INTERSTATE TRUCKING OF EXEMPT AGRICULTURAL COMMODITIES

U.S. DEPARTMENT OF AGRICULTURE/ECONOMIC RESEARCH SERVICE
IN COOPERATION WITH THE UNIVERSITY OF CALIFORNIA AGRICULTURAL
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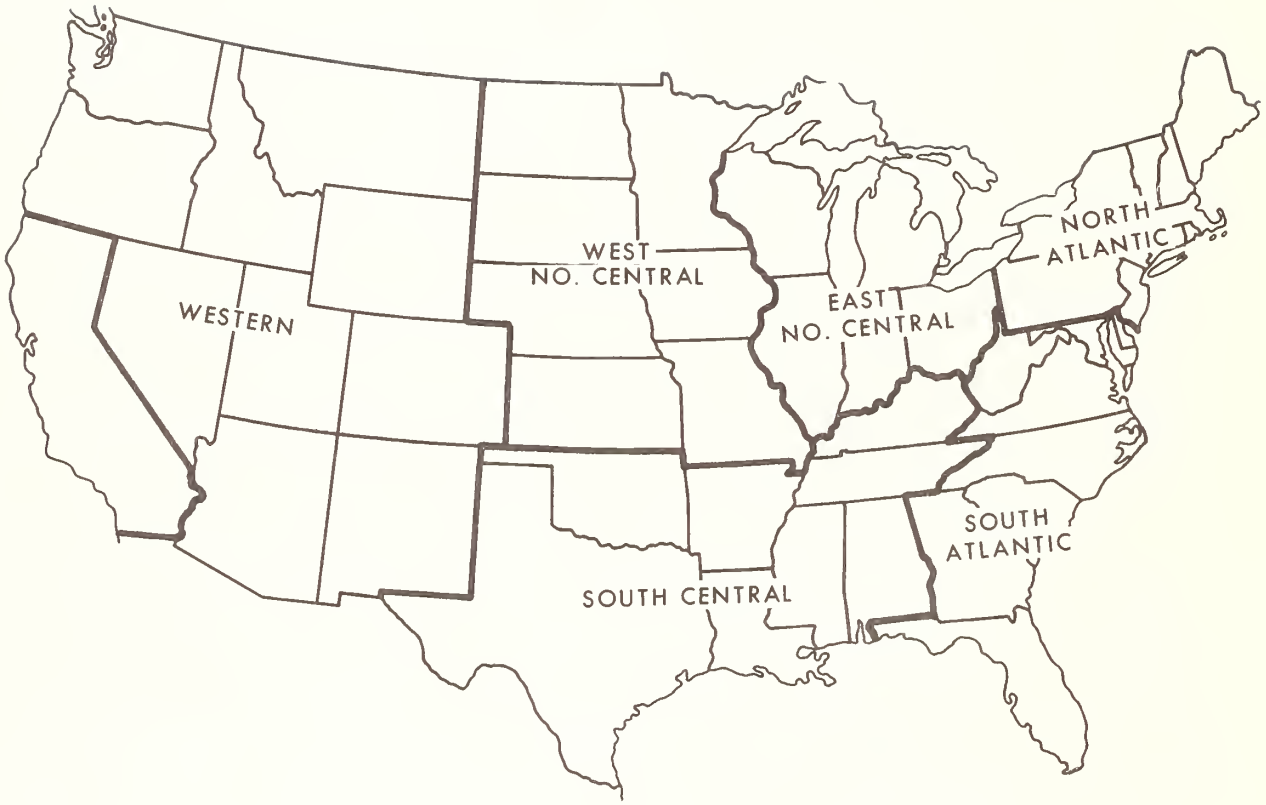
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ACKNOWLEDGMENTS

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SUMMARY

Truck transportation of exempt agricultural commodities originating or terminating in California during 1963 totaled 3.4 million tons, accounted for 4.2 billion ton-miles, and required more than 200,000 truckloads. The exempt traffic consisted mainly of fruits, vegetables, processed poultry, grains, livestock, and hay.

In 1963, outbound truck shipments of exempt farm products (mostly fresh fruits and vegetables) totaled about 1.4 million tons. Between 1955 and 1963, the share of total fruit and vegetable traffic carried by trucks increased from 19.1 to 34.1 percent. During the same period, the share of the railroads in this traffic decreased from 77.4 to 63.4 percent. There was also an absolute increase in truck tonnage that was handled by heavier loading and more trucks.

The distribution of destinations of fresh fruit and vegetable shipments suggests that trucks tend to serve markets closer to the growing areas. In 1961-63, 35 percent of all truck shipments were consigned to the Western Region, and only 2 percent to the North Atlantic Region. Samples taken at California border points in 1961 indicated that 65 percent of the outbound trucks contained mixed loads; the loads averaged 5.5 different commodities. Comparison of these samples with others taken 5 years earlier showed that the proportion of loads that were mixed had increased. The more diversified of the mixed shipments were usually destined for the nearby Western Region and western Canada.

Seventy-four percent of all truck shipments involved more than one pickup and one delivery. In order to assemble a load, trucks made an average of 2.28 pickups and 1.56 deliveries. In pickup service, trucks traveled an average of 122 miles in California.

The inshipments of exempt commodities included fresh fruits and vegetables, processed poultry, grain, livestock, and hay. Inbound shipments of 2.1 million tons accounted for 2.0 billion ton-miles and required about 110,000 truckloads. They exceeded the outshipments in terms of tonnage and number of truckloads. Likewise, with the exception of the 3 peak shipping months--June, July, and August--for fresh fruits and vegetables, the number of incoming trucks hauling exempt agricultural commodities exceeded the number of loaded trucks leaving California. The balance between the number of incoming and outgoing loaded trucks varied among different regions.

INTERSTATE TRUCKING OF EXEMPT AGRICULTURAL COMMODITIES--CALIFORNIA

by

W. Miklius and D. B. DeLoach 1/

INTRODUCTION

The primary purpose of this report is to make available certain statistical information about motortruck shipments of agricultural commodities into and out of California. Interstate truck transportation of certain agricultural commodities ordinary livestock, poultry, fish, shellfish, and most unprocessed farm products--is exempt from economic regulation by the Interstate Commerce Commission (ICC) by Section 203 (b) of the Motor Carrier Act of 1935, as amended in 1958. Therefore, no agency, public or private, has the responsibility for assembling economic information on the interstate transportation of exempt commodities.

This report relates only to exempt truck shipments inot and out of California. All intrastate for-hire carriers, except those hauling agricultural commodities from fields to canneries, packing sheds, or processing plants, are regulated by the State. Although the main emphasis is on truck transportation, selected rail and water data are included for comparative purposes.

The basic data used in this report were compiled from a number of secondary sources, the Federal-State Market News Service, and interviews with growers, shippers, truckers, brokers, and tradespeople.

TOTAL EXEMPT TRAFFIC

More than 200,000 truckloads of exempt agricultural commodities originated or terminated in California during 1963. This traffic totaled 3.4 million tons, and accounted for 4.2 billion ton-miles. Fresh fruit and vegetables dominated the outbound truck movement, accounting for about 40 percent of the total interstate tonnage, and 50 percent of the ton-miles (table 1).

Inshipments of exempt commodities include fresh fruits and vegetables, processed poultry, grains, livestock, and hay. These inshipments exceeded the outshipments in terms of both tonnage and number of truckloads, but not in ton-miles. The greater ton-miles for outshipments reflect longer distances to destinations for outbound commodities.

OUTSHIPMENTS

Fresh Fruits and Vegetables

California supplies a large percentage of all fresh fruits and vegetables that are consumed within the United States and contributes heavily to export trade. In

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Table 1.--Exempt agricultural commodities: interstate truck shipments originating and terminating in California, 1963

Commodity group	Tonnage	Ton-miles 1/	Truckloads
	1,000 tons	Millions	Number
Outbound:			
Fresh fruits and vegetables	1,300	1,995	86,300
Dried fruit	90	188	4,500
All outbound	1,390	2,183	90,800
Inbound:			
Fresh fruits and vegetables	555	480	33,800
Processed poultry	127	205	10,000
Grains	468	542	23,000
Livestock	717	661	35,000
Hay	174	82	7,600
All inbound	2,041	1,970	109,400
Total	3,431	4,153	200,200

1/ With the exception of cases where actual destination or origin was known for estimating ton-miles, mileage from Los Angeles to a major city in each origin or destination state was used.

Sources:
- Fresh fruits and vegetables-- California Truck Passing Summary, Fresh Fruits and Vegetables (Sacramento: Fed.-State Mkt. News Serv., 1964).
- Dried fruit-- Data supplied by Dried Fruit Assoc. of Calif.
- Processed poultry-- California Egg and Poultry Statistics (Sacramento: Fed.-State Mkt. News Serv., 1964).
- Grains-- Grain, California Market Summary, 1963 (Sacramento: Fed.-State Mkt. News Serv., 1964).
- Livestock-- California Annual Livestock Report for 1963 (Sacramento: Calif. Crop and Livestock Rptg. Serv., 1964).
- Hay-- Alfalfa Hay Trucked into California from Out of State (Sacramento: Fed.-State Mkt. News Serv., 1964).

1963, the volume of California fruits and vegetables transported to interstate and Canadian destinations totaled 264,509 carlot equivalents (table 2). (A carlot equivalent is a statistical standard adopted to convert truck shipments to the equivalent of rail carlots, according to commoty.) All modes of transportation participated in this movement. The railroads hauled 167,462 cars, trucks carried 90,079 carlot equivalents, and 6,968 carlot equivalents were shipped by water. Small quantities of highly perishable commodities were shipped by air. 2/

From 1955 to 1963, the share of total fruit and vegetable traffic carried by trucks increased from approximately one-fifte to one-third. There was also an increase in the tonnage of fruits and vegetables hauled by truck. The larger tonnage was handled by a heavier loading and by an increase in the number of outgoing trucks (table 3).

Motor carriers are generally classified into 4 groups: common, contract, private, and exempt. 3/ The actual participation of various types of motor carriers in the fruit and vegetable traffic is not known. The distribution of shipments made by 74 California and Arizona firms may be indicative of the division of traffic among these carriers. Sixty-six percent of truck shipments made by these firms were handled by exempt carriers, 14 percent by common and contract carriers, 14 percent by private carriers, and 6 percent were picked up in receiver-owned or -leased trucks. 4/

Mixed Truck Shipments

An important characteristic of the outbound fruit and vegetable truck movement has been the large proportion of mixed shipments. A 5-percent sample of the 1961 border station outbound inspection records indicated that about 65 percent of all trucks inspected at California border stations contained more than one commodity. 5/ These mixed loads had an average of 5.5 commodities, but there was a considerable variation among shipments. Although concentration is primarily in the 2- and 3-commodity categories, more than 14 percent of all mixed loads contained 10 or more commodities (table 4). These "drug-store" loads often contained more than

2/ For example, air shipments of California strawberries in 1962 totaled more than 200 carlots or about 4 percent of the total interstate movement. (The Packer, Vol. 70, Aug. 3, 1963, p. 10.)

3/ Common carriers are those who hold themselves out to serve the general public and operate over regular or irregular routes, while contract carriers serve only one or a few individuals. Both are subject to economic regulations by the ICC. Private carriers, on the other hand, are ones who carry goods which are owned by the same enterprise that owns the vehicle and are not economically regulated. Exempt haulers are ones who haul only those commodities which are exempt from ICC regulation (listed in Rule 107, ICC Bureau of Motor Carriers). However, common, contract, and private carriers legally can, and do, haul exempt commodities.

4/ Bennett, R. M. Interstate Hauling of California-Arizona Fresh Fruits and Vegetables by Rail and Truck. U. S. Dept. Agr. Mktg. Res. Rpt. No. 673. (See pp. 11-12.) 1964.

5/ The Bureau of Plant Quarantine, California Department of Agriculture, inspects all trucks carrying [illegible] and vegetables at its border-inspection stations. The daily inspection records are turned over to the Federal-State Market News Service A 5-percent random sample of inspection records provided the data on mixed shipments in this report.

Table 2.--Fresh fruits and vegetables: California shipments to other States and Canada, by mode of transport, 1955-1963

Year	Shipped by truck	Percentage of total	Shipped by rail	Percentage of total	Shipped by water	Percentage of total	Total
	Carlot equivalents						
1955	67,289	19.7	264,347	77.4	9,833	2.9	341,469
1956	75,385	22.5	248,534	74.3	10,611	3.2	334,530
1957	85,901	25.7	242,825	72.5	6,070	1.8	334,796
1958	89,514	30.0	202,302	67.8	6,476	2.2	298,292
1959	96,004	29.5	218,730	67.3	10,411	3.2	325,145
1960 1/	93,916	29.4	217,819	68.0	8,400	2.6	320,135
	(84,613)		(205,489)		(7,744)		(297,846)
1961 1/	96,246	28.5	231,708	68.6	9,769	2.9	337,723
	(85,598)		(194,394)		(9,005)		(288,997)
1962 1/	100,659	34.1	187,102	63.4	7,402	2.5	295,163
	(89,099)		(175,644)		(6,860)		(271,603)
1963 1/	101,313	34.1	188,618	63.4	7,534	2.5	297,465
	(90,079)		(167,462)		(6,968)		(264,509)

1/ In 1960 the carlot conversion factors were changed. In order to make the data comparable, the reported volumes were recomputed, using 1955-1959 conversion factors. Actual reported volumes are shown in parentheses. Reported rail volumes are reduced by unloads within the State.

Source : California Carlot Shipments, Fruits and Vegetables, 1955-63 (Sacramento: Calif. Crop and Livestock Rptg. Serv. and Fed.-State Mkt. News Serv., 1956-64.)

Table 3.--Fresh fruit and vegetables: Shipped by truck from California to other States and Canada 1955-63

Year	Truckloads 1/	Tonnage	Average weight per truckload 2/
	Number	1,000 tons	Tons
1955	64,894	877	13.5
1956	69,915	985	14.1
1957	77,485	1,107	14.3
1955-1957	70,765	990	14.0
1958	81,625	1,157	14.2
1959	85,159	1,235	14.5
1960	86,430	1,227	14.2
1958-1960	84,405	1,206	14.3
1961	81,472	1,234	15.1
1962	85,444	1,402	15.1
1963	86,357	1,300	15.1
1961-1963	84,424	1,312	15.1

1/ Number of trucks passing through California border stations.

2/ Federal-State Market News Service in Sacramento supplied weights of most commonly used containers and the average number of containers per truckload. These were used to convert carlot equivalents to tons.

Source: Estimates based on data from California Truck Passings Summary, Fresh Fruits and Vegetables (Sacramento: Fed.-State Mkt. News Serv., issued annually).

Table 4.--Fresh fruit and vegetables: Mixed loads shipped by truck to other States, from California 1961

Number of commodities	Estimated shipments	Percentage of total shipped
	Number	Percent
2	12,273	23.3
3	9,248	17.5
4	6,701	12.7
5	5,113	9.7
6	3,991	7.6
7	2,992	5.7
8	2,534	4.8
9	2,401	4.6
10 and more	7,417	14.1
Total	52,670	100.0

Source: 5-percent sample of the border-station inspection reports.

20 different fruits and vegetables. The volume of specific fruits and vegetables hauled in single-commodity and mixed loads also varied among different products; some commodities being hauled in single-commodity, others predominantly in mixed loads (table 5).

Neither the proportion of mixed shipments nor the average number of commodities per mixed shipment show a distinct seasonal pattern (table 6). However, there was some change in the proportion of mixed shipments.

A comparison of data collected in 1956, and a 5-percent sample of all trucks passing border stations in March, April, and July of 1961, supports the generally accepted opinion that the percentage of mixed shipments has been increasing (table 7).

The present low-inventory policy of most retail food dealers probably contributes to the high percentage of mixed to total shipments of California fresh fruits and vegetables. The flexibility of truck routing and the ability of truckers to provide retailers with more frequent, scheduled deliveries of small orders reduce quality risks and storage costs, making possible a low-inventory operation. As would be expected, the percentage of mixed to total shipments decreases as the distance from the point of origin increases. Thus, about three-fourths of the 1961 shipments to the Western Region and to western Canada were mixed loads, of which a considerable proportion contained more than 10 commodities. In contrast, mixed shipments to the North and South Atlantic Regions accounted for a much smaller proportion of the total shipments (table 8).

There are other possible explanations of the high percentage of mixed shipments which are not explored here.

Seasonal Variation

The seasonal production of California fruits and vegetables is reflected in the seasonal shipping pattern. Both the truck and rail shipments vary seasonally. However, rail shipments have a higher peak, and drop below the level of truck shipments during an off-season (figure 1). A probable explanation of the difference in seasonal variation between the two modes of transport follows: Railroads are common carriers; they must accept the goods offered for transport at a regulated rate. Truck rates, on the other hand, are not regulated, but are determined by supply and demand. During an off-season, the number of incoming trucks exceeds the number of loaded trucks leaving California. The relatively ample seasonal supply of equipment causes the truck rates to fall. 6/ Conversely, there is not enough equipment to satisfy a relatively heavy demand during the peak shipping season and truck rates rise. Because railroad rates remain the same throughout the year, shippers substitute truck for rail transportation during an off-season, and rail for truck during the peak shipping season. 7/

6/ The actual extent of rate fluctuations is difficult to determine because commodities shipped during the summer differ from those shipped during the winter. However, in 1963 truck rates on lettuce during the winter were 20-25 cents per carton lower than during the summer. Truck rates on other commodities show a similar seasonal difference.

7/ This evidence supports the "residual claimant" hypothesis, i.e., railroads in the transportation of agricultural commodities are residual claimants in supplying transport services. For a fuller explanation see Alexander, D., and Moses, L. N. "Competition Under Uneven Regulation," Amer. Econ. Rev. 466-470, Vol. 53: May 1963.

Table 5.--California fresh fruits and vegetables: Percentages of the total volume of selected commodities shipped in mixed truckloads to other States, 1961

Commodity shipped in mixed loads	Percentage of total volume	Commodity shipped in mixed loads	Percentage of total volume
Apricots	100	Lemons	79
Artichokes	100	Carrots	73
Broccoli	100	Oranges	72
Grapefruit	100	Peaches	72
Cabbage	97	Asparagus	64
Plums	96	Grapes	64
Pears	95	Avacados	58
Cauliflower	92	Lettuce	57
Cherries	90	Cantaloups	56
Nectarines	90	Tomatoes	41
Strawberries	88	Potatoes	27
Celery	88	Watermelons	14
Dates	88		
Apples	87	Other fruits 1/	97
Sweetpotatoes	84	Other melons	93
Onions	83	Other vegetables 2/	98
Corn	82		
Nuts	82		

1/ "Other fruits" includes mandarins, mangos, persimmons, pomegranates, tangelos, and tangerines.

2/ "Other vegetables" includes beans, brussels sprouts, cucumbers, green onions, peas, peppers, radishes, rutabaga, spinach, squash, and turnips.

Source: 5-percent sample of the border-station inspection reports.

Table 6.--Fresh fruits and vegetables: Seasonal variation in percentage of mixed commodity truckloads in truck shipments from California to other States, and a number of commodities per mixed load, 1961

Month	Percentage of total mixed loads	Commodities per mixed load
	Percent	Number
January	65	5.2
February	64	5.4
March	66	6.4
April	74	5.4
May	62	6.6
June	66	5.6
July	60	5.4
August	63	5.1
September	68	5.1
October	67	5.7
November	64	5.4
December	62	5.0
Average for the year	65	5.5

Source: 5-percent sample of the border-station inspection reports.

Table 7.--Fresh fruits and vegetables: Percentage of trucks transporting specified number of commodities from California to other States, 1953 and 1961 1/

Month	1 commodity		2 to 4 commodities		5 and more commodities	
	1953	1961	1953	1961	1953	1961
	Percent					
March	36	34	28	31	36	34
April	37	26	31	40	32	34
July	45	34	28	34	27	32

1/ The 1953 estimates are based on complete enumeration for the periods March 9-15, April 13-19, and July 25-31, 1953. The 1961 estimates based on a 5-percent sample of all trucks passing border stations during the months of March, April, and July of 1961.

Source: Compiled by U. S. Fed.-State Mkt. News Serv. and shown in table 3 of Black, Guy, Long-Haul Truck Transportation of California Fresh Fruits and Vegetables, Calif. Agr. Expt. Sta., Giannini Foundation of Agr. Econ. Rpt. No. 174, p. 25., Feb. 1955.

Table 8.--Fresh fruits and vegetables: regional distribution of truck shipments from California, by type of load, 1961

Item	Single-commodity loads	Mixed loads		Total
		Less than 10 commodities	10 or more commodities	
	Percent			
Western	27	54	19	100
West North Central	30	69	1	100
South Central	43	52	5	100
East North Central	46	53	1/	99
South Atlantic	67	33	--	100
North Atlantic	82	18	--	100
Exports 2/	19	73	8	100
Total	35	56	9	100

1/ Less than 1/ percent.
2/ "Mixed" and "drug-store" loads were shipped mainly to western Canada.

Source: 5-percent sample of the border station inspection reports.

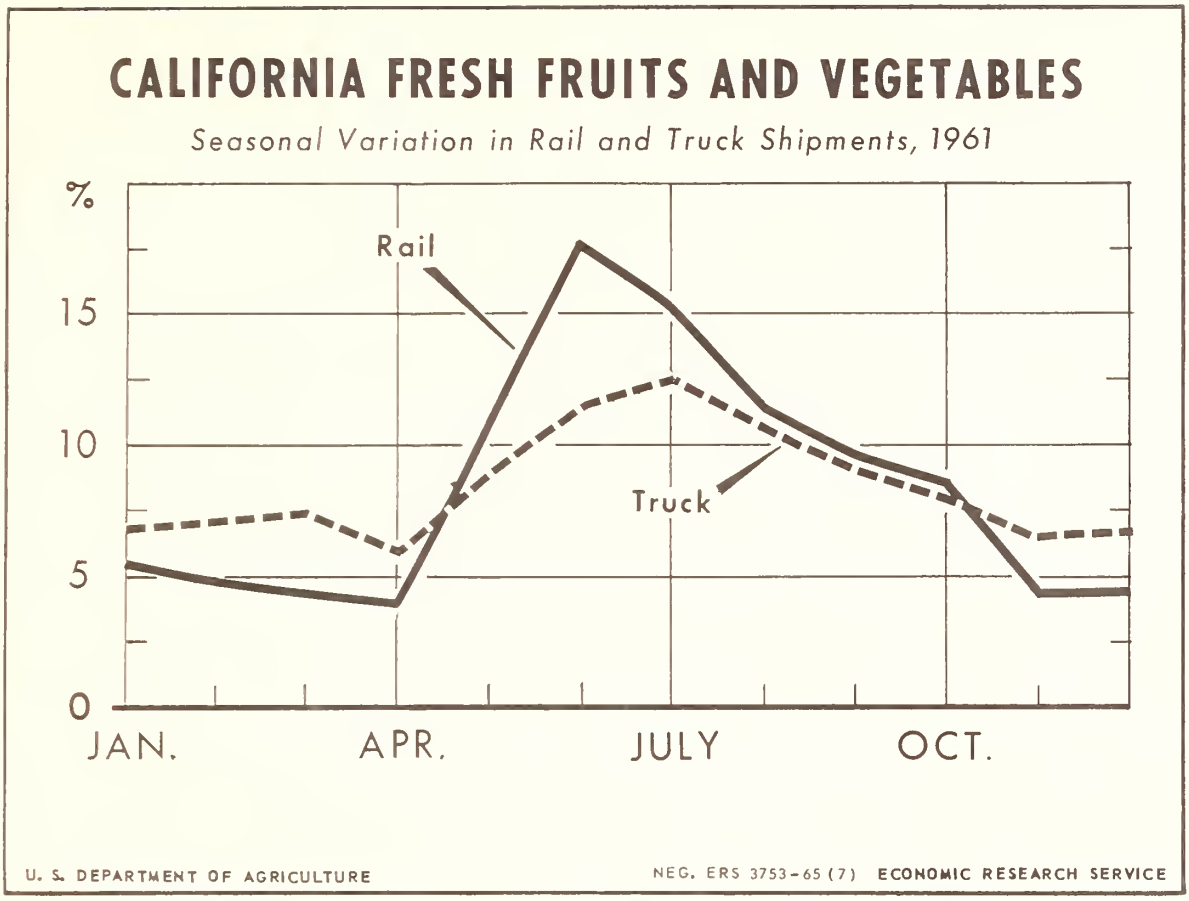

Figure 1

The seasonal variation of truck shipments from various production areas within California is not available. However, rail shipments show a quite different seasonal pattern in the 3 main producing areas (fig. 2). Shipments from southern California fluctuate less than those from other areas. Because of the predominance of deciduous fruit and potatoes, San Joaquin Valley shipments show the greatest seasonal variation.

Origins

No data are available on the origins of outbound truck shipments from various production areas within California. An indication of the volume shipped may be obtained from the data on origins of rail shipments. In 1961, the major producing areas in California shipped the following number of loads:

	Total carlot equivalents	Percentage
San Joaquin Valley	76,183	41
Southern California	62,334	33
Central Coast	43,554	23
Other areas	5,052	3

Truck origins, however, may differ from rail origins. Production areas rely on these transportation modes to a different degree. For example, it is likely that motor carriers are used to a greater extent in southern California than in other parts of the State. A majority of incoming trucks terminate their trip in that area, assuring a more adequate supply of trucks for the outbound movement. The location of the market served also may be a deciding factor in determining

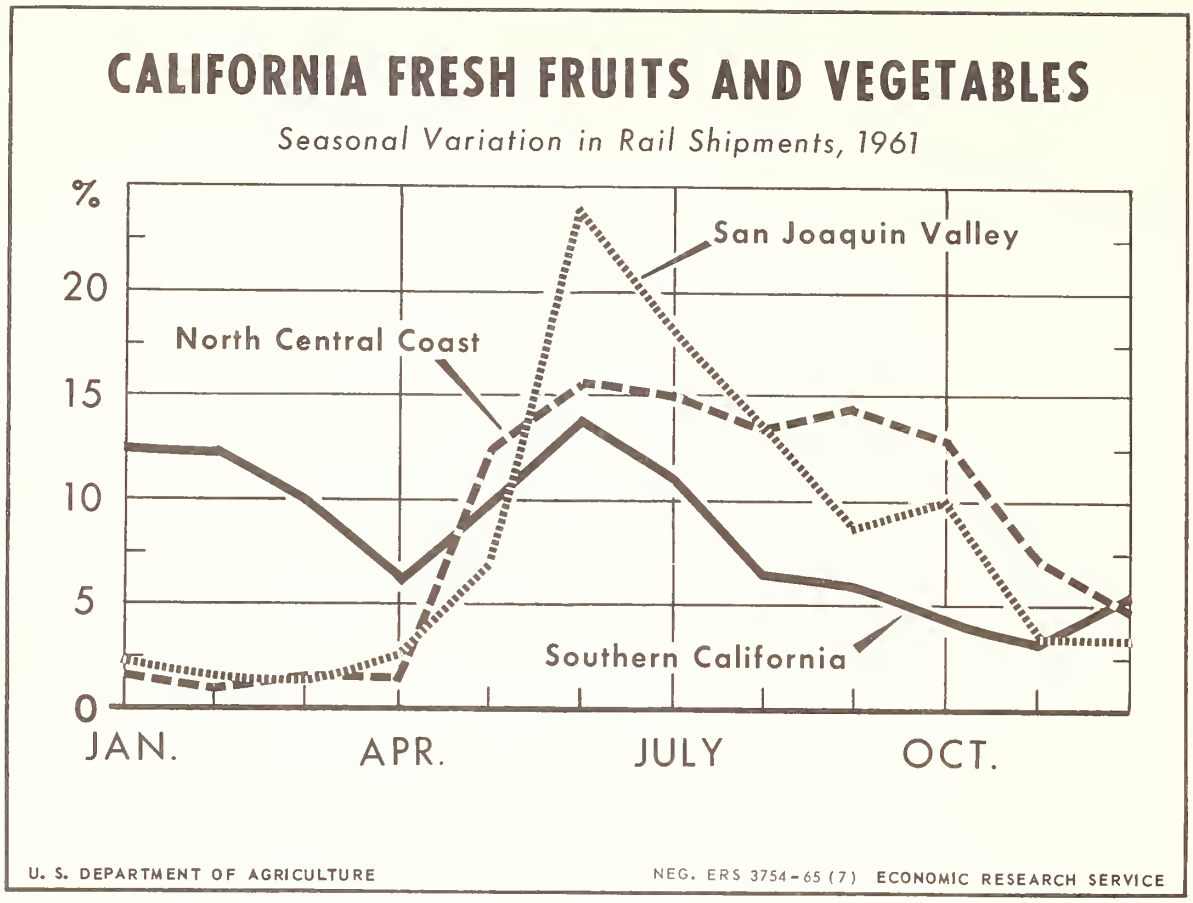

Figure 2

the choice of the mode of transportation. For example, truck movements represented 41 percent of the total lettuce shipped from the Salinas-Watsonville areas in 1961, and 86 percent from the Santa Maria-Guadalupe-Lompoc area. A much larger percentage of the total Salinas Valley shipments moved to out-of-State markets. 8/

The estimation of truck shipment origins also is complicated by numerous multiple pickups in different areas. A sample of bills of lading showed that 74 percent of truck shipments involved more than one pickup and one delivery (table 9). 9/ On the average, trucks made 2.28 pickups in California and 1.56 deliveries at destination. There was a considerable variation in mileages driven to pick up and deliver shipments (table 10). On the average, a truck traveled 122 miles in California to assemble a load, and an additional 39 miles from the point of first to final delivery at destination. 10/ As expected, the number of pickups and deliveries and distances traveled decrease during the peak shipping season and increase during an off-season.

8/ Marketing Lettuce from Salinas-Watsonville and Other Central California Districts, 1961 (Salinas: Fed.-State Mkt. News Serv., 1962.) (See pp. 1 and 5.)

9/ A random sample of 216 bills of lading drawn from truck shipments handled by 9 truck brokers and 3 carriers. The sample represents about 1 percent of shipments handled by truck brokers. It was not possible to make a similar estimate for shipments handled by carriers.

10/ The pickup mileage includes the estimated mileage driven in California (and in few cases in Arizona), and bhe additional line-haul mileage where pickup operation necessitated a circuitous instead of a direct route to out-of-State destination. The delivery mileage does not include empty mileage from the last point of delivery to the home base for the out-of-State carrier or mileage to the point where return trip starts for a California-based carrier.

Table 9.--Fresh fruits and vegetables: Frequency distribution of truck pickups and deliveries for out-of-State markets, California, 1962-63 season

Number of pickups or deliveries	Pickups		Deliveries	
	Number of shipments	Percentage of total	Number of shipments	Percentage of total
1	72	33	135	62
2	63	20	48	22
3	45	21	30	14
4	24	11	--	--
5	9	4	3	1
6	3	1	--	--
Total	216	99	216	99

Source: Sample of bills of lading drawn from truck shipments handled by 9 truck brokers and 3 regulated carriers.

Table 10.--Fresh fruits and vegetables: Frequency distribution of truck pickup and delivery mileages, California, 1962-63 season

Mileage	Pickups		Deliveries 1/	
	Number of loads	Percent	Number of loads	Percent
Less than 50	78	36	163	75
50-99	30	14	47	22
100-199	60	28	6	3
200-299	22	10	--	--
300-399	20	10	--	--
400-499	6	3	--	--
Total	216	101	216	100

1/ Does not include mileage from the point of last delivery to home base of the out-of-State carrier or to the point of return loading for the California-based carrier.

Source: Sample of bills of lading drawn from truck shipments handled by 9 truck brokers and 3 regulated carriers.

The data indicated that in a majority of cases a load of fresh fruit and vegetables originates in more than one production area within the State.

Destinations

The main out-of-State markets for fruits and vegetables are a considerable distance from California. In fact, the region farthest from California accounts for the largest percentage of the total volume (table 11).

Distance is also an important factor affecting the distribution of fruit and vegetable traffic between trucks and railroads. Trucks tend to serve areas closer to California, i.e., more than 35 percent of all truck shipments were consigned to destinations in the Western Region alone. The North Atlantic Region received only 2 percent of California's truck shipments. Rail shipments, on the other hand, were mainly consigned to the area east of the Mississippi river. 11/ In fact, the relationship is approximately linear ($\hat{Y} = 145.11 - 0.5X, r^2 = .73$) 12/ between distance and truck unloads as percentage of total unloads at 35 out-of-State markets for which unload data are available (table 12). The linear relationship is even more pronounced if southern and northern destinations are separated. In both cases r^2 is increased to .85. Furthermore, the regression line for southern destinations is above and has a less steep slope than that for northern destinations (fig. 3).

This evidence is consistent with a further finding of this study (table 23, p. 24) that the balance between incoming and outgoing trucks between California and the two Southern Regions is closer than with the other regions. A more favorable balance means better opportunities to obtain loads on both directions of a trip. In a competitive enviroment this means lower rates which, in turn, should result in a greater percentage of truck shipments in relation to rail shipments. 13/

Dried Fruit

In addition to fresh fruits and vegetables, a considerable volume of dried fruits moves to out-of-State markets (table 13). During 1961-63, this volume exceeded 230,000 tons annually. All modes of transport participated in this movement. Trucks increased slightly their relative share of the total traffic, hauling approximately 40 percent of the total or approximately 4,500 truckloads annually during 1961-63. Railroads also have increased their relative share while the percentage shipped by water declined.

The distribution of dried fruit traffic by different modes of transport varied by regions of destination. Rail accounted for the largest percentage of shipments

11/ Rail destinations estimated from the unload data at 35 United States major cities; however, unloads in Seattle include those for Tacoma; in Minneapolis, those for St. Paul; and in New York City, those for Newark--38 cities in all. It was assumed that proportion of total shipments going to different destination regions is equal to the percentage of total unloads in the regions cities for which unload data were available.

12/ Y = truck unloads as a percentage of total unloads, X = distance in miles from Los Angeles, California.

13/ An alternative explanation is that rail rates to southern and northern destinations differ, being higher to southern than to northern points. The Chi-square test on 4 commodities: lettuce, grapes, tomatoes, and oranges showed no significant differences between railroad rates to northern and southern destinations.

Table 11.--Fresh fruits and vegetables: Truck and rail shipments to other States and Canada, by regions, 1961-1963 average

Item	Truck shipments		Rail shipments		Regional share of total shipments	
	Carlot equivalent	Percentage of regional total	Carlots		Carlots or carlot equivalent	Percentage of total
Region:	Number	Percent	Number	Percent	Number	Percent
Western	30,046	87.5	4,300	12.5	34,346	12.8
West North Central	14,890	64.4	8,242	35.6	23,132	8.7
South Central	23,901	78.3	6,629	21.7	30,530	11.4
East North Central	6,617	12.6	45,866	87.4	52,483	19.6
South Atlantic	5,093	29.5	12,183	70.5	17,276	6.5
North Atlantic	1,599	1.8	85,821	98.2	87,420	32.7
Exports 1/	6,018	27.2	16,125	72.8	22,143	8.3
Total	88,164	33.0	179,166	67.0	267,330	100.0

1/ Canada and Mexico.

Source: Rail destinations are estimated from the unload data at 35 United States major cities; however, unloads in Seattle include those for Tacoma; in Minneapolis, those for St. Paul; and in New York City, those for Newark--38 cities in all. It was assumed that the proportion of total shipments going to different destination regions is equal to the percentage of total unloads in the regions' cities for which unload data are available. For truck destinations, California Truck Passings Summary, Fresh Fruits and Vegetables (Sacramento: Fed.-State Mkt. News Serv., 1961-1963).

Table 12.--Fresh fruits and vegetables: Total rail and truck unloads and also truck unloads at 35 major U. S. cities, shipped from California, 1961-63 averages 1/

City	Unloads		Truck unloads as a percentage of total	City	Unloads		Truck unloads as a percentage of total
	Total	Truck			Total	Truck	
	Carlot equivalents		Percent		Carlot equivalents		Percent
Salt Lake City	4,950	4,692	94.8	Chicago	16,422	2,115	12.9
Denver	4,976	4,706	94.6	Detroit	7,150	536	7.5
Portland	5,015	4,113	82.0	Cincinnati	3,103	217	7.0
Seattle	7,753	6,052	78.1	Cleveland	5,376	179	3.3
Western Region cities	22,694	19,563	86.2	East North Central Region cities	37,185	3,982	10.7
Wichita	967	868	89.8				
Kansas City	2,803	2,258	80.6	Birmingham	1,531	1,086	70.9
St. Louis	4,074	2,004	49.2	Atlanta	2,524	1,562	61.9
Minneapolis	4,860	1,698	34.9	Columbia	1,079	562	52.1
				Miami	2,276	1,056	46.4
West North Central Region cities	12,704	6,828	53.7	Washington, D.C.	2,387	214	9.0
				Baltimore	3,782	250	6.6
Dallas	4,271	3,925	91.9	South Atlantic Region cities	13,579	4,730	34.8
Ft. Worth	1,196	1,063	88.9				
San Antonio	3,396	2,965	87.3				
Memphis	1,206	956	79.3	Albany	1,528	168	11.0
Houston	3,978	2,767	69.6	Philadelphia	11,722	444	3.8
New Orleans	2,248	1,414	62.9	Pittsburg	5,436	130	2.4
Nashville	755	257	34.0	New York	31,329	699	2.2
Louisville	1,248	194	15.5	Boston	9,925	155	1.6
				Providence, R. I.	1,011	12	1.2
South Central Region cities	18,298	13,541	74.0	Buffalo	2,620	10	.4
Milwaukee	3,059	634	20.7	North Atlantic Region cities	63,571	1,618	2.5
Indianapolis	2,075	301	14.5				

1/ Unloads in Seattle include those for Tacoma; in Minneapolis, those for St. Paul; and in New York City, those for Newark--38 cities in all.

Source: Complied from Fresh Fruit and Vegetable Unload Totals (U.S. Dept. of Agr., AMS-25, 1961, 1962, 1963).

Table 13.--Dried fruit: California shipments to other States and Canada, by mode of transport, 1955-63

Year	Truck	Percentage of total	Rail	Percentage of total	Water	Percentage of total	Total
	Tons						
1955	93,530	36.4	96,739	37.7	66,497	25.9	256,766
1956	97,159	38.7	86,534	34.4	67,644	26.9	251,337
1957	103,512	37.3	107,529	38.7	66,472	24.0	277,513
1958	86,588	37.0	100,709	43.0	47,108	20.0	234,405
1959	75,380	36.4	105,331	50.8	26,591	12.8	207,302
1960	89,067	37.5	117,052	49.4	31,140	13.1	237,259
1961	92,044	39.7	123,643	53.3	16,105	6.9	231,792
1962	92,553	40.0	125,893	54.4	13,158	5.7	231,604
1963	89,948	38.5	114,209	48.8	29,686	12.7	233,843

Source: Data supplied by Dried Fruit Association of California.

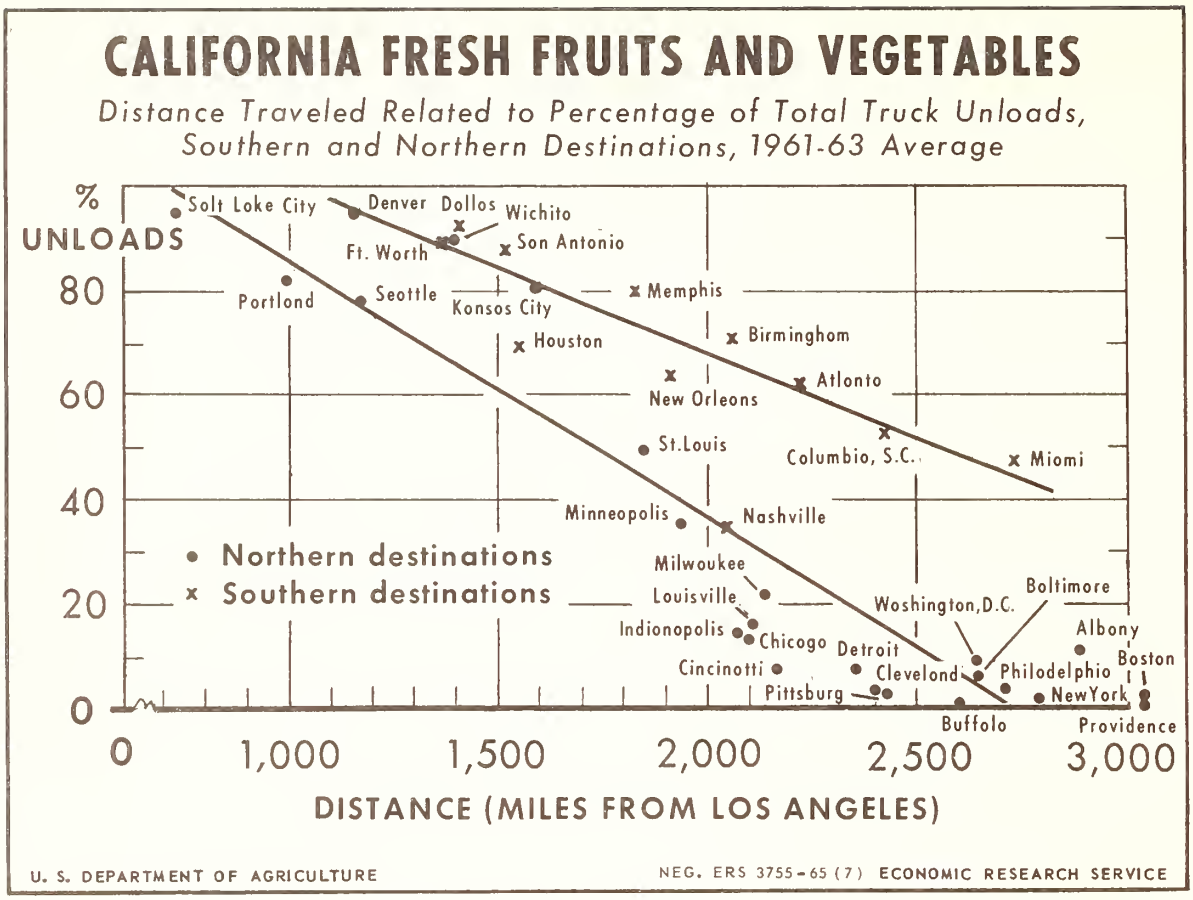

Figure 3

to the North Atlantic Region and Canada. Water shipments to this area were also significant. Trucks either supplied a major percentage or competed effectively with railroads in supplying the remaining areas (table 14).

Smaller quantities of beans, seeds, fish, horticultural, and floricultural commodities also are transported from California by motor carriers. Truckers stated that these commodities, together with dried fruit shipments, provide hauls for motor carriers during the off-season for fresh fruits and vegetables.

CALIFORNIA INSHIPMENTS

Fresh Fruits and Vegetables

During 1961-63, annual truck inshipments of fresh fruits and vegetables totaled 517,000 tons and required approximately 30,000 truckloads annually (table 15). Incoming truckloads averaged 16.5 tons compared to 15.1 tons per outgoing truckload.

The majority of inbound fruit and vegetable shipments originated in the Western Region (table 16) and moved into the two major population centers of the State. In 1963, 51 percent of total inshipments were unloaded in Los Angeles and 28 percent in San Francisco-Oakland areas. 14/

14/ Agricultural Marketing Service. Fresh Fruit and Vegetable Unloads in Western Cities by Commodities, States and Months, Calendar Year 1963. U.S. Dept. Agr. AMS-25. 67 pp. Mar. 1964. Reported unloads were adjusted for incomplete coverage of the Market News Service reports.

Table 14.--Dried fruit: truck and rail shipments to other States and Canada, by regions, 1961-1963 average

Item	Truck shipments		Rail shipments		Water shipments		Regional share of total shipments	
	Volume	Percentage of regional total	Volume	Percentage of regional total	Volume	Percentage of regional total	Volume	Percentage of regional total
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
Region:								
Western	11,430	82.8	1,909	13.8	463	3.4	13,802	5.9
West North Central	13,612	71.0	5,558	29.0	--	--	19,170	8.3
South Central	17,180	65.3	9,018	34.3	118	.4	26,316	11.3
East North Central	23,083	48.7	24,317	51.3	--	--	47,400	20.4
South Atlantic	11,602	42.2	13,214	48.0	2,687	9.8	27,503	11.8
North Atlantic	12,766	15.1	57,260	67.6	14,684	17.3	84,710	36.5
Canada	1,842	13.6	9,973	73.8	1,697	12.6	13,512	5.8
Total	91,515	--	121,248	--	19,650	--	232,413	100.0

Source: Data supplied by the Dried Fruit Association of California.

Table 15.--Fresh fruits and vegetables: trucks inshipments to California, 1961-1963

Year	Number of truckloads 1/	Total weight 2/	Average weight per truckload
		1,000 tons	Tons
1961	28,878	472	16.4
1962	31,355	524	16.7
1963	33,812	555	16.4
1961-1963 average	31,483	517	16.5

1/ Number of trucks passing through California border stations.
2/ Federal-State Market News Service in Sacramento supplied weights of most commonly used containers and the average number of containers per truckload. These were used to convert carlot equivalents to tons.

Source: Estimates based on data from California Truck Passings Summary, Fresh Fruits and Vegetables. (Sacramento: Fed. State Mkt. News Serv. 1961, 1962, 1963.

Table 16.--Fresh fruits and vegetables: truck inshipments by State of origin to California, 1961-1963

State of origin	1963		1961-1963 average	
	Carlot equivalents	Percent of total	Carlot equivalents	Percent of total
Arizona	7,917	23.6	7,795	25.1
Washington	6,914	20.6	6,228	20.0
Oregon	6,902	20.6	6,225	20.0
Mexico	4,813	14.4	4,124	13.3
Florida	2,022	6.0	1,882	6.1
Idaho	1,266	3.8	1,286	4.1
Texas	1,033	3.1	1,146	3.7
Utah	923	2.8	761	2.5
Nevada	693	2.1	558	1.8
Colorado	198	.6	326	1.0
Other	824	2.5	749	2.4
Total	33,505	100.0	31,080	100.0

Source: California Truck Passings Summary, Fresh Fruits and Vegetables (Sacramento: Fed.-State Mkt. News Serv., 1961, 1962, 1963.

The main fruits and vegetables received in California are also produced within the State (table 17). The inbound movement supplements locally produced commodities during the periods when they are not available or in short supply. Therefore, the inbound movement of fruits and vegetables shows an opposite pattern of seasonal variation from that of outbound movement. This inverse pattern of seasonal variation indicates that the outbound movement during the peak shipping season has to reply on other than inbound fruits and vegetables for the supply of trucking equipment.

Processed Poultry

No data are available on total inshipments of processed poultry. The receipts at Los Angeles and San Ffrancisco areas provide good indicators as to the magnitude of movement into California. During 1962-63, annual truck receipts at the 2 areas totaled over 120,000 tons and required approximately 10,000 truckloads annually. 15/ In 1963, 75 percent of these receipts were unloaded in Los Angeles and 25 percent in the San Francisco area. Additional volume moved to other parts of the State. This volume, however, may not be very significant because the smaller market areas probably rely more heavily on local production and the terminal markets in Los Angeles and San Francisco transship part of their receipts to other parts of the State.

The peak of the inshipments of processed poultry coincides with the peak of the outshipments of California's fruits and vegetables. Poultry inshipments, therefore, supply refrigerated equipment necessary for fruits and vegetables at the time when such equipment is most needed. Furthermore, most shipments of processed poultry received from out-of-State originate in the South Central Region (table 18), which is a major destination for Calfornia's fruits and vegetables.

Grain

California imports a considerable volume of wheat and feed grains to supplement local production. During 1961-63, total inshipments of grain averaged 2.5 million tons per year. The railroads hauled by far the larger percentage of this tonnage and have been increasing their relative share of the grain traffic (table 19). Truck inshipments averaged 466,000 tons per year and required approximately 23,000 truckloads annually.

The largest percentage of grain volume moved to Southern California. In 1962 and 1963, over 90 percent of feed grains were shipped to that area and 80 percent of the wheat tonnage was consigned to Los Angeles County alone, reflecting a large milling demand for wheat and the feed grain requirements of the Southern California dairy and poultry industries. 16/ Texas was the major supplier of grain, followed by Montana and Utah (table 20).

Because of the relatively low rates, truckers usually do not seek grain traffic. However, grain inshipments often do provide a means of balancing traffic flows between some regions. For example, truckers carrying fruits and vegetables or other commodities to the Northwest at certain times of the year find it difficult to get a backhaul to California. In order to avoid an empty load they travel to Montana

15/ The average weight of a truckload of processed poultry was estimated by the Market News Service at 24,500 lbs.

16/ Cumulative Inbound Truck Passings of Grain Through California Border Stations by County of Destination and Origin of Shipment (Sacramento: Fed.-State Mkt. News Serv. 1963 and 1964).

Table 17.--Fresh fruits and vegetables: truck inshipments by commodity to California, 1961-1963

Commodity	1963	1961-1963 average
	--Carlot equivalent--	
Potatoes	7,320	6,744
Apples	7,890	6,734
Lettuce	3,107	2,868
Grapefruit	2,026	2,665
Tomatoes	2,954	2,426
Watermelons	1,938	1,743
Onions	1,711	1,606
Cantaloups	1,348	966
Pears	614	635
Oranges	444	982
Other	4,153	3,711

Source: California Truck Passings Summary, Fresh Fruits and Vegetables (Sacramento: Fed.-State Mkt. News Serv., 1961, 1962, 1963.

Table 18.--Processed poultry: truck inshipments by State of origin to Los Angeles and San Francisco areas, 1962-1963 1/

State of origin	1963		1962-1963 average	
	Tons	Percent of total	Tons	Percent of total
Mississippi	35,347	27.9	35,478	29.3
Arkansas	40,299	31.8	36,774	30.3
Alabama	22,332	17.6	23,934	19.7
Texas	19,042	15.0	16,942	14.0
Other	9,698	7.7	8,082	6.7
Total	126,718	100.0	121,210	100.0

1/ As suggested by the Market News Service in Los Angeles and San Francisco, the reported receipts in Los Angeles were increased by 20 percent and in the San Francisco area by 25 percent to adjust for incomplete coverage. Los Angeles area includes Los Angeles, Ventura, Orange, San Bernardino, and Riverside Counties.

Source: California Egg and Poultry Statistics (Sacramento: Fed.-State Mkt. News Serv. 1963 and 1964).

Table 19.--Grain: inshipments by mode of transport to California, 1961-1963 1/

Year	Truck		Rail	
	Tons	Percent	Tons	Percent
1961	480,034	20.4	1,868,612	2,348,646
1962	457,062	18.2	2,050,397	2,507,459
1963	462,252	16.2	2,384,458	2,846,710
1961-1963 average	466,449	18.2	2,101,156	2,567,605

1/ Corn, grain sorghum, wheat, barley, and oats.

Source: Grain, California Market Summary, 1963 (Sacramento: Fed.-State Mkt. News Serv., 1964), p. 22.

Table 20.--Grain: truck inshipments by State of origin to California, 1961-1963 1/

State of origin	1963		1962-1963 average	
	Volume	Share of total	Volume	Share of total
	Tons	Percent	Tons	Percent
Texas	186,272	39.8	194,412	41.8
Montana	76,709	16.4	74,017	15.9
Utah	979	14.5	77,288	16.6
Arizona	25,536	5.4	24,611	5.3
Idaho	24,459	5.2	24,986	5.4
Oregon	23,188	5.0	17,290	3.7
Colorado	21,333	4.6	20,924	4.5
Other	42,701	9.1	31,578	6.8
Total	468,177	100.0	465,106	100.0

1/ Includes "other" grain available for truck shipments but not for rail shipments. In 1962 "other" grains totaled 4,613 tons; in 1963, 5,925 tons.

Source: Monthly Inbound Truck Passings of Grain Through California Border Stations by County of Destination and Origin of Shipment (Sacramento: Fed.-State Mkt. News Serv. 1964).

or Idaho to pick up a load of grain. Texas truckers, in order to participate in a more lucrative fruit and vegetable movement from California, haul grain if no other commodities are available. 17/

Livestock

Livestock is one of the important commodities moved. During 1961-63 more than 2.0 million head of cattle and calves, 1.4 million head of sheep and lambs, and 1.4 million head of hogs were shipped to California annually. The truck inshipments during this period accounted for almost three-fourths of all cattle and for two-thirds of all sheep. Moreover, the relative amount of truck inshipments of livestock has increased (table 21). The truck movement of livestock in 1963 accounted for an estimated 717,000 tons, and required approximately 35,000 truckloads. 18/

Arizona and Texas are the main suppliers of cattle, and Idaho, Utah, and Oregon are the main suppliers of sheep (table 22). Nebraska alone supplied 77 percent of all hogs shipped to California by truck.

Two types of trailers are used to transport cattle. One type is specially built, and is limited to hauling livestock. Ocasionally, these trailers are used to haul agricultural commodities that do not require refrigeration, but often such trailers return empty to their origin. The other type of trailer, the so-called "convertible" type, has removable doors and other openings, insulation, and cooling equipment. Upon arrival in California these trailers are steamcleaned and then are suitable for transportation of fruits and vegetables. No information is available on the extent of use of each type of equipment. Texas truckers are said to prefer the convertible type of equipment.

Hay

The truck inshipments of hay in 1963 totaled 174,286 tons and required about 7,600 truckloads. The 1963 tonnage is about the same as that estimated for 1961, but is 16,000 tons higher than the 1953-55 average. 19/ It has been estimated that an average of 159,000 tons per year were shipped to California by truck during that period.

17/ For example, in 1963 the prevailing rate on grain from Texas to California was 50-60 cents per 100 pounds. Thus, a 21-ton load of grain at 55 cents per 100 pounds would yield $231 gross revenue, compared with $500 to $600 on fresh fruits and vegetables transported from California to Texas. The additional costs of handling fresh fruits and vegetables consist primarily of refrigeration ($35 per truckload to Texas destinations) and cargo insurance ($14.50 per $1,000 gross revenue).

18/ Estimates are based on records of the California border stations during January 1963:

	Av. no. per truckload	Av. wt. per head (lb.)
Breed and feeding cattle	67	650
Slaughter cattle	37	1,000
Sheep and lambs	356	100
Hogs	208	180

19/ Fellows, I. F. Forage Procurement and Use by the California Dairy Industry and Selected Dairy Farms. Univ. Calif. Gaiannini Found. Agr., Berkeley. Econ. Res. Rpt. No. 262, p. 13, 1963; and McGlothin, R. S. Hay and Feed Grains in the West: Supplies, Utilization, and Interstate Movement. Ariz. Agr. Expt. Sta. Bul. No. 289 (p.) Tucson.

Table 21.--California livestock: truck inshipments, 1961-63

Type of livestock and year	Total	By truck	
		Head	Percentage of total
	1,000 head	1,000	Percent
Cattle and calves:			
1961	1,829	1,285	70.2
1962	2,287	1,656	72.4
1963	2,241	1,788	79.8
1961-63 average	2,118	1,576	74.4
Sheep and lambs:			
1961	1,469	885	60.2
1962	1,462	975	66.7
1963	1,381	1,029	74.5
1961-1963 average	1,437	963	67.0
Hogs:			
1961	1,303	184	14.1
1962	1,495	177	11.8
1963	1,445	172	11.9
1961-1963 average	1,414	178	12.6

Source: California Crop and Livestock Reporting Service. (Sacramento: California Annual Livestock Report for 1963, pp. 14-15.

Approximately three-fourths of the inshipments moved to southern California to satisfy the local demands of dairy and cattle feeding industries, as well as for production of alfalfa pellets and meal to be shipped from California ports. In 1963 these exports totaled 202,695 tons. About 50 percent of the 1963 tonnage originated in Nevada and 43 percent in Arizona (table 23).

THE BALANCE OF EXEMPT COMMODITY MOVEMENTS

A significant feature common to most modes of transportation is that the provision of transport services in one direction provides capacity for a return movement.

As shown earlier, the inshipments of exempt agricultural commodities into California exceeded the outshipments in terms of tonnage and number of truckloads, but not in ton-miles (table 1). The larger amount of ton-miles for outshipments reflect longer distances to destinations for outbound commodities. Of course, it is not the total yearly balance between incoming and outgoing trucks, but the balance at any particular time, and between particular regions, that is of importance in the equipment supply-demand relationship.

The seasonal variation in the exempt commodity shipments appears in table 24. Although some inbound commodity traffic shows a more definite seasonal pattern, the aggregate seasonal variation is not pronounced.

Table 22.--Livestock: truck inshipments by State of origin, California, 1961-1963

Type of livestock and State of origin	1963		1961-1963 average	
	Head	Percentage of total	Head	Percentage of total
	1,000	Percent	1,000	Percent
Cattle and calves:				
Arizona	592	33.1	541	34.3
Texas	510	28.5	405	25.7
Oregon	144	8.0	167	10.6
Nevada	130	7.3	123	7.8
Idaho	69	3.9	75	4.8
Utah	55	3.1	59	3.7
Other	288	16.1	206	13.1
Total	1,788	100.0	1,576	100.0
Sheep and lambs:				
Idaho	238	23.1	215	22.3
Utah	219	21.4	214	22.2
Oregon	217	21.1	197	20.5
Arizona	89	8.6	102	10.6
Nevada	127	12.3	122	12.7
Other	139	13.5	112	11.7
Total	1,029	100.0	962	100.0

Source: California Annual Livestock Report for 1963 (Sacramento: Calif. Crop and Livestock Rptg. Serv., 1964, p. 14-15.)

Table 23.--Hay: California truck inshipments by State of origin, 1963

Origin of shipment	Amount	Percentage of total
	Tons	Percent
Nevada	87,622	50.3
Arizona	75,405	43.3
Oregon	4,764	2.7
Utah	4,356	2.5
Other	2,139	1.2
Total	174,286	100.0

Source: Alfalfa Hay Trucked into California from Out of State (Sacramento: Fed.-State Mkt. News Serv., Jan. 21, 1964.)

Table 24.--Some exempt agricultural commodities: truck movements, by months, California, 1963

Month	Outbound			Inbound					
	Fruits and vegetables	Dried fruit	Total	Fruits and vegetables	Poultry	Grain 1/	Livestock	Hay	Total
	1,000 tons								
January	86	6	92	52	10	29	57	18	166
February	82	6	88	54	9	26	44	19	152
March	80	7	87	70	12	25	56	14	177
April	71	6	77	67	10	27	51	15	170
May	116	5	121	44	10	46	53	15	168
June	145	5	150	37	13	53	44	15	162
July	169	5	174	23	10	62	54	15	164
August	156	8	164	13	13	62	53	10	151
September	124	10	134	31	10	43	62	10	156
October	114	16	130	50	10	32	83	13	188
November	78	10	88	56	11	29	93	14	203
December	79	66	85	58	9	28	67	16	178
Total	1,300	90	1,390	555	127	462	717	174	2,035

1/ Excluding "other grains." See table 17, footnote 1/.

Figure 4 illustrates the balance between the estimated number of incoming and outgoing trucks. The equipment provided by the inbound movement of exempt agricultural commodities seems to be sufficient to satisfy the demand for the outbound shipments for most of the year, with the exception of the peak shipping season.

The balance of exempt commodity flows between California and other regions can be obtained only on a yearly basis. The available data indicate a large imbalance with the Western Region and lesser imbalances with other regions (table 25). The large imbalance with the western region arises primarily from a one-way traffic of such commodities as livestock and hay. The transportation of these commodities requires specialized equipment with limited possiblilities of participating in transportation of fresh fruits and vegetables to out-of-State markets.

The traffic imbalances in exempt commodities, seasonally and between different regions, suggest considerable empty mileage and additional trips between various regions in order to minimize empty return trips. However, the picture presented is incomplete. On the one hand, such relatively low-volume exempt commodities as dry beans, seeds, and horticultural and floricultural commodities usually shipped from California were not included because of lack of data. Also, the equipment utilized in the inbound transportation of some exempt commodities is not suitable for the outbound transportation of fresh fruits and vegetables. Both of these factors tend to exaggerate the sufficiency of equipment. Conversely, some regulated and private carriers hauling mostly manufactured commodities to California participate in the movement of fruits and vegetables to out-of-State markets.

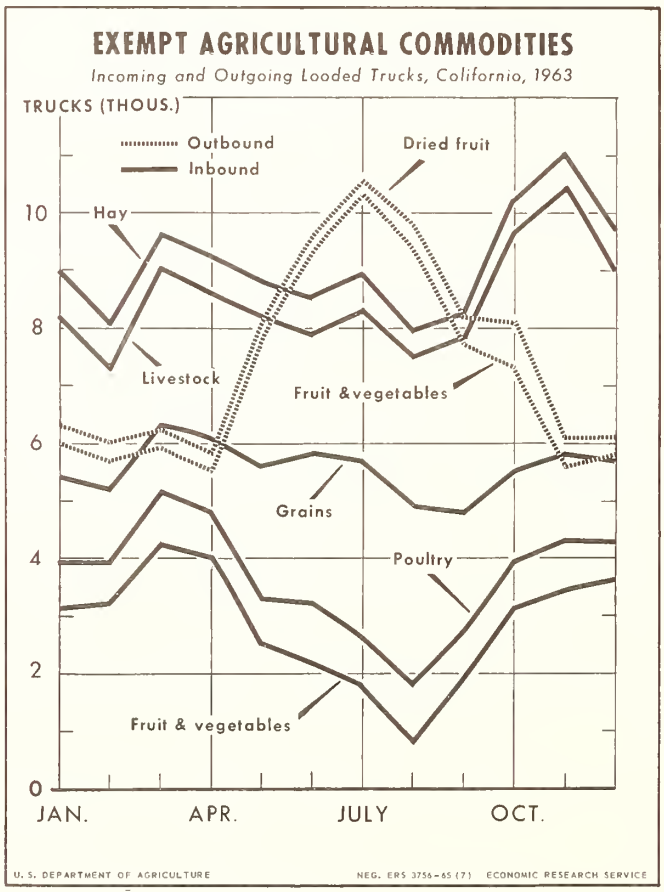

Figure 4

Table 25.--Exempt agricultural commodities: estimated truckloads by origin or destination regions, California, 1963

Region of destination or origin	Outbound			Inbound					
	Fruits and vegetables	Dried fruit	Total	Fruits and vegetables	Poultry	Grain	Livestock	Hay	Total
Western	29,100	600	29,700	25,300	--	13,200	25,600	7,500	71,600
West North Central	14,500	700	15,200	--	--	500	700	--	1,200
South Central	22,700	900	23,600	1,100	9,200	9,300	8,200	100	27,900
East North Central	7,000	1,100	8,100	--	--	--	--	--	--
South Atlantic	5,500	500	6,000	2,100	--	--	--	--	2,100
North Atlantic	1,800	600	2,400	--	--	--	--	--	--
Exports	5,700	100	5,800	5,300	--	--	--	--	5,300
Unknown	--	--	--	--	800	--	500	--	1,300
Total	86,300	4,500	90,800	33,800	10,000	23,000	35,000	7,600	109,400

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