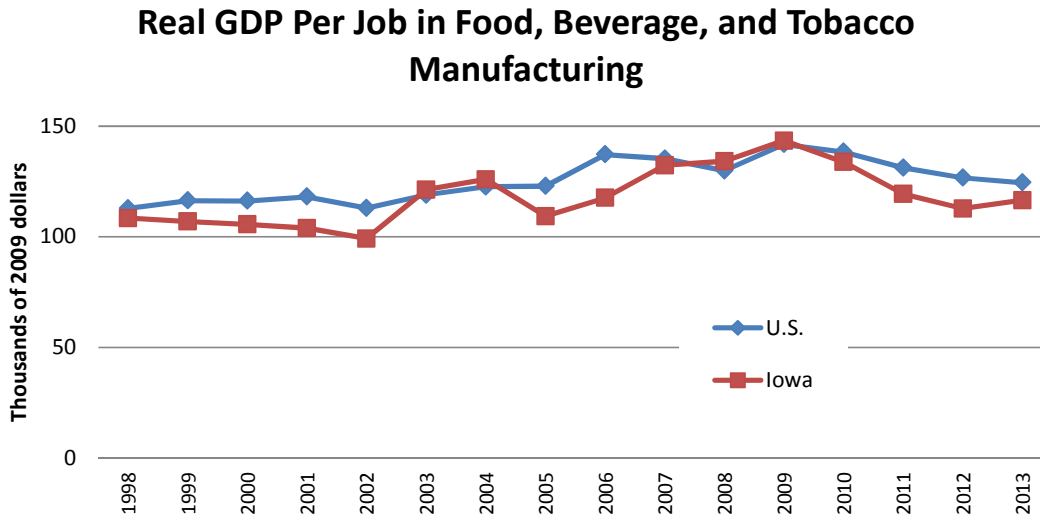
### AVERAGE GDP PER JOB

Standardizing industry GDP on a per job basis provides a measure of how efficiently firms are utilizing their labor inputs. Many factors including technology change, managerial practices, workforce experience, input costs, and substitution of capital for labor may contribute to changes in labor productivity over time.

Figure 11 shows Iowa and U.S. trends in real average GDP per job in food, beverage, and tobacco manufacturing industries. Nationally, gains in the GDP-per-job ratio from 1998-2009 were slightly offset by declines from 2009-2013. Iowa's real GDP-per-job ratio has generally tracked the national trend with values averaging about 94 percent of the U.S. average.



FIGURE 11.

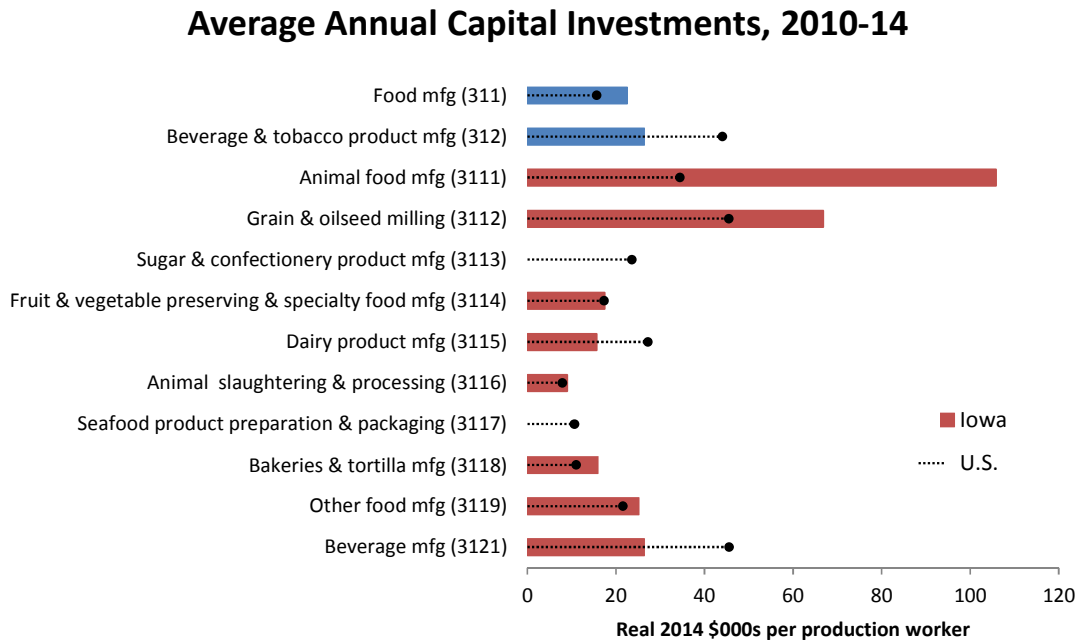


## CAPITAL INVESTMENT PATTERNS

Figure 12 compares recent capital investment activity by U.S. and Iowa food and beverage manufacturing industries. Iowa’s food manufacturing subsector (NAICS 311) averaged \$22,500 in annual capital investments per production worker from 2010-14, exceeding the national average of \$15,600 per worker. In the beverage and tobacco manufacturing subsector (NAICS 312), Iowa’s investments of \$26,400 per worker were well below the U.S. average of \$44,000.

At the detailed industry level, Iowa’s capital investment levels far exceed U.S. averages in animal food manufacturing and grain and oilseed milling. Investments by Iowa’s dairy product manufacturers and beverage manufacturers lag U.S. averages. Iowa’s remaining food manufacturing industries are generally close to U.S. averages.

**FIGURE 12.**



## EXPORT SALES

### U.S. FOOD AND BEVERAGE EXPORTS

Export sales account for 9.1 percent of the value of product shipments by U.S. food manufacturing industries and 6.7 percent by beverage manufacturing industries. Grain and oilseed milling and animal slaughtering and processing had the highest percentage of sales to foreign markets at 15 percent and 11 percent, respectively. Bakeries and tortilla manufacturing had the lowest fraction of export sales. Figure 13 shows the share of product shipments going to export sales by detailed industry for the U.S. in 2012.

By total dollar value of export sales, animal slaughtering and processing ranked first among food and beverage manufacturing industries, followed by grain and oilseed milling. Figure 14 shows the dollar value of U.S. export sales by industry group in 2012.

The real value of U.S. food and beverage exports grew by nearly 100 percent from 2005-2015. Meat product exports accounted for about one quarter of the growth. Grain and oilseed milling products accounted for 20 percent. Animal foods manufacturing was among the slower-growing categories, accounting for only 3 percent of U.S. growth in food and beverage product exports.

FIGURE 13.

### Percentage of U.S. Industry Sales to Foreign Exports (2012)

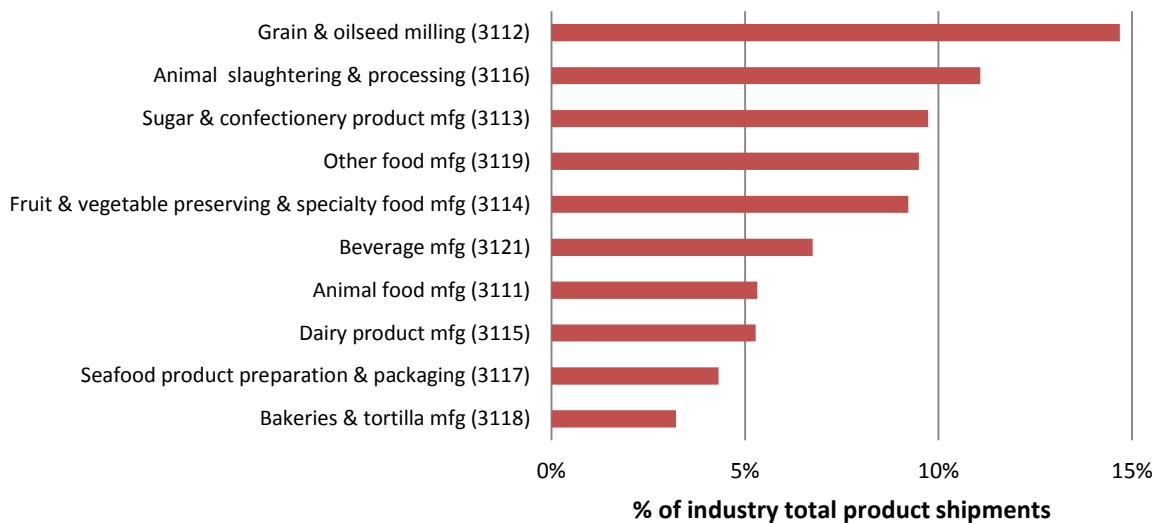
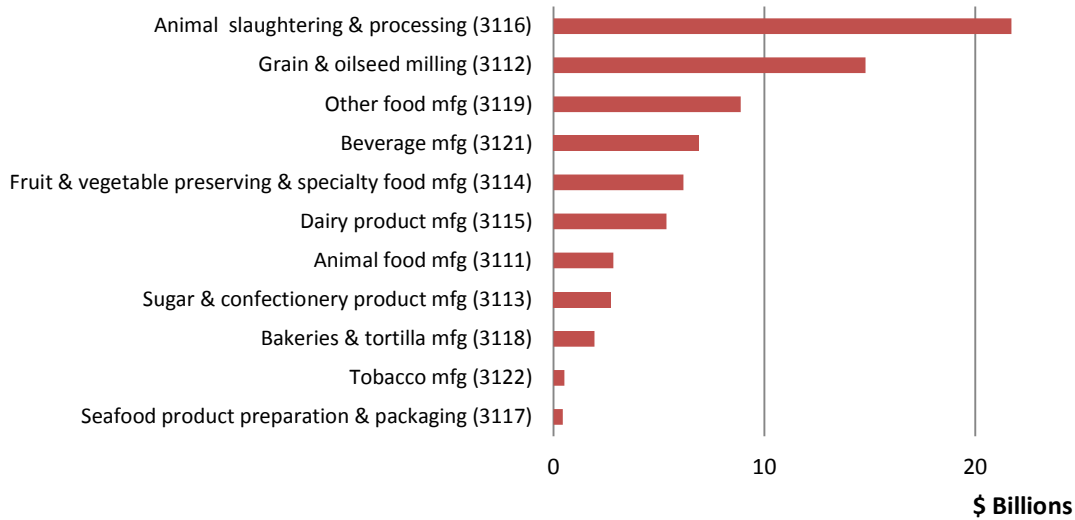


FIGURE 14.

### Value of U.S. Foreign Exports by Industry (2012)



#### IOWA EXPORTS

Iowa was the shipment origin for \$2.75 billion in export sales of manufactured food and beverage products in 2015. Other than a slight downturn from 2014-15, Iowa’s food and beverage exports have grown annually since 2005. Iowa’s 91 percent growth rate in export sales from 2005-15 only slightly lagged the U.S. average of 97 percent. Figure 15 shows the trend in real export sales for Iowa.

**MEAT PRODUCTS MANUFACTURING IS IOWA’S LARGEST EXPORT INDUSTRY WITHIN THE SUBSECTOR, ACCOUNTING FOR MORE THAN HALF OF EXPORT SALES. PRODUCTS FROM THE GRAIN AND OILSEED MILLING INDUSTRY ACCOUNT FOR 30 PERCENT OF IOWA’S EXPORT SALES. ANIMAL FOOD MANUFACTURING RANKS A DISTANT THIRD WITH 5 PERCENT. FIGURE 15**

Figure 16 shows the average composition of Iowa’s food and beverage sector export sales by industry from 2011-2015.

FIGURE 15.

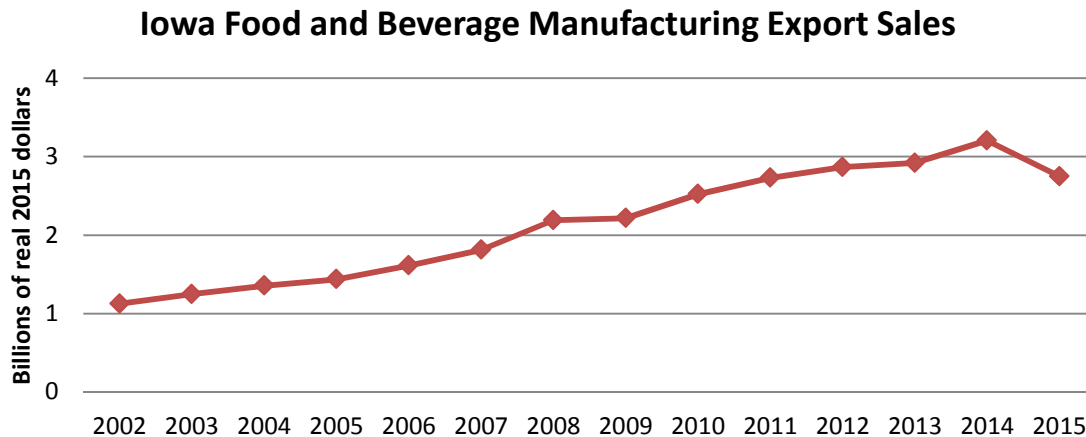
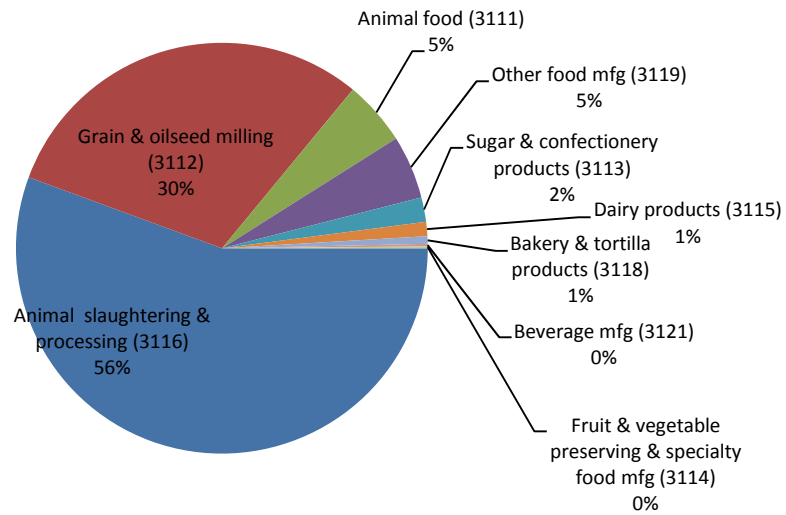


FIGURE 16.

### Composition of Iowa Food and Beverage Product Exports by Industry (2011-2015)



#### IOWA'S TRADING PARTNERS

The top trading partners for Iowa's food manufacturing industries include Japan, Mexico, and Canada, with each accounting for more than 20 percent of the state's total food product exports. South Korea, Hong Kong, Taiwan, Australia, China, the Philippines, and Germany rounded out the top ten.

## OCCUPATIONAL PROFILE

About 61 percent of food and beverage jobs are in production occupations. Transportation and material moving occupations are 13 percent, and a combined 10 percent of jobs are associated with office and administrative support and management. Though not shown in detail, a scant .8 percent of the jobs are engineering or related positions. Figure 17 shows the distribution of food and beverage manufacturing employment by major occupational group in 2014. Table 1 shows, for the slice that is production workers, the major occupations in that subset of food and beverage manufacturing jobs. Food processing jobs, slaughterers and packers, along with cutters and trimmers are the dominant occupations

FIGURE 17.

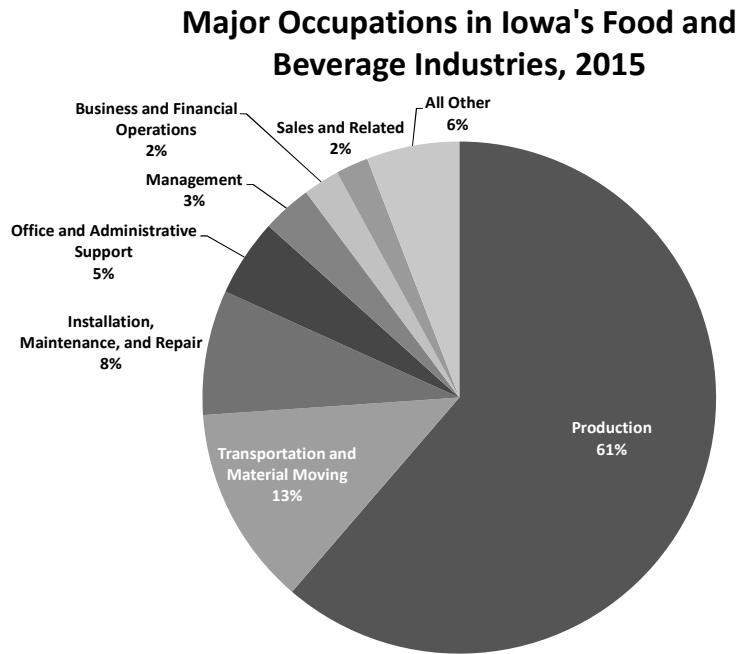


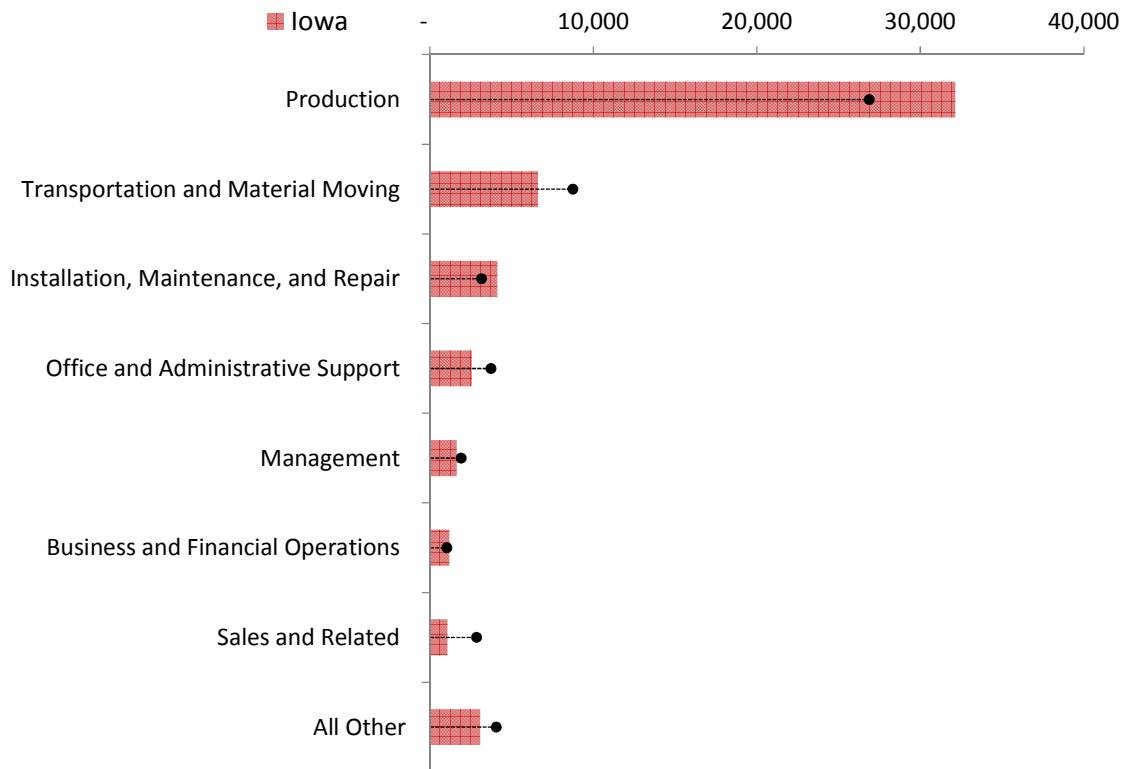
TABLE 1

<b>Production Occupations by Major Category in 2015</b>	
Food Processing Workers, All Other	5,690
Slaughterers and Meat Packers	5,000
Meat, Poultry, and Fish Cutters and Trimmers	4,130
Packaging and Filling Machine Operators and Tenders	3,390
Food Batchmakers	2,760
First-Line Supervisors of Production and Operating Workers	1,610
Helpers--Production Workers	1,330
Inspectors, Testers, Sorters, Samplers, and Weighers	1,190
Mixing and Blending Machine Setters, Operators, and Tenders	1,170
All Others	5,880
<b>All Production Workers</b>	<b>32,150</b>

Figure 18 displays the broad occupational distribution for the state of Iowa. It also, using national staffing patterns to predict expected occupations, displays how Iowa deviates from the U.S. food and beverage industry occupational distributions. Overall, Iowa has significantly more workers than would be expected in production jobs, but the state has fewer than would be expected in transportation and material moving, office and administrative support, sales and related, and in the all-encompassing all other category.

**FIGURE 18.**

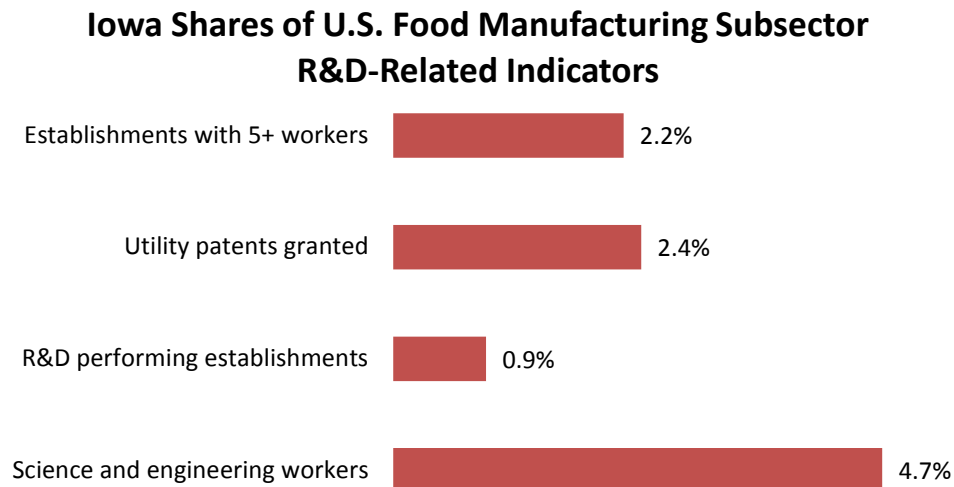
**Actual and Expected Staffing (Based on National Averages)  
 for Iowa's Food and Beverage Manufacturers**



## RESEARCH AND DEVELOPMENT

Available indicators of R&D activity within the food manufacturing sector (NAICS 311) include the number of utility patents granted, the estimated number of firms performing domestic R&D activities, and the number of food manufacturing workers engaged in occupations such as science and engineering that may engage in R&D efforts. Figure 19 provides a snapshot comparing Iowa's percentage share of U.S. totals for all three of these R&D-related measures. Iowa's share of U.S. food manufacturing establishments with five or more paid employees is included as a baseline comparison measure.

FIGURE 19



From 2002-2012, the U.S. Patent & Trademark Office issued more than 1,300 utility patents to U.S. based firms in the food manufacturing sector. Iowa was the residence of the first-named inventor for 2.4 percent of the patents granted. Iowa's patent share is very close to its overall share of food manufacturing establishments with 5 or more works, suggesting the state's patenting activity is about average compared to other states.

Estimates from the Business Research and Development and Innovation Survey by the National Science Foundation suggest that nearly 4,000 U.S. food manufacturing companies paid for and performed domestic R&D activities in 2014. Iowa accounted for fewer than one percent of those firms.

Despite its comparatively low share of R&D-performing firms, Iowa appears to have a higher than expected share of science and engineering workers employed within its food manufacturing sector. Across the U.S., food manufacturing firms employ nearly 22,000 workers in science or engineering occupations. Iowa's food manufacturing subsector employs 4.7 percent of those workers.



## BACKWARD AND FORWARD INDUSTRIAL LINKAGES

### *BACKWARD LINKAGES: AMOUNTS*

Iowa's food and beverage manufacturers require Iowa-supplied manufactured inputs, and they make sales to Iowa manufacturers. As is the intrinsic nature of food and beverage manufacturing, these industries also make extensive purchases from the state's agriculture sector. These relationships are estimated using an input-output model of the entire state economy, which accounts for all production related transactions among all industries and other economic institutions in the state. Table 2 provides an estimate of the backward or supply chain linkages the food and beverage industry relies on in Iowa. More than \$9.7 billion in inputs were required from Iowa ag sources in 2014. That compares to \$2.8 billion in input purchases from other Iowa manufacturers. The higher amounts of input purchases were processed oilseeds, milled corn, nonpoultry animals, processed meat carcasses. Twelve of the seventeen top manufactured inputs were food and beverage manufacturing industries.

TABLE 2

### **Food and Beverage Manufacturer Estimated Purchases from Iowa Agriculture and Manufacturer Sources, 2014 (\$ Amounts in Millions)**

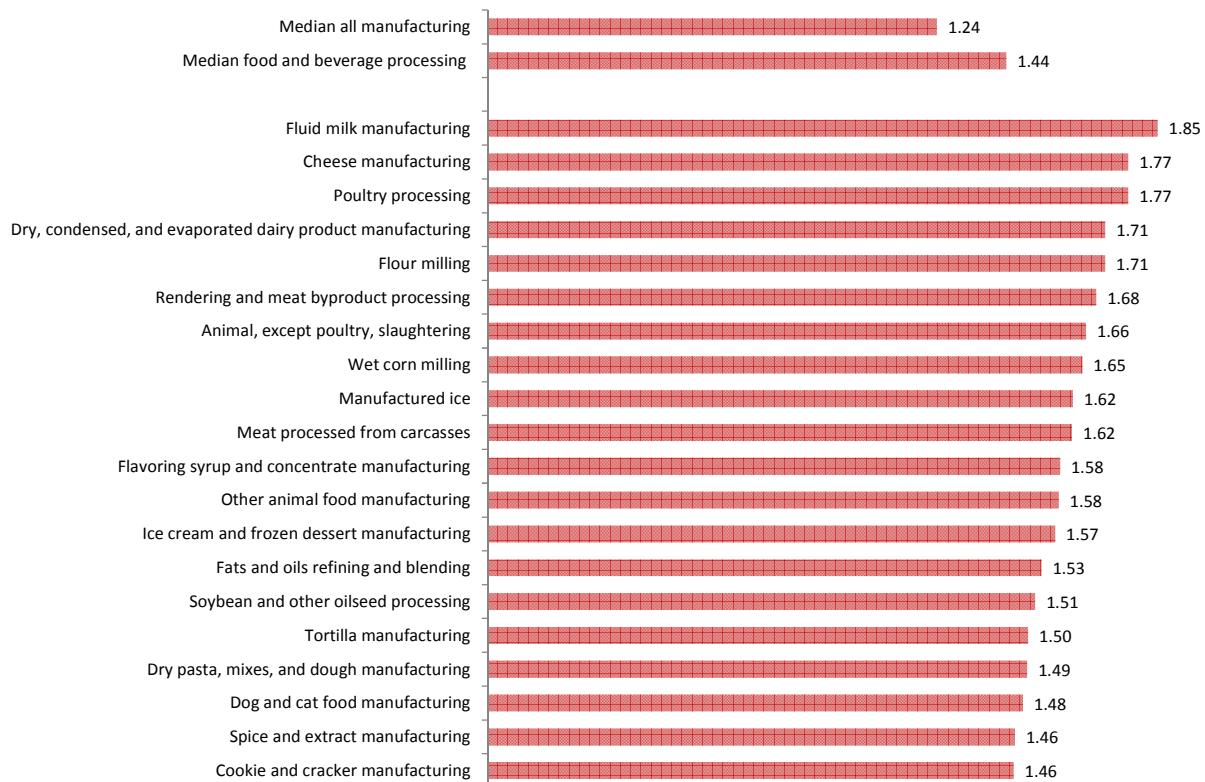
Ag animals	7,053.5
Ag crops	2,675.0
Total agriculture-based inputs	\$ 9,728.5
Soybean and other oilseed processing	596.6
Wet corn milling	546.0
Animal, except poultry, slaughtering	503.2
Meat processed from carcasses	289.3
Flour milling	182.4
Paperboard container manufacturing	116.0
Fluid milk manufacturing	104.4
Poultry processing	70.5
Dry, condensed, and evaporated dairy product manufacturing	67.6
Paper bag and coated and treated paper manufacturing	37.1
Flavoring syrup and concentrate manufacturing	34.9
Metal cans manufacturing	30.9
Other animal food manufacturing	29.0
Medicinal and botanical manufacturing	23.2
Plastics bottle manufacturing	22.6
Cheese manufacturing	14.6
Fats and oils refining and blending	10.9
All other manufacturing	125.9
Total manufacturing inputs	\$ 2,805

**BACKWARD LINKAGES: MULTIPLIERS**

Inter-industrial modeling systems allow us to compile an indexed value of industrial reliance on in-state suppliers for manufactured goods and other services. This index is called an inputs multiplier, and it describes the relationship an industry has with the rest of the state’s manufacturing and nonmanufacturing inputs suppliers. The median inputs multiplier in Iowa for manufacturing firms was 1.24 in 2014. That value means this: for every \$1 of total production input expenditures, the median Iowa manufacturing firm required \$.24 worth of input supplies from some other Iowa industry. Figure 20 displays the multipliers for the food and beverage industrial categories in the input-output modeling system for Iowa. Food and beverage multipliers are much higher than the overall manufacturing average because of Iowa based feedstocks as well as robust inter-industry purchases. Pictured are the 20 subsectors with values in excess of the median value for all food and beverage processing of 1.44. Fluid milk, cheese, and poultry processing had the highest multipliers.

**FIGURE 20.**

**Top 20 Food and Beverage Manufacturing Inputs Multipliers in Iowa**



**FORWARD LINKAGES**

Iowa’s food and beverage manufacturers have forward linkages within the Iowa economy and outside of the Iowa economy. Table 3 shows, by broad category, which sectors of the Iowa and external economies receive the \$45.2 billion in food and beverage manufactured goods produced in Iowa. Firstly, the vast majority, 87 percent or \$39.3 billion), of food and beverage products are sold to the rest of the country or to the rest of the world as export sales. Other food and beverage manufacturers buy 5.5 percent, followed by households at 3.5 percent, and agriculture at 2.5 percent.

**TABLE 3**

**The Distribution of Iowa Food and Beverage Industry Sales, 2014**

	Amount of Sales (\$Millions)	Percent of Total
Domestic and Foreign Exports	39,316.5	87.0%
<i>Sales Within Iowa</i>		
Food and Beverage Manufacturers	2,505.6	5.5%
Households	1,588.7	3.5%
Agriculture	1,116.4	2.5%
All Other	259.9	0.6%
Dining and Drinking	204.4	0.5%
Governments	102.5	0.2%
Other Manufacturing	75.1	0.2%
Trade*	10.9	0.02%
<b>Total Food and Beverage Industry Sales</b>	<b>\$ 45,180.2</b>	<b>100.0%</b>

\* Trade values do not include food or beverage products that are subsequently resold to households or to government institutions.

## KEY DATA SOURCES

International Trade Administration, U.S. Department of Commerce

Science and Engineering Indicators, National Science Foundation

U.S. Bureau of Economic Analysis

U.S. Bureau of Labor Statistics

U.S. Census Bureau

U.S. Patent and Trademark Office

2014 Input-output model of the Iowa economy