

Drought Impacts on California Farm Revenue and Prices

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Droughts in California reduce the availability of irrigation water, raise costs, and have dire consequences for some farms. However, as with earlier droughts, the 2020–2021 drought is having only small impacts on farm revenues and prices. Farm responses to drought generally minimize the drought’s overall impacts and protect consumers from severe food price increases.



Fresh produce grown in coastal regions, like leafy greens, are less prone to irrigation cutbacks during a drought.

Photo credit: iStock

The drought of 2020–2021 has been particularly severe; precipitation was low and irrigation water deliveries were cut drastically. The previous article documented that the farms in California made many adjustments when faced with reduced water quantities, more expensive irrigation water, and other consequences of drought.

This article describes relatively small overall price and revenue consequences for California crop and livestock farms and ranches and small effects on consumers from this drought. California agriculture is large (about \$50 billion in sales) and diverse (hundreds of commodities).

Farms have made many adjustments to mitigate drought impacts, and this drought has occurred during a period of otherwise strong revenue prospects.

Overall, we expect that revenue this year will increase, although it is unlikely to reach the record-high farm revenues reached in 2014, which was also a dry year. Farm costs are also high this year; therefore, net revenue is likely to be moderate at best.

Drought and California Prices and Farm Revenue

There are several reasons that drought has not generally caused substantial variation in California farm revenue. First, droughts have generally had relatively small effects on the output of coastal agriculture, which comprises about 25% of farm output and includes major vegetable, berry, winegrape, and greenhouse and nursery industries. Second, during droughts, California farms pump more groundwater and shift available irrigation water to high-revenue crops, which tends to maintain aggregate revenue.

Third, for some field crops such as rice, alfalfa hay, and corn silage—from which acreage and irrigation water is shifted during a drought—farm prices tend to rise to partly offset the reduction in output. Fourth, for milk, beef, poultry, and egg output (about 25% of California farm revenue) revenue generally responds indirectly and may rise or fall. Finally, revenue variation is driven largely by subtle non-drought weather variations affecting yields and national and world price variations that are not influenced much by California conditions.

Several of these factors also influence why consumer prices do not respond much to California drought. Many of the crops, such as many fresh produce

items, for which California is the main or only supplier to the national market during certain seasons, are grown in coastal regions that are less prone to irrigation water cutbacks during a drought. Other crops, such as tree and vine crops, have water shifted to them to maintain production during drought because they are the crops with higher revenue per unit of water.

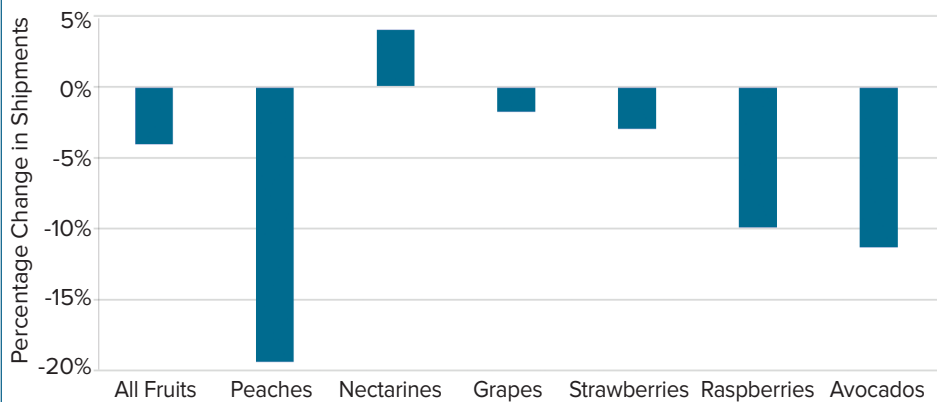
Crops that are subject to supply reductions, such as some grains and other field crops, tend to be those crops for which California supplies a relatively small share of the market. Hence, they have their prices determined by supplies outside of California. As we see below, rice, melons, and processing tomatoes are a partial exception to this rule. Finally, some crops that experience reduced production during a drought, such as corn silage and alfalfa hay, are fed to livestock, not people, and thus their impacts on consumer prices are indirect and diluted.

Observed Impacts of the 2020–21 Drought on Farm Prices and Revenues

Let us now review available data to assess potential drought effects. This is difficult in part because commodity markets have lots of normal variability in production and prices from year to year, even without drought impacts. Moreover, the drought began in 2020 and has overlapped with the pandemic.

This section provides market price and quantity assessments for several important crop categories. But first, we should note that production and price movements for some California commodities are only remotely connected to drought. For example, nursery and flower products (worth about \$4 billion) are often grown in

Figure 1. Percentage Change of California Fruit Shipments, 2021 Compared to the 2018–2020 Average*



*Note: All-fruits percentage change is a quantity weighted average and includes blackberries.

Source: USDA Agricultural Marketing Service Custom Reports for 2018, 2019, 2020, and 2021.

controlled environments and generally use small amounts of water per dollar of output, compared to other crops. Citrus crops (worth about \$2 billion) are grown both on the South and Central Coast and in the Central Valley, but they are a winter-harvested crop and one for which we do not have data for this harvest year yet. On the livestock product side, poultry and eggs (worth more than \$2 billion) are fed mostly grains and oilseeds that are shipped into California.

Fresh Produce

To assess produce quantities that may have been influenced by drought, we compare weekly USDA Agricultural Marketing Service data for 2021 with the prior three years. In particular, we consider berries, grapes, tree fruits, lettuces, and other major fresh vegetables. Of course, produce shipments vary from year to year for many reasons, so we do not make definitive claims about differences in shipments caused by drought.

Fresh fruit and vegetable shipments in 2021 are a bit lower compared to the three prior years. Fruit shipments are down about 4% in 2021 (Figure 1). Among Central Valley fruits, which are more likely to be affected by water cuts, peach shipments were down by 19%, but nectarines shipments were up

by 4%. Grape shipments—a large share of the total—were down less than 2%. Among coastal fruits, avocados were down 11%, but this decline is unlikely to be drought-related. Blackberries rose by about 50% from a small base, but strawberry shipments, which account for most of the coastal fruit shipments, were down just 3%. Vegetable shipments—for which most production is in coastal counties—fell by only 3%. The big drop in shipments was in melons (down 34%), which as annual crops grown in the Central Valley, are sensitive to irrigation water cuts.

Tree Nuts

Tree nuts account for about 20% of California farm revenue. As shown in the second article, the production of California almonds, pistachios, and walnuts has more than doubled in the recent decade and is on track to continue to expand, as recently planted orchards come into production. The alternate-bearing tendency of these crops makes simple year-to-year comparisons complicated.

After high yields per acre last year, the 2021 yields for almonds, and especially pistachios, would likely have been low in 2021, even without the drought. Nonetheless, the recently harvested 2021 crop is likely smaller than it would have otherwise been

because some acreage of mature trees was removed and because yields were reduced by irrigation cutbacks. Low production will boost prices somewhat from what would have prevailed because California has a large share of world production for these crops. However, annual carryovers moderate price hikes caused by lower than expected yields.

Unless tree nut demands, and therefore prices, are unusually strong over the next several months, revenue from the 2021 crop, which is mostly realized in 2022, will be down. Since much of the tree nut revenue realized in 2021 is from sales of the 2020 crop, we may see a rise in 2021 annual revenue.

Rice, Cotton, and Other Grain Crops

As noted above, California grain, oilseed, and cotton prices are determined largely in national and international markets. Prices for grain, such as corn and wheat, have risen by 30% or more in 2021 relative to prior years. The increase is not because of reduced output in California, which is a very small share of the relevant market, but mainly because of low stocks and increases in international market demands. Likewise, cotton prices are about 40% higher in 2021 than in recent years. Although California acreages and production are down substantially, California revenue for these crops may actually be higher in 2021 due to high market prices unrelated to our drought.

California grows japonica rice, which has a market price that moves separately from, and is much higher than, the price of rice from other states. The distinct demand for California rice means that when the quantity of California rice falls, the price of California rice rises. In 2021, the quantity of California rice will likely be down by about 25%, and the price is projected by USDA to rise by about 10% above the average of the prior two years.

Table 1. Differences in Average April–August Prices in 2021 Versus 2017–2019

Commodity	Percentage Change
Fed Cattle	-2%
Feeder Cattle	2%
Milk	12%
Alfalfa Hay	7%
Corn Silage	42%

Note: Prices for alfalfa, silage, and milk are for California. Prices for feeder cattle are for the Western states, and for the Midwest for fed cattle.

Source: Silage prices are from the Hoyt Report. Cattle, hay, and milk data are from USDA.

California rice revenue is likely to fall by about 11%, or about \$100 million. Given the added costs as rice moves from farm to consumers, retail prices are likely to rise by less than 5%, and the additional cost of a meal at your local Korean restaurant, which probably uses California rice, will be too small to notice.

Beef and Dairy and Forage Crops

Sales of cattle and calves from California have been about \$3 billion in recent years. Cattle and calves rank fourth among California commodities, but still comprise only 5% of the U.S. total. The California shares of both the fed cattle segment (steers and heifers that have been fed intensively) and the cow-calf and feeder cattle segment (the cattle on pasture used for breeding or not yet ready to enter the feedlots for intensive feeding) are too small to have much influence on national cattle prices. For 2021, fed cattle prices are up compared to last year's pandemic-lowered prices, but down 2% from the average of 2017–2019 (Table 1). Western feeder cattle prices in 2021 are 2% higher than the 2017–2019 period. Cattle gross revenue (not net revenue) is likely to be up slightly in 2021 because of drought-induced pressure to sell more cull cows and feeder cattle.

California has farm sales of milk of about \$7 billion. Year-to-year variation in milk revenue has large effects on aggregate farm revenue in California.

Milk revenue will likely be up in 2021 because production will be up by a few percent; the average price of milk will be higher than in 2020 and up by 12% over the 2017–2019 average. However, government payments to dairy farms are lower in 2021 than in 2020.

The dairy industry is the major source of demand for hay and silage from California farms. The second article explained that strong demand from dairy farms caused hay and silage acreage to rise in 2021 compared to 2020, back to the average of 2018–2019. Alfalfa hay production is up by 10% from last year, but down from 2018 and 2019; alfalfa hay prices are up 7%, so revenue is up significantly from the 2017–19 average. Corn for silage production is also up in 2021, with prices up about 42% compared to the 2017–19 average revenue, and cost to dairy farms is up substantially.

Final Remarks

A main thrust of this article is that, while drought has major impacts on California crop and livestock farms, the overall impacts on aggregate farm revenue during drought years are likely to be small. California farm revenue hit new highs during the nadir of the 2012–2015 drought, and farm revenue will likely remain relatively robust in 2021 as well.

Also, as in previous droughts, this California drought has had only small

effects on consumer food prices. The California farm price impacts that would most influence food costs—the price of fresh produce crops, for which California supplies a large share of national consumption—tend to be small. These produce crops tend to be grown mostly in the less drought-affected regions, and they have among the highest returns per unit of irrigation water. Thus, farms shift water away from other crops to maintain fresh fruit and vegetable shipments. In addition, the marketing margins from farm to consumer are usually the largest share of the consumer price, and therefore, a drought-induced increase in the farm price has a diluted impact on the percentage change in consumer prices.

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Medellín-Azuara, Josué, et al. 2016. "Economic Analysis of the 2016 California Drought on Agriculture." Center for Watershed Sciences, University of California Davis. Available at: <https://bit.ly/2YQIkO5>.