

## ECONOMIC IMPACTS OF COVID-19 ON THE TENNESSEE BROILER INDUSTRY

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As an emergent, transboundary disease, the novel coronavirus, commonly referred to as COVID-19, substantially affected global lives since its discovery in 2019. While the disease initially impacted denser populated, urban areas more strongly, it ultimately proliferated to all populations and geographies. Disease spread control measures, stay-at-home and safer-at-home policies, all aimed at reducing physical interactions, affected the marketplace. As access to restaurants became very limited, consumers changed their purchasing behavior by consuming much less away from home food, changing the types of products demanded and the outlets they were purchased from including poultry. For poultry production, in addition to the consumption impacts, COVID-19 effects are multifaceted (i.e., caused directly through the need to prevent infection or indirectly through supply-chain-based ripple effects).

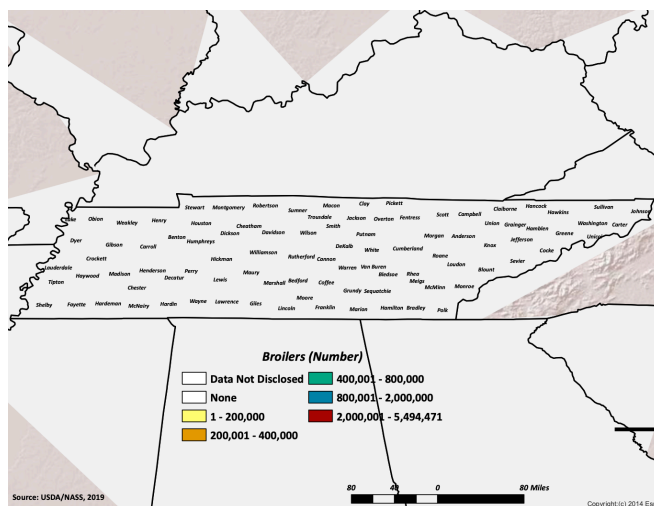
COVID-19 created a backlog due to the shutdown of processing facilities based on labor shortages resulting from infection and quarantine and the need to protect workers from the spread of COVID-19 (Weersnick et al, 2021). This bottleneck in processing affected bird placements on farms. In Tennessee's diverse agricultural landscape, broiler production ranks in the top five commodities (Murray et al., 2020), and as such, COVID-19 not only impacted citizens but also the broiler industry. Other agricultural sectors (cattle for example) also experienced a combination of reduction in demand and market supply chain disruptions during the COVID-19 pandemic.

The exact short- and long-run impacts of these disruptions continue to emerge. This analysis considers the impact of COVID-19-induced delays in Tennessee's poultry supply chains (primary breeders→ feed mills→ breeders→ hatcheries→ grow-out farms→ basic processing plants→ further processing plants→ transportation → wholesale and retail). The resulting negative impact on the profitability of broiler producers in Tennessee and the subsequent ripple effects were estimated to be \$227.7 million and a loss of 672 jobs with tax losses of \$13.3 million. While the pandemic is ongoing, this analysis provides an initial estimate of the economic impacts on the Tennessee economy resulting from COVID-19-induced disruptions in the Tennessee broiler industry.

## POULTRY IN TENNESSEE

The broiler industry is vertically integrated from birds to processing, meaning that the integrator maintains ownership of birds throughout the grow-out process while also supplying feed, medicine and technical support. The grower in turn provides the physical capital (buildings and equipment) and management. The grower is paid based on the end weight of flocks at processing with incentives for flock uniformity, feed conversion ratios and proper handling.

Tennessee has more than 30.5 million broilers and other meat-type chickens on 1,182 farms, 2.0 million layers on 8,830 farms and 1.3 million pullets for laying flock replacement on 1,457 farms (USDA/NASS, 2019). In 2019, Tennessee ranked 16th among U.S. states in cash receipts for broilers at \$458.0 million, or a 1.6 percent share of U.S. broilers receipts (\$28.3 billion) (USDA/ERS, 2020). Tennessee produced 177.7 million broilers in 2019, totaling 941.8 million pounds<sup>1</sup> (USDA/NASS, 2019). The Tennessee Poultry Association (TPA) indicates that Tennessee has more than 1,650 commercial broiler and breeder houses located on more than 500 family farms and ranks 14th nationally for broiler



**Figure 1. Numbers of Broilers by County in Tennessee, 2017**  
(Source: USDA/NASS, 2019)

production. The state processes more than 6 million birds per week at five processing plants. Primary breeders (i.e., farms with pedigree/elite, great-grandparents and/or grandparent birds) are present in the state with the top three global leaders in poultry genetics (Aviagen, Inc., Cobb-Vantress, Inc. and Hubbard, LLC) having major breeder operations contributing more than 98 percent of the poultry genetics worldwide (TPA 2020). According to a 2014 TPA survey (2020), cash receipts for primary breeding stock (parent stock and grandparent stock) contributes another \$250 million annually.

The United States Department of Agriculture (USDA) responded to producers' price losses in agricultural markets by establishing direct payments to producers through the Coronavirus

Food Assistance Program (CFAP) in May 2020 (USDA, 2020). The payments were designed for specific industries to assist farmers and ranchers with direct payments while the nation recovers from the pandemic. However, poultry was not included in the first round of payments, and therefore the impact of such payments is excluded from this analysis.

## IMPACT ANALYSIS

The analysis evaluates the change in proprietor income for Tennessee broiler producers using IMPLAN as indicated in Menard et al. (2020). While COVID-19 in general led to losses in downstream poultry activity (in sectors such as processing, distribution and retail), the impact on those sectors is excluded from the analysis. For example, processing was impacted due to COVID-19-induced additional health and safety protocols and the direct health impacts of COVID-19 spread on laborers requiring quarantine during the infectious stage as directed by the Center for Disease Control. However, the economic impact from processing is related to the final revenue earned by integrators for selling their products. Integrators are diversified across the U.S., whereas growers located within Tennessee and their impacts have a concentrated effect. Because of the proprietary and complex relationship between

<sup>1</sup> In value of production, the state ranks 11th for farm chickens, 20th for poultry and eggs, 27th for chicken eggs and 27th for turkeys (USDA/ERS, 2020).

integrators, final consumers and growers, this analysis focuses only on the impacts of COVID-19 on broiler grower profits (i.e., proprietary income) and the resulting reductions in spending by growers as households on items such as doctor office visits (which in turn also have multiplier-based impacts throughout the economy).<sup>2</sup>

**Table 1. Estimated Direct Quarterly Gain/Loss in Producer Income for Tennessee Broiler Producers in 2020 Because of COVID-19**

Quarter	Estimated Direct Gain/Loss	2019 Value for Tennessee
1	\$143,794	\$157,792,985
2	-\$55,815,395	\$172,864,371
3	-\$41,433,963	\$151,143,700
4	-\$25,097,287	\$145,605,484
<b>Total</b>	<b>-\$122,202,851</b>	<b>\$627,406,540</b>

Source: Calculated from USDA/OCE (2020) and USDA/NASS (2020)

This analysis is based on the methodology used by Anderson et al. (2020) where losses reflect the change in USDA's World Agricultural Supply and Demand Estimates (WASDE) quarterly expectations in January (pre-COVID-19) and October 2020 reports (USDA/OCE, 2020). The October reports represent the realized production in the first three quarters and the updated expectations for the fourth quarter. These changes show the production-level impacts on broiler production and prices reflected against the projected production levels prior to the pandemic, e.g., the January WASDE report had a 6 percent increase in production for 2020 over 2019. The total value of U.S. production is calculated for each quarter as the pounds produced multiplied by the WASDE reported mean price. Using the proportion of Tennessee's broiler production to total U.S. production (1.6 percent) (USDA/NASS, 2020), the production-level impacts are calculated as a share of total U.S. production changes.<sup>3</sup> The estimated direct quarterly economic impacts for Tennessee broiler producers in 2020 are displayed in Table 1. These losses reflect the difference between actual production values compared to USDA projections in January 2020, which provide a counterfactual to compare what occurred to what was likely to occur in the absence of COVID-19. The total four-quarter loss to broiler producers is estimated at \$122.2 million. The loss of producer income reverberates throughout the state economy because less income is spent within the communities and has multiplier effects throughout the economy. The multiplier effects include loss of net income to broiler producers, which results in less money spent on inputs and services. In addition, income from associated jobs are decreased, resulting in less expenditures on goods and services in the region.

### ECONOMIC IMPACTS OF COVID-19

The impact on the entire Tennessee economy due to COVID-19-based losses in profits for the state's broilers producers is displayed in Table 2. The total loss in economic activity and jobs are estimated at \$227.7 million and 672, respectively. Value added and labor income losses are estimated at \$184.0 million and \$159.6 million, respectively. Local, state and federal tax losses are estimated at \$13.3 million.

<sup>2</sup> For input-output analyses, economic shocks can have both an indirect (input suppliers) and an induced effect (household income). For this analysis, since we are shocking proprietor income (self-employed income), the induced effect is appropriate for reporting.

<sup>3</sup> In 2019, Tennessee's broiler production was estimated at \$457.7 million or 1.6 percent of U.S. production (\$28.3 billion) (USDA/NASS, 2020). Annual estimates cover the period December 1 previous year through November 30.

**Table 2. Estimated Total Quarterly Economic Impacts in Producer Income for Tennessee Broiler Producers in 2020 Because of COVID-19 (2020\$)**

Quarter	Total Economic Activity <sup>a</sup>	Value Added <sup>b</sup>	Labor Income <sup>c</sup>	Jobs <sup>d</sup>	Taxes <sup>e</sup>
1	\$267,915	\$216,519	\$187,754	0.8	\$15,611
2	-\$103,994,677	-\$84,044,601	-\$72,879,187	-306.8	-\$6,059,511
3	-\$77,199,339	-\$62,389,613	-\$54,101,087	-227.7	-\$4,498,212
4	-\$46,761,010	-\$37,790,496	-\$32,769,989	-137.9	-\$2,724,648
<b>Total</b>	<b>-\$227,687,111</b>	<b>-\$184,008,191</b>	<b>-\$159,562,509</b>	<b>-671.6</b>	<b>-\$13,266,760</b>

a Annual dollar value of goods and services that an industry produces

b Estimated labor income (i.e., employee compensation, proprietary income), other income, and taxes on production and imports

c Consists of employee compensation and proprietary income

d Estimated number of total wage and salary employees (both full- and part-time), as well as self employed

e Includes local, state, and federal taxes

In terms of economic activity and employment, the top 10 industries most impacted by COVID-19-based losses in the net income for the state's broiler producers are indicated in Table 3, listed by the three-digit North American Industry Classification System (NAICS) code. As shown in Table 3, these impacts are concentrated in health care, retail trade and housing.

**Table 3. Top 10 Industries Impacted Due to Producer Income Losses for Tennessee Broiler Producers Because of COVID-19**

Economic Activity	Employment
Owner-occupied dwellings	Full-service restaurants (722)
Hospitals (622) <sup>a</sup>	Limited-service restaurants (722)
Physicians' offices (621)	Hospitals (622)
Other real estate (531)	Physicians' offices (621)
Limited-service restaurants (722)	Retail general merchandise stores (452)
Monetary authorities and depository credit intermediation (521)	Other real estate (531)
Full-service restaurants (722)	Retail food and beverage stores (445)
Insurance carriers, except direct life (524)	All other food and drinking places (722)
Tenant-occupied housing (531)	Other financial investment activities (523)
Retail non-store retailers (454)	Employment services (561)

<sup>a</sup> Values in parentheses indicate three-digit North American Industry Classification System (NAICS) code; if blank, no NAICS code assigned (not considered a business establishment).

Source: IMPLAN 2018 data; U.S. Census, 2020

## DISCUSSION AND CONCLUSION

Risk and uncertainty affect agricultural production and industries. The COVID-19 pandemic has brought a level of uncertainty that has impacted both agricultural and nonagricultural supply chains. These impacts are varied and multifaceted. This analysis estimated the impacts of COVID-19 on the net income of Tennessee's broiler producers and the corresponding loss in economic activity. The negative

impact on broiler producers in the state and the subsequent ripple effects were estimated to be \$227.7 million and a loss of 672 jobs. Local, state and federal tax losses were estimated at \$13.3 million. These values exclude CFAP payments or any other government assistance because broiler producers were excluded from the first round of subsidies.<sup>4</sup> The results show there were negative (if short-lived) impacts on growers and the economy. The negative impacts were shrinking by the fourth quarter, indicating market adjustments and improvements in business continuity practices that helped minimize disruptions related to COVID-19. The unprecedented pandemic has shown the interdependence of the broiler industry and, more broadly, the effects of human health on agricultural industries. With vaccinations, public policy and communal responsibility, the broiler industry aims to return to pre-COVID-19 production levels, but in the interim, this analysis provides some indication of the cost of COVID-19 on broiler growers and the rest of the Tennessee economy.

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<sup>4</sup> Broiler producers were included in the second round (CFAP 2) but these monies were not dispersed until 2021.

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