

III. THE CHANGING STRUCTURE OF CALIFORNIA AGRICULTURE, STATISTICS, AND FINANCIAL INDICATORS: 1950-2000

A fuller appreciation of changes of the recent half century is the immediate precursor to an examination of the state of California agriculture as the industry enters the 21st Century. We first review the changing character of California agriculture from 1950 to 2000, focusing on major shifts in the structure of production (crops versus livestock, intensive versus extensive products), commodity composition, and geographic distribution. We then document the increasing importance of exports, followed by statistical information and financial indicators comparing California and aggregate national (U.S.) agriculture with respect to farm numbers, land in farms, farm real estate values, farm income, and selected financial ratios.

The Changing Character of California Agriculture: 1950-2000

Irrigated Area

Without doubt, the most significant structural changes of the half century were those that followed the addition of two major water projects that came online in this pe-

riod. Together, the federal CVP and the California SWPT brought more than three million additional acres under irrigation. As shown in Figure 2, irrigated acreage grew from 4.3 million acres prior to WWII to 6.4 million at the start of the 1950s. Expansion, mostly from CVP supplies, increased irrigated acreage to 7.4 million in 1959 and subsequent increases, mostly from SWP deliveries, yielded 8.5 million acres in 1978. The most recent census indicated that there were 8.7 million acres of irrigated land in 1997.

Value of Production

Expansion in irrigated production capacity plus rapid increases in productivity allowed California agriculture to experience very rapid growth in output at good prices (except for grains in the 1950s and 1960s) until the early 1990s. Demand growth fueled by rising incomes and population growth kept California agriculture on a steep growth path. In constant 1996 dollars, the market value of agricultural products sold grew from \$400 million in 1950 to nearly \$27 billion in 1997 (see Figure 3). The

Figure 2. Total Crop Land and Irrigated Land in Farms in California, 1869-1997

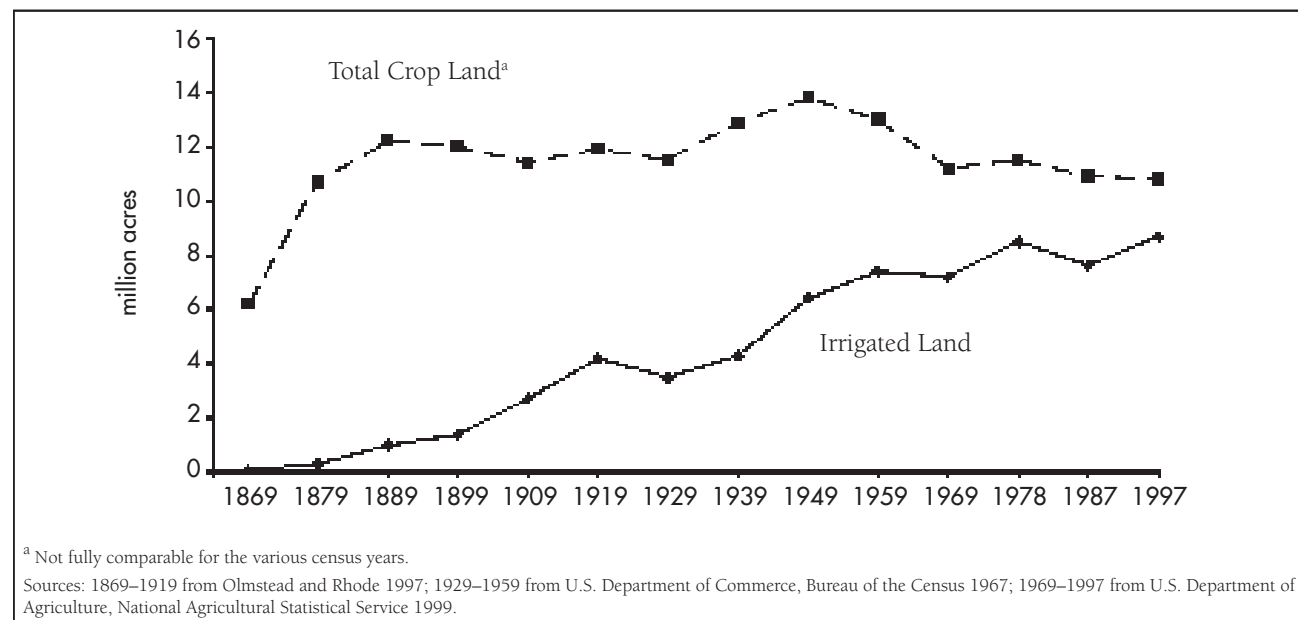
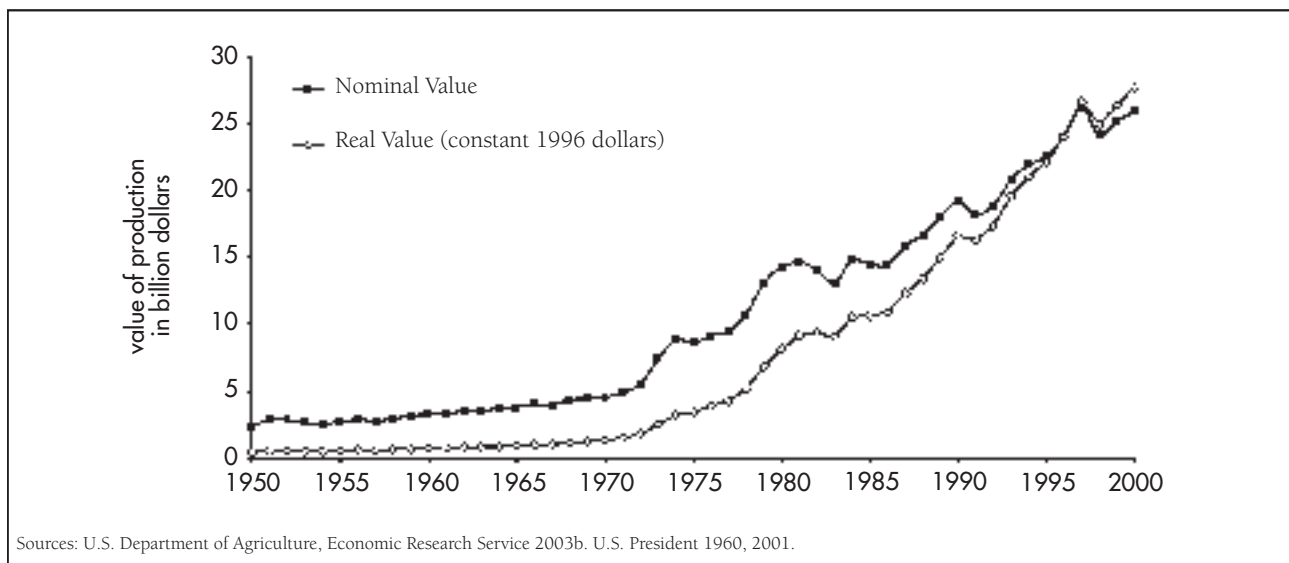


Figure 3. Value of California Crop and Livestock Production in Nominal and Constant 1996 Dollars, 1950–2000



upward trend in the real value of agricultural production was tempered by short periods of decline—in the mid-1970s (weaker foreign markets) and early 1980s (weak markets in general) and by economic recessions in the early 1990s and again at the end of that decade. However, within that overall picture of growth, there were significant changes in the composition of output, the importance of particular commodities, and the geographic location of production.

Plant versus Animal Production

The shares of the value of agricultural product sales coming from plant and animal products changed persistently over the past 50 years. As shown in Figure 4, crops made up 61 percent of sales in 1950 while livestock accounted for 39 percent.⁵ The shares remained relatively constant throughout the 1950s and 1960s with expansions both in crop production (acreage expansion) and livestock production (beef feedlots and dairy). However, livestock shares then fell steadily so that in 2000 three-quarters of the value of California production came from plant production (more intensive crops, i.e., perennials, vegetables, and nursery crops) and only one-quarter from livestock. The crop share in California was

much higher than the U.S. average of roughly 50/50 and significantly different from European agriculture, where animal products generated approximately two-thirds of sales.

Additionally, these broad trends hide significant changes that occurred within both the plant and livestock production categories. Figure 5 shows the shares of crop production made up by major crop categories: field crops (cereals, cotton, hay, etc.); fruits, nuts, and berries; vegetables and melons; and nursery and greenhouse products. Over 50 years, the field-crop share of total crop production fell steadily, dropping from 33 percent of value in 1950 to less than 10 percent in 2000. The share of intensive agricultural crops (fruits, nuts and berries plus vegetable crops) rose from 63 percent in 1950 to 77 percent of total crop products by 2000. Growth was most pronounced in nursery products (rising from 4 percent to 15 percent). These latter trends no doubt reflected (1) the shift in the preference of consumers with rising incomes toward fresh products, and (2) phenomenal growth in urban populations.

Shares also shifted significantly within the livestock sector. In 1950 poultry and poultry products made up about 23 percent of the value of production, dairy products constituted 26 percent, and meat animals

⁵ It is interesting to note that these are nearly the same shares that existed in 1910 (62 percent crops and 38 percent livestock).

Figure 4. Crop and Livestock Shares of Total Agricultural Production in California, 1950–2000

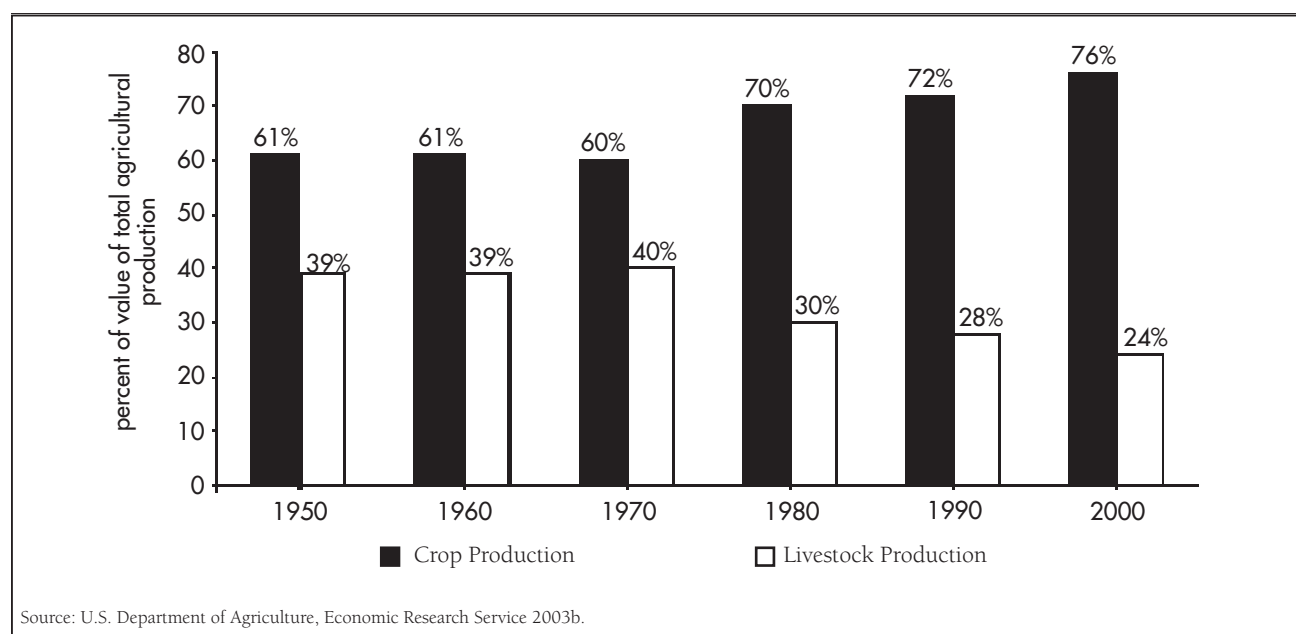
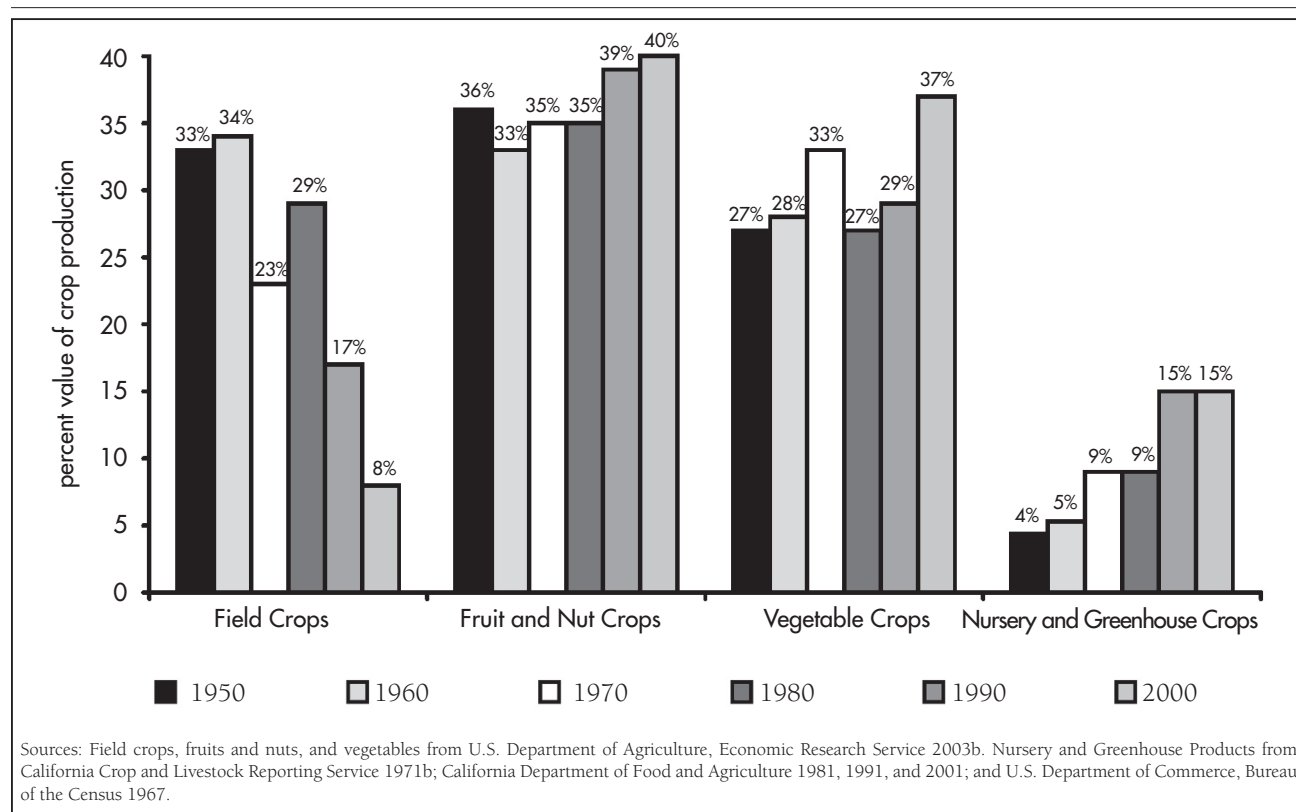


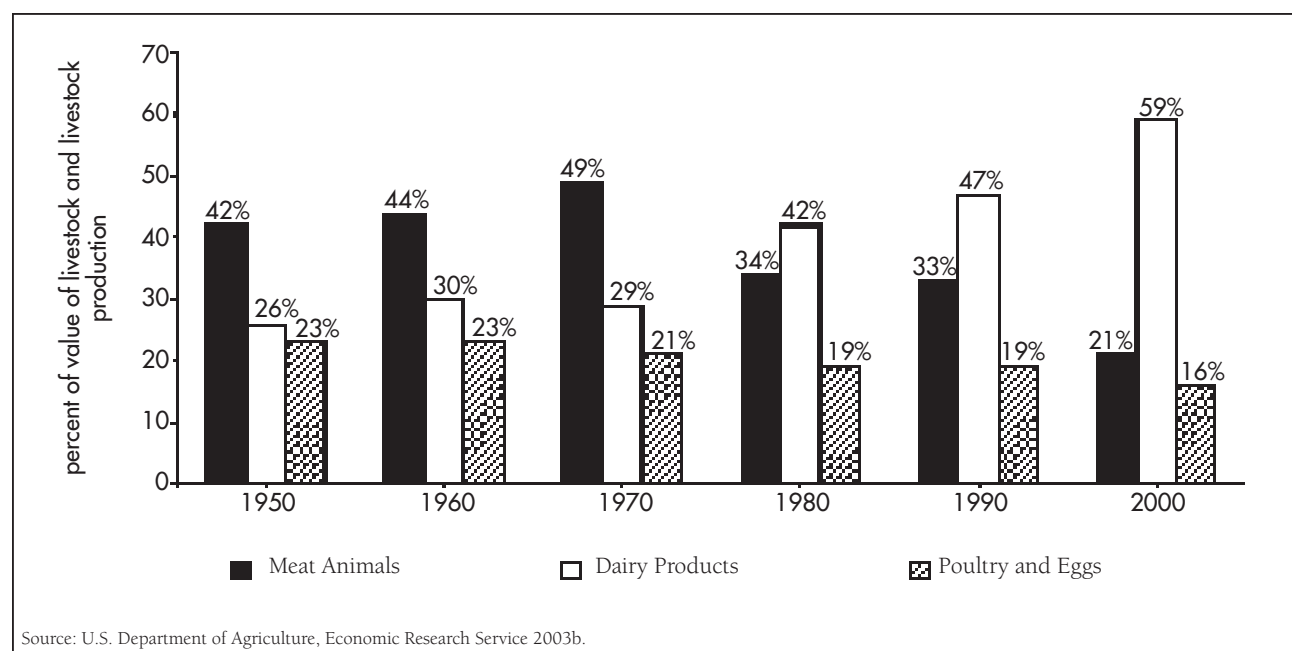
Figure 5. Relative Shares of the Production of Major Crops in California, 1950–2000



represented 42 percent (Figure 6). Over the 50-year period, poultry's share declined gradually to 16 percent. Cattle and calves increased very rapidly in the 1950s and 1960s as the large-scale feedlot boom hit California, rising to 49 percent of livestock value in 1970. Thereafter, the

share of the beef industry steadily declined, approaching 20 percent of value in 2000. The value of dairy production approached 60 percent of total livestock production in 2000, doubling in importance from shares of 30 percent or less in the period 1950 to 1970. We attempt to explain

Figure 6. Relative Shares of Livestock and Livestock Products in California, 1950–2000



some of the causes of these shifts in industry composition in the sections that follow.

Commodity Composition—Ranking and Value

At the aggregate level, California agriculture seems to be fairly stable and growing rapidly (Figure 3); but beneath the surface it is a caldron of perpetual change. Here, we look briefly at what commodities are important, followed in the next section by a discussion of where they are produced.

Table 1 attempts to capture the dynamics of an ever-changing commodity composition. Part A presents the top ten commodities in 1950 and what happened to their rankings over the next 50 years, and Part B presents the top ten commodities in 2000 and how their rankings changed over the past 50 years.

Several trends stand out in Part B. Dairy has clearly supplanted beef as the number-one commodity and now holds a commanding lead over the second-ranked commodity, grapes. Cattle and calves, ranked first from 1950 to 1970, were ranked fifth in 2000. Field crops' role in the top ten declined in relative importance. In

1950 four of the top ten were field crops (Part A)—cotton (number three), hay (number five), barley (number eight), and potatoes (number ten). In 2000 only two field crops remained in the top ten (Part B)—cotton (number six) and hay (number nine). Nursery products and flowers and foliage have come from relative insignificance to number three and number seven, respectively. Overall, products sensitive to rising incomes have grown in importance—grapes (wine), nursery products, flowers, lettuce, strawberries, and almonds make up six of the top ten.⁶

The share of the total value of production accounted for by the top ten commodities has fallen, reflecting a much wider spectrum of high-valued commodities produced on California farms and ranches. The top ten commodities accounted for 66 percent of the total value of agricultural production in 1950 but only 61 percent in 2000.⁷

⁶ Appendix Table A1 amplifies the changing commodity composition over recent decades by showing the ranking of the top 20 commodities for each decade, 1950 to 2000.

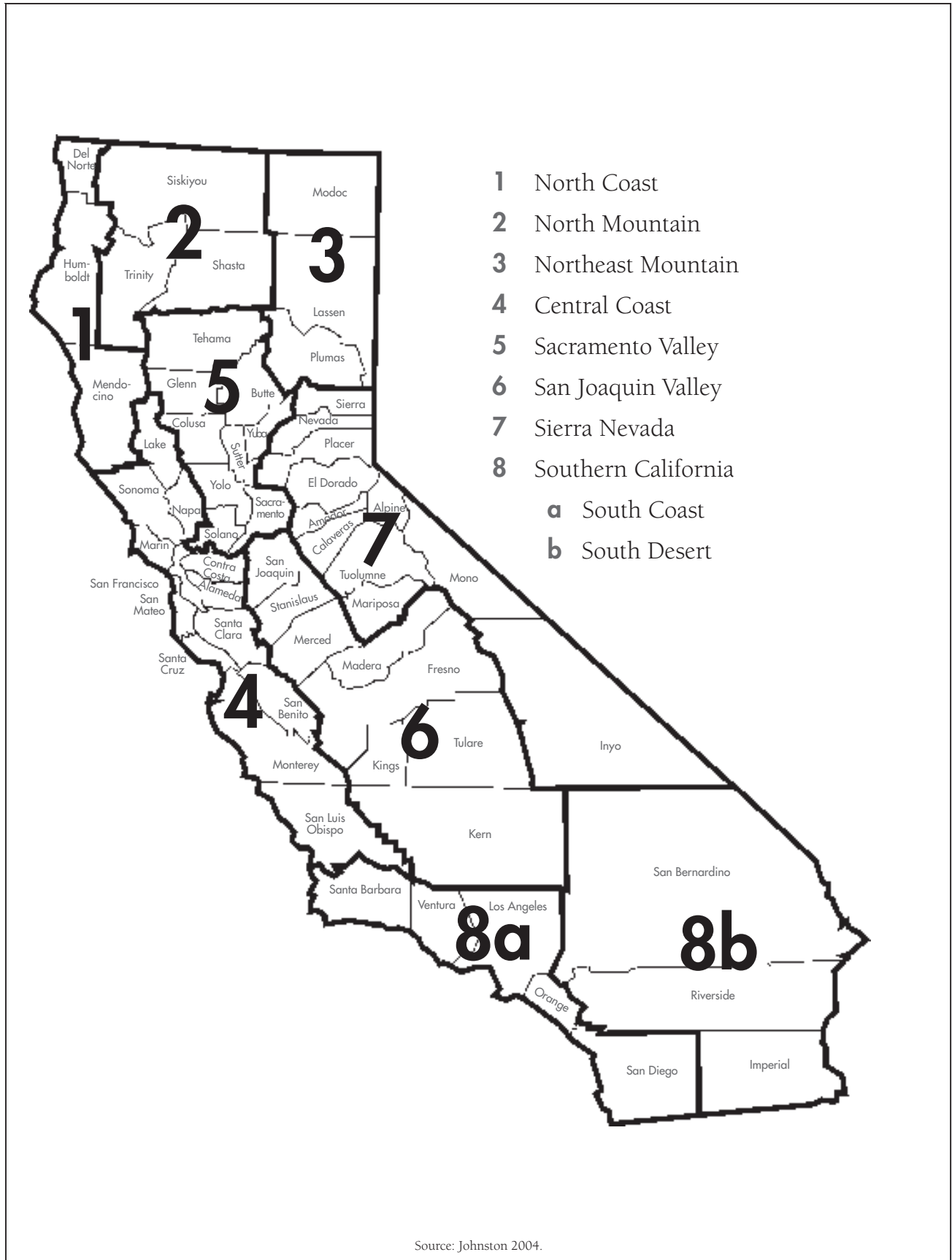
⁷ Appendix Table A3 lists commodities that accounted for 1 percent or more of the value of production and shows in more detail the shift from extensive to more intensive production over the past half century.

Table 1. California's Top Ten Agricultural Commodities, Where They Went, and Where They Came From, 1950-2000

Part A. Top Ten Commodities in the 1950 Annual Report and their Rankings in Subsequent Decades								
Commodity	1950 Value of Production (million dollars)	1950	1960	1970	1980	1990	2000	Trend
Cattle and Calves	321	1	1	1	2	2	5	▼
Dairy Products	238	2	2	2	2	1	1	▲
Cotton	202	3	3	6	3	4	6	▼
Grapes	158	4	6	3	4	3	2	▲
Hay	121	5	4	4	5	6	9	▼
Eggs, Chicken	105	6	5	5	11	12	24	▼
Oranges	92	7	7	10	15	11	16	▼
Barley	73	8	11	18	24	48	70	▼
Lettuce	59	9	9	7	10	8	4	▲
Potatoes	52	10	8	13	22	22	29	▼
Total Value of State Production in Million Dollars		2,321						
Top Ten as Percent of Total Value		66%						

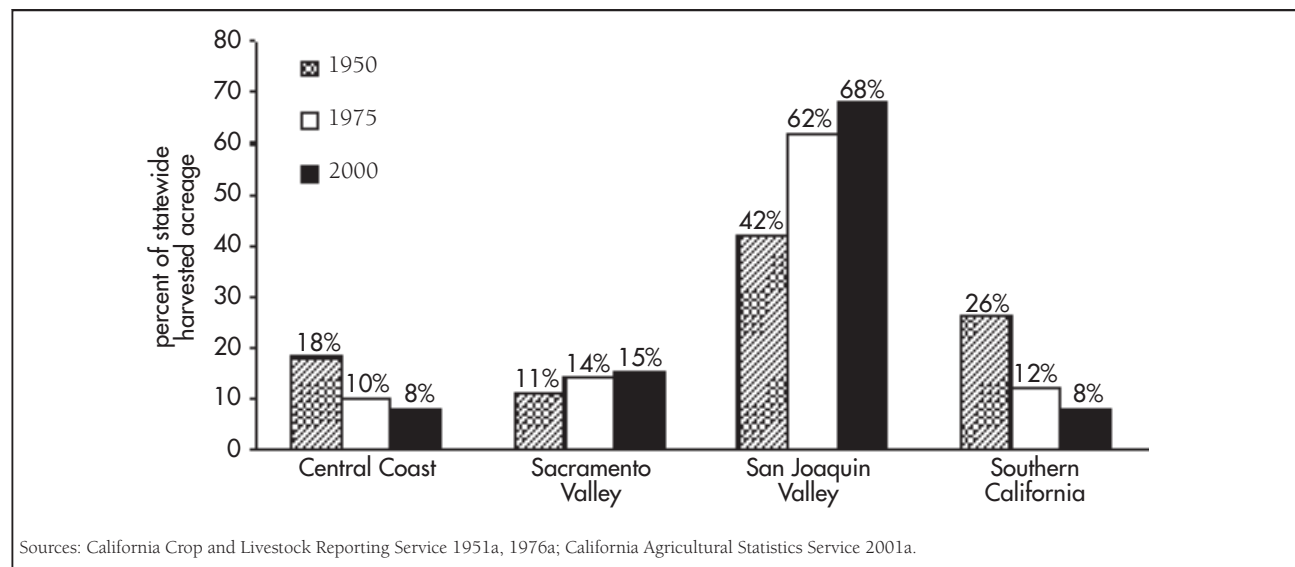
Part B. Top Ten Commodities in the 2000 Annual Report and their Rankings in Previous Decades								2000 Value of Production (million dollars)
Trend	1950	1960	1970	1980	1990	2000	Commodity	
▲	2	2	2	1	1	1	Milk and Cream	3,704
▲	4	6	3	4	3	2	Grapes	2,836
▲	n/a	n/a	9	6	5	3	Nursery Products	2,247
▲	9	9	8	10	8	4	Lettuce	1,484
▼	1	1	1	2	2	5	Cattle and Calves	1,267
▼	3	3	6	3	4	6	Cotton	898
▲	n/a	n/a	14	9	7	7	Flowers and Foliage	842
▲	25	18	19	14	13	8	Strawberries	767
▼	5	4	4	5	6	9	Hay	730
▲	23	19	17	7	10	10	Almonds	682
n/a – not available							Total Value of State Production in Million Dollars	25,509
							Top Ten as Percent of Total Value	61%

Figure 7. The Agricultural Production Regions of California



Source: Johnston 2004.

Figure 8. Fruit and Nut Crops' Share of Harvested Acreage by Major Agricultural Production Region for 1950, 1975, and 2000



Changing Location of Production— Agricultural Production Regions

The majority of agricultural production takes place in just four of the eight agricultural production regions of California (see Figure 7): Region 4 (Central Coast), Region 5 (Sacramento Valley), Region 6 (San Joaquin Valley), and Region 8 (Southern California).⁸

Major shifts of production among regions reflect progressively increasing demands for California products for both domestic and export markets, withdrawal of land from agricultural production because of population growth in temperate coastal areas (especially the Los Angeles basin), growth in higher-valued perennial and vegetable production displacing field-crop acreage in interior areas, and shifts within the Central Valley induced by surface-water deliveries. We examine the half-century of changes in regional shares of production for the major commodity groupings—fruit and nut crops, vegetable crops, and dairy products.

Fruit and Nut Crops

Statewide acreage of fruit and nut crops increased throughout the last half a century from about 1.5 million acres in 1950 to nearly 2 million in 1975 and 2.5 million in 2000. Yields per acre also increased, resulting in

production increases far above that of just acreage alone. Figure 8 shows that the share of the state's acreage fell in the Central Coast region from 18 to 8 percent and in the Southern California region from 26 to 8 percent. There were significant increases in the San Joaquin Valley (from 42 to 68 percent of state acreage); many of the additional acres are located in newly developed areas supported by federal and state water-delivery systems.

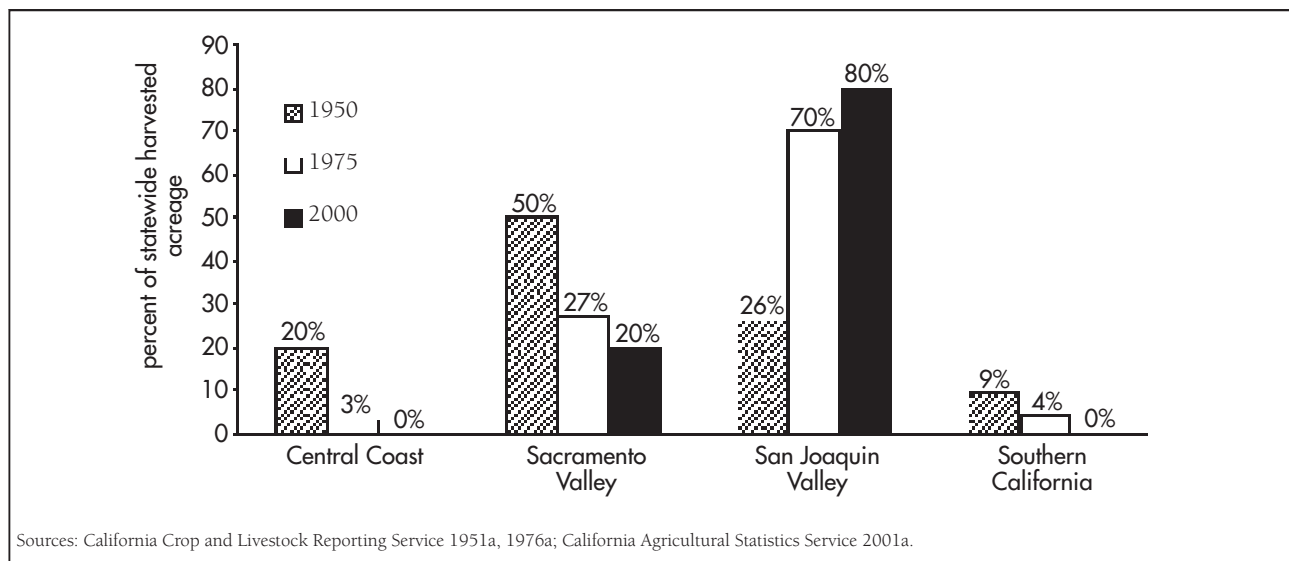
Commodity Example – Almonds. The shifting location of almond acreage reflects the shift of production southward in the Central Valley from the Sacramento to the San Joaquin Valley toward productive irrigated lands with newer cultural and management systems in the southern region. Urbanization displaced a large portion of the acreage in the Central Coast region.

Eighty percent of almond plantings are now located in the San Joaquin Valley (Figure 9). In 1950 three of the “top five” almond producing counties were located in the Sacramento Valley. In 2000 the top five counties accounted for more than two-thirds of statewide acreage, and all were located in the San Joaquin Valley (Appendix Table A2, Part A).

Commodity Example – Oranges. In 1950 four out of every five acres of oranges were in Southern California (Figure 10). The early dominance of Southern California counties (Orange, Los Angeles, San Bernardino, Ventura) waned within the next two decades, and acreage was

⁸ California's agricultural production regions are described in Johnston (2004).

Figure 9. Almonds' Share of Harvested Acreage by Major Agricultural Production Region for 1950, 1975, and 2000



progressively displaced northward to the east side of the San Joaquin Valley as CVP water deliveries began in the 1950s. San Joaquin Valley acreage rose by 85,000 acres between 1950 and 1975. Tulare County alone now accounts for more than half of the state's 207,000 acres of oranges, and 82 percent of the harvested acreage is now located in the San Joaquin Valley production region. Orange County, which had 60,109 acres of oranges in 1950, retained only 115 acres in 2000.

Appendix Table A2, Part B, identifies harvested acreages of oranges for the top five counties from 1950 to 2000. In 1950 the top five counties accounted for 85 percent of orange acreage. Concentration in the top five counties is now 93 percent of statewide acreage.

Vegetable Crops

High-valued production has persisted in the Central Coast and Southern California agricultural production regions (Figure 11). Statewide, acreage increased from about 700,000 acres in 1950 to nearly 900,000 in 1975 and to 1.5 million in 2000. Nearly 20 percent of all vegetable acreage is devoted to

processing tomatoes grown in the Central Valley. Without processing tomatoes, 2000's shares of harvested vegetable acreage are nearly equally distributed among the Central Coast, the San Joaquin Valley, and Southern California—34, 33, and 27 percent, respectively.

Commodity Example – Processing Tomatoes.

Processing tomatoes had several shifts in production as acreage grew from only about 75,000 acres in 1950 to 250,000 in 1975 and nearly 300,000 in 2000. In the 1950s production was concentrated in the northern San Joaquin and southern Sacramento Valleys (Figure 12). By 1975, harvested acreage and share increased in the Sacramento Valley, but it has since shifted to central and

Figure 10. Oranges' Share of Harvested Acreage by Major Agricultural Production Region for 1950, 1975, and 2000

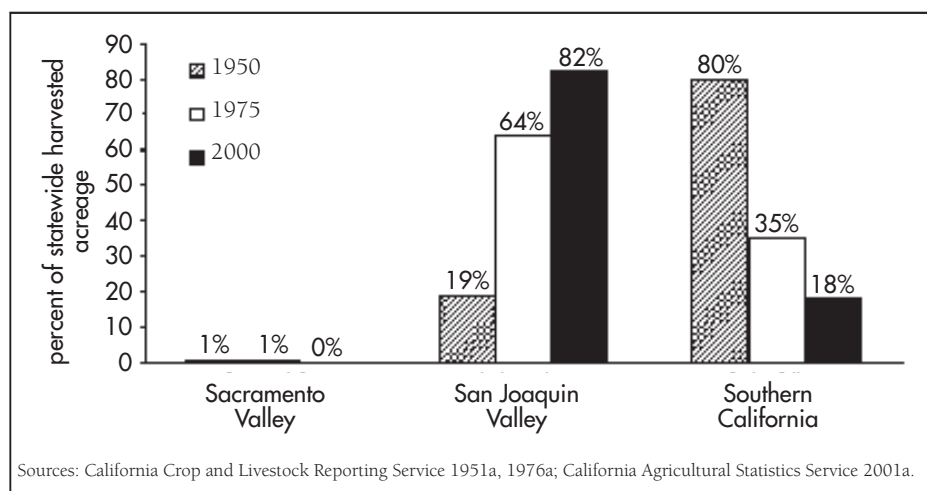
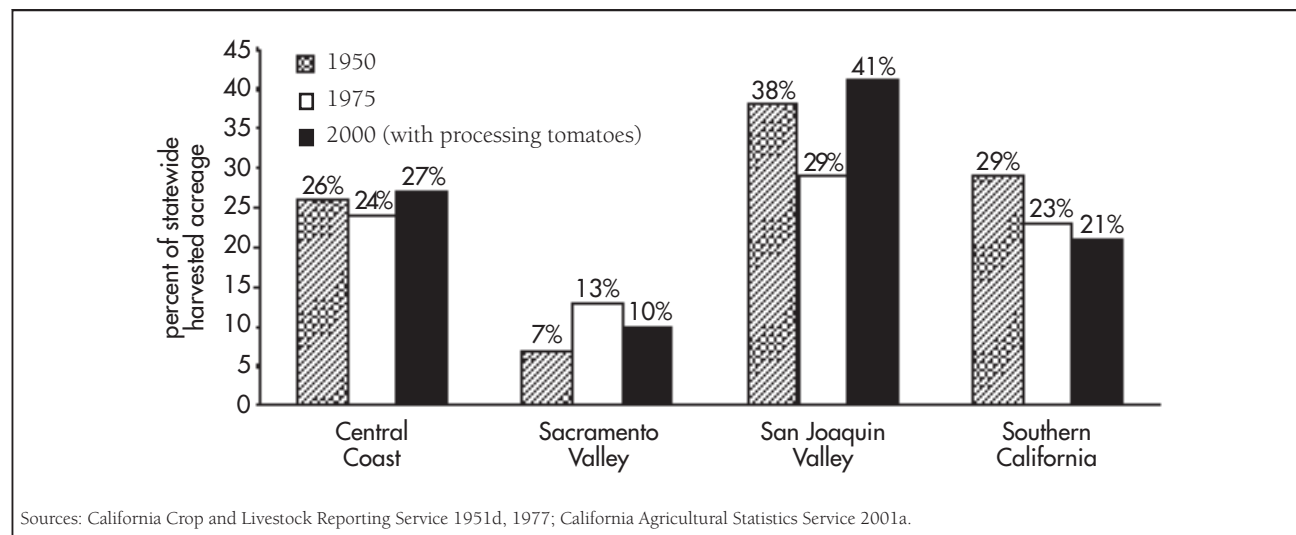


Figure 11. Vegetable Crops' Share of Harvested Acreage by Major Agricultural Production Region for 1950, 1975, and 2000



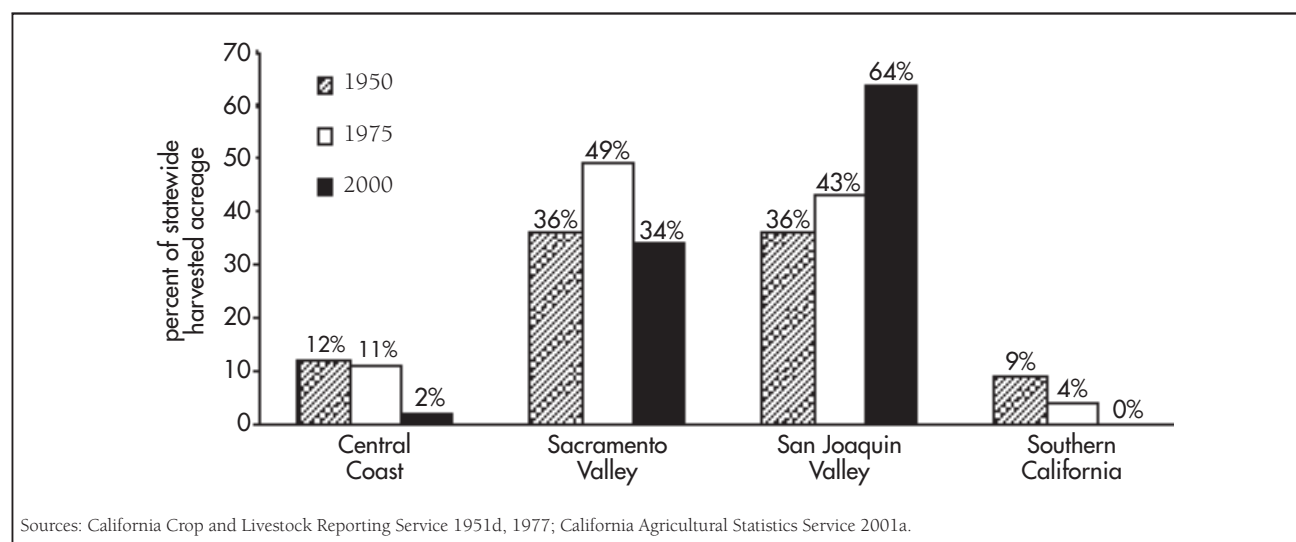
southern areas of the San Joaquin Valley, drawn by better growing seasons, higher solids for paste production, and improved water availability. San Joaquin County was the top county in 1950, Yolo County was number one in 1975, and Fresno, with nearly 40 percent of the state's harvested acreage, was the number one county in 2000 (Appendix Table A2, Part C).

Dairy Products

Dairy products now constitute about 15 percent of the

total value of California agricultural production. In 1950 dairy production was located primarily in proximate areas serving the Los Angeles and San Francisco fresh-milk markets. Los Angeles County ranked number one in dairy production in 1950, and its production was nearly twice the volume of Stanislaus', the number two ranked county. Stanislaus, Merced, and San Joaquin County each served the state's other metropolitan area—the San Francisco Bay Area. By 1970, Los Angeles' production was displaced from the top five due to the growth in dairying in adjacent San Bernardino and Riverside Counties (Appendix Table

Figure 12. Processing Tomatoes' Share of Harvested Acreage by Major Agricultural Production Region for 1950, 1975, and 2000



A2, Part D).

Total production has now grown manyfold with an increased variety of manufactured milk products. The chief shift in production has been from the Los Angeles basin into the southern San Joaquin Valley (Figure 13). Tulare County increased production continuously throughout the last 50 years and became the state's number one producer by 1970. The San Joaquin Valley now accounts for three-quarters of statewide production of dairy products, and Tulare County alone accounts for nearly a quarter of statewide milk production.

Changing Location of Production— Top Counties

Data presented in Table 2 confirms two fundamental trends in California agriculture. The first is the decline in importance of Southern California in overall value. Los Angeles produced the highest value of production in 1949 (highest also of any county in the United States) but had disappeared from California's top five by the 1960s.

The second trend is the rising importance of the southern San Joaquin Valley; Fresno, Kern, and Tulare County accounted for 21 percent of California production in 1949 and 32 percent in 2000. This reflects two things: (1) the shifts of high-value commodities (citrus and dairy) from Southern California, and (2) the enormous productive potential of both east-side agriculture and the newly irrigated agricultural land on the west side of the valley. The share of total value coming from the top five counties increased sharply, from 35 percent to 49 percent, over the 50-year period.

A few other points of note: California Department of Food and Agriculture (CDFA) preliminary data for 2001 put Tulare County in the number one spot, confirming the rising importance of dairy production to California. Monterey County has steadily increased its share of production, which rose from 3 percent in 1949 to 11 percent in 2000, reflecting a rapid increase in demand for fresh vegetables.

Table 3 lists the top ten California counties by value of crop and animal production. In 1950 Los Angeles County was number one but was shortly thereafter overtaken by Fresno County, which dominated throughout the last four decades of the 20th Century (until 2001). The

same six San Joaquin Valley counties are included in the 1950 and 2000 rankings (Fresno, Tulare, Kings, Merced, San Joaquin, and Stanislaus), but their relative rankings changed from decade to decade. There are three Southern California counties on both the 1950 ranking and the 2000 ranking, but they are entirely different counties. In 1950 Southern California counties included were Los Angeles, Imperial, and Orange; in 2000, they were San Diego, Riverside, and Ventura.

Increased concentration of statewide agricultural production occurred over the past half decade. The top five counties accounted for about a third (35 percent) of the value of production in 1950 and nearly half (49 percent) in 2000. The top ten counties accounted for slightly more than half (53 percent) of statewide production in 1950 and 70 percent in 2000.

In summary, population growth and water availability have been the two dominant underlying forces affecting regional shifts in the location of agricultural production within the state. Rapid postwar and continuing urban and suburban population expansions forced relocation to interior valleys—first from the Los Angeles basin and later from the central coast and San Francisco Bay Area. Only high-valued vegetables, nursery, and specialty crops persist because of climatic and location advantages in the remaining Central Coast and Southern California areas of production. Trees and vines have, when possible, moved from Southern California and Central Coast regions to those interior areas with more favorable soils and water supplies and less population pressures. The most favored area for increased intensive production, including dairies, is the San Joaquin production region. In general, the Sacramento Valley has had fewer opportunities to change the mix of commodities produced. In some cases, commodities traditionally grown in the Sacramento Valley have also found more productive locales in the newer crop areas of the San Joaquin Valley. Now, at the start of the 21st Century, urban development is placing pressure on agricultural production in the northern San Joaquin and southern Sacramento Valleys, setting in motion further dynamics affecting the future location of the state's agricultural production.

Figure 13. Dairy Products' Share of Production by Major Agricultural Production Region for 1950, 1975, and 2000

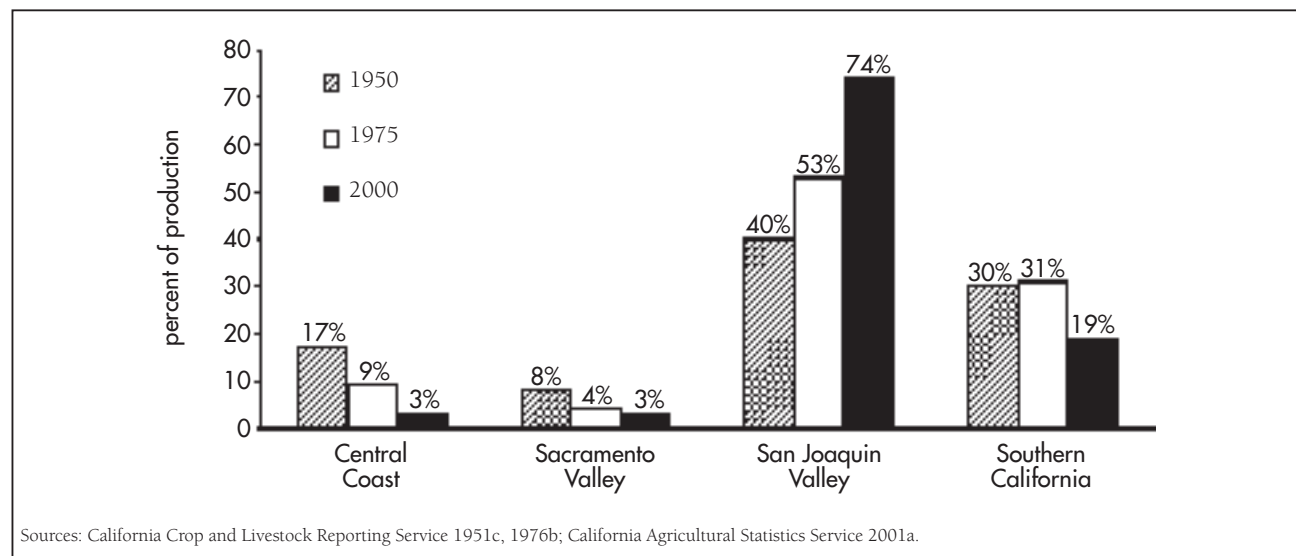


Table 2. California's Top Five Agricultural Counties, Where They Went, and Where They Came From, 1949-2000

Part A. Top Ten Commodities in 1949 and Where They Went								
Percent of Production in 1949	County	Rank						
		1949	1959	1969	1982	1992	2000	2001
9%	Los Angeles	1	5	15	16	21	28	27
8%	Fresno	2	1	1	1	1	1	2
7%	Kern	3	2	2	2	3	4	4
6%	Tulare	4	3	4	3	2	2	1
5%	San Joaquin	5	7	8	8	8	6	6
35%	Top Five							

Part B. Top Five Counties in 2000 and Where They Came From							
Rank						County	Percent of Production in 2000
1949	1959	1969	1982	1992	2000		
2	1	1	1	1	1	Fresno	13%
4	3	4	3	2	2	Tulare	11%
8	12	8	5	4	3	Monterey	11%
3	2	2	2	3	4	Kern	8%
10	9	9	6	5	5	Merced	6%
						Top Five	49%

Sources: California Department of Food and Agriculture 2001; U.S. Department of Commerce, Bureau of the Census 1952, 1961a, 1972, 1984, 1994.

Table 3. California's Top Ten Agricultural Counties Ranked by Value of Agricultural Sales, 1949–2000

Rank	County	Value of Sales (millions)	Percent of State Sales	Rank	County	Value of Sales (millions)	Percent of State Sales	Rank	County	Value of Sales (millions)	Percent of State Sales
1949 Census of Agriculture				1959 Census of Agriculture				1969 Census of Agriculture			
	California	1,742.0			California	2,824.5			California	3,875.2	
1	Los Angeles	157.0	9%	1	Fresno	276.0	10%	1	Fresno	379.2	10%
2	Fresno	144.0	8%	2	Kern	220.2	8%	2	Kern	304.9	8%
3	Kern	122.1	7%	3	Tulare	199.0	7%	3	Imperial	293.2	8%
4	Tulare	105.4	6%	4	Imperial	170.4	6%	4	Tulare	258.2	7%
5	San Joaquin	86.9	5%	5	Los Angeles	156.0	6%	5	Riverside	223.6	6%
6	Imperial	75.2	4%	6	Riverside	144.8	5%	6	Stanislaus	222.3	5%
7	Stanislaus	65.6	4%	7	San Joaquin	137.8	5%	7	San Joaquin	188.9	5%
8	Monterey	57.8	3%	8	Stanislaus	115.0	4%	8	Monterey	185.3	5%
9	Orange	56.5	3%	9	Merced	94.5	3%	9	Merced	145.8	4%
10	Merced	54.8	3%	10	Ventura	92.3	3%	10	Ventura	135.6	3%
	Top Five Counties		35%		Top Five Counties		36%		Top Five Counties		38%
	Top Ten Counties		53%		Top Ten Counties		57%		Top Ten Counties		60%
1982 Census of Agriculture				1992 Census of Agriculture				2000 Cdfa			
	California	12,491.4			California	17,052.0			California	27,162.1	
1	Fresno	1,495.6	12%	1	Fresno	2,081.5	12%	1	Fresno	3,418.6	13%
2	Kern	1,074.1	9%	2	Tulare	1,386.7	8%	2	Tulare	3,067.0	11%
3	Tulare	963.0	8%	3	Kern	1,336.9	8%	3	Monterey	2,923.3	11%
4	Imperial	741.8	6%	4	Monterey	1,212.7	7%	4	Kern	2,208.5	8%
5	Monterey	737.8	6%	5	Merced	907.6	5%	5	Merced	1,538.5	6%
6	Merced	655.4	5%	6	Stanislaus	897.1	5%	6	San Joaquin	1,348.7	5%
7	Riverside	619.2	5%	7	Riverside	846.9	5%	7	San Diego	1,253.8	5%
8	San Joaquin	593.2	5%	8	Imperial	753.0	4%	8	Stanislaus	1,197.3	4%
9	Stanislaus	555.4	4%	9	Ventura	667.8	4%	9	Riverside	1,048.6	4%
10	San Bernardino	479.1	4%	10	Kings	581.8	3%	10	Ventura	1,047.1	4%
	Top Five Counties		40%		Top Five Counties		41%		Top Five Counties		48%
	Top Ten Counties		63%		Top Ten Counties		63%		Top Ten Counties		70%

Sources: California Department of Food and Agriculture 2001; U.S. Department of Commerce, Bureau of the Census 1952, 1961a, 1972, 1984, 1994.

Agricultural Exports

California's farms and ranches have always relied on exporting a significant share of total production to foreign markets, which recently amounted to a fifth or more of the total value of production. The value of California agricultural exports ranged from \$6.5 to \$7 billion over the five-year period 1997–2001.

Table 4 shows export values and rankings for California's

most important agricultural export commodities for 1997 and 2001.⁹ The rankings of most important exported commodities did not change much between 1997 and 2001. Almonds and cotton, the top two export commodities, each with exports exceeding \$600 million, had exports valued significantly less in 2001 than in 1997. The largest percentage of increase in export values was for carrots (+69.2 percent) and dairy (+57.5 percent);

Table 4. California Agricultural Export Values and Rankings for 1997 and 2001

Commodity	Ranking		Export Value (Million Dollars)		Percent Change
	2001	1997	2001	1997	1997-2001
Almonds	1	2	685.6	\$818.3	-14.3
Cotton	2	1	604.5	918.3	-33.4
Wine	3	3	470.9	375.9	+25.3
Table Grapes	4	4	394.5	330.3	+19.4
Dairy	5	8	338.4	214.8	+51.5
Oranges	6	5	297.5	308.4	-3.5
Tomatoes, Processing	7	7	211.7	226.3	-6.5
Walnuts	8	10	179.1	153.0	+17.0
Rice	9	11	166.4	144.4	+15.2
Beef and Products	10	6	154.8	262.0	-40.9
Prunes	11	13	149.5	139.2	+7.3
Raisins	12	9	144.1	199.8	-27.9
Lettuce	13	14	142.6	120.8	+18.0
Strawberries	14	15	136.1	116.5	+16.8
Peaches and Nectarines	15	18	118.7	102.1	-16.3
Pistachios	16	16	108.9	113.4	-4.0
Broccoli	17	19	89.2	87.7	+1.7
Hay	18	12	86.3	141.2	-38.9
Lemons	19	17	75.7	119.9	-36.9
Carrots	20	27	68.0	40.2	+69.2
Total of 50 Principal Animal and Plant Commodities			5,348.6	5,673.2	-5.7
Total of All Agricultural Exports			6,521.9	6,995.5	-6.8

Sources: Bervejillo and Sumner; Kuminoff et al.

decreases of 30 percent or more occurred for beef and products, hay, lemons, and cotton. An improvement in commodity prices from lower price levels could significantly increase the value of agricultural exports in the 21st Century.

Exports have always been important to California's farmers and ranchers. Over time, changes in the character of California agriculture have changed the kinds of animal and plant commodities significantly entering export markets. Table 5 compares the most recent list (2001) of the top 20 export commodities with that of two decades

earlier (1980). Comparable export values do not exist for these two periods, but the two lists of rankings do reflect the agricultural sector's shift toward production (and exports) of higher-valued dairy, fruits, tree nuts, and vegetables.

Export outlets are crucial for many of California's commodities. It is estimated that in 2001 the quantities exported were nearly half or more for rice, pistachios, almonds, prunes, and cotton produced on California's farms and ranches (Table 6). Note that the export of grapes and grape products appears as the first commod-

⁹ Changes in the value of exports reflect changes in export quantities as well as export prices. Prices for many commodities were low in 2001 so a decline in export value could occur even with larger export quantities over the period.

Table 5. Changes in the Composition of the Top 20 California Agricultural Exports between 2001 and 1980

Rank	2001	1980
1	Almonds	Cotton
2	Cotton	Almonds
3	Wine	Rice
4	Table Grapes	Wheat
5	Dairy	Grapes, All Uses
6	Oranges	Oranges
7	Tomatoes, Processing	Lemons
8	Walnuts	Cattle and Products
9	Rice	Walnuts
10	Beef and Products	Peaches
11	Prunes	Prunes
12	Raisins	Tomatoes, All Uses
13	Lettuce	Cottonseed
14	Strawberries	Dairy Cattle and Products
15	Peaches/Nectarines	Alfalfa
16	Pistachios	Dry Beans
17	Broccoli	Chickens and Products
18	Hay	Lettuce
19	Lemons	Onions
20	Carrots	Pears

Sources: Bervejillo and Sumner; California Department of Food and Agriculture 1981.

ity in this table as the most important agricultural export. The aggregate of fresh grape, wine, raisin, and grape juice exports was more than \$1 billion, easily topping the value of almonds or cotton alone (Bervejillo and Sumner). In 2001 17 percent of the quantity of production of the top 50 export commodities was exported.

Economic conditions in East Asia and Europe are important to exporters (Table 7). Shares of exports have not changed much over the recent past. Roughly a fifth is exported to each of the following markets: Japan, other East Asian nations, the European Union, Canada, and the rest of the world, including Mexico and Latin America. Changes in foreign economic conditions, trading relationships, and exchange rates significantly affect the bottom line for California producers.

Table 6. Ratio of Farm Quantity Exported to Farm Quantity Produced (Top 14 Export Commodities in 2001 Compared to 1997)

Commodity	2001 Percentage	1997 Percentage
Grapes, All Uses ^a	22	21
Almonds	67	55
Cotton	87	82
Dairy	6	5
Oranges	27	32
Tomatoes, Processing	13	15
Walnuts	33	27
Rice	49	27
Beef and Products	6	9
Prunes	69	36
Lettuce	8	8
Strawberries	13	12
Peaches and Nectarines	11	20
Pistachios	50	32

^a Includes export values of fresh grapes, raisins, wine, and grape juice. Sources: Bervejillo and Sumner; Kuminoff et al.

Selected Farm Statistics: 1950–2000

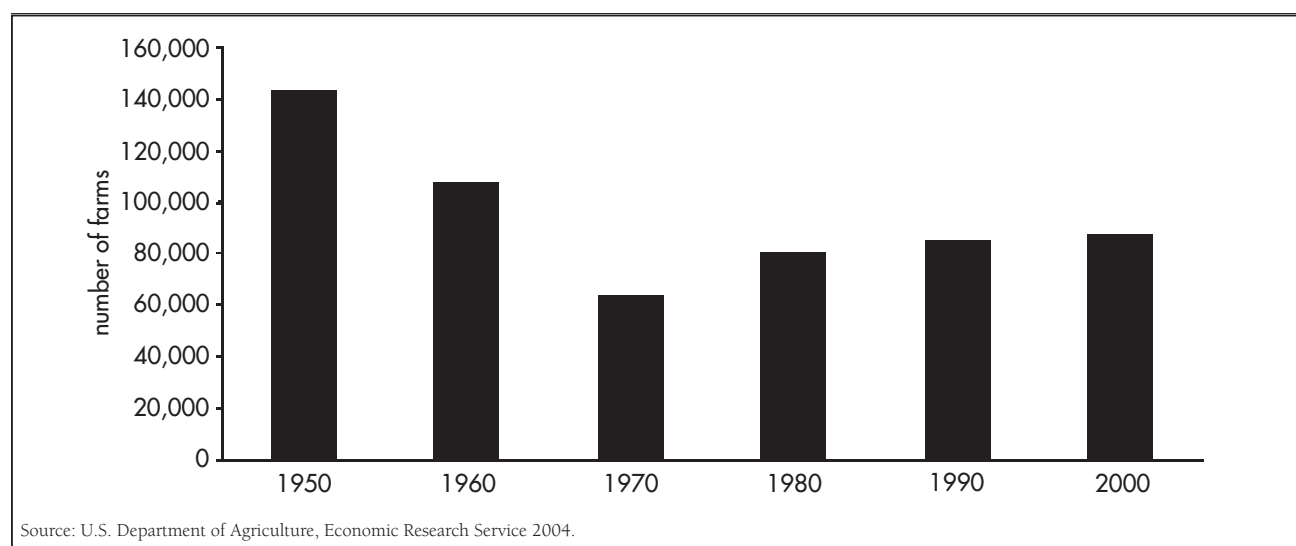
This final section contains additional information to enhance understanding of the changing character of California agriculture. Specifically, we now assess structural dimensions of California agriculture—farm numbers and the value of agricultural production.¹⁰

Table 7. Percent of California Agricultural Export Value Shipped to Major Markets in 2001 and 1998

Export Market	Percentage of Top 50 Commodity Exports	
	2001	1998
East Asia	40	41
(Japan)	(18)	(22)
European Union	21	22
Canada	22	20
Rest of the World	17	17

Sources: Bervejillo and Sumner; Kuminoff et al.

Figure 14. Number of California Farms for Selected Years, 1950–2000



Farm Numbers

The number of farms in California fell sharply from 144,000 to 64,000 over the period 1950–1970. Farm numbers subsequently rose from 81,000 farms in 1980 to 85,000 farms in 1990 and peaked at 89,000 in 1998 and 1999.¹¹ There were an estimated 87,500 farms in California in 2000 (Figure 14).

The U-shaped pattern of farm numbers in California differs from the pattern observed for the United States over the same time period. The number of U.S. farms fell continuously from 5.6 million in 1950 to 4.0 million in 1960, 2.9 million in 1970, and 2.4 million in 1980 and has ranged between 2.1 and 2.2 million from 1986 to the present.

What is a Farm?

A farm for statistical purposes is any “place” from which \$1,000 or more of agricultural products were or normally would have been sold. This Census of Agriculture definition has been used in a consistent manner since 1974.¹² While there were an estimated 87,000 farms in California in 1997 (CDFA, National Agricultural Statistical Service), the *1997 Census of Agriculture* contained detailed information only for the 74,126 farms for which responses to its mail census survey were received.¹³

The following description of the structure of California agriculture is based on *1997 Census of Agriculture* information. Respondents ranged from very small retirement, residential, and lifestyle farms to operations with sales in the millions of dollars. While average farm size was 374 acres, 28 percent of the enumerated farms were less than nine acres in size and 60 percent were less than 50 acres in size. The average market value of agricultural

¹⁰ More detailed information about the structure and performance of California agriculture, land in farms, farm real estate values, farm incomes, and financial ratios may be found in the University of California Agricultural Issues Center publication *The Measure of California Agriculture, 2000* (Kuminoff and Sumner).

¹¹ Because the definition of a farm is based on the value of agricultural sales in nominal terms and has not changed since 1974, rising farm numbers over the past three decades is due, in part, to the effect of inflation over the time period.

¹² For the 1969 and previous censuses, the definition of a farm was \$250 or more sold on establishments less than ten acres in size; alternatively, places of ten acres or more were counted as farms if sales amounted to at least \$50.

¹³ The difference between the census enumeration of 74,126 farms in 1997 and the U.S. Department of Agriculture (USDA), National Agricultural Statistics Service (NASS) (1999) estimate of 87,000 farms in 1997 is the subsequent adjustment for four components of error in the census farm count. Undercounts were due to farms not being on the mail list and to farms incorrectly classified as nonfarms. Overcounts were due to farms duplicated or enumerated more than once and to nonfarms incorrectly classified as farms (see USDA, NASS, *1997 Census of Agriculture: California, State and County Data*, Volume 1, Geographic Series, Part 5, Appendix C.) For the most part, the additional 13,847 farms identified in the coverage overview and revision were low value producers. Only 3,580 farms produced \$10,000 or more of agricultural product (Appendix C, Table G).

Table 8. Distribution of “Smaller” and “Larger” Farms in California and the United States, 1997

	Proportion of All Farms	Proportion of Total Sales
Smaller Farms (Sales <\$250,000)		
California	84%	9%
United States	91%	33%
Larger Farms (Sales >\$250,000)		
California	16%	91%
United States	9%	67%

Source: U.S. Department of Agriculture, National Agricultural Statistics Service 1999.

products sold was \$310,718 per farm, but 35 percent of the farms sold less than \$5,000 and 65 percent sold less than \$50,000 per farm. An occupation other than farming was the principal occupation of 47 percent of “farm” operators.

Farm Numbers and Agricultural Production

The U.S. Department of Agriculture’s (USDA’s) Economic Research Service (ERS) recently developed a farm typology based primarily on annual sales of farms and the occupation of owners (USDA ERS 2001). Specific data for California farms were not included in the ERS study, but some parallel inferences can be identified.

Smaller Farms

Farms with annual sales of less than \$100,000 likely capture the majority of the many “limited resource/retirement/residential/lifestyle” farms in California. Such farms account for 74 percent of all farms (90 percent of farms with operators having a principal occupation other than farming) but produce only 4 percent of the total value of agricultural sales. Farms with annual sales between \$100,000 and \$250,000 may be operated by someone who identifies principal occupation as farming. Farms in this sales grouping make up 10 percent of all farms and contribute 5 percent of total sales.

Smaller California farms, those with less than \$250,000 in agricultural sales, make up 84 percent of all farms. They account for 73 percent of farming-occupation farms and almost all (96 percent) of the other-occupation farms.

Given the intensive nature and frequently high cost of production, unenviable standards of living (low net farm incomes) might still be associated with even the larger farms in this group. These farms reflect smaller proportions of total farms and total sales in California than are estimated for the United States with ERS typology groupings (Table 8). In contrast, 91 percent of U.S. farms sold less than \$250,000 of agricultural products and accounted for 33 percent of total agricultural sales.

Larger Farms

The remaining 12,147 California farms, those with more than \$250,000 in sales, made up one of every six farms (16 percent) in 1997 and accounted for 91 percent of sales. Extreme skewness is noted within this grouping. The largest group, consisting of 4,775 farms (6 percent of California farms), had sales exceeding a million dollars and accounted for 75 percent of total sales. In contrast, only 9 percent of U.S. farms had sales of \$250,000 or more. They accounted for 67 percent of total U.S. sales of agricultural products.

Is the Concentration of Agricultural Production Increasing?

It is generally asserted that farming in the United States has become more concentrated as farm numbers have declined and more complex as farm operators have adjusted to change. Has the concentration of agricultural production in California become more pronounced over time? The census data show little change over the past two decades in the number of larger farms producing approximately three-quarters of the value of agricultural products sold (Table 9).

Land in Farms

Land being used for agricultural production in California decreased by 26 percent over the period 1950–2000. There were nearly ten million fewer acres (about 15,500 square miles) of land in California being farmed in 2000 than in 1950. Acreage increased from 37.5 million acres in 1950 to 39 million acres in the late 1950s, but since then there has been a continual decline in area throughout the remainder of the 20th Century (Table 10).

The relative reduction in the state’s agricultural land

Table 9. Proportion of Large Farms Producing about 75 Percent of Sales for 1978, 1987, and 1997

Census Year	Proportion of Farms	Proportion of Sales
1997	6.4%	74.8%
1987	6.8%	74.0%
1978a	4.4%	65.3%
1978b	10.2%	80.8%

Sources: U.S. Department of Agriculture, National Agricultural Statistics Service 1999; U.S. Department of Commerce, Bureau of the Census 1981, 1989.

area is greater than that for the United States; land area in U.S. farms decreased by only 22 percent over the same period (1950–2000).

Farm Real Estate Values

Land is an important farm asset for farmers and ranchers. Farm real estate values include land and buildings plus permanent appurtenances (trees, vines, permanent irrigation systems, etc.). USDA statistics show substantial appreciation over time in the value of land and buildings (Figure 15). The average value in California in 1950 was \$154 per acre. The nominal value of \$2,850 per acre in 2000 is 18.5 times larger than that for 1950. Real appreciation is about 250 percent when adjusted for inflation.

There is, of course, wide variation in per-acre values depending on the location and the highest and best use of California's agricultural land. Select vineyard and vegetable lands are considerably higher in value and have displayed

Table 10. Land in Farms in California and the United States in Millions of Acres for 1950–2000

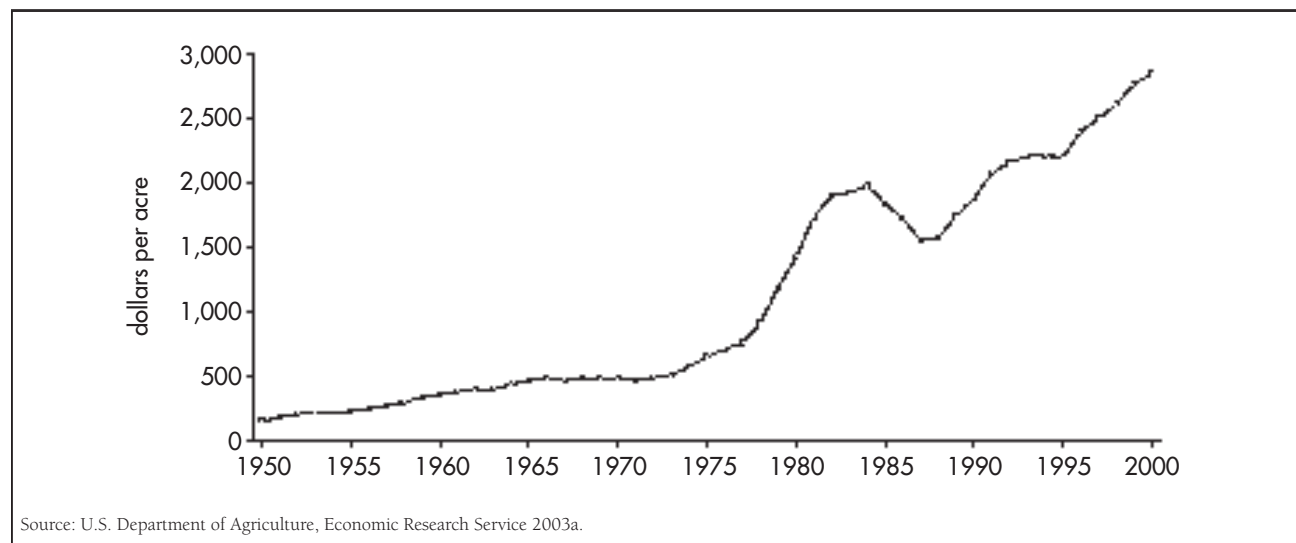
Year	California	United States
1950	37.5	1,202
1960	38.8	1,171
1970	36.6	1,088
1980	33.8	1,035
1990	30.8	987
2000	27.8	943

Source: U.S. Department of Agriculture, Economic Research Service 2003b.

greater appreciation than statewide averages. Table 11 shows USDA-estimated values for several broadly defined statewide types of California agricultural land in 2000.

Statewide averages are of limited use in reflecting the large variation in values of land in various areas of the state even if they had similar highest and best uses. For example, the California Chapter of the American Society of Farm Managers and Rural Appraisers (CALASFMRA) reported wine-grape values ranging from \$3,500 to \$180,000 per acre in 2000, along with considerable variation in opinions about market activity and price trends depending on location within the state. Vineyards in the North Coast region ranged in value from \$12,000 to \$180,000 per acre depending on other factors, such as location or rootstock.¹⁴

Sales information for irrigated crop land reveals a range from \$600 to \$49,000 per acre depending on location, highest and best use, and water source. Central Valley

Figure 15. Average Value of Land and Buildings in Farms in California, 1950–2000

sales values range from a low for Kings County lake-bottom irrigated crop land (\$660 to \$1,600 per acre) to a high for choice irrigated crop land in San Joaquin County (\$5,500 to \$9,000 per acre). Coastal irrigated land values were substantially greater. In Monterey County values ranged from a low of \$9,000 per acre in the King City area to a range of \$20,000 to \$39,000 per acre in the prime vegetable production area of the lower Salinas Valley (CALASFMRA).

Farm Incomes

Gross Farm Income

California's share of U.S. gross farm income (GFI) has increased over the past 50 years. It was about 9 percent of the U.S. GFI in 1960 and 1970 and in the low teens in 1990 and 2000 (Table 12). Net farm incomes (with direct government payments) also show a similar relative performance, amounting to 9 percent of the U.S. gross in 1960 and 11 percent in 2000.

Net incomes to farmers and growers are influenced

Table 11. Average Value of California's Agricultural Land on January 1, 2000

Type of Land	Value of Land and Buildings Dollars per Acre
Pasture Land	\$1,000
Crop Land	\$5,870
Nonirrigated	\$1,400
Irrigated	\$6,400

Source: U.S. Department of Agriculture, National Agricultural Statistics Service 2001.

by changes in prices, productivity, factor costs, and net government transactions, including direct government payments, licenses, and property taxes. Producers of basic commodities (cotton, rice, cereals) are the primary recipients of direct payments. However, because a large share of California's farmers and ranchers do not receive direct government payments, its share of net income amounted to 20 percent of the U.S. net farm income without direct government payments.

Net Farm Income

Net farm incomes to California farmers and ranchers were constant (about \$1 billion) and without much variation during the 1960s (Figure 16). For most of the 1990s, incomes ranged from \$5 to \$6 billion with considerable year-to-year variation, presenting a difficult financial environment for agricultural producers. California farmers experienced reduced levels of net farm incomes beginning in 1997, which was also true for the net farm incomes of all U.S. farmers. The two interim decades (from 1970 to 1990) were expansive years, showing growth in production capacity statewide and cyclical variations that were mostly associated with offshore market opportunities gained and lost. California's share of U.S. net farm income increased from 9 to 11 percent over the period 1960–2000.

In contrast, U.S. net farm income growth was more gradual through the 1980s, except for a spurt in the early 1970s, due again to export market opportunities that were attractive to all U.S. crop and livestock producers. The

Table 12. Gross and Net Farm Income for California and the United States for Selected Years, 1960–2000

Year	Gross Farm Income (in Billion Dollars)			Net Farm Income with Direct Government Payments			Net Farm Income without Direct Government Payments		
	U.S.	CA	% Total	U.S.	CA	% Total	U.S.	CA	% Total
			U.S.			U.S.			U.S.
1960	37.9	3.4	9	11.2	1.0	9	10.5	1.0	10
1970	55.1	4.7	9	14.4	1.0	7	10.7	0.9	8
1990	188.8	20.2	11	44.6	5.7	13	35.3	5.3	15
2000	218.6	27.2	12	46.4	5.3	11	23.5	4.8	20

Source: U.S. Department of Agriculture, Economic Research Service 2003a.

¹⁴ Napa and Sonoma Counties reflected vineyard values ranging from \$55,000 to \$180,000 per acre. The range in values for Lake and Mendocino County vineyards ranged from \$12,000 to \$65,000 per acre (CALASFMRA).

Figure 16. Net Farm Income (Billion Dollars) in California, 1960–2000



more significant growth in net incomes occurred from the 1980s through the mid-1990s (Figure 17).

Ratios of Farm Debt to Net Farm Income

California's share of U.S. farm debt increased from 9.7 to 10.1 percent over the period 1960–2000, reflecting the more capital-intensive nature of California's agriculture. U.S. and California ratios of debt to net farm income were very comparable through the 1960s to 1973 (Figure 18).

Since 1973, the U.S. ratio has been higher than that of California and considerably higher during the remainder of the 1970s to the mid-1980s, leading up to the farm financial crisis of the mid-1980s. U.S. farm debt ranged

from 5 to 13.4 times net farm income throughout the period 1976–1986, considerably higher than ratios for California farms. (Interest payments, ranging from \$16.3 to \$21.8 billion over the period 1980–1986, were greater than net farm income in several years.) U.S. ratios of debt to net farm income since 1987 continue to exceed the California ratio, ranging from three to four times net farm income.

Figure 17. Net Farm Income (Billion Dollars) in the United States, 1960–2000

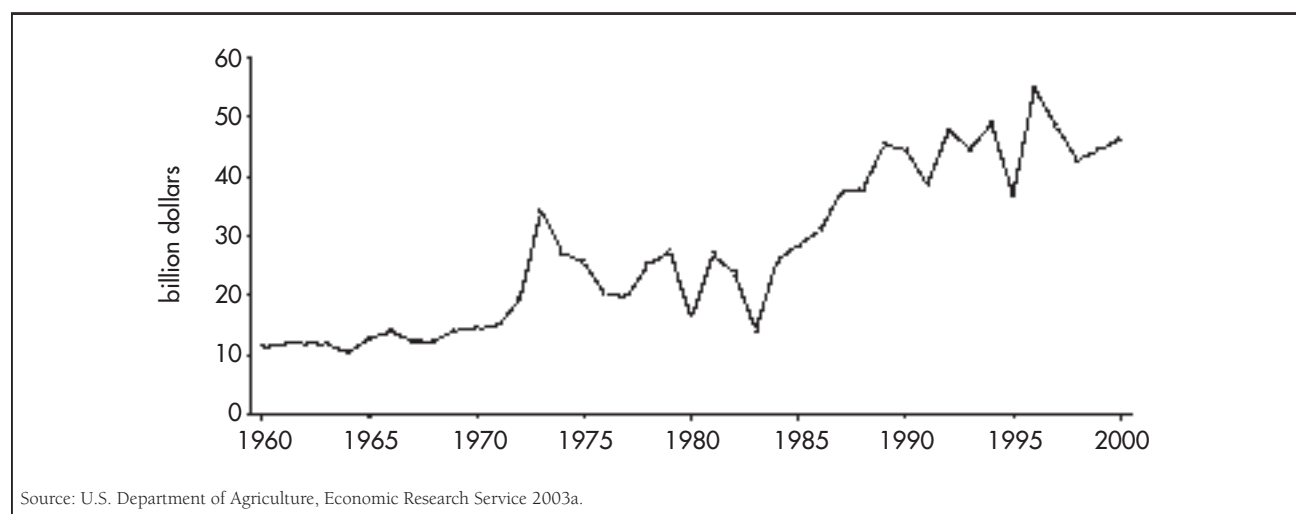


Figure 18. Ratios of Debt to Net Farm Income for California and the United States, 1960–2000

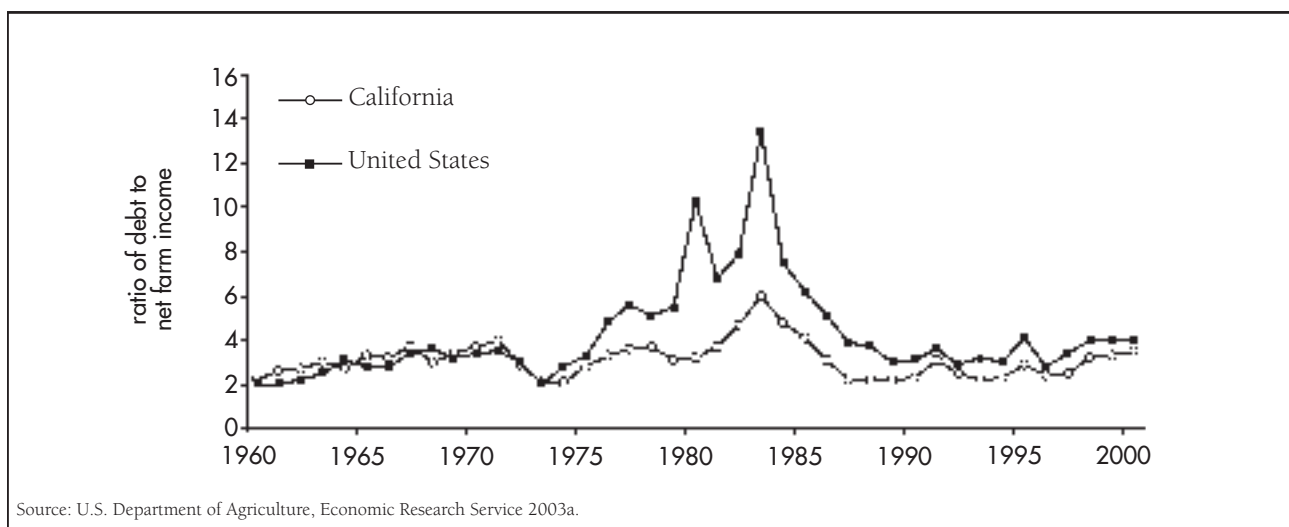
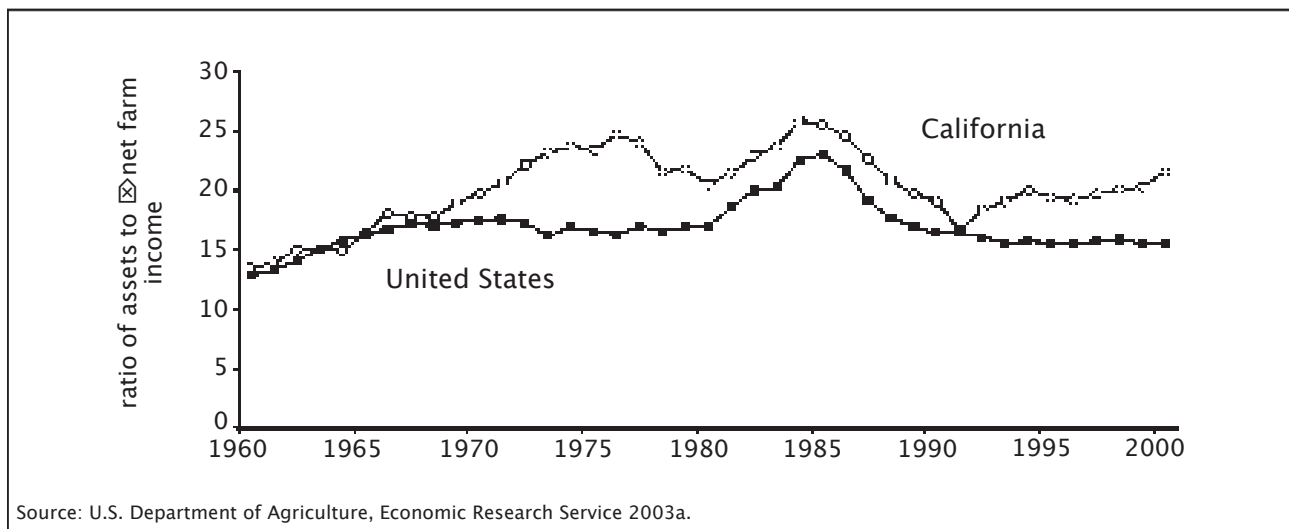


Figure 19. Ratios of Assets to Net Farm Income for California and the United States, 1960–2000



Farm Debt to Asset Ratios

The capital-intensive nature of California agriculture is reflected in the debt-asset ratio, which was persistently higher than the U.S. ratio over the period 1960–2000 (Figure 19). In general, the change in U.S. and California ratios was similar over time with one notable exception. Whereas the U.S. ratio remained relatively unchanged from the mid-1960s through the 1970s (between 16 and 18 percent), the California ratio reflected the sharply increased indebtedness required to develop new lands and perennial plantings.

Summary

The last half of the 20th Century witnessed dramatic change in the character of California agriculture—from a sector economy dominated by extensive livestock and field-crop production to the premier specialty-crop producer of the nation and the world. Changes included a reconfiguration of production within the state in response to rising population, increased domestic and foreign demands, and available resources. Farm numbers fell, though not as dramatically as U.S. farm numbers, and have been relatively stable for the past several decades. A diverse mixture of limited-resource/retirement/residential/lifestyle farms exist along with larger farms that provide a large share of total agricultural production. Despite perceptions of increased concentration of production among a few larger-sized farm units, U.S. census data do not reveal strong evidence of increased concentration over the past several decades. Land in farms has declined over the half-century, and farm real estate values have demonstrated substantial appreciation, increasing by 250 percent in real terms. There is, of course, wide variation in

per-acre values depending on natural-resource endowments, location, and highest and best use of lands currently in agricultural production. California's share of national gross farm income exceeds 10 percent, and the share of national net farm income without inclusion of direct government payments is 20 percent. Both reflect the preeminence of California's agriculture and the weak association of much of its production with direct government payments for basic commodities. Financial ratios are also different from those for the U.S. industry, reflecting higher net incomes and higher capital investments required for specialty crops vis-à-vis field crops.