

# The Measure of California Agriculture

## CHAPTER 5

### Agricultural Issues Center

#### Agriculture's role in the economy

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- 5-7.....The direct economic contribution of agriculture
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California farmers constitute an essential part of the state economy. As early chapters document, farm production is itself large and dynamic. Furthermore, farm production is closely linked to many other industries: the production of farm inputs, the processing of food and beverages, the textile industry, transportation and financial services. Including multiplier effects, California farm and closely related processing industries employ 7.3 percent of the state's private sector labor force and account for 5.6 percent of the state labor income. Every dollar of value added—labor and property income and indirect business taxes—in farming and agricultural related industries generates an additional \$1.27 in the state economy. For every 100 jobs in agriculture, including the food industry, there are 94 additional jobs created throughout the state. California agriculture is also large on a global scale. Depending on the method applied to measure the value of agriculture here and elsewhere, California ranks between 5th and 9th in the world, ahead of such countries as Canada, Mexico, Germany and Spain.

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## The contribution of agriculture to the California gross state product

California farms have a significant direct effect on the state's economy. According to the U.S. Bureau of Economic Analysis, California's gross state product (GSP), the value added by all industries in the state, was \$1,438 billion in 2003. At \$21 billion (Table 5.1), agriculture (farming), forestry, fishing, hunting, and support services accounted for 1.45 percent of the California GSP.

Determining the share and role of agriculture in California's economy depends in part on how agriculture is defined. Many industries are related to farm production in general, but the degree of linkage varies. From a very broad perspective, about 90,000 commercial establishments (in addition to farms) in California are related to agricultural production (Table 5.2). Within this group, some industries such as food and beverage manufacturing, are closely linked to local farming, but others, such as restaurants, may be only weakly related to local farm production. While food retailing depends on food production, it does not usually depend much on local production. Food produced in California is sold worldwide and food retailing occurs even in places where local food production is minor.

With more than \$61 billion in sales, the California food, beverage and tobacco manufacturing industry employs nearly 200,000 workers. There are 4,661 establishments in the state that process farm products to produce foods, beverages and tobacco. The bakery and tortilla manufacturing group has the largest number of establishments (39%) and employees (22%), but the beverage industry is the largest in sales (24%) (Table 5.3). Wineries account for most of the beverage sales value (fluid milk processing is included with dairy products).

California food, beverage and tobacco manufacturing establishments account for 15 percent of these U.S. establishments and 11 percent of U.S. sales (Table 5.4). California's shares of U.S. sales in the fruit and vegetable preserving, dairy products, bakeries and tortilla, and beverage production subsectors are all larger than the state's share of the agricultural and beverage processing sector as a whole.

TABLE 5.1  
California gross state product by industry, 2003

	Compen- sation to employees <sup>a</sup>	Taxes on production & imports <sup>b</sup>	Gross operating surplus <sup>c</sup>	Value added <sup>d</sup>
(\$ million)				
Agriculture <sup>e</sup>	9,304	-1,698	13,228	20,835
Crop and animal production (farms)	4,701	-1,834	11,192	14,059
Mining and utilities	7,412	5,285	21,666	34,365
Manufacturing and construction	152,307	6,438	66,615	225,361
Food and beverages manufacturing	9,601	3,056	4,168	16,824
Wholesale trade	41,127	21,411	19,370	81,908
Retail trade	55,315	22,613	26,529	104,458
Transportation and warehousing <sup>f</sup>	21,544	854	11,350	33,748
Information, finance and insurance	99,168	6,651	80,121	185,939
Real estate, rental, and leasing	13,408	20,165	190,290	223,864
Professional and management services	97,573	1,300	40,029	138,903
Administrative and waste services	30,270	859	11,056	42,185
Educational services	9,674	155	407	10,236
Health care and social assistance	62,096	1,154	21,525	84,775
Arts, entertainment, and recreation	12,199	503	5,966	18,668
Accommodation and food services	23,286	3,876	9,895	37,057
Other services, except government	22,584	2,451	10,473	35,508
Subtotal private industries	657,269	92,018	528,522	1,277,809
Government	147,740	-2,289	14,875	160,326
Total gross state product <sup>g</sup>	805,009	89,728	543,397	1,438,134

Source: U.S. Department of Commerce, Bureau of Economic Analysis, [www.bea.gov/bea/regional/gsp](http://www.bea.gov/bea/regional/gsp)

<sup>a</sup> Compensation of employees is the sum of employee wages and salaries and supplements to wages and salaries. Wages and salaries are measured on an accrual, or "when earned" basis, which may be different from the measure of wages and salaries on a disbursement, or "when paid" basis. Wages and salaries and supplements of federal military and civilian government employees stationed abroad are excluded from the measure of GSP.

<sup>b</sup> Taxes on production and imports consist of tax liabilities, such as general sales and property taxes that are chargeable to business expense in the calculation of profit-type incomes. Also included are special assessments. This figure is the sum of state and local taxes — which are primarily nonpersonal property taxes, licenses, and sales and gross receipts taxes — and federal excise taxes on goods and services. Negative values for agriculture are taxes net of direct government subsidy.

<sup>c</sup> Gross operating surplus is a value derived as a residual for most industries after subtracting total intermediate inputs, compensation of employees, and taxes on production and imports less subsidies from total industry output. Gross operating surplus includes consumption of fixed capital (CFC), proprietors' income, corporate profits, and business current transfer payments (net). Prior to 2003, it was referred to as other value added or property-type income.

<sup>d</sup> Value added is equal to the sum of compensation to employees, taxes on production of inputs, and gross operating surplus.

<sup>e</sup> Agriculture includes farm production, forestry, fishing, hunting, and support services such as soil preparation, planting, harvesting, and management, on a contract or fee basis.

<sup>f</sup> Not including U.S. Postal Service.

<sup>g</sup> Gross state product (GSP) is the sum of value added by labor and capital in all industries located in the state.

TABLE 5.2  
California's agriculture-related industries, 2002

	Establishments	Sales (\$ million)	Payroll (\$ million)	Employees
Food, beverages and tobacco mfg.	4,661	61,615	6,515	196,508
Textile mills	491	1,753	361	13,170
Wood product mfg.	1,337	6,061	1,142	39,490
Paper mfg.	560	8,587	1,226	29,379
Pesticide, fertilizer and other chemical mfg.	96	668	77	2,020
Farm machinery and equipment mfg.	104	284	60	1,729
Food product machinery mfg.	73	238	69	1,616
Grocery and related product wholesale	5,397	69,228	4,033	108,585
Farm products raw materials wholesale	320	2,884	93	2,498
Alcoholic beverage wholesale	511	12,071	942	18,843
Grocery stores, supermarkets and convenience stores	9,928	55,956	6,407	263,645
Specialty food stores	2,981	2,008	287	17,886
Beer, wine and liquor stores	3,236	2,279	163	10,156
Full-service restaurants	23,277	18,580	6,045	440,944
Limited-service eating places	29,983	18,633	4,771	428,313
Special food services	3,050	2,771	834	50,538
Drinking places (alcoholic beverages)	3,769	1,372	327	30,996
<b>Total agriculture-related industries</b>	<b>89,774</b>	<b>264,988</b>	<b>33,353</b>	<b>1,656,316</b>
Total California, not including farming, government, railroad and employed sectors <sup>a</sup>	820,997	N/A	510,841	12,856,426

Source: U.S. Department of Commerce, Census Bureau, Economic Census, 2002,  
[http://www.census.gov/econ/census02/data/ca/CA000\\_31.HTM](http://www.census.gov/econ/census02/data/ca/CA000_31.HTM) and County Business Patterns.

<sup>a</sup> This total is from the Census Bureau County Business Patterns.

TABLE 5.3  
California food, beverage and tobacco manufacturing industry, 2002

	Establishments	Sales	Payroll <sup>a</sup>	Employees
		(\$ million)	(\$ million)	
Manufacturing industry				
Animal feed <sup>b</sup>	147	3,077	177	4,069
Grain and oilseed milling	98	2,838	182	4,042
Sugar and confectionery products	220	2,410	346	10,054
Fruit & vegetable preserving & specialty food	336	10,391	1,148	38,409
Dairy products	211	9,078	624	14,802
Animal slaughtering and processing	279	4,359	524	21,019
Seafood product preparation and packaging	57	824	93	3,465
Bakeries and tortilla	1,814	6,004	1,272	43,527
Other food <sup>c</sup>	653	7,580	798	25,380
Beverages	844	15,042	1,349	31,717
Tobacco	2	12	1	24
Total food, beverages and tobacco	4,661	61,615	6,515	196,508

Source: U.S. Department of Commerce, Census Bureau, Economic Census, 2002,  
[http://www.census.gov/econ/census02/data/ca/CA003\\_31.HTM](http://www.census.gov/econ/census02/data/ca/CA003_31.HTM)

<sup>a</sup> Annual payroll.

<sup>b</sup> Includes pet and agricultural animal feed.

<sup>c</sup> Includes snack food, coffee, tea, syrup, condiments and spice manufacturing.

TABLE 5.4  
California share of the U.S. food, beverage and tobacco manufacturing industry, 2002

Manufacturing industry description	Establishments	Sales	Payroll	Employees
	(percent)			
Animal feed <sup>a</sup>	8.1	11.0	10.1	8.7
Grain and oilseed milling	11.5	6.0	7.4	7.3
Sugar and confectionery products	12.0	9.5	12.6	12.6
Fruit & vegetable preserving & specialty food	19.3	19.5	21.4	21.7
Dairy products	12.6	13.8	12.9	11.5
Animal slaughtering and processing	7.0	3.6	4.1	4.2
Seafood product preparation and packaging	7.6	9.4	8.8	8.4
Bakeries and tortilla	15.9	12.4	13.8	14.1
Other food <sup>b</sup>	17.0	13.1	14.9	15.7
Beverages	29.1	23.1	24.6	23.3
Tobacco	1.8	<0.1	0.1	0.1
Total California share of food, beverages and tobacco	15.1	11.0	12.4	11.8

Source: U.S. Department of Commerce, Census Bureau, Economic Census, 2002.  
[http://www.census.gov/econ/census02/data/ca/CA003\\_31.HTM](http://www.census.gov/econ/census02/data/ca/CA003_31.HTM)

<sup>a</sup> Includes pet and agricultural animal feed.

<sup>b</sup> Includes snack food, coffee, tea, syrup, condiment and spice manufacturing.

## The direct plus indirect effects of agriculture

Agriculture creates significant ripple effects (i.e. multipliers) throughout California's economy. Each dollar earned within agriculture fuels a more vigorous economy by stimulating additional activity in the form of jobs, labor income and value added.

The Agricultural Issues Center utilized IMPLAN Pro<sup>®</sup> version 2.0 software and accompanying 2002 dataset to determine multiplier effects. IMPLAN utilizes a model developed by the USDA Forest Service<sup>1</sup> designed to model the interrelationships between the economic sectors in the state and regional economies. The model employs input-output tables to show transactions among sectors. For any given industry, the model enables quantification of outputs (value of production), jobs, labor income and value added both before and after taking into account the ripple effects on the entire economy. These ripple effects are expressed as a dollar value and as an industry multiplier. Industry multipliers are typically a ratio close to 2. For the agricultural production and processing industry there is a value added multiplier of 2.27. Thus for every dollar of value added in that sector, there is an additional \$1.27 added to the state economy. Ripple effects may also be measured in terms of jobs added to the economy.

Ripple, or multiplier effects are composed of three types of effects—direct, indirect and induced. Direct effects measure the direct outputs of a particular industry and thus are determined directly by that industry's inputs. Indirect effects are the secondary inter-industry effects that one industry has on another. For example, increases in fertilizer purchase by the vegetables, fruits and nuts subgroup indirectly results in the production of additional fertilizer as well as usage of additional natural gas to produce the fertilizer and increased production and transport of the gas.<sup>2</sup> These direct and indirect effects result in changes in population and income, which in turn affect household consumption. Induced effects are the changes in household consumption of goods and services measured in employment, income and value added.

The industry multipliers are essentially the ratio of total effects to direct effects for each industry. For example, in Table 5.5.A, the direct effect from agricultural production and processing was 744,920 jobs, and the total effect (direct, indirect and induced) was 1,445,357 jobs. In Table 5.5.B, these values are given as a share of the state economy. In Table 5.5.C, the employment multiplier was 1.94 (or additional 0.94 jobs created for every job in agricultural production and processing). Here we can see that the multiplier of 1.94 can be derived by dividing the total effect (1,445,357) by the direct effect (744,920).

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<sup>1</sup> IMPLAN (IMpact Analysis for PLANning) developed by the U.S. Department of Agriculture Forest Service, together with the Federal Emergency Management Agency and U.S. Department of Interior Bureau of Land Management. IMPLAN's secondary database is derived from published sources including the U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Department of Labor Bureau of Labor Statistics and U.S. Department of Agriculture.

<sup>2</sup> Our analysis is limited by the data available for use with IMPLAN, including their industry aggregations.

There is an important caveat when interpreting the multiplier effects of particular industries. The total effects (direct, indirect and induced) and industry multipliers for aggregated subgroups are not equivalent to the sums of the individual subgroups. Agricultural activities are related in many ways, so when regional economic impacts of one industry are measured, effects associated with the production of other industries are also incorporated. Thus one industry's output becomes another industry's input. To avoid double counting, each industry must be separately analyzed to determine a unique "net effect" on the regional economy. This is why the total economic effect of farming is not the sum of the effects of each of the subgroups—field crops, vegetables, fruits, dairy, etc.

Multiplier effects differ by commodity because the production of some commodities may be related to more input and processing industries located within the state or region than others. Multipliers may also differ by region due to geographic dispersion of industries related to agriculture, differences in aggregate size of agriculture and type of commodities produced in that region. In addition, state multiplier effects do not reflect interactions with industries located out of state. Some industries may have a greater impact at the state level, while other industries may have broader geographic impacts, which are not included in the IMPLAN analysis for California.

## Agriculture and the state economy

In 2002, California's multifaceted economy sold goods and services worth almost \$2.28 trillion, provided 19.8 million jobs, paid nearly \$915 billion in labor income (including employee compensation and proprietary income) and created \$1.39 trillion of value added (Table 5.5.A). Considering direct effects only, the agriculture production and processing industry combined accounted for 4.3 percent of the state output, 3.8 percent of the jobs, 2.5 percent of labor income, and 2.9 percent of value added in the state (Table 5.5.B).

When taking into account direct, indirect and induced effects, the measured share of agricultural production and processing increased to 7.3 percent of the 20 million jobs in the state, 5.6 percent of the state labor income, and 6.5 percent of the state value added. The total effects from agricultural production alone accounted for 4.2 percent of state employment, 2.5 percent of labor income and 2.7 percent of value added in the state economy.

Farming directly accounted for 1.2 percent (i.e. \$28.4 billion) of the state output. The highest valued subgroup within farming—vegetables, fruits and nuts—was worth \$15 billion in 2002, or 0.7 percent of the state output. The direct, indirect and induced effects of farming accounted for 2.6 percent (nearly 514 thousand jobs) of employment in California, 1.6 percent (\$14.3 billion) of labor income, and 2 percent (\$27.2 billion) of value added.

Vegetables, fruits and tree nuts accounted for 1.5 percent of state employment, 1 percent of labor income and 1.2 percent of value added after including indirect and induced effects. Similarly, the beef and dairy industry, the second largest group within farming, accounted



for \$1.8 billion in labor income and 105 thousand jobs, or 0.5 percent of state employment. The state and regional multipliers for the beef and dairy subgroup, which are presented in this chapter, are much higher than those for other industries. Two main factors contributed to this unusual result. First, by their nature, the beef and dairy industries, in contrast to many other agricultural industries, have a higher portion of purchased inputs (feed, animals) relative to direct labor income and value added. Second, the direct effect estimates were biased down for California because the IMPLAN database uses national parameters that reflect a large share of activity from very small, part time cattle farms contributing little or no value added. This makes estimations of total (direct, indirect and induced) effects seem higher in comparison to the direct effect estimations, and thus the multipliers are higher. For California, the beef and dairy multiplier was 7.39 for total labor income and 7.30 for total value added, when most other multipliers are closer to 2.<sup>3</sup>

Agriculture support activities comprise a number of activities closely related to agricultural production. Some are conducted on the farm, some are not. All of these support activities are managed by a separate firm, not by the farm's operator. They are reported here as a separate group as is done by the U.S. Census Bureau North American Industry Classification System (NAICS). Agricultural support activities include, for example, soil preparation when this is contracted out, but does not include field preparations activities done by the farm's operator. It also includes packing and cooling of agricultural products when conducted by a non-farm firm. On-farm contract labor is particularly important for California, considering how labor intensive are many of the most important crops produced in the state. Contract labor constitutes a large part of the support activity group. Under 2002 business conditions, the value added directly attributable to agricultural support services was smaller than labor income, \$4,273 million compared to \$5,197 million, suggesting that in 2002, the sector had negative return to other inputs (Tables 5.5.A and B).

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<sup>3</sup> Unfortunately, given the built-in industry aggregation of IMPLAN categories, the beef and dairy industries could not be analyzed as two distinct industries.

TABLE 5.5

## Economic impact of California's agricultural production and processing, 2002

**A. CALIFORNIA: Direct and total effects<sup>a</sup>**

	Direct Effects				Total Effects <sup>b, c</sup>		
	Industry output (sales) <sup>d</sup>	Employment <sup>e</sup>	Labor income <sup>f</sup>	Value added <sup>g</sup>	Employment	Labor income	Value added
	(\$million)	(jobs)	(\$million)		(jobs)	(\$million)	
Agricultural production and processing	97,722	744,920	22,553	39,646	1,445,357	51,227	90,194
Agricultural processing <sup>h</sup>	60,726	201,812	9,895	19,979	670,829	27,904	51,678
Agricultural production	36,996	543,108	12,658	19,667	822,879	22,843	37,769
Forestry, fishing, hunting	1,913	13,040	448	800	30,590	1,043	1,692
Ag-support activities <sup>i</sup>	6,731	221,819	5,197	4,273	300,351	8,200	9,277
Farming	28,352	308,248	7,013	14,594	513,542	14,283	27,173
Grains, oilseeds, cotton	1,201	16,134	213	519	27,727	608	1,161
Vegetables, fruits, nuts	14,977	164,333	4,279	9,100	298,868	8,881	16,407
Greenhouse and nursery	3,237	39,437	1,613	2,772	60,156	2,389	4,125
Other crops	2,698	21,736	497	1,393	44,806	1,291	2,695
Beef, dairy cattle	5,039	54,227	245	450	105,183	1,809	3,285
Other animals	1,199	12,381	166	361	20,458	483	928
Total California economy	2,281,194	19,831,054	914,708	1,389,164			

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset.

<sup>a</sup> Nominal dollars.

<sup>b</sup> Total effects include direct, indirect and induced effects of the industry named a left.

<sup>c</sup> Values that utilize multiplier effects cannot be aggregated to get totals.

<sup>d</sup> Industry output: value of production (i.e. total sales) by the group of industries named at the left.

<sup>e</sup> Employment: number of jobs directly employed by the corresponding industry.

<sup>f</sup> Labor income: value of wages and salaries and other proprietary income paid by industry.

<sup>g</sup> Value added equals sum of labor income (employee compensation and proprietor income), property income and indirect business taxes. This is the same as total sales (industry output) less purchased inputs and services.

<sup>h</sup> This group includes animal feed, food and beverage industries.

<sup>i</sup> Agricultural support activities includes contract labor, fertilizer and pesticides manufacturing, soil preparation and harvesting services, packing and cooling, and cotton ginning.

TABLE 5.5 (continued)

**B. CALIFORNIA: Direct and total effects as share of state economy**

	Direct Effects				Total Effects		
	Industry output (sales)	Employ- ment	Labor income	Value added	Employ- ment	Labor income	Value added
	(percent)						
Agricultural production and processing	4.28	3.76	2.47	2.85	7.29	5.60	6.49
Agricultural processing	2.66	1.02	1.08	1.44	3.38	3.05	3.72
Agricultural production	1.62	2.74	1.38	1.42	4.15	2.50	2.72
Forestry, fishing, hunting	0.08	0.07	0.05	0.06	0.15	0.11	0.12
Ag-support activities	0.30	1.12	0.57	0.31	1.51	0.90	0.67
Farming	1.24	1.55	0.77	1.05	2.59	1.56	1.96
Grains, oilseeds, cotton	0.05	0.08	0.02	0.04	0.14	0.07	0.08
Vegetables, fruits, nuts	0.66	0.83	0.47	0.66	1.51	0.97	1.18
Greenhouse and nursery	0.14	0.20	0.18	0.20	0.30	0.26	0.30
Other crops	0.12	0.11	0.05	0.10	0.23	0.14	0.19
Beef and dairy cattle	0.22	0.27	0.03	0.03	0.53	0.20	0.24
Other animals	0.05	0.06	0.02	0.03	0.10	0.05	0.07

Source: Table 5.5.A.

**C. CALIFORNIA: Industry multipliers**

	Employment	Labor income	Value added
Agricultural production and processing	1.94	2.27	2.27
Agricultural processing	3.32	2.82	2.59
Agricultural production	1.52	1.80	1.92
Forestry, fishing, hunting	2.35	2.33	2.11
Agriculture support activities	1.35	1.58	2.17
Farming	1.67	2.04	1.86
Grains, oilseeds and cotton	1.72	2.85	2.24
Vegetables, fruits and nuts	1.82	2.08	1.80
Greenhouse and nursery	1.53	1.48	1.49
Other crops	2.06	2.60	1.93
Beef and dairy cattle	1.94	7.39	7.30
Other animals	1.65	2.90	2.57

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and accompanying 2002 dataset.

See notes under Table 5.5.A.

## Agriculture and regional economies

The Central Valley region, which includes the San Joaquin Valley in the south and Sacramento Valley in the north, is the largest agricultural region in the state. With \$42 billion output in 2002, Central Valley agricultural production and processing accounted for 43 percent of California's total agricultural production and processing while the Central Coast region accounted for 14 percent (\$14 billion). In comparison to the Central Coast, the Central Valley has a smaller total economy, so agriculture in the region directly accounts for a much greater share of the Central Valley economy.

Just as state multiplier effects do not include input and processing industries located out of state, regional multiplier effects do not reflect out-of-region interactions. This explains, in part, differences in regional multipliers. Moreover, as with state estimates based on IMPLAN's multipliers, which have been adjusted to avoid double counting, we again caution that one cannot determine regional effects by aggregating subgroups.

### Central Valley

In 2002, agriculture production and processing industries in the Central Valley<sup>4</sup> region directly provided close to 368 thousand jobs, \$9.2 billion in labor income, and \$16 billion in value added (Table 5.6.A). In other words, 15.6 percent of total regional output was directly attributable to the agricultural production and processing industry in the Valley, 12.6 percent of regional employment, and 10 percent of value added (Table 5.6B). Vegetable, fruit, and nut production is the largest farming industry in the Central Valley followed by the beef and dairy industry.

The Central Valley agricultural processing industry accounts for about one-third of the state's agricultural processing output. But when looking at the regional economy, the agricultural processing industry has a larger total impact in the Central Valley region than its overall impact in the state economy. Considering direct, indirect and induced effects, the Central Valley agricultural processing industry accounts for almost 8 percent of the regional employment, 7 percent of the regional labor income, and 9 percent of the regional value added, in contrast to less than 4 percent for valued added in the state as a whole.

The Central Valley employment multiplier of the agricultural production and processing industry was 1.91, which means that for every job in this sector 0.91 additional jobs were created in the Central Valley (Table 5.6.C). Twenty-four percent of regional jobs—about 704 thousand—were directly and indirectly supported by the industry. For value added, the production and processing multiplier was 2.21 and in total generated 22.2 percent of the regional economy's value added. The total impact of vegetable, fruit and nut production alone was estimated at nearly 7 percent (194 thousand jobs) of the overall regional employment, almost 5 percent (\$5.2 billion) of the labor income, and 6 percent (\$9.6 billion) of the regional output. The entire farming subgroup, including vegetables, fruit and nuts, had an estimated value added multiplier of 1.9 and directly and indirectly was responsible for 9.2 percent of the regional value added and 10 percent (nearly 303 thousand) of the jobs.

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<sup>4</sup> The Central Valley consists of Butte, Colusa, Fresno, Glenn, Kern, Kings, Madera, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, Tehama, Tulare, Yolo and Yuba counties.

TABLE 5.6  
Economic impact of Central Valley agricultural production and processing, 2002<sup>a</sup>

**A. CENTRAL VALLEY: Direct and total effects in the region<sup>b</sup>**

	Direct Effects				Total Effects <sup>c, d</sup>		
	Industry output (sales) <sup>e</sup>	Employment <sup>f</sup>	Labor income <sup>g</sup>	Value added <sup>h</sup>	Employment	Labor income	Value added
	(\$million)	(jobs)	(\$million)		(jobs)	(\$million)	
Agricultural production and processing	41,964	367,700	9,159	16,016	703,804	20,168	35,410
Agricultural processing <sup>i</sup>	20,503	65,029	2,854	5,595	228,777	7,935	14,526
Agricultural production	21,460	302,671	6,305	10,421	495,857	11,903	20,546
Forestry, fishing, hunting	1,018	4,383	182	383	17,395	540	895
Ag-support activities <sup>j</sup>	3,793	139,868	2,824	2,308	188,116	4,317	4,746
Farming	16,650	158,420	3,298	7,730	302,566	7,334	14,719
Grains, oilseeds, cotton	1,132	14,679	200	489	29,280	586	1,079
Vegetables, fruits, nuts	9,066	89,314	2,352	5,377	194,256	5,169	9,573
Greenhouse & nursery	541	4,374	214	463	7,501	309	626
Other crops	1,685	12,799	300	871	31,835	810	1,664
Beef and dairy cattle	3,550	33,120	148	317	80,696	1,333	2,472
Other animals	676	4,133	84	212	8,696	226	466
Total Central Valley economy	268,917	2,912,659	108,895	159,416			

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset.

<sup>a</sup> The Central Valley comprises San Joaquin and Sacramento Valleys. San Joaquin Valley is Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare counties. Sacramento Valley is Butte, Colusa, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo and Yuba counties.

<sup>b</sup> Nominal dollars.

<sup>c</sup> Total effects include direct, indirect and induced effects of the industry named a left.

<sup>d</sup> Values that utilize multiplier effects cannot be aggregated to get totals.

<sup>e</sup> Industry output: value of production (i.e. total sales) by the group of industries named at the left.

<sup>f</sup> Employment: number of jobs directly employed by the corresponding industry.

<sup>g</sup> Labor income: value of wages and salaries and other proprietary income paid by industry.

<sup>h</sup> Value added equals sum of labor income (employee compensation and proprietor income), property income and indirect business taxes. This is the same as total sales (industry output) less purchased inputs and services.

<sup>i</sup> This group includes animal feed, food and beverage industries.

<sup>j</sup> Agricultural support activities includes contract labor, fertilizer and pesticides manufacturing, soil preparation and harvesting services, packing and cooling, and cotton ginning.

TABLE 5.6 (continued)

**B. CENTRAL VALLEY: Direct and total effects as share of regional economy**

	Direct Effects				Total Effects		
	Industry output (sales)	Employment	Labor income	Value added	Employment	Labor income	Value added
				(percent)			
Agricultural production and processing	15.60	12.62	8.41	10.05	24.16	18.52	22.21
Agricultural processing	7.62	2.23	2.62	3.51	7.85	7.29	9.11
Agricultural production	7.98	10.39	5.79	6.54	17.02	10.93	12.89
Forestry, fishing, hunting	0.38	0.15	0.17	0.24	0.60	0.50	0.56
Ag-support activities	1.41	4.80	2.59	1.45	6.46	3.96	2.98
Farming	6.19	5.44	3.03	4.85	10.39	6.74	9.23
Grains, oilseeds, cotton	0.42	0.50	0.18	0.31	1.01	0.54	0.68
Vegetables, fruits, nuts	3.37	3.07	2.16	3.37	6.67	4.75	6.01
Greenhouse & nursery	0.20	0.15	0.20	0.29	0.26	0.28	0.39
Other crops	0.63	0.44	0.28	0.55	1.09	0.74	1.04
Beef and dairy cattle	1.32	1.14	0.14	0.20	2.77	1.22	1.55
Other animals	0.25	0.14	0.08	0.13	0.30	0.21	0.29

Source: Table 5.6.A.

**C. CENTRAL VALLEY: Industry multipliers**

	Employment	Labor income	Value added
Agricultural production and processing	1.91	2.20	2.21
Agricultural processing	3.52	2.78	2.60
Agricultural production	1.64	1.89	1.97
Forestry, fishing, hunting	3.97	2.96	2.33
Agriculture support activities	1.34	1.53	2.06
Farming	1.91	2.22	1.90
Grains, oilseeds and cotton	1.99	2.94	2.21
Vegetables, fruits and nuts	2.17	2.20	1.78
Greenhouse and nursery	1.71	1.44	1.35
Other crops	2.49	2.70	1.91
Beef and dairy cattle	2.44	9.00	7.80
Other animals	2.10	2.69	2.19

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset. See notes under Table 5.6.A.

## San Joaquin Valley

The San Joaquin Valley<sup>5</sup> regional output—including agricultural and non-agricultural industries—was \$148 billion in 2002. The total number of jobs was about 1.6 million, and the regional value added was \$83 billion. In this region, the relative importance of agricultural production and processing output of the region is larger than for the state as a whole or the Central Valley. Agricultural production and processing output in this region accounted for 34.8 percent of the agricultural production and processing in the state. The San Joaquin Valley agricultural production and processing industry's direct value added of \$12.7 billion (Table 5.7A) accounted for 15.3 percent of the value added in the regional economy, a much larger share than the 2.9 percent generated by the agricultural industry in the state.

Considering direct effects only, farming accounted for 9.2 percent of regional output, 8 percent of regional employment, and 7.4 percent of regional value added. Within the farming subgroup, vegetable, fruit, and nut production accounted for 5 percent of regional output, 4.6 percent of employment, and 5.3 percent of value added (Table 5.7.B).

The share of the total direct, indirect and induced effects on the regional economy attributable to agricultural production and processing was larger for the San Joaquin Valley than for any other region. Agricultural production and processing industries in the San Joaquin Valley accounted for 37.8 percent of regional employment, almost 30 percent of regional labor income, and 34.2 percent of regional total value added. Agricultural production alone supported 427 thousand jobs (26.9 percent of the region's jobs), generated \$10 billion in labor income (18.1%) and \$16.8 billion in value added (20.3%). The farming subgroup accounted for 15.5 percent of employment, 10.6 percent of labor income, and 14 percent of value added. Within farming, the vegetable, fruit, and nut industry in the San Joaquin Valley accounted for 10.1 percent of regional employment, 7.6 percent of labor income, and 9.2 percent of value added.

The San Joaquin Valley employment multiplier of the agricultural production and processing industry was 1.92, which means that for every 100 agricultural production and processing jobs in the San Joaquin Valley, 92 additional jobs were created in the region. The value added multiplier was 2.23 and labor income was 2.19 (Table 5.7.C).

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<sup>5</sup>The San Joaquin Valley consists of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare counties.

TABLE 5.7

Economic impact of San Joaquin Valley agricultural production and processing, 2002<sup>a</sup>A. SAN JOAQUIN VALLEY: Direct and total effects in the region<sup>b</sup>

	Direct Effects				Total Effects <sup>c, d</sup>		
	Industry output (sales) <sup>e</sup>	Employment <sup>f</sup>	Labor income <sup>g</sup>	Value added <sup>h</sup>	Employment	Labor income	Value added
	(\$million)	(jobs)		(\$million)	(jobs)	(\$million)	
Agricultural production and processing	34,005	313,277	7,567	12,698	601,102	16,580	28,345
Agricultural processing <sup>i</sup>	16,045	51,672	2,169	4,111	178,659	5,973	10,732
Agricultural production	17,960	261,605	5,398	8,587	422,260	10,033	16,836
Forestry, fishing, hunting	888	3,444	156	328	15,154	467	763
Ag-support activities <sup>j</sup>	3,447	130,858	2,560	2,085	174,076	3,843	4,156
Farming	13,625	127,303	2,681	6,174	245,542	5,883	11,648
Grains, oilseeds, cotton	815	8,368	146	349	19,127	419	755
Vegetables, fruits, nuts	7,380	73,077	1,946	4,388	160,132	4,192	7,658
Greenhouse & nursery	420	3,275	166	359	5,652	235	478
Other crops	1,147	9,224	208	592	22,481	548	1,108
Beef and dairy cattle	3,247	30,013	138	290	73,985	1,191	2,178
Other animals	617	3,346	77	197	7,450	201	416
Total San Joaquin Valley economy	147,716	1,588,703	55,411	82,999			

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset.

<sup>a</sup> The San Joaquin Valley is Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus and Tulare counties.

<sup>b</sup> Nominal dollars.

<sup>c</sup> Total effects include direct, indirect and induced effects of the industry named a left.

<sup>d</sup> Values that utilize multiplier effects cannot be aggregated to get totals.

<sup>e</sup> Industry output: value of production (i.e. total sales) by the group of industries named at the left.

<sup>f</sup> Employment: number of jobs directly employed by the corresponding industry.

<sup>g</sup> Labor income: value of wages and salaries and other proprietary income paid by industry.

<sup>h</sup> Value added equals sum of labor income (employee compensation and proprietor income), property income and indirect business taxes. This is the same as total sales (industry output) less purchased inputs and services.

<sup>i</sup> This group includes animal feed, food and beverage industries.

<sup>j</sup> Agricultural support activities includes contract labor, fertilizer and pesticides manufacturing, soil preparation and harvesting services, packing and cooling, and cotton ginning.

TABLE 5.7 (continued)



**B. SAN JOAQUIN VALLEY: Direct and total effects as share of regional economy**

	Direct Effects				Total Effects		
	Industry output (sales)	Employment	Labor income	Value added	Employment	Labor income	Value added
	(percent)						
Agricultural production and processing	23.02	19.72	13.66	15.30	37.84	29.92	34.15
Agricultural processing	10.86	3.25	3.91	4.95	11.25	10.78	12.93
Agricultural production	12.16	16.47	9.74	10.35	26.89	18.11	20.28
Forestry, fishing, hunting	0.60	0.22	0.28	0.40	0.95	0.84	0.92
Ag-support activities	2.33	8.24	4.62	2.51	10.96	6.94	5.01
Farming	9.22	8.01	4.84	7.44	15.46	10.62	14.03
Grains, oilseeds, cotton	0.55	0.53	0.26	0.42	1.20	0.76	0.91
Vegetables, fruits, nuts	5.00	4.60	3.51	5.29	10.08	7.56	9.23
Greenhouse & nursery	0.28	0.21	0.30	0.43	0.36	0.42	0.58
Other crops	0.78	0.58	0.38	0.71	1.42	0.99	1.34
Beef and dairy cattle	2.20	1.89	0.25	0.35	4.66	2.15	2.62
Other animals	0.42	0.21	0.14	0.24	0.47	0.36	0.50

Source: Table 5.7.A.

**C. SAN JOAQUIN VALLEY: Industry multipliers**

	Employment	Labor income	Value
Agricultural production and processing	1.92	2.19	2.23
Agricultural processing	3.46	2.75	2.61
Agricultural production	1.63	1.86	1.96
Forestry, fishing, hunting	4.40	2.99	2.33
Agriculture support activities	1.33	1.50	1.99
Farming	1.93	2.19	1.89
Grains, oilseeds and cotton	2.29	2.87	2.16
Vegetables, fruits and nuts	2.19	2.15	1.75
Greenhouse and nursery	1.73	1.42	1.33
Other crops	2.44	2.64	1.87
Beef and dairy cattle	2.47	8.60	7.51
Other animals	2.23	2.60	2.11

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset. See notes under Table 5.7.A.

## Agriculture in the Sacramento Valley

The total economy of the Sacramento Valley<sup>6</sup> is similar in size to the economy of the San Joaquin Valley. In 2002 the Sacramento Valley economy recorded \$121.1 billion in total output, 1.3 million jobs, and \$53 billion in labor income (Table 5.8.A). The regional value added was \$76.4 billion. Agricultural production and processing output was about \$8.0 billion, employment was more than 54 thousand jobs, labor income was near \$1.6 billion, and value added was about \$3.3 billion. Agricultural production alone directly supported 41 thousand jobs, \$907 million in labor income and \$1.8 billion in value added. The Sacramento Valley accounted for 8.1 percent of the total state output from agricultural production and processing.

Considering the multiplier effects, the agricultural production and processing industry accounted for 96 thousand direct, indirect and induced jobs (7.2% of the regional total), and \$6 billion in value added (7.8%). For this industry the employment multiplier was 1.76, the labor multiplier was 1.92, and value added 1.80 (Table 5.8.C). Agricultural production alone supported nearly 63 thousand direct, indirect and induced jobs (4.7 percent of the regional employment), 1.6 billion in labor income (3% of the regional labor income), and \$3.1 billion in value added (4% of the regional economy, Table 5.8.B).

In 2002, due to direct, indirect and induced effects, agricultural processing in the region was responsible for 41 thousand jobs, \$1.6 billion in labor income and \$3.1 billion in value added in the region—4 percent of Sacramento Valley's value added. Like the San Joaquin Valley and Central Valley, vegetables, fruits and nuts was the largest farming subgroup. Vegetables, fruit and nut production in the Sacramento Valley generated 2.1 percent (over 27 thousand) of the jobs in the region, 1.4 percent (\$767 million) of labor income and 2.1 percent (\$1.6 billion) of the value added.

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<sup>6</sup> The Sacramento Valley consists of Butte, Colusa, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo and Yuba counties.

TABLE 5.8

### Economic impact of Sacramento Valley agricultural production and processing, 2002<sup>a</sup>

#### A. SACRAMENTO VALLEY: Direct and total effects in the region<sup>b</sup>

	Direct Effects				Total Effects <sup>c, d</sup>		
	Industry output (sales) <sup>e</sup>	Employment <sup>f</sup>	Labor income <sup>g</sup>	Value added <sup>h</sup>	Employment	Labor income	Value added
	(\$million)	(jobs)	(\$million)		(jobs)	(\$million)	
Agricultural production and processing	7,958	54,422	1,592	3,318	95,517	3,056	5,977
Agricultural processing <sup>i</sup>	4,458	13,356	685	1,484	40,819	1,575	3,084
Agricultural production	3,501	41,066	907	1,834	62,769	1,581	3,114
Forestry, fishing, hunting	130	939	26	55	2,059	61	113
Ag-support activities <sup>j</sup>	346	9,010	264	224	12,435	379	420
Farming	3,025	31,117	617	1,555	49,852	1,199	2,603
Grains, oilseeds & cotton	317	6,311	54	140	8,569	127	265
Vegetables, fruits & nuts	1,687	16,238	406	990	27,394	767	1,585
Greenhouse & nursery	121	1,099	49	104	1,675	67	138
Other crops	538	3,575	92	279	7,037	204	474
Beef & dairy cattle	303	3,107	10	27	5,762	82	170
Other animals	59	787	7	15	1,079	16	33
Total Sacramento Valley economy	121,201	1,323,956	53,484	76,417			

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset.

<sup>a</sup> The Sacramento Valley is Butte, Colusa, Glenn, Sacramento, Solano, Sutter, Tehama, Yolo and Yuba counties.

<sup>b</sup> Nominal dollars.

<sup>c</sup> Total effects include direct, indirect and induced effects of the industry named a left.

<sup>d</sup> Values that utilize multiplier effects cannot be aggregated to get totals.

<sup>e</sup> Industry output: value of production (i.e. total sales) by the group of industries named at the left.

<sup>f</sup> Employment: number of jobs directly employed by the corresponding industry.

<sup>g</sup> Labor income: value of wages and salaries and other proprietary income paid by industry.

<sup>h</sup> Value added equals sum of labor income (employee compensation and proprietor income), property income and indirect business taxes. This is the same as total sales (industry output) less purchased inputs and services.

<sup>i</sup> This group includes animal feed, food and beverage industries.

<sup>j</sup> Agricultural support activities includes contract labor, fertilizer and pesticides manufacturing, soil preparation and harvesting services, packing and cooling, and cotton ginning.

TABLE 5.8 (continued)

**B. SACRAMENTO VALLEY: Direct and total effects as share of regional economy**

	Direct Effects				Total Effects		
	Industry output (sales)	Employment	Labor income	Value added	Employment	Labor income	Value added
	(percent)						
Agricultural production and processing	6.57	4.11	2.98	4.34	7.21	5.71	7.82
Agricultural processing	3.68	1.01	1.28	1.94	3.08	2.94	4.04
Agricultural production	2.89	3.10	1.70	2.40	4.74	2.96	4.07
Forestry, fishing, hunting	0.11	0.07	0.05	0.07	0.16	0.11	0.15
Ag-support activities	0.29	0.68	0.49	0.29	0.94	0.71	0.55
Farming	2.50	2.35	1.15	2.03	3.77	2.24	3.41
Grains, oilseeds & cotton	0.26	0.48	0.10	0.18	0.65	0.24	0.35
Vegetables, fruits & nuts	1.39	1.23	0.76	1.29	2.07	1.43	2.07
Greenhouse & nursery	0.10	0.08	0.09	0.14	0.13	0.13	0.18
Other crops	0.44	0.27	0.17	0.37	0.53	0.38	0.62
Beef & dairy cattle	0.25	0.23	0.02	0.04	0.44	0.15	0.22
Other animals	0.05	0.06	0.01	0.02	0.08	0.03	0.04

Source: Table 5.8.A.

**C. SACRAMENTO VALLEY: Industry multipliers**

	Employment	Labor income	Value added
Agricultural production and processing	1.76	1.92	1.80
Agricultural processing	3.06	2.30	2.08
Agricultural production	1.53	1.74	1.70
Forestry, fishing, hunting	2.19	2.37	2.05
Agriculture support activities	1.38	1.44	1.88
Farming	1.60	1.94	1.67
Grains, oilseeds and cotton	1.36	2.34	1.89
Vegetables, fruits and nuts	1.69	1.89	1.60
Greenhouse and nursery	1.52	1.39	1.33
Other crops	1.97	2.22	1.70
Beef and dairy cattle	1.85	8.43	6.28
Other animals	1.37	2.44	2.18

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset. See notes under Table 5.8.A.

## Central Coast

With \$14 billion in output, the agricultural production and processing industry in the Central Coast region<sup>7</sup> accounted for 14 percent of the agricultural production and processing in the state in 2002. Because the overall Central Coast economy is very large—22 percent of the state economy—the regional agricultural production and processing industry contributed a smaller share of the regional output than in either the San Joaquin or Sacramento Valley regions even though the value of agriculture in the Central Coast is larger than that in the Sacramento Valley industry.

Because it includes the relatively urban counties of Alameda and San Mateo, Central Coast agricultural production and processing directly produced only about 2.8 percent (\$14 billion) of the regional output, 3 percent (almost 111 thousand jobs) of regional employment, and 2.2 percent (\$6.7 billion) of the regional value added (Tables 5.9.A and 5.9.B).

Based on IMPLAN estimates, Central Coast agricultural production and processing has an employment multiplier of 1.66, meaning for every 100 jobs in the industry 66 jobs additional jobs are created in the region (Table 5.9.C). This amounted to 184 thousand jobs, or 5 percent of regional employment as the direct, indirect and induced result of agricultural production and processing in the region.

The industry's total impact on labor income was estimated as \$7.2 million (3.5 percent of regional labor income), and the impact on regional value added was \$12.6 million (4 percent of the regional value added). Regional agricultural production alone supported 3.1 percent (112 thousand jobs) of total regional employment, 1.8 percent (\$3.7 billion) of labor income, and 2 percent (\$6 billion) of value added. Farming accounted for 1.8 percent of employment, 1.1 percent of labor income, and 1.4 percent of value added.

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<sup>7</sup> The Central Coast consists of Alameda, Contra Costa, Monterey, San Benito, San Luis Obispo, San Mateo, Santa Clara and Santa Cruz counties.

TABLE 5.9

Economic impact of Central Coast agricultural production and processing, 2002<sup>a</sup>A. CENTRAL COAST: Direct and total effects in the region<sup>b</sup>

	Direct Effects				Total Effects <sup>c, d</sup>		
	Industry output (sales) <sup>e</sup>	Employment <sup>f</sup>	Labor income <sup>g</sup>	Value added <sup>h</sup>	Employment	Labor income	Value added
	(\$million)	(jobs)	(\$million)		(jobs)	(\$million)	
Agricultural production and processing	14,028	110,686	3,894	6,728	183,606	7,213	12,594
Agricultural processing <sup>i</sup>	8,371	30,069	1,464	3,023	38,118	3,131	5,673
Agricultural production	5,657	80,617	2,430	3,705	112,098	3,728	6,019
Forestry, fishing, hunting	138	1,589	31	59	2,387	62	105
Ag-support activities <sup>j</sup>	1,217	34,052	1,032	852	45,274	1,507	1,653
Farming	4,301	44,976	1,368	2,794	66,628	2,244	4,318
Grains, oilseeds, cotton	7	241	1	3	293	3	6
Vegetables, fruits, nuts	3,095	30,316	892	1,971	50,423	1,689	3,241
Greenhouse & nursery	882	9,935	442	755	14,439	629	1,082
Other crops	51	547	11	27	881	24	49
Beef & dairy cattle	185	2,447	10	17	3,524	46	81
Other animals	81	1,490	13	21	1,817	26	45
Total Central Coast economy	506,351	3,666,203	206,648	303,956			

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset.

<sup>a</sup> The Central Coast consists of Alameda, Contra Costa, Monterey, San Benito, Santa Clara, Santa Cruz, San Luis Obispo and San Mateo counties.

<sup>b</sup> Nominal dollars.

<sup>c</sup> Total effects include direct, indirect and induced effects of the industry named a left.

<sup>d</sup> Values that utilize multiplier effects cannot be aggregated to get totals.

<sup>e</sup> Industry output: value of production (i.e. total sales) by the group of industries named at the left.

<sup>f</sup> Employment: number of jobs directly employed by the corresponding industry.

<sup>g</sup> Labor income: value of wages and salaries and other proprietary income paid by industry.

<sup>h</sup> Value added equals sum of labor income (employee compensation and proprietor income), property income and indirect business taxes. This is the same as total sales (industry output) less purchased inputs and services.

<sup>i</sup> This group includes animal feed, food and beverage industries.

<sup>j</sup> Agricultural support activities includes contract labor, fertilizer and pesticides manufacturing, soil preparation and harvesting services, packing and cooling, and cotton ginning.

TABLE 5.9 (continued)

**B. CENTRAL COAST: Direct and total effects as share of regional economy**

	Direct Effects				Total Effects		
	Industry output (sales)	Employment	Labor income	Value added	Employment	Labor income	Value added
	(percent)						
Agricultural production and processing	2.77	3.02	1.88	2.21	5.01	3.49	4.14
Agricultural processing	1.65	0.82	0.71	0.99	1.04	1.52	1.87
Agricultural production	1.12	2.20	1.18	1.22	3.06	1.80	1.98
Forestry, fishing, hunting	0.03	0.04	0.01	0.02	0.07	0.03	0.03
Ag-support activities	0.24	0.93	0.50	0.28	1.23	0.73	0.54
Farming	0.85	1.23	0.66	0.92	1.82	1.09	1.42
Grains, oilseeds & cotton	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Vegetables, fruits & nuts	0.61	0.83	0.43	0.65	1.38	0.82	1.07
Greenhouse & nursery	0.17	0.27	0.21	0.25	0.39	0.30	0.36
Other crops	0.01	0.01	0.01	0.01	0.02	0.01	0.02
Beef & dairy cattle	0.04	0.07	0.00	0.01	0.10	0.02	0.03
Other animals	0.02	0.04	0.01	0.01	0.05	0.01	0.01

Source: Table 5.9.A

**C. CENTRAL COAST: Industry multipliers**

	Employment	Labor income	Value added
Agricultural production and processing	1.66	1.85	1.87
Agricultural processing	1.27	2.14	1.88
Agricultural production	1.39	1.53	1.62
Forestry, fishing, hunting	1.50	2.01	1.77
Agriculture support activities	1.33	1.46	1.94
Farming	1.48	1.64	1.55
Grains, oilseeds and cotton	1.21	2.55	2.06
Vegetables, fruits and nuts	1.66	1.89	1.64
Greenhouse and nursery	1.45	1.42	1.43
Other crops	1.61	2.27	1.83
Beef and dairy cattle	1.44	4.86	4.93
Other animals	1.22	2.08	2.12

Source: UC Agricultural Issues Center, using IMPLAN Pro V.2.0 software package and 2002 dataset. See notes under Table 5.9.A.

## California agriculture in the global context

California is one of the top 10 economies in the world. California's overall economy is larger than that of Brazil, Russia, Canada or Mexico. California ranks 9th in the world using gross domestic product (GDP)—where the United States as a whole is number one with or without California—and exchange rates adjusted for purchasing power of currency in the local economy (Table 5.10). Using market exchange rates California moves to sixth, well ahead of China and India (which move well down in the ranking) and just ahead of Italy.

Common currency units are necessary to compare GDPs across countries or states. Using market exchange rates can be misleading. For example, if the value of the Mexican peso were to fall by half compared to the U.S. dollar in a particular year, the gross domestic product measured in dollars would also fall by half. However, the change in the exchange rate would result from financial markets' fluctuations. It does not necessarily mean that Mexican workers or businesses are much poorer, particularly if they buy mainly local goods and services. Incomes and prices measured in pesos would likely change little and consumers and businesses would be affected only for the

goods with imported components. As an alternative to market exchange rates, column 3 in Table 5.10 presents GDP purchasing power parity (PPP) terms, which uses rates of currency conversion that eliminate the differences in domestic price levels among countries. For comparison, column 5 lists GDP using market exchange rates.

Purchasing power parity exchange rates are especially useful when official market exchange rates are manipulated by

TABLE 5.10  
Gross domestic product (GDP)<sup>a</sup> of the top-15 economies of the world, 2004

Country	GDP purchasing power parity exchange rates <sup>b</sup>		GDP market exchange rates <sup>c</sup>	
	Rank	(\$ billion)	Rank	(\$ billion)
United States <sup>d</sup>	1	11,249.2	1	11,649.8
China	2	6,353.8	8	1,412.3
Japan	3	3,517.8	2	4,296.2
India	4	2,889.8	13	579.7
Germany	5	2,256.0	3	2,406.3
France	6	1,619.6	5	1,762.2
United Kingdom	7	1,606.1	4	1,797.6
Italy	8	1,537.7	7	1,470.9
California	9	1,490.7	6	1,543.8
Brazil	10	1,390.6	16	492.3
Russia	11	1,290.0	17	432.8
Canada	12	977.3	9	869.9
Mexico	13	929.1	11	626.1
Spain	14	903.0	10	842.1
South Korea	15	836.9	12	605.4

Source: UC Agricultural Issues Center based on International Monetary Fund and Bureau of Economic Analysis, U.S. Department of Commerce.

<sup>a</sup> GDP is the market value of goods and services produced by labor and property in the individual country.

<sup>b</sup> GDP, based on purchasing power parity (PPP) exchange rates.

<sup>c</sup> GDP, based on market exchange rates.

<sup>d</sup> Includes California



governments. Countries with heavy government control of the economy sometimes enforce official exchange rates that make their own currency artificially strong or artificially weak. In such cases, a purchasing power parity exchange rate is likely to be the most realistic basis for an economic comparison. Countries such as Japan, with inflated prices, see their agricultural GDP decline markedly by using the purchasing power parity approach. Note that even using the PPP approach the agriculture value-added measures have not been adjusted to reflect local agricultural prices relative to world prices—a very difficult adjustment because of differentiated product quality.

Even given a choice of exchange rate basis, there are many potential approaches to comparing the size of agriculture across different economies. One of these is agricultural value added. The World Bank publishes estimates on agricultural value added for more than 200 countries. These figures are based on the International Standard Industrial Classification (ISIC) division 1-5, which includes the cultivation of crops and livestock production as well as forestry, hunting and fishing. Using purchasing power parity exchange rates California ranks 9th among countries sorted by agricultural value added (Table 5.11).

TABLE 5.11

### Top-15 countries by agricultural value added,<sup>a</sup> average 2001-2003

Country	GDP purchasing power parity exchange rates <sup>b</sup>		GDP market exchange rates <sup>c</sup>	
	Rank	(\$ billion)	Rank	(\$ billion)
China	1	191.0	3	42.5
United States <sup>d</sup>	2	148.6	1	153.9
India	3	110.6	8	22.2
Japan	4	58.2	2	71.1
France	5	35.5	4	38.6
Italy	6	29.7	5	28.4
Indonesia	7	28.5	14	8.1
Brazil	8	27.7	13	9.8
California <sup>e</sup>	9	27.6	5	28.4
Mexico	10	23.0	10	15.5
Turkey	11	22.4	12	11.6
Germany	12	21.8	7	23.3
Spain	13	20.6	9	19.2
South Korea	14	20.1	11	14.5

Source: UC Agricultural Issues Center based on World Bank.

<sup>a</sup> Agricultural value added by cultivation of crops and livestock production and forestry, hunting and fishing.

<sup>b</sup> GDP, based on purchasing power parity (PPP) exchange rates.

<sup>c</sup> GDP, based on market exchange rates.

<sup>d</sup> Includes California.

<sup>e</sup> The World Bank reports a U.S. value of \$148 billion, which is much higher than the U.S. Bureau of Economic Analysis (BEA) figure of \$100 billion. We adjusted the California value added number of about \$19 billion estimated by the BEA by the same proportion to yield \$27.6 billion.

California ranks 5th (tied with Italy) when the measure of agricultural value added is based on market exchange rates. Using market exchanges, developing countries (China, India, Indonesia and Brazil) fall dramatically. Note that Italy, Indonesia, Brazil and California are similar and their rank may change from year to year with changes in exchange rates or relative prices of farm commodities.

The World Bank data also provides the agriculture share of GDP. Developing countries have a large agriculture share. California agriculture share of GDP at 1.4 percent is below that of other developed countries such as Australia, France and Italy, and similar to Japan and far below the developing countries such as Brazil or China and India (Table 5.12).

Using data from members of the Organiza-

TABLE 5.12  
Agriculture's contribution<sup>a</sup> to GDP, selected countries and California, average, 2001-2003

Country	Agriculture's share of GDP
	%
United Kingdom	1.0
Germany	1.2
Japan	1.4
California	1.4
United States	1.6
Canada	2.3
France	2.7
Italy	2.8
Australia	3.6
South Korea	3.8
Mexico	4.1
Russian Federation	6.0
Brazil	6.3
Argentina	8.0
New Zealand	9.0
China	15.5
India	23.6

*Source:* UC Agricultural Issues Center based on World Bank and, for California, California Department of Finance.

<sup>a</sup> Industry cultivation of crops and livestock production and forestry, hunting and fishing.

tion for Economic Cooperation and Development (OECD) (developed countries), California ranks 6th in gross value of agricultural production based on market exchange rates (Table 5.13). These data aggregate the individual members of the EU, therefore no data is available for member states such as France or Italy. The agricultural production value of the combined 25 members of the European Union is almost ten times larger than the California's production value. The value of California agriculture is four times larger than that of New Zealand. Developing countries are not part of the OECD database.

TABLE 5.13  
Value of agricultural production, selected countries and California, average, 2001-2003

Country	Production value <sup>a</sup>
	(\$ million)
EU- 25 <sup>b</sup>	270,440
USA <sup>c</sup>	193,522
Japan	71,984
Mexico	31,754
Russia	29,608
California	28,576
South Korea	25,804
Canada	21,735
Australia	19,967
Ukraine	10,165
New Zealand	6,994

*Source:* UC Agricultural Issues Center based on OECD and for California, Economic Research Service, USDA.

<sup>a</sup> Market exchange rates used.

<sup>b</sup> Includes all 25 members of the European Union: Austria, Belgium, Czech Republic, Cyprus, Denmark, Estonia, France, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovenia, Slovakia, Spain, Sweden, and the United Kingdom.

<sup>c</sup> Includes California.

## Conclusion

California agriculture plays a major role in California's large and diverse economy. Farm activity is just a part of this role because upstream and downstream linkages mean that inputs both to farming and the processing and marketing of farm products depend on farm production in California.

In this chapter we show that farming, forestry, fishing and hunting account for about 1.5 percent of the gross state product. When we include activity closely related to farming and indirect effects, the share rises to 6.5 percent of the state value added. The shares are larger in the Central Valley and especially the San Joaquin Valley.

California agriculture is large compared to the economic activity generated by agriculture in other countries. California agriculture ranks between 5th and 9th among countries of the world, depending which currency exchange rates are used.