TRANSPORTATION IN AGRICULTURAL MARKETING

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TRANSPORTATION IN AGRICULTURAL MARKETING 1/

Agricultural transportation is a dynamic link between widely scattered producing regions and the Nation's dining tables. A head of lettuce growing in California one week may be in a salad in New York City the next week. Broilers in a Chicago supermarket are often raised in Georgia, feed for them coming from the Midwest. Some of the milk consumed in Gulf States is produced by dairy cows in Wisconsin. A generation ago, these particular movements of products hardly existed. Their development illustrates the important role that transportation has played in agricultural marketing.

Transporting farm products and supplies is a big job. In 1964, cost of transporting farm food products for civilian consumption alone totaled $5.1 billion (table 1). This was nearly double the 1950 estimate of $2.7 billion and almost $1 billion above the 1957-59 average of $4.2 billion. Since 1950, this transportation bill has accounted for just over 10 percent of the total marketing bill for farm food products. Railroads and trucks handle most of the business, which includes the equivalent of a million railroad carloads of fresh fruits and vegetables and nearly another million carloads of meat, to cite only two examples.

This estimate of $5.1 billion does not include, by any means, all the costs of transporting agricultural products and supplies. Charges paid for transporting feed and fiber add a considerable amount to the total transportation bill, as do the charges for transporting farm production supplies. Shipments of agricultural products moving into industrial uses and into export channels further add to it, as do the shipments of food imported for domestic use.

The farmers' costs for moving products in their own trucks would add still more. Agriculture is a major user of all motortrucks in the United States; about 3.5 million trucks out of 12 million are used in agriculture, according to the 1963 Census of Transportation.

Estimates are that the total amount paid to move farm products and supplies may run as high as $10 billion a year.

Another indication of the importance of transportation to agriculture and consumers is the portion of a commodity's value that results from charges for transportation. In 1959, for example, these charges amounted to more than 33 percent of the wholesale value of cabbage and celery rail receipts at Chicago and New York; about 25 percent of the wholesale value of lettuce, onions, and potatoes; and 11 percent of the value of 6 important grains at major grain terminals--terminals that were still a long way from the points of ultimate consumption (37). 2/

ECONOMIC EVOLUTION OF CURRENT SYSTEM

Many agricultural products are exempt from the economic regulatory provisions of the Interstate Commerce Act when carried by trucks or barges but not when hauled by railroads. The section of the Act which permits this is commonly called the "Agricultural Exemption." Rates for exempt commodities are set by negotiations between truck and barge operators and shippers, whereas a railroad may have to get over a series of administrative and legal hurdles before it can make a rate

1/ Prepared by Transportation Economics Group.
2/ Underscored numbers in parentheses refer to Selected References, p. 107.

Table 1.--Transportation bill for marketing farm food products and total marketing bill 1949-64 1/

Year	Rail and truck transportation 2/	Total marketing bill	Percentage transportation is of total marketing bill
	Billion dollars	Billion dollars	Percent
1949	2.3	23.9	10
1950	2.7	23.9	11
1951	2.7	26.4	10
1952	3.1	28.3	11
1953	3.3	29.2	11
1954	3.4	30.0	11
1955	3.4	32.0	11
1956	3.8	33.7	11
1957	3.9	35.2	11
1958	4.2	36.8	11
1959	4.5	39.2	11
1960	4.6	41.0	11
1961	4.9	41.9	12
1962	4.9	43.2	11
1963	5.0	45.3	11
1964 3/	5.1	47.3	11

1/ Total marketing bill is the difference between civilian expenditures for domestic farm-originated food products and the farm value or payment farmers received for the equivalent farm products. It pertains only to domestic food bought by civilian consumers and not to that sold to the Armed Forces or exported.
2/ Includes charges for heating and refrigeration; does not include local hauling.
3/ Preliminary.

change. Exempt truck and barge operators are not required to report rates; consequently, little information about rates for such traffic is available. Rail rates are published, and most inferences concerning evolution of competition in transportation are based on trends in these published rates.

History of Rail-Rate Structure

The basic rail-rate structure for many agricultural commodities was developed in the early thirties by the Interstate Commerce Commission (ICC) in its Docket 17000 series of investigations. These investigations were carried out as a result of the Hoch-Smith resolution of 1925 which, in part, directed the ICC to investigate and revise the carriers' rate structures to promote freedom of movement of agricultural products, including livestock, at the lowest possible lawful rates compatible with the maintenance of adequate transportation service. As a result of these investigations, maximum reasonable rates were prescribed for grain and grain products, livestock, cotton, hay, cottonseed cake and meal, and other vegetable cakes and meals.

At the time of the prescription of these maximum rates and the establishment of these particular rate structures, there was very little competition for the railroads. The Commission, in prescribing rates, gave far greater weight to the value-of-service concept of ratemaking than to the cost-of-service concept. Equal rates for raw grains and their products, equal treatment of large and small shippers, and

recognition of competitive relationships between producing areas and marketing areas characterized the rate structure thus established.

As an example of underlying rail-rate structures, much of the rail-rate structure for grain in the Northeast was developed to enable processors at two different markets to compete for raw materials by giving a producing area the same rate to both markets. This practice also enabled carriers servicing both markets to participate in the traffic and increased the outlets for a given producing region. To achieve the rate structure, all points in a given area of origin were given the same rate to points in a given destination area. Usually the rate was based on the distance from the midpoint of one area to the midpoint of another. Some of the areas were quite large, resulting in high costs to shippers. So as rail rates increased, they exceeded the charges of competing truckers for short hauls. Thus the rails began to lose the shorter hauls to truckers who quoted lower rates based on their costs.

General Rate Increases

Immediately before and after World War II, railroad operating costs rose rapidly. Wages, materials costs, and taxes all increased. To cover these cost increases, railroads sought specific rate increases. The ICC granted several specified percentage rate increases in order that the railroad's revenues in total would cover costs; the first of these was granted in 1938. By October 1960, the time of the last such increase, 10 general increases had been granted. From 1946 to 1960, the rate levels allowed by these increases increased 115 percent. Not all railroads entered tariffs reflecting these increases on all commodities. Some railroads eliminated certain commodities from the increases. Many agricultural commodities were granted smaller increases in rates than other commodities. In addition, there were many "hold-downs" placed on agricultural commodities, and different rates of increases were granted for different regions of the country. 3/

Changes in Indexes of Rail-Freight Rates

An index of rail-freight rates for selected agricultural commodities, prepared in the Marketing Economics Division, increased from 81 in 1949 to a peak in 1958 of 102 (1957-59 = 100) (table 2). By 1964, the index declined to 95. After 1957, selective rate cuts usually involving heavier minimum weights--for grains, meats, and fruits and vegetables, more than offset the general rate increases approved by the ICC, in 1958 and 1960.

Growth of Competition

Two interrelated factors, the underlying rate structure and the general rail-rate increases, were of major importance during the fifties in the evolution of the current transportation system. Combined, they provided trucks and barges with the opportunity to furnish some shippers with needed transportation services at lower rates. This competition diverted considerable traffic from the rails to trucks and barges.

3/ Hold-downs are maximum increases such as 6 cents per 100 pounds, regardless of distance. For example, when a 6-percent increase is granted on a rate of $2, the increase would be 12 cents, but with a hold-down of 6 cents, the new rate is only $2.06. Thus, the percentage of increase for the more distant movements has been reduced to 3 percent.

Table 2.--Index numbers of railroad freight rates for specified commodities, 1949-64

1957-59 = 100

Year	Livestock	Meats	Fruits and vegetables	Wheat	All grains	Soybeans	Cotton	Wool	Tobacco	Combined indexes
1949	74	84	87	77	---	---	91	---	---	81
1950	75	86	89	79	---	---	93	---	---	83
1951	77	89	89	81	---	---	96	---	---	84
1952	84	95	94	87	---	---	104	---	---	90
1953	86	97	95	89	---	---	108	---	---	93
1954	86	97	95	89	---	---	108	---	---	93
1955	86	97	95	89	---	---	105	---	---	92
1956	90	101	98	94	---	---	101	---	---	96
1957	98	108	103	99	99	98	99	107	108	101
1958	102	101	101	101	102	101	101	108	101	102
1959	100	91	96	100	99	101	100	85	91	97
1960	99	92	95	99	98	102	100	82	90	97
1961	99	92	95	99	98	99	100	83	91	97
1962	98	91	95	97	97	97	100	83	92	96
1963	96	91	94	96	96	96	99	83	92	95
1964 1/	96	91	94	96	96	96	99	83	92	95

1/ Preliminary.

The rail-rate structure in effect in 1946 for many agricultural commodities made allowances for certain accessorial services, such as stops in transit for storage or processing, diversions in route, and circuitous routings. Shippers not requiring these services paid the same rates as those using them. Again, as rail rates increased after World War II, truckers found it possible to underbid rails for hauls where the shippers desired only point-to-point transportation without accessorial services.

Several kinds of trucking operations were ready to carry unmanufactured agricultural products to utilize more fully their trucking equipment. Common and contract carriers are exempt from economic regulation when hauling unmanufactured agricultural products. In instances where common carriers have a heavy flow of regulated products in one direction but not in the other, they will transport an agricultural commodity that generally moves in the other direction. However, regulated truckers are not heavily engaged in moving exempt commodities.

Trucks operated by farmer cooperatives in interstate commerce are also exempt from economic regulation by the ICC when hauling for members of the cooperatives, and under certain conditions when hauling other goods.

Private carriers typically generate empty mileage when returning from delivering a product or in going to pick one up. Therefore, instead of running empty these carriers often haul exempt agricultural commodities, to cut down the cost of carrying on their primary business.

Some truckers handle exempt agricultural products as their primary business. A survey of these exempt for-hire truckers indicated that, in addition to much local and regional hauling, these carriers also did considerable interregional hauling (11). Over a third of their major movements of exempt agricultural products originated outside their home office regions. Half their destinations were outside their home office regions.

Increases in rail rates during the fifties also caused these rates to surpass the charges of water carriers in many instances. Consequently, the rails lost

traffic, particularly grain traffic, to barges between points serviced by them. Much of the traffic moved in some form of truck-and-barge combination, a truck movement being necessary from the origin to water or from water to the ultimate destination.

By 1958, these increases in rail-freight rates were widely recognized by railroads, Congress, and others as preventing the railroads from sharing in traffic increases. Ton-miles of rail traffic were relatively constant between 1946 and 1958 in relation to total ton-miles by all modes (table 3). Total intercity freight traffic, however, over the same period increased from 904 billion to 1,215 billion ton-miles. As a result, railroads' share of the total intercity freight traffic dropped from 67 percent in 1946 to 46 percent in 1958.

Legislative Activities in the Fifties

In an attempt to redesign Federal regulatory policies to be more effective, a Presidential Advisory Committee in early 1955 appraised Federal transportation

Table 3.--Estimated ton-miles of intercity freight traffic, public and private, by mode of transportation, 1946-64

Year	Railways	Motor vehicles	Inland waterways	Pipelines	Airways	Total 1/
	Billion ton-miles					
1940	379	62	118	59	0.014	619
1941	482	81	140	68	.019	772
1942	645	60	149	75	.034	929
1943	735	57	142	98	.053	1,031
1944	747	58	150	133	.071	1,088
1945	691	67	143	127	.091	1,027
1946	602	82	124	96	.093	904
1947	665	102	147	105	.158	1,019
1948	647	116	162	120	.223	1,045
1949	535	127	139	115	.235	916
1950	597	173	163	129	.318	1,063
1951	655	188	182	152	.379	1,178
1952	623	195	168	158	.415	1,144
1953	614	217	202	170	.413	1,204
1954	557	213	174	179	.387	1,123
1955	631	223	217	203	.481	1,275
1956	656	249	220	230	.563	1,355
1957	626	254	232	223	.570	1,335
1958	559	256	189	211	.579	1,215
1959	582	279	197	227	.730	1,286
1960	579	285	220	229	.778	1,314
1961	570	296	210	233	.805	1,310
1962	600	309	223	238	1.080	1,371
1963	629	332	234	253	1.096	1,450
1964 2/	666	347	250	265	1.504	1,531

1/ Totals do not always add because of rounding.
2/ Preliminary.

Source: ICC Statement 6103, Intercity Ton-Miles 1939-1950; and Transport Economics (38, 1966).

policies and their administration. The Committee recognized that (1) considerable changes had transpired in transportation, (2) Federal policy now restricted efficient operation of the Nation's transportation system, and (3) the public interest required the transportation services of all available modes. The Committee proposed that the Declaration of Policy in the Interstate Commerce Act be revised to put emphasis on transportation developments "under the free enterprise system of dynamic competition (40)." Regarding ratemaking, it said, "increased reliance on competitive forces in ratemaking constitutes the corner stone of a modernized regulatory program." The Committee was also concerned with the "growth" of the Agricultural Exemption and declared that continued expansion of it "could destroy the fundamental purpose of the Act." A proposal was made that Congress clarify existing statutory provisions, particularly those concerning the exemption. But there was no indication of what remedial legislation was needed.

Using the report as a guide, Congress drafted and passed the Transportation Act of 1958. Two major provisions, directly affecting the transportation of agricultural products, involved the Rule of Ratemaking and the Agricultural Exemption.

The Rule of Ratemaking [Section 15a(3)] was amended to read: "In a proceeding involving competition between carriers of different modes of transportation subject to this Act, the Commission, in determining whether a rate is lower than a reasonable minimum rate, shall consider the facts and circumstances attending the movement of the traffic by the carrier or carriers to which the rate is applicable. Rates of a carrier shall not be held up to a particular level to protect the traffic of any other mode of transportation, giving due consideration to all the objectives of the national transportation policy declared in this Act (13)." The National Transportation Policy directs the ICC, among other things, to preserve the inherent advantages of each mode of transport.

This amendment of the Rule of Ratemaking encouraged regulated carriers, particularly railroads, to reduce rates as a means of meeting recognized competition. Indexes of rail-freight rates for most agricultural commodities and many industrial products have dropped several percentage points since 1958.

The 1958 Act also incorporated into the Interstate Commerce Act, by reference, a commodity list that sets down the exempt or nonexempt status of agricultural products, commodity by commodity. Before that time, attempts to restrict the provisions of the Agricultural Exemption were not usually successful, but several commodities were granted exempt status as a result of court actions.

Other significant changes embodied in the 1958 Act were the extension of the exemption to some fish products and the removal from exemption of frozen fruits, frozen vegetables, frozen berries, cocoa beans, coffee beans, tea, hemp, wool tops and noils, bananas, imported wool, and wool waste (corded, spun, woven, or knitted).

Frozen fruits and vegetables had been regulated by interpretation of the Act by the ICC until 1956. At that time, the Supreme Court upheld a lower court which had declared these products exempt since they retained a "continuing substantial identity," and had not become manufactured products in the freezing process.

Fresh and frozen poultry also passed the test of continuing substantial identity. These products were declared exempt by the Supreme Court in 1956.

When frozen fruits and vegetables changed from regulated to exempt status (1956), fruit and vegetable processors reported that motor-carrier rates decreased

and services improved (28). A before-and-after examination of rates from major producing areas to major markets indicated decreases of 11 to 29 percent, and an average decrease of 19 percent between 1955 and 1957. In contrast, rail rates (not exempt) between the same points increased from 6 to 14 percent from July 1, 1955, to July 1, 1957. During the same period, the share of interstate shipments of frozen fruits and vegetables hauled by trucks increased from 53 to 56 percent; while the share shipped by rail decreased from 47 to 44 percent.

Truck shipments predominated in all regions except the Mountain and Pacific Region, which has a relatively long haul to the big eastern markets. In that region, interstate truck shipments increased from 26 to 31 percent between 1955 and 1957; rail shipments decreased from 74 to 69 percent.

Processors reported that truck rates for hauling fresh and frozen poultry decreased and services increased when regulation was removed. Truck rates on fresh poultry decreased a third from 1952 to 1956-57 and over a third on frozen poultry from 1955 to 1956-57 (30). Since 1952, nearly all fresh poultry has moved by truck. The percentage of frozen poultry moving by truck, however, increased from 84 to 87 percent from 1955 to 1956-57.

As stated above, in the Transportation Act of 1958, frozen fruits and vegetables were changed to nonexempt status. By 1960, many of the same processors interviewed in 1957 (just after deregulation) reported that transportation services needed by them were now more difficult to obtain, particularly for service to new markets (41). Carriers with authority to service only particular markets cannot immediately initiate service to others. Exempt motor carriers, however, are not subject to restrictions of routes and operating rights. Processors in the Far West generally reported less change in service, primarily because of the predominance of rail movements.

Since 1958, the railroads' share of total intercity ton-miles of freight has continued to decline. Trucks have accounted for an increasing share (15). The share of freight hauled by railroads declined from 46 percent in 1958 to 44 percent in 1964, while the trucks' share increased from 21 to 23 percent. Volume moved by rail was relatively stable, the decreasing share resulting from increased total traffic.

Legislative Developments Since 1960

Railroads, not satisfied with the continuing smaller share of traffic, supported recommendations made by President Kennedy in his transportation messages to Congress in 1962 and 1963. The theme of these messages was the removal of competitive inequalities among modes. President Kennedy preferred less Federal regulation and more reliance on competition. But if such a solution could not be developed, he would then support extension of regulation to all carriers, or in effect, the discontinuance of the agricultural exemptions.

Less regulation would involve granting freedom from minimum-rate regulation on unmanufactured agricultural commodities to all carriers, not just to some. This would give the railroads considerably greater latitude in ratemaking. None of the bills that have been introduced since 1962 to revise regulation have been passed.

Recent Changes in Ratemaking Principles

As early as 1955, railroads began proposing rates which incorporated new concepts of ratemaking. In lieu of new legislative provisions, railroads initiated "multiple-

minimum" and "flat per-car" rates for fruits and vegetables and, "mileage" and "multiple-car" rates for grain. The new grain rates provide fewer transportation services (transit and routing privileges) than rates previously in effect.

The incentive behind this change in rail-rate structures to a cost-of-service basis was the intense intermodal competition facing the railroads--competition which they tended to overlook in the late 1930's, the 1940's, and the early 1950's. The railroads, to compete with trucks and barges, are offering lower rates made possible by lowered costs of operation. Such lowered costs of operation, however, are not easily obtained. Railroads have been establishing nontransit rates; mileage rates (in lieu of group rates); and volume rates for multiple cars, large cars, and even unit trains. In addition, they offer "a la carte" transportation, in which one pays for only the particular service needed.

Multiple-minimum rates apply from western origins to eastern markets and provide lower rates for heavier minimum-weight shipments per car. Flat per-car rates apply from southern origins to major markets and enable the shipper to load the car as heavily as possible upon payment of a specific (per-car) rate. Both are designed to attract traffic that had been lost to trucks.

Many of the new point-to-point rates for grain are based on mileage. The rates are designed to let the railroads regain a share of traffic previously lost to trucks and barges. Such rates recently put into effect have been accompanied by reductions in services, such as transit privileges and free loading and unloading time. The sponsoring railroads have argued that costs of the transportation services are covered by the reduced rates. Multiple-car rates are at specified levels below the basic rate.

The "Big John" Hopper Car Case

The most vigorously contested point-to-point rate proposal for grain was made by the Southern Railway System in 1961. 4/ It offered rates from points on the northern radii of its lines to points on its lines in the heart of the south-eastern broiler production area. Different rates (for grain only) were proposed on single-car, 5-car, 10-car, and 20-car shipments in newly acquired "Big John" covered-hopper cars. The proposed rates, about 60 percent below existing single-car rates, allowed only minimum loading and unloading times. They did not provide for milling the grain in transit. The railroad argued that the larger equipment would lower the unit costs and, with the resulting better utilization of equipment, the rates would be compensatory and let them share in the broiler-feed traffic. Barge lines opposed the new rates on the grounds that they would be put out of business.

After approval of the rates on the 5-car shipments by Division II of the ICC (the proposed rates on the 10- and 20-car shipments were not approved), opponents appealed the decision to the full 11-man Commission. The Commission ruled the 60-percent reduction was below a just and reasonable level, but said that a reduction of as much as 53.5 percent would be acceptable.

The Southern Railway, unwilling to accept such a decision, appealed the case to a Federal district court. This 3-judge court overturned the ICC's decision. The case was then appealed to the Supreme Court, which turned it back to the district court with instructions that ICC reconsider its former decision. In September 1965, the

4/ Use of the name of a particular company in this report does not constitute endorsement of the company named or imply discrimination against other companies.

Big John and its little brother. The 100-ton plus capacity Big John is made of aluminum and has 12 roof hatches and 8 discharge hoppers for fast loading and unloading. Little brother is a standard size steel covered hopper car. (Photo courtesy of Southern Railway.)

The Whopper hopper car is even bigger than Big John. (Photo courtesy of Atlantic Coast Lines.

ICC issued its second report and order. This time, the Commission approved the reduced rates of the Southern Railway System on grain moving from certain Mississippi and Ohio River crossings to specified points in the Southeast and between points in Georgia and Florida. These rates apply on minimum shipments of 450 tons in 5-car units of 90 tons per car. Also, single-car rates with 90-ton minimum weights were approved. These rates would be 120 percent of the rates approved for the 5-car shipments with a 450-ton minimum.

When the Southern Railway made its multiple-car rates effective in 1963, other railroads established similar rates for grain moving in standard boxcars. Single-boxcar rates at 120 percent of the Southern 5-car rate were put into effect at this time. Some railroads published rates for 9-boxcar units at the Southern rate for 450-ton minimum weight. On December 1, 1965, these rates were canceled and republished to apply to 8-boxcar units of 450-ton minimum weight. The single-boxcar rates and the multiple-car rates were being investigated by the ICC at the beginning of 1966.

Before the introduction of these rates, the production of broilers increased greatly in the normally feed-grain deficit Southeastern States. Feed-grain in-shipments increased. The rail volume increased but trucks and barges had the largest increases, by far.

Two kinds of truck shipments accounted for most of the increased movement. Itinerant truckers bought grain from midwestern country elevators and sold it to southeastern broiler producers. Also, exempt for-hire truckers who hauled fresh fruit and vegetables from Florida and other southern origins to large population centers in the Midwest backhauled grain into the Southeast.

Barge movements were really truck-barge-truck movements. They were composed of truck movements from country elevators to water, barge movements down the Illinois and Mississippi Rivers and up the Ohio and Tennessee Rivers, and finally truck movements from the river unloading points to broiler producers or feed mills.

Shippers, receivers, and carriers have made numerous other proposals to modify rail tariffs. Many of these proposals have been for rate reductions; they have been defended on the grounds that the reductions are necessary to meet truck and barge competition for traffic, or that reduced services, new equipment, or new procedures have reduced costs of the carriers. Several of these proposals have been put into effect by the carriers; others are pending.

TECHNOLOGICAL ADVANCEMENTS

Technological developments have been significant in the progress made in the transportation industry and in proposals for modifying tariffs. These technological developments have increased in importance during the past 30 years.

Rail

Traffic on many main rail lines is now controlled by central traffic control centers--two-way traffic is maintained on single-track lines with intermediate sidetracks which accommodate one train while another passes. Because of better communications, trains can follow a closely regulated schedule and eliminate some need for maintaining double tracks between rail centers, while still maintaining an even flow of traffic.

In assembly and reassembly of through trains there has been a shift from manual methods using switch engines to use of automatic classification yards which consist of a single track laid over a crest, with the descending side fanning out to a number of tracks. Under the system, the number of each car is recorded as a train approaches the yard terminal, and the numbers are classified according to destination. As a train is pushed over the crest, an operator in a control tower controls the path of each car by a series of switches.

Improved communications have been necessary with the development of automatic classification yards and central traffic control. Control-panel operators maintain constant contact with yardmen and trainmen, sometimes using closed-circuit television.

Railroad technology has aided in the development of more efficient rolling equipment. The shift from steam to diesel locomotion has probably been the most obvious change. In 1947, steam locomotives accounted for over 80 percent of all railroad locomotives. By 1960, no major railroad was using them in regular service.

Bearing manufacture and maintenance are more closely controlled, resulting in fewer unscheduled stops on the main tracks.

Agricultural commodities are being transported more and more in special cars designed to fit individual needs of each shipper. Ice-bunker refrigerator cars accounted for about 79 percent of the refrigerator car fleet at the beginning of 1961 but dropped to 60 percent at the beginning of 1965. Insulated cars with mechanical refrigeration were developed for shipping perishables requiring controlled temperatures. Refrigerator cars in use by the railroads totaled about 110,000 on January 1, 1965.

The mechanical refrigerator car was first used commerically in 1949 to transport frozen foods requiring zero-degree temperatures or less. It proved successful. Now, with further refinements, constant temperatures ranging from 70 degrees to zero or below can be maintained. The number of mechanical refrigerator cars has increased from 6 in 1950 to over 13,000 by the end of 1965.

Covered-hopper cars increased from 20,000 in 1950 to more than 100,000 by Dec. 31. 1965. This number includes all covered-hopper cars used for transporting dry bulk commodities. These cars are used to a limited extent for transporting bulk agricultural commodities such as grain, flour, feed, sugar, and coffee. The number used for transporting bulk agricultural commodities such as grain is unknown, but in 1961 an estimated 12 percent of the grain movement was in covered-hopper cars (14).

New cars used for packaged shipments have sheathings of steel and light metal alloys rather than wood. Doors have been widened from the standard 4-foot widths used in the past to 6-, 8-, and even 20-foot widths to facilitate mechanical loading and unloading.

The load capacities of covered-hopper cars have increased from about 40 tons to over 100 tons. Aluminum is used in the construction of hopper cars as its noncorrosive and lightweight properties permit heavier loads. Loading is through top hatches, and unloading through dumps or discharge gates under the car. Aeration and pneumatic methods have vastly improved the unloading of granular or finely ground bulk products from hopper cars. The aeration process mixes air with a finely ground commodity such as flour so that the resulting mixture "flows" from the hopper car. The pneumatic system uses a vacuum or suction process which draws the products from the hopper car.

"Integral trains" haul bulk commodities in trainload units. Most of the integral trains operating at present transport coal and ore, but some have also been used to transport bulk grain. For example, a unit-train movement of grain in 95 cars has been operating since 1964 from Minnesota terminals to Buffalo, N. Y. The rate established for this movement is 45 percent of the single-car rate. Reduced rates also apply on multiple-car movements for export of up to 25 cars at a time. In the Southeast, grain shipment in 5-car units of up to 450 tons are being made in jumbo covered-hopper cars. This multiple-car shipment would also be particularly effective for large volume movements between interior grain terminals and river, lake, or ocean ports.

Truck

Truck transportation has grown and expanded with the highway system. Currently under construction is a federal-aid 41,000-mile "National System of Interstate and Defense Highways." When completed, it will connect by direct routes pratically all the principal metropolitan areas, cities, and industrial centers, and will greatly reduce travel time for trucks engaged in intercity, interregional, and cross-country hauling. Thus, perishable agricultural products will move faster from farm to consumer, reducing loss and insuring better quality in supermarkets.

These roadway improvements have paved the way for changes in types of equipment used by motor carriers. Many of the 30- to 34-foot trailers used in the early fifties have been replaced by 40- and 45-foot trailers. With the completion of additional miles of interstate highways, there will be a greater tendency to use "double bottoms," where two semitrailers are pulled by one power unit.

Specialized units are also available to meet various shipper needs. In grain-producing areas, open-top, low-sided trailers used to transport grain are common. Many of the trailers are multipurpose, with detachable sides to permit their use as flat-beds for hauling lumber, steel, and other suitable products.

Refrigerated trailers are used to transport perishable commodities. Mechanical units are rapidly replacing the ice-blower method of cooling trailers. Insulation in the trailer walls, ceilings, and floors has been improved to provide better protection from outside extremes in temperature encountered in interregional movements.

Closed-hopper trailers are becoming available to haul grain, feed, flour, sugar, and other bulk granulated commodities. Like the covered-hopper railcars, they are more efficient in loading and unloading, and reduce handling costs for the shippers and receivers. Closed-hopper trailers are unloaded in the same way as rail cars, using either dumps or discharge gates in the bottom along with aeration or pneumatic systems for granular materials.

Innovations in livestock trailers have been beneficial to motor carriers in meeting the increased demand for their services. Longer trailers, many with multilevel floors and improved ventilation, have increased the load capacity and the well-being of the animals. Many trailers used for transporting hogs have sprinkler systems to cool the hogs during hot weather. Truck deliveries of livestock at the major markets have increased significantly during the past 10 years. From 1950 to 1964, truck receipts of cattle at these markets increased from 76 to 95 percent of total receipts; of hogs, from 79 to almost 100 percent; of sheep and lambs, from 44 to 82 percent.

Multipurpose trailers permitting 2-way hauls are used for transporting various bulk commodities even where the nature of the one commodity would not in the past

Hopper trailer with pneumatic unloader used for hauling flour and feed. (Photo courtesy of Butler Manufacturing Co.)

Double bottom rig on interstate highway. (Photo courtesy of American Trucking Association.)

have permitted the use of the trailer for any other commodity. Special tank trailers have been built with sides for transporting dry bulk commodities on return hauls. In several areas of the country, these trucks haul such liquids as molasses one way and grain the other. Collapsible rubber tanks are sometimes used in open-top grain trailers so that these trucks can be used for hauling liquid products one way.

Water

Much of the technological change in inland water transportation has occurred since 1945.

At present, there are about 25,000 miles of commercially navigable inland waterways. Technology has been important in the development and maintenance of these inland waterways. Locks and dams have provided navigable channels. New construction is being designed to handle larger tows without having to maneuver separate barges through small locks. Newer locks being constructed will be wide enough to hold three or four barges abreast and tows up to 1,200 feet long.

Construction is underway to replace 46 small dams which have outmoded locks on the Ohio River with 21 new dams and modern locks. On the Warrior-Tombigbee Waterway, 6 new dams will replace 17 smaller dams. The Arkansas and Snake Rivers are examples of new channels scheduled for addition to the inland waterway system.

The equipment used today by waterway carriers has contributed to increasing their load of traffic. Barges are now made from welded steel or aluminum, replacing wood and riveted steel. Many covered-hopper barges for grain are 195 feet long with 1,500-ton capacity. Even larger barges of 3,000-ton capacity are coming into use on the deeper and wider waterways. A 1,500-ton barge can transport as much freight as about 30 conventionally loaded rail cars.

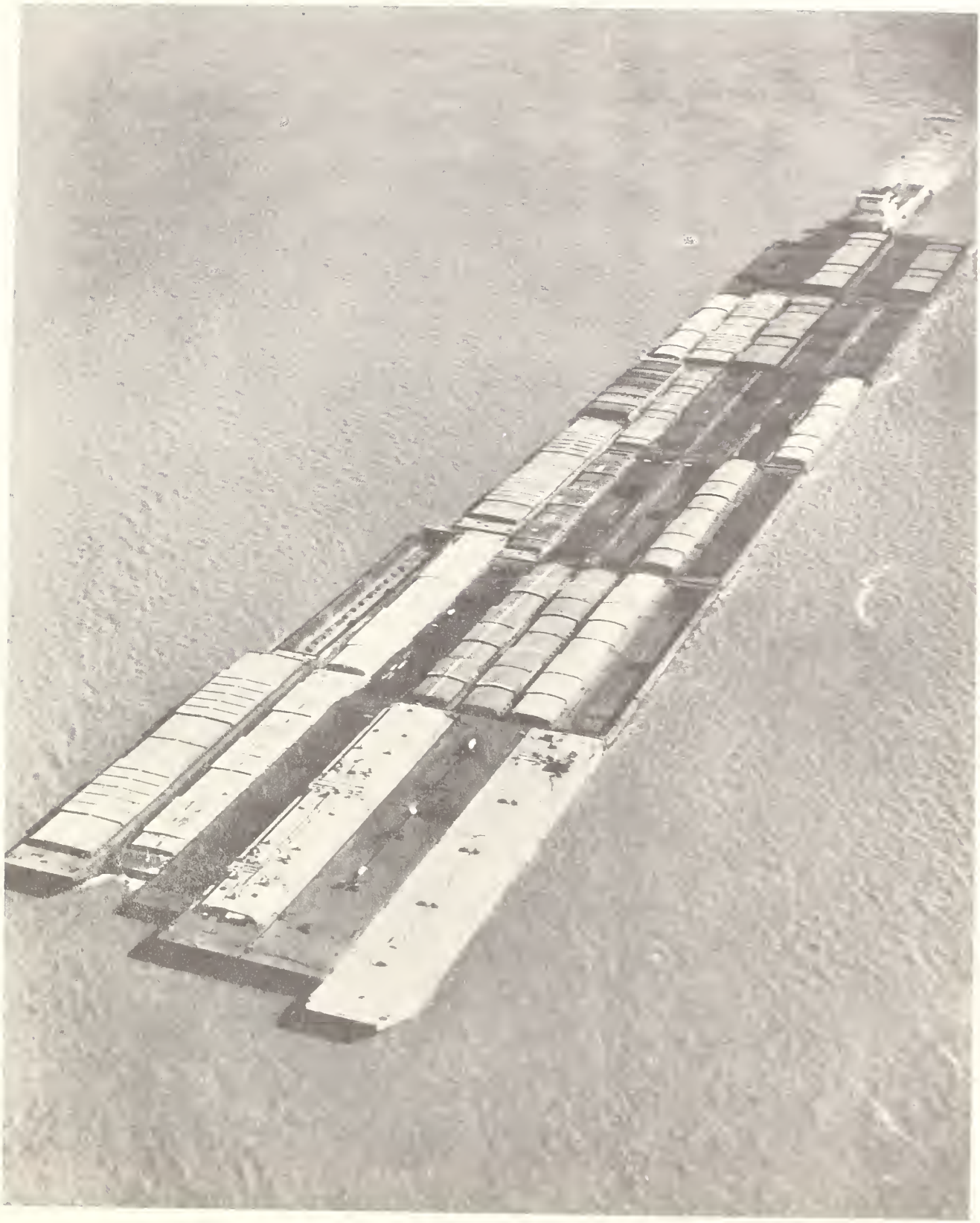
The conversion of automobile-carrying barges to cattle barges offers a potential use of outmoded equipment. On experimental runs, cattle gained weight while in transit by barge from the Gulf of Mexico to the upper Ohio River.

Towboats used on the inland rivers today are a far cry from the steam-driven paddle packets of early river history. Vessels driven by diesel engines of 4,000 horsepower or more are common. During World War II, improved reduction gears were developed which enabled the use of high-speed engines with low-speed propellers for shallow-water navigation. As a result, a 4,000 horsepower towboat will handle 20,000 tons of freight, or the equivalent of about 400 rail cars.

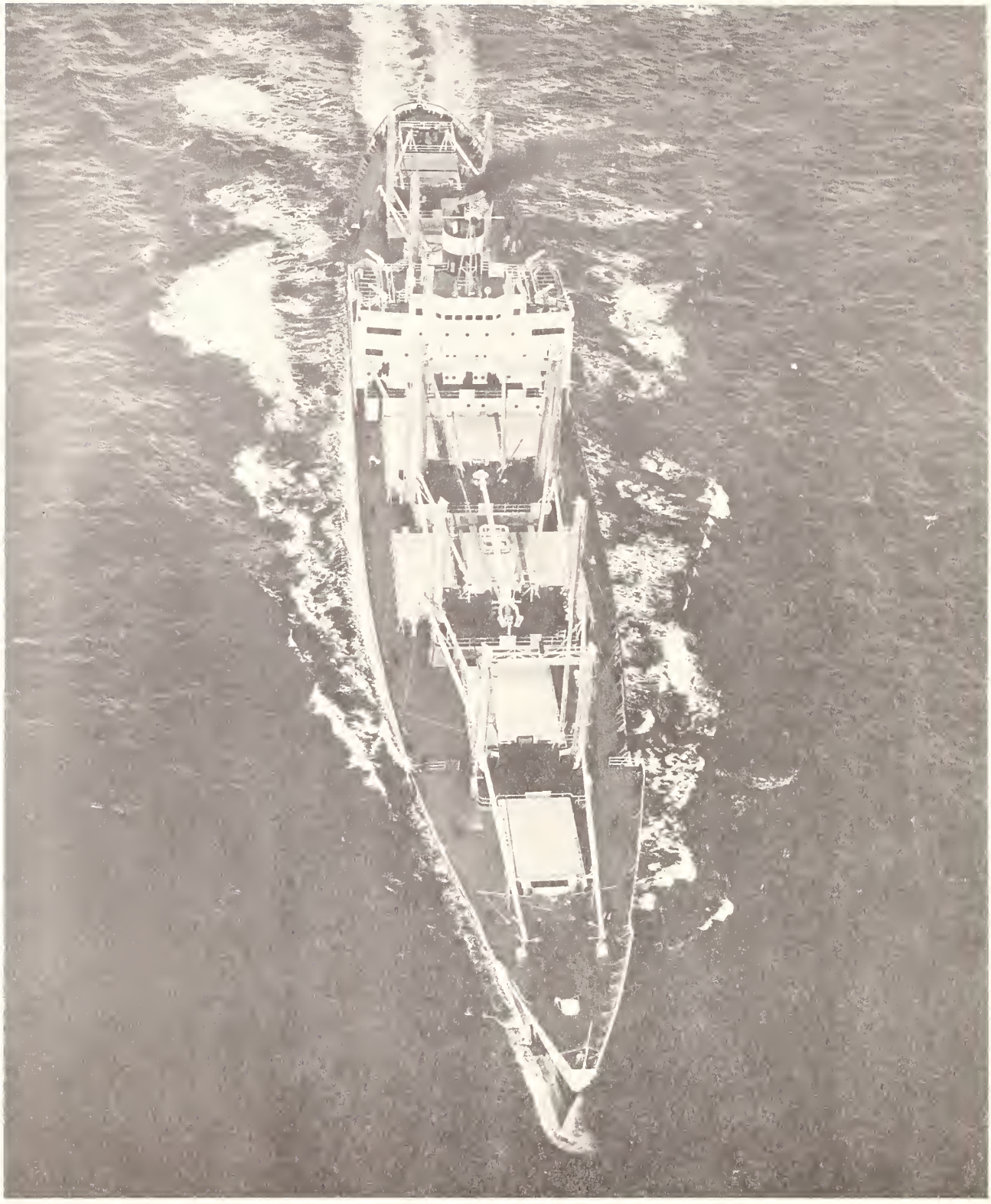
The ocean shipping industry has provided carriage for increased quantities of U.S. agricultural products moving into foreign markets since World War II.

Ocean freight moves primarily under two kinds of contractual arrangements--tramp and liner service. Tramp shipping means a rate is negotiated each time a ship is chartered. Grain, a bulk commodity, is the most important U.S. export in terms of volume and moves almost exclusively under tramp shipping charters. The volume shipped from the United States depends also on the relative size of deficits and surpluses in different countries, on export programs, and on the rates charged. The volume per ship varies from below 10,000 tons to 100,000 tons.

Liner service, usually for small units of shipment, is regularly scheduled; published rates are available to shippers. Cuts in rates on some commodities are



Thirty-five barge tow on the Mississippi. (Photo courtesy of Union Barge Line Corporation.)



Modern ocean vessel making 21 knots. Typical of modern American ships, it is 560 feet long, carries 45,000 cubic feet of refrigerated cargo plus 28 refrigerated containers on the main deck, and carries more than one half million cubic feet of dry cargo in its hold. Its largest boom can lift 70 tons. (Photo courtesy of United States Lines.)

helping to open new markets for them. Dressed beef is an example. Improved refrigeration on shipments to Europe has enabled more carcasses per shipment to arrive in better condition. Similar advancements in the loading and quality maintenance of other commodities could increase their tonnage moving in ocean shipping. Nonetheless, grain which moves primarily in tramp vessels, is likely to remain the predominant agricultural product of the United States marketed in international commerce.

Air

Air freight became commercially significant after World War II. Few agricultural products move by air, and air movements account for a very small part of all agricultural transport. For extremely perishable items, however, such as fresh strawberries, developments in air transportation have opened up new markets. In 1959, five leading air freight lines moved 12,500 tons of horticultural products, 3,500 tons of fresh fruits and vegetables and smaller quantities of other agricultural products. From July 1, 1964, to June 30, 1965, total tonnage rose to 35,150 tons (14). Horticultural products (particularly cut flowers) and fresh fruits and vegetables accounted for 30,600 tons, 87 percent of the tonnage.

New cargo planes, improved methods for handling products on the ground, more attractive tariffs and routings, and improved package designs have enabled air carriers to become more competitive on rates for hauling agricultural commodities.

All Four In One

Carrier coordination--the use of containers suitable for movement by rail, truck, water, and air--is probably one of the most significant developments in recent years.

Piggyback transportation--the most popular version--refers to the movement of highway trailers on railroad flatcars. It is now available on the major railroads in the United States. Through the 1930's and 1940's, several railroads adopted this service, but with one or two exceptions none were able to continue the service for any length of time. Lack of interest among shippers was their chief reason for discontinuing it. In 1953, however, interest was revived. One of the railroads that had continued to offer this service reported hauling 50,000 trailers in 1953. By 1955, 23 railroads were offering this service. Since that time, piggyback service has continued to expand rapidly on more and more lines.

Originally, the standard flatcar was 40 to 50 feet long and accommodated one highway trailer. Today, piggyback flatcars are 85 feet long and carry two 40-foot semitrailers. The flatcars handle both semitrailers and van containers, and are equipped with shock absorbers to lessen the danger of damage to cargo or trailers.

Containerization--the use of van containers--has been further diversified with the inauguration of regular ocean container service, or fishyback. This service was started in the early 1950's between the continental United States and Alaska and Hawaii. Since 1956, it has grown rapidly on the East and Gulf Coasts.

Agricultural commodities account for most of the fishyback traffic moving between Atlantic, Gulf, and Carribean ports. The service has opened up new mainland markets for highly perishable commodities grown in Puerto Rico, such as vine-ripened tomatoes

Mechanized loading device, with push-button control, unloads and reloads a 90,000-pound capacity jet freighter in 40 minutes. (Photo courtesy of American Airlines.)

The interior of this jet-freighter is equipped with rollers, permitting easy movement of palletized cargo. The freighter is 102 feet long and can carry 45 tons of cargo. (Photo courtesy of American Airlines.)

and field-ripened pineapples, and is used for several commodities moving to and from Hawaii.

Containerization has provided a means of integrating land and water transportation. Shipments of agricultural products can be loaded in the field, transported by truck to a ship or railroad, and delivered to a receiver without any handling of the commodity. Fewer handlings not only reduce labor costs and chance of damage or pilferage, but also increase speed of delivery. These savings, in turn, reduce the costs to consumers for the final product.

Further developments in coordinating equipment and facilities of different transportation modes will help in getting agricultural products to market faster and in better quality. Geographical shifts and increases in population combined with shifts in production areas will continue to provide challenges for a comprehensive transportation system.

IMPACTS OF RECENT CHANGES IN TRANSPORTATION ON AGRICULTURAL MARKETING

Railroads, trucks, and barges all depend upon agriculture for part of their traffic. About 13 percent of the freight hauled by railroads in 1963 was agricultural products, including animals and animal products. The addition of canned and packaged foods and animal feeds increases the share to more than 16 percent. About 5 percent of all barge traffic was bulk agricultural commodities. Because of the nature of truck operations and regulations, the volume of agricultural products moved by truck cannot be easily determined. However, nonexempt agricultural products account for about 10 percent of the total freight of common and contract motor carriers.

Many of today's marketing functions are still based upon the old rail-rate structure. New types of rate structures, which emphasize cost-related rates though reducing the cost of transportation, are changing the marketing structure for some agricultural commodities. As the railroads attempt to meet their ever-increasing competition by establishing lower "cost-oriented" rates for a la carte transportation in a particular area and for a given commodity where the competition is intense, the historic rail-rate relationship among producing areas, markets, and consuming areas is gradually beginning to disappear. Rate reductions given by the railroads in one area but not in a competing area because of lack of intermodal competition can cause loss of markets if not offset by other economic advantages.

Lower rates on raw products, which in some instances are less costly to transport than processed commodities, can, and do, cause processing plants to relocate in the major consumption areas.

Unit-train rates and multiple-car rates offer vastly lower rates for the large-volume shipper, and thus can have a significant influence on the size and number of firms in an industry.

Mileage rates, such as those on corn in the East, favor those processors and handlers located close to their markets; the old rate structure protected hundreds of the small, geographically scattered processors and handlers by equalizing rates within large origin and destination groups. Elimination of transit privileges creates advantages for marketing or processing facilities located in the origin or destination areas and disadvantages for those at intermediate locations.

As can be seen, these new rates are changing former geographic and commodity relationships. They may affect the locations of producing areas, processors, and markets. As a result, adjustments in rates for some areas to reestablish former relationships are demanded by those adversely affected. However, the reasons that compelled the railroads to make an adjustment in one area on one commodity may not always be evident in another area.

Competition, technological improvements in transportation, and the changing rate structure of carriers--especially railroads--have caused some changes in the marketing of agricultural products. These changes have already affected agricultural marketing at all levels. Grain merchandising is a prime example. For many years, farmers hauled their grain in wagons and trucks to nearby country elevators, often operated by independent merchants. From the country elevators, rail cars hauled the grain to interior terminals and to terminals located on the major navigable rivers. Many terminals not only stored grain, but also milled wheat into flour for local consumption and for shipment to large population centers. Grain could be shipped from the country elevators to the terminals and processors, and then moved to industrial consumers or wholesalers by railroad at a through rate, even though the grain was stored or processed along the way. These marketing channels developed in the late 19th century and continued until the years immediately following World War II.

By 1950, highways and waterways had been substantially improved. Trucks, barges, and towboats were modernized and became more plentiful. Trucks, competing with railroads, hauled more grain from country elevators. Between 1958 and 1963, trucked tonnage of grain increased from 30 to 41 percent.

Trucks not only hauled more grain from country elevators, but also loaded grain from farm storage for shipment to barge-loading facilities in grain-producing areas near river terminals. Often, the country elevator operator arranged for the trucks to load from farm storage. In addition, itinerant merchant truckers bought grain from farmers, bypassing the local country elevators. Use of a combination of trucks and barges also increased. In the Pacific Northwest, for example, 24 percent of the truck shipments of grain handled by elevator operators in 1960-61 was hauled direct from the farm to river terminals on the Columbia River.

The primary reasons for the increased use of trucks were lower frieght charges, faster delivery, and availability. The services offered by trucks and barges, however, fell short of that provided by railroads. Trucks did not offer transit privileges for storage or milling at intermediate points on through rates. Trucks hauled very little flour because the transportation of flour is regulated by ICC and requires costly specialized equipment when handled in bulk loads. As a result, grain merchandisers began buying and selling whole grain for direct shipment to consuming areas, to take advantage of the lower truck and truck-barge rates. Railroads have offered reduced grain rates to remain competitive, but they have also reduced the services offered along with these lower rates.

The reduced services offered by railroads at the lower rates have, in effect, eliminated many transit and storage privileges, and encouraged movement of whole grain from country origins to destinations within the consuming areas for storage and processing. Transit and storage priviliges are offered only in connection with the higher rates. Storage and milling points located at intermediate terminals have thus been bypassed, and some have relocated.

As the technological evolution continues, carriers are using larger and more specialized equipment, often suited for the movement of only a few commodities. For

the railroads increased utilization of equipment is necessary to maintain low operating costs. Railroads are encouraging shippers to move large quantities and to load and unload rail cars rapidly to decrease the idle time of equipment. As a result, greater concentration of storage facilities is needed in producing and consuming areas for accumulating and receiving whole grain. Such changes in marketing because of transportation changes have discouraged the small independent elevators. The number of large farmer cooperative elevators and branches of complex grain merchandising companies is increasing, while the number of independent elevator companies is decreasing.

Competition among carriers has changed the marketing of agricultural products. Livestock shipments have shifted almost entirely to motor carriers because of their speed and flexibility. These same factors--speed and flexibility--are also important to fruit and vegetable wholesalers. Line-haul truck shipments reduce the need for large inventories, since trucks may deliver to several destinations. Truck shipments have also increased the market area for produce wholesalers. Although long-distance line-haul truck rates are sometimes higher than rail rates, handling costs are lower for trucks and often result in lower total operating costs to wholesalers.

As railroads, trucks, barges, and airlines compete more intensively for agricultural traffic, long-established geographic and commodity rate relationships will be altered. Some alterations may be temporary due to lags in adjustments by carriers operating in other geographic areas. Others may be longer lasting. Uncertainty concerning future rate relationships will have a dampening effect upon investments in new production and marketing facilities having high fixed costs, and upon relocation of current facilities. This uncertainty will probably be most pronounced for grain and grain-related industries, but it will also affect the fruit and vegetable industries.

SUMMARY

Transportation of domestically produced food used by civilian consumers alone amounted to $5.1 billion in 1964. Adding on the cost for transporting feed, fibers and farm supplies may increase the agricultural transportation bill to $10 billion.

Transporting agricultural commodities is no longer the exclusive domain of railroads. Trucks, barges, and airplanes compete for this traffic. However, this competition is not uniform over all areas and for all commodities. Competition with the railroads for agricultural traffic has grown considerably since World War II, and has caused the railroads to make many downward adjustments in rates in attempts to retain this traffic. Indexes of rail-freight rates (1957-59 = 100) for all agricultural products combined rose from 81 in 1949 to 102 in 1958, and declined to 95 in 1964.

The factors accounting for the growth of competition in the transportation of agricultural products are numerous and complex. One factor was the exemption of trucks and barges, when moving unmanufactured agricultural products, from the economic regulatory provisions of the Interstate Commerce Act. Rates for individual exempt shipments could be negotiated on the spot. Rail rates, on the other hand, were regulated and thus were not variable in the short run.

Another factor in the rise of competition was the nature of the rail-rate structure which developed in the years before there was any competition. The structure was developed partly to accomplish nontransportation goals, some rates being based on factors other than costs of providing specific transportation services. As a result, truck or barge operators could often move commodities at considerably lower rates

than those charged by the railroads. Rails maintained absolute levels of traffic fairly consistently but lost ground relatively. As a means of maintaining net revenue in the face of increasing competition for traffic and rising costs, railroads proposed and were granted 10 general rate increases between 1938 and 1960.

Railroads have taken numerous steps in recent years to meet the competition of trucks and barges. Some rates have been modified to reflect fewer accessorial services, such as transit privileges; lower rates have been put into effect for larger units of shipments; and specilized equipment has been added. Most of these measures have been the result of railroads' individual initiative. For example, the Southern Railroad pioneered the development of an oversized covered-hopper car for grain shipments and then pursued a 60-percent rate reduction for 5-car units through rate bureaus, ICC, and the courts for about 4 years.

Technological advances in trucking have not been quite so dramatic in reducing costs to shippers as have some of those for railroads. Nonetheless, advances have been made. Improvements in highways, for example, have been considerable. The 41,000-mile Interstate and Defense Highway System has progressed. Larger trucks are now in use.

Technology in water transportation has also progressed since World War II. There are at present about 25,000 miles of commercially navigable waterways. New, larger barges can carry up to 3,000 tons per barge, or the equivalent of about 60 conventional rail cars.

Air transportation of agricultural products has increased greatly in recent years. Very perishable fresh commodities, such as strawberries and tomatoes, can move at commercially feasible rates from California to northeastern and European markets in only a few hours.

Coordination of modes of transport has also grown considerably. Loaded trailers can move on highways from packing sheds to rail lines, then be hauled two per flatcar between cities, and finally move again on highways to distributors. Other forms of containers can move from trucks to flatcars to oceangoing vessels.

The location and nature of agricultural marketing facilities have been, and will continue to be, affected by developments in transportation. As railroads, trucks, and barges compete for available agricultural traffic, long-established rate relationships are being altered. Many processors and marketing firms are uncertain as to what relationships will emerge in the future. This uncertainty will have a dampening effect upon investments in new facilities and upon relocation of current facilities.

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