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Economic Importance of the Iowa Egg Industry—2014 Update

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Economic Importance of the Iowa Egg Industry

2014 Update



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EXECUTIVE SUMMARY

Iowa leads the nation in egg production, producing more than the second- and third-largest states combined. The United States Department of Agriculture (USDA) estimates that approximately 59.3 million layers in Iowa produced 16.5 billion eggs in 2014. This level of production utilizes 54.9 million bushels of corn and 504,500 tons of soybean meal to feed the layers and an additional 6.8 million bushels of corn and 62,200 tons of soybean meal to feed the growing pullets. In addition, the egg industry is an important value-added activity in Iowa, directly employing an estimated 3,900 hatchery, production, and processing workers in 2014 and generating over \$175 million in direct payroll. When multiplier effects on the Iowa economy are included, even more impressive numbers are generated: total labor income of \$502 million, nearly 8,825 total jobs, and total sales of \$769 million.

A number of factors account for the phenomenal growth of the egg industry in Iowa in recent years. First, per capita annual egg consumption increased from approximately 240 in 1989 to approximately 260 by 2014. Growing population and per capita egg consumption have supported a 1.6 percent annual expansion rate in egg production nationally over the last 27 years. During this same period, Iowa egg production has increased eightfold. Second, Iowa has a competitive advantage due to low feed costs, which represent approximately 60 percent of production costs. Third, Iowa has capitalized on the rapidly growing market for breakers, a processing step where eggs are broken and sold as liquid or further processed eggs. The sale of these egg products require lower transportation costs to major population centers on the East and West Coasts.

Iowa is favorably situated to benefit from any continued growth in the egg industry. The advantages Iowa producers enjoy over their counterparts in other regions are relatively stable. Competing regions face the same corn prices plus higher shipping costs to import corn from the Midwest. Threats to Iowa's production cost advantage would likely be through technological advances that improve feed efficiency or by industry shifts that reduce pullet costs. Any advantages created by these changes would likely be short-lived, as Iowa producers would be able to adopt these changes as well.



CHAPTER 1

Egg Industry Situation and Outlook

This chapter examines Iowa's egg production trends and market share within the US egg industry. It also provides a timely snapshot of Iowa's production landscape just prior to the avian influenza (AI) outbreak of 2015. As such, this report provides the benchmark by which economic impact calculations will be made for the Iowa industry.

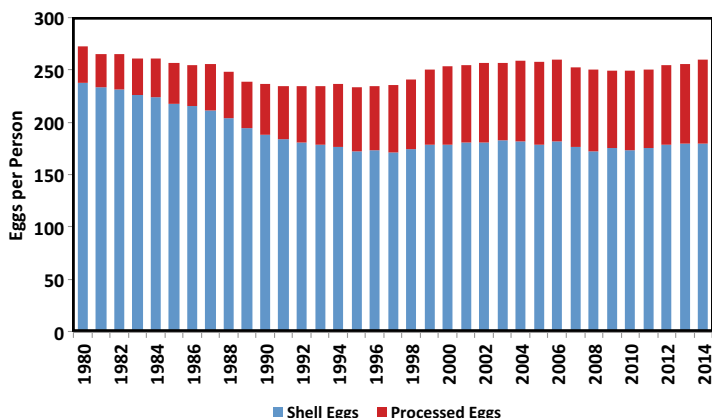
According to the USDA, there were approximately 59.3 million layers in Iowa, which consumed an estimated 54.9 million bushels of corn and 504,500 tons of soybean meal in 2014. Iowa was the largest egg producing state prior to 1958 but relinquished this title until 2001 when it recovered its number one status. Between 1997 and 2007, Iowa's egg production grew faster than anywhere in the country, increasing 150 percent during that time. Recently, the growth rate in Iowa has stabilized to a level similar to other states. In 2014, Iowa produced more eggs than the second- and third-largest states (Ohio and Indiana, respectively) combined and more than the 30 smallest producing states combined.

The egg industry is separated into two main segments for marketing purposes. The first segment, called "shell eggs," are eggs put in cartons and sent to the store. The second segment is called "processed eggs," where egg shells are broken and the liquid egg or further processed egg product is sold.

An increase in processed egg production, improved transportation, and modernized facilities has encouraged investment in Iowa egg production to capture its significant feed cost advantage. Per capita annual egg consumption in the United States peaked in 1945 at 403, reached its lowest level in 1991 at 235, and steadily increased to 260 in 2006. In 2007, per capita annual consumption began to decrease and fell to approximately 250 eggs from 2008 to 2011, but then increased rapidly between 2012 and 2014 to reach 260 eggs (figure 1.1). Increasing population and rising per capita food consumption have enabled the table

egg industry to expand production 47 percent from 1990 to 2014.

FIGURE 1.1
United States per capita egg consumption by processing type.



Source: USDA-Economic Research Service

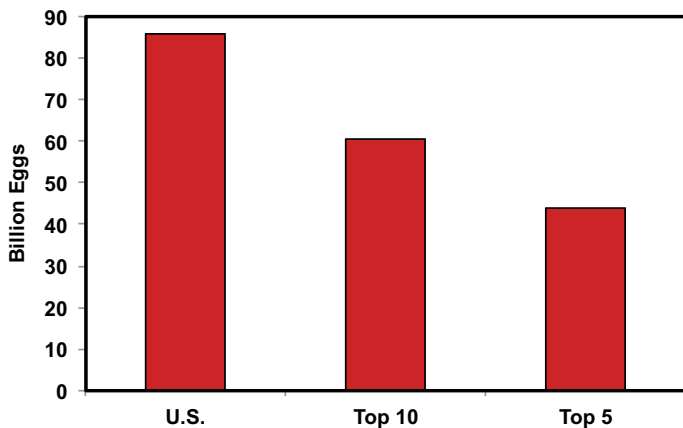
The growth in egg consumption over the past three decades occurred primarily in egg products rather than shell eggs (figure 1.1). In 1980, approximately 13 percent of egg production was consumed as egg products. By 2000, this amount had grown to 29 percent, further increased, albeit at a lower rate, and stabilized at about 31 percent. On a per capita basis, annual shell egg consumption declined 24 percent from 1980 to 2014, while product egg consumption increased 128 percent. Production for shell egg consumption has increased 15 percent or about 0.5 percent per year between 1983 and 2014. Nationwide, egg production for the processed egg products market increased 208 percent during the same period. Because Iowa's primary competitive disadvantage is the distance to major population centers, this trend benefited Iowa's industry because processing reduces transportation costs relative to shipping whole eggs for retail sales. Some food manufacturers have also chosen to locate in less populated areas of the Midwest, further reducing shipping distances for Iowa egg products. Yet, Iowa egg producers can still sell into the higher value shell egg market, if economics are favorable.

Industry Size and Location

The top 10 egg producing states account for 70 percent of the total United States production (figure 1.2). California, the leading producer in 1988, was passed by Ohio in 1997. Ohio then held the top spot until Iowa became number one in 2001. Indiana and Pennsylvania round out the top five producing states, which account for 51 percent of United States egg production. Of the top five states, California has reduced egg production and market share over the last 27 years (figure 1.3). Ohio has reduced egg production and market share over the last 15 years. Indiana and Pennsylvania have had relatively stable production and market share. Texas, Michigan, Minnesota, Georgia, and Nebraska round out the rest of the top 10.

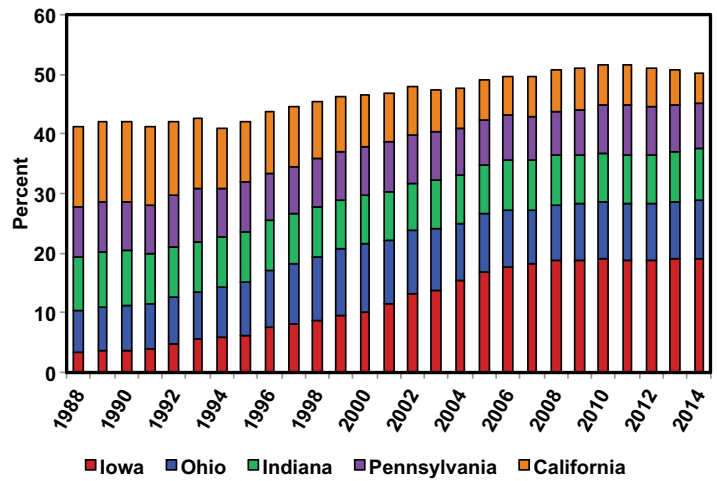
The Iowa egg industry has experienced rapid expansion over the past two decades. Figure 1.4 shows the 27-year trend in Iowa egg production and the share of United States production. Since 1988, Iowa's layer inventory increased over 8 percent per year and egg production increased 8.5 percent per year. This expansion caused Iowa's production share to increase from slightly less than 3 percent in 1988 to more than 16.5 percent by 2014.

FIGURE 1.2
Production of top 5 and top 10 egg producing states, 2014.



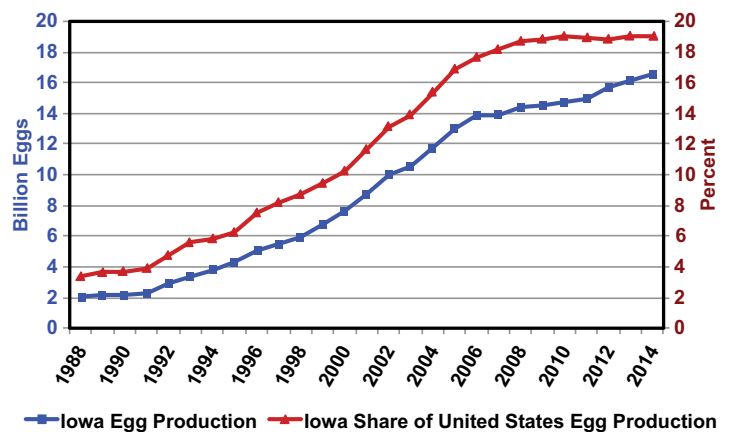
Source: USDA-Economic Research Service

FIGURE 1.3
Market share of the top 5 egg producing states, 1988–2014.



Source: USDA-Economic Research Service

FIGURE 1.4
Iowa egg production and share of U.S. production.



Source: USDA-Economic Research Service

Prices and Profits

Iowa egg prices are consistently below the national average. Prices fluctuating between 37 cents and 99 cents per dozen are common; however, the overall price trends upward (table 1.1). The spread between the Iowa price and the national average price ranged from 1 cent to 8 cents per dozen and has averaged 2.9 cents per dozen since 2000. The industry was relatively unprofitable in 2005 and 2006; however, in spite of past experiences with higher feed costs, prices have been stronger and at profitable levels since.

TABLE 1.1

Iowa and the United States Layer and Egg Production Producer Price of Non-Processed Eggs.

	Iowa				United States			
	Average No. Layers 1,000 ^a	Annual Eggs per Layer ^a	Total Egg Production Million ^a	Price, Cents/Doz. ^b	Average No. Layers 1,000 ^a	Annual Eggs per Layer ^a	Total Egg Production Million ^a	Price, Cents/Doz. ^b
1988	8,073	255	2,059	38.8	278,587	251	69,878	44.0
1989	8,505	252	2,140	53.0	270,415	250	67,503	61.3
1990	8,261	260	2,151	56.1	270,946	251	68,134	62.8
1991	9,047	248	2,247	53.5	275,451	252	69,465	58.6
1992	11,091	262	2,902	39.4	278,824	254	70,749	45.6
1993	13,221	252	3,328	45.9	284,770	253	71,936	51.6
1994	14,686	259	3,808	42.1	291,035	254	73,903	49.2
1995	16,717	258	4,318	44.3	294,350	254	74,764	50.6
1996	19,066	264	5,023	59.9	298,270	256	76,377	64.2
1997	21,187	261	5,527	54.8	303,604	255	77,532	58.7
1998	23,044	259	5,969	48.3	312,035	255	79,690	52.5
1999	25,623	264	6,754	40.8	322,354	257	82,715	45.2
2000	28,423	270	7,665	43.5	328,232	257	84,385	44.9
2001	32,924	266	8,762	41.7	335,521	256	85,851	43.4
2002	37,276	268	9,997	41.3	337,498	257	86,779	43.2
2003	39,362	267	10,512	61.0	337,218	259	87,299	63.0
2004	44,156	266	11,734	55.4	342,765	261	89,295	57.5
2005	48,957	266	13,041	36.8	343,767	262	90,028	39.2
2006	51,708	268	13,846	39.7	346,166	263	90,895	42.2
2007	52,565	265	13,925	78.8	344,082	263	90,569	81.6
2008	53,488	270	14,421	91.1	339,106	266	90,230	94.3
2009	53,881	269	14,502	65.5	337,401	269	90,825	68.4
2010	54,753	269	14,752	68.2	340,140	270	91,871	70.6
2011	54,542	273	14,909	76.4	338,085	274	92,574	79.2
2012	55,896	280	15,653	75.4	340,281	278	94,591	80.0
2013	58,085	278	16,143	81.1	348,358	281	97,734	86.0
2014	59,258	279	16,528	98.8	355,031	282	100,010	104.2

Source: ^aUSDA- National Agricultural Statistics Service. ^bEgg Industry Center.

CHAPTER 2

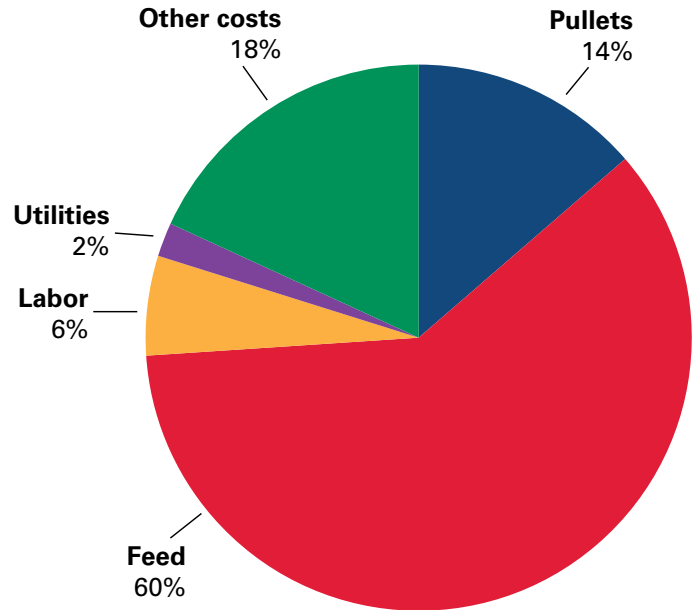
Competitiveness of the Iowa Egg Industry

The Iowa egg industry has expanded almost every year since 1990, increasing in eggs produced and share of United States production. This expansion is fueled by the increased demand of a growing population and rising consumption of egg products. The continued sustainability and growth of Iowa's egg sector will depend upon the state's competitiveness compared to other regions, especially those closer to major market centers. Higher energy prices and higher corn prices are changing the cost of producing animal proteins, including eggs; however, Iowa still maintains a competitive position.

Access to lower cost feed is the primary advantage Iowa producers enjoy over other egg producing regions. Figure 2.1 represents the percentage breakdown of egg production costs in Iowa. Feed is the largest component, representing approximately 60 percent of production costs. Consequently, feed prices can have a dramatic impact. Iowa has a feed price advantage due to its extensive feed-grain production and will likely maintain that advantage for the foreseeable future.

FIGURE 2.1

Distribution of Iowa egg production costs, 2014.



Source: Egg Industry Center

Cost of Egg Production in Iowa

Determining accurate and objective production costs is difficult because costs vary with operational efficiencies, production systems, age and condition of facilities, and input prices. This is compounded by a natural reluctance by producers to provide access to actual data. Moreover, different people allocate different costs to different items creating a lot of variability around the average cost per item.

This analysis attempts to address the regional cost of production by modeling estimated costs for Iowa and competing states. First, costs for a typical Iowa egg production system are estimated based on producer

reported input costs, *Feedstuffs* weekly reports of corn and soybean meal prices, and white laying-hen production guidelines (from genetic companies) to approximate production efficiency. Second, this same production budget, with minor adjustments, is applied to two other states, using the feed ingredient costs and the cost difference for labor and utilities listed in table 2.3. This approach examines the difference in cost of production due to input prices. Finally, a sensitivity analysis for each state is used to determine the impact on cost of production to changes in key variables. The sensitivity analysis serves two functions: 1) it illustrates the magnitude of error in the cost of production if one of the underlying assumptions is not correct; and 2) it allows cost advantages to be compared across regions—for example, Iowa has lower feed costs than California. This raises the question, how much cheaper do other production costs in California have to be to offset the Iowa corn price advantage?

Cost of production for Iowa is based on the Egg Industry Center nationwide producer surveys of cost of production and the white layers production guidelines (from genetic companies). The diet is corn (67 percent), soybean meal (22 percent), limestone (8 percent), and the remainder is vegetable oil, vitamins and minerals, and amino acids. Input prices for corn and soybean meal used in this analysis are based on weekly prices reported by *Feedstuffs* newspaper. Limestone is assumed to cost \$58/ton and the other feed ingredients cost \$420/ton. The EIC producer surveys also indicated the approximate transportation and milling cost to be \$11/ton.

In addition to feed cost, other expenses are listed in table 2.1. Pullets were valued at \$3.87 per bird at 19 weeks of age after they were moved to the layer house and were productive over a 101-week laying/molting/laying cycle (up to 120 weeks of age, producing 44.5 dozen eggs per hen housed). Spent hens were disposed of at no value. We assume all other costs to be 16.61 ¢/dozen. Given these assumptions, the economic model estimates the cost of producing eggs in Iowa to be 63.76¢/dozen at the facility, prior to processing (table 2.1).

TABLE 2.1
Iowa egg cost of production budget, 2014.

Input	¢/Dozen
Pullets	8.70
Feed	38.45
Utilities *	1.28
Labor *	3.76
Facilities and equipment *	4.55
Other costs *	7.02
Total costs	63.76

Note: *The non-feed costs are an average obtained from U.S. producer surveys conducted by the Egg Industry Center.

Table 2.2 shows total production cost estimates at various combinations of corn and soybean meal prices and the impact of changes in key price and production variables. The bolded blue values are the initial values represented in table 2.1. Note that a 41¢/bushel increase in corn price increases the cost of producing eggs approximately 1.8¢/dozen. A \$46/ton increase in soybean meal price increases the cost of producing eggs approximately 1.88¢/dozen. The largest non-feed expense factor is the cost of pullets—a 10 percent increase in this expense increases the cost of producing eggs 0.87¢/dozen. Production efficiency is paramount, a 10 percent decrease in eggs per layer results in nearly a 7.08¢/dozen higher cost of production, while a 10 percent increase in feed use per dozen eggs results in nearly a 3.85¢/dozen higher cost of production.

TABLE 2.2

Iowa cost of egg production (¢/doz) at different corn and soybean meal prices and due to a 10 and 20 percent change in selected variables.

Soybean Meal/ Corn	\$3.25	\$3.66	\$4.07	\$4.47	\$4.88
\$370	56.42	58.22	60.01	61.80	63.61
\$416	58.30	60.09	61.89	63.68	65.49
\$462	60.18	61.97	63.76	65.56	67.36
\$508	62.05	63.85	65.64	67.44	69.24
\$554	63.93	65.72	67.52	69.31	71.12

	Eggs/Hen	Feed/doz.	Pullet	Non-Feed & Non-Pullet
Initial value	279	3.36	8.70	16.61
-10%	70.85	59.92	62.89	62.10
Base	63.76	63.76	63.76	63.76
+10%	57.97	67.61	64.63	65.42

Source: Egg Industry Center

Iowa's Competitive Position

The Iowa model discussed is used as the starting point to estimate production costs in California and Pennsylvania. These two states are among the top five United States producers. While they are located away from the feed-producing region of the Midwest, they are located closer to the population on the coasts. The same production system was used in all three states because they use similar facilities for commercial egg production. The analysis accounts for different prices for production inputs but does not adjust for possible differences in land for the production site, construction materials, or labor. The sensitivity analysis does address differences in cost of production due to annualized facility and equipment costs.

Table 2.3 compares the relative price of inputs and total costs for egg production in Iowa, California, and Pennsylvania. The corn and soybean meal price are based on *Feedstuffs* prices. The labor cost differences are based on reported prices from USDA. The utilities index uses USDA prices for electricity and propane and industry experts to determine the quantities used in each state for a similar facility. Values greater than

one suggest the cost of the input is more than in Iowa, and values less than one suggest the cost is lower than Iowa's. Iowa has the lowest feed, utility, and total cost of the states considered in the study.

TABLE 2.3

Input prices, indexes, and cost of production for Iowa, California, and Pennsylvania, 2014.

	Corn (\$/bushel)	Soybean Meal (\$/ton)	Labor (\$/hr)	Utilities Index	Total Cost (¢/dozen)
Iowa	4.06	461.92	15.10	1.00	63.76
California	6.08	511.60	15.73	1.21	74.71
Pennsylvania	4.58	506.26	12.36	1.33	67.85

Note: Non-feed and non-pullet costs included in the total cost calculation are assumed to be equal across regions at 16.61 cents/dozen.

Source: *Feedstuffs*, USDA-National Agricultural Statistics Service, Total Cost calculated by the Egg Industry Center.

Tables 2.4 and 2.5 describe the cost of production and the impact on that cost due to changes in prices of feed and other selected variables for California and Pennsylvania, respectively. As with table 2.2, the bolded blue values are the initial values.

TABLE 2.4

2014 California cost of egg production (¢/doz) at different corn and soybean meal prices and due to a 10 percent change in selected variables.

Soybean Meal / Corn	\$4.87	\$5.48	\$6.08	\$6.69	\$7.30
\$409	65.17	67.86	70.55	73.24	75.93
\$460	67.25	69.94	72.63	75.32	78.01
\$512	69.33	72.02	74.71	77.40	80.09
\$563	71.41	74.10	76.79	79.48	82.17
\$614	73.49	76.18	78.87	81.56	84.24

	Eggs/Hen	Feed/doz.	Pullet	Non-Feed & Non-Pullet
Initial value	279	3.36	9.69	16.61
-10%	83.01	69.87	73.74	73.05
Base	74.71	74.71	74.71	74.71
+10%	67.92	79.55	75.68	76.37

Source: Egg Industry Center

TABLE 2.5

2014 Pennsylvania cost of egg production (¢/doz) at different corn and soybean meal prices and due to a 10 percent change in selected variables.

Soybean Meal / Corn	\$3.66	\$4.12	\$4.58	\$5.04	\$5.50
\$405	59.68	61.71	63.73	65.76	67.78
\$456	61.74	63.76	65.79	67.81	69.84
\$506	63.8	65.82	67.85	69.87	71.89
\$557	65.85	67.88	69.9	71.93	73.95
\$608	67.91	69.94	71.96	73.98	76.01

	Eggs/Hen	Feed/doz.	Pullet	Non-Feed & Non-Pullet
Initial value	279	3.36	9.07	16.61
-10%	75.38	63.63	66.94	66.18
Base	67.85	67.85	67.85	67.85
+10%	61.68	72.06	68.75	69.51

Source: Egg Industry Center

Iowa's feed price advantage has been relatively stable, but the demand for corn from ethanol production has led to higher corn prices in Iowa and elsewhere. Producers operating in other states will have to focus on either improving feed efficiency or reducing non-feed costs to offset Iowa's advantage. Two specific examples are California's egg producers who need a 38 percent non-feed cost reduction compared to a 14 percent reduction for Pennsylvania (not considering transportations costs).

The largest non-feed cost items provide the greatest opportunity for producers in other regions to compensate for Iowa's feed-cost advantage. At a cost of 8.70¢/dozen, pullet depreciation represents the largest non-feed cost item in the production budget and 13.6 percent of the total production costs. Pullet development costs, however, are primarily feed related, thereby favoring Iowa producers. Furthermore, any innovations that decrease a competitor's non-feed portion of pullet development costs could also be adopted in Iowa. Therefore, any regional cost advantages derived from lower cost pullets would

likely be short-lived. Consequently, Iowa will likely maintain an advantage in pullet production as well as feed costs.

Facilities and equipment is the second largest non-feed item in the production budget at approximately 7.1 percent of total costs. Facilities and equipment include buildings, cages, and other production equipment. Annual depreciation costs are primarily determined by the initial cost and expected useful life of the assets. The initial cost accounted for in this analysis includes the cost of building materials, site preparation, construction costs, and repairs. While macroeconomic factors may impact some of these costs, construction standards and site selection regulations will also impact cost and may differ by state.

Combined, labor and energy costs comprise 8 percent of egg production costs. Although it is a relatively small input cost, Iowa does have the advantage of lower utility rates. Any climate-related cost advantage would be realized through lowered energy requirements or lower construction costs to maintain an ideal laying hen environment in the building. Because region-specific electrical or natural gas utilization values were not available, the production cost estimates assume constant power consumption among all regions of the country. The total electric cost is substantially less than the feed cost advantage. Furthermore, any labor saving innovations adopted in competing states would be available in Iowa.

Production efficiency exerts a significant influence over production costs. Efficiency improvements achieved in other states could threaten Iowa's cost advantage. If California producers improve eggs per layer by 17.2 percent, they will offset Iowa's feed-cost advantage. Pennsylvania producers would need to improve eggs per layer by 6.4 percent to offset Iowa's feed-cost advantage. Production efficiency is primarily related to diet, environmental conditions, genetics, and other factors controlled by management. Consequently, feed conversion improvements achieved in other areas would also be available to Iowa producers, which suggests competitive gains would be short-lived.

A major disadvantage for Iowa producers is lack of proximity to population centers. Pennsylvania producers are closer to the urban areas on the East Coast. California producers are closer to the population centers on the West Coast. Table 2.6 estimates the cost per dozen of transporting shell eggs from central Iowa to markets near New York City and Los Angeles. It also compares the shipping cost associated with production areas closer to these population centers. The freight rate is based on current commercial rate for refrigerated trucks. The rate from Des Moines to a West Coast market would cost around \$2.38 per loaded mile; the rate from Des Moines to the East Coast was found to be closer to \$3.70 per loaded mile.

TABLE 2.6
Shell egg transportation to population centers (¢/doz), 2014.

Destination	Production Center		
	Iowa	California	Pennsylvania
Los Angeles	16.7	1.9	
New York City	17.1		2.3

Source: Egg Industry Center

Iowa's transport cost is 14.8¢/dozen higher than shipping eggs from both Pennsylvania to New York City and California-produced eggs to major population center like Los Angeles. This comparison assumes a minimal trucking distance for producers in California and Pennsylvania to reach the city; actual costs may be higher. When competing against these regions for the table egg market, Iowa may be vulnerable to transportation costs. Iowa is compensating for this freight disadvantage to major cities by sending a disproportionate number of eggs into the breaker market for further processing.

Conclusions

If demand remains strong enough to sustain prices at a profitable level despite higher feed costs, the egg production industry will continue to expand. Iowa continues to benefit from a production environment favorable to expansion. In the foreseeable future, Iowa producers will continue to hold a competitive production advantage over egg producers in other regions. The balance between the cost of transporting feed to production areas near population centers and the cost to transport eggs and egg products will impact regional competitiveness. Threats to Iowa's production cost advantage would come from technological advances that improve feed efficiency, reduce pullet costs, or increase transportation costs. Iowa egg production may easily adapt to advances in technology and efficiency, but the challenge of transporting product to the major population centers is a growing hindrance to competing in those markets.

There are some factors that might affect the future of the competitiveness of the Iowa egg industry. Cold winters represent a big challenge to egg production systems that require access to the outdoors such as free-range or organic. Moving to production systems that require access to the outdoors year round would pose a big challenge for Iowa producers. The avian influenza outbreak experienced in 2015 was a significant loss to all egg producers and affected Iowa more than any other state because it infected 25.1 million layers in Iowa (which represents 43 percent of the 2014 average flock). Other states, such as Nebraska, Minnesota, Wisconsin, and South Dakota, lost a larger percentage of their laying flocks even though a smaller number of birds were affected.

CHAPTER 3

Economic Impacts

The rapid expansion of the egg industry in Iowa has taken place primarily in the integration of the egg laying-hen farms and the related value-added processing facilities. Based on monthly average prices, the total market value of egg production in Iowa was about \$1.307 billion in 2014. This represents 16.53 percent of total United States production, according to the USDA. About two-thirds of Iowa's egg production goes into egg-breaking facilities for further processing, and the remaining portion goes into retail outlets as shell eggs. The additional processing at the egg-breaking facilities represents value-added agricultural activity that brings jobs and income into the Iowa economy, mainly in rural areas.

The growth of the Iowa egg industry is positive employment news for rural areas of Iowa. Data from Iowa Workforce Development (IWD) for the egg processing North American Industry Classification System (NAICS) code (311999) suggest that in 2014 there were about 2,235 employees at 36 egg-processing facilities in Iowa (table 3.1). Most of these are concentrated in north-central Iowa, where high levels of corn production are also located. Total annual wage and salary income in 2014 for these workers totaled about \$114.1 million, according to IWD data.

TABLE 3.1
Average annual egg processing data (NAICS 311999—Other Miscellaneous Food Manufacturing).

Year	Establishments	Employees	Total Wages (million \$)
2012	37	2,253	\$104.7
2013	37	2,245	\$110.1
2014	36	2,234	\$114.1

Source: Iowa Workforce Development

However, we must add to the egg processing jobs, the jobs of those who actually work on the farm itself. For 2014, data reported to IWD for the egg production NAICS code (112310) indicated 1,683 employees at 56 facilities in Iowa, up from 38 facilities in 2009. Aggregate wage and salary income for production workers totaled \$60.9 million in 2014 (table 3.2).

TABLE 3.2
Average annual egg production data (NAICS 112310—Chicken Egg Production).

Year	Establishments	Employees	Total Wages (million \$)
2012	45	1,534	54.3
2013	57	1,705	59.1
2014	56	1,683	60.9

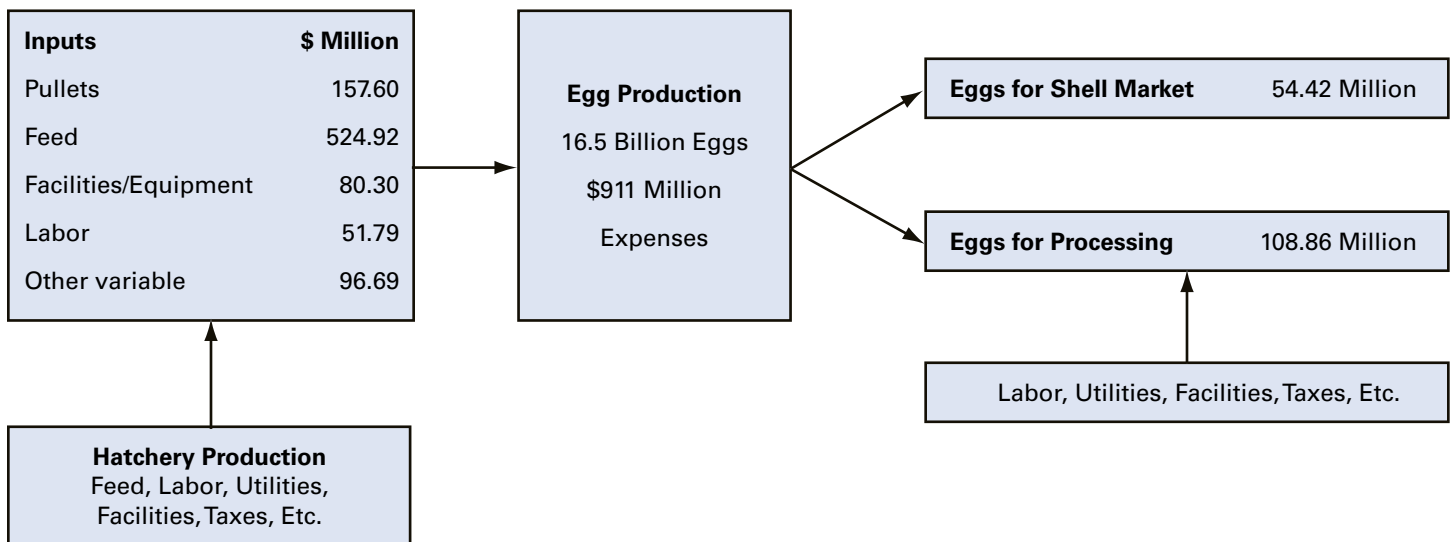
Source: Iowa Workforce Development

The number of egg production and processing facilities reported by IWD is less than the 3,821 farms in Iowa that are listed as producing eggs in the 2012 Census of Agriculture. This number is up considerably from the 2002 Census of Agriculture, which listed 1,934 farms with laying-hens. In both years, a large majority of this total is comprised of farms with less than 100 layers and would include individuals producing for niche markets such as free-range eggs. At the higher end, there were 40 farms in Iowa with over 100,000 layers in 2012, compared to 46 farms of this size in 2002. Our report focuses on the economic impacts of the large-scale commercial egg production and processing facilities.

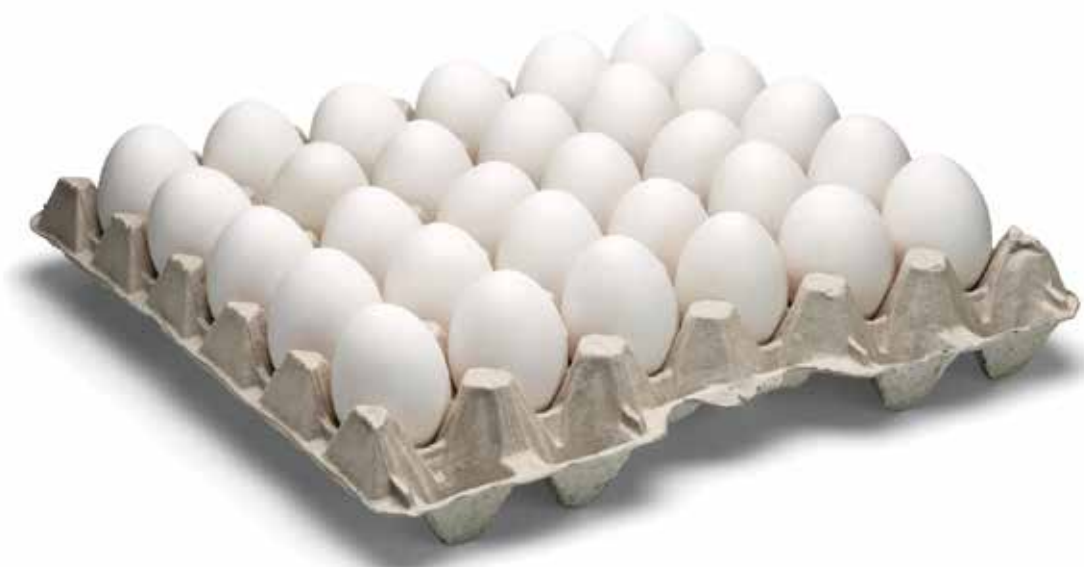
The relationships among components of the Iowa egg industry are schematically displayed in figure 3.1. Because of the close integration between growers and processors in the Iowa egg industry, the production and processing components are considered the core of the industry. The backward linkages consist of suppliers of inputs including feed-grains, supplements, veterinary services, and utilities. Based on the 2014 levels of production, approximately 61.6 million

bushels of corn and 566,700 tons of soybean meal were used by the 59.3 million layers and 40.7 million pullets grown in Iowa. Total feed costs based on 2014 prices were estimated to be \$524.9 million based on prices of \$4.07/bushel for corn and \$462/ton for soybean meal and other ingredients. Costs of other non-feed inputs (including labor, depreciation, transportation, and miscellaneous expenses) totaled \$228.8 million for the Iowa egg industry.

FIGURE 3.1
Iowa egg production sector without considering processing sector.



Source: Egg Industry Center



The egg production and processing activities identified as the core of the Iowa egg industry also are responsible for generating economic effects beyond the farm and processor levels. The purchases made and incomes earned in these core sectors affect regional and state economies via economic linkages. An input-output model is used to identify and estimate the value of these linkages within the state. An input-output model is essentially a generalized accounting system of a regional economy that tracks the purchases and sales of commodities between industries, businesses, and final consumers. Successive rounds of transactions stemming from the initial economic stimulus (such as a new plant or a community business) are summed to provide an estimate of direct, indirect, induced (or consumer-related), and total effects of the event. Our analysis considers the contribution of the various components of the Iowa Egg Industry to the Iowa economy. The impacts are calculated using the IMPLAN Input-Output (I-O) modeling system, originally developed by the U.S. Forest Service and currently maintained by the Minnesota IMPLAN Group. This modeling system is widely used by regional scientists to estimate economic impacts.

In this analysis, the dollar value of activity at the producer and processor level (core level), identified as \$1.307 billion worth of egg products, is used as the direct effect, or input, to the model. The value of incomes and jobs at the hatcheries and the 16.5 billion eggs produced and processed in Iowa serve as the direct effects that stimulate the successive rounds of economic activity captured by the I-O model. Hatcheries and pullet production are inputs toward producing 16.5 billion eggs. The market value for these eggs and egg products of \$1.307 billion incorporates the value of the intermediate inputs and poultry production. The direct labor inputs are 3,917 jobs at the hatcheries, production, and processing levels.

Using \$1.307 billion of sales as the direct input to the modeling, results from this I-O impact analysis are presented in table 3.3. When all direct and secondary effects are considered, the total impacts include over \$2.36 billion of output sales, \$501.8 million of personal income, \$769 million of contribution to the gross state product, and 8,825 jobs to Iowa's economy. Based on average state tax yields per income, the IMPLAN model also estimates the Iowa egg industry generates \$22.8 million of state general tax revenues annually. These numbers reflect a substantial increase in economic impacts since 2002 because the level of annual egg production grew at an average rate of 5.4 percent per year, increasing from 10.0 billion to 16.5 billion in 2014.

TABLE 3.3
Economic contribution of egg industry in Iowa, 2014.

Sectors	Output Impact (\$)	Income Impact (\$)	Value Added (\$)	Job Impact
Agriculture	722,180,579	158,989,013	156,737,950	2,073.8
Mining	503,529	202,371	159,566	3.6
Construction	17,635,428	7,419,003	7,930,394	123.7
Manufacturing	1,073,794,012	148,840,348	263,864,662	2,568.9
Transportation and Public Utilities	85,409,295	23,860,954	46,827,110	379.9
Trade	109,401,919	44,882,363	73,284,346	901.2
Service	343,423,636	113,369,256	215,400,827	2,716.9
Government	9,119,952	4,255,783	5,141,454	57.5
Total	2,361,468,349	501,819,090	769,346,308	8,825.5

Source: Iowa Input-Output Model



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