Iowa State University
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Economic Importance of the Iowa Egg Industry

Authors:
John Lawrence
Shane Ellis
Dan Otto

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Department of Economics
Iowa State University
Ames, Iowa 50014

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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 estimates that approximately 52.7 million layers in Iowa produced 13.9 billion eggs in 2007. This level of production consumes 50 million bushels of corn and 453,000 tons of soybean meal. In addition, the egg industry is an important value-added activity in Iowa, directly employing an estimated 2,870 hatchery, production, and processing workers in 2007 and generating over $123 million in direct payroll. The multiplier impacts on the Iowa economy are even more impressive, with total labor income of $281.3 million to nearly 7,600 total jobs and value added of $475.7 million attributable to direct and indirect impacts of the egg industry on the Iowa economy.

A number of factors account for the phenomenal growth of the egg industry in Iowa in recent years. First, per capita egg consumption increased from 235 in 1991 to 257 by 2001, a level at which it has stabilized. Growing population and per capita egg consumption have supported a 1.7 percent annual expansion rate in egg production over those 18 years. During this same period, Iowa egg production has increased almost six-fold. Second, Iowa has a competitive advantage due to low feed costs. Feed costs represent over 60 percent of costs to produce a dozen eggs and most competing states face higher feed costs than Iowa. Third, although Iowa does market shell eggs in spite of a transportation cost disadvantage in shipping shell eggs to major metropolitan centers on the east and west coasts, Iowa has capitalized on the rapidly growing market for breaker or "processed" eggs, which incur lower transportation costs.

If demand allows the egg industry to expand profitably, Iowa is in a favorable position to benefit. The advantages Iowa producers enjoy over their counterparts in other regions are relatively stable. While the rapidly emerging ethanol industry has driven up corn prices in Iowa, competing regions face the same higher corn prices plus the higher shipping cost 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.

There are other factors that create uncertainties in the egg industry. Animal health issues, such as Exotic Newcastle Disease or avian influenza, always pose risks—and the costs of risk management—to Iowa egg producers. New animal welfare guidelines for shell egg producers will have a major impact on production capacity in all parts of the country over the next five years. Another factor is how the flock certification process will be implemented. Expansion of capacity may be easier in less densely populated parts of the nation, increasing Iowa's competitive advantage in egg production. Alternatively, if the certification process requires a shell/breaker egg producer to certify all flocks/operations regardless of whether the eggs are bound for the shell or breaker market, then shell/breaker egg producers could be put at a major disadvantage in the breaker market or forced out of the certified shell market. These factors are beyond the scope of this study but raise interesting questions for future analyses when appropriate data are available to evaluate the market and industry impacts.

CHAPTER 1

Egg Industry Situation and Outlook

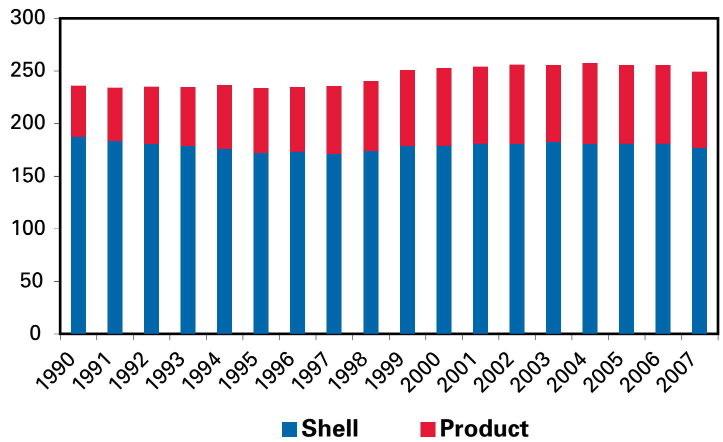
The egg industry is an important value-added activity in the state of Iowa. According to the U.S. Department of Agriculture (USDA), approximately 52.7 million layers in Iowa consumed an estimated 50 million bushels of corn and 453,000 tons of soybean meal during 2007. Iowa was the largest egg producing state prior to 1958 when farm flocks dominated the industry, and the state became number one again in 2001. Iowa also has the fastest growing egg production industry, increasing 150 percent between 1997 and 2006. In 2007, Iowa produced more eggs than the second (Ohio) and third (Pennsylvania) largest states combined and more than the 30 smallest producing states combined.

In recent years, the trend to increased proportion of processed eggs, improved transportation, and modern facilities has encouraged investment in Iowa egg production to capture its significant feed cost advantage. This chapter will examine recent national trends in egg supply and demand and look at Iowa's recent growth in production.

Per capita annual U.S. egg consumption peaked in 1945 at 403, reached its lowest level in 1991 at 235, and has increased steadily until 2001, where it has leveled off at 255–257 eggs per person (Figure 1.1). Increasing population and rising per capita consumption have enabled the industry to expand production 14 percent from 1998 to 2006.

FIGURE 1.1

U.S. per capita egg consumption by processing type.



The growth in egg consumption over the past decade occurred primarily in egg products rather than shell eggs (Figure 1.1). In 1990 approximately 20 percent of egg production was consumed as egg products. By 2000 this figure had grown to 29 percent, where it has remained. On a per capita basis, annual shell egg consumption declined 6 percent from 1990 to 2007 while product egg consumption increased 51 percent. Production for shell egg consumption has increased 18 percent or about 1 percent per year between 1990 and 2007. Product egg production has increased 89 percent during the same period. Since Iowa's primary competitive disadvantage is distance to major population centers, this trend benefits Iowa because processing reduces transportation costs relative to shipping whole eggs for retail sales. Food manufacturers that utilize egg products are less likely to locate in highly populated areas, further reducing shipping distances. Yet Iowa egg producers can still sell into the higher value shell egg market, where economics favor it.

Industry Size and Location

The top 10 egg producing states account for 65 percent of total U.S. production (Figure 1.2). Pennsylvania, the leading producer in 1990, was passed by Ohio in 1994, which held the top spot until Iowa became number one in 2001. Indiana and California round out the top five producing states, which account for 44 percent of U.S. egg production. Of the top five states, only Iowa is still growing in egg production (Figure 1.3). Ohio and California have reduced production and market share over the last 10 years. Indiana and Pennsylvania have had relatively stable production and market share. Texas, Georgia, Arkansas, Nebraska, and Minnesota round out the top 10.

The Iowa egg industry has experienced rapid expansion over the past decade (Table 1.1). Figure 1.4 shows the 18-year trends in Iowa egg production and the share of U.S. production. Since 1990, Iowa's layer inventory increased over 10 percent per year and egg production increased 11 percent per year. This expansion caused Iowa's production share to increase from slightly more than 2 percent in 1990 to more than 15.4 percent by 2007.

FIGURE 1.2

Production shares of top 5 and top 10 egg producing states, 2001.

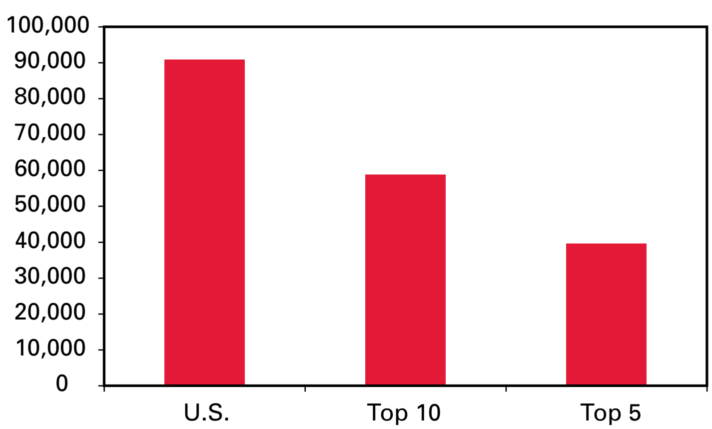


FIGURE 1.3

Market share of the top 5 egg producing states, 1990–2001.

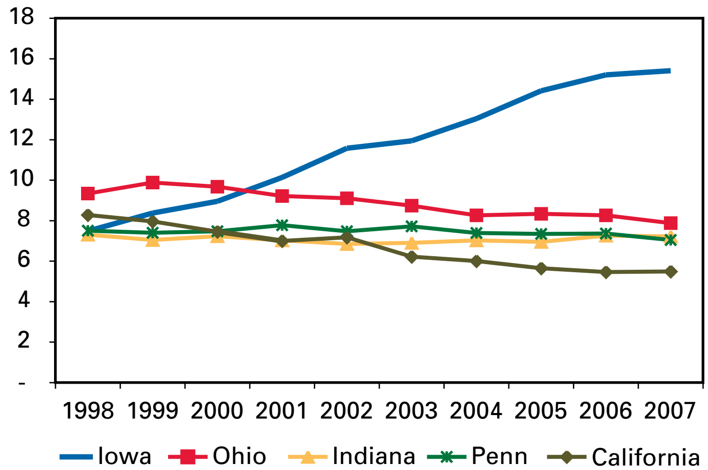
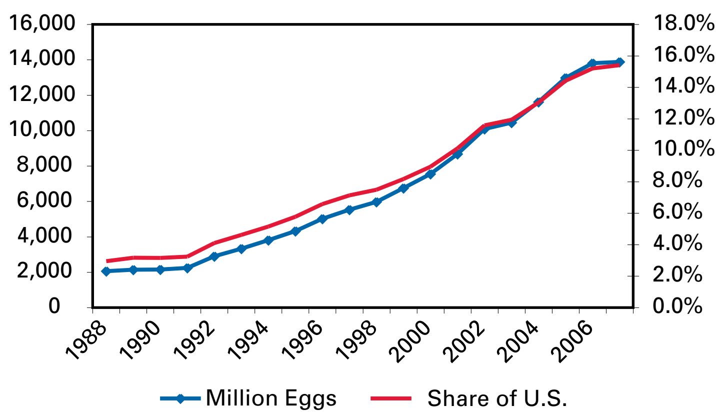


FIGURE 1.4

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



Prices and Profits

Iowa egg prices are consistently below the national average, recently fluctuating between 29 cents and 60 cents per dozen and displaying a slight upward trend (Table 1.1). The spread between the Iowa price and the national average price ranged from 6 cents to 9 cents per dozen and has averaged 7.7 cents per dozen since 2000. The industry was relatively unprofitable in 2004, 2005, and 2006, but prices have been stronger in 2007 and at profitable levels in spite of higher feed costs.

TABLE 1.1

Iowa and the United States: Layers and egg production.

	Iowa				United States			
	Average No. Layers 1,000	Annual Eggs per Layer	Total Egg Production Million	Price, Cents/Doz.	Average No. Layers 1,000	Annual Eggs per Layer	Total Egg Production Million	Price, Cents/ Doz
1988	8,073	255	2,059	35.2	278,587	251	69,878	43.1
1989	8,505	252	2,140	54.4	270,415	250	67,503	60.5
1990	8,261	260	2,151	53.6	270,946	251	68,134	60.4
1991	9,047	248	2,247	49.9	275,451	252	69,465	57.1
1992	11,091	262	2,902	36.0	278,824	254	70,749	45.5
1993	13,221	252	3,328	43.1	284,770	253	71,936	51.6
1994	14,686	259	3,808	37.1	291,035	254	73,903	49.2
1995	16,717	258	4,318	40.2	294,350	254	74,764	50.6
1996	19,066	264	5,023	55.6	298,270	256	76,377	64.3
1997	21,187	261	5,527	49.6	303,604	255	77,532	58.7
1998	23,044	259	5,969	42.0	312,035	255	79,690	52.4
1999	25,623	264	6,754	34.9	322,354	257	82,715	45.2
2000	28,098	269	7,554	35.9	327,908	257	84,412	44.6
2001	32,075	270	8,676	36.5	333,798	257	85,702	45.4
2002	37,664	268	10,092	31.9	339,024	257	87,179	41.2
2003	39,142	267	10,446	50.9	338,393	259	87,473	57.6
2004	43,569	267	11,615	49.1	341,956	261	89,091	55.9
2005	48,760	266	12,978	29.2	343,792	262	90,027	34.7
2006	51,557	268	13,811	33.6	346,078	263	90,877	40.2

Source: U.S. Department of Agriculture, National Agricultural Statistics Service and Economic Research Service

CHAPTER 2

Competitiveness of the Iowa Egg Industry

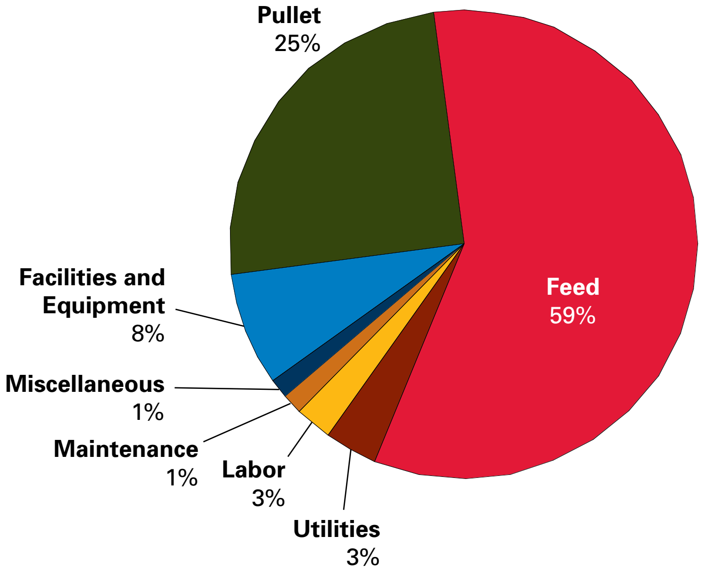
The Iowa egg industry has expanded considerably in recent years, increasing in eggs produced and share of U.S. production. This expansion is fueled by the increased demand of a growing population and rising egg product consumption. The continued sustainability and growth of Iowa's egg sector will depend upon the state's competitiveness compared to other regions, especially those closer to major market centers. Higher energy prices and higher corn prices driven by ethanol production are changing the cost of producing animal proteins, including eggs. Has Iowa's competitive position changed?

The primary advantage Iowa producers enjoy over other egg producing regions is access to lower cost feed. Figure 2.1 represents the percentage breakdown of egg production costs in Iowa. Feed is the largest component, representing approximately 59 percent of production costs. Consequently, feed prices can have a dramatic impact. Iowa has a feed price advantage due to its extensive farmland and will likely maintain that advantage for the foreseeable future.

Higher oil prices have resulted in additional cost of feed transportation from the Midwest to corn deficient regions. While feed prices have increased everywhere, they have increased more in corn importing regions.

FIGURE 2.1

Distribution of Iowa egg production costs.



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 price. This is compounded by a natural reticence by producers to provide access to accurate data.

This analysis attempts to address the regional cost of production by modeling estimated costs for Iowa and for competing states. First, costs for a typical Iowa egg production system are estimated based on USDA reported input prices and interviews with industry experts to approximate production efficiency. Second, this same production budget with minor adjustments is applied to two other states, using their reported input prices. This approach examines 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 wrong, and (2) it allows cost advantages to be compared across regions. For example, Iowa has lower feed costs than California, which has lower heating costs. How much cheaper do California heating prices have to be to offset the Iowa corn price advantage?

Cost of production for Iowa is based on an economic model developed for this analysis with input from egg industry experts including producers, lenders, nutritionists, and building contractors. The diet is corn (61%), soybean meal (19%), and meat and bone meal (7%), and the remainder is vegetable oil, vitamins and minerals, and amino acids. Input prices for corn and soybean meal (SBM) used in this analysis are based on long-run baseline prices forecast in December 2007 by the Food and Agriculture Policy Research Institute (FAPRI). The FAPRI Baseline prices are adjusted to the long-run Iowa basis, and these are $3.12/bu for corn and $209/ton for SBM. Other feed input prices are based on 2007 levels.

In addition to feed cost, other expenses are listed in Table 2.1. Pullets were valued at $2.35 per bird and were productive over a 90-week laying/molt/laying cycle. Spent hens were disposed of at no value. The land, buildings, and equipment were valued at $700,000 for a facility with a capacity of 110,000 hens. Power consumption and labor requirements were constant among all states considered in the study at 200,000 kw-hrs and 2,000 man-hours per year, respectively, for a 110,000 hen laying barn. In colder regions where occasional heating may be required, 4,000 gallons of propane are used. Power and propane costs were calculated from statewide average commercial electricity rates reported by the U.S. Department of Energy (DOE). Wage rates for each state were statewide average wage paid by livestock operations (Agricultural Prices, USDA NASS).

Given these assumptions, the economic model estimates the cost of producing eggs in Iowa to be 40.24 ¢/dozen FOB the facility (Table 2.1). This estimate represents a long-run cost of production because it uses a 10-year projected cost for corn and SBM, and new facilities annualized over many years.

TABLE 2.1

Iowa egg cost of production budget.

Input	¢/Dozen
Pullet	10.04
Feed*	23.47
Utilities	1.40
Labor	1.06
Maintenance	0.59
Miscellaneous	0.58
Facilities & Equip	3.10
Total Costs	**40.24**

** Source: FAPRI Baseline December, 2007 adjusted to Iowa Basis $3.12/bu corn and $209/ton SBM*

Table 2.2 presents 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 values in bold are the initial values represented in Table 2.1. Note that a 50¢/bushel increase in corn price increases the cost of producing eggs approximately 1.83¢/dozen. A $50/ton increase in SBM price increases the cost of producing eggs approximately 1.59¢/dozen. The largest non-feed expense factor is the price of pullets. A 10 percent increase in this expense increases the cost of producing eggs 1.0¢/dozen. Production efficiency is paramount, when a 10 percent decrease in eggs/layer results in nearly a 4.5¢/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 percent change in selected variables.

SBM/ Corn	$2.00	$2.50	$3.12	$3.50	$4.00
$150	34.26	36.09	38.36	39.75	41.58
$200	35.85	37.68	39.95	41.34	43.17
$209	36.14	37.97	40.24	41.63	43.46
$250	37.44	39.27	41.54	42.93	44.76
$300	39.03	40.86	43.13	44.52	46.35
$350	40.62	42.45	44.72	46.11	47.94

	Labor	Utilities	Pullet	Facilities	Eggs/Hen
Initial value	1.06	1.40	10.04	3.10	288
-10%	40.13	40.10	39.23	39.93	44.71
Base	40.24	40.24	40.24	40.24	40.24
+10%	40.34	40.38	41.24	40.55	36.21

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 U.S. 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 for egg production in Iowa, California, and Pennsylvania. The corn and SBM price differences and labor costs are based on reported prices from USDA. The utilities index uses DOE 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 price 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.

	Corn ($/bu)	SBM ($/ton)	Labor ($/hr)	Utilities Index	Total cost (¢/dozen)
Iowa	3.12	209	14.00	1.00	40.24
California	4.53	245	14.59	1.22	46.89
Pennsylvania	3.72	233	11.46	1.23	43.33

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 for Iowa, the values in bold are the initial values.

TABLE 2.4

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

SBM/ Corn	$3.50	$4.00	$4.53	$5.00	$5.50
$150	40.10	41.93	43.87	45.59	47.42
$200	41.69	43.52	45.46	47.18	49.01
$245	43.12	44.95	46.89	48.61	50.44
$250	43.28	45.11	47.05	48.77	50.60
$300	44.87	46.70	48.64	50.36	52.19
$350	46.46	48.29	50.23	51.95	53.79

	Labor	Utilities	Pullet	Facilities	Eggs/Hen
Initial value	1.11	1.70	10.04	3.10	288
-10%	46.78	46.72	45.89	46.58	52.10
Base	46.89	46.89	46.89	46.89	46.89
+10%	47.00	47.06	47.90	47.20	42.20

TABLE 2.5

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

SBM/ Corn	$2.00	$2.50	$3.72	$3.50	$4.00
$150	34.39	36.22	40.69	39.88	41.72
$200	35.98	37.81	42.28	41.48	43.31
$233	37.03	38.86	43.33	42.53	44.36
$250	37.57	39.41	43.87	43.07	44.90
$300	39.17	41.00	45.46	44.66	46.49
$350	40.76	42.59	47.05	46.25	48.08

	Labor	Utilities	Pullet	Facilities	Eggs/Hen
Initial value	0.87	1.72	10.04	3.10	288
-10%	43.24	43.16	42.33	43.02	48.15
Base	43.33	43.33	43.33	43.33	43.33
+10%	43.42	43.50	44.33	43.64	39.00

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. In addition, the rising energy prices that help fuel ethanol expansion have also increased the cost of shipping grain from the Midwest to grain deficit regions such as the east and west coasts. For, example, rail rates to ship corn from Omaha, Nebraska, to Los Angeles increased 80 percent, or approximately $.60/bushel, between October 2003 and October 2007.

As a result producers operating in other states will have to focus on improving non-feed costs to offset Iowa's advantage. California producers would have to reduce non-feed costs by 6.31¢/dozen, nearly 37 percent, to produce eggs at the same cost as an Iowa producer. Pennsylvania feed costs are 2.96¢/dozen higher than Iowa's, and its non-feed costs will have to decrease 17 percent to match Iowa's cost of production.

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 10¢/dozen, pullet depreciation represents the largest non-feed cost item in the production budget and 25 percent of 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 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.

Fixed asset depreciation is the second largest non-feed item in the production budget at approximately 8 percent of total costs. Fixed assets 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 price of the land, cost of building materials, site preparation, and construction costs. 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 5 percent of egg production costs. Although there 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 environment in the building. Because region-specific electrical or natural gas utilization values were not available, the production cost estimates above assume constant power consumption among all regions of the country. The total electric bill 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 12 percent, they will offset Iowa's feed cost advantage. Pennsylvania producers would need to improve eggs per layer by 6.5 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 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 commercial rates in mid-December 2007 for refrigerated trucks. The rate from Des Moines to a west coast market would cost around $2.10 per loaded mile; the rate from Des Moines to the east coast was found to be closer to $2.35 per loaded mile.

TABLE 2.6

Shell egg transportation to population centers (¢/doz).

	Production Center		
Destination	Iowa	California	Pennsylvania
Los Angeles	14.4	1.7	
New York City	10.0		1.5

Iowa's transport cost is 8.5¢/dozen higher than the cost from Pennsylvania to New York City and 12.7¢/dozen more than California to Los Angeles. This comparison assumes a minimal trucking distance for producers in California and Pennsylvania to reach the city; actual cost 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 the higher cost of feed, 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 and reduced pullet costs or increased transportation costs. Iowa egg production may easily adapt to advances in technology and efficiency, but the challenge of product transport to the major population centers is a growing hindrance to competing in those markets.

CHAPTER 3

Economic Impacts

The rapid expansion of the egg industry in Iowa has taken place primarily in large integrated laying and processing facilities. Based on monthly average prices, the total market value of egg production in Iowa was about $825 million in 2007. This represents 15.4 percent of total U.S. production, according to the USDA. About 65 percent of Iowa 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 suggests there are about 1,800 employees at 12 egg processing facilities. Most of these are concentrated in north-central Iowa, where high levels of corn production are also located. Annual wage and salary incomes for these workers total about $54 million.

The processing is usually integrated with the production facility. Based on aggregate budgeting methods, the full-time employment equivalent required to produce 13.9 billion eggs (2007) is about 480 workers. This number is less than the 1,934 farms in Iowa that are listed as producing eggs in 2002. The 1997 Census of Agriculture listed 2,015 farms with layers. In both years, a large majority of this total number is composed of farms with less than 100 layers. At the higher end, there were 46 farms in Iowa with over 100,000 layers in 2002, up slightly from 41 farms of this size in 1997.

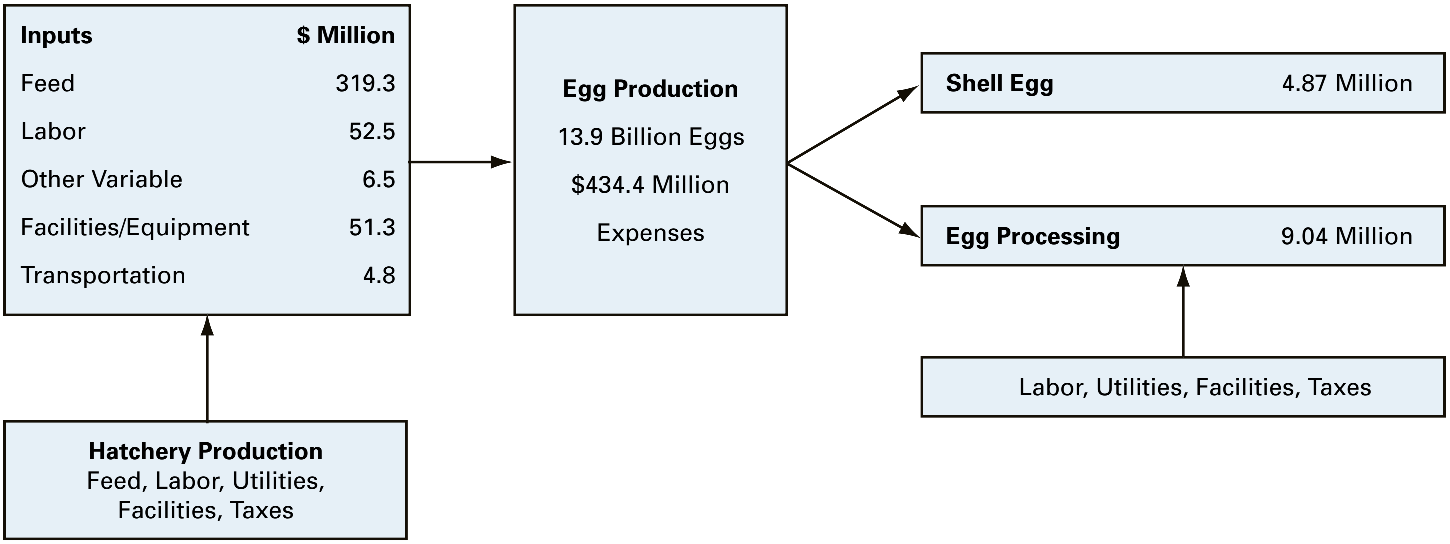
Significant rural employment also occurs at the 13 hatcheries in Iowa, which employ about 531 workers, according to Iowa Workforce Development. This generates about $16.6 million of wages and salary. These numbers reflect an employment growth of about 15 percent since 2002 for this segment of the Iowa egg industry.

The linkages 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 (Figure 3.1), the production and processing component are considered as the core of the industry. The backward linkages consist of suppliers of inputs including feedgrains, supplements, veterinary, and utilities. Based on the 2007 levels of production, approximately 50 million bushels of corn and 453,000 tons of soybean meal were used by the 52.7 million layers in Iowa. Total feed costs were estimated to be $250.3 million based on prices of $3.12/bushel for corn and $209/ton for SBM[1] and 2007 prices for other ingredients. Costs of other inputs including depreciation, transportation, and miscellaneous expenses totaled $62.6 million for the Iowa egg industry.

The egg production and processing activities identified as the core of the Iowa egg industry also are responsible for generating economic effects beyond farm and processor. The purchases made and incomes earned in these core sectors spill over and impact the rest of the regional and state economy via the economic linkages. An input-output model was used to identify and estimate the value of these linkages within the state. An I-O model is essentially a

[1] *Corn and soybean meal prices based on long-run projected prices from FAPRI December 2007 Baseline.*

FIGURE 3.1
Iowa egg production and processing sector.



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. The impacts are calculated using the IMPLAN Input Output modeling system, originally developed by the U.S. Forest Service and currently maintained by the Minnesota IMPLAN Group. The 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) is used as the direct effect, or input, to the model. The value of incomes and jobs at the hatcheries and the 13.9 billion eggs produced and processed in Iowa serve as the direct effects that stimulate the successive rounds of economic activity that is captured by the I-O model. The hatcheries and pullet production are inputs toward producing 13.9 billion eggs. The market value of $825 million for these eggs incorporates the value of the intermediate poultry production. The direct labor inputs are 2,870 jobs at the hatcheries, production, and processing levels.

Using the $825 million of sales as the direct input, the results from this I-O impact analysis are presented (Table 3.1). When all direct and secondary effects are considered, the total impacts include $1.82 billion of sales, $281.3 million of personal income, $475.7 million of contribution to the gross state product, and about 7,600 jobs. Based on average state tax yields per income, the Iowa egg industry generates $18.3 million of state general tax revenues annually. These numbers reflect a substantial increase in impacts since 2002 because the level of annual egg production increased from 9.8 billion to 13.9 billion in 2007.

If the egg industry in Iowa continues to grow, it will generate additional benefits for the rural economy. Based on recent trends, growth of an additional 10 percent is a feasible and reasonable goal. This section illustrates the economic impact that an increase of an additional 1.4 billion eggs marketed at $83 million would generate. Using our I-O model for this scenario, the results are presented in Table 3.2.

TABLE 3.1

Economic importance of egg industry in Iowa.

Sectors	Total Sales	Labor Income	Value Added to GDP	Jobs
Agriculture	$401,681,024	$32,159,024	$113,862,768	910
Construction and Utilities	$24,164,962	$6,275,065	$16,109,245	96
Manufacturing	$1,017,960,256	$107,649,256	$125,784,624	3,227
Trans and Utilities	$35,178,536	$14,500,602	$19,417,404	333
Wholesale and Retail Trade	$76,563,632	$29,390,242	$50,765,076	807
Fin, Ins, and Real Estate	$53,483,608	$14,156,014	$31,737,148	348
Professional Services	$148,195,408	$62,404,080	$76,708,488	1,193
Other Services	$66,336,320	$14,753,202	$41,361,900	682
Total	**$1,823,563,746**	**$281,287,485**	**$475,746,653**	**7,594**

Source: IMPLAN Model for Iowa

TABLE 3.2

Economic impact of a 10 percent growth in Iowa's egg industry.

Sectors	Total Sales	Labor Income	Value Added to GDP	Jobs
Agriculture	$40,569,783	$3,248,061	$11,500,140	92
Construction and Utilities	$2,440,661	$633,782	$1,627,034	10
Manufacturing	$102,813,986	$10,872,575	$12,704,247	326
Transportation and Utilities	$3,553,032	$1,464,561	$1,961,158	34
Wholesale and Retail Trade	$7,732,927	$2,968,414	$5,127,273	81
Finance, Insurance and Real Estate	$5,401,844	$1,429,757	$3,205,452	35
Professional Services	$14,967,736	$6,302,812	$7,747,557	120
Other Services	$6,699,968	$1,490,073	$4,177,552	69
Total	**$184,179,938**	**$28,410,036**	**$48,050,412**	**767**

Source: IMPLAN Model for Iowa

This analysis indicates that producing an additional 1.4 billion eggs in Iowa would directly and indirectly generate additional impacts of $184 million of sales, $28.4 million of income, $48 million of contribution to the gross state product, and 767 jobs.

REFERENCES

Agricultural Prices, USDA National Agricultural Statistical Service, various issues