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Transportation of Poultry and Poultry Products from the North Central States

W. H. Thompson

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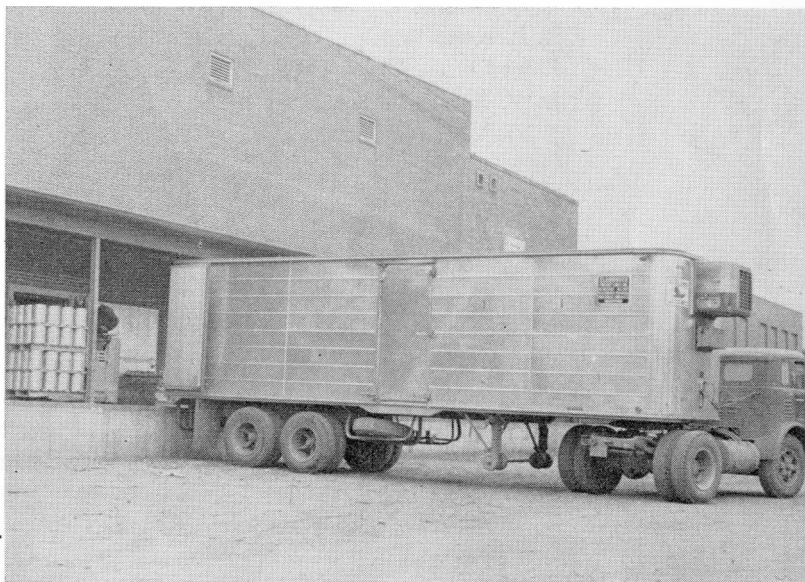
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Transportation of Poultry

AND POULTRY PRODUCTS FROM THE NORTH CENTRAL STATES



Agricultural Experiment Stations of

Illinois	Michigan	North Dakota
Indiana	Minnesota	Ohio
Iowa	Missouri	South Dakota
Kansas	Nebraska	Wisconsin

U. S. Department of Agriculture

AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE
BROOKINGS

Acknowledgment

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Application of Findings

A. For Processors

1. Processors of poultry products located in the seven North Central States west of the Mississippi River shipped heavy volumes of commodities to markets over 1,000 miles from their plants. Shipments from processors located in the five North Central States east of the Mississippi River went to destinations under 500 miles from their plants.
2. Time in transit from western area origins to Boston and New York was half as great for motor carrier shipments as that for rail shipments.
3. Transit time for western area shipments to San Francisco was essentially the same for both rail and truck shipments.
4. Some processors preferred motor carriers to railroads as a transportation media because of its availability, flexibility, convenience, and frequency of service. They also liked the personal attention given to shipments, low loss and damage experience, and the less complicated arrangements for dividing a load between two or more buyers.
5. Total transportation costs for major hauls for for-hire motor carriers were lower than railroad charges for comparable movements in the majority of cases.
6. In some instances privately owned and operated trucks provided lower cost transportation services than those of the commercial or for-hire carriers.

B. For Transportation Agencies

1. Railroads have lost considerable traffic in the poultry products classification since the close of World War II.
2. Motor carriers of all types hauled from 60 to 100% of each of the commodities shipped from the 42 North Central plants studied.
3. Carriers interested in maintaining or improving their competitive positions need to consider quality and variety of services offered, as well as rate schedules.
4. Transportation requirements for the different commodities analyzed may vary with such factors as perishability, seasonality of production, and seasonality of demand.
5. Changes in production, processing, and retailing methods, as well as changes in production and consumption patterns, will call for adjustments in transportation services for poultry products shipped from the North Central States.

C. For Regulatory Agencies

1. Railroad and motor common carriers hauled a large volume of poultry products from the North Central States during 1954, but contract and private motor carriers were also important on these movements. What effect recent Supreme Court decisions relative to exempt motor carrier movements may have had on the common carrier traffic is not known.
2. The volume of traffic moved to eastern, western, and southern regions with some variations in distribution.
3. On "short haul" shipments, about one in every 50 was made by railroad. On "long haul" shipments, about one in every seven was made by railroad.
4. Although fewer trips were made by railroads, the average mileage per trip was longer than that of the motor carriers to all destinations. However, the differences in average mileage between the two media were quite small on most of the commodity movements.
5. Transportation cost is a "package" which includes rates, services, quality, timeliness, speed, and other factors.
6. Transportation charges were slightly higher to southern and southeastern destinations than to eastern and western destinations.

Transportation of Poultry and Poultry Products

From the North Central States

by
William H. Thompson¹

Findings of the Study

The 12 North Central States from which the poultry and poultry products were moved covers the area from North Dakota south to Kansas and east to Michigan and Ohio. This is the egg basket of the nation for half of our total egg production comes from these states. Almost two-thirds of this output is shipped east, south, and west. Shipments are moved as far east as Massachusetts and New York; as far south as Florida; and as far west as the Pacific Coast. Although the bulk of the egg production of the region is sold as shell or "table eggs," many are broken out in egg-breaking plants within these states and sold as frozen eggs or as egg solids (dried eggs).

Live and dressed chickens and turkeys are also produced in large numbers in this area and sold beyond its borders. Poultry producers, egg handlers, and poultry processors who ship these products into consuming markets must compete with the eggs and poultry produced

in or near these markets. Therefore, whether the poultry industry of the North Central States can compete successfully in eastern and western markets depends in part upon the costs and efficiency of our transportation system which carries the products to markets located from 500 to over 1,000 miles from producing points.

Changes in Methods of Transportation

For some years, but especially since the end of World War II, the railroad movement of poultry and poultry products has been declining. On the basis of the 1% carload waybill sample used by the Interstate Commerce Commission to measure railroad traffic, 140,000 cases of eggs were shipped by rail from the North Central Region in 1948, as compared with only 2,800 cases in 1955. Motor carriers of all types have been replacing railroads as the major transportation media on all hauls, including those of long

¹Professor of Transportation, Iowa State College, Ames, Iowa. Financial and personnel assistance in collecting data and compiling freight rates was provided by the Farmer Cooperative Service, United States Department of Agriculture. The author is principally responsible for the opinions and conclusions expressed in this report.

distance as well as short ones. The study shows that poultry processors utilized motor carriers almost exclusively in shipping shell eggs and live poultry. Both railroads and motor carriers were used for the movements of frozen eggs, egg solids, dressed poultry, and dressed turkeys, but the volume of traffic was considerably greater by motor carrier than by railroad.

However, although the transportation of these commodities was dominated by the motor carriers, the railroads played an important role in two respects:

1. Railroads were important in moving a heavy concentration of traffic from the Western North Central Area to markets 1,000 miles or more from the processing plants.
2. Most of the egg solids produced in the North Central Region came from the western portion. Whether moved to eastern or western destinations, they were transported long distances. In fact, egg solids moved farther to market than any other egg or poultry product analyzed in this study. Railroads were more important on westbound than on eastbound shipments, especially from the Dakotas, Nebraska, and Kansas, the states farthest to the west in the North Central Region.

Comparison of Transportation by Truck and Railroad

The belief that motor carriers are more efficient than railroads on

“short hauls” but less efficient on “long hauls” has been common in our nation for some time. However, this idea is contrary to the findings of this study. Motor carriers appeared to be firmly entrenched in the movement of the commodities to all destinations, regardless of distance, from plants located in every state of the Region. The major contribution of the railroads to the transportation of the six commodities was found primarily on the egg solids movement, and to a lesser extent on the movements of frozen eggs and dressed poultry from the western portion of the North Central Area.

For every one of the commodities, vastly more trips were made by truck than by railroad. This was true of both eastbound and westbound shipments. From the total of almost 15,000 trips made in hauling the various poultry products covered in this study, over 93% were made by truck.

Although fewer trips were made by the railroads, their average mileage per trip was longer than that of the motor carriers. The greatest difference in average miles shipped between railroad and motor carriers was found on the movement of frozen eggs, whereas the smallest difference was found in the movement of dressed poultry and dressed turkeys. Except for frozen eggs, both types of carriers transported the products an average distance of over 1,000 miles to markets outside the region.

When all expenses were considered, the for-hire motor carrier

charges were lower on the majority of the major hauls than those of the railroads. In some instances, on similar shipments moving equal distances, privately owned and operated motor carriers were a less expensive form of transportation than the for-hire or commercial carriers.

Time in Transit

Reports furnished by some of the plants studied concerning time spent in over-the-road operations showed that on eastbound shipments to New York and Boston, the average time in transit for trucks was approximately half of that for railroad shipments. On westbound movements to San Francisco, the average time in transit was approximately the same for each type of transportation.

For products such as shell eggs and fresh poultry, the less time spent in movement the less the problem of deterioration—assuming that temperature and other conditions that maintain quality are the same. Thus, to the extent that trucks spend less time in transit, the more of an advantage they have over the railroads on the poultry movements.

Transportation Costs

Average transportation charges by the case (shell eggs), per 100 pounds, or per 100 pounds per 100 miles for both types of carriers were lower on the traffic to eastern and western destinations than on the movements to the southern and southeastern regions. To markets outside the region, shell egg ship-

ments averaged between 3 and 4 cents per dozen to the eastern and western points, and slightly higher to southeastern destinations. Charges for poultry products, other than shell eggs averaged between 1.2 cents and 2.5 cents per pound on long distance traffic.

Railroad and motor carrier charges on these shipments were assumed to cover the movements from the dock of the processor to the dock of the buyer. Where pickup and delivery charges were included in the railroad costs, the comparison of charges between each mode of transportation would be valid. If, however, pickup and delivery charges are additional costs to the shipper, the railroad costs found in this study would be understated.

Weight of Shipments in Relation to Transportation Costs

An important element in the cost of transportation was the weight of the shipment, especially on long distance movements. Loads weighing 20,000 pounds (10 tons) and over were most common, but many shipments were made to all destinations, primarily by truck in small loads of 1,000 pounds to less than 20,000 pounds.

More heavy loads—10 tons or over—carried by both truck and railroad were found in the movements of shell and frozen eggs than for any of the other commodities. This was the minimum weight necessary to obtain carload or truckload freight rates. On the other hand, the proportion of heavy loads

was relatively small for dressed and live poultry. The probable reason for the difference was that whereas a sufficient number of eggs were produced within a limited area to fill a truck or railroad car, the amount of poultry available was not sufficient to use the capacity of the truck or railroad car.

Seasonality of Movements

The pattern of seasonal movements was dissimilar on a product-to-product basis as well as on the shipments to markets within and outside the region, but some similarities were observed on the traffic between rail and motor carriers. Seasonality in the movements of dressed poultry and dressed turkeys may have been the result of production and consumer purchases. However, neither could fully explain the seasonal pattern of shell egg shipments, for little or no association was found between the movement index and those relating to total egg production, per capita disappearance, retail prices, prices received by farmers, and the spread between farm and retail prices. How important the storage function would be in explaining the seasonal patterns of egg shipments is not known.

Origin of Shipments

Iowa, Minnesota, Kansas, Ohio, and Michigan were the principal states which shipped shell eggs. Frozen eggs and egg solids (dried eggs) originated primarily in Missouri, Kansas, and Nebraska. Dressed poultry was shipped mainly from Ohio, Iowa, and Nebraska,

whereas dressed turkeys moved mainly from Iowa, Minnesota, and Wisconsin. Live poultry originated largely in Illinois, Ohio, and Michigan.

The North Central Region was a surplus producing area for all of the six commodities studied. As might be expected, the commodities moved from surplus to deficit regions. Heavy volumes of each commodity moved from North Central plants studied to eastern and western destinations, and relatively small amounts moved into the southern and southeastern regions.

Destination of Shipments

More than three-fourths of the shell eggs shipped from the North Central States went to five representative destinations. Three of these—Chicago, Cleveland, and Detroit—represented sales areas within the North Central Region. The other two were New York, representative destination for the Middle Atlantic Region; and San Francisco, representative destination for the Pacific Coast States. Almost 7 of every 10 pounds of frozen eggs, egg solids, and dressed turkeys went to four destinations—Chicago, Detroit, New York, and San Francisco. Substantial movements of frozen eggs, dressed poultry and dressed turkeys were shipped to Boston, the representative destination of the New England Region. Frozen eggs were shipped in significant volume to Charlotte, representative city in the Southeastern Region; and egg solids were an important movement to Birmingham, representing the South Central Region.

Reasons for the Study

Shifts in the nature and relative importance of the poultry industry in the different regions of the United States have been accompanied by far-reaching changes in transportation methods and costs. These changes which have taken place in the character of transportation services make it desirable to analyze the extent to which transportation and related factors have been responsible for changes in the marketing methods, practices, and channels for handling poultry products in the North Central Region. This includes the relative importance of the transportation changes to other economic factors, and the probable influence in the future of further changes in transportation costs and services. For example, these transportation changes have been a contributing factor in some locations where processing and handling plants have closed down and in others where business firms have delayed the establishment of new marketing facilities due to a feeling of uncertainty as to the future of transportation arrangements as well as of other phases of the production and marketing of poultry products. This analysis, when combined with other marketing studies, should provide the basis for more effective planning by the industry as to the nature and location of production, processing, and handling facilities, as well as furnish a basis for improvements in efficiency and service on the part of the carriers, and suggest some guide lines to regulatory agencies.

Objectives of Study

The objectives of this study are to determine for the states in the North Central Region, (1) the transportation services used in moving poultry and poultry products; (2) the flow patterns of the products shipped to destination markets; (3) costs of transportation; and (4) some of the factors related to the transportation of these products, such as length of haul, size of load, season of movement, and special services required. Commodities involved in the study are eggs (shell, frozen, solids), poultry (live and dressed), and dressed turkeys.²

This report is the first phase of a research project having three phases. Objectives of succeeding phases are (1) to determine methods and costs of transporting poultry feed and feed ingredients from important production points through manufacturing facilities to poultry producing areas in the North Central Region and other competing poultry areas; (2) to analyze the costs of transporting processed poultry and eggs in relation to costs of transporting grain, grain products, and other feed ingredients from North Central States to destinations in various markets and competing poultry areas.

Method of Investigation

The study was based on 1954 data, collected from 42 egg, poultry,

²When referred to in this report "poultry" means all poultry other than turkeys; "shell eggs" refers to eggs in their original shells; "frozen eggs" refers to frozen liquid eggs; and "solids" refers to liquid eggs which have been dehydrated.

and turkey processors in the North Central Region, during 1955 and 1956.³ Information to supplement the primary data was taken from publications of the United States Department of Agriculture, the Interstate Commerce Commission, and the American Trucking Associations, Inc. Members of the Poultry Marketing Research Committee (NCM-14), representing each of the 12 states comprising the North Central Region, were requested to select processing plants typical of those operating in their states, from which data could be obtained. The number and location of plants participating were not determined by random sampling techniques since population estimates of processing plants in the region were not available. However, it is assumed that the plants selected were representative of the poultry processing operations in each state.

A pilot study covering a 3-month period was undertaken in four plants in Iowa in 1955 for the purpose of pre-testing research schedules. From the results, the research schedules were revised and the collection of data extended to the entire region. The revised schedules requested movement data and transportation costs from origins to first destinations only. Backhaul data and costs would have been desirable, but were not available from the processors.

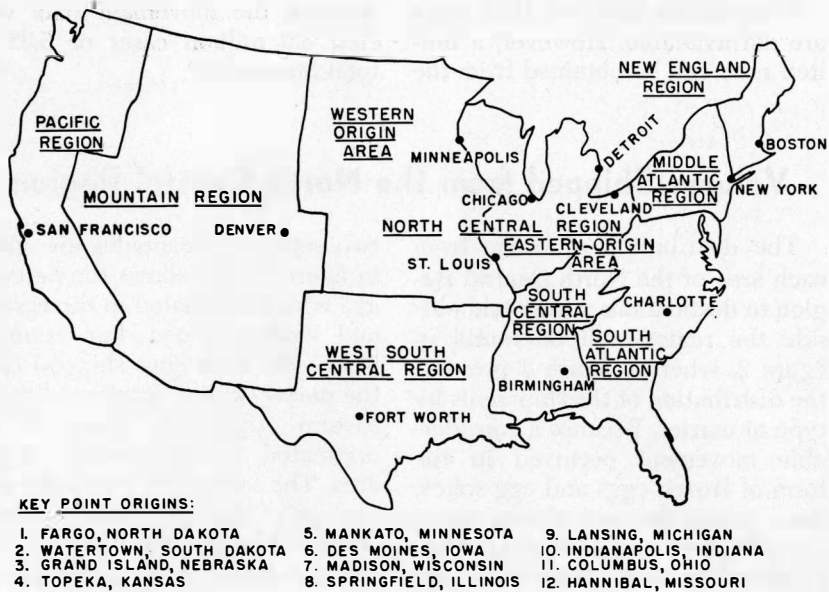
The commodities were moved by railroads and motor carriers to hundreds of destinations throughout the nation. To facilitate the presentation of such items as the traf-

fic flow patterns, mileage distribution, size of shipments, and costs of the movements, both origin and destination points were grouped. One key city was selected as representative of the traffic originating in each North Central State. A further grouping was made in the origins by combining the data from each state into two origin areas arbitrarily divided at the Mississippi River. These are referred to in some of the tables and figures as the "Eastern Origin Area," which includes the states of Ohio, Michigan, Illinois, Indiana, and Wisconsin; and the "Western Origin Area," consisting of the states of North Dakota, South Dakota, Nebraska, Iowa, Kansas, Missouri, and Minnesota.

From the many individual shipments, 45 interregional destinations were originally selected on the basis of the volumes moving into them, then grouped into major selling outlets, each represented by a key destination. As a result of the grouping feature, seven major destinations were used on the movements outside the region and five destinations were utilized for the traffic moving within the region. Destinations within the North Central Region grouped cities in a radius of approximately 100 miles. The key origins, markets, states comprising these markets, and representative destinations are shown on figure 1. The data include traffic hauled by railroads; and common, contract or

³Sixteen of these plants were cooperatives. Of the total number participating, 30 plants processed eggs, 26 processed poultry, and 19 processed turkeys.

Figure 1. Regions and representative destinations selected to show the movement of poultry and poultry products from the North Central Region.



leased, and private motor carriers. Throughout the discussion which follows, the movements from the key origins to the representative destinations serve as the core of this report. Through the use of the grouping and key point technique it is possible to transfer the individual point-to-point movements to that of a region-to-region analysis in which the intra- and interregional aspects of the problem may be presented and evaluated.

Ratio of Volume of Movement to Poultry Killed in Dressing Plants

A total of 488 million live-weight pounds of chickens and fowl and 168 million pounds live weight of turkeys were processed through the poultry dressing plants of the North Central Region in 1954.⁴ These

plants are assumed to be full-time commercial operations specializing in the dressing of these commodities and do not include those who process as a sideline to their major activity. Estimating the yield of dressed poultry to be approximately 75% of live weight would reduce the above volumes to 366 million pounds dressed weight of chickens and fowl and 126 million pounds dressed turkeys.⁵ Transportation data covering the movement of these commodities from the 42 plants represented 11% (41 million pounds) of chicken and fowl, and

⁴Bulletin MC-20A, 1954 Census of Manufacturers, U. S. Department of Commerce, Bureau of the Census, Washington, D. C.

⁵Estimates furnished by the Poultry Husbandry Department, Iowa State College.

35% (45 million pounds) of the turkeys.

Comparable data for shell eggs are not available. However, a limited ratio can be obtained from the

total farm sales of eggs which amounted to 76.5 million cases, whereas the movement data covered 3.9 million cases or 5.3% of total farm sales.⁶

Volume Shipped from the North Central Region

The distribution of traffic from each area of the North Central Region to destinations within and outside the region will be found in figure 2, whereas figure 3 presents the distribution of the shipments by type of carrier. Because a considerable movement occurred in the form of frozen eggs and egg solids, these categories are shown separately from that of shell eggs. Also, poultry movements have been separated into live and dressed classifications. Shell egg shipments are expressed in cases weighing 52 pounds each, whereas the movements of all other commodities are shown in pounds.⁷

Dressed poultry and turkeys move from the plants in an eviscerated frozen form and are packed in standard cartons or cases. Ice and salt, as well as mechanical apparatus are used as refrigerants by the carriers. Egg solids are shipped in barrels and drums with gross weights up to 200 pounds. Frozen or liquid eggs are shipped in cans of 30 to 36 pounds. All commodity volumes shown in figures 2 and 3 are gross weights, including net product weight and weight of containers.

In addition to the volume figures,

two sets of percentages are given in figure 2. One shows the percentage which originated in the eastern and western states. For example, 54% of the shell eggs shipped from the plants studied originated in the eastern origin area, whereas 46% originated in the western origin area. The second set shows the percentage of the volumes which were shipped to markets within and outside the region, and again may be illustrated by the shell egg movements. Of the 46% which originated in the western states, 30% went to markets outside the region and 16% to destinations within the region. The movement from eastern origins (54% of the regional total) went almost entirely to markets within the region.

Figure 3 shows the movements from each origin area by type of carrier to destinations within and outside the region. Continuing with shell egg movements as our exam-

⁶USDA, AMS. Farm Production, Disposition, Cash Receipts and Gross Income, *Chicken and Eggs*, 1953-54, April, 1955. Each case contains 30 dozen eggs.

⁷The weight of 52 pounds assigned to a 30 dozen case of shell eggs is a rough average of the weights found on all movements. It consists of a net product weight of 45 pounds and a case weight of 7 pounds.

Figure 2. Volume and distribution of volume of poultry and poultry products shipped from the North Central Region (in thousands).

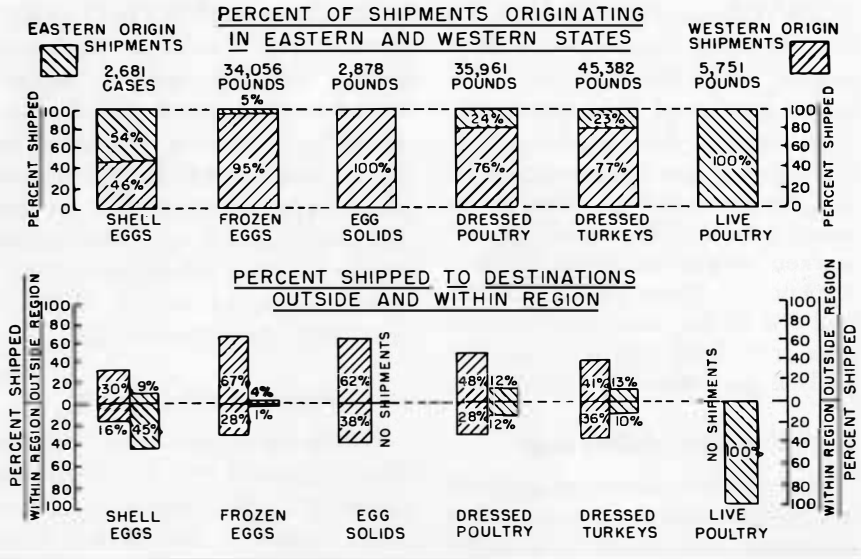
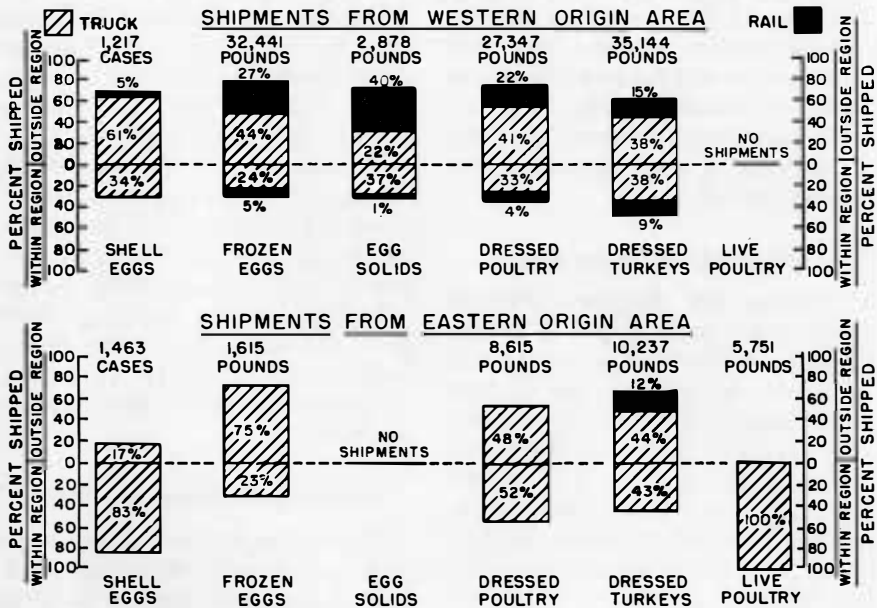


Figure 3. Volume and distribution of volume of poultry and poultry products shipped by railroad and truck from the North Central Region (in thousands).



ple, it will be seen first that trucks accounted for 95% and railroads 5% of the volume shipped from the western states, and that from these origins, all of the railroad movement and 61% of the truck movement went to destinations outside the region. From the eastern origin area, trucks hauled the entire movement, but only 17% was shipped to markets outside the region. Table 1, Appendix 1, shows that trucks carried 98% of the movement of shell eggs from both origin areas. The analysis continues by commodities.

Shipments of Shell Eggs

The regional volume of approximately 2.7 million cases included shipments from plants in 10 states and showed a heavy movement to markets within the region. Ohio and Michigan shipped the highest percentage of their eggs to intraregional markets, whereas Iowa and Minnesota were the most important shippers interregionally. These states accounted for over 70% of the movement of shell eggs from the plants studied.

Shipments of Frozen Eggs

Within the Region—Although eight states participated in the regional movement of about 34 million pounds, those in the western area originated practically the entire volume of traffic. Less than one-third of the western area movement, and one-fourth of the eastern shipments went to these destinations, and were carried principally by truck.

Outside the Region—To move the relatively large volume of traffic to these markets, both origin areas utilized trucks as the major carrier, but the western origins moved over one-fourth of their shipments by railroad as contrasted to no rail movement from the eastern states. Approximately 80% of the movement studied originated in the states of Kansas, Missouri, and Nebraska, each of which shipped heaviest to these destinations.

Shipments of Egg Solids

Within the Region—The western area originated the entire movement of 2.8 million pounds from the plants reported. Slightly less than one-third of the traffic moved to these destinations, almost all of which was carried by trucks.

Outside the Region—Railroads were the major carrier used by the plants studied to haul the traffic to these markets, and the volume moved (40%) represented the highest throughout all of the commodity classifications. The egg solids movement is the only one in this study which parallels the historical pattern of truck and rail traffic—namely, motor carriers handling short hauls and railroads the long hauls. Kansas and Nebraska originated the egg solids movements that were reported.

Shipments of Dressed Poultry

Within the Region—Every state participated in the movement of 36 million pounds of dressed poultry.

The western area originated 76%, with slightly over one-third of the volume shipped primarily by truck to destinations in the region. Eastern traffic to these markets was slightly over half of the volume originated, carried entirely by truck.

Outside the Region—The heaviest movement originated in the western area and was hauled by truck and rail. Slightly less than half of the eastern traffic moved by truck to these markets. Over 60% of the total movement originated in Ohio, Iowa, and Nebraska.

Shipments of Dressed Turkeys

Within the Region—The movement of 43 million pounds showed that 77% originated in the western area, almost half of which went to these markets by truck and rail. From eastern origins, trucks were utilized to move somewhat less than

half of their volume to these destinations.

Outside the Region—Both origin areas shipped their highest volume to markets outside the region and both used rail and motor carriers to haul the traffic. In fact, the dressed turkey movement was the only one from the eastern origin area in which railroads participated. Iowa, Minnesota, and Wisconsin originated over 80% of the total volume.

Shipments of Live Poultry

The eastern area originated the entire live poultry movement amounting to almost 6 million pounds, and it was shipped by motor carrier to markets within the region. Based on the volume analyzed, Illinois, Ohio, and Michigan accounted for all of the traffic. Poultry plants selected in the other states did not report shipments of live poultry.

Mileage Distribution of Movements by Motor Carriers and Railroads

Figures 4 and 5 show the percentage distribution of the traffic from the two major origin areas to destinations within each of four mileage blocks. These blocks measure the length of haul for each commodity via the short line mileage between origin and destination. Data were compiled from each key point origin to each representative destination on the basis of the actual volume of traffic. When the distribution by ton miles and case miles was examined, no differences

in the percentages falling into each block were found from those of the volume movements. Therefore, the figures give an accurate description of ton mile and case mile distribution as well as the volume flow.

Figure 4 shows the mileage distribution of the commodities shipped from the western origin area to destinations within and outside the region. Percentages shown for each commodity in each mileage block are percentages of the total movement to destinations within

and outside the region. For example, only 1% of the shell egg shipments within the region moved under 100 miles; 25% moved 100 to 499 miles; and 8% moved 500 to 749 miles. Outside the region, no movements were found under 500 miles; 1% fell in the 500 to 749 mile age block; 13% went 750 to 999 miles; and 52% moved 1,000 miles or over. The addition of all percentage figures for the intra- and interregional shipments will total 100%

Except for egg solids, which moved in significant volume longer distances, the commodity movements to destinations within the region fell primarily in the blocks between 100 and 750 miles. Ship-

ments to markets outside the region moved 1,000 miles or more in substantial volume. Railroads were of little significance on the movement within the region but played an important role in the long distance movement outside the region.⁸

Figure 5 shows the mileage distribution from the eastern origin area. Practically all of the commodities were moved distances between 100 and 500 miles within the region. Traffic destined outside the region was distributed throughout all mileage blocks. Except for some dressed turkey movements outside the region, railroads did not participate in the traffic from the eastern origins

Figure 4. Mileage distribution of poultry and poultry products shipped from the western origin area (in percentages).

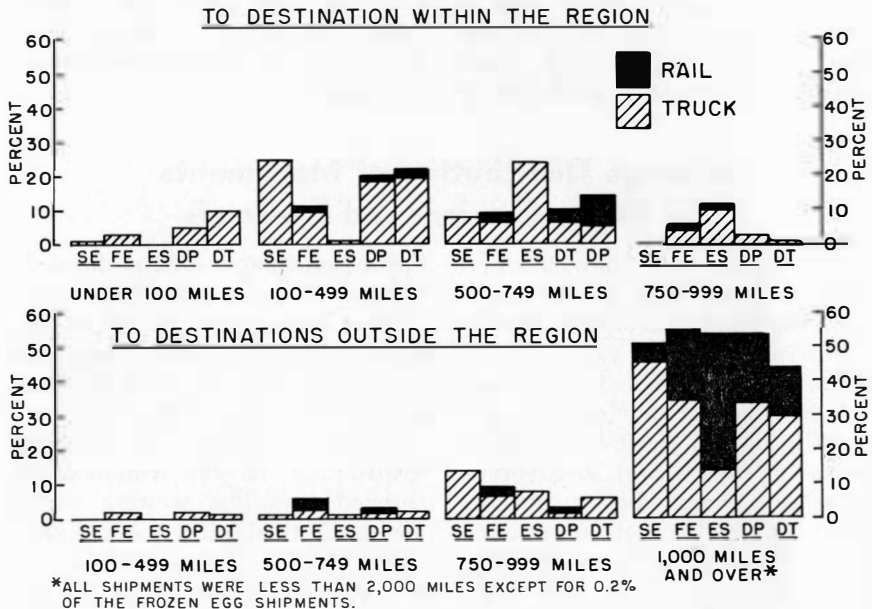
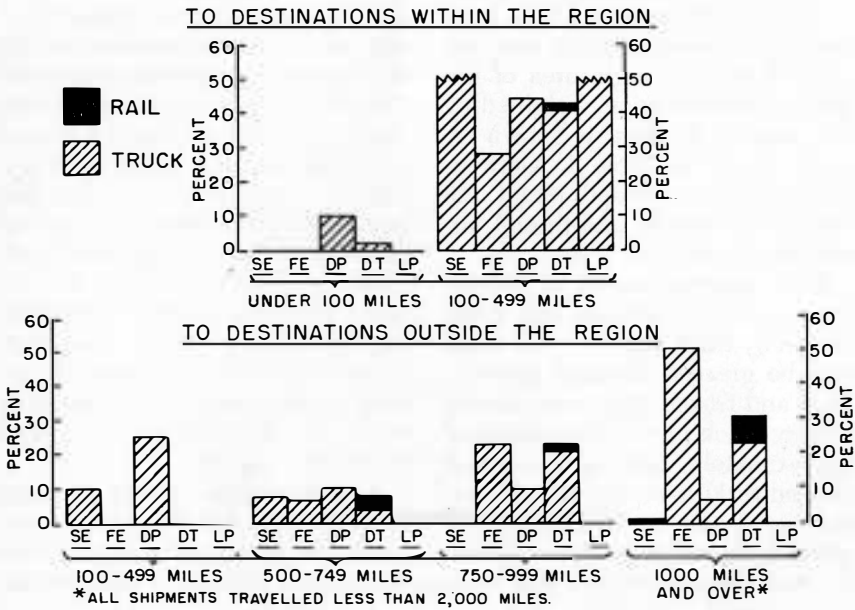


Figure 5. Mileage distribution of poultry and poultry products shipped from the eastern origin area (in percentages).



⁵Since the end of World War II, railroad transportation of poultry and products has shown a marked decline. The 1% sample carload waybill data of the Interstate Commerce Commission showed that shell egg traffic in 1948 totaled 139,462 cases, of which 9,462 cases were shipped within the region and 130,000 cases to destinations outside the region. In 1955, a total of 2,827 cases were transported from the region, consisting of 500 cases to destinations within the region and 2,327 cases to those outside the region. Movements of dressed poultry including turkeys in 1948 amounted to 1,627 tons of which 169

tons moved within the region, and 1,458 tons to points outside the region. In 1955, the traffic amounted to 179 tons. Of this total, 65 tons were shipped within the region and 114 tons outside the region. The railroad transportation of shell eggs between the years 1948-1955 declined 98%, whereas the dressed poultry traffic declined by 86%. ICC Bureau of Transport Economics and Statistics, *1% Carload Waybill Statistics State to State Movement of Animals and Products*, Statements No. 5023, May, 1950; 5063, Dec., 1950; 5145, Aug., 1951; Aug., 1952; 5238, July, 1953; 5432, Sept., 1954; SS-3, Dec., 1955; SS-3, Sept., 1956.

Average Mileage of Shipments by Motor and Rail Carriers

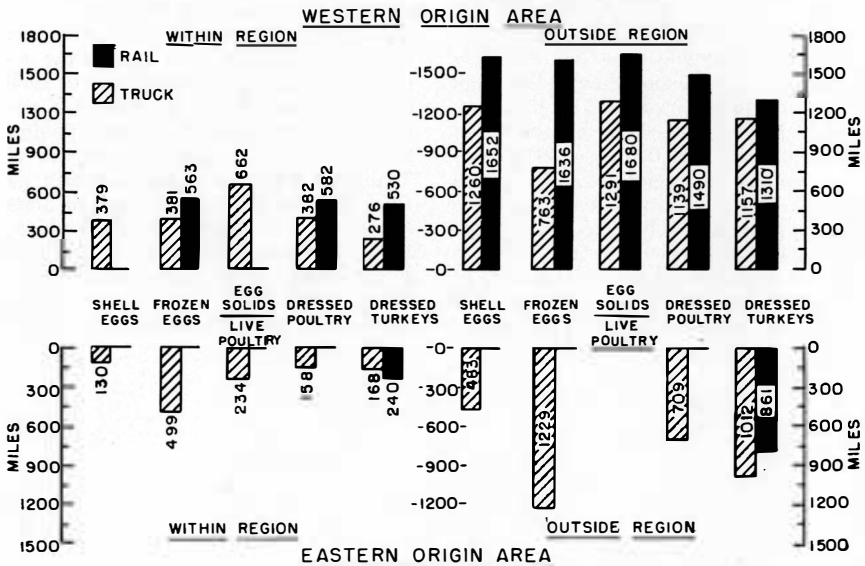
The average mileage of the commodities shipped by truck and railroad from each origin area of the North Central Region, weighted by the number of trips, is shown on figure 6 and in table 1. Destination areas are divided into those "within the region" and those "outside the region."

From western origins to destinations within the region, egg solids hauled by truck moved on the average the greatest distance per trip. Shell and frozen eggs, and dressed poultry truck movements averaged approximately 380 miles, and dressed turkeys moved the shortest average distances. Railroad movements were longer for dressed poultry and dressed turkeys but aver-

aged less than truck shipments of egg solids. To destinations outside the region, the railroad movements were longer than those of the motor carriers for each commodity. Frozen egg traffic showed the greatest difference, approximately 770 miles, between average mileage of rail and truck. Shell egg and egg solids railroad movements differed in distance by approximately 400 miles, but the average mileage discrepancies between the two types of carriers were narrowed considerably on the dressed poultry and dressed turkey movements.

A comparison of the average miles per trip for the commodities carried by trucks and railroads from the eastern origin area was possible

Figure 6. Average distance shipments moved by type of carrier from North Central origins.



only on the movement of dressed turkeys. To markets within the region, railroads moved their shipments further than those hauled by trucks, but the movement outside the region was longer by truck than by railroad. The motor carrier traffic to interregional markets averaged over 1,000 miles per trip on

the frozen egg and dressed poultry movements from the eastern area.

Data concerning the movements from both origin areas to all destinations reveal one important fact which should clarify the argument carried on by transportation authorities for some years—namely, can motor carriers effectively com-

Table 1. Average Distance Shipments Moved by Type of Carrier From North Central Origins

Commodity	Carrier	Within Region		Outside Region		Total Trips by Commodity
		Trips	Average Mileage	Trips	Average Mileage	
West North Central Area						
Shell Eggs	Truck	940	379	1486	1260	2426
	Rail	—	—	106	1652	106
Frozen Eggs	Truck	393	381	443	763	836
	Rail	31	563	52	1636	83
Egg Solids	Truck	101	662	85	1291	186
	Rail	—	—	65	1680	65
Dressed Poultry	Truck	1268	382	883	1139	2151
	Rail	38	587	337	1491	375
Dressed Turkeys	Truck	894	276	534	1157	1428
	Rail	90	531	144	1310	234
Total Trips	Truck	3596	—	3431	—	7027
	Rail	159	—	704	—	863
East North Central Area						
Shell Eggs	Truck	3260	130	771	483	4031
	Rail	—	—	—	—	—
Frozen Eggs	Truck	83	497	306	1229	389
	Rail	—	—	—	—	—
Dressed Poultry	Truck	813	159	237	710	1050
	Rail	—	—	—	—	—
Dressed Turkeys	Truck	308	168	198	1012	506
	Rail	2	240	42	861	44
Live Poultry	Truck	677	234	—	—	677
Total Trips	Truck	5141	—	1512	—	6653
	Rail	2	—	42	—	44
Total Trips for the Region	Truck	8737	—	4943	—	13680
	Rail	161	—	746	—	907

pete with railroads for long distance traffic? It is no longer a question of whether or not they can compete, but rather what types of traffic must be available and what types of conditions must be present in order to make long distance movements feasible for the truckers.

The shipments of poultry and poultry products to destinations outside the region were dominated by motor carriers. Of the 4,135 individual trips from western origins to outside markets, 3,431 were made

in trucks. Similarly, the bulk of eastern area movements, as indicated in table 1 were also made by truck. However, the average distances of the truck movements were shorter than those of the railroads. Nevertheless, the shipments could not be classified as "short haul" by truck and "long haul" by railroad. If 1954 may be considered as a typical year, it seems or appears that the motor carriers are firmly entrenched in the movement of these commodities to all destinations.

Number of Trips and Weight of Shipments Moved from the North Central Region

No significant differences were found when the weight of loads from each origin area was examined. Thus, the figures as presented in figures 7 and 8 are descriptive of the entire North Central Region.

Figure 7 shows the distribution of individual commodity shipments by weight of load when moving to destinations within the region. Figure 8 portrays similar data for movements outside the region. The number of trips made for each commodity by truck and rail is also shown on each figure.

From the 42 processing plants analyzed, a total of 14,587 trips were necessary to move the commodities to all destinations. Motor carriers accounted for 13,680 trips, 64% of which were found on movements within the region and 36% outside the region. The railroad movement

consisted of 907 trips, of which 18% were made within the region and 82% outside the region.

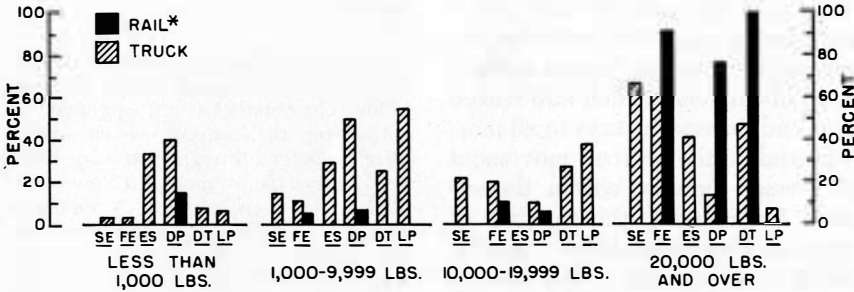
Except for the egg solids and dressed poultry traffic, the number of trips loading less than 1,000 pounds was insignificant, and can be accounted for by the practice of combining poultry products with other commodities (dairy products) to form maximum loads. In instances where this practice was found, only the data pertaining to the commodities under analysis were recorded.

Within the weight classifications between 1,000 pounds and 20,000 pounds and over, the greatest number of trips handling the lightest loads (1,000 to 10,000 pounds) occurred on the motor carrier movements of dressed and live poultry within the region and the truck

movement of egg solids outside the region. However, over one-fourth of the railroad dressed poultry traffic within the region also consisted of

loads falling in this weight bracket. Trips by motor carriers hauling medium loads (10,000 to 20,000 pounds) were most significant in

Figure 7. Percentage distribution of shipments to destinations within the region, by weight.

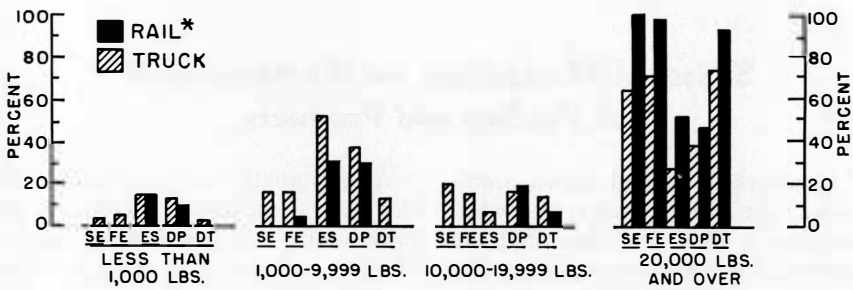


NUMBER OF TRIPS

	SHELL EGGS	FROZEN EGGS	EGG SOLIDS	DRESSED POULTRY	DRESSED TURKEY	LIVE POULTRY
TRUCK	4,200	476	101	2,081	1,202	677
RAIL	-	31	-	38	92	-

*EACH CATEGORY TOTALS 100 PERCENT (i.e., THE SHELL EGGS SHIPPED BY TRUCK WILL TOTAL 100 PERCENT FOR THE FOUR WEIGHT CLASSIFICATIONS).

Figure 8. Percentage distribution of shipments to destinations outside the region, by weight.



NUMBER OF TRIPS

	SHELL EGGS	FROZEN EGGS	EGG SOLIDS	DRESSED POULTRY	DRESSED TURKEY	LIVE POULTRY
TRUCK	2,257	749	85	1,120	732	-
RAIL	106	52	65	337	186	-

*EACH CATEGORY TOTALS 100 PERCENT (i.e., THE SHELL EGGS SHIPPED BY TRUCK WILL TOTAL 100 PERCENT FOR THE FOUR WEIGHT CLASSIFICATIONS).

the movement of shell eggs to all destinations, and the movement of dressed turkeys and live poultry within the region, whereas those of the railroads occurred on the movement of dressed poultry and turkeys outside the region. The heaviest loads (20,000 pounds and over) were found most frequently on the movements by both motor carriers and rail carriers of shell and frozen eggs and dressed turkeys to all markets, and on the railroad movement of dressed poultry within the region. By contrast, the number of trips carrying heavy loads was relatively small on the motor carrier movement of dressed and live poultry to markets in the region and the movement of dressed poultry and egg solids outside the region.

The heavy concentration of trips in the 20,000 pounds and over classification is understandable when the freight commodity classifica-

tions of railroads and motor carriers are studied. Both publications use 20,000 pounds as the minimum weight of poultry shipments which must be hauled by common carriers for a shipper to obtain a carload, truckload, or "volume" freight rate.⁹

⁹A freight classification is a device whereby commodities having similar transportation characteristics are grouped together for the purpose of calculating freight charges. Freight rates are based partly upon the volume of a commodity offered for transportation. A minimum weight of 20,000 pounds shown in the classification means that a shipment weighing less than the amount would take a rate higher than that quoted for the minimum weight. Minimum weights may be higher in individual carrier tariffs than those found in the freight classifications. For the year of 1954, railroad classifications may be found in *Uniform Freight Classification No. 2*, effective December 10, 1953; and for motor carriers in the *National Motor Freight Classification No. 13*, effective July 7, 1955.

Seasonal Fluctuation on the Movement of Poultry and Products

Quarterly seasonal index numbers of the shipments are presented in table 2. The data show that the pattern of seasonal movement is dissimilar on a product-to-product basis, but a partial seasonal pattern exists between the rail and truck movements. Also, the seasonality of the traffic destined within and outside the region is strikingly dissimilar with regard to any one commodity and mode of transportation.

An explanation of the dissimilarities in the seasonal movements is beyond the scope of this report. However, the seasonality involved in the commodity movements deserves attention, because the least severe seasonal movement (i.e., shell eggs by truck outside the region) changes 23.2 points from the low to the high.

Many factors influence the changes in the seasonal flow of

these commodities. Among these are the production of poultry and poultry products in the North Central Region; production in areas to which the commodities are shipped; consumption in all areas; and other factors such as breakage, and loss and damage. Seasonality in consumer preferences might possibly explain the range of the first quarter lows to the third and fourth quarter highs in the movement of dressed

poultry and dressed turkeys. On the other hand, the seasonal swings in egg movements are difficult to explain in terms of production or consumer preferences.

Figure 9 examines the seasonal movement of shell eggs hauled by truck, and in addition, presents indexes of the nation's egg production, civilian per capita disappearance of shell eggs, retail prices, prices received by farmers, and the

Table 2. Quarterly Seasonal Index Numbers* of the Movement of Poultry and Poultry Products

Commodity	Mode of Transportation (Truck or Rail)	Type of Shipment (Within or Outside Region)	Quarters			
			1st	2nd	3rd	4th
Shell Eggs	Truck	Within	92	110	84	114
		Outside	98	93	94	116
	Rail	Within	---	---	---	---
		Outside	147	132	49	72
Frozen Eggs	Truck	Within	82	106	114	97
		Outside	95	127	86	92
	Rail	Within	129	142	78	52
		Outside	105	137	85	73
Egg Solids	Truck	Within	93	69	133	105
		Outside	98	62	118	123
	Rail	Within	---	---	---	400
		Outside	111	148	98	43
Dressed Poultry	Truck	Within	76	108	95	122
		Outside	67	87	116	133
	Rail	Within	11	11	278	100
		Outside	95	70	101	133
Dressed Turkey	Truck	Within	23	42	96	240
		Outside	23	62	103	218
	Rail	Within	5	5	92	299
		Outside	16	16	108	260
Live Poultry	Truck	Within	66	136	113	85
		Outside	---	---	---	---
	Rail	Within	---	---	---	---
		Outside	---	---	---	---

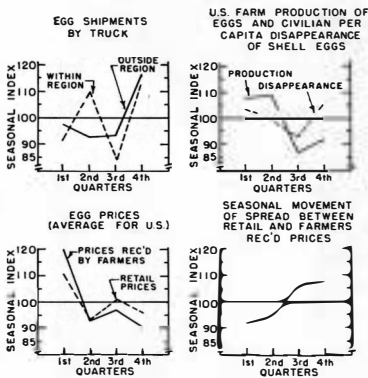
*100 equals the quarterly average.

spread between retail and farm prices. The figure discloses little or no logical pattern of association between the five general indexes and the seasonal indexes of shell egg movements. For example, the quarterly changes in egg production and egg shipments within the region move in the same direction, but the

relative changes are substantially different. By contrast, the seasonal pattern of egg shipments outside the region is completely different from the production pattern.

The per capita disappearance of shell eggs likewise does not form a seasonal pattern with that of shell egg movements. A further explanation might possibly be found in data relating to the location of and quantitative changes in the storage of eggs, a factor not investigated in this study. It is known that the storage of shell eggs increases throughout the first part of the year to a peak about July 1, and then declines throughout the remainder of the year.¹⁰ A detailed examination of this type of data might make it possible to explain more completely the forces which determined the seasonal movement of shell eggs.

Figure 9. Quarterly Seasonal Index Numbers (S.I.) for shell egg movements, egg production (farm), egg prices (retail and farm), retail-farm price spread, and shell egg disappearance, 1954.



SOURCE: U.S. Dept. of Agriculture, A.M.S., *The Poultry and Egg Situation*, P.E.S. 179, Washington D.C., October 3, 1955.

¹⁰The first of the month storage inventory of shell eggs for 1954 ranged from 0.1 million cases on January 1 to a peak of 1.6 million on July 1; and declined to 0.3 million on December 1. USDA, AMS, *The Poultry and Egg Situation*, PES 180, p. 34, Washington, D. C., 1955.

Movements of Poultry and Products from Key Origins to Representative Destinations

In the preceding section of this report, the destinations to which the traffic was shipped were given only as those "within the region" and those "outside the region." In the discussion which follows, these regional destinations are identified by the cities selected as representative points for each marketing area. These cities together with the marketing areas which they represent are found in figure 1.

The volume of each commodity moving from the North Central Region, considered as one origin area, to each city is shown in table 3. Similar data are found in table 4, except that the region has been divided into the western and eastern origin areas. Data concerning the live poultry traffic are omitted from each table because of its restricted movement, as this commodity moved from Ohio to points within that state, from Illinois entirely to Chicago, and from Michigan only to Detroit.

Tables 5 and 6 present data on population, total production, per capita production, and surplus and deficit estimates for eggs, farm chickens, and turkeys in nine geographical regions of the United States. Table 6 shows the position of the North Central Region as a surplus producer of these commodities and should be useful in visualizing the direction the traffic would tend to move from surplus to deficit regions. Figures 10, 11, and 12 illustrate the data in table 6. A comparison of these estimates with the

traffic flow patterns for each commodity as shown in figures 13 through 17 will show the extent to which the commodities actually moved during 1954 in response to the demand from the regions having deficits in per capita production.

Shell Eggs

The heaviest traffic moved to Chicago, Cleveland, New York, and Detroit in that order from all states within the region. Both eastern and western origins participated heavily in the Chicago and New York movement, whereas that to Cleveland and Detroit originated almost entirely from the eastern states. Chicago, Cleveland, and Detroit are major markets in the Eastern North Central Region, which showed the lowest per capita deficit of any region in the nation. It is probable, therefore, that a substantial part of the heavy volume shipped into these cities either went into storage for future delivery or were immediately consumed in order to replace the eggs moved from eastern origins to destinations outside the region. The volumes shipped to New York, San Francisco, and Charlotte form a logical flow pattern in view of the deficit in the Middle Atlantic, Pacific, and Southeastern regions. These movements and deficits may be seen by referring to figures 10 and 13.

Frozen Eggs

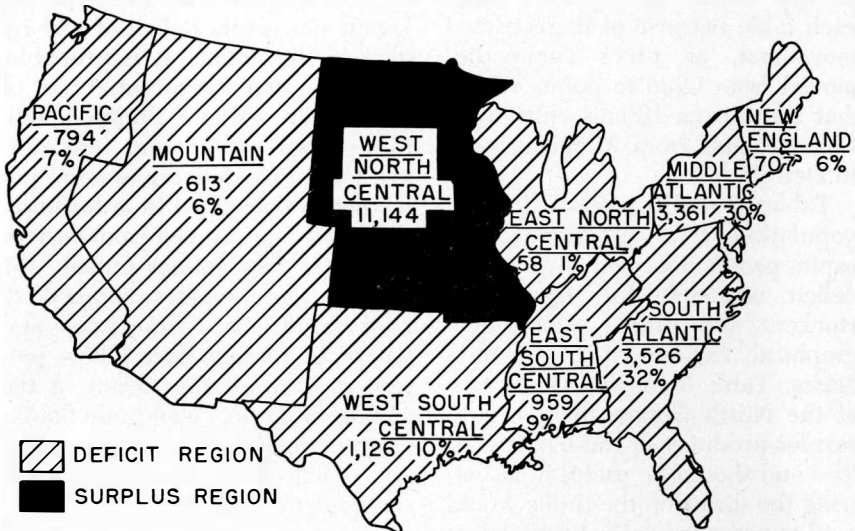
Regional deficits in the per capita production of shell eggs are as-

Table 3. Movements of Poultry and Products from Key Origins to Representative Destinations

Representative Destination	Shell Eggs, cases (000)		Frozen Eggs, lbs. (000)		Egg Solids, lbs. (000)		Dressed Poultry, lbs. (000)		Dressed Turkeys, lbs. (000)	
	Vol-ume	% of Total	Vol-ume	% of Total	Vol-ume	% of Total	Vol-ume	% of Total	Vol-ume	% of Total
Chicago	637	25	4,267	12	543	19	9,236	26	12,857	28
New York City	381	14	11,544	34	319	11	11,098	31	14,549	30
Detroit	332	12	914	3	—	—	337	*	1,275	3
San Francisco	254	9	3,372	10	934	33	4,042	11	152	*
Charlotte, N. C.	210	8	4,470	13	190	7	1,174	3	1,799	4
St. Louis	87	3	2,339	7	164	6	1,905	5	1,290	3
Fort Worth	82	3	1,572	5	—	—	1,726	5	209	*
Minneapolis	76	3	1,294	4	26	*	1,710	5	5,176	11
Birmingham	76	3	605	2	334	12	116	*	73	*
Cleveland	464	17	1,141	3	354	12	1,415	4	316	*
Denver	56	2	205	*	—	—	1,054	3	—	—
Boston	26	1	2,322	7	13	*	2,149	6	7,686	17
Total	2,681	100	34,055	100	2,877	100	35,962	99	45,382	96

*Less than 1 percent. Columns do not always add to 100 percent because of fractions omitted.

Figure 10. Deficit* and surplus egg producing regions in the United States, 1954 (millions of eggs).



*THE DEFICIT OR SURPLUS IS ESTABLISHED BY SUBTRACTING THE U.S. PER CAPITA PRODUCTION FROM EACH REGION'S PER CAPITA PRODUCTION, MULTIPLIED BY THE NUMBER OF PEOPLE IN EACH REGION.

†THE RELATIVE IS EACH REGION'S DEFICIT AS A PERCENTAGE OF THE AGGREGATE DEFICIT.

sumed to exist also in the production of egg products and there should be a tendency for both frozen eggs and egg solids to move in the general pattern of shell eggs. Figure 14 shows that approximately one-third of the frozen egg traffic moved to New York, with other significant amounts shipped to Char-

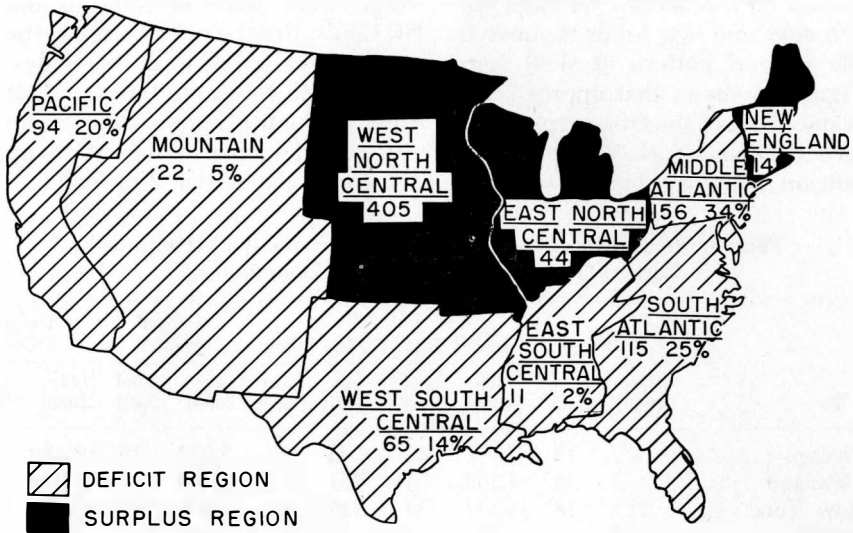
lotte, San Francisco, and Boston. Within the region, the heaviest receipts were found at Chicago and St. Louis. From western origins, the traffic was shipped to the same destinations in the same order as that from the entire region which indicates the influence of these states on the traffic pattern of this commod-

Table 4. Movements of Poultry and Products from the Western and Eastern Origins to Representative Destinations

From	To	Shell Eggs		Frozen Eggs		Egg Solids		Dressed Poultry		Dressed Turkeys	
		Cases (000)	% of Total	Lbs. (000)	% of Total	Lbs. (000)	% of Total	Lbs. (000)	% of Total	Lbs. (000)	% of Total
Western North Central Area	Chicago	302	25	3,892	12	543	19	5,072	19	8,686	25
	Cleveland	2	*	1,142	4	354	12	1,384	5	269	*
	New York	225	18	11,142	34	319	11	7,569	28	11,476	33
	Detroit	14	1	914	3			337	1	1,091	3
	San Francisco	254	21	3,372	10	934	32	3,936	14	112	*
	Charlotte	167	14	4,181	13	190	7	812	3	1,627	5
	St. Louis	87	7	2,309	7	164	8	1,793	6	1,274	4
	Fort Worth	82	7	1,572	5			1,726	6	209	*
	Minneapolis	11	*	1,294	4	26	*	1,576	6	5,176	15
	Birmingham	11	*	605	2	334	11	30	*	73	*
	Denver	56	5	205	*			1,054	4		
	Boston	7	*	1,813	6	13	*	2,058	8	5,152	15
	Western Total	1,218	99	32,441	100	2,877	100	27,347	100	35,144	100
Eastern North Central Area	Chicago	335	23	376	23			4,163	48	4,171	41
	Cleveland	461	32					32	*	47	*
	New York	157	11	410	25			3,529	41	3,073	30
	Detroit	318	22							184	2
	San Francisco							106	1	40	*
	Charlotte	44	3	290	18			362	4	172	2
	St. Louis			30	2			112	1	16	*
	Fort Worth										
	Minneapolis	65	4					134	2		
	Birmingham	65	4					86	1		
	Denver										
	Boston	19	1	509	32			91	1	2,535	25
	Eastern Total	1,464	100	1,615	100			8,615	99	10,238	100

*Less than 1 percent. Columns do not always add to 100 percent because of fractions omitted.

Figure 11. Deficit* and surplus farm chicken producing regions in the United States, 1954 (millions of pounds produced).



*THE DEFICIT OR SURPLUS IS ESTABLISHED BY SUBTRACTING THE U. S. PER CAPITA PRODUCTION FROM EACH REGION'S PER CAPITA PRODUCTION, MULTIPLIED BY THE NUMBER OF PEOPLE IN EACH REGION.
THE RELATIVE IS EACH REGION'S DEFICIT AS A PERCENTAGE OF THE AGGREGATE DEFICIT.

Table 5. Farm Production of Eggs, Farm Chickens, and Turkeys, and Population for United States and Nine Regions*

Region	Population (thousands)	Eggs (millions produced)	Farm Chickens (thousands of pounds)	Turkeys (thousands of pounds)
New England	9,762	3,252	149,963	29,934
Middle Atlantic	32,114	9,664	293,024	66,517
South Atlantic	22,773	5,710	203,030	180,901
East South Atlantic	11,467	3,692	148,943	18,675
West South Atlantic	15,333	5,093	149,494	94,948
Mountain	5,692	1,696	56,906	69,057
Pacific	16,671	5,968	139,368	242,037
West North Central	14,568	17,053	609,273	301,362
East North Central	32,804	13,247	502,704	157,113
United States	161,184	65,375	2,252,704	1,160,544

*Source: *Current Population Reports*, Series P-25, No. 124, U. S. Dept. of Census; and *Farm Production, Disposition, Cash Receipts, and Gross Income: Chickens and Eggs 1953-1954*, April 5, 1955, and *Turkeys 1954-1955*, March 27, 1956, U. S. Dept. of Agriculture, Agr. Marketing Service, Washington, D. C.

ity. The volume hauled by the railroads occurred on the San Francisco and New York movements.

Egg Solids

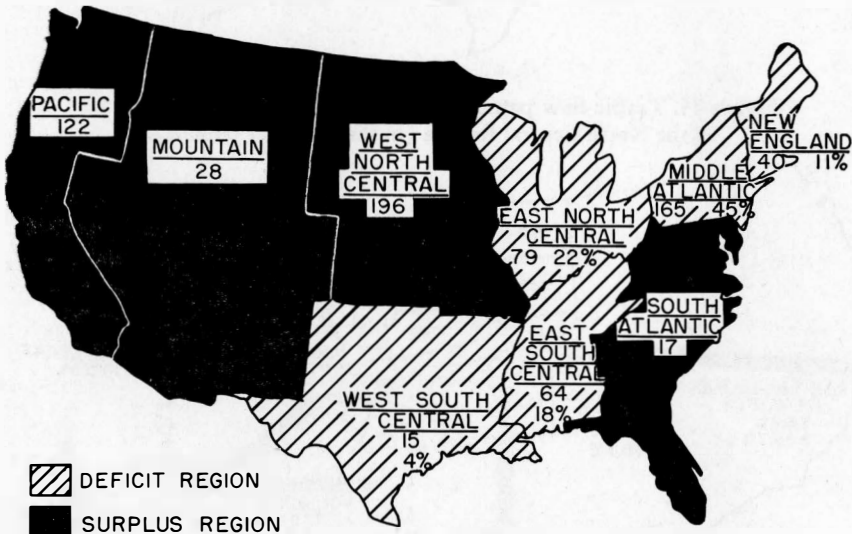
As may be seen in figure 15, all of the movement originated in the western area, and approximately one-third moved to the Pacific Coast. A substantial amount of the westbound traffic was destined for export. Birmingham and New York were the other major destinations outside the region, whereas Chicago, Cleveland, and St. Louis received the heaviest traffic moving within the region. The railroad traffic amounting to 41% of the total volume moved to San Francisco and Birmingham.

Dressed Poultry

Figure 11 shows the regions having surplus per capita production of farm chickens. The East North Central and New England Regions show a small surplus as contrasted to the relatively large surplus in the West North Central Region. Figure 16 indicates the relatively heavy flow of traffic to the eastern and western destinations as New York, Boston, and San Francisco together received almost half of the traffic. Chicago and St. Louis were the important markets within the region.

In view of the surplus production of New England, shipments to Boston are difficult to explain unless midwestern poultry was used to replace movements from these states

Figure 12. Deficit* and surplus turkey producing regions in the United States, 1954 (millions of pounds produced).



*THE DEFICIT OR SURPLUS IS ESTABLISHED BY SUBTRACTING THE U.S. PER CAPITA PRODUCTION FROM EACH REGION'S PER CAPITA PRODUCTION, MULTIPLIED BY THE NUMBER OF PEOPLE IN EACH REGION.

† THE RELATIVE IS EACH REGION'S DEFICIT AS A PERCENTAGE OF THE AGGREGATE DEFICIT.

to other regions. Movements to Chicago and St. Louis probably were for immediate consumption because each city is in the center of a heavily populated metropolitan

area which encompasses a 100 mile radius. Some portion of the volume, however, may have moved into storage for later shipment. The major railroad movements went to

Figure 13. Traffic flow pattern of shell eggs from principal states in the North Central Region (in thousands of cases).

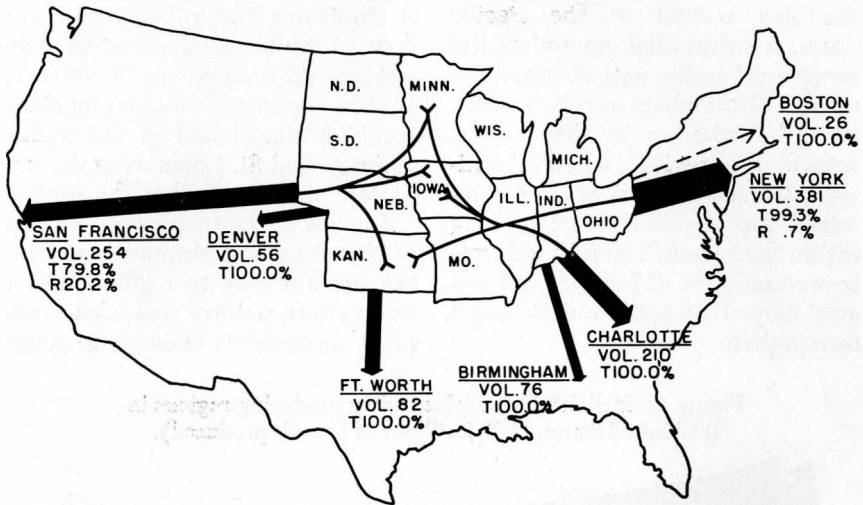
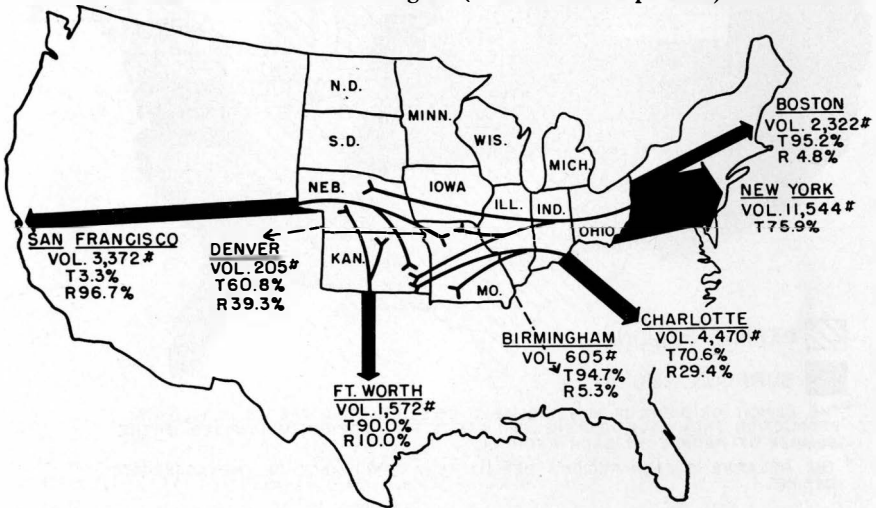


Figure 14. Traffic flow pattern of frozen eggs from principal states in the North Central Region (in thousands of pounds).



San Francisco, New York, and Boston.

Dressed Turkeys

The regions showing a surplus

per capita production of dressed turkeys are found on figure 12. From these data, the turkeys should tend to move to eastern points and this tendency is confirmed in figure

Figure 15. Traffic flow pattern of egg solids from principal states in the North Central Region (in thousands of pounds).

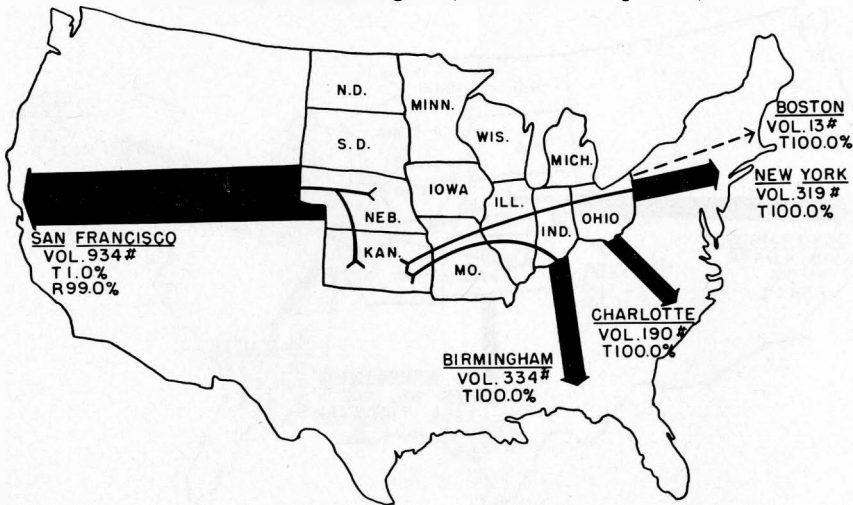


Table 6. Per Capita Production* of Eggs, Farm Chickens, and Turkeys†; and the Deviations from National Average for Nine Regions in United States

Region	Eggs (number produced)		Farm Chickens (pounds produced)		Turkeys (pounds produced)	
	Per Capita Production	Deviation from National Average	Per Capita Production	Deviation from National Average	Per Capita Production	Deviation from National Average
N. E.	333‡	- 73‡	15‡	+ 1‡	3‡	- 4‡
M. A.	301	-105	9	- 5	2	- 5
S. A.	251	-155	9	- 5	8	+ 1
E. S. A.	322	- 84	13	- 1	2	- 5
W. S. A.	332	- 74	10	- 4	6	- 1
Mountain	298	-108	10	- 4	12	+ 5
Pacific	358	- 48	8	- 6	14	+ 7
W. N. C.	1,170	+764	42	+28	21	+14
E. N. C.	404	- 2	15	+ 1	5	- 2
U. S.	406		14		7	

*Farm production divided by number of people in that area.

†Source: *Current Population Reports*, Series P-25, No. 124, U. S. Dept. of Census; and *Farm Production, Disposition, Cash Receipts, and Gross Income: Chickens and Eggs 1953-1954*, April 5, 1955, and *Turkeys 1954-1955*, March 27, 1956, U. S. Department of Agriculture, Agricultural Marketing Service, Washington, D. C.

‡Rounded to nearest whole number.

17 which shows the heavy east-bound movements. New York and Boston were the major markets outside the region, and Chicago and Minneapolis within the region.

Both eastern and western movements went to the same destinations in the same order of importance as that of the regional movement. Minneapolis was an important market

Figure 16. Traffic flow pattern of dressed poultry from principal states in the North Central Region (in thousands of pounds).

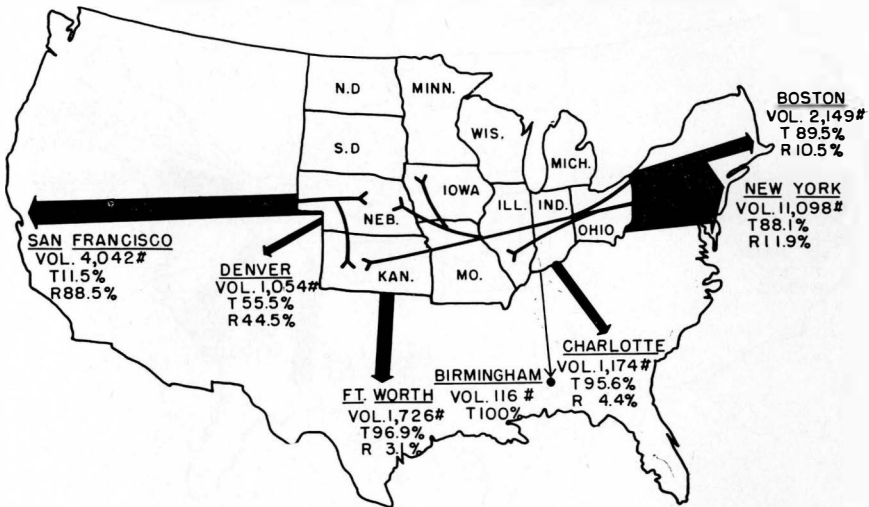
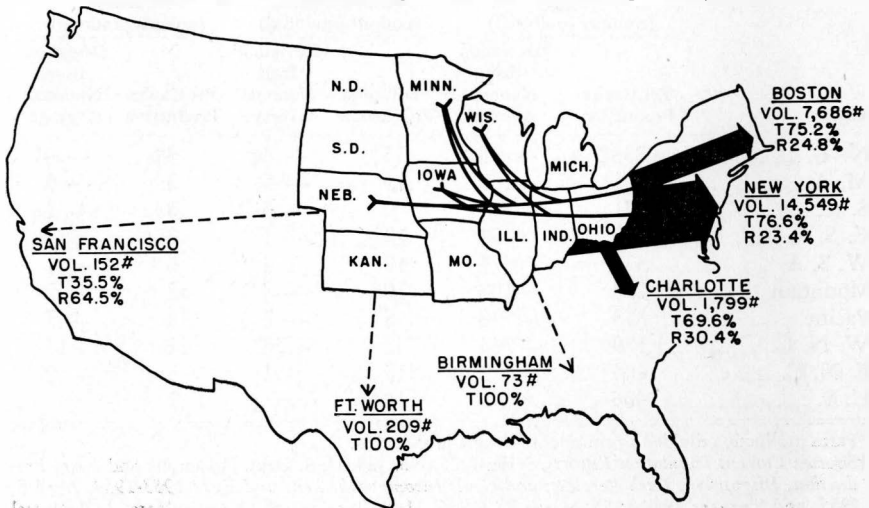


Figure 17. Traffic flow pattern of dressed turkeys from principal states in the North Central Region (in thousands of pounds).



for shipments from states in both eastern and western areas of the North Central Region. In addition to its influence as a center of a large metropolitan area of consumption,

it appeared to be a major assembly point for storage and transshipment of this commodity. Almost one-fourth of the traffic to the east was carried by the railroads.

Average Costs of Movement

The two most important factors that determine transportation costs are the volume shipped and the distance the shipment must travel. Indirectly, the transit time for the movement may be an additional cost if quality deterioration occurs or market conditions change adversely while the commodities are in transit. However, volume and distance are the important cost factors for these products.

Average costs of moving the commodities are presented in tables 7 and 8. Column 1 in each table shows the average charge per case of shell eggs and per hundred pounds for the remaining products. Column 2 shows the average charges for moving a case of eggs and a hundred pounds of the other commodities a distance of 100 miles. The averages presented are based on the operations of the for-hire (i.e., common and contract carrier) movements into the seven destinations outside the North Central Region, and the five destinations within the region.

The For-Hire Carrier

Average costs of the railroad and motor carrier movements to each destination include all expenses except those of the containers, which

were omitted because (1) a wide variety of containers were used in different marketing practices by the plants, and (2) some plants used containers for one trip only whereas others used the same containers over and over. A separation of motor common carrier costs from those of motor contract operations was impossible because in some instances the carriers operated under the dual classification, others operated by lease to a regulated carrier, and still others operated as a common or contract carrier on one haul and as an exempt carrier on others. For these reasons the costs of the common and contract movements have been combined into a total which for our purpose is considered the for-hire motor carrier expenses. Private motor carrier operations are discussed in a later part of this report.¹¹

Common and contract motor carrier costs include the following items: rates, refrigeration charges when not included in the rates, stop-off charges, driver bonuses, loading and unloading charges (shell egg traffic only), and federal transportation taxes. Leased truck costs, which are considered as contract operations, include the charge

¹¹See Appendix 2.

for the lease (on a per trip basis), drivers' wages, gasoline and oil, and toll road fees. Railroad costs include rates, icing, and switching charges, and federal transportation taxes.

The average costs per case of shell eggs and per 100 pounds for the other commodities were computed by adding the total freight charges on each movement, then dividing by the volumes shipped. Average costs per 100 miles were found by adding the loads carried by each

mode of transportation, and the distance each load traveled, then dividing the total cost by volume and mileage. The mileage costs represent the expense of hauling one case or 100 pounds a distance of 100 miles.

Table 7 shows that the cost of shipping 100 pounds of frozen eggs by truck from the western origins to Boston was \$1.18, and the charge for moving 100 pounds 100 miles was 8 cents. If shipped by railroad

Table 7. Average Cost of Shipping Poultry and Products to Representative Destinations Outside Region

Commodity	Boston		New York		Charlotte		Birmingham		FortWorth		Denver		San Francisco	
	1*	2†	1	2	1	2	1	2	1	2	1	2	1	2
A. From West North Central Area														
Shell Eggs‡														
Truck	110	8	98	8	140	13	112	12	98	12	76	11	113	6
Rail			123	9										
Frozen Eggs														
Truck	118	8	170	15	217	21	170	22			112	22	236	12
Rail	194	16	142	13	198	18	224	29					196	11
Egg Solids														
Truck	216	14	187	15					141	18				
Rail													202	11
Dressed Poultry														
Truck	195	12	172	13							111	26		
Rail	241	16	208	16					189	27	180	26	209	11
Dressed Turkey														
Truck	186	13	190	15	184	16			245	26				
Rail	200	15	235	18									191	9
B. From East North Central Area														
Shell Eggs‡														
Truck					132	18								
Dressed Poultry														
Truck			128	14										
Dressed Turkey														
Truck	180	16	128	18										
Rail	205	19	147	15										

*Cents per hundred pounds.

†Cents per hundred weight per hundred miles.

‡Cents per case.

the per hundred weight expense was \$1.94, or a charge of 16 cents per 100 miles. These figures are averages which were computed on all movements into the New England region and do not represent the actual costs of shipping this commodity into Boston. Boston is used only as a key point for this region, as New York is for the Middle Atlantic region, and the other cities which are representative destinations in their regions. The reader should be

cautioned against using the average charges into each destination as the specific transportation costs into these cities for they are only representative for the entire region.

Generally, the costs of movement increased with distance, reflecting the influence of the common carrier rate structures. Actually, rates do not increase strictly in proportion to distance, but rather at a declining ratio to the distance traveled. Relative charges to destinations outside

Table 8. Average Cost of Shipping Poultry and Products to Representative Destinations Within Region

Commodity	St. Louis		Minneapolis		Chicago		Cleveland		Detroit	
	1*	2†	1	2	1	2	1	2	1	2
A. From West North Central Area										
Shell Eggs‡										
Truck	81	25	11	5	30	8	57	8	46	7
Rail	—	—	—	—	—	—	—	—	—	—
Frozen Eggs										
Truck	62	23	56	22	80	18	162	22	144	18
Rail	—	—	—	—	41	14	—	—	141	19
Egg Solids										
Truck	70	12	76	15	47	8	95	11	—	—
Rail	—	—	—	—	—	—	—	—	—	—
Dressed Poultry										
Truck	71	13	85	53	72	16	133	15	64	8
Rail	—	—	—	—	96	16	133	19	—	—
Dressed Turkey										
Truck	78	15	43	25	78	19	13	18	122	18
Rail	—	—	69	31	104	16	—	—	—	—
B. From East North Central Area										
Shell Eggs‡										
Truck	—	—	—	—	16	9	—	—	—	—
Dressed Poultry										
Truck	—	—	107	38	60	35	—	—	—	—
Dressed Turkey										
Truck	—	—	69	24	60	33	128	31	138	34
Rail	—	—	—	—	96	13	—	—	105	30

*Cents per hundred pounds.

†Cents per hundred weight per hundred miles.

‡Cents per case.

the region appeared to be lowest on the eastbound and westbound traffic and highest on movements to the south and southeast. The heavy density of traffic to the eastern and western cities as seen in the flow charts and the competition of the carriers for the business probably account for this fact. On traffic within the region, distance seemed to have been the governing factor in the costs of the movements.

With few exceptions, charges from both origin areas were lower when the commodities were shipped by motor carrier than when railroads were used whether costs per 100 pounds or per 100 miles are examined. This is a significant point for it is possible for one type of carrier to have lower cost per unit of weight but actually to be the most expensive one when volume and distance are both considered. However, from column 2 of the tables, it may be observed that where trucks charged the lowest price per 100 pounds, it usually followed that their costs were also the lowest on a distance basis. In other words, motor carriers hauled volumes per load over distances quite comparable to the railroad movements. Where the commodity traffic data could be compared, it was found that motor carriers had lower costs on 18 movements, railroads had the advantage on four movements, and on one movement the charges were the same for each mode of transportation. In instances where the cost per 100 pounds was lower by truck, but the charge for moving 100 pounds 100 miles was lower by railroad, the

size of the load carried may have been the primary factor.

However, neither mileage nor size of loads alone can fully explain the difference in the amounts charged by the two transportation media, for any one or a combination of other factors may have had an influence. For example, (1) refrigeration charges were usually included in motor carrier rates, but were added to railroad rates, (2) switching charges were an added expense to railroad patrons but did not exist as such on truck movements unless considered equivalent to stop-off charges, (3) strong evidence indicated that some motor carriers moved the commodities as a back-haul operation, on which charges are often lower than those on traffic in the opposite direction, (4) finally, some carriers operated under the agricultural exemption and were therefore partially free from economic regulation and the expenses pertaining thereto.¹²

Shippers appeared to prefer motor carriers even though their charges were equal to or higher than those of the railroads. An example of this observation may be found in table 2 on the movement of frozen eggs to Charlotte. The railroad had a cost advantage of 19 cents per 100 pounds and 3 cents per 100 miles under the trucks, yet moved only 29% of the traffic (figure 14). Shippers who preferred the motor carriers over rail carriers did so because of (1) their availability,

¹²See Appendix 2 for an explanation of the agricultural exemptions as applied to motor carrier movements.

convenience, flexibility of operation, and frequency of service, (2) the personal attention given to their shipments, (3) little or no loss and damage, (4) the fact that they can carry small loads to buyers who cannot handle a large inventory, and (5) less over-the-road transit time.

In support of point number 5, reports were given by 12 plants on comparisons of the time involved to move shell and frozen eggs and dressed poultry to New York, Boston, and San Francisco by trucks and railroads from western origins. As table 9 shows, a significant difference existed in the average time for shipments to the eastern cities, but was of little importance on the western movement. One possible reason for the longer period of railroad movements was the necessity of re-icing the cars having no mechanical refrigeration. Another reason could be that of congestion and subsequent delay at the large railroad terminals through which railroad traffic is moved to eastern destinations. The hours of transit are aver-

ages derived from a range of data and do not exactly correspond to the transit times of individual plants.

Private Motor Carrier Movements and Costs of Operation

Trucks owned and operated by processors were important carriers of live poultry and shell eggs from the eastern origins, but hauled relatively small volumes of traffic from the western areas. All of the live poultry traffic reported and 38% of the shell egg shipments from the eastern area moved in this manner. Dressed poultry shipments by private carrier amounted to 10% of the movements from each origin area, and represented the highest percentage of privately owned truck shipments from the western area. Although private carriers were used to haul the commodities to all markets, their traffic moved primarily within the region.

Data concerning operating expenses per privately operated truck were not available but nine plants submitted records of carrier fleet operations. The type of equipment in the fleets varied from a 2-ton dual wheel pickup truck to a 4-axle tractor-semi trailer combination. Since only total mileage for each fleet was given, it is not known what percentage of the operations were local in nature and what percentage consisted of over-the-road trips.

Total expenditures for each fleet operation were added together to form a base for determining the percentage shown for each item. The percentages therefore represent

Table 9. Average Time (hours) in Transit from Western Origins to Representative Destinations by Type of Carrier*

Carrier	Dest nation		
	New York	Boston	San Francisco
Truck			
Hours	58.9	72.5	118.0
Trips	69	24	12
Rail			
Hours	120.0	150.0	120.0
Trips	17	22	14

*Based on reports furnished by plants on individual trips.

Table 10. Distribution of Private Truck Operating Expenses

Items of Expense	Percent of Total
Drivers' Wages	24.5
Gas and Oil	21.7
Repairs	14.2
Depreciation	13.1
Miscellaneous	8.3*
Insurance—Liability and Prop- erty Damage	5.3
Tires	4.6
Registration Fees	3.0
Loading	2.1
Unloading	1.9
Use Taxes	1.0
Cargo Insurance3
	100.0

*Includes grease, anti-freeze, drivers' meals, social security, unemployment compensation, and telephone and telegraph.

averages for the nine plants and it is probable that the figure for each item in table 10 would vary from plant to plant.

Wages, gas and oil, repairs, and depreciation accounted for over 70% of the total operating costs. Costs for all fleet operations averaged 25 cents per mile.

Comparisons of Private and For-Hire Motor Carrier Operations

Tables 11 and 12 present data which compare the costs of shipping the commodities by for-hire and private carriers to the representative destinations. Column 1 under each commodity classification indicates the cost per case of shell eggs or per 100 pounds, where-

Table 11. Comparisons of Average Costs of Movements by For-Hire and Private Motor Carriers from East North Central Origins

To:		Shell Eggs (Cases)		Dressed Poultry (hundred lbs.)		Dressed Turkeys (hundred lbs.)	
		1*	2†	1	2	1	2
Boston	CC‡	—	—	—	—	180	16
	P§	—	—	—	—	169	15
New York	CC	—	—	128	14	128	14
	P	—	—	150	15	163	17
Minneapolis	CC	—	—	107	38	64	24
	P	—	—	105	25	67	16
Chicago	CC	16	9	60	35	60	33
	P	86	52	65	22	65	22
Cleveland	CC	—	—	—	—	128	31
	P	—	—	—	—	151	31
Detroit	CC	—	—	—	—	138	34
	P	—	—	—	—	135	30

*The costs are cents per hundred pounds.

†The costs are cents per hundred weight per hundred miles.

‡Common and Contract Carrier costs.

§Private Truck Carrier costs.

as column 2 shows the cost per case or 100 pounds per 100 miles.

From the western origin area (table 8) the most significant comparisons are found on the frozen egg movements as each type of carrier was used to carry the commodity to all of the destinations. In every instance the per unit cost by private carrier was lower than that of the for-hire carrier, but when the cost per 100 miles was considered, the private truck did not have the advantage on all of the hauls. Throughout the remaining com-

modity movements, private carriers showed higher costs on shell eggs, egg solids, and dressed poultry traffic than those of the for-hire carriers. The costs of shipping egg solids to Chicago and Cleveland are not a valid comparison because the loads of the private carriers averaged 660 and 1,116 pounds respectively as contrasted to the 21,000 pound loads of the for-hire carrier.

Eastern origin shipments as shown in table 11 indicate an advantage costwise on some movements for private carriers on long

Table 12. Comparisons of Average Costs of Movements by For-Hire and Private Motor Carriers from West North Central Origins

To:		Shell Eggs (Cases)		Frozen Eggs (hundred lbs.)		Egg Solids (hundred lbs.)		Dressed Poultry (hundred lbs.)		Dressed Turkeys (hundred lbs.)	
		1*	2†	1	2	1	2	1	2	1	2
Boston	CC‡	—	—	188	13	—	—	—	—	—	—
	P§	—	—	144	12	—	—	—	—	—	—
New York	CC	—	—	177	15	—	—	172	14	—	—
	P	—	—	150	15	—	—	150	15	—	—
Charlotte	CC	—	—	217	21	—	—	—	—	—	—
	P	—	—	145	17	—	—	—	—	—	—
San Francisco	CC	—	—	236	12	—	—	—	—	—	—
	P	—	—	225	11	—	—	—	—	—	—
St. Louis	CC	—	—	62	23	—	—	—	—	—	—
	P	—	—	40	34	—	—	—	—	—	—
Minneapolis	CC	11	6	56	22	—	—	85	53	43	25
	P	15	7	27	34	—	—	27	34	31	39
Chicago	CC	30	8	80	18	47	8	72	16	78	19
	P	50	8	39	13	136	22	39	6	59	17
Cleveland	CC	—	—	162	15	95	11	133	15	—	—
	P	—	—	161	17	216	23	200	21	—	—

*The costs are cents per hundred pounds.

†The costs are cents per hundred weight per hundred miles.

‡Common and Contract Carrier costs.

§Private Truck Carrier costs.

distance traffic outside the region, but seem to show a comparative cost disadvantage on movements within the region. Apparently when private carriers can haul maximum loads over long distances they can compete favorably with for-hire carriers on the basis of costs. Where the density of loading is light, the advantage disappears. Of course, privately owned trucks may be used for a variety of purposes associated with plant operations besides the transportation of their outbound products. Inbound materials, supplies, and machinery are hauled

also. In view of the alleged advantages of the private carrier over the for-hire carrier, including a relatively constant flow of traffic without solicitation, little or no regulatory expenses, and relatively balanced movement in both directions, it is surprising to find that private carrier operations on the poultry movements were not able to show a better cost advantage than they actually did. However, without more data concerning these operations, it is impossible to draw valid conclusions concerning the relative efficiencies of private and for-hire carriers.

Appraisal of Findings

This study was designed to analyze the transportation factors involved in the movement of poultry and poultry products from origins in the North Central Region. The commodities were transported by two media—railroads and motor carriers. Because data currently published by private and public sources do not adequately nor accurately cover the factors analyzed in this report, it was necessary to work directly with the records of cooperating shippers and carriers. Until such time as public regulatory agencies or carrier associations require or encourage the reporting of this data by all carriers, this technique will continue to be necessary, if transportation elements of a marketing problem concerning individual commodities are to be seriously examined.

The analysis was meant to be descriptive, without pretense of predicting future trends in the transportation of these commodities. Two weaknesses are obvious:

1. Backhaul data, which could not be obtained, would have helped greatly in presenting a more complete analysis.

2. Complete data from some non-resident carriers was not obtained. Such information would have added to the precision of the data presented.

On the other hand the study points out areas in which further research could be directed on this problem. These are:

1. The influence of transportation costs, facilities, and services on the location of poultry production and marketing.

2. The influence of storage on

transportation patterns and movements.

3. A more comprehensive analysis of the use and costs of private, contract, and common motor carriers in the movement patterns of these commodities.

4. For analysis of the effects of transportation upon the competitive interregional aspects of the poultry industry, an appraisal of the transportation of feed grains and feed stuffs from the North Central States to competing producing areas. Work is now in progress which should materially assist in filling this gap.

5. The possibility of the future use of a coordinated service, such

as trailer-on-flat-car, in the movement of the commodities.

The reader is again reminded that this study is just one phase of a broad investigation into the intra- and interregional competitive problem in the marketing of poultry and poultry products. It is hoped that the analysis will be more meaningful when relationships between the movement of poultry products from the North Central States, the movement of feed grain ingredients to competing poultry producing areas, and the movement of poultry from other producing areas into common markets are further studied. Research on the latter two movement phases is underway at the time of publication of this bulletin.

Appendix I

Table No. 1. Total Volume of Poultry and Poultry Products Shipped by Rail and Motor Carriers From Each Regional Area to Intra- and Interregional Destinations

Origin	Type of Carrier	Shell Eggs (Cases)			Frozen Eggs (lbs.)			Dried Eggs (lbs.)		
		Total	Within Region	Outside Region	Total	Within Region	Outside Region	Total	Within Region	Outside Region
Western Area	Truck	1,154,806	416,030	738,766	23,267,394	8,170,078	15,097,316	1,705,671	1,057,063	648,603
	Rail	63,100		63,100	9,173,363	1,379,651	7,793,712	1,172,073	30,030	1,142,043
	Total	1,217,906	416,030	801,876	32,440,757	9,549,729	22,891,028	2,877,744	1,087,098	1,790,646
Eastern Area	Truck	1,462,860	1,217,027	245,833	1,615,222	405,856	1,209,366			
	Rail									
	Total	1,462,860	1,217,027	245,833	1,615,222	405,856	1,209,366			
Regional Total	Truck	2,617,666	1,633,057	984,609	24,882,616	8,575,934	16,306,682	1,705,671	1,057,063	648,603
	Rail	63,100		63,100	9,173,363	1,379,651	7,793,712	1,172,073	30,030	1,142,043
	Total	2,680,766	1,633,057	1,047,709	34,055,979	9,955,585	24,100,394	2,877,744	1,087,098	1,790,646

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Origin	Type of Carrier	Dressed Poultry (lbs.)			Dressed Turkeys (lbs.)			Live Poultry (lbs.)		
		Total	Within Region	Outside Region	Total	Within Region	Outside Region	Total	Within Region	Outside Region
Western Area	Truck	20,289,131	9,171,088	11,118,043	25,761,897	13,233,482	13,528,415			
	Rail	7,057,709	991,534	6,066,175	8,382,579	3,267,880	5,114,699			
	Total	27,346,840	10,162,622	17,184,218	35,144,476	16,496,362	18,648,114			
Eastern Area	Truck	8,614,979	4,440,705	4,174,274	8,956,356	4,360,261	4,596,095	5,751,157	5,751,157	
	Rail				1,281,276	57,480	1,223,796			
	Total	8,614,979	4,440,705	4,174,274	10,237,632	4,417,741	5,819,891	5,751,157	5,751,157	
Regional Total	Truck	28,904,110	13,611,793	15,292,317	35,718,253	17,593,743	18,124,510	5,751,157	5,751,157	
	Rail	7,057,709	991,534	6,066,175	9,663,855	3,320,360	6,343,495			
	Total	35,961,819	14,603,327	21,358,492	45,382,108	20,914,103	24,468,005	5,751,157	5,751,157	

Percentage Distribution of Volume Shipped

Origin	Type of Carrier	Shell Eggs (Cases)			Frozen Eggs (lbs.)			Dried Eggs (lbs.)			Dressed Poultry (lbs.)			Dressed Turkeys (lbs.)			Live Poultry (lbs.)		
		Within		Outside	Within		Outside	Within		Outside	Within		Outside	Within		Outside	Within		Outside
		Total	Region	Region	Total	Region	Region	Total	Region	Region	Total	Region	Region	Total	Region	Region	Total	Region	Region
By Destinations																			
All Carriers:		100	61	39	100	28	72	100	38	62	100	41	59	100	46	54	100	100	---
Western Area		45	34	66	95	29	71	100	38	62	76	37	63	77	47	53	---	---	---
Eastern Area		55	83	17	5	25	75	---	---	---	24	52	49	23	43	57	100	100	---
By Carrier:																			
Western	Truck	95	36	64	68	35	65	59	62	38	74	45	55	76	49	51	---	---	---
Area	Rail	5	---	100	32	14	86	41	3	97	26	14	86	24	39	61	---	---	---
Eastern	Truck	100	83	17	100	25	75	---	---	---	100	52	48	88	49	51	100	100	---
Area	Rail	---	---	---	---	---	---	---	---	---	---	---	---	13	5	96	---	---	---
Regional	Truck	98	62	38	73	35	66	59	62	38	80	47	53	79	49	51	100	100	---
Total	Rail	2	---	100	27	14	86	41	3	97	20	14	86	21	34	66	---	---	---

Appendix II

Legal Status of Common, Contract, Private, and Exempt Carriers

Motor carriers may be classified as common, contract, private, or exempt carriers. Railroads usually are considered as common carriers. A common carrier has a duty to serve all shippers without discrimination, whereas a contract carrier may limit his operations to particular shippers. In determining the status of a carrier, the Interstate Commerce Commission has stated: "Each case requiring a determination whether or not common carriage exists, when brought to its irreducible minimum, turns finally on the question whether or not a holding out to the public is shown." *Craig Contract Carrier Application*, 31 M.C.C., 705, 708-709, (1941).

On the other hand, private carriage is considered as that which is incidental to or a furtherance of a non-transportation business enterprise. Private carriers are regulated by the Interstate Commerce Commission only with respect to qualifications and maximum hours of service of employees, standards of equipment, and safety, whereas the others are subject to regulation of business practices.

Under section 203 (b) (6) of the Interstate Commerce Act motor vehicles carrying ordinary livestock, fish, or non-manufactured agricultural commodities are exempt from economic regulation by the Interstate Commerce Commission if such vehicles are not used in carry-

ing any other property or passenger for compensation. Eggs in the shell were declared exempt commodities, but frozen and dried eggs and dressed poultry were not considered exempt by the Commission in *Determination of Exempted Agricultural Commodities*, 52 M.C.C. 511 (1951). Again in *East Texas Motor Freight Lines Inc. et al v. Frozen Fruit Express*, 62 M.C.C. 646 (1954), the Commission declared that motor carrier movements of fresh and frozen dressed poultry were not within the meaning of section 203 (b) (6).

Carriers involved in the movement of dressed poultry fought these decisions through Federal district courts to the Supreme Court, which in 1956 declared that dressed poultry should be classed as an exempt agricultural commodity. A summary of the decision is found in *Traffic World*, April 28, 1956. In December, 1956, as the result of a Federal District case at Houston, Texas, frozen and dried eggs in certain forms were held to be exempt commodities. In October, 1957, the Supreme Court upheld this decision. Concern over the development has been expressed by the motor common carriers, who feel that this latest decision is another step in broadening the "agricultural commodity exemptions" beyond the original intent of Congress. Further, they feel that as regulated carriers they cannot profitably compete for the traffic against the increasing numbers

of non-regulated carriers who are attracted to the dressed poultry movement as a result of its current exempt status.¹³

Motor Carrier Operations in the Movement of Poultry and Products

Because of the importance of for-hire motor carriers in the transportation of poultry and poultry products and the absence of information regarding their activities in the plant data, a short questionnaire requesting certain data was mailed to each of the carriers appearing on the plant records. Data were requested on such items as (1) the legal classification of the carrier (common or contract); (2) type of equipment used (tractor-trailer, tractor-semi trailer, straight truck); (3) commodities back-hauled; and (4) problems associated with physical and economic barriers to the interstate movement by highway.

A total of 158 motor carrier companies were engaged in the movement of the commodities from the plants analyzed. Of this number, 41.7% or 66 carriers furnished data, 5 carriers furnished incomplete data, and 15 were returned because of incorrect addresses. Those replying consisted of 40 who listed themselves as common carriers and 26 who were engaged in contract operations. Whereas all of the 66 reporting carriers operated from home bases in the North Central Region, those returned because of incorrect addresses were listed in plant records as operating from states outside the region. It is possible that the latter group consisted of the "itinerant"

or "gypsy" carriers with no home base of operations, who follow seasonal traffic movements throughout the nation. Private carriers, owned and operated by independent plants and cooperatives, are not included in the above figures.

From the data given on the completed questionnaires, the combined common-contract operations may be summarized as follows:

1. Equipment. The most commonly used equipment was the 4-axle tractor-semi trailer combination. The 5-axle and 2 to 3-axle tractor-semi trailer combinations were ranked second and third respectively, whereas less than 10% of the reporting carriers used tractor-trailer combinations. Straight trucks apparently are not used by these carriers on the over-the-road movement. A large majority of the carriers (52) owned their own equipment whereas a small number (5) leased equipment on a term or trip basis. The remainder used equipment which was owned and leased.

2. Backhauls. Two questions were asked of the carriers in regard to backhauls. One concerned the matter of whether or not a backhaul was considered necessary in the profitable operation of their hauls, and the second requested data on the classification of commodities backhauled into the North Central

¹³An analysis of the effects of the agricultural exemption upon the interstate transportation of fresh and frozen poultry will be found in the USDA Marketing Research Report No. 224, *Interstate Trucking of Fresh and Frozen Poultry Under Agricultural Exemption*, Washington, D. C., March, 1958.

Region. In answer to the first question, 49 of the carriers indicated the necessity of the backhaul movement. Information on the second question revealed the wide variety of commodities backhauled which may be seen by the following list of the most important movements, ranked in order of the number of times mentioned by each carrier reporting:

- a. General Freight
- b. Fresh Fruits and Vegetables
- c. Meats and Fish
- d. Frozen Fruits and Vegetables
- e. Dairy Products
- f. Poultry and Supplies
- g. Paper Products
- h. Grains
- i. Canned Goods
- j. Building Materials

No data were available on the volume and cost of movement of these commodities, nor was there any information on the origins and destinations of the movements. Whether or not the agricultural commodities shown in the above list were backhauled from intra- or interregional origins is not known.

3. Problems Confronting the Motor Carrier. The problem of balancing traffic appeared to be the major concern of the majority of the carriers, further supporting their opin-

ions on the necessity of backhaul traffic. However, this problem is not peculiar to motor carrier operations, for all forms of transportation except pipelines are involved in its solution. Common carriers and contract carriers to a limited degree are also concerned with the recent agricultural exemption granted on the movement of dressed poultry. Other problems reported concerned the lack of uniformity among state highway laws with particular reference to weight allowances and taxes, and problems concerning labor relations and rates.

Vehicle size and weight regulations were considered a major problem in hauling poultry and poultry products through the states of Iowa, Minnesota, Nebraska, Missouri, Illinois, Kansas, Kentucky, and Virginia. State vehicle taxes were listed as a major difficulty in the states of New York, Ohio, Kansas, Virginia, Nebraska, and California. However, the regulations and laws referred to were those in effect in the years 1954 and 1955, and revisions have undoubtedly occurred or are under legislative discussion at the present time. It is known, for instance, that weight laws have been changed in the states of Iowa and Kentucky since the carriers reported on this phase of the study.