

Contributions of the Dairy Industry to the California Economy, 2023 and 2024



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**Department of Agricultural and Resource Economics,
California Agricultural Issues Lab,
University of California, Davis**

William A. Matthews and Daniel A. Sumner*

*William A. Matthews is a project scientist at the Agricultural and Resource Economics Department, University of California, Davis, where Daniel A. Sumner is the Frank H. Buck, Jr., Distinguished Professor and Director of the University of California Giannini Foundation of Agricultural Economics. This study was funded in part by the California Milk Advisory Board. All analyses are those of the authors and not those of the funders.

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Contributions of the California Dairy Industry to the California Economy, 2023 and 2024

Executive Summary

The California dairy industry is large, dynamic, and closely linked to other agricultural industries and the rest of the economy. California has remained the largest producer of milk and processed dairy products in the United States for many years, producing and processing about 18 percent of all U.S. farm milk. Almost all the milk produced on farms in California is also processed in California, and likewise, almost all milk processed in California is produced on dairy farms in the state. Most of the dairy products produced and processed in California, measured by either quantity or value, are shipped out of California in the form of cheese, whey, lactose, milk powders, butter, and other products, and are used globally.

In this report, we measure the value of the direct output of California dairy farms and processors that use California milk for dairy products sold in California, the rest of the country, and around the world. Farms use purchased products and services, hired and family labor, capital, and management to produce farm milk. Processors use the milk from farms combined with other purchased products and services to supply dairy products used by food manufacturers or sold directly to consumers.

California dairy farms purchase feed, other materials, and services from suppliers, such as nutrition consultants and veterinarians. These purchases create a chain of indirect economic activity that would not occur in California without the demand from dairy farms. Moreover, little or no milk processing would occur in California without milk production on farms in the state. And, besides farm milk, processing companies buy electricity, trucking and hauling services, packaging materials, and other items and services from other California industries, which also create a chain of indirect economic impacts.

In addition to these indirect impacts, income earned by hired farm workers and managers, and farm family members allows consumption of goods and services throughout the economy. For example, those who earn their incomes on dairy farms, both farmers and their workers, buy consumption goods and services in the local economy. For example, some have children who attend local schools, which hire bus drivers and teachers. Similarly, dairy processor employees buy clothing or eat at local restaurants, which adds to local retail sales and employment. These purchases, in turn, induce more income and jobs outside the dairy industry. These induced effects spread the impact of the dairy industry throughout the California economy into all industries and to workers in every occupation.

California milk production depends in part on feed produced on other California farms and shipped from other states and Canadian provinces. The economic health of the California dairy industry also depends crucially on a healthy local forage industry to supply corn silage and other forages that are too bulky to haul economically over long distances. Much alfalfa hay for dairies is produced in California, although substantial amounts are shipped in from other Western states. California dairy farming also depends on viable local milk processing, because milk is costly to move long distances. Likewise, although the California dairy processing industry ships cheese, milk powders, and other products across the country and around the world, its viability requires milk production on nearby farms. Therefore, to consider economic impacts, we consider the two segments of the California dairy industry—dairy processing and dairy farming—together. Neither could remain economically viable without the other.

We quantify these direct, indirect, and induced economic impacts using detailed dairy industry information for 2023 and 2024, such as data on gross revenues and employment. We then use these dairy-specific data incorporated into an economywide database and model of

economic linkages (IMPLAN). This “input-output” modeling approach quantitatively traces the direct employment, incomes, and value-added in dairy farming and processing throughout the economy to measure the magnitude of the overall impact on California economic activity, including employment. Using these well-established methods, our analysis documents how linkages from milk production and processing, which include the transport of dairy products for export, extend to the rest of the California economy, and measures the overall impacts of California dairy on the state economy.

In 2023, the value of California-produced farm milk was about \$8.3 billion, growing to about \$9.0 billion in 2024. (Table ES.1). The dairy farm production value \$8.8 billion of indirect and induced output value in 2023, rising to \$9.5 billion in 2024. The California direct, indirect, and induced value of output attributable to California farm milk production (the full effect) was \$17.1 billion in 2023 and \$18.4 billion in 2024.

The value of California-processed dairy products totaled about \$28.3 billion in 2023, rising to \$29.1 billion in 2024. After adding indirect and induced values, the sum of direct, indirect, and induced effects for the California dairy processing industry (the full output value effect) was \$67.3 billion in 2023 and \$69.1 billion in 2024. The California-wide sales full effects of dairy farm milk and processed product sales may include counting values of the same inputs, including farm milk or dairy products, multiple times as products are sold or resold from company to company. Economists use the concept of “value added” to remove double-counting of income in summing economic contributions as products and services move through the economy. In this way, only the amount of value that each company or industry adds is attributed to that step in the process. For example, the value added by a dairy farm is the value of the milk sold minus the amount paid for inputs purchased from other industries.

The second panel of Table ES.1 shows that the direct value added by California farm milk was \$2.5 billion in 2023 and \$2.7 billion in 2024. After adding the value added of indirect and induced sales, California farm milk production added \$6.9 billion in 2023 and \$7.4 billion in 2024 to the California economy. However, since almost all California-produced farm milk is also processed in California, and California milk processing relies almost exclusively on California farm milk, we must include the dairy processing industry in these economic impact calculations. California milk processing had a direct value added of \$4.9 billion in 2023 and \$5.07 billion in 2024. Including the contributions from indirect and induced impacts, the California dairy industry (dairy farming and milk processing) contributed \$22.6 billion of value added in 2023 and \$23.2 billion in 2024.

Table ES.1 also shows that California dairy farms had employment of about 18,818 jobs in 2023 and about 20,250 jobs in 2024. Overall employment impacts of farming rose from 50,864 jobs in 2023 to 54,736 jobs in 2024. The processing industry had 24,521 direct jobs in 2023 and 25,176 in 2024. Overall employment impacts of California dairy farming and processing were 147,910 in 2023, increasing to 151,859 in 2024.

Table ES.1 Contributions of Milk Production and Processing to the California Economy in 2023 and 2024

	Dairy Farm		Dairy Processing	
	<u>2023</u>	<u>2024</u>	<u>2023</u>	<u>2024</u>
California Dairy Industry Sales				
Direct (\$ billion)	\$8.33	\$8.97	\$28.33	\$29.08
Indirect and Induced (\$ billion)	\$8.80	\$9.47	\$38.98*	\$40.03*
Full Effect (\$ billion)	\$17.13	\$18.44	\$67.31*	\$69.11*
Contributions to Value Added (Gross State Product)				
Direct (\$ billions)	\$2.52	\$2.72	\$4.94	\$5.07
Indirect and Induced (\$ billion)	\$4.38	\$4.72	\$17.66*	\$18.16*
Full Effect (\$ billions)	\$6.91	\$7.43	\$22.60*	\$23.23*
Contributions to Employment				
Direct Job	18,818	20,250	24,521	25,176
Indirect and Induced Jobs	32,047	34,486	123,388*	126,683*
Full Effect Jobs	50,864	54,736	147,910*	151,859*

Source: IMPLAN data and calculations supplemented with additional projections and model results.

Note: The table entries with * in the dairy processing columns include the contribution of dairy production as well as processing, because the indirect, induced, and full effects of dairy processor sales, value-added, and jobs include the value of farm milk production as an input. These impacts also include contributions linked to the transport of dairy products for exports.

Introduction

Milk produces more revenue than any other California agricultural commodity (about 14% of the state's total). California produces far more milk than any other state in the United States (about 18% of total U.S. production). California manufactures the full range of dairy products, and the economic impact of the California dairy industry extends far beyond the farm gate. California farm milk is used for a wide variety of food ingredients and consumer goods, including butter, dry milk powder, cheese, whey products, yogurt, ice cream, and many fluid milk products that are distributed locally, throughout the United States, and globally.

Because of the location of the California dairy industry and the cost of hauling farm milk, which is about 87% water, almost all of the milk produced on farms in California is processed in California, and almost all of the milk processed in California is produced on dairy farms in the state. California produces a much larger share of U.S. milk and dairy products than Californians consume. Californians enjoy a range of dairy products from many other states and nations; nonetheless, the dairy industry ships out of California a far greater value of dairy products is shipped into the state.

The economic contributions of the dairy industry begin with farms that purchase feed, other materials, and services from other California industries. These purchases create a chain of indirect economic activity that would otherwise not occur in California. Dairy processing companies buy milk from farms as well as many services and products from other California industries, causing indirect economic impacts. In addition to these indirect impacts, income earned by workers and owners within dairy farms and processors allows them to purchase goods and services from suppliers throughout the economy. Such induced economic impacts spread throughout the California economy.

For background and context, Section 1 briefly describes recent economic trends, patterns, and relationships in the California dairy industry. Section 2 explains our modeling approach that highlights the linkages between the California dairy industry and the rest of the state's economy. Section 3 uses the data, approach, and model to quantify the economic contributions that the California dairy industry made to the California economy and two milk-producing regions, the North Coast and the San Joaquin Valley, in 2023 and 2024. These contributions are measured as output values, labor incomes, and value added, which feed into the gross state product (the standard measure of the size of the California economy). Our analysis also calculates jobs generated by California milk production and processing and tax implications. We may summarize these contributions by highlighting the approximately \$23 billion in economic value added and about 150,000 California jobs that are supported by the California dairy industry in 2024.

The North Coast specializes in organic milk and specialty manufacturing. This region, which produces about 2% of California milk revenues, is the subject of subsection 3.3. About 90% of California milk production and most of the milk processing in the state occur in the San Joaquin Valley, which is the subject of subsection 3.4.

Before proceeding, it is useful to clarify how and why our impact analysis differs from a recent study released by the International Dairy Foods Association (IDFA), which presented dairy impacts for the United States and individual states, including California. (Information about the latest IDFA reports may be found at <https://www.idfa.org/dairydelivers>)

The IDFA publications measure the impacts of the production and sale of processed dairy products on the economy, no matter the geographic origin of those products. Therefore, they include impacts related to wholesale and retail sales of all dairy products, including those

produced outside of California. Since their focus is on dairy foods, they include no distinct analysis of California dairy farming or California-based dairy processing. The IDFA California reports are clear that they measure impacts occurring within California that result from milk production and processing that occurs anywhere. The IDFA analyses include the economic impacts of the sale of processed dairy products even in states and regions that produce no milk. Of the 108,823 direct dairy jobs that the IDFA report finds in 2023, about 76% (82,345) are in retailing, and another almost 6% (6,085) are in wholesaling. None of the jobs they report are on dairy farms. The IDFA analyses have a distinctly different objective and focus from this report.

As noted above, this report estimates the direct, indirect, and induced economic impacts of California farm milk production and milk processing. Our results may be used to consider what the long-term consequences would be for the California economy if the California dairy industry were affected by substantial positive or negative shocks.

Section 1. Trends and the Current Situation of the California Dairy Industry: Background for the Analysis of the Economy-wide Contributions

This section provides information about the recent situation of the California dairy industry to help readers understand and interpret the economy-wide impacts that are developed in Sections 2 and 3. We start with the comparisons of the recent history of California milk production to the milk production in the United States as a whole. We then use county data to consider the geographic distribution of dairy production within California. Then we present the recent pattern of milk prices to illustrate the challenging economic situation facing milk producers, given steady increases in farm costs. Finally, we conclude this section with data on California dairy exports.

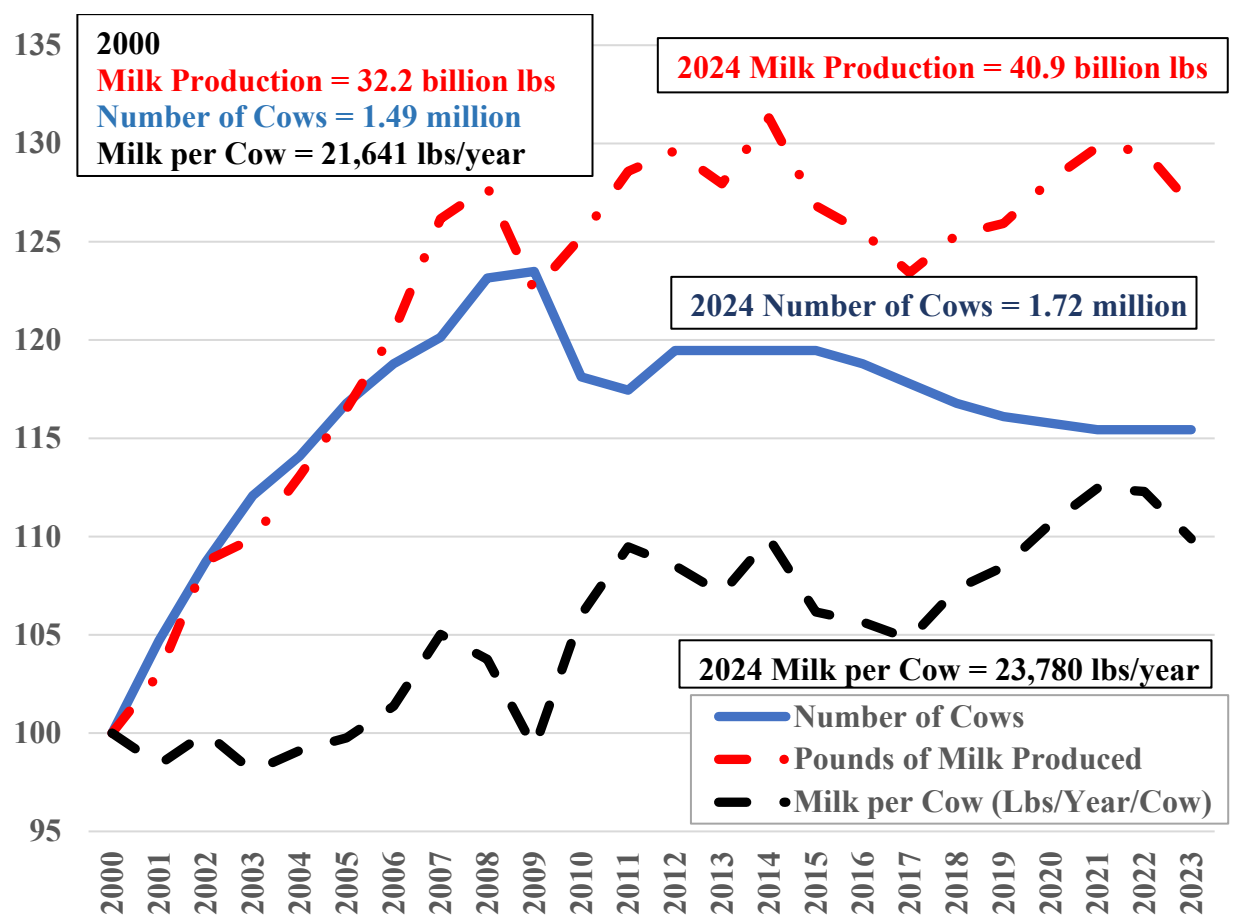
1.1 California in U.S. Milk Production

Figure 1.1 shows the evolution of California dairy production since 2000, when California dairies produced about 32.2 billion pounds of milk from 1.49 million cows. From 2000 to 2008, California milk production was still growing dramatically, continuing a trend that had been underway for several decades. From 2000 to 2008, annual on-farm milk production increased 30% to over 40 billion pounds due to a 25% increase in cow numbers and a 5% to 10% increase in milk per cow. Since 2008, cow numbers have fallen, and milk production per cow has varied from year to year, while rising by a few percentage points. In 2024, California dairy farms milked about 1.7 million cows that produced almost 41 billion pounds of milk.

Figure 1.2 shows analogous data for the United States (including California) from 2000 to 2023. Since 2008, milk production in the rest of the United States has grown faster than milk production in California. Milk production per cow nationwide has continued to grow steadily. Average milk per cow in the United States has now surpassed that in California. U.S. milk

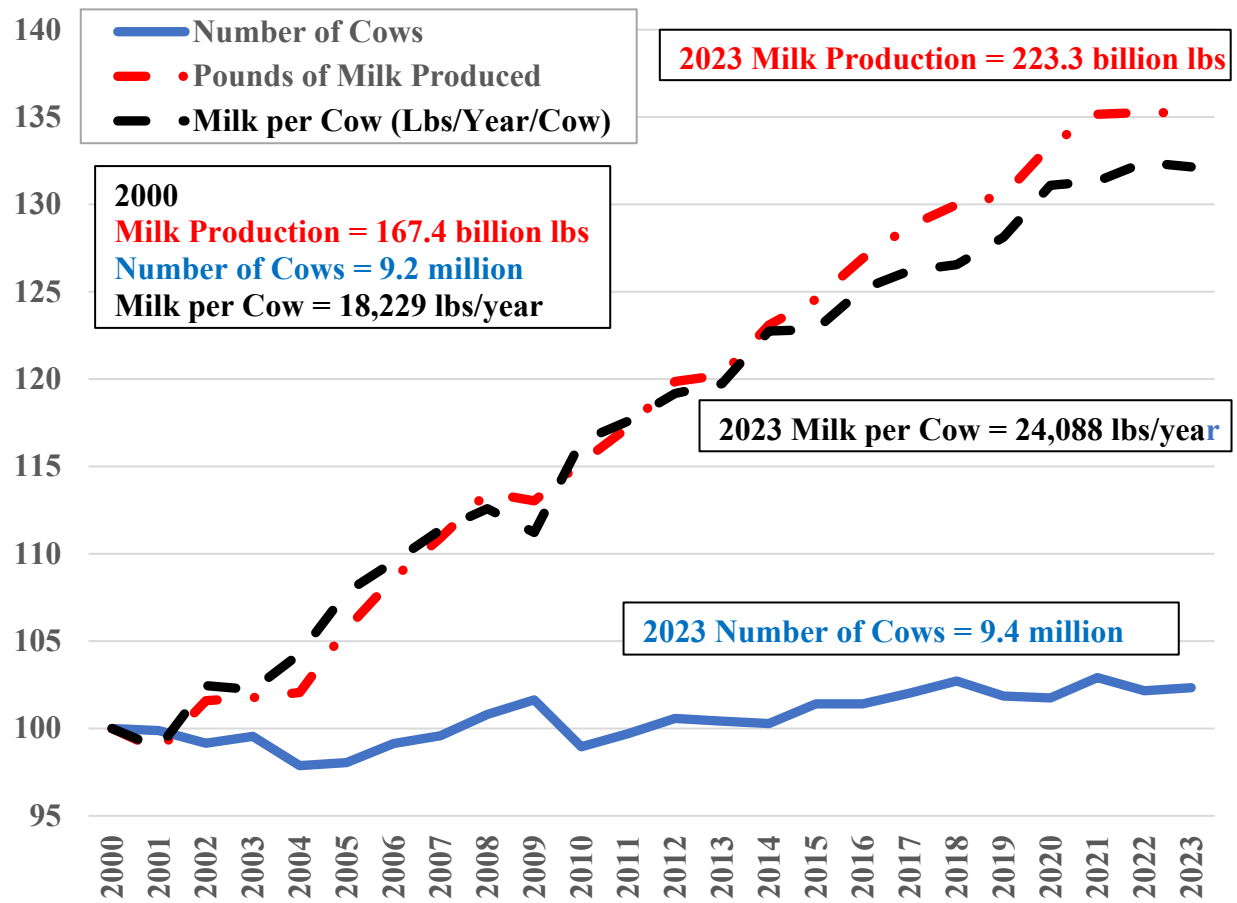
production has grown despite a decline the milk cow herd since 2008. With steady increases in milk production in other states, California's share has fallen over the past two decades. Figure 1.3 shows that California peaked at almost 22% of U.S. milk production in 2007 before falling to about 18% in 2018, where it has remained since. Among other states, Texas and Idaho have grown the most.

Figure 1.1 California Milk Production and Productivity Indexed to 2000



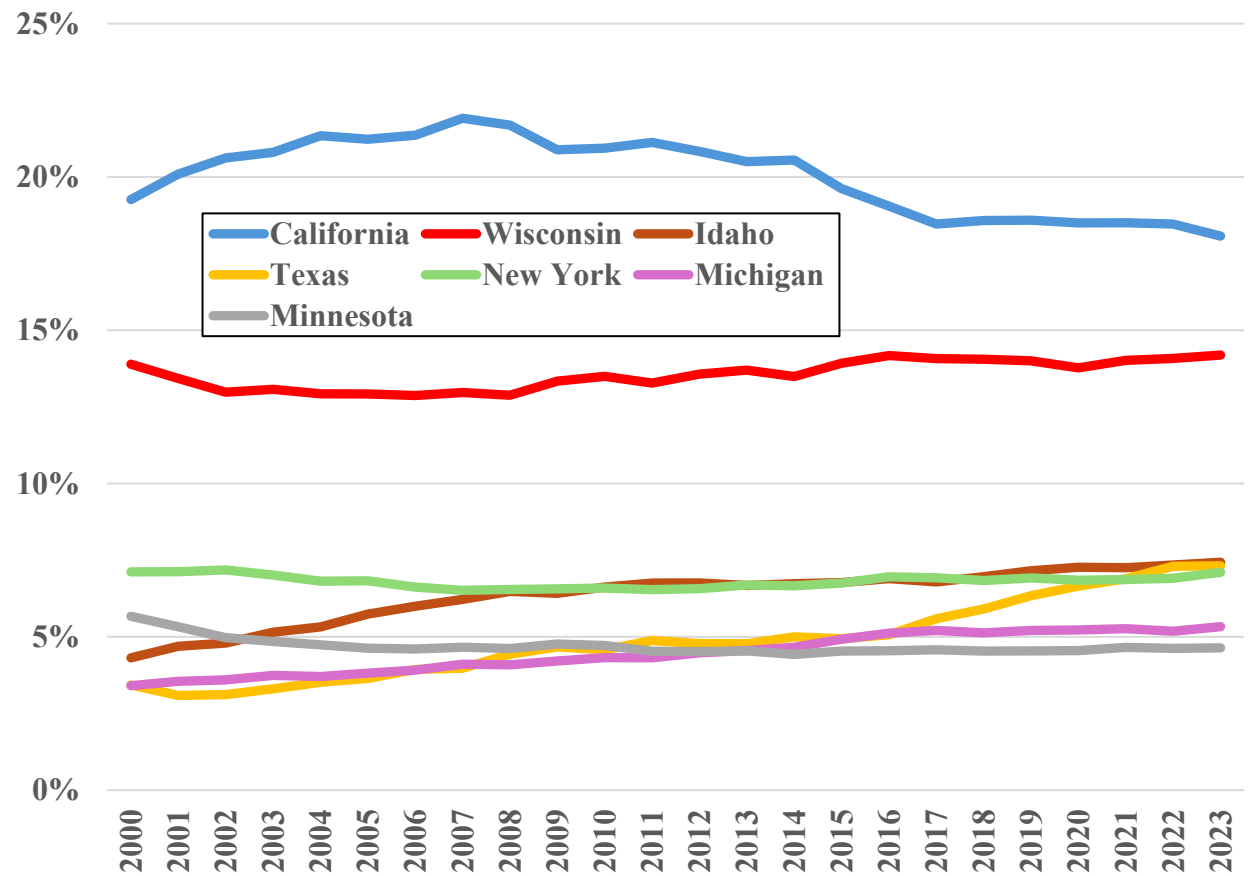
Source: USDA, NASS Quick Stats.

Figure 1.2 US Milk Production and Productivity Indexed to 2000



Source: USDA, NASS Quick Stats.

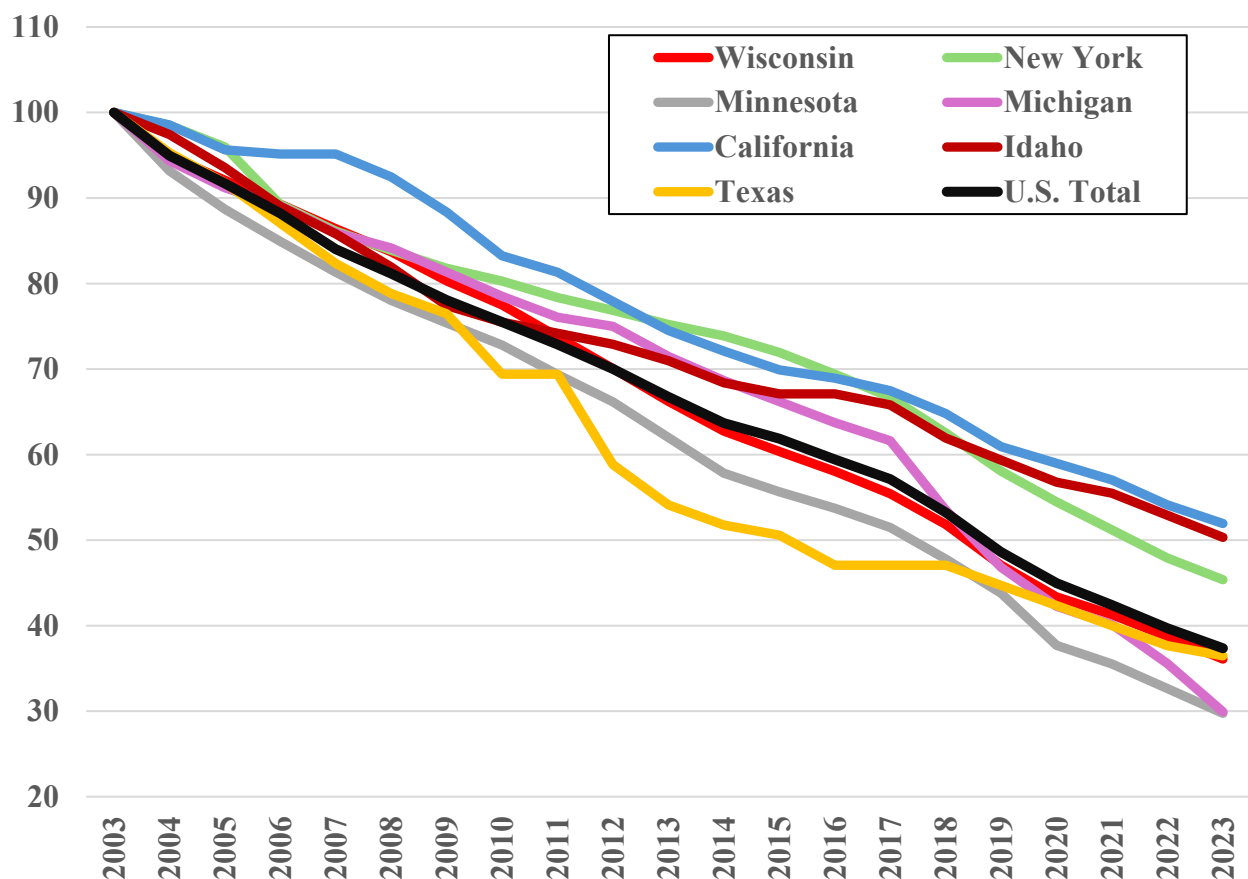
Figure 1.3 Share of Total US Annual Milk Production by Top Milk Producing States, 2000-2023



Source: Based on data from USDA, NASS Quick Stats.

Figure 1.4 shows how the number of dairy farms has fallen in all major dairy state and in the United States overall. The percentage decline in California has been the slowest of major dairy states at slightly less than 50% since 2003. California has 1,000 fewer commercial dairy farms than in 2003, compared to 44,000 fewer dairy farms nationwide, a 63% decline (Figure 1.4 and Table 1.1). Although the number of dairy farms has been falling, the number of milk cows in California and throughout the United States has changed relatively little since 2008 (Figure 1.5 and Table 1.2).

Figure 1.4 Index of Number of Dairy Farms in the Top Milk Producing States and U.S. Total, 2003-2023 (2003=100)



Source: USDA, NASS Quick Stats.

Table 1.1 Number of Dairy Farms in Top Milk Producing States and U.S. Total, 2003 and 2023

	Number of Dairies	
	2003	2023
California	2,060	1,070
Wisconsin	16,400	5,920
New York	6,700	3,040
Idaho	775	390
Texas	850	310
Minnesota	6,235	1,855
Michigan	2,840	850
U.S. Total	70,375	26,290

Source: USDA, NASS Quick Stats.

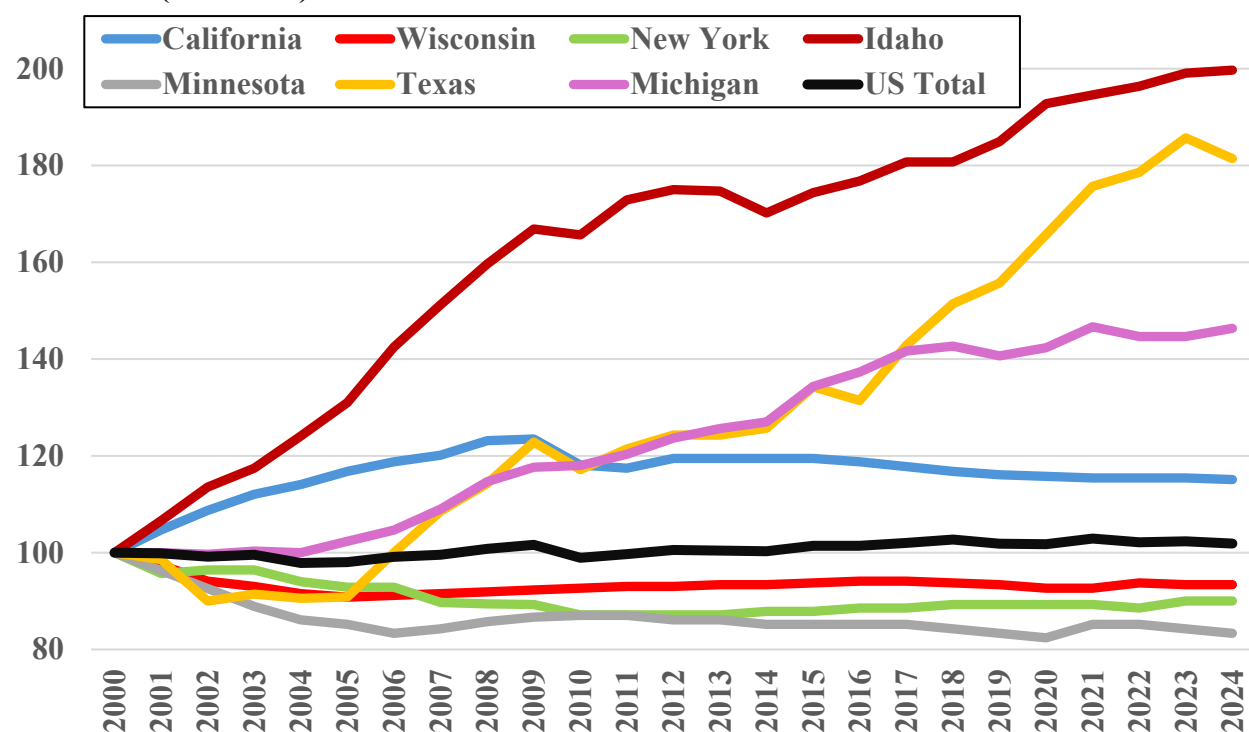
The number of dairy cows has shifted across states. Texas and Idaho have almost doubled their numbers of milk cows since 2000, offsetting declines in Wisconsin, New York, and Minnesota (Table 1.2 and Figure 1.5).

Table 1.2 Number of Dairy Cows in Top Milk Producing States and U.S. Total, 2000 and 2024

	Number of Cows (in 1,000)	
	2000	2024
California	1,490	1,715
Wisconsin	1,360	1,270
New York	700	630
Idaho	332	663
Texas	350	635
Minnesota	540	450
Michigan	300	439
U.S. Total	9,183	9,357

Source: USDA, NASS Quick Stats.

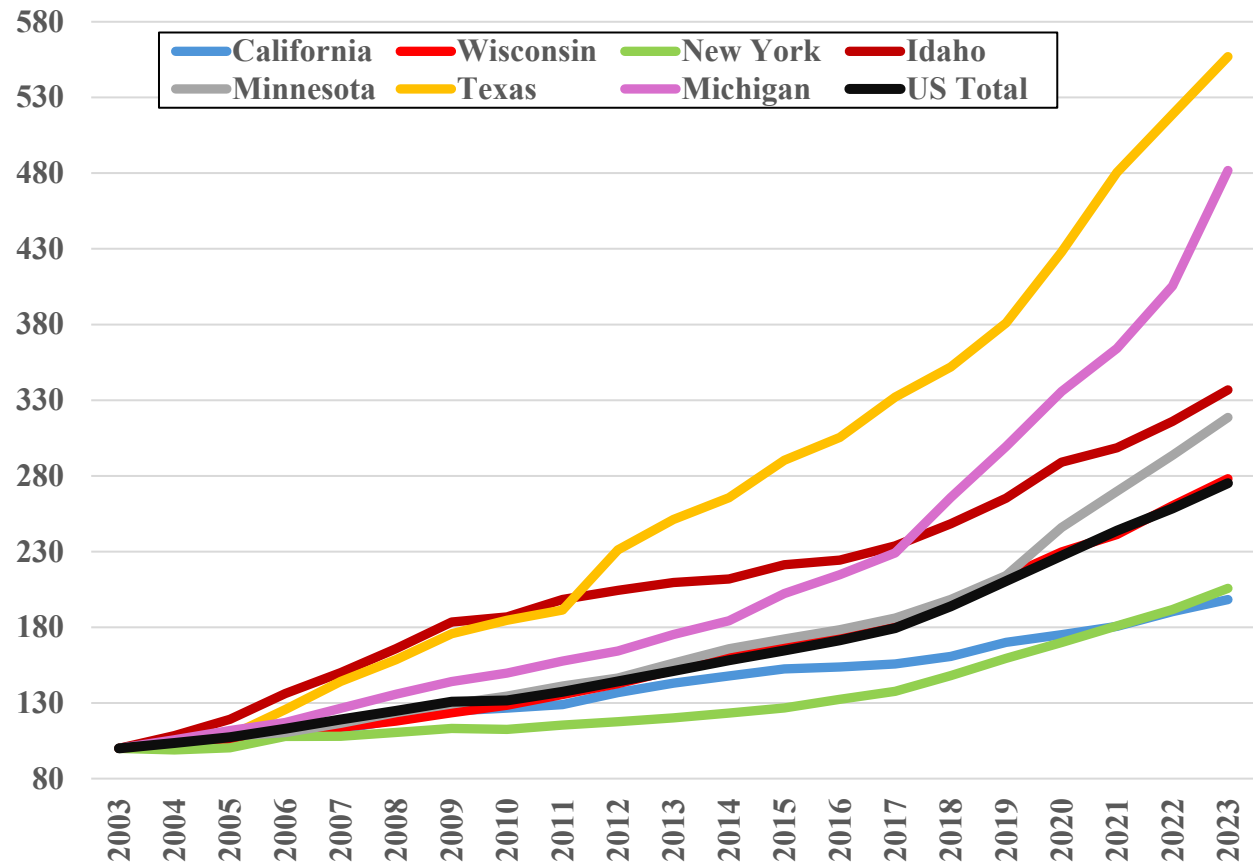
Figure 1.5 Index of Dairy Cow Numbers in Top Milk Producing States and U.S. Total, 2000-2024 (2000=100)



Source: USDA, NASS Quick Stats.

Across all major milk-producing states and the United States as a whole, the average number of milk cows per farm has increased substantially in the past two decades. In 2003, California dairy farms milked an average of just over 800 cows, which was almost 40 percent larger than any other major milk-producing state. By 2023 average herd size in California had increased to over 1,600 cows per farm, but Texas and Idaho have surpassed California as the states with the largest average herd size (Figure 1.6 and Table 1.3). The rate of consolidation (increase of dairy cows per farm) continues to be higher for the U.S. and other leading milk-producing states, as compared to California.

Figure 1.6 Index Comparison of Dairy Cows per Farm for Top Milk Producing States and the U.S. Average, 2003-2023 (2003 = 100)



Source: USDA, NASS Quick Stats.

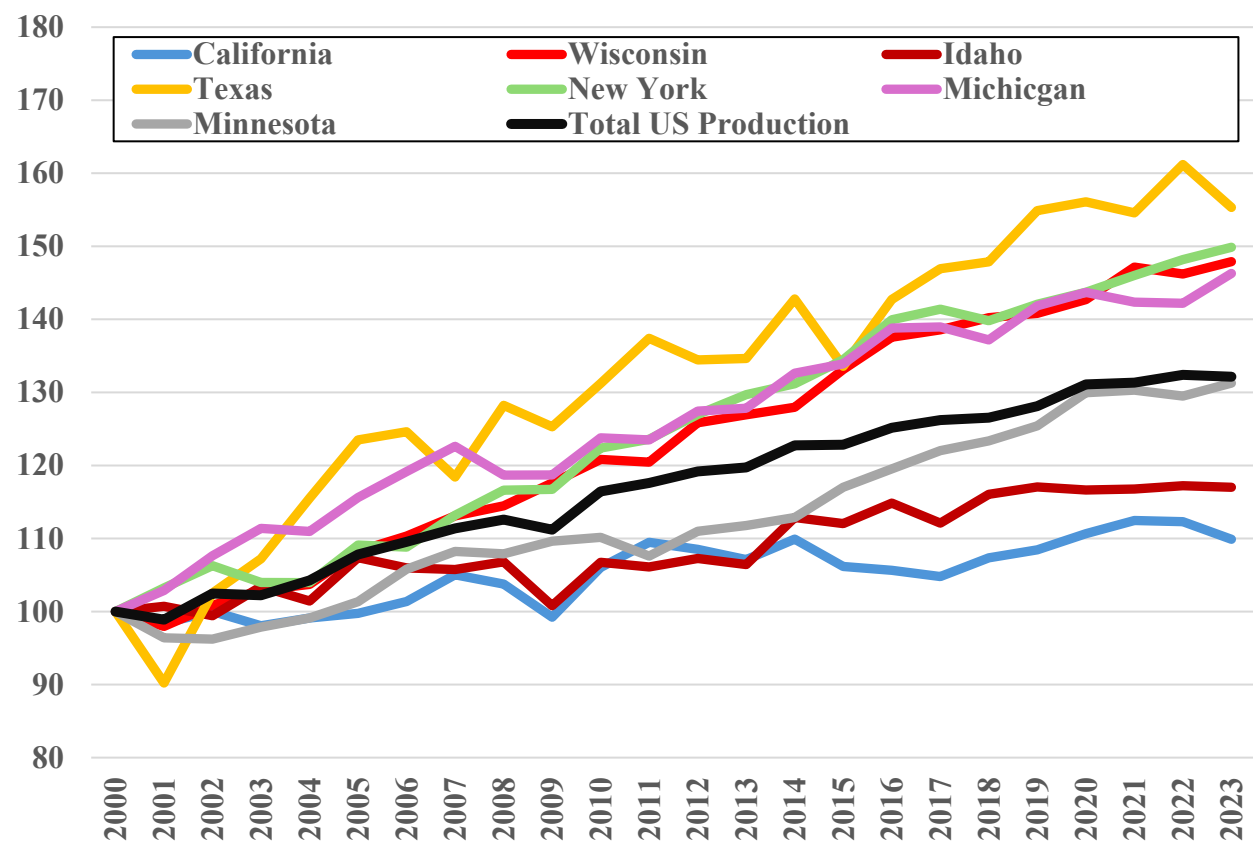
Table 1.3 Average Number of Dairy Cows per Farm in Top Milk Producing States and the United States, 2003 and 2023

	Cows per Dairy	
	2003	2023
California	811	1,607
Wisconsin	77	215
New York	101	207
Idaho	503	1,695
Texas	376	2,097
Minnesota	77	245
Michigan	106	511
U.S. Total	130	357

Source: USDA, NASS Quick Stats.

Increases in cows per farm have coincided with similar increases in milk production per cow across the nation. Historically, California had the highest average milk per cow, but Idaho had surpassed California by 2003 (Figure 1.7 and Table 1.4). In 2003, the average annual milk per cow in California was almost 3,000 pounds above the national average, with Idaho being the only other state producing above 20,000 pounds per cow. However, by 2023, milk production per cow in each of the major milk-producing states had increased to over 23,000 pounds per cow per year, and California was below the national average (Table 1.4).

Figure 1.7 Index Comparison of Annual Milk Production Per Cow for Top Milk Producing States and US Average, 2000-2023 (2000 = 100)



Source: USDA, NASS Quick Stats.

Table 1.4 Average Annual Milk Production per Cow in Top Milk Producing States and the United States, 2003 and 2023

	Pounds of Milk per Cow per Year	
	2003	2023
California	21,641	23,780
Wisconsin	17,102	25,294
New York	17,030	25,522
Idaho	21,756	25,457
Texas	16,409	25,485
Minnesota	17,580	23,077
Michigan	19,017	27,818
U.S. Total	18,229	24,088

Source: USDA, NASS Quick Stats.

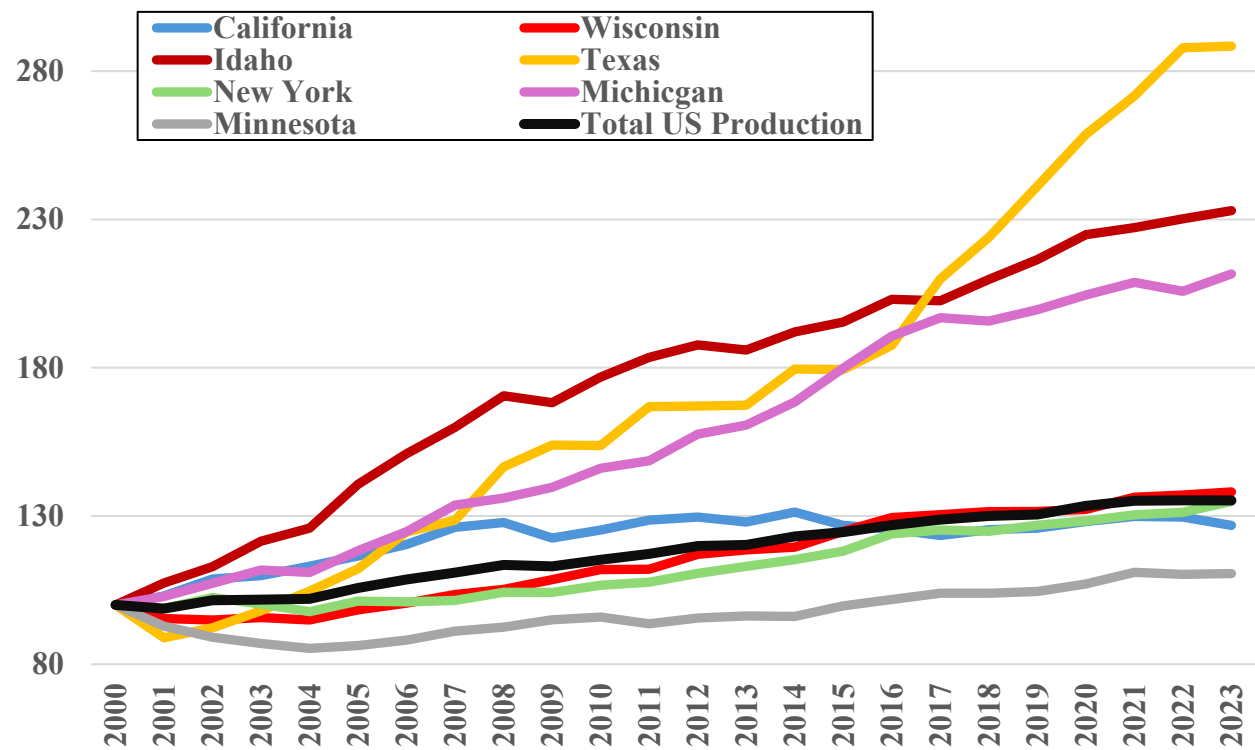
California milk production has grown slowly in the 15 years since 2008 while production in other states has grown much more rapidly. California and Wisconsin remain the largest milk-producing states in the country, but Idaho, Michigan, and Texas have been growing rapidly (Figure 1.8 and Table 1.5).

Table 1.5 Total Annual Milk Production in Top Milk Producing States and U.S. for 2004 and 2017

	Pounds of Milk Produced (million pounds)	
	2000	2023
California	32,245	40,902
Wisconsin	23,259	32,123
New York	11,921	16,079
Idaho	7,223	16,827
Texas	5,743	16,565
Minnesota	9,493	10,500
Michigan	5,705	12,073
U.S. Total	167,392	226,363

Source: USDA, NASS Quick Stats.

Figure 1.8 Index Total Annual Milk Production for Top Milk Producing States and the United States (2000 = 100)

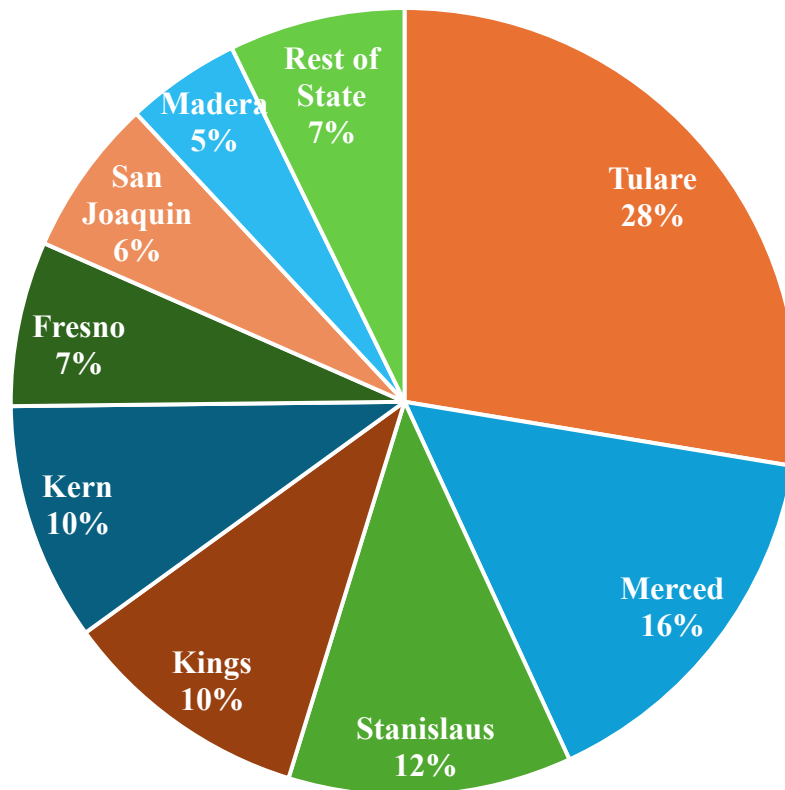


Source: USDA, NASS Quick Stats.

Section 1.2 Milk Production and Processing within California

Milk production in California is concentrated in the eight counties comprising the San Joaquin Valley: Tulare, Merced, Stanislaus, Kings, Kern, Fresno, San Joaquin, and Madera. Dairy farms located in these eight counties account for more than 90% of the milk produced in California (Figure 1.9).

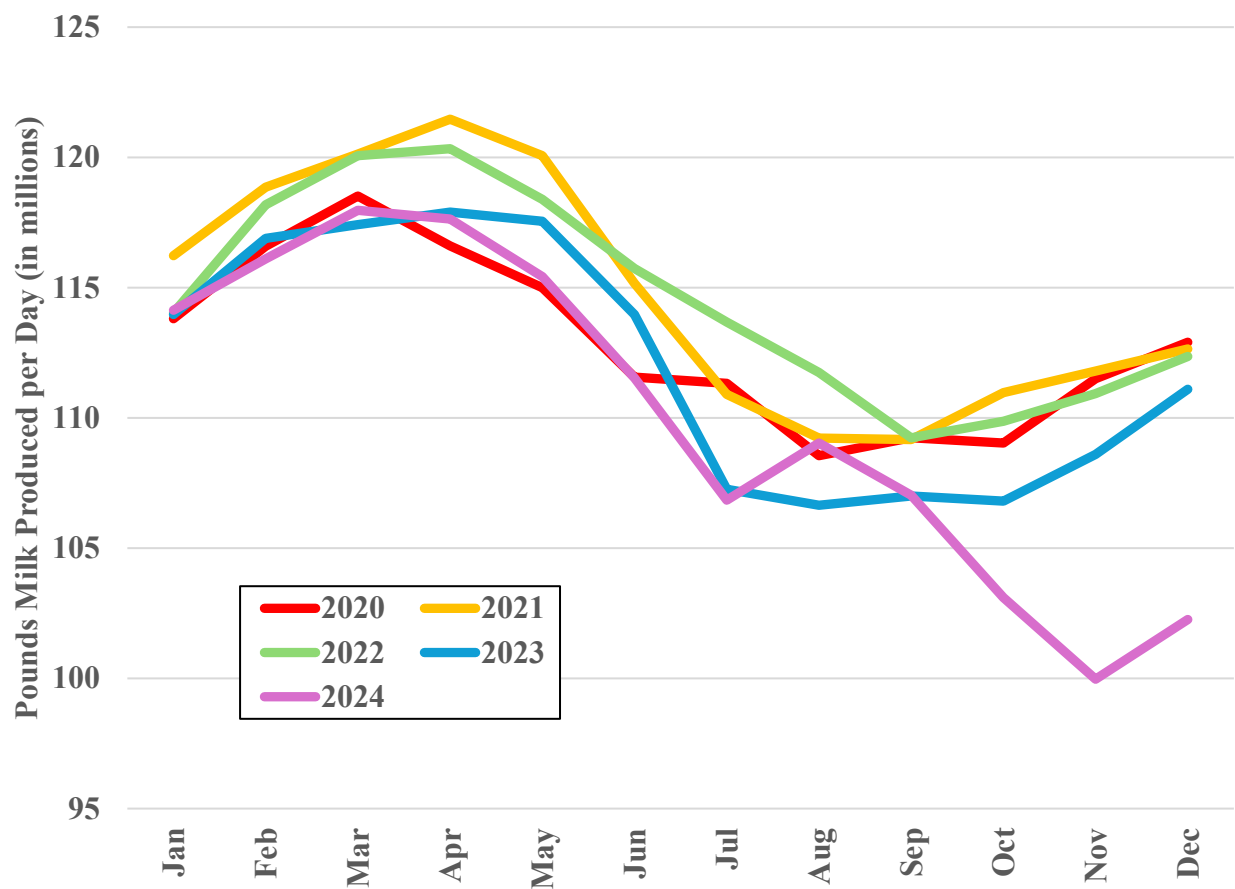
Figure 1.9 California Milk Production by County, 2022



Source: California County Agricultural Commissioners' Reports

California milk production varies seasonally (Figure 1.10). Milk production is highest in the early spring and typically lowest in the late summer and early fall. (Production in Figure 1.10 varies by month with the number of days per month.) The noticeable drop in production in the fall of 2024 was caused by the outbreak of H5N1, a variant of Highly Pathogenic Avian Influenza, which reduced milk production of infected cows.

Figure 1.10 California Monthly Milk Production, 2020-2024, (shown as average per day in million pounds)

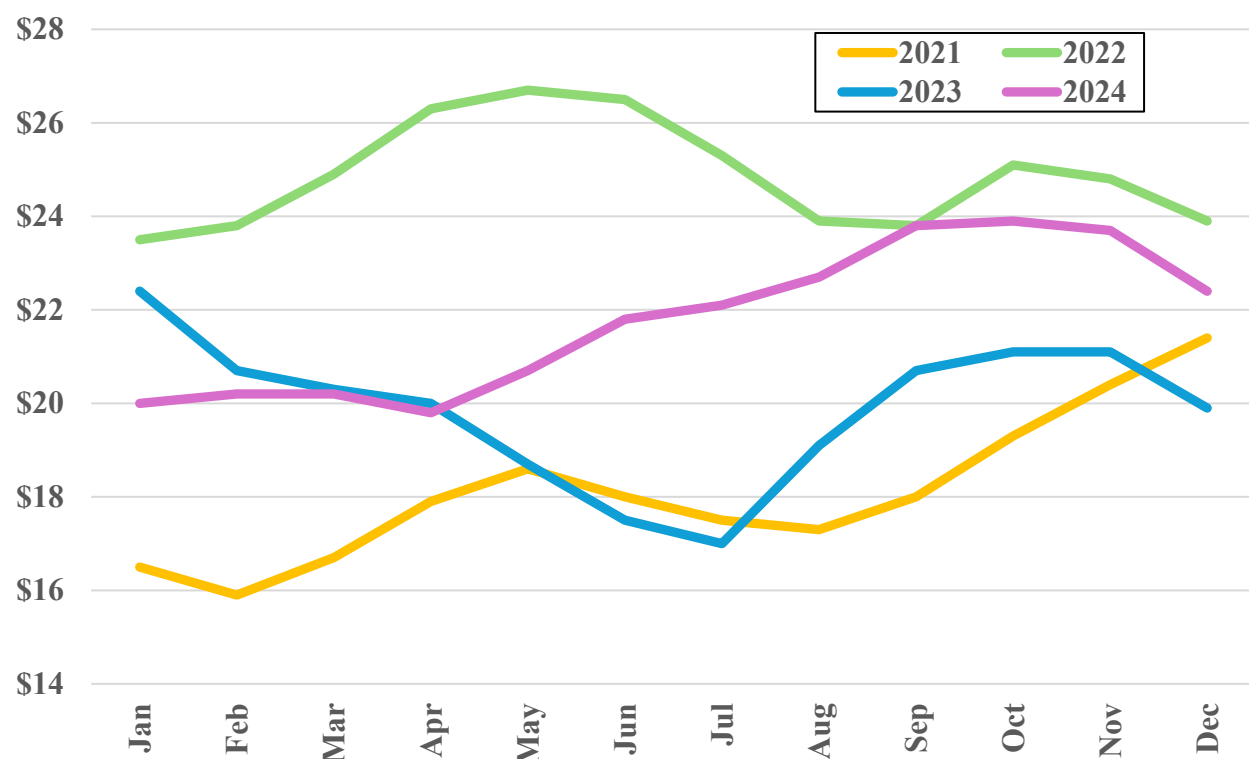


Source: USDA, NASS Quick Stats.

Milk prices received by California dairy farms change substantially from year to year and sometimes even from month to month (Figure 1.11). The California farm price of milk rose from

\$15.90 per hundredweight in February 2021 to \$26.70 per hundredweight in May 2022. In 2024, the price rose from \$19.80 per hundredweight in April to \$23.90 per hundredweight in October.

Figure 1.11 California Milk Price Received per Month, 2021-2024



Source: USDA, NASS Quick Stats.

Feed is the largest component of cost for dairy farms (Table 1.6). Feed costs account for 74% of variable farm input costs. Like milk prices, feed prices fluctuate from season to season and year to year. For example, feed costs in 2022 were about 22% higher than 2021, but higher farm-milk prices allowed California dairy producers to earn a relatively high price-cost residual (Table 1.6).

Table 1.6 California Dairy Farm Annual Unit Costs of Production by Category 2021-2023

Dairy Input	2021		2022		2023	
	\$/cwt	% share	\$/cwt	% share	\$/cwt	% share
California Average						
Feed	\$12.08	74	\$14.96	75	\$13.57	72
Hired Labor	\$1.96	12	\$2.09	11	\$2.22	12
Operating Costs	\$2.02	12	\$2.61	13	\$2.81	15
Milk Marketing	\$0.16	1	\$0.18	1	\$0.19	1
Total Costs	\$16.22	100	\$19.84	100	\$18.79	100
Average Milk Price	\$18.12		\$24.87		\$19.85	
Price – Costs (Residual)	\$1.90		\$5.03		\$1.09	
US Average						
Feed	\$11.93	71	\$14.77	71	\$13.56	68
Hired Labor	\$1.94	11	\$2.11	10	\$2.23	11
Other Operating Costs	\$2.85	17	\$3.61	17	\$3.82	19
Milk Marketing	\$0.16	1	\$0.18	1	\$0.19	1
Total Costs	\$16.88	100	\$20.67	100	\$19.80	100
Average Milk Price	\$18.44		\$25.18		\$20.24	
Price – Costs (Residual)	\$1.56		\$4.51		\$0.44	

Source: USDA, ERS “Milk Cost of Production Estimates” (<https://www.ers.usda.gov/data-products/milk-cost-of-production-estimates>)

Section 2. Methods for Measuring the Economic Contributions of the California Dairy Industry

2.1 Modeling and Measuring the Economic Linkages and Contribution

This study utilizes input-output (I-O) analysis to measure the economic impacts of the California dairy industry. I-O analysis is the most common methodology for measuring the economy-wide economic impacts of industries. The methodology identifies and models how an industry, such as the California dairy industry, interacts with other segments of the economy. The advantage of this approach is that it accounts for the array of economic transactions between an industry of interest and other sectors of the economy and the magnitude of impact these transactions have on the rest of the economy.

I-O analysis reaches beyond the direct economic impacts of an industry and includes many of the ripple effects that occur within an economy due to a change in the industry's output. I-O models can demonstrate the relative importance of an industry to the economy and account for economy-wide responses to changes in industry output that may be caused by any sort of influence, such as regulatory change or a shift in production technology and methods.

The ripple effects within I-O analysis are computed as multipliers and reflect the magnitude of an impact on the economy from a unit change in output from an industry. Multipliers help identify the structural interdependence between an industry and the rest of the regional economy. By employing a series of fixed ratios from the I-O data set, it is possible to create a set of multipliers that measure a range of economic impacts of the California dairy industry output on the number of jobs in California or the state's Gross State Product (GSP).

For this study, we focus on four multipliers that measure specific economic impacts: (a) value of output, (b) labor income, (c) total value added, which is the contribution to the state GSP, and (d) employment or the number of jobs supported. Each of these measures has a specific definition.

The value of output multiplier measures the sum of direct and indirect requirements from all economic sectors needed to deliver an additional dollar of output of a specific industry to final demand. For example, an increase in the value of milk output by California dairy farms would entail an increase in on-farm milk production at the farm price, plus an increase in all the input supplier' outputs at their product prices. Likewise, changes in the value of output for milk processing plants are the sums of the prices multiplied by the quantities of each dairy product manufactured, as well as the sum of increased milk supply from California dairy farms at the farm price, along with all other inputs to dairy processing (such as energy and packaging). A limitation of the value of output measure for the California dairy industry is the potential for double-counting the value of milk production by California dairy farms. The output value of processed dairy products includes the value of milk purchased from California dairies, along with the value of all other inputs used in production. The value of a gallon of bottled milk sold by the processing plant includes the farm value of that same gallon of milk when it was sold to the processor.

The labor income multiplier measures (as a ratio) the value that is paid as compensation to hired labor, contracted labor, and business proprietors, divided by the value of industry output (gross revenue). It represents a subset of the value-added multiplier, which includes (in the numerator) any profit and indirect business taxes paid by the industry relative to output value.

Value added for the dairy farm industry represents that portion of gross output value that is not used to purchase inputs, such as feed or veterinary services, from outside industries but rather is contributed by the workers and capital within the dairy farm industry. The dairy farm industry's value added is its economic contribution above the cost of goods and services that were purchased from other sectors and were therefore already measured as the outputs of those sectors. As mentioned, when considering dairy farming and processing separately, we recognize that milk purchased from farms is the major purchased item for milk processors. Hence, when we measure the contribution of milk processing to the economy, we must "net out" the value of the milk purchased in the process of assigning the value that was added in the processing stage. Value added is the dairy industry's contribution to the size of the California economy, with no double-counting of output that is transferred from one link in the supply chain to the next.

The employment multiplier measures the number of jobs supported by an industry for each million dollars of output. The employment data and hence the multiplier include all jobs and do not distinguish between part-time or seasonal employment versus full-time year-round jobs within an industry. These jobs include business owners and family members who share entrepreneurial income, as well as full-time and part-time hired workers and contracted workers.

I-O analysis further classifies impacts for each of the multipliers as direct, indirect or induced. Direct impacts are changes in economic measures that occur directly within the industry being examined. The value of output multipliers is 1.0 by definition. Indirect impacts are the changes that occur through purchases of input products and services from supporting industries. For example, when dairy farms produce more milk, farms also likely buy more hay, use more electricity, and hire additional hauling services, leading to increases in the output, jobs, worker compensation, and value added for these industries. Data sets that cover the whole economy

include quantitative measures of all these relationships and allow us to follow along as the effects of purchases ripple through the economy.

Induced impacts measure changes in the economy caused by changes in consumption expenditures that result from changes in compensation of workers (including business owners and their unpaid workers) in the direct industry and supporting industries. They measure the economic impacts within each industry that result from added consumption generated by spending by those earning new income from the direct and indirect effects. For example, milk farms selling milk for a higher price have employees or owners who get higher earnings and spend some of their new income at grocery stores or barbershops. These businesses compensate their employees and owners, who spend some of that added income. Workers also pay higher taxes, and taxes may provide more support for government services, such as schools.

Total effects are the sum of the direct, indirect, and induced impacts. The total effects represent the complete impact or contribution of the dairy industry to California's value of output, value added, and employment. Box 2.1 concisely defines each of the multipliers measured and the classification of impacts across the economy.

Box 2.1

Using Input-Output Models to Measure Economy-wide Impacts and Contributions

Input-output models link the magnitude of changes in an industry or segment of the economy to the associated changes in all the other industries and segments throughout the economy. For example, an expansion of demand for California dairy products causes more employment and other economic activity in dairy farming and dairy product manufacturing, and these activities cause increased demand for materials and services from outside the industry. Moreover, income generated by this economic expansion will be spent on other goods and services. Input-output models and data on economic linkages in the economy provide the tools and information to quantify these impacts as “multiplier effects” without leaving out impacts or double-counting. Impacts are generally classified as direct, indirect, and induced effects.

Direct Effects: Direct effects are impacts directly within the selected industry. For example, a one-million-dollar increase in dairy farm sales has a direct income impact of one million dollars.

Indirect Effects: Indirect effects are the changes in industries outside the directly affected industry through purchases from supporting industries of input goods and services. The increased economic activity for dairy input suppliers increases the purchases of their own inputs and services, which ripple further through the economy.

Induced Effects: Induced effects are economic ripples that result from added consumption generated by the added income spent by those with earnings from the direct and indirect effects. For example, dairy farmers, processors, and their employees spend their income at California grocery stores, auto dealerships, and barbershops. These businesses have workers of their own who spend their incomes, which ripple further through the economy.

Full Effects: The sum of direct, indirect, and induced impacts generates the complete impact or contribution of the dairy industry on the whole of the California economy. We report the contributions using three economic measures.

Value of Output: The value of direct output or service contribution of an industry or segment. For example, the direct value of dairy farm output is simply the market value of milk produced. For processors, it is the total market value of the dairy products they sell.

Value Added: Value added is the measure of salaries and wages, proprietor income and profit minus business taxes. It is the proportion of value of output contributed by labor and capital within the sector. An industry’s value added is the economic contribution of a sector above the cost of goods and services purchased from other sectors. Value added for dairy is the industry’s contribution to the size of the California economy.

Employment: Employment is defined as the number of jobs, including part-time or seasonal employment. It is not converted to full-time equivalent (FTE) employment.

WE utilize the IMPLAN I-O model to produce the analysis underlying Chapter 3 of this report. (See <https://implan.com/>.) The equations and data used within the IMPLAN model represent an abstraction of the real world and depend upon assumptions that approximate portions of the underlying reality. Naturally, the accuracy of the analysis and results hinges on the reliability of the raw data used to represent economic activity. Using multiple data sources, the IMPLAN group developed a comprehensive model of the U.S economy, as well as the economies of each state and many local regions

The IMPLAN model provides a valuable tool for conducting economic impact assessment. However, the representation of specific industries in localized geographic areas within the IMPLAN database is challenging. Specific input or output data may not be available for some industries and aggregates, and sometimes the multipliers calculated on available data do not represent a local industry accurately. To increase the accuracy of modeling specific industries in specific locations, IMPLAN allows users to modify the model and data to better represent the specific industry and geographic region under study. In this study, we implement the IMPLAN model using California dairy industry data supplied by the National Agricultural Statistics Service of the USDA and the California Department of Food and Agriculture. We use State of California data for on-farm labor use. We also incorporate direct dairy processing labor data published by the International Dairy Foods Association. (See *2023 Dairy Delivers: The Economic Impact of Dairy Products in the United States* (<https://www.idfa.org/dairydelivers>).

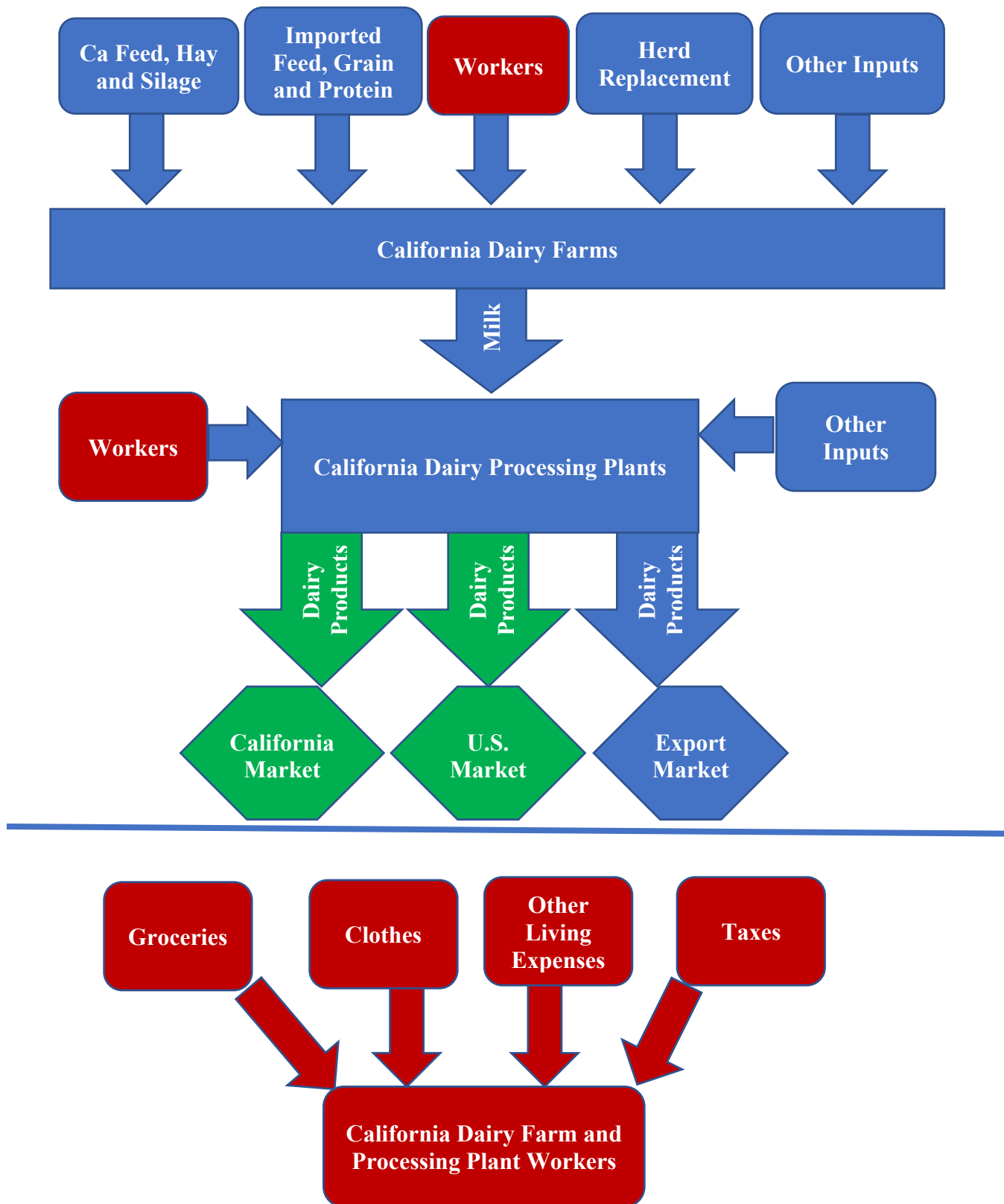
2.2 Building the I-O Model for the California Dairy Industry

Flow Chart 2.1 illustrates our model of the California dairy industry. In this study, we define the California dairy industry to include on-farm milk production by California dairies, transportation of farm milk to dairy processing plants within California, the transformation of

farm milk by these processors into the numerous dairy products for commercial use, and shipments to wholesalers and retailers in California and beyond. Going from top of the flow chart down, California dairy farms rely on input suppliers from various sectors, ranging from the forage feeds and grains industries in California to the high-protein feeds and oilseeds industries outside of California. Farms also rely on local accounting and banking industries, and many other input suppliers. The output of milk from California dairy farms is supplied to dairy manufacturing plants, which use farm milk and additional inputs to produce a wide array of processed dairy products. These processed dairy products are sold in California, across the United States, or exported.

We do not include the wholesale or retail sales of dairy products in our analysis. California consumers buy dairy products from many sources, just as California products are shipped all over the world. Dairy product sales further down the supply chain and California dairy product consumption would be at most minimally affected by changes in the value of California-produced milk and processed dairy products. The size of the California dairy farming or milk processing industries simply does not determine dairy purchases in California. Therefore, the economic impact of the California dairy industry does not hinge on where its products are sold but rather the value of production in aggregate.

Flow Chart 2.1 California Dairy Industry Economic Impact Flow Chart



We used the IMPLAN database for California that was updated through the calendar year 2023. We use California milk production and prices to update the IMPLAN data to 2024. For this analysis, we use the IMPLAN multipliers calculated for 2023. The IMPLAN database has details on dairy farming and several categories of dairy product manufacturing in California. We use detailed data from the IMPLAN database as listed in Table 2.1. IMPLAN sectors are based on data made available by the U.S. Department of Commerce, Bureau of Economic Analysis, in their latest Benchmark Input-Output Study.

Despite the detailed industry data available, there are unavoidable complications. For example, in Table 2.1, the category “Fluid Milk Products” includes such non-fluid products as cottage cheese and non-milk products such as non-dairy creamers and whipped toppings in addition to cream and whipped cream. The IMPLAN data includes other non-dairy products, such as fruit pops, sherbet, and other frozen desserts. These complications are generally small relative to the value of milk products, but they do limit the precision expected in our calculations.

Table 2.1 Dairy Industry Sectors within IMPLAN and Products Produced Within Sector

IMPLAN Sector	Dairy Products Produced within the Sector
Dairy Cattle and Milk Production	Raw Milk Production
Fluid Milk Products	Bottled milk Chocolate milk Milk-based drinks Cream Eggnog Whipped cream and topping Nondairy creamers Buttermilk Sour cream Non-frozen yogurt Sour cream dips Cottage Cheese
Creamery Butter Products	Butter Whey butter Anhydrous butterfat
Cheese Products	Aged cheese Processed cheese Cheese spreads and dips Whey products
Dry and Evaporated Dairy Products	Condensed canned milk products Powdered milk and cream Baby formula Dry ice cream mix Casein Lactose Malted milk UHT milk Dry yogurt mix
Ice Cream and Frozen Dessert Products	Ice Cream Frozen custard Fruit pops Frozen desserts Ice milk Frozen yogurt Sherbet

Source: IMPLAN

Using multipliers calculated for these sectors in the 2023 IMPLAN database, we estimate the value of economic contributions for the California dairy industry in 2023 and 2024. For estimates of contributions of California dairy farms, we use USDA milk production and farm milk price data to calculate the value of output at the farm.

For California dairy processing, we use three additional sources of data to update the IMPLAN data to better represent the California dairy industry. First, we use California dairy farm labor data that is available monthly and annually from the Employment Development Department (<https://labormarketinfo.edd.ca.gov/data/ca-agriculture.html#Tables>). Second, as noted above, we use direct processing labor data from the IDFA “Dairy Delivers” study for each dairy manufacturing product category. IDFA conducted an extensive review of manufactured dairy product production data across the United States in 2023. Their work provides a more accurate measure of the number of direct jobs supported by each of the IMPLAN dairy manufacturing sectors within California in 2023.

We also update the total direct output in IMPLAN for each dairy manufacturing sector to reflect California’s U.S. share of production for each processed product category. This adjustment is done using production data from the USDA, NASS. The multipliers for each of the dairy sectors and their economic contributions in 2023 are presented in Section 3. Finally, we conduct analyses for 2024, which, as noted above, are based on California milk production data supplied by the USDA, NASS.

Section 3. Economic Contributions of California Milk Production and Processing to the California Economy

This section traces how California milk production and processing affect the value of output, labor income, value added, and employment of the California economy through the direct, indirect, and induced effects outlined in Section 2. We begin with the effects of dairy farming and then consider the economic impact that includes milk processing. We use data on processing product categories to examine the economic impacts of the four subindustries that together comprise dairy manufacturing in California.

We also examine the roles of the dairy industry in two regions within California. The small North Coast dairy production region has many relatively small herds that produce mostly organic milk and tend to sell relatively high-priced dairy products. The San Joaquin Valley region of California accounts for more than 90% of milk production and more than 65% of processed dairy product output.

Recall that the IMPLAN database and model contain information on six dairy industry subsectors, including dairy farming, and five manufacturing subsectors defined and labeled by the main product in the subsector: fluid milk, cheese, dry and condensed products, butter, and ice cream and frozen desserts. The specific products corresponding to each of these subsectors were listed above in Table 2.3. The products listed under these IMPLAN subsectors do not correspond directly with Federal Milk Marketing Order dairy product classes. The fluid milk category in IMPLAN includes both the FMMO system fluid milk products (Class I) and the non-fluid soft products, such as yogurt, sour cream, and cottage cheese (Class II). Cheese, including whey as a by-product, is in the FMMO Class III, but both butter and dry milk powders are included in the

FMMO Class IV. In our analysis and the results that we report, we combine butter and dry milk powder manufacturing into a single category called butter-powder, because they are often produced in the same manufacturing plant and are complementary in using the milk fat for butter and the non-fat solids in many of the dry and condensed milk products. Ice cream and frozen desserts are included within Class II in the FMMO system. However, since the other Class II products are combined with fluid milk, we retain the separate category as defined in IMPLAN.

3.1 Contribution of Dairy Farming and Processing to the California Economy

Table 3.1 shows the impact multipliers and the economic contributions of California dairy farms in 2023 and 2024. Reading from the top left of Table 3.1, every \$1.00 of milk output by California dairy farms has, by definition, a direct multiplier of 1.0, an indirect impact of 0.78, and an induced impact of 0.28, for a total effect of 2.06. This means that each dollar of milk farm production adds an additional \$1.06 of output value in California. In 2023, the value of farm milk production in California was \$8.3 billion, which drove the California economy to produce an additional \$8.8 billion in output through indirect and induced. The impacts in 2024 are larger because milk sales grew by about 6%. As shown in Figure 1.10, milk production fell in the last quarter of 2024 because of H5N1 infections. We estimate that California milk production was about 2% lower in 2024 than it would have been without the spread of this disease. That is to say, California milk production would have risen by about 8%.

In 2023, California dairy farms paid about \$1.15 billion, or 14% of farm output, to workers and proprietors as compensation. Substantial indirect and induced labor income effects mean that the total effect on California labor income is \$3.62 billion.

About 30% of the total output value is value added. Direct farm value of output accounted for \$2.52 billion in value added in 2023 and \$2.72 billion in 2024. After adding the

indirect and induced effects, the value added to the California economy was \$6.91 billion in 2023 and \$7.43 billion in 2024 (Table 3.1).

Table 3.1 Impact Multipliers and Contributions of California Dairy Farms to the California Economy in 2023 and 2024

<i>Multiplier</i>	<i>Impact Multipliers</i>	<i>2023 Contributions</i>	<i>2024 Contributions</i>
Value of Output	<i>\$ of output per \$1.00 output</i>	<i>\$ millions</i>	
Direct Effect	1.00	8,335	8,970
Indirect Effect	0.78	6,482	6,975
Induced Effect	0.28	2,319	2,496
Total Effect	2.06	17,137	18,441
Labor Income	<i>Labor income per \$1.00 output</i>		
Direct Effect	0.14	1,148	1,235
Indirect Effect	0.20	1,678	1,806
Induced Effect	0.10	798	859
Total Effect	0.43	3,624	3,899
Value Added	<i>GDP(\$) per \$1.00 of output</i>		
Direct Effect	0.30	2,523	2,715
Indirect Effect	0.34	2,874	3,093
Induced Effect	0.18	1,510	1,625
Total Effect	0.83	6,906	7,432
Employment	<i>Jobs per \$ million of output</i>	<i>Number of Jobs</i>	
Direct Effect	2.26	18,818	20,250
Indirect Effect	2.51	20,928	22,521
Induced Effect	1.33	11,119	11,965
Total Effect	6.10	50,864	54,736

Source: Multipliers were generated in IMPLAN using revenue and cost data contained within the IMPLAN database in 2023. Note: Projections of 2024 impacts were calculated using milk output of California dairy farms in 2024 and the 2023 IMPLAN database multipliers.

California dairy farms supported 2.26 direct dairy farm jobs for every \$1 million of milk output, for a total of 18,818 jobs in 2023 and 20,250 dairy farm jobs in 2024. The indirect and induced effects together added another 3.84 jobs per million dollars of output. The total effect is 50,864 jobs in 2023 and 52,248 jobs in 2024.

Table 3.2 presents the economy-wide impacts of the dairy industry, including both dairy farming and milk processing, on the California economy. In 2023, the value of California-processed dairy products was \$28.3 billion, which rose to \$29.1 billion in 2024. The indirect value of output (which includes the value of farm milk as an input into milk processing) was \$31 billion in 2023 and \$32 billion in 2024. Including both indirect and induced effects, the total effect on the value of output was \$67.3 billion in 2023 and \$69.1 billion in 2024.

Workers and proprietors of manufacturing plants earned direct labor incomes of about \$2.74 billion, or almost 10% of the direct output value in 2023 and \$2.83 billion in 2024. The labor income effect, including indirect and induced effects, was \$12.55 billion in 2023 and \$12.88 billion in 2024.

Direct value added in the processing industry was 17% of the value of output, which equaled \$4.94 billion in 2023 and \$5.07 billion in 2024. The indirect value added, which includes the effects of dairy farms and their suppliers, was \$12.46 billion in 2023, rising to \$12.78 billion in 2024. Adding induced effects produces the contribution to California GSP of \$22.6 billion in 2023 and \$23.21 billion in 2024. This contribution to the California economy includes no double-counting and includes contributions of dairy farms and dairy processing in California.

The final panel of Table 3.2 presents the employment impact of the California dairy industry. Dairy product manufacturing in California supported 24,521 direct jobs in 2023 and 25,176 direct jobs in 2024. Adding the large indirect and induced effects indicates 147,910 jobs in 2023 and 151,859 jobs in 2024. These are jobs that depend on dairy farm production in California because, as we have pointed out, California milk processors and jobs throughout the supply chain ultimately depend on California-produced milk.

Table 3.2 Impact Multipliers and Contributions of California Dairy Processing to the California Economy in 2023 and 2024

<i>Multiplier</i>	<i>Impact Multipliers</i>	<i>2023 Contributions</i>	<i>2024 Contributions</i>
Value of Output	<i>\$ of output per \$1.00 output</i>	<i>\$ millions</i>	
Direct Effect	1.00	28,325	29,081
Indirect Effect	1.10	30,971	31,798
Induced Effect	0.28	8,013	8,227
Total Effect	2.38	67,309	69,106
Labor Income	<i>Labor income per \$1.00 output</i>		
Direct Effect	0.10	2,738	2,827
Indirect Effect	0.25	7,055	7,280
Induced Effect	0.10	2,755	2,843
Total Effect	0.44	12,549	12,884
Value Added	<i>GSP(\$) per \$1.00 of output</i>		
Direct Effect	0.17	4,940	5,072
Indirect Effect	0.44	12,446	12,779
Induced Effect	0.18	5,216	5,383
Total Effect	0.80	22,602	23,205
Employment	<i>Jobs per \$ million of output</i>	<i>Number of Jobs</i>	
Direct Effect	0.87	24,521	25,176
Indirect Effect	3.00	85,014	87,284
Induced Effect	1.35	38,374	39,399
Total Effect	5.22	147,910	151,859

Source: Multipliers were generated in IMPLAN using revenue and cost data contained within the IMPLAN database in 2023. Note: Projections of 2024 impacts were estimated using the output of dairy sectors in 2024 multiplied by the 2023 IMPLAN multipliers. Indirect, induced, and total effects of dairy manufacturing would include the effects of milk purchased from California dairies.

Table 3.3 shows that the total direct output of dairy product processes in California made with milk from California dairy farms was about \$28.3 billion in 2023 and \$29.1 billion in 2024. The industry provided direct labor income of \$3.89 billion in 2023 and \$4.05 billion in 2024. In 2023, the industry contributed about \$7.47 billion in direct value added and \$7.79 billion in 2024. The dairy industry supported 43,339 direct jobs in 2023, growing to 45,436 in 2024.

Table 3.3 Direct Economic Impacts of the California Dairy Industry in 2023 and 2024.

<i>Impact Measure</i>	<i>Dairy Farming</i>		<i>Dairy Processing</i>		<i>Total Impacts</i>	
			<i><u>\$ millions</u></i>			
	<u>2023</u>	<u>2024</u>	<u>2023</u>	<u>2024</u>	<u>2023</u>	<u>2024</u>
Value of Sector Output			28,325	29,081	28,325	29,081
Labor Income	1,148	1,235	2,738	2,812	3,886	4,047
Value Added	2,532	2,715	4,940	5,072	7,472	7,787
			<i><u>Number of Jobs</u></i>			
Employment	18,818	20,250	24,521	25,176	43,339	45,436

Source: The dairy farming information is from Table 3.1. The dairy processing information is from Table 3.2. This table sums those values as explained in the text.

Table 3.4 presents multipliers by processed product category for a more detailed analysis of economy-wide effects. The ripple effects of the dairy industry differ depending on the milk products being produced. We use the multipliers together with the direct values of output in each subindustry to derive direct, indirect, induced, and total impacts for output, labor income, value added, and employment by subindustry.

Table 3.4 Impact Multipliers for California Dairy Processing Industry by Sector for Cheese, Fluid Milk, Butter and Dry Products, and Ice Cream Manufacturing, in 2023

<i>Multiplier</i>	<i>Cheese</i>	<i>Fluid Milk</i>	<i>Butter and Dry Products</i>	<i>Ice Cream</i>
Value of Output	<i>\$ of output of the economy per \$1.00 output of the dairy sector</i>			
Direct Effect	1.00	1.00	1.00	1.00
Indirect Effect	1.11	1.18	1.04	0.92
Induced Effect	0.26	0.33	0.27	0.33
Total Effect	2.38	2.51	2.31	2.25
Labor Income	<i>Labor income per \$1.00 output of the dairy sector</i>			
Direct Effect	0.08	0.13	0.08	0.17
Indirect Effect	0.24	0.27	0.25	0.24
Induced Effect	0.09	0.11	0.09	0.11
Total Effect	0.41	0.52	0.42	0.52
Value Added	<i>GSP(\$) per \$1.00 of output</i>			
Direct Effect	0.14	0.19	0.20	0.23
Indirect Effect	0.43	0.48	0.43	0.40
Induced Effect	0.17	0.21	0.18	0.22
Total Effect	0.75	0.89	0.80	0.85
Employment	<i>Jobs per \$1 million of output</i>			
Direct Effect	0.61	1.22	0.79	2.31
Indirect Effect	3.01	3.26	2.78	2.56
Induced Effect	1.27	1.58	1.29	1.60
Total Effect	4.89	6.07	4.96	6.47

Source: Multipliers were generated in IMPLAN using revenue and cost data contained within the IMPLAN database for 2023.

Tables 3.5 and 3.6 show economic impacts for each processing subindustry in 2023 and 2024. Since the results are similar, we will focus our discussion on the 2024 results.

Table 3.6 shows that cheese manufacturing had a direct output of \$12.7 billion in 2024, which was the highest among the four product categories, followed by butter-power manufacturing with \$8.9 billion, fluid milk (and soft product) manufacturing with \$6.2 billion, and ice cream manufacturing with \$1.36 billion. The value of output for the subindustries, after adding indirect and induced effects, is: \$30.1 billion for cheese, \$20.6 billion for butter-power, \$15.6 billion for fluid milk (and soft products), and \$3.1 billion for ice cream.

Total labor income differs across subindustries roughly in proportion with the value of output, with the indirect effects much larger than the direct effects, except for ice cream manufacturing, which is particularly direct-labor intensive. Butter-powder manufacturing uses relatively little direct labor but has a large indirect labor component.

Value added also differs across subindustries roughly in proportion to output. Considering the total value added effects, cheese manufacturing contributed \$9.5 billion in 2024, butter-powder manufacturing contributed \$7.1 billion, fluid milk manufacturing contributed \$5.5 billion, and ice cream contributed \$1.15 billion to value added in 2024

For cheese and, especially, butter-powder manufacturing, the numbers of indirect and induced jobs were both much larger than the numbers of direct jobs. This is less true for fluid milk and, especially, ice cream manufacturing, which are more direct-labor-intensive. In 2024, the total jobs were 61,910 for cheese, 44,351 for butter-powder, 37,637 for fluid milk, and 8,826 for ice cream manufacturing.

Table 3.5 Economic Impacts of the California Dairy Processing by Sector for Cheese, Fluid Milk, Butter and Dry Products, and Ice Cream Manufacturing, in 2023

<i>Impact Measure</i>	<i>Cheese</i>	<i>Fluid Milk</i>	<i>Butter and Dry Products</i>	<i>Ice Cream</i>
Value of Sector Output	<u><i>\$ million</i></u>			
Direct Output	12,037	5,765	9,296	1,227
Indirect Output	13,409	6,809	9,627	1,126
Induced Output	3,189	1,901	2,513	410
Total Output	28,635	14,474	21,436	2,764
Labor Income				
Direct Labor Income	991	768	770	210
Indirect Labor Income	2,906	1,556	2,302	292
Induced Labor Income	1,096	654	864	141
Total Labor Income	4,993	2,977	3,935	643
Value Added				
Direct Value Added	1,718	1,116	1,821	285
Indirect Value Added	5,206	2,784	3,972	485
Induced Value Added	2,076	1,238	1,636	267
Total Value Added	8,999	5,137	7,428	1,037
Employment	<u><i>Number of Jobs</i></u>			
Direct Employment	7,329	7,061	7,298	2,833
Indirect Employment	36,251	18,809	26,808	3,146
Induced Employment	15,272	9,105	12,032	1,965
Total Employment	58,853	34,975	46,139	7,943

Source: Values were generated in IMPLAN using gross revenue data contained within the IMPLAN database. Note: Indirect, induced, and total effects of dairy manufacturing sectors would include effects of milk purchased from California dairies.

Table 3.6 Economic Impacts of the California Dairy Processing by Sector for Cheese, Fluid Milk, Butter and Dry Products, and Ice Cream Manufacturing, in 2024

<i>Impact Measure</i>	<i>Cheese</i>	<i>Fluid Milk</i>	<i>Butter and Dry Products</i>	<i>Ice Cream</i>
Value of Sector Output	<u>\$ million</u>			
Direct Output	12,662	6,203	8,852	1,364
Indirect Output	14,105	7,327	9,296	1,252
Induced Output	3,355	2,046	2,413	456
Total Output	30,122	15,576	20,560	3,071
Labor Income				
Direct Labor Income	1,043	826	724	233
Indirect Labor Income	3,057	1,674	2,225	325
Induced Labor Income	1,153	703	830	157
Total Labor Income	5,253	3,204	3,779	714
Value Added				
Direct Value Added	1,807	1,201	1,707	317
Indirect Value Added	5,476	2,995	3,828	539
Induced Value Added	2,183	1,332	1,571	297
Total Value Added	9,467	5,528	7,105	1,153
Employment	<u>Number of Jobs</u>			
Direct Employment	7,710	7,599	6,888	3,147
Indirect Employment	38,135	20,240	25,909	3,495
Induced Employment	16,066	9,798	11,554	2,183
Total Employment	61,910	37,637	44,351	8,826

Source: Projections of 2024 impacts were estimated using total output by California dairy processors in 2024 multiplied by the 2023 IMPLAN multipliers. Note: Indirect, induced, and total effects of dairy manufacturing sectors would include effects linked to the purchase of milk from California dairies. The horizontal sum of the columns, other than direct output, does not equal the totals in Table 3.2 because in Table 3.2, multipliers are weighted averages across processing sectors are weighted averages using 2023 weights.

3.2 Contributions of the California Dairy Industry to Taxes

Using the IMPLAN model and data, we can estimate tax payments supported by the California dairy industry. IMPLAN identifies taxes in four broad categories: payroll taxes, taxes on production and imports, corporate income taxes, and household taxes paid by employees. Each of these tax categories represents a subset of the value-added. For example, payroll taxes, which include social security payments, Medicare payments, unemployment insurance, and all other employee-related payments, are included in labor income, which is a subset of value added. Likewise, the payment of taxes by employees, including personal income taxes, driver's license taxes and motor vehicle registration, and personal property taxes, is also part of worker income and therefore a component of value added. Taxes on production and imports are also part of value added and include sales tax, all excise taxes, business property taxes, and any business license or permit fees. Corporate income taxes are also a part of value added. As with other economic impacts, tax payments supported by the California dairy industry can be identified as direct, indirect, and induced effects.

In 2023, farm milk production in California generated direct U.S. federal tax payments totaling \$285 million and local and California state taxes of \$113 million for a total direct tax impact of \$398 million (Table 3.7). In 2024, the total direct contribution to taxes by California dairy farms increased to \$415 million, with about \$290 million going to direct federal taxes and \$125 million to state and local taxes (Table 3.8). Of the total direct tax impact, about 40% came from personal income taxes, property taxes, and other non-tax government payments by dairy farm workers and proprietors in each of the past two years (Tables 3.7 and 3.8).

Table 3.7 Direct Impact on State and Local Taxes, and U.S. Taxes from California Dairy Farming in 2023

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ Millions</i>			
Payroll Taxes	86	3	88
Tax on Production and Imports	3	77	81
Corporate Income Tax	59	30	89
Tax Paid by Employees	137	3	139
Total Tax Paid	285	113	398

Source: IMPLAN using estimates of 2023 California dairy farming revenue.

Note: Payroll taxes include social security, Medicare, unemployment insurance, and all other employee-related taxes. Tax on production and imports includes excise, sales, and property taxes, fees and fines, and licenses and permits. Tax paid by employees includes personal income taxes, property taxes, motor vehicle license and registration, and all other non-tax payments to local, state, and federal governments.

Table 3.8 Direct Impact on State and Local Taxes, and U.S. Taxes from California Dairy Farming in 2024

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ Millions</i>			
Payroll Taxes	85	3	88
Tax on Production and Imports	4	86	90
Corporate Income Tax	66	34	100
Tax Paid by Employees	135	2	138
Total Tax Paid	290	125	415

Source: IMPLAN using estimates of 2024 California dairy farming revenue.

Note: For detailed tax definitions, see note to table 3.08.

Including the indirect and induced effects, the total tax contribution from California dairy farms in 2023 was about \$1.53 billion (Table 3.9). This increased in 2024 to about \$1.63 billion (Table 3.10).

Table 3.9 Total Impact on State and Local Taxes, and U.S. Taxes from California Dairy Farming in 2023

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ million</i>			
Payroll Taxes	345	13	358
Tax on Production and Imports	24	544	568
Corporate Income Tax	124	64	187
Tax Paid by Employees	403	8	411
Total Tax Paid	896	629	1,525

Source: IMPLAN. Note: For detailed tax definitions, see note to Table 3.08.

Table 3.10: Total Impact on State and Local Taxes, and U.S. Taxes from California Dairy Farming in 2024

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ million</i>			
Payroll Taxes	364	14	378
Tax on Production and Imports	26	590	616
Corporate Income Tax	135	70	205
Tax Paid by Employees	422	8	431
Total Tax Paid	947	682	1,629

Source: IMPLAN using estimates of 2024 California dairy farming revenue.

Note: For detailed tax definitions, see note to Table 3.08.

Tables 3.11 and 3.12 show the direct impacts on federal and state taxes from dairy processing in California in 2023 and 2024. In 2023, economic activity in the dairy processing sectors generated a direct tax contribution of \$1.065 billion, which grew to \$1.018 billion in 2024. In 2024, \$718 million was paid in federal taxes, with \$318 million coming from payroll tax payments for Social Security, Medicare, and unemployment insurance. California state and local direct taxes from dairy processing were \$372 million in 2023 and increased to \$400 million in 2024.

Table 3.11 Direct Impact on State and Local Taxes, and U.S. Taxes from California Dairy Processing in 2023

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ million</i>			
Payroll Taxes	308	14	322
Tax on Production and Imports	13	308	322
Corporate Income Tax	86	44	130
Tax Paid by Employees	286	6	292
Total Tax Paid	693	372	1,065

Source: Data produced using the IMPLAN model of California dairy processing sectors in 2023.
Note: For detailed tax definitions, see note to Table 3.08.

Table 3.12 Direct Impact on State and Local Taxes, and U.S. Taxes from California Dairy Processing in 2024

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ Million</i>			
Payroll Taxes	318	14	332
Tax on Production and Imports	15	333	348
Corporate Income Tax	90	46	136
Tax Paid by Employees	296	6	302
Total Tax Paid	718	400	1,118

Source: Data produced using the IMPLAN model with projected values for 2024.
Note: For detailed tax definitions, see note to Table 3.08.

Tables 3.13 and 3.14 show that the total tax revenues linked to the California dairy industry were about \$5.04 billion in 2023 and increased to \$5.23 billion in 2024. Total tax contributions include all direct, indirect, and induced taxes generated from dairy farming and dairy processing in California in 2023 and 2024.

Table 3.13 Total Impact on State and Local Taxes, and U.S. Taxes from California Dairy Processing in 2023

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ Millions</i>			
Payroll Taxes	1,318	55	1,374
Tax on Production and Imports	72	1,649	1,720
Corporate Income Tax	380	196	575
Tax Paid by Employees	1,349	27	1,376
Total Tax Paid	3,118	1,927	5,045

Source: Data produced using the IMPLAN model of California dairy processing sectors in 2023.
Note: For detailed tax definitions, see note to Table 3.08.

Table 3.14 Total Impact on State and Local Taxes, and U.S. Taxes from California Dairy Processing in 2024

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ millions</i>			
Payroll Taxes	1,354	57	1,410
Tax on Production and Imports	75	1,732	1,807
Corporate Income Tax	398	205	602
Tax Paid by Employees	1,385	28	1,413
Total Tax Paid	3,211	2,022	5,233

Source: Data produced using the IMPLAN model of California dairy processing sectors in 2023 and projected values for 2024.

Note: For detailed tax definitions, see note to Table 3.08.

3.3 Contributions of North Coast Dairy Farming and Processing to the California Economy

A small but important segment of the California dairy industry is located in the North Coast in Marin, Sonoma, and Humboldt Counties, and to a smaller extent, Mendocino County. This region was the origin of the California commercial dairy industry, dating back to the middle of the 19th Century. In the 21st century, the region focuses on organic farm practices and the production of specialty dairy products, such as artisanal cheeses, that command relatively high prices. Herd sizes are small by California standards, and because of organic practices and high feed costs, average milk production per cow is lower than the California average, which is mostly driven by other regions of the state.

Table 3.15 presents information about the North Coast dairy farm and economic impacts for 2023 and 2024. In 2024, the direct farm milk value of output was \$166 million, direct farm labor compensation was \$29 million, direct value added was \$43 million, and direct farm employment was 537 jobs. The value of milk output was about 1.9% of the California total reported in Table 3.1, whereas the share of direct employment was twice as large (3.94%) because organic and North Coast practices, with much smaller herds and pasture forage, are more labor-intensive. Including direct, indirect, and induced effects, North Coast dairy farms contribute \$94 million to the regional value added and 991 jobs.

Farm milk, including organic milk, in the North Coast counties is processed into fluid milk products, cheese, and ice cream products that generated \$884 million in value in 2024 (see the top row of the right-most column of Table 3.16). Because there is little or no processing of farm milk into butter or milk powders in the region, Table 3.16 has no column for the butter-powder category.

For regional processing in 2024, direct labor income was \$91 million, direct value added was \$142 million, and direct employment was 991 jobs. Including indirect and induced effects, the contribution to regional value added was \$370 million, and the contribution to regional employment was 3,045 jobs in 2024 (Table 3.16).

Table 3.15 Impact Multipliers and Contributions of North Coast Dairy Farms to the California Economy in 2023 and 2024

<i>Multiplier</i>	<i>Impact Multipliers</i>	<i>2023 Contributions</i>	<i>2024 Contributions</i>
Value of Output	<i>\$ of output per \$1.00 output</i>	<i>\$ millions</i>	
Direct Effect	1.00	156	166
Indirect Effect	0.38	59	62
Induced Effect	0.15	23	25
Total Effect	1.53	238	253
Labor Income	<i>Labor income per \$1.00 output</i>		
Direct Effect	0.17	27	29
Indirect Effect	0.14	22	24
Induced Effect	0.05	8	9
Total Effect	0.37	58	62
Value Added	<i>GDP(\$) per \$1.00 of output</i>		
Direct Effect	0.26	41	43
Indirect Effect	0.20	32	34
Induced Effect	0.10	16	17
Total Effect	0.57	88	94
Employment	<i>Jobs per \$ million of output</i>	<i>Number of Jobs</i>	
Direct Effect	3.24	506	537
Indirect Effect	1.97	308	327
Induced Effect	0.77	120	127
Total Effect	5.98	933	991

Source: Multipliers were generated in IMPLAN using revenue and costs data contained in IMPLAN for dairy farming and dairy processing in the North Coast Region of California. Projections of 2024 contributions were estimated using the value of regional farm milk production in 2024 and the 2023 IMPLAN database for multipliers.

Table 3.16 Economic Impacts of the North Coast California Processing by Sector for Cheese, Fluid Milk, and Ice Cream Manufacturing, and for Total Processing in 2023 and 2024

<i>Impact Measure</i>	<i>Cheese</i>		<i>Fluid Milk</i>		<i>Ice Cream</i>		<i>Total Processing</i>	
	<u>2023</u>	<u>2024</u>	<u>2023</u>	<u>2024</u>	<u>2023</u>	<u>2024</u>	<u>2023</u>	<u>2024</u>
Value of Sector Output	<u><i>\$1,000,000</i></u>							
Direct Output	444	468	366	389	3	28	814	884
Indirect Output	185	194	189	201	25	11	399	406
Induced Output	39	42	46	49	10	3	95	94
Total Output	669	703	602	639	38	42	1,308	1,384
Labor Income								
Direct Labor Income	35	36	47	50	1	4	83	91
Indirect Labor Income	50	53	53	56	4	3	107	113
Induced Labor Income	14	15	16	17	3	1	33	33
Total Labor Income	99	104	116	124	8	9	223	237
Value Added								
Direct Value Added	60	63	69	73	2	6	131	142
Indirect Value Added	74	78	77	82	5	5	157	165
Induced Value Added	27	28	31	33	4	2	62	63
Total Value Added	160	169	178	189	12	13	350	370
Employment	<u><i>Number of Jobs</i></u>							
Direct Employment	425	447	451	479	59	65	892	991
Indirect Employment	727	765	726	771	33	37	1,511	1,573
Induced Employment	202	212	236	251	16	18	471	481
Total Employment	1,353	1,424	1,413	1,501	108	120	2,874	3,045

Source: Multipliers were generated in IMPLAN using revenue and costs data contained in IMPLAN for dairy farming and dairy processing in the North Coast Region of California. Projections of 2024 contributions were estimated using the value of regional dairy farm production in 2024 and the 2023 IMPLAN database for multipliers.

3.4 Contribution of Dairy Farming and Processing to the San Joaquin Valley of California

Dairy farms in the California San Joaquin Valley (SVJ) produced milk valued at about \$8.2 billion, contributing \$2.5 billion to direct value added, and 18,399 direct jobs (Table 3.17).

Table 3.17 Impact Multipliers and Contributions of San Joaquin Valley Dairy Farms to the California Economy in 2023 and 2024

<i>Multiplier</i>	<i>Impact Multipliers</i>	<i>2023 Contributions</i>	<i>2024 Contributions</i>
Value of Output	<i>\$ of output per \$1.00 output</i>	<i>\$ millions</i>	
Direct Effect	1.00	7,573	8,150
Indirect Effect	0.78	5,889	6,338
Induced Effect	0.28	2,107	2,268
Total Effect	2.06	15,570	16,755
Labor Income	<i>Labor income per \$1.00 output</i>		
Direct Effect	0.14	1,043	1,122
Indirect Effect	0.20	1,524	1,641
Induced Effect	0.10	725	780
Total Effect	0.43	3,292	3,543
Value Added	<i>GSP(\$) per \$1.00 of output</i>		
Direct Effect	0.30	2,292	2,466
Indirect Effect	0.34	2,611	2,810
Induced Effect	0.18	1,372	1,476
Total Effect	0.83	6,275	6,752
Employment	<i>Jobs per \$1 million of output</i>	<i>Number of Jobs</i>	
Direct Effect	2.26	17,098	18,399
Indirect Effect	2.51	19,015	20,462
Induced Effect	1.33	10,102	10,871
Total Effect	6.10	46,214	49,732

Source: Multipliers were generated in IMPLAN using revenue and cost data contained within the IMPLAN 2023 database. Projections of 2024 contributions were estimated using total output by California dairy sectors in 2024 and the 2023 IMPLAN multipliers.

The total 2024 value-added impact, including direct, indirect, and induced effects, was \$6.75 billion, of which \$3.54 billion was labor income. The total jobs created in 2024, including indirect and induced jobs, were 49,732.

The SJV processed milk output was valued at about \$19 billion in 2024 (Table 3.18). The direct value added was \$3.16 billion, of which \$1.74 billion was labor income. Total effects for the SJV dairy industry, which includes dairy farming, were a contribution of \$15 billion to regional value added and support for 98,370 jobs in 2024.

Table 3.18 Impact Multipliers and Contributions of San Joaquin Valley Dairy Processors to the California Economy in 2023 and 2024

<i>Multiplier</i>	<i>Impact Multipliers</i>	<i>2023 Contributions</i>	<i>2024 Contributions</i>
Value of Output	<i>\$ of output per \$1.00 output</i>	<i>\$ millions</i>	
Direct Effect	1.00	18,425	18,952
Indirect Effect	1.10	20,292	20,987
Induced Effect	0.28	5,153	5,323
Total Effect	2.38	43,869	45,262
Labor Income	<i>Labor income per \$1.00 output</i>		
Direct Effect	0.09	1,690	1,743
Indirect Effect	0.25	4,608	4,763
Induced Effect	0.10	1,772	1,830
Total Effect	0.44	8,069	8,336
Value Added	<i>GDP(\$) per \$1.00 of output</i>		
Direct Effect	0.17	3,095	3,155
Indirect Effect	0.44	8,111	8,380
Induced Effect	0.18	3,354	3,465
Total Effect	0.79	14,560	15,000
Employment	<i>Jobs per \$ million of output</i>	<i>Number of Jobs</i>	
Direct Effect	0.81	14,836	15,314
Indirect Effect	3.02	55,655	57,563
Induced Effect	1.34	24,676	25,493
Total Effect	5.17	95,167	98,370

Source: Multipliers were generated in IMPLAN using revenue and cost data contained within the IMPLAN 2023 database. Projections of 2024 contributions were estimated using total output by California dairy sectors in 2024 and the 2023 IMPLAN multipliers. Note: Projections of 2024 impacts were estimated using the output of dairy sectors in 2024 multiplied by the 2023 IMPLAN multipliers. Indirect, induced, and total effects of dairy manufacturing would include the effects of milk purchased from California dairies.

Turning to the subindustries within dairy product processing, the San Joaquin Valley produces about \$9.7 billion of California cheese value, about \$2.7 billion of fluid milk value, \$5.9 billion of butter and milk powder value, and \$0.73 billion of ice cream value (Table 3.20). Cheese and butter-powder plants account for about 90 percent of SJV value added by dairy processing, but about 78% of the jobs, because fluid milk and ice cream processing are more labor intensive.

Table 3.19 Economic Impacts of the San Joaquin Valley Dairy Processing by Sector for Cheese, Fluid Milk, Butter and Dry Products, and Ice Cream Manufacturing, in 2023

<i>Impact Measure</i>	<i>Cheese</i>	<i>Fluid Milk</i>	<i>Butter and Dry Products</i>	<i>Ice Cream</i>
Value of Sector Output	<u>\$ millions</u>			
Direct Output	9,186	2,463	6,115	661
Indirect Output	10,233	2,910	6,543	606
Induced Output	2,434	812	1,686	221
Total Output	21,853	6,186	14,343	1,488
Labor Income				
Direct Labor Income	757	328	493	113
Indirect Labor Income	2,217	665	1,568	157
Induced Labor Income	837	279	580	76
Total Labor Income	3,811	1,272	2,640	346
Value Added				
Direct Value Added	1,311	477	1,153	154
Indirect Value Added	3,973	1,190	2,688	261
Induced Value Added	1,584	529	1,097	144
Total Value Added	6,868	2,195	4,938	558
Employment	<u>Number of Jobs</u>			
Direct Employment	5,593	3,018	4,700	1,525
Indirect Employment	27,666	8,038	18,258	1,693
Induced Employment	11,655	3,891	8,073	1,058
Total Employment	44,914	14,946	31,031	4,276

Source: Values were estimated using the IMPLAN 2023 database. Note: Indirect, induced, and total effects of dairy manufacturing sectors would include effects linked to the purchase of milk from California dairies.

Table 3.20 Economic Impacts of the San Joaquin Valley Dairy Processing by Sector for Cheese, Fluid Milk, Butter and Dry Products, and Ice Cream Manufacturing, in 2024

<i>Impact Measure</i>	<i>Cheese</i>	<i>Fluid Milk</i>	<i>Butter and Dry Products</i>	<i>Ice Cream</i>
Value of Sector Output	<u><i>\$1,000,000</i></u>			
Direct Output	9,663	2,651	5,903	734
Indirect Output	10,764	3,131	6,418	674
Induced Output	2,560	874	1,643	245
Total Output	22,988	6,656	13,965	1,653
Labor Income				
Direct Labor Income	796	353	469	125
Indirect Labor Income	2,333	716	1,540	175
Induced Labor Income	880	301	565	84
Total Labor Income	4,009	1,369	2,574	385
Value Added				
Direct Value Added	1,379	513	1,092	171
Indirect Value Added	4,179	1,280	2,631	290
Induced Value Added	1,666	569	1,070	160
Total Value Added	7,225	2,362	4,793	620
Employment	<u><i>Number of Jobs</i></u>			
Direct Employment	5,884	3,247	4,489	1,694
Indirect Employment	29,103	8,650	17,930	1,882
Induced Employment	12,261	4,187	7,870	1,175
Total Employment	47,247	16,084	30,288	4,751

Source: Values were estimated by UC AIC staff by applying dairy industry input-output multipliers generated in IMPLAN and using gross revenue data contained within the IMPLAN database. Note: Indirect, induced, and total effects of dairy manufacturing sectors would include effects linked to the purchase of milk from California dairies.

Table 3.21 shows the contribution of the local dairy industry to total San Joaquin Valley value added and employment. Direct dairy value added of \$2.095 billion accounted for about 1.2% of SJV value added in 2023. However, recognizing indirect and induced effects shows that the SJV dairy industry contributed about 5.8% to the San Joaquin Valley economy. The 95,167 jobs created by the dairy industry through direct, indirect, and induced effects supported about 4.3% of jobs in the San Joaquin Valley in 2023 (Table 3.21).

Table 3.21 Dairy Industry Share of Total Gross Regional Product and Employment for the San Joaquin Valley Economy, in 2023

Economic Measure	Dairy Industry Contribution (Table 3.18)	Total San Joaquin Valley Economy	Dairy Industry Share of SJV Total
Value Added		<i>\$ millions</i>	
Direct	3,095		1.2%
Total	14,560	249,510	5.8%
Employment		<i>Number of jobs</i>	
Direct	14,836		0.07%
Total	95,167	2,183,704	4.3%

Source: Dairy industry contribution values were estimated applying dairy industry input-output multipliers generated in IMPLAN (Table 3.18). Total San Joaquin Valley value added and employment are estimated for 2023 using the IMPLAN database.

Tables 3.22 and 3.23 show taxes paid by SJV dairy farms in 2023 and 2024. In 2024, SJV dairy farms paid \$263 million in federal taxes and another \$114 in state and local taxes for a total of \$377 million (Table 3.23). Tables 3.24 and 3.25 show the taxes paid by the SJV dairy processing industry in 2023 and 2024. In 2024, SJV dairy processing paid \$464 million in federal taxes and another \$249 million in state and local taxes, for a total of \$713 million. (Table 3.25).

Table 3.22 Direct Impact on State and Local Taxes, and U.S. Taxes from San Joaquin Valley Dairy Farming, in 2023

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ millions</i>			
Payroll Taxes	78	2	80
Tax on Production and Imports	3	70	73
Corporate Income Tax	54	28	81
Tax Paid by Employees	124	2	127
Total Tax Paid	259	102	361

Source: IMPLAN using 2023 California dairy farming revenue.

Note: Payroll taxes include social security, Medicare, unemployment insurance, and all other employee-related taxes. Tax on production and imports includes excise, sales, and property taxes, fees and fines, and licenses and permits. Tax paid by employees includes personal income taxes, property taxes, motor vehicle license and registration, and all other non-tax payments to local, state, and federal governments.

Table 3.23 Direct Impact on State and Local Taxes, and U.S. Taxes from San Joaquin Valley Dairy Farming, in 2024

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ millions</i>			
Payroll Taxes	77	2	80
Tax on Production and Imports	3	78	82
Corporate Income Tax	60	31	91
Tax Paid by Employees	123	2	125
Total Tax Paid	263	114	377

Source: Source: IMPLAN using projected 2024 California dairy farming revenue.

Note: (See table 3.22.)

Table 3.24 Direct Impact on State and Local, and U.S. Taxes from San Joaquin Valley Dairy Processing, in 2023

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ millions</i>			
Payroll Taxes	200	9	209
Tax on Production and Imports	9	200	209
Corporate Income Tax	56	29	84
Tax Paid by Employees	186	4	190
Total Tax Paid	451	242	693

Source: IMPLAN using estimates of 2023 California dairy farming revenue.

Note: (See Table 3.22.)

Table 3.25 Direct Impact on State and Local, and U.S. Taxes from San Joaquin Valley Dairy Processing, in 2024

Type of Tax	Federal Tax	State and Local Tax	Total Tax
<i>\$ Millions</i>			
Payroll Taxes	206	9	215
Tax on Production and Imports	9	206	215
Corporate Income Tax	57	30	87
Tax Paid by Employees	192	4	196
Total Tax Paid	464	249	713

Source: IMPLAN using projected 2024 California dairy processing revenue.

Note: (See Table 3.22)

Concluding Remarks

Despite difficult economic circumstances in recent years, the California dairy industry continues to make vital and growing contributions to the California economy. The industry also contributes widespread nutritional and social benefits for consumers, producers, and communities in California and in myriad places where California dairy products are available.

We find that, in 2024, California dairy farming and processing contributed \$23.2 billion to California's Gross State Product and supported 151,859 California jobs. These contributions to the California economy depend on an economically sustainable California dairy industry. Given California's size and the location of dairy farming areas, viable farm milk production in California depends on processing in the state. Likewise, the processing industry needs California milk production to remain economically viable. Hence, economic factors that foster or limit either of these initial links in the California dairy supply chain have vital effects on the whole industry. In California, dairy farms and processing operations are inseparable.

Although its economic effects are statewide, the dairy industry is particularly important in the San Joaquin Valley. Environmental, resource, farm labor, and regulatory issues are critical concerns, and the dairy industry is central to those concerns. With \$15 billion in SJV value added and 98,370 Valley jobs at stake, how the resolution of concerns affects the dairy industry is worthy of careful consideration.

In addition to the economic impacts we have documented, California milk production and processing contribute to state, national, and global health and well-being by offering healthful, nutritious, and enjoyable products to consumers everywhere. Although this report has focused on traditional and well-developed measures of economic impacts, it is important to remember that consumers are the major beneficiaries of affordable California dairy products.

The California dairy industry is one of the most efficient, competitive, and successful producers of milk products in the world. Because California milk is competitive in markets around the globe, hundreds of millions of consumers have the opportunity to enjoy California dairy products directly and as ingredients in a huge variety of products. These consumer benefits are the most important contribution of the dairy industry. The economic health of the dairy industry is vital to the economy in California and dairy product consumers, both locally and globally.