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Transportation of Boilers into the North Central States

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TRANSPORTATION OF BROILERS INTO THE NORTH CENTRAL STATES



Agricultural Experiment Stations of Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin, and U. S. Department of Agriculture

**AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE
BROOKINGS**

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Transportation of Broilers into the North Central States

By WILLIAM H. THOMPSON¹

FINDINGS OF THE STUDY

The 12 North Central States into which broilers are shipped cover the area from North Dakota south to Kansas and east to Michigan and Ohio. The region is highly specialized in egg production, accounting for 45% of all eggs produced in the United States in 1959. As compared with the more specialized broiler-producing states in the Eastern, Southeastern, and South Central Regions, the North Central States produce relatively few broilers yet offer an important market outlet for the broilers produced and processed in the other regions.

Research on this study was undertaken through personal interview and an examination of the records of 246 broiler distributors in the North Central States during the 2 year period, 1957-58. Shipments received by these firms amounted to 1.3 billion pounds of broiler meat, which represents approximately 62% of the broilers consumed during the period, assuming an average annual per capita consumption of 19.1 pounds of broiler meat in 1957 and 22.1 pounds in 1958, throughout the region.

The largest volume of broilers received in the North Central Re-

gion originated in the Southeastern and South Central Regions. Four states — Illinois, Michigan, Ohio, and Missouri—accounted for almost 75% of the total receipts and Illinois and Ohio received 90% or more of their broilers from producing areas outside the North Central Region. For the region as a whole, 85% of the receipts over the 2 year period came from states outside and 15% from states within the region.

The heaviest volume of broiler movements into the North Central States occurred during the third quarter of each year in the period. Receipts were lightest during the first quarter of each year. Minor deviations from this pattern occurred in individual states which received their broilers via an intra-regional movement.

Major state origins for broilers were Georgia, Arkansas, and Alabama. Together, these states accounted for 67% of the regional receipts. Georgia alone was responsible for 43% of the total receipts and was by far the most important supplier of any origin state. Within

¹Professor of Transportation, Iowa State University, Ames, Iowa. The author is principally responsible for the opinions and conclusions expressed in this report.

the region, shipments from Indiana and Missouri accounted for 9% of the total. The remainder of the receipts originated in both Eastern and South Central States. The Del-Mar-Va area was not an important broiler supplier to the North Central Region. Where broilers were produced in the North Central States they were sold primarily through markets within the state except for Missouri.

During the 2 year period, distributors showed little or no inclination to shift from one origin to another for their broilers. Suppliers in Georgia and Alabama held their markets although in competition with Arkansas, which is much closer to the markets in the North Central Region. However, it is possible that Arkansas producers could sell their broilers to nearby markets and did not have to compete.

About 80% of the broilers were received as whole birds, ice-packed. Shipments of live birds, primarily on an intrastate level, accounted for another 10%. The remaining 10% was made up of disjointed, frozen; whole, frozen; and disjointed, iced birds. The majority of distributors reported that there was little or no seasonal differences in the form of broilers received.

Motor carriers were the only mode of transportation used in hauling broilers from points within and outside the region. But the motor carrier classification consists of a number of different categories and three types; namely, (1) privately owned and operated vehicles, (2) exempt carriers, and (3) regulated trucks were found

to be involved in these movements. Private carriers hauled 49% of the traffic, exempt carriers hauled 46%, and regulated carriers only 5%. It was assumed that the so-called merchant trucker was active in these movements, but specific data regarding this operation were not available. The merchant trucker is difficult to classify and could be considered as either a private or a contract carrier. The importance of the exempt carrier arises from the status given poultry as an exempt commodity under the "agricultural exemption" clause of the Motor Carrier Act of 1935, as amended.

Private carriers, possibly because of more direct control over route and traffic, were most significant on the traffic from Arkansas, whereas exempt movements appeared to be more important on the Georgia and Alabama traffic. Regulated carriers hauled some traffic from the latter states but were not involved in the movements from Arkansas.

The most common method of establishing rates was through direct negotiation between processors, distributors, and carriers. From Georgia and Alabama, private and exempt carriers had lower average charges than those of the regulated trucks. From Arkansas, exempt carriers charged somewhat lower rates than private carriers.

Despite the fact that rates and charges were negotiated, some measure of rate stability was found, although the charges did not rise proportionately to distance

especially from the southeastern origins. Stability on rates may have been the result, in part, of the influence of the private carrier, and in part due to the degree of service stability offered by all three motor carrier types.

Generally, private carriers appeared to have the advantage over the others in over-the-road transit time, probably because of the direct origin to destination haul without stop-offs for loading or unloading. However, differences in transit times between all three types from all origins were not significant enough to discern a definite pattern of advantage or disadvantage regarding each type of haul.

Forty percent of the distributors throughout the region anticipated some future changes in the pattern of broiler procurement and marketing. The most common response concerned a shift in the purchase of broilers from one state to another in areas outside the North Central Region, but no evidence was given which would indicate an overwhelming shift to any one state or the other. Other anticipated changes, perhaps of some significance, involved plans for increased use of shipper-owned or leased trucks, more direct purchases of broilers instead of through distributors, and changes concerning marketing procedures.

Three definite types of outlets were found through which broilers were sold. These were chain stores, retail independents, and hotel-restaurant markets. The combined retail markets accounted for 85% of the broilers merchandised.

The distributors indicated by a considerable margin that the broiler movements were considered the primary or major haul into the region. However, the rate structure may depend upon the ability of a carrier to get a return or secondary haul and where the trucker was successful, it was found that meat and meat products, grain, and eggs were the commodities most frequently listed as those carried on the back haul.

There was some evidence of cross-hauling of broilers between the North Central States. Missouri shipped heavy volumes into Illinois and received small quantities in return. Indiana and Michigan practically traded broilers and a significant volume was moved between Indiana and Illinois. No analysis was made of the reasons for these movements, which were hauled between the states at a cost of 1 cent per pound.

More important in this analysis is the problem of cross-hauling between regions. The North Central Region exports large volumes of feed ingredients (corn and soybean oil meal) to the broiler producing states and imports these ingredients converted to broiler meat. This procedure raises the question as to why the midwestern states do not raise broilers at the source of feed supply instead of having both the feed ingredients and broilers move hundreds of miles between origin and destination points. Strictly from a transportation viewpoint, economic waste results from this arrangement but transportation is only one

factor in location of industry. It seems obvious that forces other than transportation are strong enough to overcome the handicap of distance and costs involved on these movements.

In order to isolate the transportation factor, rough approximations were made concerning the combined costs of moving feed ingredients from selected origin points in the North Central States to Gainesville, Ga., and the cost of hauling broilers from Gainesville back to these points. For the movement of a 3.5 pound bird, the combined charges ranged from 8.5 cents at Indianapolis Ind., to 10.9 cents at Des Moines, Iowa. Whether or not these charges will become significant in the future will depend upon the ease with which broiler producers, located long distances from feed supply and markets, can continue to absorb them in competition with producers located closer to such points. Future changes in production and marketing factors in the feed and broiler industry together with technological improvements in the transportation media used will have an important impact upon the location problem.

REASONS FOR THE STUDY

This study is the third phase of a North Central Regional Poultry Marketing project. The regional project sought to analyze the extent to which transportation factors have been responsible for interregional shifts in the nature and relative importance of the poultry industry. More specifically, the

project has attempted to describe the methods used and charges made for the movement of poultry and products from the North Central States, for the movement of poultry feed ingredients (corn and soybean oil meal) from these states to other regions which compete for poultry business in common markets, and for the movement of poultry (broilers) from the competing regions back into the North Central markets. The first report of the series was published in 1958 and the second in 1960.²

OBJECTIVES OF THE STUDY

The objectives of this study were to determine for the North Central States, (1) the volume of broilers shipped in from competing poultry producing regions, (2) the types of transportation used, (3) transportation charges, (4) time in transit of the shipments, (5) seasonal factors, (6) the form in which broilers were received, (7) type of outlets through which the broilers were sold, and (8) the commodities carried on the outbound movement. The analysis concerns the movement of broilers from three regions—the Southeastern States, the South Central States, and the Del-Mar-Va area. The study covers the years 1957-58.

²Thompson, W. H. *Transportation of Poultry and Poultry Products from the North Central States*, Agricultural Experiment Station, South Dakota State College, Brookings, Bulletin No. 472, NCR 92, October, 1958. *Transportation of Poultry Feed Ingredients from the North Central States*, Agricultural Experiment Station, South Dakota State College, Brookings, Bulletin No. 485, NCR 109, May, 1960.

METHOD OF INVESTIGATION

Research on this phase of the project was undertaken coincident with that on the poultry feed ingredient phase. A preliminary study was made in 1957 in order to isolate the regions and states which shipped significant volumes of broilers into the North Central States and to test research schedules. From the results, it appeared that Georgia, Alabama, and Arkansas were the major suppliers.

Following revision of the research schedules to correct certain weaknesses, members of the North Central Poultry Marketing Research Committee (NCM-14) were requested to furnish lists of broiler distributors located in each state. Primary data were also received from the carriers, whereas secondary data were taken from publications of the United States Department of Agriculture, Interstate Commerce Commission, and the previous reports published in the series.³

The largest number of firms interviewed classified themselves as direct distributors or those who bought directly from a supplier, then distributed broilers through various marketing channels. Others combined the purchasing, processing, and retailing functions. Only a few of these firms handled less than 100,000 pounds per year.

The years 1957 and 1958 were selected to coincide with the dates used in the analysis of the poultry feed ingredient movements. Distributors were also requested to indicate changes which might be anticipated in the movement pat-

tern for 1959. Since some of the North Central States produce and market significant volumes of broilers within the region, the analysis shows movements of an intraregional as well as an interregional nature. However, since the data were collected for the most part from large firms, the intraregional movements shown in this analysis probably understate their importance.

The study emphasizes a state-to-state movement technique and the tables and charts include data covering the 2 year period. The volume of broilers received in the North Central States during the second year of the 1957-58 period was 17% greater than that of the first year. The types of firms interviewed, together with volumes for each classification, are shown in table 1.

PRODUCTION OF COMMERCIAL BROILERS

Table 2 shows the production of commercial broilers in the Southeast, South Central, Del-Mar-Va, and North Central Regions. The North Central States obtain their largest volumes of broiler receipts from the Southeastern and South Central States.

CONSUMPTION OF BROILERS

Consumption of all poultry has increased on an irregular basis for the past decade. In 1950, per capita consumption of poultry meat was 20.6 pounds and increased to 28.8 pounds in 1959. During this

³Thompson, W. H. *op. cit.*

Table 1. Types of Firms Interviewed

Destination state	Direct dis- tributor	Direct distribu- tor and processor	Direct distribu- tor and retailer	Direct distribu- tor and broker	Chain store	Processor	Total
Illinois	27	6	8	—	1	1	43
Missouri	10	11	8	4	1	1	35
Iowa	16	6	5	2	2	—	31
Michigan	19	4	5	—	1	—	29
Ohio	10	2	7	1	1	—	21
Indiana	2	5	7	—	1	4	19
Wisconsin	12	4	1	—	1	—	18
Kansas	4	5	3	1	—	1	14
Minnesota	7	4	—	1	1	—	13
Nebraska	7	5	1	—	—	—	13
North Dakota	2	2	—	1	—	—	5
South Dakota	2	3	—	—	—	—	5
Total	118	57	45	10	9	7	246
%	48	23	18	4	4	3	100

period, broiler consumption per capita showed a phenomenal increase from 8.7 pounds in 1950 to 22.8 pounds in 1959, a rise of approximately 150% in the 8 years.

Factors responsible, at least in part, for the increase in per capita consumption and which are still contributing to the increase, include: (1) the constant increase in egg production per hen resulting in proportionately less poultry meat as a by-product of egg production; (2) the rate of sexing continued to increase with the destruction of egg-type cockerels so that less poultry meat is marketed as a by-product of the production of replacement stock; (3) egg-type hens are being bred for lighter weights, another factor in the reduction of the amount of poultry meat as a

by-product of egg production; (4) with broilers reaching heavy weights at an early age, the increased tendency to use broilers for roasting purposes to replace hens has occurred; (5) preparation of the birds in ready-to-cook form and inspection have resulted in a higher quality and a more uniform product giving greater consumer satisfaction and acceptance; and, (6) lower prices relative to other meats.

It is possible to generalize upon future broiler requirements in the nation by using the estimated per capita consumption trends for broilers and estimated population increases. Littlefield and Merchant suggest that the percent rate of broiler consumption per capita, together with a median projection of

Table 2. Production of Commercial Broilers, 1957-58 (Thousands)*

State and region	Number		Percent of U. S. total	
	1957	1958	1957	1958
Southeast				
Alabama	103,875	131,640	7	8
Georgia	261,000	292,119	18	18
Mississippi	66,597	85,424	5	5
North Carolina	106,352	134,600	7	8
South Carolina	15,690	17,561	1	1
Area total	553,514	661,344	38	40
South Central				
Arkansas	110,191	133,331	8	8
Oklahoma	6,523	6,653	—	—
Texas	100,826	114,855	7	7
Area total	217,540	254,839	15	15
Del-Mar-Va				
Delaware	93,537	94,250	6	6
Maryland	74,288	86,209	5	5
Virginia	61,646	63,495	4	4
Area total	229,471	243,954	15	15
North Central				
North Dakota	—	—	—	—
South Dakota	—	—	—	—
Nebraska	2,280	2,280	—	—
Kansas	1,716	1,991	—	—
Minnesota	2,926	3,950	—	—
Iowa	4,460	4,192	—	—
Missouri	28,200	33,900	2	2
Wisconsin	17,394	19,482	1	1
Illinois	8,337	8,419	1	1
Indiana	42,370	44,912	3	3
Michigan	4,300	4,700	—	—
Ohio	17,600	17,248	1	1
Area total	129,583	141,074	8	8
Total	1,451,661	1,659,636	76	78

*USDA, AMS, *Poultry and Egg Situation*, May, 1958-1959.

a population of 179 million by 1960, 190 million by 1965, and 218 million by 1975 would indicate an increase of 25% in broiler requirements by 1975 without any increase in per capita consumption.⁴ Any increase in the per capita consumption of a rising population would, of course, raise this percentage. Trends in the consumption pattern of broilers between 1950 and 1959 are shown in table 3.

Table 3. Per Capita Consumption of Broilers in the United States, 1950-59*

Year	Estimated per capita consumption		
	All chicken Lbs.	Broilers Lbs.	%
1950	20.6	8.7	42
1951	21.7	10.4	48
1952	22.1	11.7	53
1953	21.9	12.3	56
1954	22.8	13.7	60
1955	21.4	13.9	65
1956	24.6	17.5	71
1957	25.5	19.1	76
1958	28.3	22.1	78
1959	28.8	22.8	79

*USDA, AMS, *Poultry and Egg Situation*, 1961, Outlook Issue, PES-210, November, 1960.

BROILERS RECEIVED BY EACH NORTH CENTRAL STATE

Table 4 shows the volume of broilers received during the 2 year period by each state from origins within and outside the North Central Region. Less than one-fifth of the total volume of 1.3 billion pounds shown as receipts by the distributors surveyed consisted of movements from states within the region, whereas over 80% of the

total receipts moved from origins outside the region.

The North Central States accounted for approximately 8% of the nation's broiler production in 1957-58 (table 2). Every state showed receipts from origins within and outside the region and included movements within each state. Volumes shown for each state represent the amounts shipped into the states primarily as first destinations, but in several instances further movements were found, particularly where large distributors acted as brokers and supplied nearby markets in other states. For example, shipments into Chicago would be included in the Illinois total, but Chicago distributors might move broilers into Wisconsin, Minnesota, and Iowa. Shipments into Omaha appear in the Nebraska totals but further movements were made into Iowa. Insofar as possible, these shipments were traced to final destination and the state totals corrected; but in some instances, it was not possible to get sufficient data from each distributor to follow this procedure.

The table shows the total receipts for each state, percentage of each state's receipts to regional totals, and a further separation of each state's receipts from origins within and outside the region. A following table points out the relative importance of origins within

⁴Littlefield, E. R. and Merchant, C. H., *Competition Among Areas in Supplying Broilers to the New York Market*, Maine Agricultural Experiment Station, Bulletin 582, April, 1959.

Table 4. Volume of Broilers Received by North Central States, 1957-58
(Thousands of Pounds)

State destination	Volume received by each state					
	Total	%	From within region	%	From outside region	%
Illinois	404,459	30	33,998	16	370,460	32
Michigan	211,334	16	28,451	13	182,883	16
Ohio	169,592	12	17,225	8	152,367	13
Missouri	164,516	12	39,546	18	124,970	11
Indiana	101,270	7	57,660	27	43,610	4
Minnesota	70,727	5	11,398	5	59,329	5
Iowa	68,224	5	8,941	4	59,283	5
Wisconsin	68,131	5	4,108	2	64,023	6
Nebraska	45,591	3	6,193	3	39,398	3
Kansas	43,521	3	6,096	3	37,425	3
North Dakota	9,271	1	2,038	1	7,233	1
South Dakota	3,712	*	75	*	3,637	*
Totals	1,360,348	99	215,729	100	1,144,619	99

*Less than 1%.

and outside the region as suppliers of broilers to each North Central State.

When total receipts from all origins are analyzed, the states of Illinois, Michigan, Ohio, and Missouri accounted for about 70% of the regional total. The same states also had a similar record for shipments from origins outside the region, which no doubt influenced their position relative to receipts from all origins. On the other hand three states—Illinois, Michigan, and Missouri, which ranked highest in receipts from all origins and from origins outside the region—were also among the highest in volumes received from origins within the region. A fourth, Indiana, showed the highest percentage of the broilers received from origins within the region, much of which was

received through intrastate movements.

The extent of the North Central Region as a market for broilers supplied by other areas is indicated by the percentage of each state's receipts from origins outside and within the region (table 5). Except for Indiana, Missouri, and North Dakota—which showed highest percentage of receipts from North Central origins—the other states received heavy shipments of broilers from origins outside the region. Four states—Illinois, Ohio, Wisconsin, and South Dakota—imported 90% or more of their broilers from other areas. For the region as a whole, 85% of the regional receipts moved from states outside the region, whereas 15% was furnished by the states within the region.

Table 5. Percentage of Each State's Receipts Originating Within and Outside the North Central Region, 1957-58 (In Thousands of Pounds)

State	Volume from outside region	%	Volume from within region	%
Illinois	370,460	92	33,998	8
Michigan	182,883	87	28,451	13
Ohio	152,367	90	17,225	10
Missouri	124,970	76	39,546	24
Indiana	57,660	57	43,810	43
Minnesota	59,329	84	11,398	16
Iowa	59,283	87	8,941	13
Wisconsin	64,023	94	4,108	6
Nebraska	39,398	86	6,193	14
Kansas	37,425	86	6,096	14
North Dakota	7,233	78	2,038	22
South Dakota	3,637	98	75	2
Total	1,144,619	85	215,729	15

SEASONAL FACTORS IN BROILER RECEIPTS

The heaviest movement of broilers into the North Central States occurred during the third quarter of the period when almost one-third of the total volume for the 2 year period was received. No significant differences were found in the percentages of broilers received during each quarter from origins within or outside the region. By contrast, receipts were lightest during the first quarter (table 6). The data reflects roughly the seasonal pattern of variations in broiler market supplies.

When movements from points outside the region were studied, it was found that receipts for each state conformed closely to the regional percentages for each quarter. Some slight deviations were noted, however, on the intraregional movements. For example, Michigan showed a uniform distribution throughout all quarters, and Iowa had larger receipts in both first and third quarters than the regional percentages.

REGIONAL RECEIPTS OF BROILERS BY ORIGINS

The major origins of broilers received by the North Central Re-

Table 6. Quarterly Receipts of Broilers, 1957-58

Origin	1st quarter %	2nd quarter %	3rd quarter %	4th quarter %	Year %
Outside region	19	28	32	21	100
Within region	20	28	31	21	100
All receipts	20	28	31	21	100

gion as a whole were Georgia, Arkansas, Alabama, and Mississippi outside the region; Indiana, Missouri, Michigan, and Illinois within the region. Georgia and Arkansas together originated 60% of all volume moved to these states. Together, Indiana, Missouri, Michigan, and Illinois originated 13% of the total movement and 81% of the volume shipped within the region. The largest shippers of broilers within the region were Indiana and Missouri which together originated 57% of the intraregional volume. Volumes of the traffic and percentages from each origin are shown in tables 7, 8, and 9. The distribution of the traffic from major origins into each state is shown in table 10 and figure 1. Except for two states—Kansas and Missouri—which show heavy movements from Arkansas, by far the greatest volume into all states originated in Georgia.

During the 2 year period, the North Central States showed relatively little shifting from one origin to another for their supply of broilers. One exception was that of Michigan, which showed a slight shift from Georgia to Alabama. It is interesting to note that suppliers in Georgia and Alabama can apparently overcome distance disadvantages relative to Arkansas to reach markets in the extreme northern and northwestern states of the region. However, it is possible that Arkansas processors could dispose of their broilers in nearby markets and did not have to pay the transportation costs necessary to reach these states. Arkansas pro-

Table 7. Origins of Broilers Shipped to the North Central States, 1957-58

Origin	Thousands of lbs.	% of total shipments
Georgia	583,430	43
Arkansas	228,383	17
Alabama	100,424	7
Indiana	62,433	5
Missouri	60,595	4
Mississippi	53,635	4
Tennessee	45,871	3
Pennsylvania	38,616	3
Kentucky	35,953	3
Michigan	27,823	2
Illinois	24,292	2
North Carolina	23,989	2
Virginia	19,876	1
Others*	55,028	4
Total	1,360,348	100

*Maryland, Delaware, Oklahoma, Minnesota, Wisconsin.

Table 8. Interregional Origins of Broilers Shipped to the North Central States in 1957-58

Origin	Thousands of lbs.	% of total shipments
Georgia	583,430	51
Arkansas	228,383	20
Alabama	100,424	9
Mississippi	53,635	5
Tennessee	45,871	4
Pennsylvania	38,616	3
Kentucky	35,953	3
North Carolina	23,989	2
Virginia	19,876	2
Others*	14,442	1
Total	1,144,619	100

*Maryland, Delaware, Oklahoma.

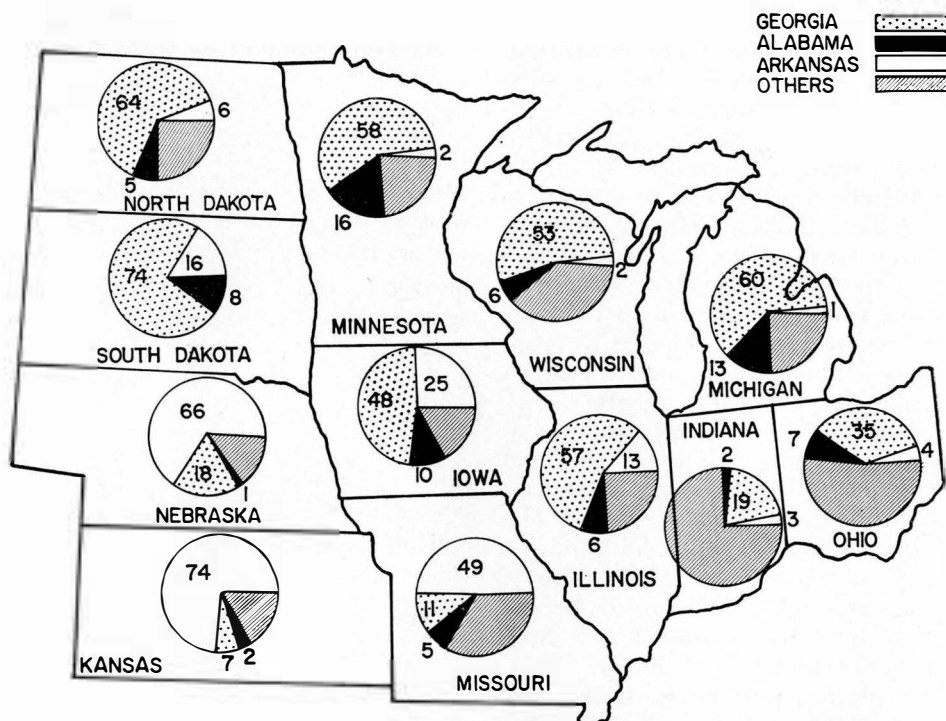


Figure 1. Major origins of broiler movements into each North Central State (percentage of each state's receipts).

ducers could meet Georgia prices in the nearby states with less transportation charges and have a larger net return above such costs.

The total volume of broilers received during the 2 year period by the North Central States was 45.3% of the total production of Arkansas in 1957 and 1958, assuming a yield of 70% on pounds of live weight produced. It should also be noted that the Del-Mar Va region shipped broilers only to states in the extreme eastern part of the region. Percentage-wise, the Del-Mar-Va area is not a significant supplier to the North Central States.

Table 9. Intraregional Origins of Broilers Shipped to the North Central States in 1957-58

Origin	Thousands of lbs.	% of total shipments
Indiana	62,133	29
Missouri	60,595	28
Michigan	27,826	13
Illinois	24,292	11
Ohio	17,225	8
Wisconsin	8,162	4
Minnesota	6,062	3
Iowa	4,791	2
Nebraska	3,744	2
Kansas	899	—
Total	215,729	100

Figure 1 shows graphically the percentage of broiler receipts shipped from different origins outside the North Central Region. Three states—Georgia, Alabama, and Arkansas—shipped broilers into each North Central State, and their movements are shown as percentages of each state's receipts and have been charted separately. Movements from all other states, both within and without the region have been grouped under the "Other" classification.

Patterns of movement as shown in this study between the North Central States, may not present the actual origin-destination movements found in the broiler trade. For example, it is assumed that Michigan received more than 1% of its broilers from Indiana and it is possible that the 13% shown as receipts from Michigan producers could include some broilers shipped from other states to them for processing and then distributed within Michigan.

Table 10. Origins of Broiler Movements into Each North Central State, 1957-58 (Percentages)*

From	TO											
	Minn.	Wis.	Neb.	N.D.	S.D.	Kan.	Mo.	Ill.	Ohio	Ind.	Mich.	Iowa
Georgia	58	53	18	64	74	7	11	57	35	19	60	48
Alabama	16	6	1	5	8	2	5	6	7	2	13	10
Arkansas	2	2	66	6	16	74	49	13	4	3	1	25
Mississippi	5	14	2			3	8	5		1	3	3
Minnesota	6			18								
Missouri	3	2	5	4	2	13	24	1				8
Tennessee		14					2	5	4	6	2	
Kentucky								5	2	7	3	
Indiana								2		56		
Wisconsin	8	5										
Virginia									9	5		
Pennsylvania		1							21		1	
Michigan										1	13	
Ohio									10			
Illinois								6				
Iowa												6
Kansas						1						
Nebraska			8									
Others†	2	3		3			1		8		4	
Totals	100	100	100	100	100	100	100	100	100	100	100	100

*Percentage of each state's receipts.

†Texas, North Carolina, Virginia, West Virginia, Maryland, Delaware.

FORM IN WHICH BROILERS WERE SHIPPED

The greatest volume of broilers received by distributors throughout the region during the period was in the form of whole birds, ice-packed, with 82% of total receipts moved in this manner⁵. Second in importance were shipments of live birds, amounting to 9% of total receipts. Live bird movements ranked high in Indiana, Missouri, Kansas, and Nebraska, according to the data furnished by distributors in these states. It is probable that live bird shipments occurred within and between other states; for instance, within Michigan and between Indiana and Michigan, but no data were obtained on this movement. For the most part, live bird shipments were made on an intra-state or intraregional basis. However, some movement was found from Arkansas to Kansas and Nebraska. Other categories mentioned by the distributors were disjointed, frozen; whole, frozen; and disjointed, iced; which together accounted for 9% of the total receipts.

The majority of distributors in all states indicated that there was little or no seasonal difference in the form of broilers received. Others indicated seasonal differences such as (1) heavier demand for parts during the summer months, (2) peak season for iced broilers from May through August, (3) price of each form makes only difference.

TYPE OF TRANSPORTATION USED

Motor carriers were the only mode of transportation used on the movement of broilers into the North Central States.⁶ However, for purposes of this study, motor carriers have been divided into three categories—private, exempt, and regulated.

Private motor carriers are defined as those vehicles which are

⁵These observations are supported in Faber, Fred L., *Commercial Poultry Slaughter Plants in the United States*, U.S. Dept. of Agriculture, Marketing Research Division, AMS-379. April, 1960.

⁶In 1954, motor carriers hauled from 60 to 100% of the poultry and products shipped from 42 North Central processing plants. In 1955, motor trucks hauled
(footnote continued on next page)

Table 11. Form in Which Broilers Were Received by Each North Central State 1957-58 (Percentage)*

Form	STATES											
	Minn.	Wis.	Neb.	N.D.	S.D.	Kan.	Mo.	Ill.	Ohio	Ind.	Mich.	Iowa
Whole, iced	86	91	76	90	87	68	68	87	78	57	96	95
Live	—	—	21	—	—	29	30	—	—	40	—	—
Disj., frozen	5	3	3	6	12	2	1	8	7	2	—	2
Whole, frozen	7	6	—	4	1	—	1	4	2	1	2	3
Disj., iced	2	—	—	—	—	1	—	1	13	—	2	—
Totals	100	100	100	100	100	100	100	100	100	100	100	100

*Percentages apply to the number of pounds.

owned, leased, or operated by a broiler processor, distributor, or retail store. Since they do not engage in for-hire transportation, they are not regulated by the Interstate Commerce Commission except for hours of employment by drivers and safety procedures. Private trucking is the fastest growing segment of highway transportation, showing an increase in carriage from 30 billion ton miles at the close of World War II to 143 billion in 1959. During the same period, regulated for-hire carriage increased from 24 billion to 84 billion ton miles.⁷

The advantages generally ascribed to the private truck include (1) lower costs than for-hire transportation, (2) reduced handling of the merchandise, which cuts in-transit damage, and (3) faster deliveries since a private truck is not regulated as to the routes it must serve. It is difficult to find accurate statistics on the volume of traffic carried by private trucks, but it is estimated that some 35% of the intercity ton miles of our nation are moved in this manner.⁸

Included under the "private car-

rier" classification, as used in this study, is another category of motor carrier operation—the so-called merchant trucker. These carriers take title to the load, operate on a buy-and-sell basis without Commission authority as to routes, rates, and services. They are fairly well established in the grain traffic and are also important in the transportation of fruits and vegetables. During the harvest season, this truck owner-operator moves into the harvest area and buys a truckload of grain from the producer or the elevator. The sale is for cash and title passes immediately to the merchant trucker who then hauls to the market which will offer him the best price upon arrival, or at which point he can obtain another load of commodities. Typically, the merchant trucker follows the traffic and only occasionally would be found retracing his original route.

Although data separating legitimate private carriage from that pertaining to merchant trucking were not available from the distributors, there is reason to believe that merchant truckers are an important factor in the movement of broilers. They operate in the transportation of poultry feed ingredients from the North Central States and are probably competing with other motor carriers for return hauls of broilers into this region.

When broilers are transported by motor carriers holding operating rights through certification or permit, they fall under the classification of processed poultry which has been considered as an exempt commodity since 1956. Processed

84% of frozen poultry, and by 1956-57, they carried 87% of frozen poultry from 144 processing plants studied on a nationwide basis. See Thompson, W. H. *Transportation of Poultry and Poultry Products from the North Central States, op cit*; and Snitzler, James R. and Byrne, Robert J., *Interstate Trucking of Fresh and Frozen Poultry Under Agricultural Exemption*, USDA Marketing Research Report No. 224, Washington, D.C., March, 1958.

⁷Wall Street Journal, August 18, 1960.

⁸SmyKay, Edward, "Private Motor Carriers of Property and the Rate Structure," *Traffic World*, February 27, 1960.

poultry is one of a group of agricultural commodities given exempt status by the so-called "agricultural exemption" clauses of the Motor Carrier Act of 1935.⁹ Thus, when this commodity is hauled by for-hire motor carriers, the carrier is exempt from regulatory control by the Commission relative to the entry into the trucking industry, the rates to be charged, and the routes to be used. The only regulation exercised applies to rules of safety and hours of service by drivers.

Regulated carriers consist of common and contract carriers. The former must conform to laws concerning their duties of service to the public which include, (1) the provision for adequate service to all shippers who wish to participate, (2) no discrimination, (3) reasonableness of rates, and (4) publication of rates. In return, common carriers are given operating rights under a certificate of convenience and necessity by the Commission, sometimes naming specific routes over which they must operate, and are supposed to be able to earn a reasonable profit. By contrast the contract carrier operates under a permit from the Commission, can select his customers, does not have to publish all of his rates, and is often not restricted to specific routes. These carriers may also carry exempt commodities and when so doing are not subject to rate and service regulation by the Commission as long as non-exempt commodities are not moved on the same vehicle at the same time.

The distributors surveyed in this study reported that 49% of the total

volume received during the 2 year period was carried in private trucks whereas, 46% was hauled by exempt carriers, and only 5% by the regulated carriers. If it were possible to get data on the composition of the regulated movement, it would probably be logical to assume that this consisted entirely of contract carriage. It would appear that common carriers or, for that matter, regulated for-hire carriage, plays little importance in the movement of broilers in this analysis.¹⁰

TRANSPORTATION CHARGES ON THE MOVEMENTS

The most common method of establishing rates on the shipments of broilers was through direct negotiations between processors or distributors and motor carriers. Where private carriers were used, an estimate of the charges was given. Direct negotiation was used to a greater extent by the exempt carriers, than by the regulated carriers and rates were established by truck brokers in a few instances.

Published rate sheets or tariffs were used primarily by regulated

⁹Sperling, Celia, *The Agricultural Exemption in Interstate Trucking—A Legislative and Judicial History*, U.S. Dept. of Agriculture, Marketing Research Report, Report 188, July, 1957.

¹⁰In studying the effect of the agricultural exemption on the poultry movements before and after the exemption was effective, Snitzler and Byrne found that regulated carriers in 1952 hauled 34% of the total volume analyzed, whereas in 1956-57, they hauled only 9%. Snitzler, James R., and Byrne, Robert J., *Interstate Trucking of Fresh and Frozen Poultry Under Agricultural Exemption*, op. cit.

carriers. However, these carriers, when hauling broilers, would be free to change any published tariffs without observing Commission requirements, or depart from them as they saw fit.

Charges as found from the records of the distributors on movements from Georgia, Alabama, and Arkansas are shown in tables 12, 13, and 14 and graphically presented in figures 2, 3, and 4. Volumes carried by each motor carrier classification are also included. These three origins were selected because they shipped some volume into each North Central State. The charges shown are averages of all movements from the selected origins to selected destinations. Corresponding point-to-point distances

are shown both in the tables and in parentheses following the name of the state on the graphs.

The data indicate the importance of the exempt carrier movement from Georgia and Alabama as contrasted to the importance of the private carrier on the movement from Arkansas. Some traffic was carried by regulated carrier from Georgia into each North Central State from Alabama into only five states, and no movement was found from Arkansas. Thus, private and exempt carriers appeared to share the markets at least in movements originating in these three states.

From Georgia (figure 2) and Alabama (figure 3) private and exempt carriers generally hauled the

Table 12. Average Charges for Broiler Movements from Georgia—1957-58

Destination	Distance* miles	Volume† %	Private carrier		Exempt carrier		Regulated carrier	
			Vol.%‡	Charge§	Vol.%‡	Charge§	Vol.%‡	Charge§
North Dakota	1,349	64	—	—	99	166	1	194
South Dakota	1,302	74	16	144	79	172	5	175
Nebraska	1,155	18	17	147	63	150	20	150
Minnesota	1,113	58	23	150	66	142	11	155
Iowa	930	48	23	134	61	142	16	160
Kansas	916	7	21	125	69	125	10	125
Wisconsin	802	53	27	167	69	165	4	150
Michigan	723	60	57	156	40	150	3	155
Illinois	715	57	33	140	50	139	17	140
Missouri	591	11	15	114	63	137	22	149
Ohio	557	35	70	136	27	150	3	160
Indiana	536	19	5	147	94	140	1	150

*From Gainesville, Ga., to Fargo, Watertown, Grand Island, Minneapolis, Des Moines, Topeka, Milwaukee, Detroit, Chicago, St. Louis, Columbus, and Indianapolis. Distances are shortline mileage from *Standard Highway Mileage Guide*, Rand, McNally & Co.

†Percentage of each state's receipts from Georgia.

‡Percentage of each state's receipts carried by each type of motor carrier.

§Average charges in cents per 100 pounds.

Table 13. Average Charges for Broiler Movements from Alabama—1957-58

Destination	Distance* miles	Volume† %	Private carrier		Exempt carrier		Regulated carrier	
			Vol.%‡	Charge§	Vol.%‡	Charge§	Vol.%‡	Charge§
North Dakota	1,199	5	—	—	80	150	20	175
South Dakota	1,129	8	5	150	70	150	35	175
Nebraska	965	1	40	150	60	150	—	—
Minnesota	963	16	11	150	67	141	21	175
Iowa	749	10	13	151	60	131	27	150
Kansas	719	2	40	150	60	150	—	—
Michigan	669	13	65	160	35	170	—	—
Wisconsin	662	6	47	160	53	140	—	—
Ohio	656	7	65	128	35	150	—	—
Missouri	651	5	25	109	56	133	19	136
Illinois	575	6	21	137	79	128	—	—
Indiana	421	2	25	153	75	150	—	—

*From Decatur, Alabama, to Fargo, Watertown, Grand Island, Minneapolis, Des Moines, Topeka, Detroit, Milwaukee, Columbus, St. Louis, Chicago, and Indianapolis. Distances are shortline mileage from *Standard Highway Mileage Guide*, Rand, McNally & Co.

†Percentage of each state's receipts from Alabama.

‡Percentage of each state's receipts carried by each type of motor carrier.

§Average charges in cents per 100 pounds.

Table 14. Average Charges for Broiler Movements from Arkansas—1957-58

Destination	Distance* miles	Volume† %	Private carrier		Exempt carrier		Regulated carrier	
			Vol.%‡	Charge§	Vol.%‡	Charge§	Vol.%‡	Charge§
North Dakota	931	6	83	175	17	175	—	—
Michigan	920	1	57	164	43	135	—	—
Ohio	818	4	100	150	—	—	—	—
South Dakota	798	16	92	175	8	150	—	—
Wisconsin	771	2	88	166	12	150	—	—
Minnesota	755	2	48	170	52	175	—	—
Illinois	698	13	35	138	65	127	—	—
Indiana	643	3	92	140	8	122	—	—
Nebraska	596	66	62	108	38	100	—	—
Iowa	503	25	41	141	59	115	—	—
Missouri	403	49	61	108	48	85	—	—
Kansas	336	74	52	108	48	85	—	—

*From Fort Smith, Arkansas, to Fargo, Detroit, Columbus, Watertown, Milwaukee, Minneapolis, Chicago, Indianapolis, Grand Island, Des Moines, St. Louis, Topeka. Distances are shortline mileage from *Standard Highway Mileage Guide*, Rand, McNally & Co.

†Percentage of each state's receipts from Arkansas.

‡Percentage of each state's receipts carried by each type of motor carrier.

§Average charges in cents per 100 pounds.

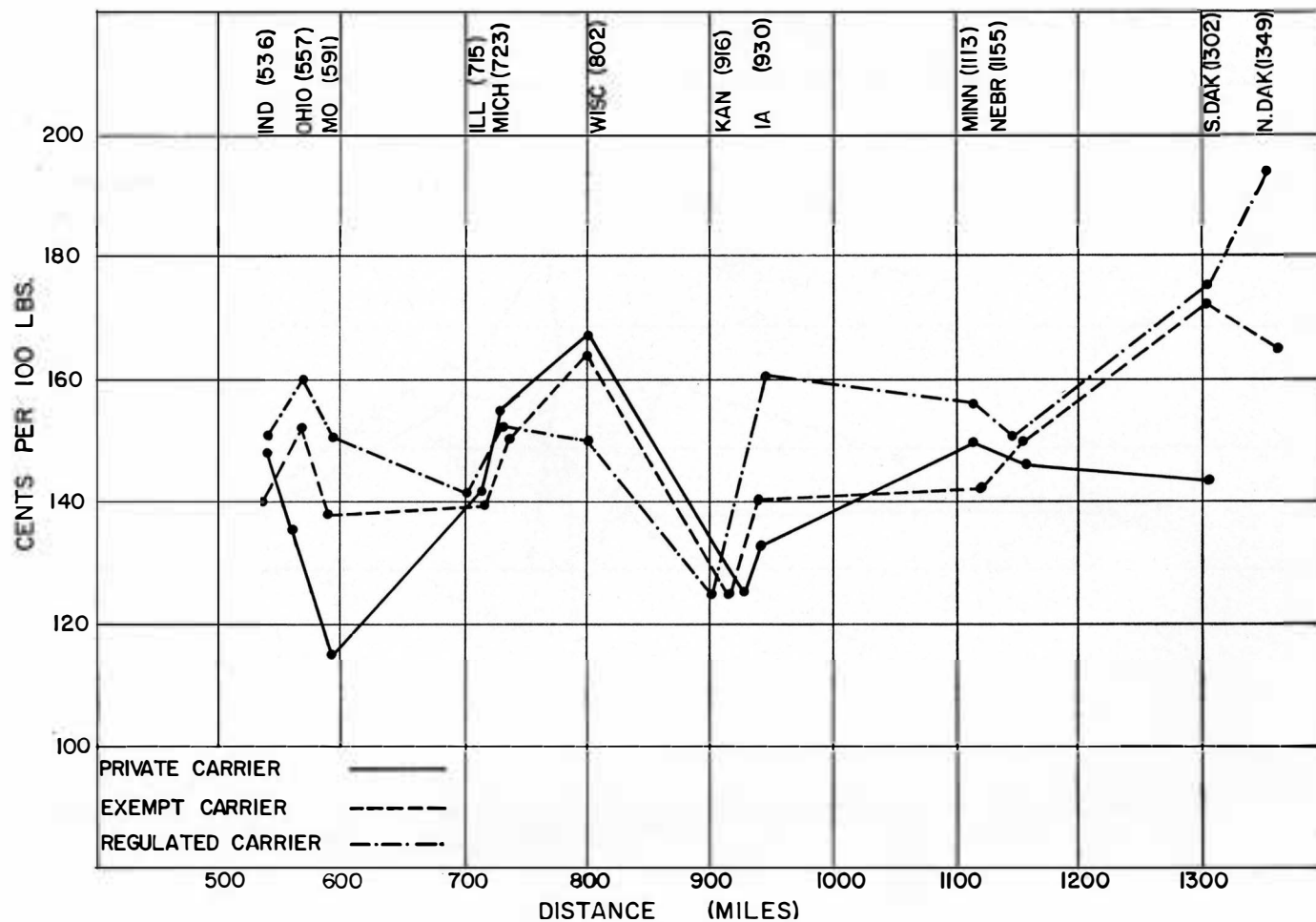


Figure 2. Charges for broiler movements from Georgia, 1957-58.

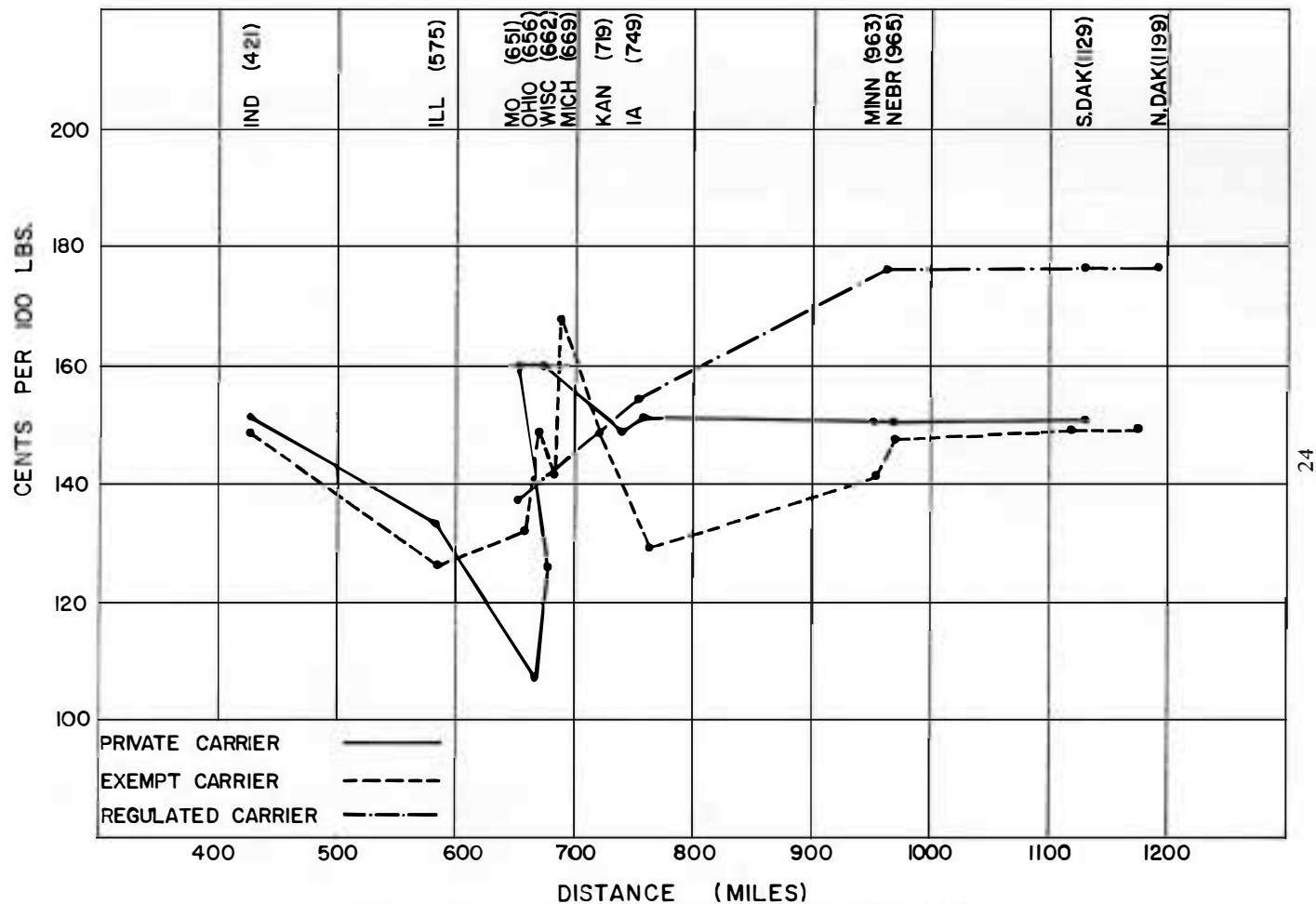


Figure 3. Charges for broiler movements from Alabama, 1957-58.

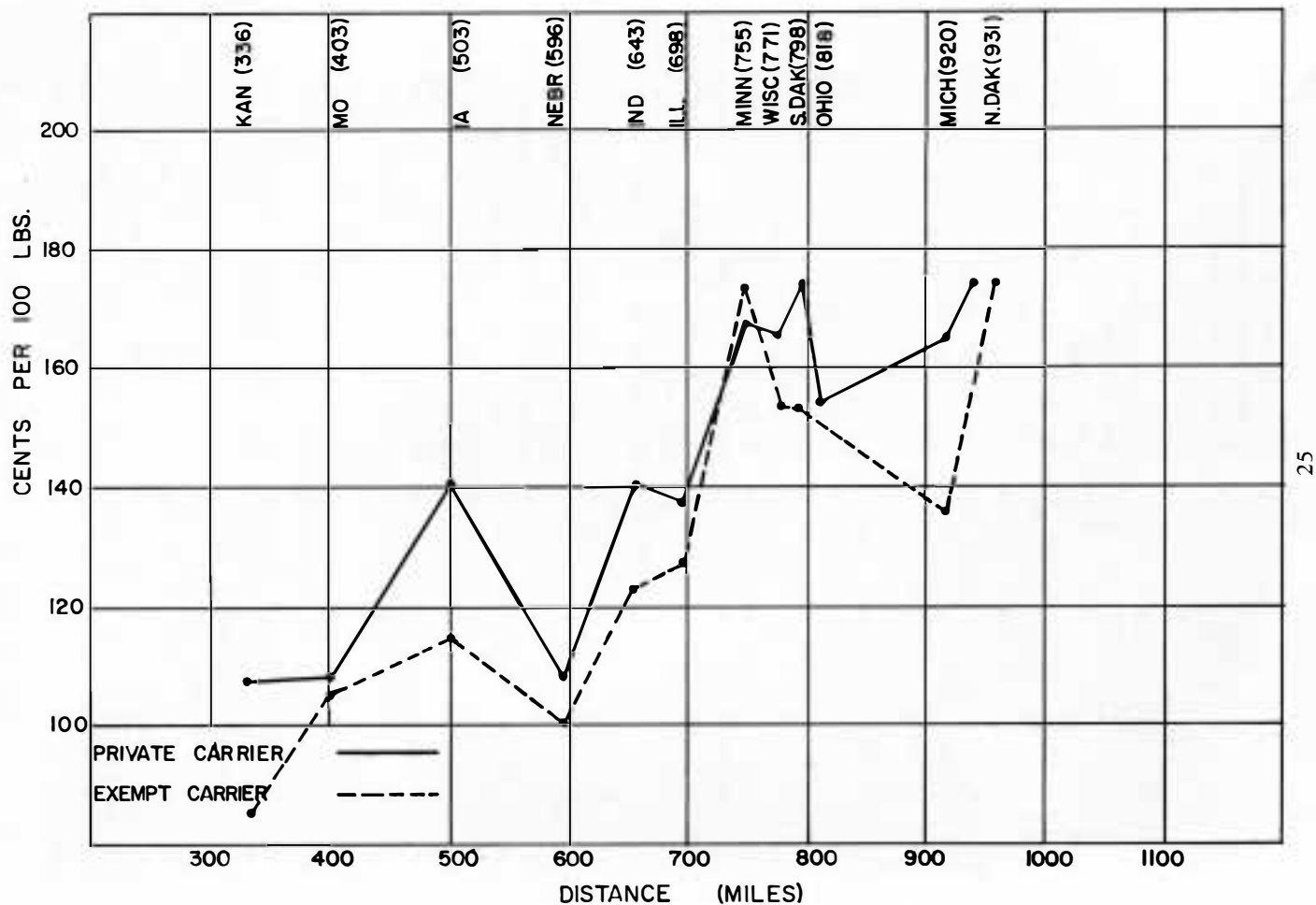


Figure 4. Charges for broiler movements from Arkansas, 1957-58.

traffic at a lower average charge than that of the regulated carriers. On movements from Arkansas (figure 4), exempt carrier charges were somewhat lower than those of the private carrier. The heavy volume hauled by private carriers would seem to indicate that better management control—more direct control of route and traffic was perhaps more responsible than the rates charged.

Distance as a function of transportation charges apparently has little or no influence on the traffic from the southeastern states. Only on the movements from Arkansas was there a tendency to find higher charges made as the distance between origin and destination increased.¹¹

It is difficult to generalize on rate stability from the data. Apparently intense competition between private and exempt carriers and, in some cases, regulated carriers, resulted in a degree of stability, even though the rates were free to fluctuate subject to the demand for and supply of motor carriers. Stability in services offered by each of the motor carrier classifications undoubtedly had a significant influence upon the rate structure and it appeared that the private carrier, because of advantages previously cited, established the rate pattern which had to be met by the other carriers.

There is, however, the possibility that regulated carriers may compete more successfully for the traffic than the exempt carrier. To the common or contract carrier, especially where routes are controlled by

Commission requirement, a return load of broilers may be carried at rates which pay no more than that sufficient to cover fuel costs. On the other hand, exempt carriers may have to charge rates, even though negotiated, which require coverage of more direct costs than only that of fuel, since this movement may be the primary part of their business.

TIME IN TRANSIT FOR BROILER MOVEMENTS

Shippers and receivers of freight must consider a number of factors when purchasing transportation service. One of the most important is the time necessary to move the commodity to the destination. As between different modes of transportation, or within a particular mode such as motor carriers, it cannot be categorically stated that one mode or one type offers faster service than another, even though the statement is qualified in view of existing circumstances. For example, will the shipment be hauled by one carrier from origin to destination or transferred enroute? Will the movement be routed through congested terminals? Are there terrain problems? Does the routing include stop-off service?

In this analysis, the three types of motor carriers reflect intra-

¹¹Some correlation analyses of the data concerning charges and distance of exempt movements from Georgia were made by Fred L. Faber of the U.S. Dept. of Agriculture. It was found that little relationship existed. A similar result was found when relationships between exempt charges and time in transit were studied.

agency competition, and it is presumed that each hauled the traffic without transferring the load to another carrier, and that each operated over the short-haul distances used as a measurement of time in transit from the selected origin points. While not conclusive, the relative averages found for transit time may be significant in measuring the service offered by each type of motor vehicle. These averages for movements from Georgia, Alabama, and Arkansas to each North Central State are found in tables 15, 16, and 17, and figures 5, 6, and 7.

From Georgia, private carrier movements averaged fewer hours in transit than did the other operations. No clear pattern showed on the movements from Alabama, whereas the movements from Arkansas indicated a close relation-

ship between the average times of private and exempt carriers. The record made by the private carriers operating from Georgia and the exempt and private carriers from Arkansas may indicate a reason why these carriers are used almost exclusively on the movements from these states. Carriers owned or leased by the processors or distributors are probably engaged in more direct hauls without the stop-offs in transit for loading and unloading which might be more typical of the exempt and regulated carrier operations.

ANTICIPATED CHANGES IN THE MARKETING AND TRANSPORTATION PATTERN

Broiler distributors in the North Central States were asked to indicate any changes anticipated

Table 15. Average Time in Transit for Broiler Movements from Georgia—1957-58

Destination	Distance,* miles	Private carrier, hours†	Exempt carrier, hours†	Regulated carrier, hours†
North Dakota	1,349	—	44	44
South Dakota	1,302	48	48	48
Nebraska	1,155	42	43	48
Minnesota	1,113	35	38	43
Iowa	930	33	35	44
Kansas	916	40	40	36
Wisconsin	802	30	35	34
Michigan	723	34	37	33
Illinois	715	27	35	33
Missouri	591	21	28	28
Ohio	557	22	24	34
Indiana	536	28	24	36

*From Gainesville, Ga., to Fargo, Watertown, Grand Island, Minneapolis, Des Moines, Topeka, Milwaukee, Detroit, Chicago, St. Louis, Columbus, and Indianapolis. Distances are shortline mileage. *Standard Highway Mileage Guide*, Rand, McNally & Co.

†Average hours in over the road transit.

Table 16. Average Time in Transit for Broiler Movements from Alabama—1957-58

Destination	Distance,* miles	Private carrier, hours†	Exempt carrier, hours†	Regulated carrier, hours†
North Dakota	1,199	—	44	44
South Dakota	1,129	48	48	—
Nebraska	965	48	48	—
Minnesota	963	40	35	36
Iowa	749	35	34	36
Kansas	719	48	48	—
Michigan	669	38	40	—
Wisconsin	662	30	32	—
Ohio	656	25	24	—
Missouri	651	24	35	36
Illinois	575	31	33	—
Indiana	421	36	30	—

*From Decatur, Alabama, to Fargo, Watertown, Grand Island, Minneapolis, Des Moines, Topeka, Detroit, Milwaukee, Columbus, St. Louis, Chicago, and Indianapolis. Distances are shortline mileage. *Standard Highway Mileage Guide*, Rand, McNally & Co.

†Average hours in over the road transit.

Table 17. Average Time in Transit for Broiler Movements from Arkansas—1957-58

Destination	Distance,* miles	Private carrier, hours†	Exempt carrier, hours†	Regulated carrier, hours†
North Dakota	931	33	35	—
Michigan	920	40	38	—
Ohio	818	32	31	—
South Dakota	798	36	36	—
Wisconsin	771	33	32	—
Minnesota	755	36	35	—
Illinois	698	18	20	—
Indiana	643	30	33	—
Nebraska	596	16	14	—
Iowa	503	14	16	—
Missouri	403	10	11	—
Kansas	336	14	11	—

*From Fort Smith, Arkansas, to Fargo, Detroit, Columbus, Watertown, Milwaukee, Minneapolis, Chicago, Indianapolis, Grand Island, Des Moines, St. Louis, Topeka. Distances are shortline mileage. *Standard Highway Mileage Guide*, Rand, McNally & Co.

†Average hours in over the road transit.

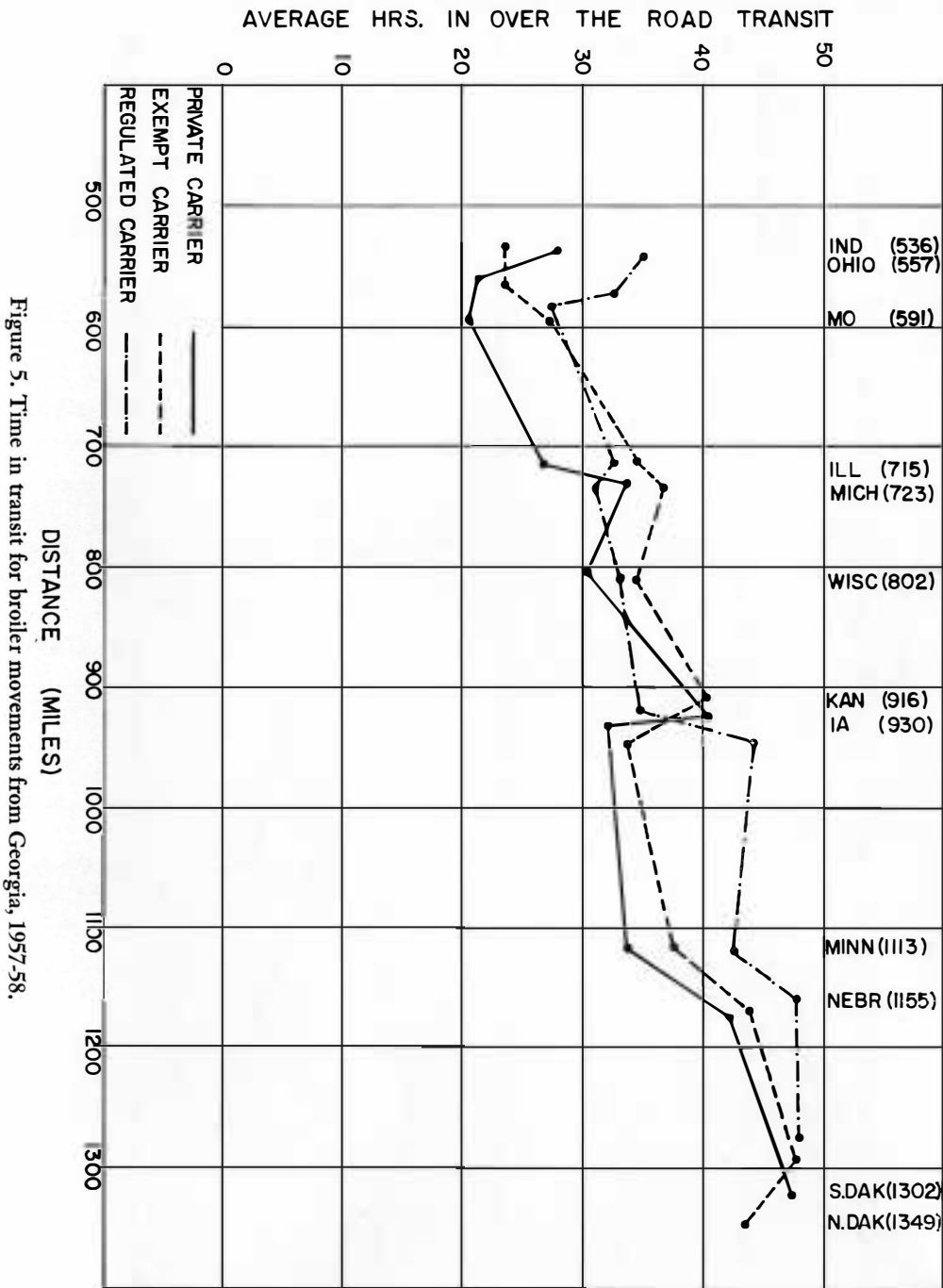


Figure 5. Time in transit for broiler movements from Georgia, 1957-58.

AVERAGE HRS. IN OVER THE ROAD TRANSIT

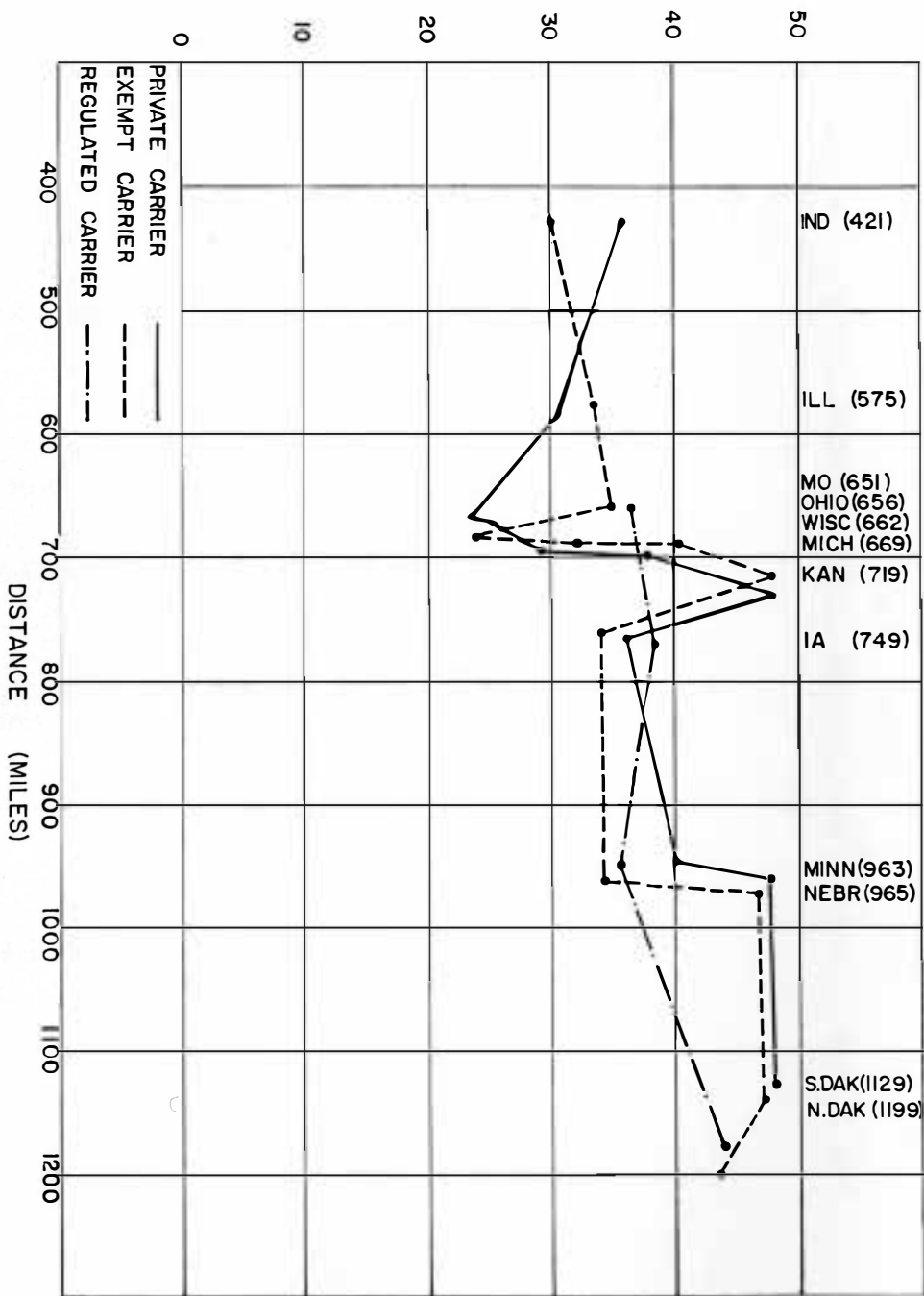


Figure 6. Time in transit for broiler movements from Alabama, 1957-58.

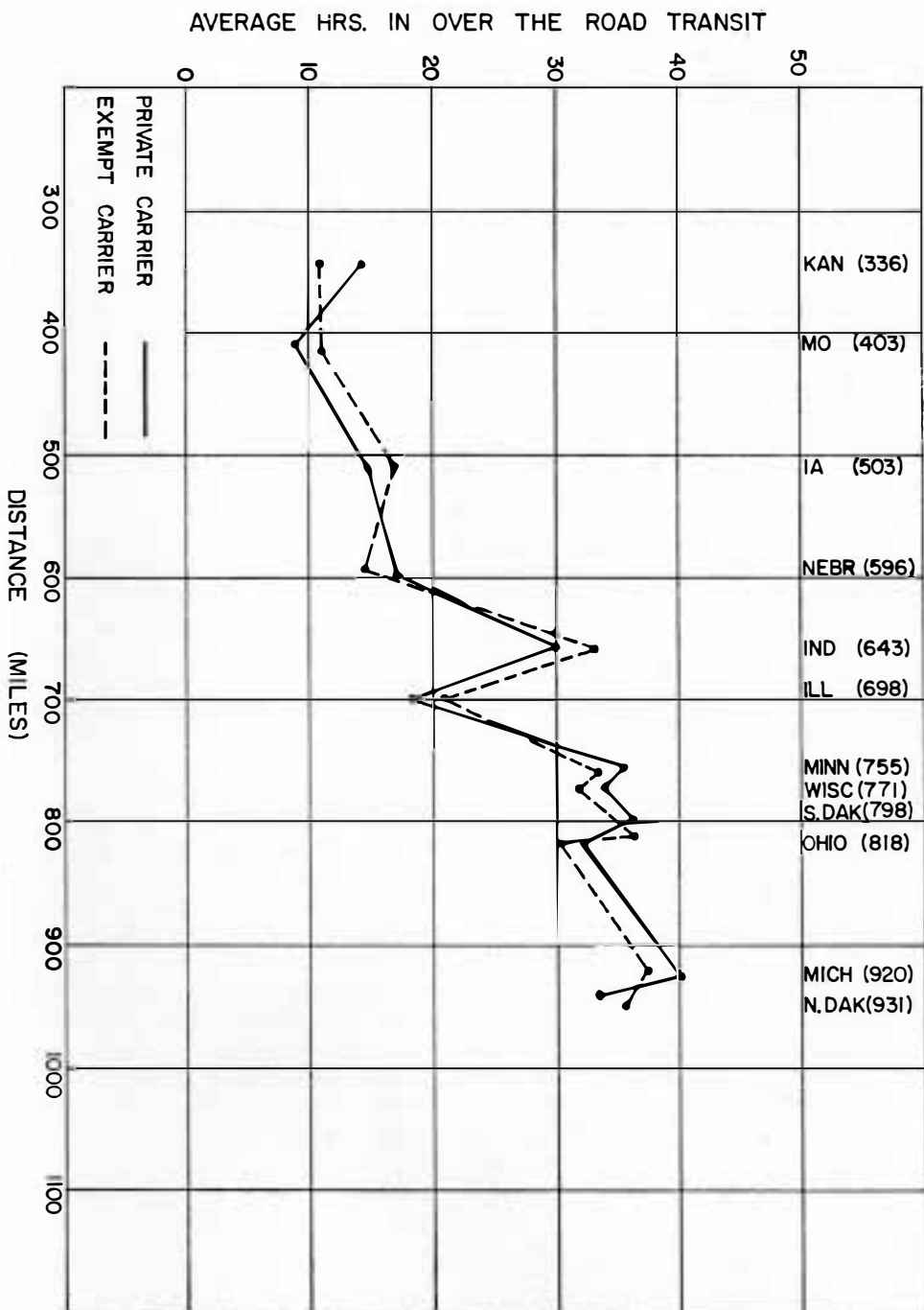


Figure 7. Time in transit for broiler movements from Arkansas, 1957-58.

which would affect the transportation pattern in the future. Their responses shown by each state, are tabulated in table 18.

Distributors in Missouri, Ohio, Illinois, Iowa, Michigan, Indiana, and Nebraska indicated the greatest intention to change the present pattern. A number of possibilities were suggested, most important of which was the anticipated change in the patterns of broiler procurement. Shifting broil-

Southeast or South Central Regions would be particularly favored as a supplier of broilers in the future. By contrast, there was little evidence of any plan to shift broiler purchases from one state to another within the North Central Region, but a few distributors indicated that they would shift from sources within the North Central States to those in other regions.

Other changes mentioned related to an increasing use of shipper-owned or leased trucks (private carriers) and to those operating on direct routes, more emphasis on direct buying rather than through distributors, more emphasis on packaging of frozen broilers, purchases of ice-packed broilers instead of live broilers for local processing, attempts to sell greater volumes of precooked broilers, and a trend away from government business.

MARKETING FUNCTIONS OF DISTRIBUTORS

The firms participating in this study were classified as to their various marketing functions. Forty-eight percent listed themselves as direct distributors, and the remainder showed a combination of the assembly function of marketing with that of processor, broker, or retailer. Distributor, as used in this study, is an all-inclusive term and could include jobbers and wholesalers who also perform the assembly-distribution function. Chain stores were also engaged in direct purchase of broilers from processors and further combined the procurement-assembly-retail functions. In

Table 18. Anticipated Changes in Pattern for Future

State	No change, %	Will change, %	Number of responses
North Dakota ..	80	20	5
South Dakota ..	80	20	5
Minnesota	79	21	13
Kansas	79	21	14
Wisconsin	72	28	18
Missouri	62	38	35
Ohio	57	43	21
Illinois	56	44	43
Iowa	55	45	31
Michigan	53	47	29
Indiana	48	52	19
Nebraska	46	54	13
Region	60	40	246

er purchases from one state to another in areas outside the North Central Region was the most common response, and when questioned as to reasons for this change, the answer was "price and quality." No clear cut pattern emerged when these comments were analyzed, which would indicate that one or another of the states in the

addition, some distributors indicated a further marketing of the broilers to other jobbers and wholesalers who may have merchandised them through retail outlets to consumers or functioned as a retail outlet.

Where a definitive pattern of merchandising could be found, three general market classifications emerged as outlets for broilers—chain stores, retail independent stores, and the hotel-restaurant markets. Jobbers and wholesalers as separate agencies did not appear to be significant, probably reflecting the fact that the firms cooperating were those which handled large volumes of broilers. Distribution of broilers through the three market classifications will be found in table 19. The column headed "Other" includes agencies operating as wholesale or retail markets not classified in the three general markets. The figures are percentages show-

ing volume distributed in each state. It should be noted that the retail market for the entire region accounted for 85% of the total.

PRIMARY AND SECONDARY HAULS

Rates charged for the movement of broilers may depend upon whether or not the haul is considered as a primary one or is a secondary or back haul. A primary haul may be defined as the major movement into the region of the traffic for which the truck was hired. For example, a truck domiciled in Georgia would take broilers into Minnesota as the major or primary haul. For the return load (secondary or back haul), it is desirable for the trucker to find commodities which could be hauled back to the home territory in order to spread the operating expenses over both hauls.

The importance of a reasonably

Table 19. Broiler Market Classification (Percentage)

Destination state	Retail chain	Retail independent	Hotel-restaurant	Other	%
Indiana	65	26	3	6	100
Iowa	51	33	13	3	100
Ohio	50	30	16	4	100
Michigan	49	40	9	2	100
Kansas	47	40	11	2	100
Minnesota	47	37	10	6	100
Illinois	43	42	12	3	100
Missouri	42	33	20	5	100
Wisconsin	41	42	12	5	100
Nebraska	40	31	21	8	100
North Dakota	39	56	5	—	100
South Dakota	20	72	8	—	100
Av.—Region	45	40	11	4	100

good balance of traffic in both directions is reflected in the cost structure of the carriers. A joint cost problem arises when the movement in one direction is normally dependent upon the movement in the opposite direction. When the routing of the truck is directly forward and backward between region and destination, joint costs are clearly incurred.

When a truck has an empty movement in one direction, for example, on the return haul from Minnesota to Georgia, it can carry traffic in that direction at direct or out-of-pocket costs. Therefore, it can seek the development of more balanced traffic by setting rates lower on the return haul than on the forward and primary movement. This problem is probably more important in the regulated motor carrier industry than that of the railroads since the return routing may be more direct. Joint costs directly influence rates insofar as direction of movement is concerned for the ease with which any commodity may stand a particular rate will depend upon the market conditions of the products whose costs are joint, and the rate burden may shift from one commodity to another as conditions change unless prevented by regulations.¹²

Traffic movements into each North Central State are separated into the primary and secondary hauls (table 20). From the data, it appears that the heaviest movement into the region was considered as the primary haul originating in the states outside the North Central

Region. Commodities carried on the return haul are listed in table 21.

In those instances where the haul originated in the North Central states — where trucks were used to transport broilers on the return movement—the commodity indicated as first on the list ranked by the distributors was meat and meat products. Except for this classification, the others shown in the table fall into the exempt category. Some of these movements are hauled by private carriers which probably are not only eliminating regulated carriers from the primary hauls but are having an important impact upon their potential traffic on secondary hauls.

MOVEMENT AND COST OF MOVEMENT WITHIN THE NORTH CENTRAL STATES

Approximately 15% of the broilers received by distributors in the North Central States originated within the region. Producers and processors in Missouri and Indiana were the heaviest shippers, accounting for about 9% of the total (table 7). Whereas, the Missouri broilers moved into a majority of North Central States, Indiana broilers moved mostly within the state.

Some cross-hauling was found between the states within the region, examples of which are shown in table 22. Possibly little or no

¹²This problem has been discussed in the previous bulletins in this series. See also Fair & Williams, *Economics of Transportation*, Harper & Brothers, 1959; and Taff, Charles, *Traffic Management, Principles and Practices*, Richard D. Irwin, 1959.

significance may be attached to these movements, especially on the Missouri-Illinois or Indiana-Illinois hauls, but on the basis of the data, it would appear that

Michigan and Indiana traded a considerable volume. It is not known from the information on each routing whether the broilers were actually produced in the origin

Table 20. Broilers as Primary and Secondary Hauls—1957-58

Destination state	Number of responses	Primary haul	Secondary haul	No knowledge
Illinois	45	30	6	9
Missouri	32	15	6	11
Michigan	30	13	1	16
Iowa	31	19	7	4
Ohio	23	10	1	12
Indiana	21	11	1	9
Wisconsin	21	12	4	5
Minnesota	14	8	2	6
Kansas	14	10	2	2
Nebraska	13	8	2	3
North Dakota	5	4	1	—
South Dakota	5	4	1	—
All states	254	144	34	77

Table 21. Commodity Classifications Hauled from the North Central States on Secondary Broiler Movements (Ranked by Receivers)

Destination state	Commodity classifications					
	Meat	Grain*	Eggs	Poultry†	Empty	Gen. frt.
Wisconsin	1	2	3	—	—	4
Minnesota	1	4	2	5	—	3
Kansas	—	1	—	—	2	—
South Dakota	1	1	—	—	2	—
North Dakota	—	2	1	—	—	—
Illinois	3	1	2	—	1	3
Missouri	—	2	—	—	1	3
Nebraska	1	3	2	—	—	—
Indiana	1	1	—	—	—	—
Ohio	2	1	3	—	—	—
Michigan	—	1	2	—	—	3
Iowa	2	3	1	4	—	5

*Grain, including mixed feed.

†Poultry, including turkeys.

states or were distributed as shipments from other producing states. However, even on a volume as low as 54,800 pounds moving from Illinois at 1 cent per pound, \$548 was paid for transportation of broilers from Illinois to Missouri, considered a surplus-producing state in this report.

Table 22. Examples of Cross-hauling of Broilers Within the North Central States—1957-58

Routing	Volume (lbs.)	Cost per lb. (cents)
Missouri to Illinois.....	4,234,900	1
Illinois to Missouri.....	54,800	1
Indiana to Michigan..	300,710	1
Michigan to Indiana..	412,000	1
Illinois to Indiana.....	215,000	1
Indiana to Illinois.....	4,400,420	1

RELATIONSHIP OF COSTS OF MOVING FEED GRAIN TO COSTS OF MOVING BROILERS

The tremendous volume of broilers moving from the southern and southeastern states into the North Central States raises questions as to why the Midwestern States do not produce broilers in sufficient quantities to supply their markets. The major broiler-producing states must import poultry feed ingredients from the surplus grain states which in turn receive these ingredients back in the form of broilers. Feed and feed ingredients are being cross-hauled between regions even though converted to broiler meat and strictly from a transportation viewpoint,

economic waste results from these movements.

If it is accurate to say that in the production of poultry, feed represents approximately 60% of the total cost, then a location close to sources of feed supply would tend to favor poultry enterprises. In this respect, the North Central States should have a comparative advantage over broiler-producing states located some distance from the major sources of feed and feed ingredients. The answers to the location problem must, therefore, lie in factors other than those relating to transportation—factors which singly or in combination are significant enough to economically justify the location of broiler production in areas hundreds of miles from the sources of feed and feed ingredients and from an important part of the broiler market.

This report does not intend to discuss factors, other than transportation, which influence location of broiler production, and apparently transportation is not as significant an influence as others, such as labor supply and costs, financing, alternate use of resources, or the importance of poultry production as a part of a complex farm business in the North Central Region. It is sufficient to point out, on the basis of previous studies in this series and through analysis of the data of this report, that serious problems of cross-hauling between regions do exist.¹³

¹³Observations concerning the problem of the relative merits of locating broiler production in the North Central States (footnote continued on page 37)

In order to illustrate the points discussed above, some rough approximations have been made concerning the transportation costs on the corn and soybeans moved into Gainesville, Ga., from four selected origins in the North Central States and cost of moving broilers from Gainesville back to these points. Rates on the grains are actual point-to-point charges by truck, railroad, and combination hauls, such as truck-barge-rail, and barge-rail. Charges on the broiler movements taken from the data in this report are averages using the selected origin points for the grain movements as keypoint destinations for broilers. The figures shown in table 23 are in cents per pound.

To continue this analysis, it is assumed that the feed ration for

broilers consists of 1,200 pounds of corn and 500 pounds of soybean oil meal per ton, and further, 2.5 pounds of feed are required for the gain of 1 pound in the weight of broilers. If corn consists of three-fifths of the total feed rations, 1 pound gain of broiler weight would require 1.5 pounds of corn. One-fourth of the total feed ration consists of soybean oil meal which on the basis of a 1 pound gain in broiler weight would mean the use of .625 pounds of soybean oil meal. Together, 2.125 pounds of corn and soybean oil meal would be fed in order to gain 1 pound of broiler weight. On dressed broilers, the ratio would be 2.83 to 1.¹⁴

The analysis now centers upon the cost of shipping the ingredients necessary to feed a 3.5 pound live weight broiler from the selected origins to Gainesville and the cost of moving the broilers back to these origins. Using the estimates for live weight ratios (2.125 to 1), a total of 7.44 pounds of the ingredients would be required to reach 3.5 pounds of broiler meat. Of this

or other regions are found in Karpoff, Edward, "Why Broilers Flourish Down South," *Poultry Digest*, April, 1959; and Kutish, Francis, "Midwestern Poultry Industry," *American Hatchery News*, January, 1959.

¹⁴These estimates were suggested by the Poultry Husbandry Department, Iowa State University, Ames, Iowa.

Table 23. Comparative Transportation Charges on Feed Ingredients and Broilers Moving Between North Central Origins and Gainesville, Georgia (Cents per Pound)

Origin— destination	Grains*						Broilers*	
	Corn			Soybeans			Truck	Type
	Truck	Rail	Comb.	Truck	Rail	Comb.		
Indianapolis, Ind.50	.85	.80	.46	.85	.78	1.4	Exempt
Columbus, Ohio51	.86	.86	.48	.86	.85	1.4	Private
Des Moines, Iowa	—	1.06	.86	—	1.07	.85	1.3	Private
Minneapolis, Minn.	—	1.04	.70	—	1.05	.70	1.4	Exempt

*Grain rates as of October 1, 1958, were taken from *Grain Transportation Statistics for the North Central Region*, Bulletin No. 268, AMS, USDA, August 1960. Broiler charges were taken from Table 13 of this report and represent the lowest charges shown by the type of carrier indicated. Grain rates per pound were converted from rates per bushel by using 56 pounds per bushel for corn and 60 pounds per bushel for soybeans.

total, 5.25 pounds would represent corn and 2.19 pounds soybean oil meal. Applying these weights to the per pound transportation charges shown in table 24, the total charges for both feed ingredient and broiler movements of a 3.5 pound bird may be shown. In each total, the lowest transportation charges have been used.

The total charges for moving feed ingredients from Indianapolis to Gainesville sufficient to produce a 3.5 pound live bird and shipping a 2.83 pound ready-to-cook broiler back to Indianapolis (including ice and cartons), using trucks in both directions are 7.6 cents. From Des Moines and Minneapolis, the combination of truck-barge-rail or barge-rail resulted in the lowest charges on the outbound movements, a fact explained in a previous study in this series.¹⁵

In other words, Indiana broiler growers have a short run opportunity cost of about 2.4 cents per pound ($7.6 \div 2.83$) insofar as transportation is concerned.

The reader should be cautioned against concluding that each of the four midwestern origins have a comparative disadvantage with other regions on these movements.

It was pointed out previously that factors other than transportation probably affect the estimated cost advantages shown above. If circumstances and conditions of a social and economic nature which are found in the production of broilers in other regions could be duplicated in the North Central Region, then the transportation factor might be of some significance. Also, combinations of transportation facilities on the movements of grains might be different than those used in the analysis, and the results have no meaning unless it is assumed that the movement of the feed ingredients occurs from the exact point which is used as the destination of the broilers. Finally, it should be recalled that the broiler charges used were averages, not point-to-point rates.

However, the evidence points to a transportation situation which should not be ignored, and as long as the North Central Region is deficit in broilers, the short run impact will probably continue. It

¹⁵Thompson, W. H., *Transportation of Poultry Feed Ingredients from the North Central States*, op. cit.

Table 24. Estimated Combined Charges (Cents per Pound) for the Transportation of Feed Ingredients and Broilers (3.5 Pound Live Weight)

Origin— destination	Grains						Broilers	Total
	Corn			Soybeans				
	Truck	Rail	Comb.	Truck	Rail	Comb.		
Indianapolis, Ind.	2.6	4.5	4.2	1.0	1.9	1.7	4.0	7.6
Columbus, Ohio	2.7	4.5	4.5	1.1	1.9	1.9	4.0	7.8
Des Moines, Iowa	—	5.6	4.5	—	2.3	1.9	3.7	10.1
Minneapolis, Minn.	—	5.5	3.7	—	2.3	1.5	4.0	9.2

does cost 3.5 cents per pound to ship corn and soybeans from Des Moines to Gainsville and move the broilers back, an amount which must be recovered in the retail price of the broilers. Whether this fact is of importance to the North Central poultry industry cannot be determined, but it is hoped that

by attempting to trace and isolate the transportation element in the production and distribution of broilers, more knowledge has been gained of its relative importance and that this study may lead to further research in the complex picture of regional comparisons of poultry marketing problems.