Economic Impacts of Connecticut's Agricultural Industry in 2022

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Report available online from The Zwick Center for Food and Resource Policy at **are.uconn.edu/zwick-center**

Photo by Autumn Kasan Curran, Sweet Ring Farm, Newtown.

EXECUTIVE SUMMARY

Scope and Methodology

The purpose of this study is to ascertain and document the importance of agriculture and related industries to Connecticut's economy in 2022 and to show changes in these industries between 2015 and 2022. To this end, we use the same sectors as in the 2010 and 2017 studies (Lopez et al., 2010, 2017). Connecticut's agricultural industry encompasses crop, livestock, fisheries, and forest production and the processing of the state's agricultural and seafood production. Because of the public and economic consequences from the COVID-19 pandemic, this update of economic impacts takes on particular significance.

The study excludes secondary sectors such as landscaping and groundskeeping; agricultural processing that does not primarily utilize Connecticut agricultural inputs; and industries, such as bakeries, beer crafting, and distilling, that are economically important but which, if included, would overstate the projected output and job impacts attributable directly to the state's agriculture. Because the agricultural industry purchases goods and services from other industries and hires local labor, its economic impact cascades throughout the state economy. Agriculture support services include feed suppliers, veterinary services, equipment manufacturers and repair services, and financial services. Farm businesses also support short-term contractual jobs in engineering, construction, plumbing, electrical work, and inspection, among others.

Using direct sales of the agricultural industry for 2022, this study estimates the total economic impact of agriculture on the Connecticut economy using two economic models: an input-output model (IMPLAN) and a dynamic general equilibrium model (REMI). Total impacts include direct sales by state agricultural businesses, impacts on other industries from which sectors the businesses buy goods and services (indirect effects), and impacts through employee spending on goods and services from firms within the state (induced effects).

Apples at Holmberg Orchards in Gales Ferry.
Courtesy of Connecticut Department of Agriculture

Chopping corn in Litchfield county for livestock feed. Courtesy of Connecticut Milk Promotion Board

Findings

The analysis reveals that in 2022, depending on the model used, the total impact of Connecticut's agricultural industry on the state's economic output was between $3.3 and $4 billion. The estimated output impact translates into $900 and $1,100 per Connecticut resident, respectively.

- Every dollar in sales in Connecticut's agricultural industry generated up to 63 additional cents in the state economy.

In addition, the Connecticut agricultural industry generated approximately 22,428 to 31,000 jobs statewide, contributing between $869 and $967 million in labor income.

- Every million dollars in sales by Connecticut's agricultural production sector supported between 16 and 27 jobs in the economy while every million dollars in sales by the primary agricultural processing sector supported between 3 and 5 jobs.
- Agricultural production is more labor-intensive than agricultural processing and generated well over two-thirds of the agricultural industry's jobs.

When measuring output in real dollars, there was a modest increase in the aggregate contribution of the sector between 2017 and 2022, which we attribute to the sector's resilience to the pandemic, as well as a transformation of agriculture in the state in favor of high-value crops and value-added agriculture. For example,

- The tobacco and animal production sectors such as cattle ranching, animal slaughtering, and aquaculture, contracted. An exception was poultry and egg production and processing.
- Greenhouse, nursery, floriculture, and sod, as well as fruit and vegetable production, ice cream, and creamery/butter manufacturing expanded significantly.

While determining the reasons why some sectors contracted between 2017 and 2022 is beyond the scope of this study, preliminary examination points to climate change, the increasing high cost of production and regulation in Connecticut, and increasing imports from other regions and countries that compete with local products.

In sum, the agricultural industry had a critical and significant impact on the economy of Connecticut in output, jobs, and the quality of life in 2022: up to $4 billion in economic output, up to nearly 31,000 jobs, and up to nearly a billion dollars in labor income.

ECONOMIC IMPACTS OF CONNECTICUT'S AGRICULTURAL INDUSTRY IN 2022

Introduction

The purpose of this study is to ascertain and document the significance of agriculture and related industries to Connecticut's economy in 2022 and to show changes in sector-specific sales from 2017 to 2022.

This study defines the Connecticut agricultural industry as encompassing crop and livestock production, forest products, fishery products, and primary agricultural and seafood processing tied to the state's agricultural and fishery production. Because the agricultural industry buys goods and services from other industries in the state and hires local labor, its economic impacts cascade throughout the state economy.

Using two models of the Connecticut economy, this analysis estimates the economic impacts of the Connecticut agricultural industry on the state economy in 2022 as follows: impact on economic output ranges approximately between $3.3 to $4 billion, generating between 22,428 and 31,000 jobs and approximately $869 to $967 million in labor income. Additional analysis shows that the sector was resilient to the pandemic and that there is a restructuring going on towards value-added agricultural products.

Connecticut's Agricultural Industry At A Glance

Agriculture has been a critical component of the Connecticut economy since colonial times, when the state's economy comprised mainly agriculture, fishing, lumber, and shipbuilding. Today the importance of agriculture in the state economy remains high not only through farms but also associated forests and fisheries. Connecticut's geographic area is approximately 3.2 million acres. Despite the state's small size, its agriculture continues to thrive, and the amount of farmland, at 372,014 acres in 2022, accounts for approximately 11% of the state's total area (USDA, 2024). In addition, the state has 50,000 acres of leased shellfish beds across the Long Island Sound (Connecticut Department of Agriculture, 2019).

As shown in Figure 1, despite its relatively small size, Connecticut agriculture ranks third in New England in farm sales, which totaled $751 million in 2022.[1] The state's agriculture is not only economically important but also quite diverse. As illustrated in Figure 1, field crops compose a minor share of agricultural sales in Connecticut, in sharp contrast to agriculture nationwide, while the largest agricultural sectors are "green" industries (nursery, greenhouse, floriculture, and sod production), vegetable and fruit farming, and dairy, poultry, and egg production. The greenhouse, nursery, floriculture, and sod sectors constitute by far the largest farm subsector in the state. As shown in Figure 2, dairy processing leads primary agricultural processing in Connecticut, accounting for more than half of it, followed by meat processed from carcasses and fruit and vegetable canning, with nearly identical shares.

Figure 1 – 2022 Sales of Agricultural Products by Commodity Groups
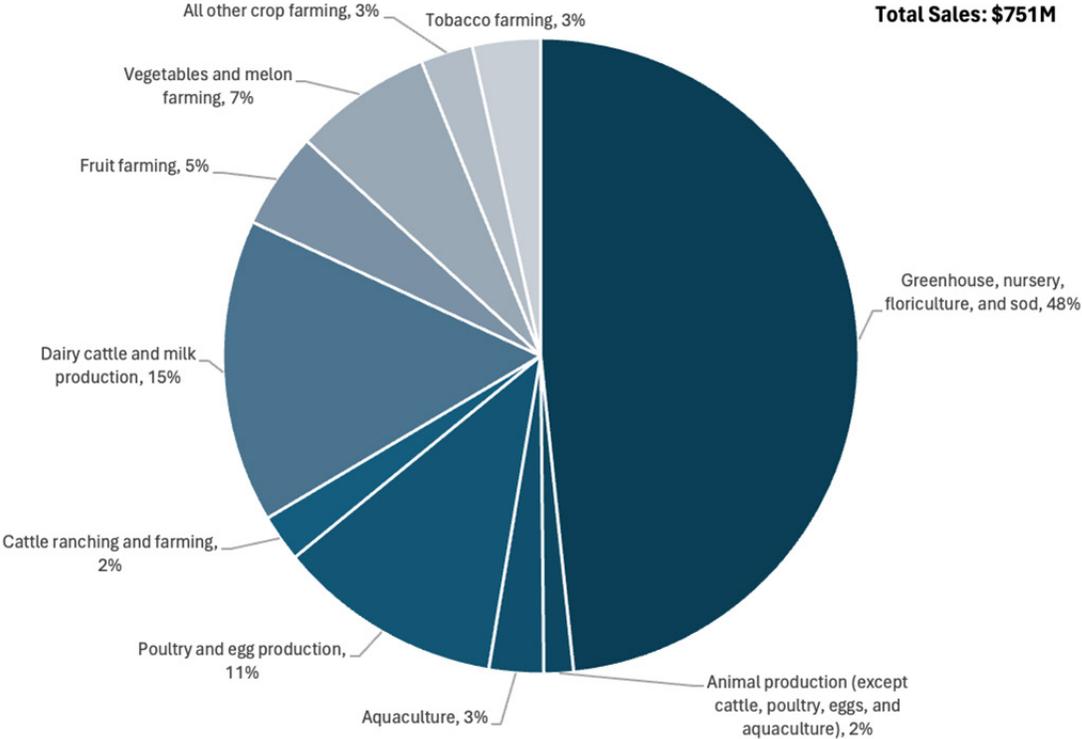
Source: IMPLAN (2024), 2022 Census of Agriculture (USDA, 2024), Connecticut Department of Agriculture (2024).

Figure 2 – 2022 Sales of Primary Agricultural and Seafood Processing Sectors

Source: IMPLAN (2024)
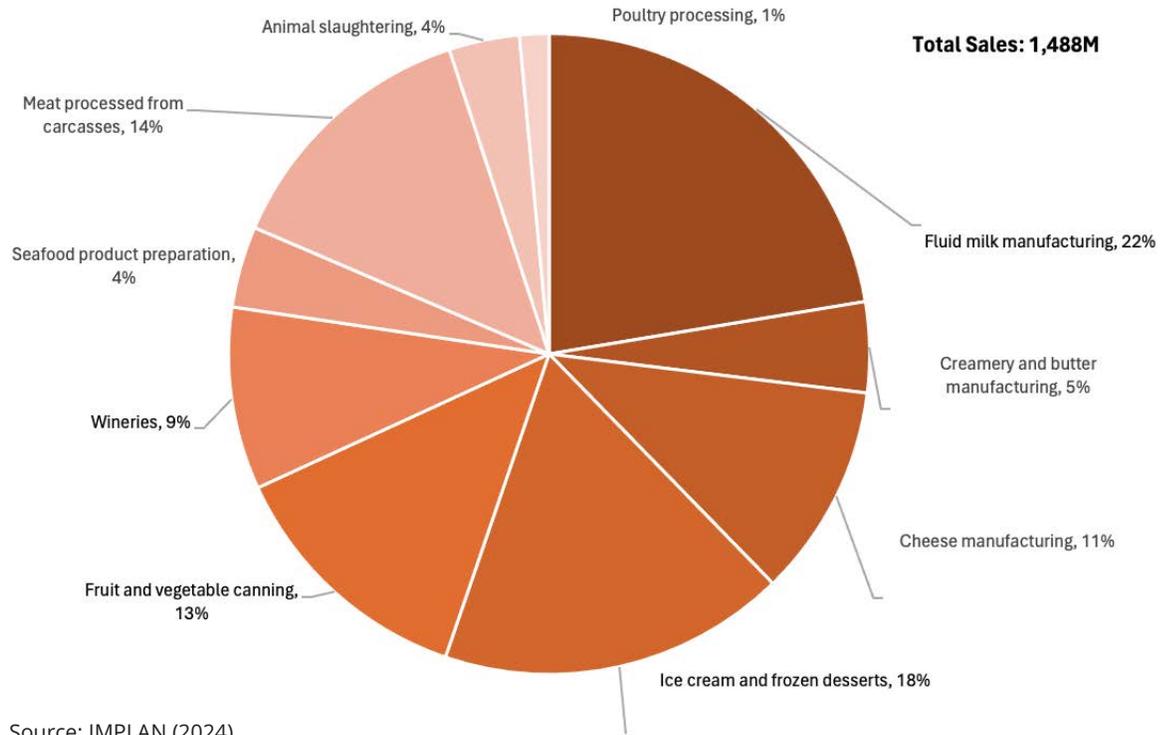
What changed between 2015 and 2022? Considering aggregate direct sales in 2015 (Lopez et al., 2017), the agricultural, fishery, and forestry production sectors expanded from $806 million in 2015 to $987 million in 2022, a 22% increase in nominal dollars. Primary agricultural processing sectors expanded from $1.22 billion to nearly $1.5 billion, a 21.7% increase. Combining production and primary agricultural processing sectors, total sales of the agricultural industry expanded from $2.03 billion in 2015 to $2.48 billion in 2022, approximately a 22% increase in nominal sales. When one considers PCE price inflation, the overall size of the pie expanded in real dollars.[2] However, there has been a restructuring of the shares of the pie due to different rates of growth in sales of various sectors.

Figure 3 shows the rates of growth of nominal dollar sales sector-by-sector between 2017 and 2022, as well as the general PCE rate of inflation (the dotted line).[3] A significant expansion in sales occurred in selected value-added processed animal products, such as creamery and butter manufacturing (in part due to new plants established by Agri-Mark, Inc.), ice cream manufacturing; seafood preparation; meat processed from carcasses (in contrast to the continued decline in animal slaughtering); and poultry processing. Likewise, selected agricultural production sectors saw a significant expansion, including poultry and egg production greenhouse, nursery, floriculture, and sod production, and fruit and vegetable production.[4]
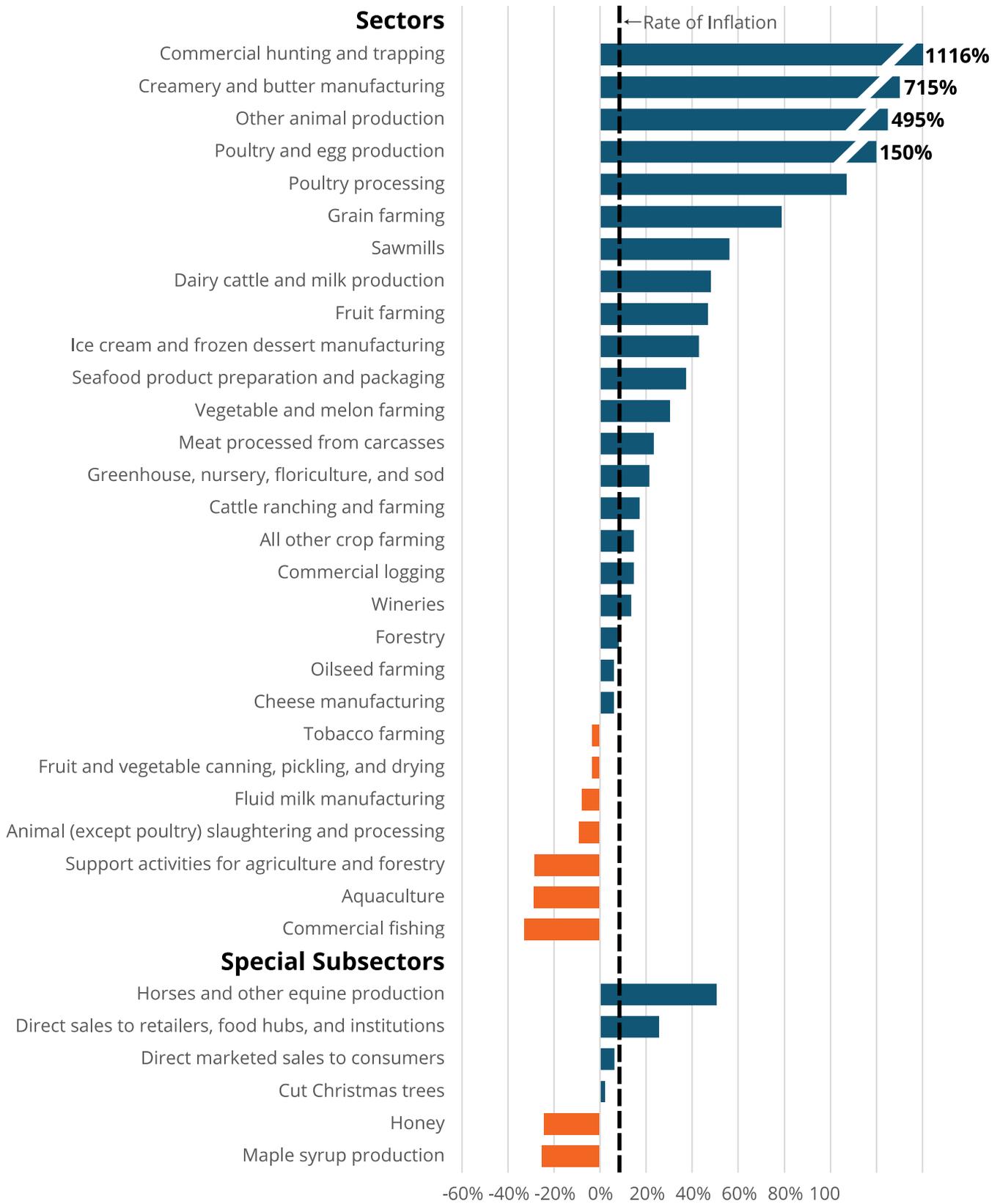
On the other hand, sectors involved in primary animal production and processing, such as animal slaughtering, aquaculture, commercial fishing, and fluid milk manufacturing contracted significantly. The decline in fluid milk manufacturing is consistent with regional and national trends as per capita consumption of fluid milk continues to decline. The decline in sales by the commercial fishery sector reflects declines in wild-caught fish, a trend occurring across the Northeast region.[5] By the same token, aquaculture production experienced a sharp decline due primarily to a drastic reduction in the production of clams, as reported by the Connecticut Department of Agriculture (2024).[6] In the agricultural production sector, tobacco farming continued its decline in sales. To the extent that such declines reflect a combination of adverse impacts of climatic conditions and competition from imports and other U.S. producing regions, they call for renewed attention to these sectors.

In the forestry production area, sawmills saw a healthy increase in sales thanks to record high prices for lumber, although prices at the producer level did not increase as much as lumber at the retail level, which was also constrained by capacity and production technology and the species grown in Connecticut which consist mostly of hardwood rather than the more price-volatile softwood lumber reported in the media.[7]

Harvesting tobacco in the Connecticut River Valley. Courtesy of Connecticut Department of Agriculture

Figure 3 – Percent Change in Sales between 2017 and 2022

Sectors	Percent Change
Commercial hunting and trapping	1116%
Creamery and butter manufacturing	715%
Other animal production	495%
Poultry and egg production	150%
Poultry processing	
Grain farming	
Sawmills	
Dairy cattle and milk production	
Fruit farming	
Ice cream and frozen dessert manufacturing	
Seafood product preparation and packaging	
Vegetable and melon farming	
Meat processed from carcasses	
Greenhouse, nursery, floriculture, and sod	
Cattle ranching and farming	
All other crop farming	
Commercial logging	
Wineries	
Forestry	
Oilseed farming	
Cheese manufacturing	
Tobacco farming	
Fruit and vegetable canning, pickling, and drying	
Fluid milk manufacturing	
Animal (except poultry) slaughtering and processing	
Support activities for agriculture and forestry	
Aquaculture	
Commercial fishing	

Special Subsectors

Horses and other equine production
Direct sales to retailers, food hubs, and institutions
Direct marketed sales to consumers
Cut Christmas trees
Honey
Maple syrup production

←Rate of Inflation

-60% -40% -20% 0% 20% 40% 60% 80% 100

Source: IMPLAN (2024), 2022 Census of Agriculture (USDA, 2024), and Connecticut Dept. of Agriculture (2024).

Findings

This study uses two standard but different models of the Connecticut economy to capture the scope of the agricultural industry and its linkages to the rest of the state economy, and to assess its contribution to economic output and jobs. These are IMPLAN (2024) and REMI (Regional Economic Models, Inc., 2024). These methodologies are explained in more detail in Appendix A, and the sectors included in the study are described in Appendix B. It is important to note that the REMI model used in this study is quite different from the one used in the 2010 and 2017 studies, leading to smaller economic impacts than previously reported.[8] In spite of this, both aggregate sector sales and IMPLAN impacts show an economic expansion relative to the ones reported in 2010 and 2015. Both results are shown in Table 1.

Table 1. Main Results: Economic Output and Employment Impacts, 2022

Sector *Agricultural, fishery, and forest production*	Sales $ Million	Economic Impact $ Million	Employment Impact Jobs
Greenhouse, nursery, floriculture, and sod	362.5	509	5,631
Dairy cattle and milk production	115.7	189.2	742
Sawmills	89.3	186.6	651
Poultry and egg production	86.3	137.6	464
Commercial logging	54.9	98.4	626
Vegetable and melon farming	52.9	74.5	777
Support activities for agriculture and forestry	40.8	80.1	1,688
Fruit farming	36.9	46.6	740
Tobacco farming	25.9	35.3	574
Aquaculture	20.8	33.5	482
Grain farming	19.6	29.3	219
All other crop farming	19.6	28.9	1,633
Cattle ranching and farming	17.7	21.2	327
Forestry	14.8	25.0	178
Commercial fishing	12.6	18.9	647
Animal production (except cattle, poultry, eggs, and aquaculture)	11.3	13.4	232
Commercial hunting and trapping	5.1	8.9	65
Oilseed farming	0.4	0.7	3
Total for agric., fishery, and forest prod.	**987.0**	**1,537.2**	**15,679**
REMI		**1741.1**	**26,324**
Primary processing			
Fluid milk manufacturing	333.2	677.4	1,602
Ice cream and frozen dessert manufacturing	260.5	425.0	1,259
Meat processed from carcasses	201.0	293.2	886
Fruit and vegetable canning, pickling, and drying	192.3	300.5	792
Cheese manufacturing	160.2	251.4	535
Wineries	137.1	232.4	804
Creamery and butter manufacturing	67.6	118.5	242
Seafood product preparation and packaging	60.9	93.4	309
Animal (except poultry) slaughtering and processing	53.4	78.0	273
Poultry processing	22.4	32.8	101
Total for primary processing	**1,488.6**	**2,502.6**	**6,803**
REMI		**1,587.1**	**4,076**
Total for the agricultural industry	**2,475.7**	**4,039.8**	**22,482**
REMI		**3,328.20**	**30,999**

Source: IMPLAN (2024), 2022 Census of Agriculture (USDA, 2024), and the Connecticut Department of Agriculture (2024)

Economic Impacts

The total output impact (i.e., measured in dollar sales) of the agricultural industry that the two alternative models estimate was approximately between $3.3 billion (REMI) and $4 billion (IMPLAN) in 2022, in an economy of $319 billion in Gross State Product in that year. On a per capita basis, the agricultural industry generated approximately between $900 and $1,100 in sales per Connecticut resident. The contribution of the agricultural, forest, and fishery production sectors to the state's economy was between $1.5 and $1.7 billion. The models project the impact of the primary agricultural processing sector as between $1.6 and $2.5 billion, with nearly 60% coming from the dairy processing industry.

Table 1 presents more detailed IMPLAN and REMI estimates of statewide sales impacts from individual sectors of the agricultural industry. Note that REMI analysis was conducted only at the aggregate production and primary processing levels, not for individual sectors.[9] Table 1 shows that the most sales statewide were generated by greenhouse, nursery, floriculture, and sod production; fruit and vegetable canning, pickling, and drying; cheese manufacturing; ice cream and frozen dessert manufacturing; meat processed from carcasses; poultry and egg production; wineries; and fluid milk manufacturing. This study confirms that Connecticut's agricultural industry is an important contributor to employment in the state. Table 1 also shows the impact of the agricultural industry on state employment: a contribution of between 22,488 and 31,000 jobs.

Agricultural, fishery, and forest production activities generate two-thirds of the jobs in the state's agricultural industry, estimated as ranging from 15,695 to 26,234 jobs. Primary agricultural and seafood processing activities add another 4,076 to 6,863 jobs. When comparing sectors, the highest job generator is greenhouse, nursery, floriculture, and sod production (5,631 jobs), followed by support activities for agriculture and forestry; all other crop farming; fluid milk manufacturing; ice cream and frozen dessert manufacturing; meat processed from carcasses; and wineries.

Photo courtesy of CAHNR

ADDITIONAL RESULTS

Special Agricultural Subsectors

Table 2 depicts several commodity sectors that are of special interest to stakeholders. While they do not have IMPLAN codes per se, they are part of the IMPLAN sectors reported in Table 1. Because of the size of operations and nature of business, these sectors tend to be under-reported in USDA surveys. In terms of commodities, horses and equine production had an estimated economic impact of $15.4 million, generating 325 jobs. Christmas trees had an impact of $7 million, generating 78 jobs, followed by honey and maple syrup production.[10]

Photo by Keith Bishop, Bishop Orchards, Guilford.

Table 2. Impacts of Special Subsectors in 2022

Sector	Sales	Economic Impact	Employment
Special subsectors	$ Million	$ Million	Jobs
Direct marketed sales to consumers	49.9	77.8	784
Direct sales to retailers, food hubs, and institutions	25.1	39.2	394
Horses and other equine production	7.8	15.4	325
Cut Christmas trees	5.0	7.0	78
Honey	1.5	1.8	31
Maple syrup production	0.7	1.2	4

Source: 2022 Census of Agriculture (USDA, 2024)

Local Food

Local food is becoming more popular in Connecticut and throughout the United States. Two channels are identified in Table 2: direct sales to consumers and direct sales to intermediaries (retailers, food hubs, and institutions including sales under farm-to-school programs).[11] These forms of marketing practice had a combined impact of nearly $117 million in statewide sales and jointly generated nearly 1,200 jobs (see Table 2). This marketing arrangement between farms and organizations is expected to keep growing as grocery stores, farmers markets, and other organizations utilize local foods to meet increasing consumer demand as well as for their own promotion strategies and for educational purposes.

Labor Income

Table 3 shows that the following sectors add significantly to wages within the state: greenhouse, nursery, floriculture, and sod production; fluid milk and butter manufacturing; ice cream and frozen dessert manufacturing; fruit and vegetable canning, pickling, and drying; and cheese manufacturing. Agricultural, forestry, and fishery production generated between $461 and $599 million in wages in 2022, while the agricultural processing industry generated between $270 and $519 million in wages. Overall, wages generated by the agricultural industry, including agricultural production and processing, are estimated to have been between $869 and $967 million in 2022.[12]

Holstein heifers at Laurelbrook Farm in Canaan. Courtesy of Connecticut Milk Promotion Board

Assessment of Opportunities

To assess opportunities offered by various subsectors, we compare output growth between 2017 and 2022 and employment location quotients, which are indicators of specialization in relation to the national level of employment in that sector. The outcomes are shown in Figure 4, where the size of the bubble indicates dollar sales by sector in 2022.

The analysis reveals three sectors with strengths and opportunities for agricultural growth as well as employment generation (i.e., output growth and location quotient greater than one): the greenhouse, nursery, and floriculture industry; ice cream manufacturing; and creamery and butter manufacturing. Sectors that represent emerging strengths and opportunities have sales growth but low location quotients (second quadrant of Figure 4). Most sectors are in this quadrant, which includes fruit and vegetable production, meat from carcasses, seafood products preparation and packaging, poultry/egg production and processing, and wineries. The groups in the third quadrant (negative growth in the 2017-2022 period and location quotient less than one) represent priority retention targets. These include mostly animal-based products such as animal slaughtering, aquaculture and commercial fishing, fluid milk production, cheese manufacturing (which saw a modest sales decline), and other animal production. Only one sector, tobacco farming, shows a high location quotient but declining output, denoting limited prospects for future output and employment growth.

Table 3. Impacts on Labor Income in 2022 Million Dollars

	Direct Wages (IMPLAN)	Wage Impact (IMPLAN)	Wage Impact REMI
Agricultural, fishery, and forest production			
Greenhouse, nursery, floriculture, and sod	109.4	160.3	-
Support activities for agriculture and forestry	43.5	57.5	-
Commercial logging	39.3	56.7	-
Aquaculture	14.6	19.3	
Sawmills	12.5	51.2	-
Vegetable and melon farming	12.1	19.4	-
Foresty	11.1	15.6	-
Tobacco farming	10.7	14	-
Fruit farming	10.1	13.6	-
Dairy cattle and milk production	8.3	30.3	-
Commercial fishing	8	10.3	-
All other crop farming	6.1	9.3	-
Poultry and egg production	5.5	19.9	-
Commercial hunting and trapping	3.7	5.1	-
Animal production (except cattle, poultry, eggs, and aquaculture)	2.7	3.4	
Grain farming	2.5	5.5	-
Cattle ranching and farming	1.5	2.5	-
Oilseed farming	0	0.1	-
Total for agricultural, fishery, and forest production	**301.3**	**460.9**	**599**
Primary agricultural processing			
Ice cream and frozen dessert manufacturing	47.1	102.6	
Fluid milk manufacturing	43.8	126.2	
Fruit and vegetable canning, pickling, and drying	29.9	69.1	-
Meat processed from carcasses	25.2	55.6	-
Wineries	19.2	51.8	
Cheese manufacturing	11.6	37	-
Seafood product preparation and packaging	9.8	22.5	-
Animal (except poultry) slaughtering and processing	6.5	13.8	-
Poultry processing	5.2	8.5	-
Creamery and butter manufacturing	3.6	19.4	-
Total for primary agricultural processing	**201.9**	**506.5**	**270**
Total for the agricultural industry	**503.2**	**967.4**	**869**

Source: Direct wages were taken from IMPLAN (2024); total wage impacts were computed from the direct sales data reported in Table 1. The more comprehensive "compensation" measure used is from REMI, of which wages and salaries before supplements compose 50.6%.

Figure 4. Relative Specialization vs. 2017-2022 Sales Growth
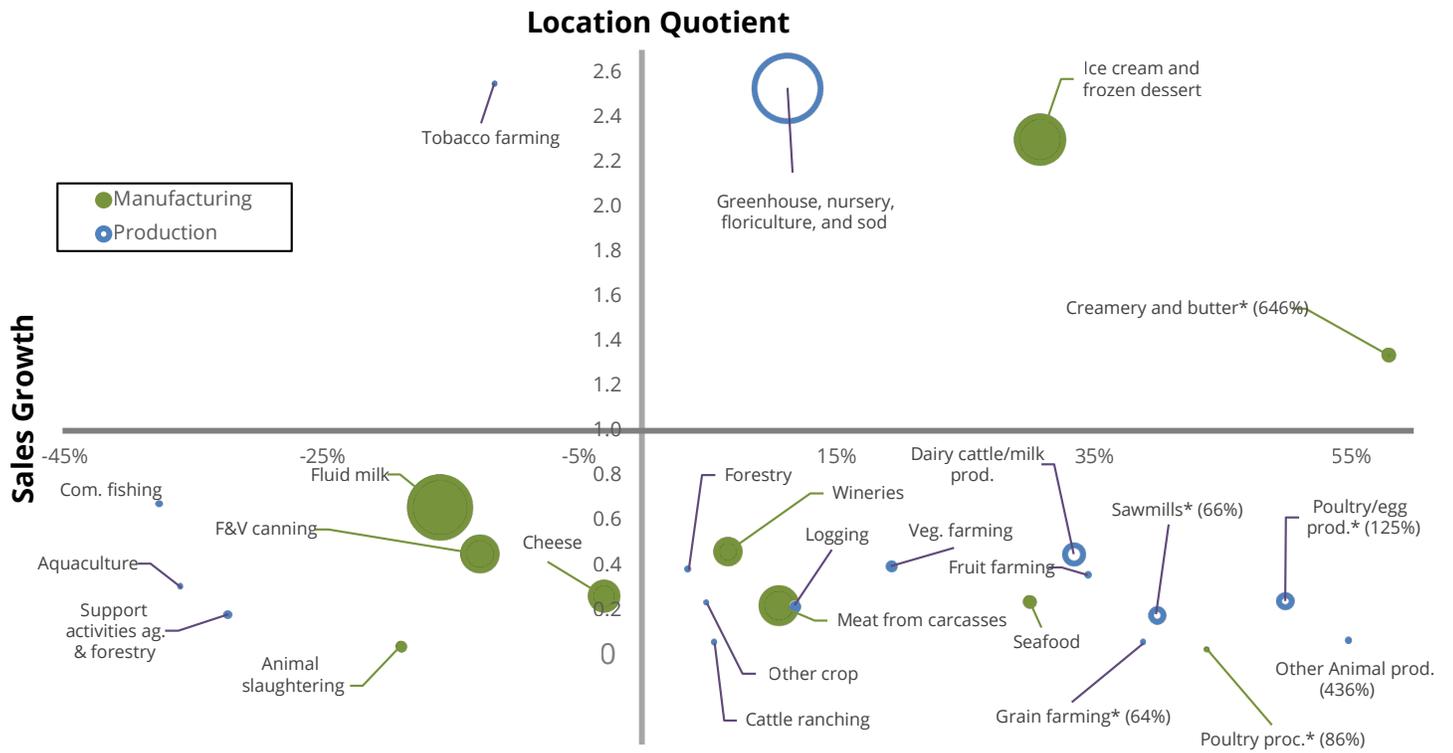
Source: IMPLAN (2024), 2022 Census of Agriculture (USDA, 2024), and Connecticut Dept. of Agriculture (2024).

CONCLUSION

This study is the third comprehensive effort to evaluate the impact of the Connecticut agricultural industry on the state economy, defining this industry as encompassing agricultural and forestry production and primary agricultural and seafood processing. The previous two studies were conducted at seven-year intervals, in 2010 and 2017, using the same sectors and two economic models (IMPLAN and REMI).

In 2022, the Connecticut agricultural industry contributed up to $4 billion in economic output and supported up to 31,000 jobs at the state level. The estimated output impact translates to between $900 and $1,100 per Connecticut resident. Viewed from another perspective, every dollar in sales in the agricultural industry in 2022 generated up to an additional 63 cents in the state economy. Compared to the 2017 study, the size of the industry and its impact on the state economy remained about the same in real dollars. In 2022, the Connecticut agricultural industry contributed between $869 and $967 million in wages. Every million dollars in sales in the agricultural production sector generated between 16 and 26 jobs in the economy, while for primary agricultural processing, a million dollars in sales generated between 3 and 5 jobs, indicating that agricultural production is more labor-intensive, i.e., generating more jobs per dollar sales.

When measuring total output in real dollars, there was a modest increase in the aggregate contribution of Connecticut's agricultural industry between 2017 and 2022, showing resilience to the pandemic, as well as a changing structure of the sector in favor of specialty crops and value-added agriculture. For example,

- The tobacco and animal production sectors, like cattle ranching, animal slaughtering, and aquaculture, contracted. An exception was poultry and egg production and processing.
- Greenhouse, nursery, floriculture, and sod production, fruit and vegetable production, and ice cream and creamery/butter manufacturing expanded significantly.

From a policy perspective, further study and policy makers' attention are needed to explore policy instruments to preserve and spur the growth of the agricultural industry. To the extent that justification for new policies may rely on the inability of agricultural markets to account for positive externalities from open space and carbon sequestration (a market failure) and the desire to promote local food, such policies may include price instruments to lower the high cost of producing in Connecticut as well as non-price policies, such as mitigating or removing regulations that may be stunting growth and investment returns in agricultural activities.[13] As a case in point, tax incentives for honey bee production have resulted in a dramatic growth of this sector in the State of Texas.[14]

Connecticut's agricultural industry will continue along the diverse, dynamic, and non-traditional path that sets it apart from typical agricultural industries in other U.S. states. Despite high costs and institutional barriers, the state's agricultural industry has remained resilient and innovative. With the proper mix of public and private policies, training, and technology, an efficient, innovative, and consumer-oriented industry could be well-positioned to resume a robust growth trajectory well into the 21st century.

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Photo by Mark Houde, Gouveia Vineyards, Wallingford.

APPENDIX A: METHODOLOGY

Models Used

This study relied on the two most-used methodologies to assess economic impacts of a given industry: IMPLAN and REMI. IMPLAN is by far the most popular in economic impact analyses due to its simplicity and ease of application. IMPLAN looks at incremental impacts as a sector increases or decreases in activity via built-in multipliers based on input-output tables of the economy. These multipliers express the change in the level of state output and jobs associated with a unit change in direct sales in a specific sector or industry of the economy. An important feature of the IMPLAN model is that it focuses on "supply" to an industry, treating the sector of interest as the point of final "demand." For example, using this model, the impact of the dairy cattle and milk production sector on the fluid milk manufacturing sector would be minimal (except through indirect and induced impacts, as defined below), but the impact of fluid milk manufacturing on the dairy cattle and milk production sector would be accounted for by milk suppliers within the state.

In contrast, REMI is an econometric model of the state economy in what economists call a general equilibrium model. REMI estimates economic impacts (including impacts on job migration) by assessing the loss of output and employment when a sector is removed from the economy. Thus, rather than focusing on the impact on suppliers, it is concerned with overall statewide impacts. REMI treats employment impacts in a more flexible fashion, allowing for migration and job relocation across sectors within the state. Thus, for example, a worker who loses his or her job in the greenhouse industry and ends up working at a grocery store, in landscaping, or at Home Depot will not be accounted for in the economy-wide job impacts as the model treats this as a transfer rather than a loss.

The models use direct sales from a sector of the agricultural industry as input to calculate economy-wide impacts through multipliers (IMPLAN) or simulation (REMI). Note that to the extent that some cash and bartering transactions and self-consumption are not reported, particularly by small farmers, the figure for direct sales of the agricultural production sector might underrepresent the total value of production and, therefore, the corresponding impacts. Although both models offer insights into the economic importance of a particular sector of the economy, they differ in some underlying assumptions and in the level of sophistication of the analysis. For completeness, this study reports the outcomes of analyses using both estimates.

Measures of Impacts

Using the above models, the study develops two indicators of the economic importance of the agricultural industries:

- Total economic impact, whose value is measured by statewide sales.
- Total impact on state employment, which includes full- and part-time jobs generated.

Although the primary focus is on the total impacts at the state level, this report

also discusses the impacts at the individual subsector levels, such as poultry and egg production or butter manufacturing. For example, the economic importance of the greenhouse, nursery, floriculture, and sod production industry ("greenhouse and nursery") in Connecticut is not limited to the $363 million worth of goods and services sold by that sector (the direct impact). That sector's effect extends to other sectors of the economy (e.g., the transportation and utility sector) because greenhouse and nursery businesses buy goods and services from those other sectors (the indirect impact). Also, employees of greenhouse and nursery establishments likely spend a major portion of their earnings buying goods and services from firms within the state (the induced impact). The total sales impact of the greenhouse and nursery industry is the sum of the direct, indirect, and induced impacts. The same reasoning applies to total employment impacts of the industry.

The REMI model uses direct sales to assess the impact on statewide output and employment when the agricultural sector is removed. Individual subsector REMI's impacts were not computed due to time and budget constraints, as this would have required detailed analysis of each subsector. REMI is a general equilibrium model in which the subsectors are intertwined. For comparison with IMPLAN multipliers, the REMI multipliers are imputed based on the ratio of the agricultural industry's statewide impacts to direct sales.

Finally, it should be noted that the estimated impacts are limited to Connecticut's economy. For example, when an apple orchard in Connecticut purchases pesticides from a firm in Massachusetts, aside from minor local wholesale margins here, the indirect impact of this transaction will not be felt in the Connecticut economy.

APPENDIX B: SECTORS INCLUDED

Following standard practice, this study relies on the U.S. Department of Commerce (USDC) classification of sectors of the economy, upon which the IMPLAN model is based, and uses all sectors classified as agricultural and forestry production and primary agricultural processing to define the scope of Connecticut's agricultural industry. Since aquaculture is included in IMPLAN's code 14 "Animal Production (except cattle, poultry, and eggs)," we split this category into aquaculture and other animal production.[15] This process resulted in 28 sectors, described in Table B1.

The decision to select sectors for inclusion in the scope of this study was based on the USDC classifications for agriculture, fishery, and forestry. For agricultural processing, we considered the extent of linkages to state farming. Some economically important Connecticut food and beverage processing sectors are excluded because they do not use agricultural commodities produced in the state in any significant way; examples of such "secondary processing" are chocolate, confectionary, and bakery product manufacturing and distilleries. Including secondary food and beverage processing that does not use state agricultural production would overstate the contribution of agriculture to the state economy.[16]

The seven special sectors in Table 2 are embedded in the 28 IMPLAN sector categories considered and, thus, are not included in Table B1. The direct sales for these were taken from the 2022 Census of Agriculture (USDA, 2024).

Dairy cows being milked in the rotary parlor at Oakridge Dairy in Ellington. Courtesy of Connecticut Milk Promotion Board

Table B1: Description of Sectors Included in the Study

IMPLAN code	NAICS codes	Sector	Description
Agricultural, fishery, and forest production			
1	111120, 111110	Oilseed farming	Soybean, canola, flaxseed, mustard, oilseeds, rapeseed, safflower, sesame, and sunflower farming
2	111130-60, 111191, 111199	Grain farming	Bean, cowpea, garbanzo, lentil, lima bean, pea, wheat, corn, popcorn, rice, oilseed and grain combination, barley, broomcorn, buckwheat, milo, oat, rye, sorghum, and wild rice farming
3	111, 211, 219	Vegetable and melon farming	Growing root and tuber crops or edible plants and/or producing root and tuber or edible plant seeds
4	111300, 111320, 111331-34, 111336, 111339	Fruit farming	Apple orchards; grape vineyards; strawberry farming; berry (except strawberry) farming, citrus, banana, other fruit tree farming
6	111411, 111419, 111421-22	Greenhouse, nursery, floriculture, and sod	Growing crops of any kind under cover and/or growing nursery stock and flowers
7	111910	Tobacco farming	Tobacco farming, field and seed production
10	111940, 111992, 111998	All other crop farming	Hay farming; all other miscellaneous crop farming (e.g. aloe)
11	112111-12	Cattle ranching and farming	Raising cattle for both milking and meat production
12	112120	Dairy cattle and milk production	Milking dairy cattle
13	112310, 112320-40, 112390	Poultry and egg production	Breeding, hatching, and raising poultry for meat or egg production
14	112390, 112210, 112410-20, 112910-30, 112990,	Animal production, except aquaculture, cattle and poultry and eggs	Pigs and hogs, goats, sheep and lambs, mohairs, animals, horses, donkeys and burros, ponies, foxes, fur bearing mink, rabbit, chinchilla, alpaca, birds for sale, bison, pet breeding animals (i.e. dogs, cats, etc.), buffalo, combination livestock, crickets, deer, earthworms, elk, laboratory animal production, snakes, adornment birds (i.e. swans, peacocks), llamas
14	112511-12, 112519	Aquaculture	Aquaculture, including finfish and fish hatcheries, shellfish farming, and other aquaculture such as seaweed, algae, and frogs
15	113100, 113210	Forestry, forest products, and timber tracts	Operating timber tracts for the purpose of selling standing timber; forest nurseries and gathering of forest product
16	113310	Commercial Logging	Cutting timber; cutting and transporting timber; producing wood chips in the field
17	114111-12, 114119	Commercial Fishing	Commercial catching or taking of finfish, shellfish, or miscellaneous marine products from a natural habitat
18	1142100	Commercial hunting and trapping	Commercial hunting and trapping; operating commercial game preserves, such as game retreats; operating hunting preserves
19	115111-14, 115116, 115210, 115310	Support activities for agriculture and forestry	Crop harvesting primarily by machine, soil preparation, farm labor contracting, farm management services
132	321113	Sawmills	Sawing dimension lumber, boards, beams, timbers, poles, ties shingles, shakes, siding, and wood chips from logs or bolts

Table B1: *continued*

IMPLAN code	NAICS codes	Sector	Description
Primary agricultural processing			
79	311421	Fruit and vegetable canning, pickling, and drying	Manufacturing canned, pickled, and dried fruits, vegetables, and specialty foods
84	311511	Fluid milk	Manufacturing processed milk product, such as pasteurized milk or cream and sour cream and/or manufacturing fluid milk dairy substitutes from soybeans and other nondairy substances
85	311512	Creamery and butter manufacturing	Creamery butter manufacturing
82	311513	Cheese manufacturing	Manufacturing cheese products (except cottage cheese) from raw milk and/or processed milk products and/or manufacturing cheese substitutes from soybean and other nondairy substances
86	311520	Ice cream and frozen dessert manufacturing	Manufacturing ice cream, frozen yogurts, frozen ices, sherbets, frozen tofu, and other frozen desserts (except bakery products)
89	311611	Animal (except poultry) slaughtering and processing	Slaughtering animals (except poultry and small game); meat processing from carcasses; rendering and meat byproduct processing
90	311612	Meat processed from carcasses	Processing or preserving meat and meat byproducts (except poultry and small game) from purchased meats. Cutting/packing of meats (i.e. boxed meats) from purchased meats.
88	311615	Poultry processing	(1) Slaughtering poultry and small game and/or (2) preparing processed poultry and small game meat and meat byproducts
92	311700	Seafood product preparation and packaging	Canning seafood (including soup); smoking, salting, and drying seafood; eviscerating fresh fish by removing heads, fins, scales, bones, and entrails; shucking and packing fresh shellfish; processing marine fats and oils; and freezing seafood
107	312130	Wineries	Growing grapes and manufacturing wines and brandies; manufacturing wines and brandies from grapes and other fruits grown elsewhere; blending wines and brandies

"Connecticut's agricultural industry contributes $4 billion to the state economy, generates up to 31,000 jobs, and contributes nearly $1 billion in labor income, in addition to significantly enhancing all residents' quality of life."

ENDNOTES

[1] We addressed discrepancies between the IMPLAN and Census data by using Connecticut Department of Agriculture and industry sources. For example, for confidentiality reasons, neither IMPLAN nor the Census captured the collapse of the clam sector or the record egg production sales (due to prices more than doubling).

[2] Nominal sales increased by 19.7% between 2015 and 2022, while the national Personal Consumption Expenditures (PCE) price deflator increased by 19.3% between 2015 and 2022, and the nearby Springfield, MA, PCE deflator increased by 17.5%. For industrial use, we avoid using the popular Consumer Price Index because it only reflects the prices paid by urban consumers.

[3] The Springfield, MA, PCE price deflator is used to reflect nearby price inflation between 2017 and 2022 (15.3%).

[4] One should note that despite a fire killing 100,000 poultry birds in Bozrah in 2022 (a small fraction of the state's poultry population), egg production companies in the state benefitted from record high egg prices at the national level in 2022, which more than doubled that year.

[5] NOAA (2024) reported a decline of 26.5% in pounds of commercial fish landings in Connecticut between 2017 and 2022. Similar trends were reported for other Northeastern states.

[6] Between 2017 and 2022, the Connecticut Department of Agriculture's records show that the sales of clams declined by approximately 80% in nominal dollars. While aquaculture also includes fish farms and oyster production in the state, overall aquaculture, including clams, declined by approximately 29%.

[7] According to Nicholas Zito of the Connecticut Department of Energy and Environmental Protection (DEEP 2024), Connecticut harvests hardwood lumber, which is higher-priced but less in demand than softwood lumber typical of the Western U.S. and often used in housing. Hardwood lumber in the state has been usually used for pallets, special order kitchen cabinets, and barrels. The U.S. Bureau of Labor Statistics (FRED, 2024) reports a 52%% average increase in the overall producer price index for sawmills nationwide between 2017 and 2022, which is in line with the 56% increase in sales in Connecticut given limited production capacity, although the producer price increase for hardwood sawmills increased by an average of 16% vs. 64% for softwood sawmill producers between 2017 and 2022.

[8] The new version of REMI for the Connecticut economy has revised structural coefficients with smaller input-output ratios and new adjustments to prevent double counting of embedded sectors and leakages for inputs that come from out-of-state and workers who live out-of-state. Thus, the REMI estimates here are not comparable to the ones in the 2017 study ($4 billion in 2015 vs. $3.3 billion in 2022) as they are subject to a radically different calibration. Thus, the comparison should not be taken as showing a drastic contraction of more than a billion dollars in 2022 values. The main discrepancy is in the estimates of agricultural processing output impact (REMI being about a billion dollars lower) and employment impacts in both production and processing sectors.

[9] See Appendix A for more details.

[10] As noted above, honey and maple syrup production reportedly contracted according to the 2017 and 2022 agricultural censuses (reported in USDA, 2024). With 42 sugar houses in the state (Connecticut Maple Syrup Association, 2024), it is likely that the 2022 sales for maple syrup are under-reported, resulting in underestimation of their impact and employment generation. However, Nicholas Zito, from Connecticut DEEP (2024), pointed out that production of syrup is down due to warm temperatures in February and March in the last two years.

[11] Direct sales to consumers are often embedded in agritourism activities, such as pick-your-own (e.g., apple orchards and berry farms), touring agricultural areas (e.g., wine routes and oyster farms), education, and entertainment (e.g., farm-to-table events).

[12] The sharp contrast between the labor income impact totals in IMPLAN and REMI derives basically from the estimates for agricultural processing and the adjustment applied by REMI to account for out-of-state residence of employees and leakages in these sectors.

[13] A recent study by Connolly et al. (2024) identified the high cost of production and climate change as the top two challenges facing farmers in 2022, with local regulation being among the top five.

[14] Collins (2024) points to a growth from 1,200 beekeeping operations in 2012 to nearly 9,000 in 2022, a 7.5-fold increase in 10 years. In fact, the U.S. added almost a million bee colonies between 2017 and 2022-about a 33% increase, reversing a previous decline (Van Dam, 2024).

[15] We separated out "Aquaculture" from IMPLAN code 14, "Animal Production," using sales from the 2022 Connecticut Department of Agriculture (2024) and subtracting those from the IMPLAN sales reported for "Animal Production." Most of sector 14 consists of aquaculture in the case of Connecticut. However, given the drastic change in multipliers for this sector in 2022, we use the 2021 input-output model of IMPLAN due to their consistency with previous studies, particularly those using the same industry and detailed expenditure data. In addition, this model better predicted the number of reported jobs using the sales-related multipliers than did the 2022 version for aquaculture only.

[16] The following agricultural production sectors were excluded from the analysis because no direct sales were reported for them in 2022: cotton farming and sugar cane and sugar beet farming. Fruit nut farming reported sales of $20,000 in the 2022 Agricultural Census (USDA 2024) and was thus deleted from consideration. Excluded agricultural processing sectors were: (1) other animal food manufacturing, (2) fats and oils refining and blending, (3) breakfast cereal manufacturing, (4) chocolate and confectionery manufacturing from cacao beans, (5) confectionery manufacturing from purchased chocolate, (6) non-chocolate confectionery manufacturing, (7) frozen food manufacturing, (8) bread and bakery product manufacturing, (9) cookie, cracker, and pasta manufacturing, (10) snack food manufacturing, (11) coffee and tea manufacturing, (12) flavoring syrup and concentrate manufacturing, (13) seasoning and dressing manufacturing, (14) all other food manufacturing, (15) soft drink and ice manufacturing, (16) breweries, (17) distilleries, and (18) tobacco product manufacturing (e.g., cigarettes and chewing tobacco). A more detailed description of the sectors can be found at: http://support.implan.com.

Picking tomatoes at Grant's Berry Patch in Lisbon. Photo courtesy Connecticut Department of Agriculture

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