

Table 3.27: System and Freight Performance Measures

	2017 Baseline Data	2-Year Target	2-Year Condition/ Performance	4-Year Target	4-Year Condition/ Performance
% of Reliable Person-Miles Traveled on the Interstate	64.6%	65.1% (+0.5%)	65.2%	65.6% (+1%)	73.8%
% of Interstate System Mileage Providing Reliable Truck Travel Time (Truck Travel Time Reliability Index)	1.69	1.68 (-0.01)	1.71	1.67 (-0.02)	1.60
<i>Source: 2022 Full Performance Period Progress Report</i>					

3C. California’s Agricultural Freight

California's climate and diverse regional landscape attracted settlers who planted the first recorded citrus orchard at Monterey in 1782 and possibly the State's first mission orange grove planted at Mission San Gabriel in 1804⁹⁴.

California's hot Central Valley and temperate coast region have ideal growing conditions for vegetable, field, nut, and fruit crops. The dense forests of the Northern California Coastal, Klamath, and Cascade Mountain Ranges are national, State, and regional assets that provide the timber needed for global construction. Fertile mountain valleys and basins provide optimal grazing for cattle, dairy, and other agricultural production. The Pacific coastline to the west supports the State's fisheries.

Winter rain and snowpack feed the larger rivers, and water from the Central Valley aquifer allows ranchers and farmers to supply quality food to the world. However, without adequate transportation, farmers and ranchers cannot move their produce to domestic or international markets, and California cannot continue to be a global food producer.

Economy

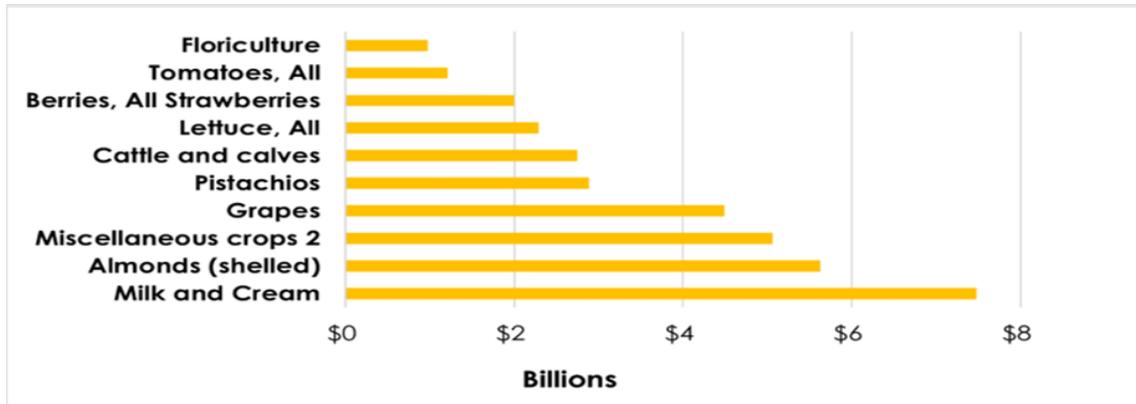
Over the course of the years, California's diverse agricultural industries and related commodities have exploded. In 2020, the State was home to 69,600 farms on 24.3 million acres of farmland, with an average farm size of 346 acres.⁹⁵ In 2020, California generated approximately \$49.1 billion in agricultural cash receipts, 13.7 percent of the nation's, with the highest-valued commodities being dairy products, specifically milk, grapes, almonds, and miscellaneous crops.



Figure 3.24: California's Highest Gross Value Commodity by County (California Department of Food and Agriculture, 2021)

During the same year, agricultural production and processing industries accounted for 2.8 percent of the state’s gross domestic product.⁹⁶

The State is the nation’s sole provider (100 percent) of artichokes, celery, garlic, honeydew melons, processing tomatoes, almonds, kiwifruit, nectarines, olives, pistachios (in-shell), plums/prunes, and walnuts. California is also the nation’s leading agricultural exporter. In 2020, California exported \$20.8 billion, or 14.3 percent of the U.S. agricultural exports.⁹⁷ According to



1 Total value is based on USDA Economic Research Service cash receipts, September 2021 release.

2 Includes nursery/greenhouse crops (excluding Floriculture), Christmas trees, seed crops, and miscellaneous field, vegetable, berry, tree fruit, & nut crops.

Figure 3.25: California 2020 Top 10 Agricultural Commodities by Value (Source: USDA Statistics Service California Field Office, 2021)

the California Agricultural Statistic Review – California Agricultural Exports 2000-2021, the State’s top ten agricultural products by export values listed by ranking include almonds, dairy and products, pistachios, walnuts, wine, rice, table grapes, oranges, processed tomatoes, and beef and products. The European Union, Canada, China/Hong Kong, Japan, and South Korea were the State’s top five agricultural export markets.

ECONOMIC CONSIDERATIONS

Agriculture is a volatile industry, as the income is determined by the cost and returns that are not consistent. Many farmers and ranchers, especially smaller noncorporations, rely on agricultural loans to cover the upfront costs of seeds, services, fertilizer, fuel, livestock, feed, and wages. They have no guarantee that the income they receive from selling their goods will cover their costs. Unexpected weather changes, cost increases, fires, road closures, and port congestion can easily result in farmers tilling under crops, ranchers culling cattle, and industries collapsing into bankruptcy.

AGRICULTURAL TRANSPORTATION AND SUPPLY CHAIN

Agricultural commodities are transported along the supply chain by multiple modes, including trucks, railroads, airplanes, tractors, ships, and pipelines. Agricultural service industries provide farmers and ranchers with seed, feed, fertilizer, and other critical inputs to produce commodities. After harvest, the produce is transported to collectors, sold, and transported to food processors. After processing, packaging, and labeling, the final goods are distributed to domestic and national markets.



Figure 3.26: Agriculture Supply Chain

Cold Supply Chain

The Cold Supply Chain (Cold Chain) is a highly complex, expensive, and distinctive supply chain that uses specialized equipment, facilities, and technologies to quickly move and manage the temperature of goods through a precisely coordinated and unbroken series of movements from the farm, collector, and processor to the distributor. It complements the regular supply chain, involves all modes of transportation, and is utilized by most agricultural producers and industries. Cold Chain haulers and carriers use special refrigerated truck trailers, rail containers, and shipping and air cargo containers referred to as “reefers” to transport goods like beef, pork, poultry, seafood, fruit, and vegetables.

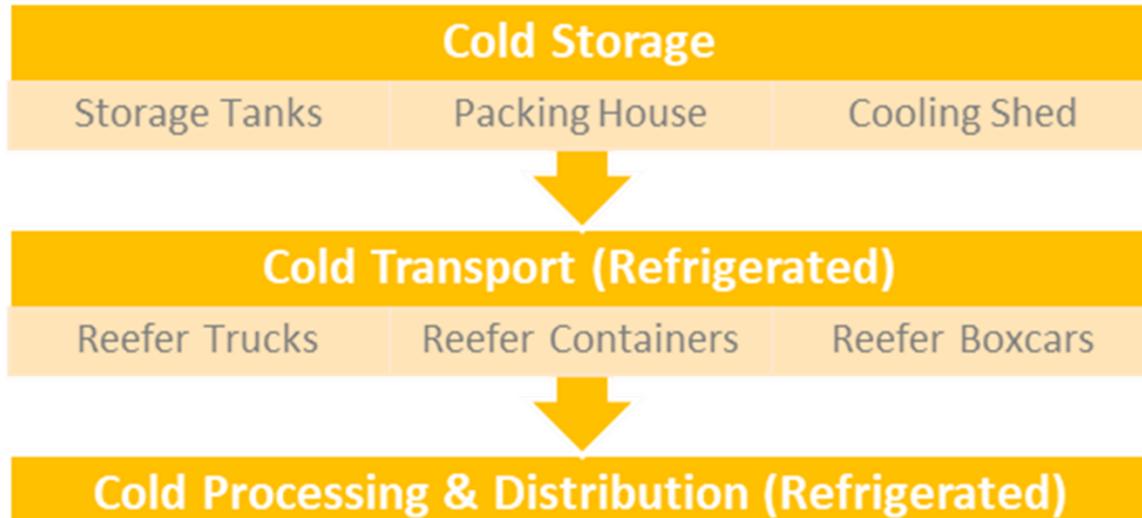


Figure 3.27: Agricultural Supply Chain

COLD CHAIN EXAMPLE

The dairy Cold Chain involves complex planning and coordination between the farmers, haulers, processors, distributors, loaders, and shippers. It begins when the milk is immediately moved from the cow through tubing to farm cooling tanks to reduce its temperature. Daily, the milk from the storage tank is loaded into a sealed insulated tanker to maintain its temperature and quickly transported to a dairy processor. The milk is heated and cooled at the processing plant to kill bacteria and processed into milk, cheese, butter, and other dairy items. After packaging, the dairy commodities are stored in refrigerated rooms until they are loaded onto refrigerated truck trailers called “reefers” and transported to retail outlets, retailers, and restaurants or exported to international markets in refrigerated containers.

California's nursery industries offer another example. Flowers are cut, moved to refrigerated facilities, and transported by reefer trucks, airplanes, and containers to ensure freshness. For cut flowers to maintain value, they must be moved through the entire Cold Chain (farms to shops) within 24 and 48 hours.

COORDINATION

A successful Cold Chain includes the quick movement and precise coordination between farmers and ranchers, various transportation haulers and carriers, food processors, freight forwarders, governmental inspection agencies, and distributors using advanced technology. One slip in the chain, such as a late pick-up, will impact all proceeding schedules within the chain. This short timeline and cold-chain technology add to the final cost.

TEMPERATURE CONTROL

Maintaining a constant low temperature through the Cold Chain is a challenge. Many refrigerated “reefers” trucks, containers, and boxcars only maintain the temperature at which the product is delivered and do not have the capability of reducing the temperature. Each time the trailer or container is opened (e.g., deliveries, inspections) provides an opportunity for the temperature to let warm air in and raise the temperature. As a result, it is not uncommon to have

loads of produce rejected at the final destination because the temperature was not maintained.

Trucks

Trucking is a component of every agricultural supply chain and the cattle industry's sole mode for moving animals. The cow-calf sector of the cattle industry raises and maintains a herd of cows and is the foundation of the beef industry. After weaning, calves and cows are separated, and a limited number of the calves are trucked to grazing areas

to retain the herd size. Most of the remaining calves are trucked across the U.S. to feeding yards in Nebraska and other Midwestern States to supply the national beef industry. However, a few are trucked to the Central Valley and the Imperial Valley feeding lots.

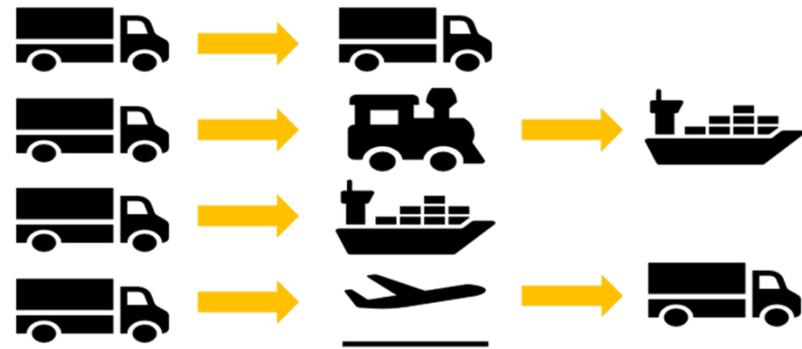


Figure 3.28: Travels by Truck

RURAL CONNECTIVITY

Most of California's agricultural produce travels by truck for all, if not part of its journey. Rural highways and local roads provide first- and last-mile access to critical freight agricultural facilities and markets. These roads have much poorer pavement conditions than urban highways and often are not constructed or brought up to current design standards to accommodate the heavy loads they must bear. For example, many California farms and ranches are located in rural areas with no direct link to the interstate systems and where the SHS has not been upgraded since the 1940s.

ELECTRONIC LOGGING DEVICE (ELD) RULE AND THE HOURS OF SERVICE (HOS) REGULATIONS

ELD and HOS enforcement poses a substantial risk to the livestock industry.⁹⁸ Most of the nation's cattle feeder operations are concentrated outside the state and concentrated from Texas to the Dakotas. Therefore, after the cow-calf production, most of California's calves are packed into livestock trailers and transported accost the United States. The on-duty time and maximum drive time limits, coupled with the required rest period (before returning to duty), do not provide enough time for the haulers to complete their trips.

Unlike other goods, livestock haulers cannot idle or unload cattle, sheep, hogs, and poultry when their hours run out without jeopardizing the health of the animals. Not only does repeat animal loading and unloading stress and harm the animals, it also can endanger the haulers. Since ELD's enactment, the livestock industry has secured annual exemptions. In 2020, during the COVID-19 pandemic, the FMCSA exempted livestock haulers via an emergency declaration for HOS enforcement. Later, FMCSA expanded the waiver to include livestock feed deliveries.

While ELD and HOS exemptions are currently in place, there is no guarantee that they will continue. Flexibility is critical when transporting live animals, and regulations must be flexible enough to allow haulers to safely perform their work while simultaneously maintaining the safety of the livestock they are hauling. The regulations disproportional impact small ranching operations and drive them out of business. For more information, please refer to Chapter 4 Future of Freight, 4A: Trends, Issues, and Opportunities.

CALIFORNIA KINGPIN TO REAR AXLE LAW (KPRA)

One significant transportation challenge impacting the livestock industry is California's KRPA law which requires the center of the rearmost axle on all two or more axle semi-trailers to be at the forty-foot mark, or thirty-eight feet when configured with a single axle trailer. Many trailers have sliding tandems that allow the haulers to adjust the KPRA and rearmost axle distance. However, livestock haulers move cattle utilizing unique, industry-specific trailers with a permanent compartment between the kingpin and the rearmost axle that does not allow for adjustment.

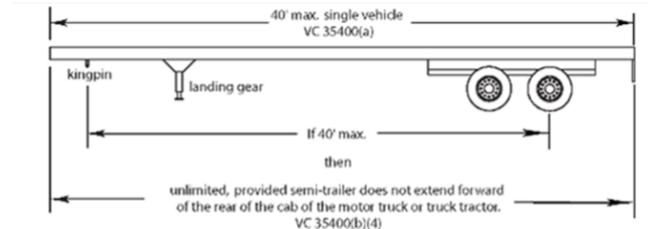
Because the livestock trailers cannot be adjusted, cattle haulers risk non-compliance using the two-axle livestock trailer. Splitting their load, and using smaller trailers, is inefficient and results in higher transportation costs (more trips, higher fuel consumption), increased emissions, and higher retail prices. Furthermore, the KPRA law is specific to California, so cattle haulers from the other forty-nine states run the same risks as California haulers. Occasionally they are turned.

FEDERAL AND STATE HIGHWAY WEIGHT LIMITS

California highways have a federal gross vehicle weight restriction of 80,000 pounds. Many commodities, such as milk, are heavy and moved in bulk. For consumer health and safety, haulers pick up bulk milk from a farm collection tank and must load the entire stock produced that day, not the amount that keeps them compliant with state and federal limits. As a result, dairy truckers are constantly at risk of exceeding weight limits. While they can break the tanker seal and remove a portion of the load to become compliant, doing so increases the transportation time and compromises milk security and safety.

CHALLENGES TO ZEV TRANSITION

Agriculture relies on high-energy usage, so ZEV transition poses unique challenges to these industries. These challenges include, and are not limited to, product availability, cost and maintenance, and weight limits.



Not allowed where route is posted for a 38' max. kingpin to last axle. VC 35401(e) & (f)
May be operated on local roads only where it is deemed safe by the owner or person operating. VC 35401.1

Figure 3.29: Two or More Axle Semi-Trailer

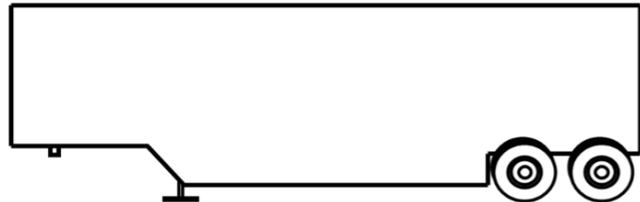


Figure 3.30: Livestock Trailer

While a few tractor manufacturers are developing electric equipment, the equipment is limited to small to medium-sized vehicles, such as small tractors and orchard vehicles. The electric versions are not competitive with the existing diesel and gas counterparts and are more expensive and less flexible and durable.

As discussed earlier, the federal government limits the gross vehicle weight to 80,000 pounds (a few states have exemptions) for highways. However, agricultural machinery and trucks also utilize local and county roads. Zero-emission vehicles and equipment are heavier than their standard diesel-fueled counterparts, and aging rural roadways, culverts, and bridges cannot accommodate the extra weight. The older infrastructure must first be upgraded to accommodate the larger and heavier ZEV and equipment, or haulers must increase the number of trips to transport their goods.

Seaports

California's strategic Pacific Rim location is a key international gateway for agricultural trade. While the state hosts more than twelve seaports, the Ports of Oakland, Stockton, West Sacramento, and Humboldt specifically support agricultural trade.

Each port provides different types of agricultural goods, including natural resources. These ports connect farmers, ranchers, foresters, and fishermen to international markets.



Figure 3.31: Shipping

Table 3.28: California Ports, Agriculture Imports and Exports

Seaport	Rail Access	Highest Value Agriculture Exports	Highest Value Agriculture Imports
San Diego	On-Dock	Food Products	Perishables, Construction, Materials, Heavy Equipment
Long Beach	On-Dock	Petroleum Coke, Bulk Chemicals	Crude Oil
Los Angeles	On-Dock	Animal Feeds, Soybeans	Automobile Parts
Hueneme	Near-Dock	Produce	Produce, Liquid Fertilizer, Bulk Liquid
Redwood City	On-Dock		Aggregates, Sand, Gypsum
San Francisco	Near-Dock	Tallow, Vegetable Oil	Aggregate, Sand
Oakland	Near-Dock	Fruits and Nuts, Meats, Machinery, Wine, Spirits	Machinery
Richmond	Near-Dock	Vegetable Oils, Coke, Coal, Aggregate, Zinc, Lead	Petroleum, Bauxite, Magnetite, Vegetable Oils
Stockton	On-Dock	Iron Ore, Sulfur, Coal, Wheat, Rice, Machinery, Petroleum Coke, Safflower Seed	Liquid Fertilizer, Molasses, Bulk Fertilizer, Ammonia, Lumber
Benicia	On-Dock	Petroleum Coke	Automobiles
W. Sacramento	On-Dock	Ag. & Industrial Products	Ag. & Industrial Products
Humboldt Bay	N/A	Logs, Wood Chips	Logs, Petroleum, Wood Chips

Source: Southern California Association of Governments – Comprehensive Regional Goods

The Port of Oakland (PoOAK) is California's most crucial agricultural port due to its centralized location, proximity to the agriculturally rich Central Valley, and direct rail link to the Midwest. It is a vital international agricultural gateway to the world.

SEAPORT CONGESTION – NATIONAL SUPPLY CHAIN CRISIS

The congestion at the POLB and POLA dramatically impacted the state's ability to export agricultural commodities in many ways. It drove up the value of empty shipping containers making it more profitable for shippers to directly return the empty containers to Asian markets rather than having them filled with agricultural commodities at the Port of Oakland.

The canceled PoOAK bookings dramatically impacted the walnut industry's ability to export their produce during the peak demand months, as one hundred percent of their exports leave the state as containerized cargo through this port. Haulers have difficulties securing containers and equipment, and it has become common for them to schedule appointments only to have their loads refused upon arrival at the port.

The significant economic losses to California's agricultural industries due to the inability to export their goods via the PoOAK has driven many nut crop and other agrarian commodity exporters and shippers into talks with the steamships and railroads to expand supply chain resiliency by transporting their products to Southern California, and East Coast and Gulf Coast state ports for international export, thereby bypassing the PoOAK. As congestion at the POLB and POLA has

decreased, agriculture exports from the PoOAK have gradually increased, reaching over 40,000 TEUs in 2022.

Freight Rail

Grain producers from Nebraska and other Mid-western states utilize the Union Pacific railroad to transport feeder grain to California's livestock feeder yards located in the Central and Imperial Valleys and to ranches and farms across the State. Union Pacific's Grain Shuttle Program includes over 110 covered hopper (freight) cars dedicated to transporting whole grains moving as a unit (train) from a single origin to a single destination. The program provides high-volume grain shippers, who commit to moving specific volumes each month (annually) long-term, a dedicated train set.



Figure 3.32: Rail

California's Short Line Railroads (SLRR) play a critical role in moving agricultural freight. It often provides vital connectivity between individual industries and markets by moving raw goods from their origin to processing and refinement. With this said, SLRRs provide the critical first and last-mile connectivity that allows local agricultural and natural resource producers to access markets and reduce transportation costs on bulk commodities like timber, aggregate, and fertilizer. Examples of agricultural SLRR utilization include moving produce from farms to distributing plants, harvesting logs from forests and moving them to sawmills, moving iron ore from mines to a steel mill, and moving containers between ports and long distances.

Common California agricultural and resource commodities moved by SLRRs include lumber and forestry products, food products (tomato paste, grain, beans, rice, wine, nut oil, and berries), minerals and stone, fertilizer, and perlite.

Recently, rail has become an essential mode within the almond industries' supply chain. Almond production takes place in the Central Valley orchards.

NATIONAL SUPPLY CHAIN CRISES

Freight railroads did not escape the impacts of the national supply chain crises. High demand for freight rail and lack of rail and labor capacity resulting from years of industry consolidation stress the resiliency of the national rail service that slows down the Union Pacific's service between the critical Los Angeles and Midwestern rail hubs. California livestock industries solely rely on the railroads to deliver feed for dairy cows, cattle, chicken, and turkey producers. Rail delays in February 2022 place millions of chickens, turkeys, and thousands of cattle at risk of starvation or culling⁹⁹.

Air Cargo

Most common agricultural commodities are produced and sold in bulk, and heavy, so it is not cost-effective to move them by air. Air cargo typically travels long distances, as a high value-to-weight



Figure 3.33: Air Cargo

ratio is time-sensitive and usually costs more to send than other modes. However, high-value, perishable produce such as cut flowers, fresh beef, cherries, and strawberries also utilize this mode. The main destinations for the State's airborne agricultural commodities are Japan, China, South Korea, Taiwan, and Hong Kong, with lesser markets in Europe and Latin America.



4

Chapter 4: Future of Freight

