2024 Poultry and Egg Economic Impact Study

Methodology

Prepared for

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The Poultry and Egg Industry Economic Impact Study: 2024

Summary Results:

The 2024 Poultry and Egg Industry Economic Impact Study measures the combined impact of the chicken, turkey, egg and other poultry growing and processing industries (including renderers, hatcheries, integrated feed producers and secondary processors) in 2024, hereafter the poultry and egg industry. The industry as defined below contributes $663.64 billion in total to the US economy, or 2.29 percent of GDP and, through its production and distribution linkages, impacts firms in all 546 sectors of the US economy.[1] The production process is defined in this study to include farms that hatch and/or raise chickens, turkeys, and other commercially produced fowl, and farms that produce eggs both for consumption and for hatcheries. Processing for this study was defined to include primary processing and secondary value-added processing. Primary processing includes the slaughtering and butchering of live birds, packing of primary products (i.e., breasts, thighs or whole birds), rendering of fats and separation of other poultry materials like feathers and offal, integrated feed producers, genetic poultry labs, and poultry by-product meal producers. Secondary processors are defined as any value-added processing, manufacturers of poultry-based nuggets, sausages, patties and other manufactured food products.

The firms that raise or convert poultry and eggs into products employ 525,442 people in production, sales, primary processing, packaging, direct distribution and value-added processing.[2]

Other firms are related to the poultry and egg industry as suppliers. These firms produce and sell a broad range of items including coops, barns, fuel, packaging materials, or machinery. In addition, supplier firms provide a broad range of services, including personnel services, financial services, advertising services, consulting services and transportation services. Finally, a number of people are employed in government enterprises responsible for the regulation of the poultry industry. All told, the poultry and egg industry is responsible for 854,093 supplier jobs with these firms, generating $282.35 billion in economic activity.

Industries are linked to each other when one industry buys from another to produce its own products, and an economic analysis of the poultry and egg industry will take additional linkages into account. While it is inappropriate to claim that suppliers to the supplier firms are part of the industry being analyzed,[3] the spending by employees of the industry and those of supplier firms whose jobs are directly dependent on egg and poultry sales and production should surely be included. This spending on everything from housing, to food, to educational services and medical care makes up what is traditionally called the induced impact or multiplier effect of the industry. In other words, this spending and the jobs it creates is induced by the production and processing of poultry and eggs. We estimate that the induced impact of the industry generates 633,025 jobs and an economic output of $133.82 billion, for a multiplier of about 1.20.[4]

An important part of an impact analysis is the calculation of the contribution of the industry to the public finances of the community. In the case of the poultry and egg products industry, this contribution comes from the traditional direct taxes paid by the firms and their employees. In total, these taxes provide $54.05 billion in revenues to the federal, state and local governments. This is in addition to sales taxes, restaurant taxes and other taxes paid by consumers who eat poultry and egg products.

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1 Based on GDP of $29,016 trillion. See: *Gross Domestic Product (Third Estimate), Corporate Profits (Revised Estimate), and GDP by Industry, Second Quarter 2024 and Annual Update*, US Department of Commerce, Bureau of Economic Analysis. Economic sectors based on IMPLAN sectors.

2 Throughout this study, the term "firms" actually refers to physical locations. One egg producer, for example, may have facilities in 10 or 12 locations throughout the country. Each of these facilities is included in the count.

3 These firms would more appropriately be considered as part of the supplier firms' industries.

4 Often economic impact studies present results with very large multipliers – as high as 4 or 5. These studies invariably include the firms supplying the supplier industries as part of the induced impact. John Dunham & Associates believes that this is not an appropriate definition of the induced impact and as such limits this calculation to only the effect of spending by direct and supplier employees.

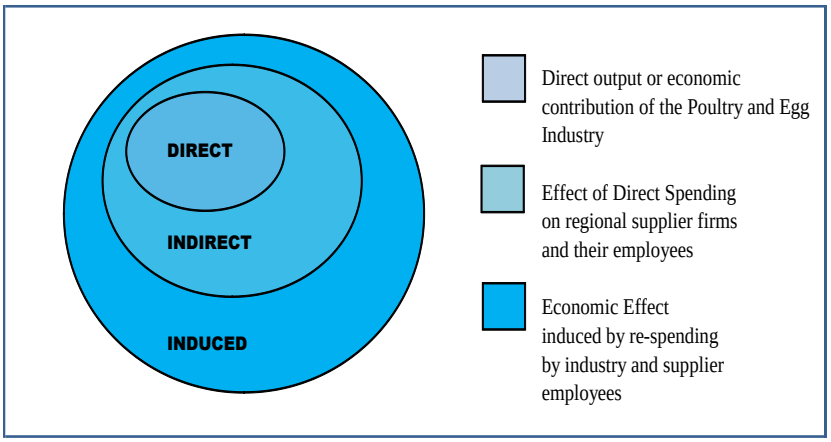
Table 1 below presents a summary of the total economic impact of the industry in the United States.

Table 1: Economic Impact of the Poultry and Egg Industry

	Direct	Supplier	Induced
Jobs	525,442	854,093	633,025
Wages	$28,586,841,700	$62,644,683,600	$41,449,813,400
Output	$247,478,640,800	$282,350,073,000	$133,815,397,700
Taxes			$54,050,114,700

Methodology:

The economic impact of the poultry and egg industry begins with an accounting of the direct employment in the various sectors. The poultry and egg industry encompasses slaughterhouses, packers, company-owned distribution and supply operations, as well as primary foul and egg farmers and producers. It also includes rendering and feather operations, poultry feed manufacturing and secondary, value-added processing. The data comes from a variety of government and private sources.



It is sometimes mistakenly thought that initial spending accounts for all of the impact of an economic activity or a product. However, one economic activity always leads to a ripple effect whereby other sectors and industries benefit from this initial spending. This inter-industry effect of an economic activity can be assessed using multipliers from regional input-output modeling.

The economic activities of events are linked to other industries in the state and national economies. The activities required to produce a broiler chicken or a carton of eggs-from butchering, to packaging, to shipping generate the direct effects on the economy. Regional indirect impacts occur when these activities require purchases of goods and services such as building materials from local or regional suppliers. Additional induced impacts occur when workers involved in direct and indirect activities spend their wages in the region. The ratio between total economic impact and direct impact is termed the multiplier. The framework in the chart above illustrates these linkages. This method of analysis allows the impact of local production activities to be quantified in terms of final demand, earnings, and employment in the states and the nation as a whole.

Once the direct impact of the industry has been calculated, the input-output methodology discussed below is used to calculate the contribution of the supplier sector and that of the re-spending in the economy by employees in the industry and its suppliers. This induced impact is the most controversial part of economic impact studies and is often quite inflated. In the case of the poultry and egg model, only the most conservative estimate of the induced impact has been used.

Model Description and Data

This Poultry and Egg Industry Economic Impact Model (Model) was developed by John Dunham & Associates (JDA) based on data provided by Data Axle, the US Department of Agriculture, participating trade associations and various state agriculture departments. The analysis utilizes IMPLAN, Inc.[5] model in order to quantify the economic impact of the poultry and egg industry on the economy of the United States.[6] The model adopts an accounting framework through which the relationships between different inputs and outputs across industries and sectors are computed. This model can show the impact of a given economic decision on a pre-defined, geographic region. It is based on the national income accounts generated by the US Department of Commerce, Bureau of Economic Analysis (BEA).[7]

The analysis begins with the identification of companies and facilities engaged in the poultry and egg industry. This is defined for the purpose of the study as those firms involved in the production and processing of:

- Chicken;
- Eggs;
- Turkey;
- Other commercially produced fowl; and
- Rendered products such as fat, feathers or poultry meal.

Also included in the definition of the industry are integrated poultry feed producers, hatcheries, and other agricultural support activities involved in the development of fowl.

The industry is defined to include not only the production of eggs and birds, but also primary and secondary processing. It also includes commercial butchering of primary products such as wings, thighs, or breasts. Secondary processors include any value-added processing, manufacturers of poultry-based nuggets, sausages, omelets, patties and other food products.[8]

Individual poultry and egg facility location data was gathered from a number of sources, including the prior US Poultry Model (2022), Data Axle, state agricultural inspection lists, and input from state poultry associations and other related industry organizations. State inspection data did not include employment data and often did not include detailed location information. To ensure that information on non-inspected facilities (i.e., sales offices) was also included, data from Data Axle was also included in the analysis. This data is gathered at the facility level; therefore, a company with a manufacturing plant, warehouse and sales office would have three facilities, each with separate employment counts. Since the Data Axle data are adjusted on a continual basis, staff from John Dunham & Associates evaluated the individual facility data for discrepancies.

All of the data sources were combined and duplicate records, or records for companies that did not handle poultry or eggs (miscoded records) were eliminated. The Data Axle data were used for facility-based employment estimates where they existed, with missing data replaced by medians.

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5 IMPLAN® model, 2022 Data, using inputs provided by the user and IMPLAN Group LLC, IMPLAN System (2024), 16905 Northcross Dr., Suite 120, Huntersville, NC 28078, www.IMPLAN.com.

6 The model uses the IMPLAN 2022 input-output tables, with dollar values inflated to the 2024 dollar year.

7 RIMS II is a product developed by the U.S. Department of Commerce, Bureau of Economic Analysis as a policy and economic decision analysis tool. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993.

8 Facilities that perform both primary and secondary processing are included and jobs were allocated based on a 50/50 ratio of primary and secondary processing. These jobs were then allocated to the facility's determined poultry products (chicken, turkey, etc.).

Since most of the data sources do not have information on the type of product processed or raised at a given facility, JDA staff performed extensive research using Google reviews, Google Maps, company websites, or SIC and NAICS listings provided by Data Axle to allocate products by type. In addition, certain lists were submitted to the sponsoring organizations to verify the industry or product produced.

In the case of firms included on membership lists, the main product was assumed to be that represented by the organization (turkey for turkey, eggs for eggs, etc.). Each record was listed by all of the products produced/handled including chicken, turkey, eggs, feed and grains, other birds (duck, quail, etc.), rendering/feathers, etc. Jobs in each facility were then allocated based on the percentage of production of each type of product in the state where the facility was located. For example, if a facility produced both chicken and turkey and was located in Arkansas, then jobs were allocated to chicken and turkey based on the share of chicken and turkey reported in Arkansas's overall poultry production industry. Missing data were replaced by the lower of either the median or average for the state/product pair.

Once these allocations were completed a dataset was compiled for each of the product lines being analyzed: eggs, chicken, turkey, and other birds. Feed operations and hatcheries that supplied turkey operations were allocated to the turkey dataset, feed operations that supplied chicken operations were allocated to the chicken dataset, and so forth. Similarly, rendering and feather operations were allocated to the respective type of bird that was rendered or used for feathers.

Whenever poultry operations could not be classified by any available data, employment was allocated based on the percentage of QCEW production jobs of each bird type in each state.[9] So if 50 percent of a state's bird production was chicken, one half of the unclassified poultry jobs were allocated to chicken in that state.

Once the initial direct employment figures have been established, they are entered into a model linked to the IMPLAN database. The IMPLAN data are used to generate estimates of direct wages and output in each of the two sectors: production and processing, as well as the supplier and induced impacts of the industry on the larger economy. IMPLAN was originally developed by the US Forest Service, the Federal Emergency Management Agency and the Bureau of Land Management. It was converted to a user-friendly model by the Minnesota IMPLAN Group in 1993. The IMPLAN data and model closely follow the conventions used in the "Input-Output Study of the US Economy," which was developed by the BEA.

- Wages: Data from the US Department of Labor's ES-202 reports are used to provide annual average wage and salary establishment counts, employment counts and payrolls at the county level. Since this data only covers payroll employees, it is modified to add information on independent workers, agricultural employees, construction employees, and certain government employees. Data are then adjusted to account for counties where non-disclosure rules apply. Wage data include not only cash wages, but health and life insurance payments, retirement payments and other non-cash compensation. It includes all income paid to workers by employees. Further details are available from IMPLAN, Inc., at http://www.implan.com.

- Output: Total output is the value of production by industry in a given state. It is estimated by IMPLAN from sources similar to those used by the BEA in its RIMS II series. Where no Census or government surveys are available, IMPLAN uses models such as the Bureau of Labor Statistics growth model to estimate the missing output.

- Taxes: The model also includes information on income received by the Federal, state and local governments, and produces estimates for the following taxes at the Federal level: corporate income; payroll, personal income, estate and gift, and excise taxes, customs duties; and fines,

[9] Bureau of Labor Statistics, *Quarterly Census of Employment and Wages*, Monthly data for 2024. NAICS Codes: 11231, 112320, 112330, and 11239. Data accessed July 2024: https://www.bls.gov/cew/

fees, etc. State and local tax revenues include estimates of: corporate profits, property, sales, severance, estate and gift and personal income taxes; licenses and fees and certain payroll taxes. In the 2020 and 2022 IMPLAN models, the tax impacts are heavily influenced by the volume of support and transfer programs, like PPP loans, administered during the early stages of the COVID pandemic; this is reflected in lower taxes or negative taxes (subsidies) in certain cases. However, the 2024 impact study is showing large increase in taxes, which reflects the end of COVID subsidies and a return to pre pandemic tax dollars (see section below for more).

While IMPLAN is used to calculate the state level impacts, Data Axle data provide the basis for congressional and state legislative district, and county level estimates. Publicly available data at the county and congressional district level is limited by disclosure restrictions, especially for smaller sectors of the economy. This model therefore uses actual physical location data provided by Data Axle in order to allocate jobs and the resulting economic activity by physical address or when that is not available, zip code. For zip codes entirely contained in a single district or county, jobs are allocated based on the percentage of total sector jobs in each zip weighted by road density. For zip codes broken by district or county lines, allocations are based on the percentage of total jobs physically located in each segment of the zip. Physical locations are based on either actual address of the facility, or the zip code of the facility, with facilities placed randomly throughout the zip code area. All supplier and indirect jobs are allocated based on the percentage of a state's employment in that sector in each of the districts. Again, these percentages are based on Data Axle data.

Data and Modeling Considerations When Using 2022 IMPLAN Tables

The models developed by JDA for the poultry and egg economic impact use the 2022 IMPLAN model, the latest available at the time the model was constructed. Each year's model has different multipliers associated with it, reflecting the realities of the general economy at that point in time. This leads to variability in supplier and induced jobs.

The taxes in the 2022 model are significantly impacted by support and transfer payments in response to the COVID impact of 2019. Generally, this means the ratio of taxes to jobs and output are significantly lower than during a normal year and in many cases might be negative.[10] JDA has worked with IMPLAN and has developed a number of adjustments to the tax models to mitigate these impacts; however, there still may be anomalies that are a result of the massive amounts of tax subsidies, tax cuts and direct payments to companies and individuals resulting from policies associated with COVID-19.

Any subsequent models of the industry will likely show much larger tax figures as the effects of the response to the virus will be eliminated from the government tax data. These models reflect the best data and modeling techniques available now and should provide an accurate measure of the economic footprint of the industry today. Any errors are unintentional and are strictly those of John Dunham & Associates and should not reflect on the quality of data provided by the US Poultry and Egg Association.

IMPLAN Methodology:[11]

Francois Quesnay, one of the fathers of modern economics, first developed the analytical concept of inter-industry relationships in 1758. The concept was actualized into input-output analysis by Wassily Leontief during the Second World War, an accomplishment for which he received the 1973 Nobel Prize in Economics.

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10 For the 2024 tax impact, the overall level of taxes on production and imports (TOPI) are derived from the 2022 IMPLAN model. However, TOPI is then split into individual tax categories using breaks consistent with the 2018 IMPLAN model, due to some distortionary effects resulting from COVID transfers.

11 This section is paraphrased from IMPLAN Professional: Users Guide, Analysis Guide, Data Guide, Version 2.0, MIG, Inc., June 2000.

Input-Output analysis is an econometric technique used to examine the relationships within an economy. It captures all monetary market transactions for consumption in a given period and for a specific geography. The IMPLAN model uses data from many different sources such as published government data series, unpublished data, sets of relationships, ratios, or as estimates. IMPLAN, Inc. gathers this data, converts it into a consistent format, and estimates the missing components.

There are three different levels of data generally available in the United States: federal, state and county. Most of the detailed data is available at the county level, and as such there are many issues with disclosure, especially in the case of smaller industries. IMPLAN overcomes these disclosure problems by combining a large number of datasets and by estimating those variables that are not found from any of them. The data is then converted into national input-output matrices (Use, Make, By-products, Absorption and Market Shares) as well as national tables for deflators, regional purchase coefficients and margins.

The IMPLAN Make matrix represents the production of commodities by industry. The Bureau of Economic Analysis (BEA) Benchmark I/O Study of the US Make Table forms the basis of the IMPLAN model. The Benchmark Make Table is updated to current year prices, and rearranged into the IMPLAN sector format. The IMPLAN Use matrix is based on estimates of final demand, value-added by sector and total industry and commodity output data as provided by government statistics or estimated by IMPLAN. The BEA Benchmark Use Table is then bridged to the IMPLAN sectors. Once the re-sectoring is complete, the Use Tables can be updated based on the other data and model calculations of interstate and international trade.

In the IMPLAN model, as with any input-output framework, all expenditures are in terms of producer prices. This allocates all expenditures to the industries that produce goods and services. As a result, all data not received in producer prices is converted using margins which are derived from the BEA Input-Output model. Margins represent the difference between producer and consumer prices. As such, the margins for any good add to one. If, for example, 10 percent of the consumer price of a carton of eggs is from the purchase of electricity, then the electricity margin would be 0.1.

Deflators, which account for relative price changes during different time periods, are derived from the Bureau of Labor Statistics (BLS) Growth Model. The 224 sector BLS model is mapped to the 546 sectors of the IMPLAN model. Where data are missing, deflators from BEA's Survey of Current Businesses are used.

Finally, one of the most important parts of the IMPLAN model, the Regional Purchase Coefficients (RPCs) must be derived. IMPLAN is derived from a national model, which represents the "average" condition for a particular industry. Since national production functions do not necessarily represent particular regional differences, adjustments need to be made. Regional trade flows are estimated based on the Multi-Regional Input-Output Accounts, a cross-sectional database with consistent cross interstate trade flows developed in 1977. These data are updated and bridged to the 546 sector IMPLAN model.

Once the databases and matrices are created, they go through an extensive validation process. IMPLAN builds separate state and county models and evaluates them, checking to ensure that no ratios are outside of recognized bounds. The final datasets and matrices are not released before extensive testing takes place.