GRAIN MOVEMENTS in Alabama:

Firms Volumes and Transportation Used

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GRAIN MOVEMENTS in Alabama: Firms, Volumes, and Transportation Used*

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INTRODUCTION

ALABAMA CONTINUES to be a grain-deficit area even though yield per acre continues to increase. In 1962, it was estimated that only 62 per cent of the grain needed in the State was home produced.[1]

Acreage devoted to feed grains – corn, wheat, oats, and grain sorghum – in Alabama during the 10-year period 1952-61 declined 35 per cent, Appendix Table 1. Beginning with 1954, there was a decline in feed grain acreage in every year through 1961. Most notable among the declines during this period was corn acreage. Alabama's corn acreage declined 36 per cent (800,000 acres) from 1952 through 1961 – 2.2 million to 1.4 million acres.

With the exception of 1952 and 1954, production of feed grains in Alabama has not fluctuated widely, Appendix Table 2. However, Alabama is still a grain-deficit area. This status has been

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** Resigned.

[1] Morris White and Wayne Curtis, *Estimated Number of Livestock on Farms and Estimated Feed Needs in Alabama in 1962,* Department of Agricultural Economics, Auburn University Agricultural Experiment Station, Auburn, Alabama, June 1962.

the result of a tremendous increase in poultry production in Alabama during the past few years. Numbers of broilers produced have increased from 23 million in 1952 to 198 million in 1961, Appendix Table 3. Broiler production has become one of the leading agricultural industries in the State. Also, beef cattle numbers have increased during this period by slightly more than 300,000 head, thus bringing about increased consumption of grain. There have been no material changes in numbers of hogs.

The gap between feed-grain production and requirements means that movements of grain from surplus-producing areas to Alabama have become important. In recent years, large quantities of grain have been imported to meet the grain deficit. Net inshipments of over 36 million bushels of feed grains were made in 1959, while slightly less than 30 million bushels were imported in 1960.

OBJECTIVES of the STUDY

The overall objective of this study was to ascertain information relative to quantity and costs of grain imported into Alabama. Specific objectives were: (1) to characterize and classify Alabama grain handling firms existing in 1960; (2) to determine for 1959 and 1960 the amount and quality of grain imported into Alabama; and (3) to determine the sources, methods, and transportation rates involved in procuring imported grain.

TYPE and SIZE of BUSINESS

Classification of Firms

Existing firms that handled grain, grain products, or soybeans were divided into six categories: elevator, feed manufacturer, feed mixer, custom grinder, processor, and other. An elevator was considered to be a firm whose primary business was buying and selling grain in an unprocessed form. Feed mixing consisted of adding grains to commercial premixes or concentrates. Firms were classified as feed manufacturers if they used a premix or concentrate that required at least oil meals in addition to the grain. Custom grinders were feed mills that ground, mixed, and added ingredients to the feed ingredients brought in by feeders. Processors were those firms that processed oil crops. Firms under the grouping "other" included all firms not in the above categories whose primary business was grain handling.

The largest number of grain-handling firms were feed manufacturers. Thirty-three of the 140 grain-handling firms in the State were in this category. There was an equal number of elevators, feed mixers, and custom grinders. There was only one processor in the State.[2] The number of firms in each category is shown below:

Business type	*Number of firms*
Elevator	30
Feed manufacturer	33
Feed mixer	30
Custom grinder	30
Processor	1
Other	16
Total	140

Volume of Business

Total storage capacity

Total storage capacity for grains in the State in 1960, including bulk and sack storage, was almost 9.5 million bushels, Table 1; approximately 7.5 million bushels was bulk storage.

The 30 elevators in the State, while comprising only 21 per cent of the total number of firms, accounted for about 55 per cent of total storage capacity. They had the largest portion of both bulk and sack storage capacity. Feed manufacturers ranked second in importance in total storage capacity, accounting for approximately a third of the total.

TABLE 1. TOTAL STORAGE CAPACITY FOR GRAINS BY SPECIFIED PRIMARY FIRM TYPES, ALABAMA, 1960

Firm type	Bulk	Sacks	Total
	Bushels	*Bushels*	*Bushels*
Elevator	4,085,000	1,060,000	5,145,000
Feed manufacturer	2,348,000	632,000	2,980,000
Feed mixer	340,000	57,000	397,000
Custom grinder	372,000	78,000	450,000
Other	364,000	93,000	457,000
TOTAL	7,509,000	1,920,000	9,429,000

Storage capacity ranges

A majority of the firms had storage capacities of less than 100,000 bushels, Appendix Table 4. All feed mixers and custom grind-

[2] Soybean processor.

ers reported capacities within that limit. Only elevators and feed manufacturers had capacities in excess of 100,000 bushels. Eight elevators and five feed manufacturers had facilities that were in the range of 100,000 to 250,000 bushels. Five elevators had storage capacities of 250,000 to 500,000 bushels, and one elevator had storage for more than 1 million bushels.

Almost all firm operators reported sack-storage capacities of less than 100,000 bushels. There were two exceptions; three elevators and three feed manufacturers had sack storage in the range of 100,000 to 250,000 bushels.

Average storage capacity was greatest for elevators, Table 2. The average total capacity of elevators was 176,000 bushels, while the bulk and sack capacities were 140,000 and 36,000 bushels, respectively. Feed manufacturers were the only other firm type that had an average storage capacity approaching that of the elevators — 89,000 bushels.

TABLE 2. AVERAGE GRAIN STORAGE CAPACITY PER FIRM BY PRIMARY FIRM TYPES, ALABAMA, 1960

Firm type	Average storage capacity		
	Bulk	Sack	Total
	Bushels	*Bushels*	*Bushels*
Elevator	140,000	36,000	176,000
Feed manufacturer	70,000	19,000	89,000
Feed mixer	11,000	1,000	12,000
Custom grinder	12,000	2,000	14,000
Other	7,000	6,000	13,000

Quarterly Grain Movements by Firm Types[3]

Purchases

Corn. Quarterly percentages of total corn purchases by firm type for 1959 and 1960 are given in Table 3. There was a fairly even distribution of purchases by elevator operators during 1959, but this was not the case in 1960. Fairly uniform purchases were made by feed manufacturers and feed mixers in both years. Predominant purchases by custom grinders in both years, on the other hand, were made during the last quarter of the year. Acquisitions made by custom grinders were for the most part local purchases. This explains why purchases were made in the fall.

[3] Months included in each quarter were as follows: first, January-March; second, April-June; third, July-September; and fourth, October-December.

TABLE 3. CORN: PERCENTAGE OF TOTAL PURCHASES MADE BY EACH QUARTER BY PRIMARY FIRM TYPE, ALABAMA, 1959 AND 1960

Firm type	Year	Purchases by quarter			
		1	2	3	4
		Per cent	*Per cent*	*Per cent*	*Per cent*
Elevator	1959	22	27	27	25
	1960	29	10	17	45
Feed manufacturer	1959	28	22	22	28
	1960	25	22	26	27
Feed mixer	1959	25	21	23	31
	1960	21	24	25	29
Custom grinder	1959	15	12	26	47
	1960	18	17	23	42
Other	1959	37	10	8	46
	1960	35	12	8	45

Soybeans. All soybean purchases were made by elevator operators. In 1959, 62 per cent and in 1960, 79 per cent of total purchases were made during the last quarter of the year, reflecting the period of soybean production and harvest.

Acquisitions during the remaining three quarters of both years were made primarily in the first quarter.

Wheat. All wheat purchases reported were made by elevator operators and feed manufacturers. Purchases at elevators during both years were made primarily during the first three quarters. However, percentage of purchases during the first quarter of 1960 was less than that of the first quarter of 1959. Quarterly purchases by elevator operators for 1959 and 1960 are given in Table 4.

TABLE 4. WHEAT: PERCENTAGE OF TOTAL PURCHASES MADE IN EACH QUARTER BY ELEVATOR OPERATORS, ALABAMA, 1959 AND 1960

Year	Purchases by quarter			
	1	2	3	4
	Per cent	*Per cent*	*Per cent*	*Per cent*
1959	33	33	32	2
1960	19	36	39	6

Practically the same pattern of purchases by feed manufacturers occured in each quarter of 1959 and 1960. There was not enough variation within the 2 years to be of significance.

Oats. With the exception of purchases by elevator operators, there existed a fairly uniform quarterly purchase pattern for oats

TABLE 5. OATS: PERCENTAGE OF TOTAL PURCHASES MADE BY EACH QUARTER BY PRIMARY FIRM TYPE, ALABAMA, 1959 AND 1960

Firm type	Year	Purchases by quarter			
		1	2	3	4
		Per cent	*Per cent*	*Per cent*	*Per cent*
Elevator	1959	56	34	8	2
	1960	12	64	22	2
Feed manufacturer	1959	26	30	27	17
	1960	22	29	26	23
Feed mixer	1959	27	26	22	25
	1960	29	22	20	29
Custom grinder	1959	25	25	26	24
	1960	25	25	25	25
Other	1959	10	9	72	9
	1960	3	2	94	1

in 1959 and 1960, Table 5. For 1959, the predominant period for purchases was the first quarter, whereas in 1960 it was the second quarter. A logical pattern, based on seasonality of production of oats, would be that most purchases take place in the latter part of the second quarter of the year or the first part of the third quarter.

Grain sorghum. Very little grain sorghum was purchased by Alabama firms, and all of that was acquired by elevator operators. Only a few firms purchased grain sorghum. In both 1959 and 1960, the same amount was bought by each firm in each quarter. Therefore, the percentage of total purchases in each quarter of 1959 and 1960 was identical.

Sales

Corn. Corn was sold by operators of three types of firms: elevators, feed mixers, and custom grinders, Table 6. The sales pattern of elevators was similar both years. Most sales by elevator operators were made in the last quarter.

The greatest percentage of feed mixers sold corn during the third quarter of the year, whereas custom grinders, usually dependent upon local farmers for their purchases, sold the greatest proportion of corn in the fourth quarter. There was a wide variation in the sales pattern of mixers between 1959 and 1960, especially during the first two quarters. Custom grinders, on the other hand, had practically no fluctuation in quarterly sales during this time period.

TABLE 6. CORN: PERCENTAGE OF TOTAL SALES MADE IN EACH QUARTER BY PRIMARY FIRM TYPE, ALABAMA, 1959 AND 1960

Firm type	Year	Purchases by quarter			
		1	2	3	4
		Per cent	*Per cent*	*Per cent*	*Per cent*
Elevator	1959	18	18	32	32
	1960	25	21	24	30
Feed mixer	1959	24	24	36	16
	1960	9	18	48	25
Custom grinder	1959	10	11	25	54
	1960	9	12	25	54
Other	1959	46	0	18	36
	1960	35	19	17	29

Soybeans. All soybean sales in Alabama in 1959 and 1960 were made by elevator operators. In both years, more than 90 per cent of sales was made during the last quarter of the year. Other sales were fairly evenly distributed among the remaining quarters. In 1959, 91 per cent and in 1960, 93 per cent of sales occurred in the fourth quarter.

Wheat. Like soybean sales all wheat sales were made by elevator operators. Most sales occurred during the middle two quarters. Approximately 80 per cent of all sales came during that period.

Oats. Oats were sold by both elevator operators and custom grinders. During both years, all sales by custom grinders were made in the second quarter. Between 40 and 50 per cent of all sales was made by operators of elevators during the same quarter of the year.

Grain sorghum. There were no sales of grain sorghum reported by any of the firms in 1959 or 1960.

Yearly Summary

Yearly purchases and sales of grains for 1959 and 1960 by the various types of firms in Alabama are summarized in Table 7. The data show the importance of elevators in grain transactions in the State, both purchases and sales. Slightly less than 80 per cent of all purchases and more than 90 per cent of all sales in terms of total volume were made by elevator operators. The predominance of elevators in sales is explained by the fact that firms other than elevators are service-type firms using grain to manufacture a feed or food product in most cases, whereas elevators

TABLE 7. PURCHASES AND SALES OF GRAIN, BY FIRM TYPE, ALABAMA, 1959 AND 1960

Year and type of transaction	Elevator	Feed manufacturer	Feed mixer	Custom grinder	Total
	Bushels	*Bushels*	*Bushels*	*Bushels*	*Bushels*
Purchases					
1959	48,500,900	9,482,300	1,259,100	1,502,900	60,745,200
1960	39,289,100	10,041,900	2,997,900	1,412,000	53,740,900
Sales					
1959	6,652,300	0	48,000	465,100	7,165,400
1960	7,506,400	0	40,200	256,800	7,803,400

are used to transfer grain. Therefore, the other firms resold little if any non processed grain.

NET MOVEMENTS of GRAIN[4]

Inshipments

Corn

Approximately 18 million bushels of corn were reported to have been shipped into Alabama in 1959. Reported inshipments decreased to slightly more than 14 million in 1960, Table 8. Considering the 2 years together, Illinois was the leading exporter of corn to Alabama, accounting for 43 per cent of the total in 1959 and 62 per cent in 1960. In 1959, however, Iowa was the individual leader, making up 44 per cent of the total shipments. Missouri also was an important shipper of corn to Alabama in both years.

TABLE 8. CORN: VOLUME REPORTED RECEIVED BY FIRMS, BY STATE OF ORIGIN, ALABAMA, 1959 AND 1960

Origin	Volume by year	
	1959	1960
	Bushels	*Bushels*
Illinois	7,807,200	8,812,800
Indiana	165,200	271,800
Iowa	7,992,400	2,815,300
Kentucky	534,000	609,000
Missouri	1,392,700	1,174,100
Tennessee	260,000	370,000
TOTAL	18,151,500	14,053,000

[4] Excludes a number of port receivers on the Tennessee River that did not report grain movement data.

In both 1959 and 1960, the greatest proportion of corn inshipments was made by barge. Barge shipments comprised 44 per cent of the total in 1959 and more than 50 per cent in 1960. The greatest change in mode of transport was in rail shipments, which decreased more than 60 per cent from 1959 to 1960.

Trucks increased in rank of importance from third in 1959 to second in 1960, and total volume shipped by truck increased more than a million bushels.

The importance of barges in transporting corn from Illinois to Alabama was evidenced by the fact that more than three-fourths of all corn shipped from Illinois in both years came by barge, Appendix Table 5. The remainder was hauled by trucks.

From Iowa, the second largest exporter, a different transportation pattern existed. More than 90 per cent arrived in Alabama via rail shipments. Except for a small amount, the remainder was transported by trucks.

The pattern for shipments from Missouri duplicated somewhat that of Illinois. Of the 1.39 million bushels shipped in 1959, about 900,000 arrived by barge and 430,000 by truck. Shipments in 1960 by method of transportation closely approximated those of 1959.

For the remaining states exporting corn to Alabama, several methods of transportation were used. For instance, all Indiana shipments in both years were made by truck, whereas most of the Kentucky deliveries were made by barge. Almost all corn coming from Tennessee was by rail shipments.

Soybeans

All soybeans received by Alabama firms from outside the State in 1959 and 1960 originated in Illinois and Iowa. Total annual shipments in both years exceeded 10.5 million bushels. Iowa was by far the leader in terms of total shipments in both years, accounting for 86 per cent in the first year and 74 per cent in 1960.

Origin	*1959 Bushels*	*1960 Bushels*
Illinois	1,487,000	2,691,000
Iowa	9,112,500	7,841,900
Total	10,599,500	10,532,900

Rail was utilized more than any other means for transporting soybeans into Alabama both years, Appendix Table 6. More than 75 per cent of the soybeans were moved by this method in 1959

and more than half in 1960. During this period there occurred an increase in both truck and water transportation.

Only rail and truck were used to ship Iowa soybeans to Alabama. A predominance of rail transportation was used. From Illinois, on the other hand, the only method of transportation was by barge.

Wheat

During the period under study, eight states contributed to wheat imports in Alabama, shipping about 8 million bushels in 1959 and approximately 6 million in 1960, Table 9. Iowa led in shipments to the State in both years, accounting for about 60 per cent of total Alabama inshipments in both years. In 1959, Illinois ranked second in importance, and Missouri was third. Their ranks were reversed in 1960. Other states that were important in supplying wheat were Minnesota and Nebraska.

Most of the wheat received by Alabama firms from points outside the State during 1959 and 1960 was received by rail, Appendix Table 7. During both years, 58 per cent was received by this means of transportation. Most of the remaining inshipments of wheat came by barge in both 1959 and 1960; a small amount was shipped by truck.

Iowa, the leading state, made greatest use of rail facilities to transport wheat, but limited quantities were shipped by truck. From Illinois, Missouri, and Minnesota – the other leading wheat-exporting states – there was in both years a great predominance of barge shipments; no method other than barge was used in shipping Illinois wheat. A mixed pattern existed in the other states shipping wheat to Alabama.

TABLE 9. WHEAT: VOLUME REPORTED RECEIVED BY FIRMS, BY STATE OF ORIGIN, ALABAMA, 1959 AND 1960

Origin	Volume by year	
	1959	1960
	Bushels	*Bushels*
Illinois	1,605,000	523,000
Iowa	4,798,100	3,807,400
Kansas	165,000	0
Kentucky	43,000	92,000
Minnesota	341,000	260,000
Missouri	942,100	1,187,400
Nebraska	240,000	46,000
Tennessee	89,000	36,000
TOTAL	8,223,200	5,951,800

TABLE 10. OATS: VOLUME REPORTED RECEIVED BY FIRMS, BY STATE OF ORIGIN, ALABAMA, 1959 AND 1960

Origin	Volume by year	
	1959	1960
	Bushels	*Bushels*
Illinois	804,000	205,000
Iowa	182,000	1,000
Minnesota	0	138,000
Mississippi	163,400	652,300
Missouri	823,600	684,800
Tennessee	98,000	28,000
TOTAL	2,071,000	1,709,100

Oats

Table 10 gives the origins and amount of oats shipped into Alabama in 1959 and 1960. The leading states in 1959 were Illinois and Missouri, each shipping about 800,000 bushels. In 1960, however, Missouri was the leader, and Mississippi was the second most important exporter of oats to Alabama. Illinois was in third place. The three remaining states – Iowa, Minnesota, and Tennessee – shipped small amounts.

In 1959, most oat inshipments arrived in Alabama by means of trucks or barges. The amount delivered by the latter slightly exceeded that shipped by trucks, Appendix Table 8. Approximately 13 per cent was delivered by rail. On the other hand, in 1960, there was a great predominance of inshipments by truck; this method accounted for approximately 79 per cent of total inshipments. All but 2,000 bushels of the remainder was shipped by barge.

In 1959, Illinois relied almost entirely on barges to transport oats, whereas Missouri exporters favored truck transportation both years. No method other than trucks was used by Mississippi shippers in either year. Minnesota shippers, who did not ship oats to Alabama in 1959, used barges only in 1960.

Grain Sorghum

All grain sorghum shipments into the State, totaling 246,430 bushels in 1959 and 1960, were made from Mississippi. Shipments in both years were by trucks.

Outshipments

Corn

Corn shipped from Alabama, amounting to approximately 1.6 million bushels in 1959 and 1.5 million bushels in 1960, was de-

TABLE 11. CORN: VOLUME REPORTED SHIPPED BY FIRMS, BY STATE OF DESTINATION, ALABAMA, 1959 AND 1960

Destination	Volume by years	
	1959	1960
	Bushels	*Bushels*
Florida	179,600	151,900
Georgia	1,232,200	1,110,400
Louisiana	30,800	57,100
Mississippi	131,300	3,000
Tennessee	25,000	151,300
TOTAL	1,598,900	1,473,700

livered mostly to surrounding states, Table 11. The greatest volume was shipped to Georgia, accounting for more than three-fourths of total Alabama outshipments in both 1959 and 1960. Florida ranked second in both years in terms of total shipments of corn received from firms in Alabama. Mississippi was third in 1959, but dropped to fifth place in 1960. Tennessee, ranking fifth in 1959, was third in 1960.

Truck transportation was the chief method of moving corn from Alabama to neighboring states both years. Ninety-eight per cent was moved by truck in 1959 and 95 per cent in 1960, Appendix Table 9. There were no rail shipments of corn from Alabama. The remaining small amounts were moved by barges.

Soybeans

All soybeans shipped from Alabama in 1959 were sent to Florida and Tennessee, and in 1960 all shipments went to Tennessee. Total shipments out of the State in 1959 amounted to slightly more than 400,000 bushels, while only 176,000 bushels was shipped in 1960, Table 12.

All outshipments of soybeans in 1959 were by truck. Shipment of soybeans to Tennessee in 1960 totaled 161,600 bushels by truck and 14,000 bushels by barge.

TABLE 12. SOYBEANS: VOLUME REPORTED SHIPPED BY FIRMS, BY STATE OF DESTINATION, ALABAMA, 1959 AND 1960

Destination	Volume by years	
	1959	1960
	Bushels	*Bushels*
Florida	104,100	0
Tennessee	299,500	175,600
TOTAL	403,600	175,600

Wheat

All wheat outshipments from Alabama in 1959 and 1960 went to Tennessee. Total outshipments were 290,000 bushels in 1959 and 190,000 bushels in 1960.

Most shipments were made by barge in 1959 and 1960, accounting for 79 and 67 per cent of total wheat outshipments, respectively. Those shipments not made by barge were made by truck. Reported shipments by each method are shown below:

Method	*1959 Bushels*	*1960 Bushels*
Truck	62,500	62,500
Rail	0	0
Barge	230,000	129,000
TOTAL	292,500	191,500

Oats

Few oats were shipped out of Alabama in either 1959 or 1960. All of the 5,000 bushels shipped in 1959 went to Tennessee, while total 1960 outshipments of 20,000 bushels went to Georgia.

The 1959 outshipments to Tennessee went by truck. In 1960, rail was used exclusively to transport oats that went from Alabama to Georgia.

Net Imports

Net imports of corn into Alabama were much larger than any other grain, Appendix Table 10. Corn imports, however, dropped from 16.6 million bushels in 1959 to 12.6 million bushels in 1960. Soybeans were also important in terms of total imports both years. Net soybean imports exceeded 10 million bushels both years — 10.2 in 1959 and 10.4 in 1960.

Among the three remaining grains, net wheat imports were largest. Wheat imports reached approximately 8.0 million bushels in 1959 and then declined to about 5.8 million bushels in 1960. Imports of oats approximated 2 million bushels both years, and grain sorghum imports held steady at 246,430 bushels.

TRANSPORTATION ANALYSIS

Relationship of Firm Type to Method of Transportation

Examination of relationship between type of firm and the capability to receive and ship grain by different methods of transportation revealed that trucks were most widely used among

the different types of firms, Appendix Table 11. All firms were equipped to handle truck inshipments, and all elevators, feed manufacturers, and custom grinders were capable of handling truck outshipments.

All firms did not have a full rail capability. On the other hand more than 80 per cent of the feed manufacturers were equipped to receive boxcar or hopper car receipts, and two-thirds indicated that they could ship by this method. About one-third of the elevator operators could ship and receive by this method, whereas one-half of the feed mixers were equipped to handle rail shipments and receipts. No custom grinders in the State could ship or receive by rail.

Capabilities for receipt and shipment of grain by barge were limited to elevators and feed manufacturers. Four Alabama elevator operators reported that they were equipped to receive and ship grain by barge. Two feed manufacturers were capable of receiving shipments by this method, but only one was able to ship by barge.

Effect of Geographical Location on Method of Transportation

Inshipments

Most inshipments of grain into Alabama came from the Midwestern states of Illinois, Iowa, and Missouri. In terms of total volume of inshipments, Iowa was the leader, accounting for approximately 55 per cent of all inshipments in 1959 and 1960. The total amount of grain received from these origins for 1959 and 1960 is given in Appendix Table 12.

Iowa. Rail transportation was used almost exclusively for inshipments from Iowa. Most shipments originated in central and western Iowa, around Des Moines, where there are no navigable rivers; this accounts in part for the absence of barge transportation. Most rail shipments were made to central and southern Alabama, especially into Birmingham and Montgomery.

A substantial amount of grain was shipped from Iowa to Alabama by truck. Most of these shipments were backhauls; that is, trucks from Alabama and the Southeast transported lumber and other products into Iowa, and corn or other grains were picked up for return haul to Alabama. Such shipments of grain were made to numerous localities throughout the State. Davenport, Iowa, located on the Mississippi River, was an important truck-

ing center and was also used for the small amount of grain shipped by barge.

Illinois. Most grain shipments from Illinois were made by barge. Much of that produced in western Illinois came down the Mississippi River to Cairo. It was then shipped up the Ohio and Tennessee Rivers to the Decatur-Guntersville area. Grain produced in southern and eastern Illinois moved by barge by way of the Wabash or Ohio rivers, and then up the Tennessee River. East St. Louis and Cairo were important as barge-shipping centers in Illinois.

About one-sixth of total grain shipments from Illinois were made by truck. Important trucking centers in Illinois were Peoria in north central Illinois, Centralia in south central Illinois, and Cairo in northeastern Illinois. As was the case with truck shipments from Iowa, shipments by truck from Illinois were largely backhauls.

Missouri. Grain shipments from Missouri for the most part, came by truck or barge with most of it by the latter. The principal origin for barge shipments was St. Louis.

Slightly more than a third of the grain shipments from Missouri came by truck. Most truck shipments originated in St. Louis or Kansas City, particularly the latter, and were largely backhauls. Truck deliveries from Missouri went to numerous destinations in the State.

Shipments

Most shipments of grain originating from Alabama in 1959 and 1960 went to surrounding states, Table 13. Approximately 60 per cent of total outshipments was accounted for by firms in Georgia during this time period, while more than 25 per cent of Alabama outshipments were received in Tennessee.

TABLE 13. ALL GRAIN: TWO-YEAR TOTAL VOLUME REPORTED SHIPPED BY FIRMS TO FLORIDA, GEORGIA, MISSISSIPPI, AND TENNESSEE BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Method	State and volume				Total
	Florida	Georgia	Mississippi	Tennessee	
	Bushels	*Bushels*	*Bushels*	*Bushels*	*Bushels*
Truck	435,600	2,342,600	134,300	672,400	3,584,900
Rail	0	200,000	0	0	200,000
Water	0	0	0	468,000	468,000
TOTAL	435,600	2,542,600	134,300	1,140,400	4,252,900
PER CENT	10	60	3	27	100

The transportation pattern was dominated almost entirely by truck transportation. Slightly less than 85 per cent of all outshipments was transported by this method. Grain shipped out of State for the most part, was that arriving by barge in northern Alabama. In most cases, it was unloaded from the barges directly to trucks and distributed both within Alabama and to points outside.

There were only two exceptions to the above pattern. In one instance, a small quantity of grain was reported shipped by rail to Georgia. In the other, grain after being received in Alabama was barged up the Tennessee River to points in Tennessee.

Types of Carriers Used

Trucks

Truck carriers were divided into four categories to determine what types of trucks were doing the largest amount of grain hauling. These categories, according to type of regulation, were: common carrier, merchant trucker, exempt carrier, and self-owned. A common carrier was considered to be a vehicle that had its rates regulated by the Interstate Commerce Commission. Merchant truckers were those who bought grain and hauled it, usually selling it to another person or firm. An exempt carrier was a vehicle used for hauling grain, but the rates were not regulated by the ICC; they were exempt from regulation. Self-owned vehicles (not for hire) were those owned by the individual or organization purchasing or selling the grain.

As indicated by Appendix Table 13, most 1960 grain inshipments into Alabama, with the exception of corn receipts, were made by merchant truckers. In most cases, individuals or firms buying grain bought it from truckers who purchased it at the origin and transported it to Alabama. In all cases where information was obtained, there was a complete absence of common carriers. Next to merchant truckers, self-owned trucks were used most in transporting grain.

In 1960 an entirely different transportation pattern existed in outshipments by Alabama firms. Exempt carriers – truckers whose rates were exempt from ICC regulation – were of primary importance. Two-thirds of all truck shipments were made by this type of carrier.

Barges

For purposes of classification by type of carrier, barges were divided into two categories: nonregulated and regulated. In-

cluded among the nonregulated types of water carriers were private or exempt barges. Regulated carriers were common or contract barges.

Few respondents were able to give answers as to the type of barge carrier employed to bring grain into Alabama. Firms giving information stated that half of their total imports by water was accounted for by nonregulated and half by regulated water carriers.

Rail

All grain movements by rail, both into and out of Alabama, were regulated by the Interstate Commerce Commission.

Changes in Method of Transportation by Firm Type

Relative to changes in volume of grain bought from or sold to truckers since the mid 1950's, most firm operators indicated that there had been no change from 1955 to 1960, Appendix Table 14. The most important changes were reported by feed manufacturers and feed mixers. Feed manufacturers stated that there had been increases in amounts bought, ranging from less than 10 per cent to 50 per cent or more. Six firms recorded volume increases of less than 10 per cent, while seven experienced increases of 50 per cent or more. Six feed mixers indicated that they had increased the amount of grain bought by 25 to 49 per cent, and said they had increased their volumes by 50 per cent or more.

Only a small number of operators provided information regarding usage of hopper cars. There were not enough respondents to indicate a pattern.

No information was obtained from firms relative to changes in barge usage.

Comparisons of Truck, Rail, and Barge Rates

Since corn is the most important grain used in Alabama and because of the availability of rates pertaining to corn shipments, comparisons were made among existing truck, rail, and barge rates for corn shipped into Alabama during 1959 and 1960. This was done in an attempt to determine what would have been the cheapest means of transportation to use in transporting corn into Alabama during this period.

Comparisons were not attempted for other grains because of the lack of rate data, especially truck and rail rates.

Initially, points representing important shipping and receiving areas for corn were selected. Birmingham, Guntersville, and Montgomery were selected as representative receiving points in Alabama. They were chosen primarily because: (1) the three were centers for receiving and dispersing grain throughout the State, and (2) rates were more readily available than at other comparable points. Shipping points, on the other hand, represented actual points in the Midwest from which large shipments of corn originated. An attempt was made to select representative points that had facilities for both rail and barge transportation. However, this was not possible in all cases.

Attempts were made to ascertain the existing rates in 1959 and 1960 for the previously mentioned points. It was decided that rates prevailing on January 1, 1960, the midpoint of this time period, would be used. Rail rates were obtained from the Navigation Economics Branch of the Tennessee Valley Authority, while barge rates were those published by Arrow Transportation Company of Sheffield, Alabama. They were among the lowest published common carrier barge line tariffs on file with the Interstate Commerce Commission for the 2-year period. However, lower rates were charged by barge lines not subject to ICC regulation.

Lack of information regarding published truck rates necessitated use of information on trucking charges, including backhaul charges obtained from the regional survey to derive a trucking cost function.[5] The function, compiled from cost data collected from seven Southern states, was as follows:

$$C = 4.36288 + .036248X^{6}$$

where

C = rate in cents per bushel
X = distance in miles.

Distances used in computing rates represented the shortest routes over major highways.

Since barges were capable of delivering grain only to Guntersville, adjustments were necessary to make barge rates comparable to truck and rail rates to Montgomery and Birmingham. A shipping charge for trucks was computed from Guntersville to

[5] Southern Regional Grain Marketing Project SM-11, Revised, "Transportation of Grain and Grain Products in the South."

[6] An r^2 of .6937 indicated that 69 per cent of the variability in truck rates was accounted for by distance. The "b" value was significant at the 1 per cent level.

Birmingham and Montgomery. This shipping charge was added to the barge rate to Guntersville, resulting in a combined barge-truck rate. The above charge consisted of a trucking cost computed from the formula mentioned earlier plus handling costs incurred in transferring the grain. Two and a half cents were charged for receiving the grain, an equal amount was charged for loading, and 1-cent-per-bushel for merchandising.

Truck, rail, and barge rates on corn from points in the Midwest to Birmingham, Guntersville, and Montgomery are given in Appendix Tables 15, 16, and 17. Appendix Tables 18, 19, and 20 contain data indicating the cheapest method of transportation to each of these points in the 1959-1960 period.

Rates on shipments into Birmingham indicated that the cheapest transportation for corn was by barge-truck or truck. Shipments from Chicago, Davenport, Kansas City, and Peoria were the least expensive by barge-truck. However, shipments originating from Cairo, Louisville, and St. Louis could have been transported by truck at a lower cost.

All shipments into Guntersville were cheapest by barge. Rates by truck and rail were from two to five times higher than barge.

If the cheapest method of transportation had been utilized on movements of grain into Montgomery, most shipments would have been made by barge-truck. There were only two exceptions. These were shipments from Cairo and Louisville, which would have been cheaper by truck.

The comparison here was for hauling grain. Milling-in-transit rates granted by railways where grain and grain products are transported were not included.

SUMMARY and IMPLICATIONS

Alabama firms in this study that handled grain or grain products in 1959 and 1960 were classified and enumerated. The 140 firms were divided into six groups: elevator, feed mixer, feed manufacturer, custom grinder, processor, and other. The largest group of firms, numbering 33, were feed manufacturers. Elevators, feed mixers, and custom grinders numbered 30 each.

Total grain storage capacity approximated 9.5 million bushels, of which 7.5 million bushels was bulk storage. The remainder was sack storage. Most of the firms reported storage capacities of less than 100,000 bushels. Elevators and feed manufacturers, however, had capacities in excess of this. Five feed manufacturers

and eight elevators were in the range of 100,000 to 250,000 bushels. Moreover, five elevators had storage facilities that allowed for storing 250,000 to 500,000 bushels, while one elevator was capable of storing in excess of a million bushels.

In both years elevators were extremely important in all grain transactions in Alabama – both purchases and sales. In terms of total volume, almost 80 per cent of all purchases and 90 per cent of all sales were made by elevators.

All firms were equipped to handle truck inshipments, and all elevators, feed manufacturers, and custom grinders were capable of handling truck outshipments. A rail capability was not widespread, but all firm types except custom grinders had at least limited ability to ship or receive by this method. Ability to receive and ship grain by barge, however, was limited to elevators and feed manufacturers.

In terms of volume of shipments, corn was the most important grain imported into Alabama in 1959 and 1960. Net import levels were 16.6 million bushels in 1959 and 12.6 million bushels in 1960. Second in terms of volume of imports was soybeans: 10.2 million bushels in 1959 and 10.4 million bushels in 1960. Wheat imports approximated 8.0 million bushels in 1959 and 5.8 million in 1960, while oats imports were about 2.0 million bushels both years. Grain sorghum imports were 246,000 bushels during both years.

Most grain shipments to Alabama in 1959 and 1960 came from the Midwest. The principal states were Illinois, Iowa, and Missouri. Iowa led in total shipments to the State, accounting for approximately 55 per cent both years. Thirty-six per cent of the shipped grain came from Illinois, while 9 per cent was from Missouri.

Slightly less than 50 per cent of the grain moving into Alabama came by rail. Important rail shipping points were Des Moines, Iowa; and Kansas City and St. Louis, Missouri. Main receiving points in Alabama were Montgomery and Birmingham.

Approximately 35 per cent of all grain inshipments into Alabama came by barge. Primarily, this was because of a low-cost barge transportation system that allowed shippers to transport grain down the Mississippi River and up the Tennessee River to ports in Alabama, particularly Guntersville and Decatur. Cairo, Illinois, and St. Louis, Missouri, were principal shipping points for barges.

About a sixth of all imports were made by truck. Most of these shipments were backhauls arriving at points throughout the State. In addition to the barge and rail centers listed, trucking centers of greatest use were Peoria, Illinois, and Davenport, Iowa.

States surrounding Alabama received most outshipments of grain in 1959 and 1960. About 60 per cent went to Georgia, and a fourth went to Tennessee. Florida and Mississippi accounted for the remainder. Truck shipments dominated the outshipment transportation pattern, accounting for 85 per cent. Approximately 10 per cent was shipped by barge from Tennessee River ports and 5 per cent was shipped by rail.

None of the truck carriers used to transport grain into or out of Alabama were under Interstate Commerce Commission (ICC) rate regulation. Limited data available on barge shipments reveal that about half the barge grain movements were made by carriers having rates regulated by the ICC. All grain movements by rails, however, both into and out of Alabama, were made by carriers whose rates were regulated by the ICC.

Cost of shipping grain into Birmingham, Guntersville, and Montgomery could have been reduced by use of barge or barge-truck. This was based on a comparison of truck, rail, and barge rates existing during the mid-period of 1959-1960. The next cheapest method would have been by truck. Available data on rates into Alabama during this period show that rail was the most expensive means of transportation for corn.

Increased needs for grain to support a continuing expansion of the livestock and poultry industries in Alabama are likely to be supplied largely from states in the Corn Belt. Therefore, expansion of existing facilities or development of new facilities that handle imported grain, or both are indicated.

Risks will be involved in choosing locations for new grain-handling facilities. There exist uncertainties relative to the level of rail freight rates as well as the development of inland waterways, such as the proposed Tennessee-Tombigbee Waterway. A facility located some place other than on an inland waterway will need to be equipped to receive and ship grain by both rail and truck.

Volumes of grain moved from points in the Midwest to inland points in Alabama by combined barge-truck shipments may decline if rail and truck rates become more competitive. However, this system will continue to be among the more important means

of bringing grain into the State. In their efforts to provide transportation services and to continue as strong competitors for the business of transporting grain, it is possible that owners and operators of barges may purchase and operate trucks for delivery of grain to final destinations.

Since grain prices normally are depressed at harvest time, many firms dealing in grain could possibly reduce expenditures by purchasing during the last quarter of the year. For most firms, such action would mean expansion of existing facilities to provide additional storage space. Before initiating such action, thought should be given to how much this additional storage space could be used for other purposes during the remainder of the year. Also, the amount of savings that would be expected on grain purchases, obtained through a study of past prices, would need to be compared with anticipated costs of expansion to determine if the latter would be economically feasible.

APPENDIX

APPENDIX TABLE 1. ACRES PLANTED TO FEED GRAINS, ALABAMA, 1952-1961

Year	Corn	Wheat	Oats	Grain sorghum	Total
	1,000 acres	*1,000 acres*	*1,000 acres*	*1,000 acres*	*1,000 acres*
1952	2,179	11	85	12	2,287
1953	2,040	21	138	25	2,224
1954	2,121	24	185	19	2,349
1955	2,030	53	148	42	2,273
1956	1,989	80	136	32	2,237
1957	1,907	130	99	37	2,173
1958	1,794	100	79	31	2,004
1959	1,807	55	101	23	1,986
1960	1,705	48	85	20	1,858
1961	1,381	56	85	14	1,536

Source: *Alabama Agricultural Statistics,* Alabama Crop and Livestock Reporting Service, Bul. 11.

APPENDIX TABLE 2. PRODUCTION OF FEED GRAINS IN CORN EQUIVALENTS,[1] ALABAMA, 1952-1961

Year	Corn	Wheat	Oats	Grain sorghum	Total
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
1952	23,969	209	1,211	192	25,581
1953	44,880	462	2,208	450	48,000
1954	27,573	528	2,729	294	31,124
1955	58,870	1,007	1,924	840	62,641
1956	47,736	1,840	2,448	608	52,632
1957	47,675	2,340	1,237	703	51,955
1958	55,614	2,300	1,256	744	59,914
1959	46,982	1,265	1,742	598	50,587
1960	44,330	1,200	1,487	480	47,497
1961	48,335	1,456	1,615	364	51,406

[1] For purposes of this study, wheat and grain sorghum were considered to have 100 per cent of the feed value of corn, pound for pound, while oats were considered to have 50 per cent of the value.

Source: Adapted from *Alabama Agricultural Statistics,* Alabama Crop and Livestock Reporting Service, Bul. 11.

APPENDIX TABLE 3. NUMBERS OF BEEF CATTLE, COMMERCIAL BROILERS, AND HOGS ON ALABAMA FARMS, JANUARY 1952-1961

Year	Beef cattle	Commercial broilers	Hogs
	1,000 head	*1,000 birds*	*1,000 head*
1952	1,086	23,484	1,200
1953	1,314	28,416	1,032
1954	1,471	47,739	877
1955	1,426	57,764	947
1956	1,363	82,473	1,061
1957	1,380	103,875	1,029
1958	1,373	131,640	988
1959	1,347	158,248	978
1960	1,386	176,654	1,144
1961	1,394	198,036	972

Source: *Alabama Agricultural Statistics,* Alabama Crop and Livestock Reporting Service, Bul. 11.

APPENDIX TABLE 4. NUMBER OF PRIMARY FIRM TYPES REPORTING BY STORAGE CAPACITY AND TYPE, ALABAMA, 1960

Range	Type	Primary firm types				
		Elevator	Feed manufacturer	Feed mixer	Custom grinder	Other
1,000 bushels		*Number*	*Number*	*Number*	*Number*	*Number*
0-100	Bulk	15	27	30	27	9
	Sack	15	27	21	27	9
	Total	15	27	30	30	15
101-250	Bulk	5	2	0	0	1
	Sack	3	3	0	0	1
	Total	8	5	0	0	1
251-500	Bulk	2	----	----	----	----
	Sack	3	----	----	----	----
	Total	5	----	----	----	----
501-1000	Bulk	----	----	----	----	----
	Sack	----	----	----	----	----
	Total	----	----	----	----	----
1001-over	Bulk	1	1	----	----	----
	Sack	----	----	----	----	----
	Total	1	1	----	----	----

APPENDIX TABLE 5. CORN: TOTAL VOLUME REPORTED RECEIVED BY FIRMS FROM ALL POINTS OUTSIDE THE STATE, BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Origin	Year and method					
	1959			1960		
	Truck	Rail	Water	Truck	Rail	Water
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Illinois	1,223	2	6,582	2,630	0	6,183
Indiana	165	0	0	272	0	0
Iowa	395	7,552	46	221	2,594	0
Kentucky	0	0	534	0	59	550
Missouri	431	65	897	436	15	723
Tennessee	0	260	0	0	284	86
Total	2,214	7,879	8,059	3,559	2,952	7,542
Per cent	13	43	44	25	21	54

APPENDIX TABLE 6. SOYBEANS: TOTAL VOLUME REPORTED RECEIVED BY FIRMS FROM ALL POINTS OUTSIDE THE STATE, BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Origin	Year and method					
	1959			1960		
	Truck	Rail	Water	Truck	Rail	Water
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Illinois	0	0	1,487	0	0	2,691
Iowa	910	8,202	0	1,990	5,852	0
Total	910	8,202	1,487	1,990	5,852	2,691
Per cent	9	77	14	19	56	26

APPENDIX TABLE 7. WHEAT: TOTAL VOLUME REPORTED RECEIVED BY FIRMS FROM ALL POINTS OUTSIDE THE STATE, BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Origin	Year and method					
	1959			1960		
	Truck	Rail	Water	Truck	Rail	Water
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Illinois	0	0	1,605	0	0	523
Iowa	347	4,451	0	531	3,276	0
Kansas	0	60	105	0	0	0
Kentucky	0	43	0	0	0	92
Minnesota	0	4	337	0	0	260
Missouri	5	90	847	5	146	1,036
Nebraska	0	20	220	0	0	46
Tennessee	0	89	0	6	30	0
Total	352	4,757	3,114	542	3,452	1,957
Per cent	4	58	38	9	58	33

APPENDIX TABLE 8. OATS: TOTAL VOLUME REPORTED RECEIVED BY FIRMS FROM ALL POINTS OUTSIDE THE STATE, BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Origin	Year and method					
	1959			1960		
	Truck	Rail	Water	Truck	Rail	Water
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Illinois	10	0	794	10	0	195
Iowa	1	181	0	1	0	0
Minnesota	0	0	0	0	0	138
Mississippi	163	0	0	652	0	0
Missouri	700	0	124	685	0	0
Tennessee	0	98	0	0	2	26
Total	874	279	918	1,348	2	359
Per cent	42	13	44	79	----	21

APPENDIX TABLE 9. CORN: TOTAL VOLUME REPORTED SHIPPED BY FIRMS TO ALL POINTS OUTSIDE THE STATE, BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Destination	Year and method					
	1959			1960		
	Truck	Rail	Water	Truck	Rail	Water
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Florida	180	0	0	152	0	0
Georgia	1,232	0	0	1,110	0	0
Louisiana	31	0	0	57	0	0
Mississippi	131	0	0	3	0	0
Tennessee	0	0	25	81	0	70
Total	1,574	0	25	1,403	0	70
Per cent	98	----	2	95	----	5

APPENDIX TABLE 10. NET GRAIN IMPORTS BY GRAIN TYPE, ALABAMA, 1959 AND 1960

Type	Year and type of shipments					
	1959			1960		
	Inshipments	Outshipments	Net	Inshipments	Outshipments	Net
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Corn	18,152	1,599	16,523	14,053	1,474	12,579
Soybeans	10,600	404	10,196	10,533	176	10,357
Wheat	8,223	292	7,931	5,952	192	5,760
Oats	2,071	5	2,066	1,709	20	1,689
Grain sorghum	246	0	246	246	0	246
Total	39,292	2,300	36,992	32,493	1,862	30,631

APPENDIX TABLE 11. NUMBER OF FIRMS EQUIPPED TO HANDLE SPECIFIED METHODS OF TRANSPORTATION FOR RECEIPTS AND SHIPMENTS, BY PRIMARY FIRM TYPE, ALABAMA, 1960

Firm type	Receipts				Shipments			
	Rail		Truck	Water	Rail		Truck	Water
	Box car	Hopper car			Box car	Hopper car		
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
Elevator	7	3	30	4	7	4	30	4
Feed manufacturer	18	9	33	2	15	6	33	1
Feed mixer	12	3	30		12	3	27	
Custom grinder			30				30	
Other	6		15		6	3	15	
TOTAL	43	15	138	6	40	16	135	5

APPENDIX TABLE 12. GRAIN: TOTAL VOLUME REPORTED RECEIVED BY FIRMS FROM ILLINOIS, IOWA, AND MISSOURI, BY METHOD OF TRANSPORT, ALABAMA, 1959 AND 1960

Method	State			Total
	Illinois	Iowa	Missouri	
	1,000 bushels	*1,000 bushels*	*1,000 bushels*	*1,000 bushels*
Truck	3,873	4,395	2,262	10,530
Rail	2	32,108	316	32,426
Water	20,060	46	3,627	23,733
Total	23,935	36,549	6,205	66,689
Per cent	36	55	9	100

APPENDIX TABLE 13. PERCENTAGE OF GRAIN RECEIVED BY EACH TYPE OF MOTOR CARRIER, ALABAMA, 1960

Item	Type of carrier				Total
	Common carrier	Merchant trucker	Exempt carrier	Self-owned	
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Receipts					
Corn	0	44	6	50	100
Soybeans[1]	N/A	N/A	N/A	N/A	
Wheat	0	100	0	0	100
Oats	0	67	12	21	100
Grain sorghum	N/A	N/A	N/A	N/A	
Shipments					
Corn	0	1	57	42	100
Soybeans	0	0	66	34	100
Wheat	0	0	70	30	100
Oats[2]	0	0	0	0	0

[1] Not reported because there was only one processor in the State.
[2] None shipped.

APPENDIX TABLE 14. NUMBER OF PRIMARY FIRMS INDICATING CHANGES IN PURCHASES AND SALES OF GRAIN TO TRUCKERS BY FIRM TYPE AND PERCENTAGE CHANGE, 1955 TO 1960

Firm type	Percentage ranges	Bought			Sold		
		No change	Increase	Decrease	No change	Increase	Decrease
		No.	*No.*	*No.*	*No.*	*No.*	*No.*
Elevator	Less than 10	16	1		17	1	
	10-24		1				
	25-49			1			
	More than 49						1
Feed manufacturer	Less than 10	11	6		14	3	
	10-24		3				
	25-49		3				
	More than 49		7			1	
Feed mixer	Less than 10	6			12		
	10-24						
	25-49		6				
	More than 49		6	3			3
Custom grinder	Less than 10	6	3	3	6		
	10-24						
	25-49						
	More than 49		3				
Other	Less than 10	6			6		
	10-24						
	25-49						
	More than 49						

APPENDIX TABLE 15. ESTIMATED TRUCK RATES PER BUSHEL FOR CORN FROM SELECTED MIDWEST POINTS TO SELECTED ALABAMA POINTS, JANUARY 1, 1960

Origin	Destination		
	Birmingham	Guntersville	Montgomery
	Cents	*Cents*	*Cents*
Cairo, Illinois	17.48	15.13	21.04
Chicago, Illinois	28.03	24.95	31.55
Davenport, Iowa	30.39	27.49	33.94
Kansas City, Missouri	30.21	29.77	33.04
Louisville, Kentucky	17.88	14.80	21.40
Peoria, Illinois	26.73	26.62	30.39
St. Louis, Missouri	22.12	22.67	25.71

Source: Rates computed from the function $C = 4.36288 + .036148X$ and distances derived from official highway maps.

APPENDIX TABLE 16. RAIL RATES PER BUSHEL FOR CORN FROM SELECTED POINTS IN THE MIDWEST TO SELECTED ALABAMA POINTS, JANUARY 1, 1960

Origin	Destination		
	Birmingham	Guntersville	Montgomery
	Cents	*Cents*	*Cents*
Cairo, Illinois	17.92	20.16	21.84
Chicago, Illinois	36.96	36.96	40.88
Kansas City, Missouri	31.08	33.88	35.56
Louisville, Kentucky	20.72	20.72	24.64
Peoria, Illinois	36.12	37.80	40.04
St. Louis, Missouri	24.08	25.20	26.88

Source: Navigation Economics Branch, Tennessee Valley Authority, Knoxville, Tennessee.

APPENDIX TABLE 17. BARGE RATES PER BUSHEL FOR CORN FROM SELECTED POINTS IN THE MIDWEST TO GUNTERSVILLE, ALABAMA, JANUARY 1, 1960

Origin	Rate
	Cents
Cairo, Illinois	6.33
Chicago, Illinois	10.44
Davenport, Iowa	10.42
Kansas City, Missouri	13.58
Louisville, Kentucky	7.98
Peoria, Illinois	8.40
St. Louis, Missouri	6.69

Source: *Guide to Published Barge Rates On Bulk Grain,* (Schedule No. 3), Arrow Transportation Company, Sheffield, Alabama.

APPENDIX TABLE 18. ESTIMATED TRANSPORTATION RATES PER BUSHEL FOR CORN FROM SELECTED POINTS IN THE MIDWEST TO BIRMINGHAM, ALABAMA, JANUARY 1, 1960

Origin	Method		
	Truck	Rail	Barge-Truck[1]
	Cents	*Cents*	*Cents*
Cairo, Illinois	17.48	17.92	19.16
Chicago, Illinois	28.03	36.96	23.27
Davenport, Iowa	30.39	.....	23.25
Kansas City, Missouri	30.21	31.08	26.41
Louisville, Kentucky	17.88	20.72	20.81
Peoria, Illinois	26.73	36.12	21.23
St. Louis, Missouri	22.12	24.08	23.25

[1] Barge rate to Guntersville plus 12.83 cents trucking, handling, and merchandising charges to Birmingham. Of this total amount, trucking accounted for 6.83 cents.

APPENDIX TABLE 19. ESTIMATED TRANSPORTATION RATES PER BUSHEL FOR CORN FROM SELECTED POINTS IN THE MIDWEST TO GUNTERSVILLE, ALABAMA, BY METHOD OF TRANSPORTATION, JANUARY 1, 1960

Origin	Method		
	Truck	Rail	Barge
	Cents	*Cents*	*Cents*
Cairo, Illinois	15.13	20.16	6.33
Chicago, Illinois	24.95	36.96	10.44
Davenport, Iowa	27.49	.....	10.42
Kansas City, Missouri	29.77	33.88	13.58
Louisville, Kentucky	14.80	20.72	7.98
Peoria, Illinois	26.62	37.80	8.40
St. Louis, Missouri	22.67	25.20	6.69

APPENDIX TABLE 20. ESTIMATED TRANSPORTATION RATES PER BUSHEL FOR CORN FROM SELECTED POINTS IN THE MIDWEST TO MONTGOMERY, ALABAMA, BY METHOD OF TRANSPORTATION, JANUARY 1, 1960

Origin	Method		
	Truck	Rail	Barge-Truck[1]
	Cents	*Cents*	*Cents*
Cairo, Illinois	21.04	21.84	22.53
Chicago, Illinois	31.55	40.88	26.64
Davenport, Iowa	33.94	.....	26.62
Kansas City, Missouri	33.04	35.56	29.78
Louisville, Kentucky	21.40	24.64	24.18
Peoria, Illinois	30.39	40.04	24.60
St. Louis, Missouri	25.71	26.88	22.89

[1] Barge rates to Guntersville plus 16.2 cents trucking, handling, and merchandising charge to Montgomery. Of this total amount, trucking accounted for 10.2 cents.