

A SURVEY OF MOTOR TRUCKS
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By R.C. ASHBY and B.D. PARRISH
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Effective transportation is essential to winning the war.

Maintenance of trucks for transporting farm products is becoming increasingly difficult, and the present shortage of tires, the scarcity of parts, the difficulty in retaining competent drivers, and the increased cost of operation is troubling commercial truckers. Now gasoline rationing is effecting all trucks.

As conditions become more critical, it becomes increasingly necessary to know the actual situation and to understand what part each trucking group contributes toward performing the required trucking service.

To this end the Department of Agricultural Economics has carried out surveys of 604 motor trucks delivering livestock to various Illinois markets,^{2/} 240 trucks hauling peaches from southern Illinois,^{2/} 137 trucks transporting vegetables to the Chicago market,^{2/} 364 trucks collecting milk for the St. Louis market,^{2/} and a survey of trucks hauling farm products in Douglas County.^{4/}

This study presents the results of a survey made of trucks hauling farm commodities in Henderson County, Illinois.

Henderson County borders the Mississippi River and has an area of 376 square miles with a population of 8,940 (1940). Its two largest towns are Oquawka and Stronghurst, with populations of 912 and 691, respectively. The county extends about 30 miles north and south; its width is about 20 miles at the south and about 8 miles at the north (Figure 1).

The Chicago-Denver line of the Burlington Railroad crosses the county approximately in the center; another line of the Burlington traverses the west side from south to north; the Santa Fe main line crosses the southeast corner; and a branch of the T. P. and W. crosses the southwest corner.

While there are a number of paved highways in the county, most of the local roads are graveled, many being surfaced with very coarse gravel. Part of the county is hilly. Hence Henderson County truck tires apparently wear more rapidly than those in Douglas County.

According to the study, livestock in Henderson County was trucked to the Chicago and Peoria public markets (225 and 75 miles, respectively), to local markets at Keithsburg, Monmouth, Galesburg, La Harpe, Burlington, and other points; and it was shipped out by rail through local cooperative shipping associations. Grain was trucked to local elevators. Gravel and limestone were trucked from sources within the county, and coal was trucked in from the Peoria area.

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^{2/} See Mimeograph AE-1915 and AE-1949.

^{3/} See Mimeograph AE-1949.

^{4/} See Mimeograph AE-1982.

Number and Size of Trucks

Records on 53 commercial trucks and on 211 farm trucks are included in this report (Table 1).

Table 1.--Number of Trucks Hauling Farm Products, Henderson County, Illinois, October, 1942, Grouped by Type of Trucks^{a/} and Rated Gross-Weight Capacity

Rated gross-weight capacity ^{b/}	Livestock ^{a/}		Commercial		Total commercial		Total farm	
	Long-haul	Short-haul	Grain and coal	Limestone	No.	%	No.	%
Under 8 000							3	1.4
8 000		1	3		4	7.5	177	83.9
10 000		1	4		5	9.5	16	7.6
12 000		2	1	1	4	7.5	8	3.8
14 000		4	10		14	26.4	6	2.8
16 000	2	3	6	4	15	28.3		
18 000	2	1	2	2	7	13.2	1	.5
20 000			1		1	1.9		
30 000 or more	3				3	5.7		
Total	7	12	27	7	53	100.0	211	100.0

a/ The trucks are divided into the several groups according to their major use.

b/ Rated gross-weight capacity is the Illinois state truck licensed gross-weight capacity.

Of the 53 commercial trucks included in the study, 7 were classified as long-haul livestock trucks (hauling primarily to Chicago); 12, as short-haul livestock trucks (hauling to Peoria, Galesburg, and for local livestock shipping associations); 27, as grain-hauling and general-purpose trucks; and 7, as limestone trucks.

The average size of long-haul livestock trucks was largest, three having a gross rated capacity of 30,000 pounds or more; 2, of 18,000 pounds; and 2, of 16,000 pounds. The rated gross capacity of the limestone trucks averaged 16,000 pounds; that of grain trucks, 14,000 pounds. Over 85 percent of the farm trucks had a gross rated capacity of 8,000 pounds or less and were mainly of the pickup type.

Condition of Trucks

Truckers were asked to appraise the condition of their trucks as excellent, good, fair, or poor. Of the commercial trucks, 2 percent were rated excellent; 63 percent, good; 35 percent, fair; and none, poor. Of farm trucks, 9 percent were rated excellent; 46 percent, good; 36 percent, fair; and 9 percent, poor. Thus 65 percent of the commercial trucks, compared with 55 percent of the farm trucks, were considered to be in good or excellent condition.

Use of Trucks

Table 2 shows the total miles traveled during the preceding 12 months by all trucks included in the study, both according to type of trucks and kind of products hauled.

According to these data, long-haul livestock trucks used 79.6 percent of their total mileage in moving livestock; 7.5 percent in hauling grain, and 7.4 percent in hauling coal and gravel. Short-haul livestock trucks used 56.3 percent of their mileage on livestock; 20.1 percent on grain; and 7.8 percent on coal and gravel. Combined; the two groups of trucks used 69.4 percent of their total mileage on livestock, 13.1 percent on grain, and 7.6 percent on coal and gravel. These trucks were reported driven a total of 715,000 miles in the 12-month period.

Of the total mileage driven by the limestone trucks, 77.6 percent was used for hauling limestone and 13.8 percent for hauling coal and gravel.

Commercial trucks used mainly for hauling grain used 35.7 percent of their total mileage for grain, 25.8 percent for coal and gravel, 11.8 percent for livestock; and 15.5 percent for other uses. Combined, the 53 commercial trucks were driven 1,708,800 miles.

Table 2. - Total Miles and Percentages of Miles Traveled by Types of Commercial and Farm Trucks in Hauling Various Farm Products, Henderson County, Illinois, October 1942

Type of trucker ^{a/}	Live stock	Grain	Hay	Coal & gravel	Lime-stone	Fruit & vegetable	Miscellaneous	Other	Total
	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)
Commercial trucks									
Livestock (long-haul)									
Miles	320	30		30	8			14	402
Percent	79.6	7.5		7.4	1.9			3.6	100.0
Livestock (other^{b/})									
Miles	176	63	2	24		4	12	32	313
Percent	56.3	20.1	.6	7.8		1.2	3.9	10.1	100.0
Total livestock									
Miles	496	93	2	54	8	4	12	46	715
Percent	69.4	13.1	.3	7.6	1.0	.5	1.7	6.4	100.0
Grain									
Miles	84	254	2	184	24	23	30	111	712
Percent	11.8	35.7	.3	25.8	3.5	3.2	4.2	15.5	100.0
Limestone									
Miles	1	5		39	219			18	282
Percent	.3	1.6		13.8	77.6			6.7	100.0
Total grain and limestone									
Miles	85	259	2	223	243	23	30	129	994
Percent	8.6	26.0	.2	22.4	24.5	2.3	3.0	13.0	100.0
Total commercial									
Miles	581	352	4	277	251	27	42	175	1 709
Percent	34.0	20.6	.2	16.2	14.7	1.6	2.5	10.2	100.0
Farm trucks									
Large									
Miles	80	69	6	7	1	45		333	541
Percent	14.9	12.7	1.1	1.3	.2	8.3		61.5	100.0
Small									
Miles	135	155	4	5		35		678	1 012
Percent	13.3	15.3	.4	.5		3.5		67.0	100.0
Total farm									
Miles	215	224	10	12	1	80		1 011	1 553
Percent	13.8	14.4	.7	.8	.1	5.1		65.1	100.0

a/ See footnote "a", Tabel 1, page 2.

b/ To Peoria, Galesburg, and local points.

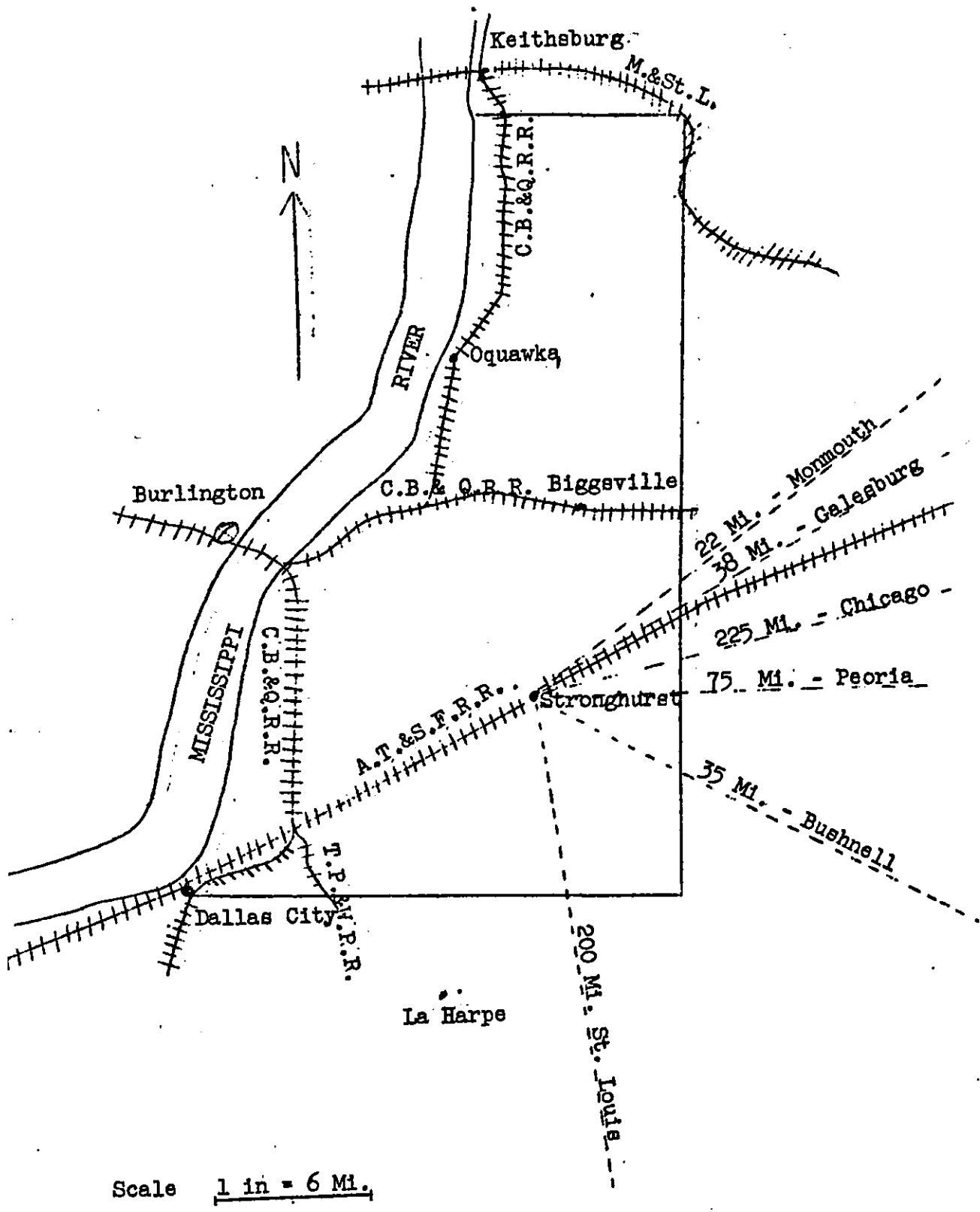


Fig. 1 - Henderson County, Illinois

The total mileage of the 211 farm trucks was reported as 1,552,600. The data in Table 2 indicate that the distribution of mileage for different types of hauling was very similar for the two groups of farm trucks.

Distribution of Tire Miles

Since on the average large trucks use more tires than do small trucks, a fairer use distribution may be made on the basis of tire miles than on truck miles. A truck's tire mileage is computed by multiplying the mileage of each truck by the number of its load tires.

Although all commercial trucks hauling farm products in the county were included in our survey, it was estimated that only 70 percent of the farm trucks were included. Accordingly, the farm truck data in Table 2 were multiplied by 1.43 in order to estimate the total truck miles traveled for the county. These data were then converted to tire miles and are shown in Table 4, page 6.

The total 12-month tire mileage was 20,404,744 for all trucks hauling farm products. Of this total, 15.2 percent was traveled by long-haul livestock trucks; 9.0 percent, by short-haul livestock trucks; 20.2 percent, by grain trucks; 8.3 percent, by limestone trucks; 18.9 percent, by larger farm trucks; and 28.4 percent, by smaller farm trucks. Commercial trucks accounted for 52.7 percent of the total tire miles; farm trucks, for 47.3 percent.

For some products commercial trucks did nearly all the hauling; for others, only a minor part. Of the total tire miles used in hauling limestone, commercial trucks accounted for 99.4 percent; coal and gravel, 95.5 percent; livestock, 74.8 percent; and grain, 60.4 percent. On the other hand, commercial trucks accounted for only 26 percent of total tire miles used for hay and for only 22.9 percent of those used for hauling fruit and vegetables.

Farm trucks accounted for 85.6 percent of the "other" trucking listed in Table 4 (largely on-farm service hauling), for 77.1 percent of the fruit and vegetable hauling, for 74.0 percent of the hay, for 39.6 percent of the grain, and for 25.2 percent of the livestock.

Table 3. - Percent of Total Truck Tire Miles by Each Type of Trucker Used in Hauling Various Products, Henderson County, Illinois, October, 1942

Type of trucker	Live-stock	Grain	Hay	Coal and gravel	Lime-stone	Fruit and vegetable	Miscellaneous	Other	Total
Total livestock	70.9	12.2	.2	7.6	1.2	.4	1.5	6.0	100
Total commercial	37.1	19.6	.2	15.6	14.1	1.4	2.3	9.7	100
Total farm	13.9	14.3	.7	.8	.1	5.4	---	64.8	100
Total county	26.1	17.1	.4	8.6	7.5	3.3	1.2	35.8	100

For all trucks the percentage of total tire miles used for livestock hauling was 26.1; for grain, 17.1; for coal and gravel, 8.6; for limestone, 7.5; for fruit and vegetables, 3.3; for hay, .4; and for other uses, 37.0 percent, as shown in Table 3. For example, of the total tire miles used in trucking livestock, 70.9 percent was run by livestock trucks, 12.2 percent by grain trucks, 7.6 percent by coal and gravel trucks, and so on.

Table 4. - Total Truck Tire Miles^{a/} and Percentages of Miles Expended by Types of Commercial and Farm Trucks in Hauling Various Farm Products, Henderson County, Illinois, October 1942

Type of trucker ^{b/}	Live-stock	Grain	Hay	Coal & gravel	Lime-stone	Fruit & vegetable	Miscel-laneous	Other	Total
	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)	(000)
Commercial trucks									
Livestock (long-haul)									
Miles	2 464	233		230	58			111	3 096
Percent	46.2	6.7		13.1	3.8			1.5	15.2
Livestock (local)									
Miles	1 034	369	12	143		22	72	184	1 836
Percent	19.4	10.6	12.7	8.2		3.2	29.5	2.5	9.0
Total livestock									
Miles	3 498	602	12	373	58	22	72	295	4 932
Percent	65.6	17.3	12.7	21.3	3.8	3.2	29.5	4.0	24.2
Grain									
Miles	488	1 473	12	1 066	143	133	173	641	4 129
Percent	9.1	42.3	13.3	60.9	9.4	19.7	70.5	8.8	20.2
Limestone									
Miles	6	27		233	1 312			113	1 691
Percent	.1	.8		13.3	86.2			1.6	8.3
Total commercial									
Miles	3 992	2 102	24	1 672	1 513	155	245	1 049	10 752
Percent	74.8	60.4	26.0	95.5	99.4	22.9	100	14.4	52.7
Farm trucks									
Large									
Miles	574	492	44	52	7	319		2 375	3 863
Percent	10.8	14.1	48.0	2.9	.5	47.2		32.5	18.9
Small									
Miles	770	886	23	28	2	202		3 879	5 790
Percent	14.4	25.5	26.0	1.6	.1	29.9		53.1	28.4
Total farm									
Miles	1 344	1 378	67	80	9	521		6 254	9 653
Percent	25.2	39.6	74.0	4.5	.6	77.1		85.6	47.3
All trucks									
Miles	5 336	3 480	91	1 752	1 522	676	245	7 303	20 405
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ The commercial truck mileage reported in the survey was estimated to be 100 percent of the total commercial truck mileage for the county. As the farm truck miles reported were estimated to be only 70 percent of the county total, the survey miles were increased by 1.43 in order to get the total county farm truck miles. In order to put total miles per truck on a per tire basis, the following weights were used: long-haul livestock, 7.7; short-haul livestock, 5.8; grain, 5.8; limestone, 6.0; large farm trucks, 5.0; and small farm trucks, 4.0.

b/ See footnote "a," Table 1, page 4.

Fig. 2 - The Percent of Total County Truck Tire Miles Spent in the Hauling of Various Products by Type of Trucks, Henderson County, Illinois, October 1942

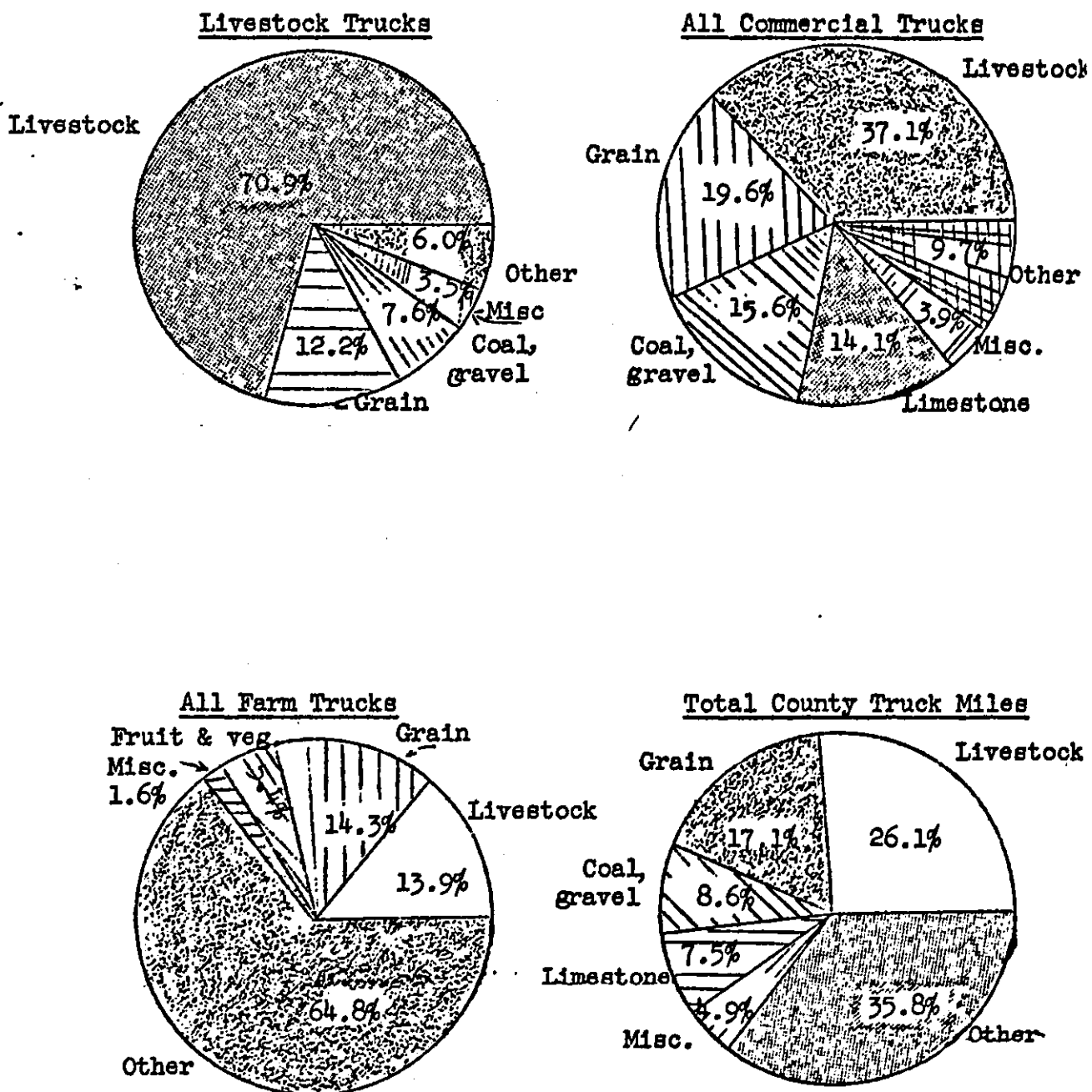
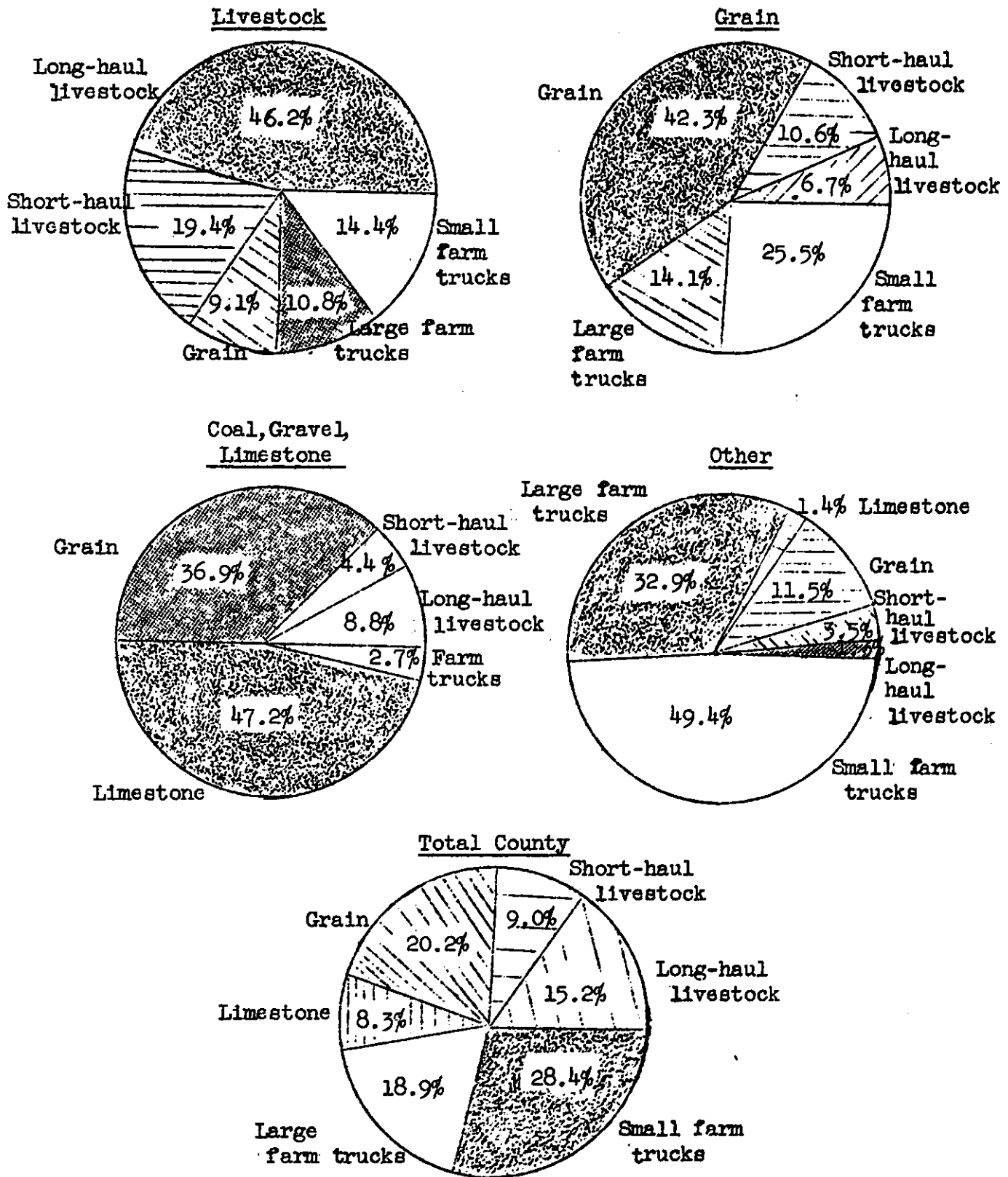


Fig. 3 - The Percent of Total County Truck Tire Miles Spent by Various Types or Sizes of Trucks Hauling Various Products, Henderson County, Illinois, October 1942.



The data in Table 3 are shown graphically in Figure 2 in order that they may be more readily understood. Figure 3 shows how the trucking of each different product, as well as the total of all products for the county, was divided between the truck groups.

Tire-Use Expectancy

As in previous surveys, truckers were asked how much mileage was estimated as remaining in each of their tires, both load and spare. This estimated mileage, divided by the miles driven during the preceding 12 months, gives a uniform basis for measuring use expectancy as shown in Table 5.

Table 5.- The Number of Tires Expected to be Worn Out at the End of Specified Intervals by Type of Commercial Trucks Hauling Farm Products, Henderson County, Illinois, October, 1942

Months	Livestock						Grain		Limestone		Total all		
	Chicago No.	%	Local No.	%	Total No.	%	No.	%	No.	%	No.	Cum. %	
Number trucks	7		12		19		27		7		53		
<u>Regular tires</u>													
Under 3 months	7	13.0	23	32.8	30	24.2	35	22.1	15	35.7	80	24.7	
3 to 5.9	23	42.6	8	11.4	31	25.0	22	13.9	7	16.7	60	18.5	43.2
6 to 8.9	22	40.7	6	8.6	28	22.6	14	8.9	4	9.5	46	14.2	57.4
9 to 11.9			10	14.3	10	8.1	21	13.3	8	19.1	39	12.0	69.4
12 to 17.9	2	3.7	7	10.0	9	7.3	33	20.9	4	9.5	46	14.2	83.6
18 to 23.9			6	8.6	6	4.8	20	12.6	4	9.5	30	9.3	92.9
24 to 35.9			6	8.6	6	4.8	8	5.1			14	4.3	97.2
36 and over			4	5.7	4	3.2	5	3.2			9	2.8	100.0
Total	54	100.0	70	100.0	124	100.0	158	100.0	42	100.0	324	100.0	
<u>Spare tires</u>													
Under 3 months	9	90.0	4	57.1	13	76.5	11	57.9	3	100.0	27	69.2	
3 to 5.9	1	10.0	3	42.9	4	23.5	3	15.8			7	18.0	87.2
6 to 8.9							2	10.5			2	5.1	92.3
9 to 11.0							2	10.5			2	5.1	97.4
12 to 17.9													
18 to 23.9							1	5.3			1	2.6	100.0
24 and over													
Total	10	100.0	7	100.0	17	100.0	19	100.0	3	100.0	39	100.0	

On this basis, at the end of six months 49.2 percent of all livestock truck load tires would be out of service, as would 36.0 percent on grain trucks, 52.4 percent on limestone trucks, or 43.2 percent on all the commercial trucks (Table 5). At the end of 12 months the following percentages of tires for the respective groups would be out of use: 79.9, 58.2, 81.0, and 69.4. Grain trucks were best situated as to tires, primarily because their mileage per month is much less than for the other groups of trucks.

On livestock and limestone trucks, spare tires were considered just good enough to bring a truck in. Grain trucks were in better shape as to spares.

Tire Replacements

On the basis of tire conditions as presented, the indicated necessary tire replacements for Henderson County commercial trucks in 1943 would be: 107 tires by January 1; 67 tires, January 1 - March 31; 48 tires, April 1 - June 30; and 41 tires, July 1 - September 30; or a total of 263 tires by or before September 30. In other words, 72 percent^{1/} of the truck tires in service at the time of the survey were expected to be worn out by the end of September. Accidents might increase this number. Conservation measures could reduce it.

Farm Truck Tires

Use expectancy was higher for farm truck tires than for others, as only 43.3 percent^{2/} were expected to be worn out within the ensuing 12 months, while 89.0 percent of the total were expected to be worn out by the end of 24 months. (Table 6)

For replacements on farm trucks, it appears that 560 tires would be required by September 30, 1943.

Table 6. - The Number of Tires Expected to be Worn Out at the End of Specified Intervals for Different Size Farm Trucks, Henderson County, Illinois, October, 1942

Months	Regular trucks			Pickup trucks			All farm trucks		
	No. tires	%	Cum. %	No. tires	%	Cum. %	No. tires	%	Cum. %
No. of trucks		79		132					
				Regular tires					
Under 6 mo.	62	15.6		101	19.1		163	17.6	
6 to 11.9	98	24.6	40.2	140	26.5	45.6	238	25.7	43.3
12 to 17.9	127	31.9	72.1	159	30.1	75.7	286	30.9	74.2
18 to 23.9	67	16.8	88.9	70	13.3	89.0	137	14.8	89.0
24 and over	44	11.1	100.0	58	11.0	100.0	102	11.0	100.0
Total	398	100.0		528	100.0		926	100.0	
				Spare tires					
Under 6 mo.	27	43.6		91	56.2		118	52.7	
7 to 11.9	11	17.7	61.3	30	18.5	74.7	41	18.3	71.0
12 to 17.9	19	30.6	91.9	26	16.0	90.7	45	20.1	91.1
18 to 23.9	5	8.1	100.0	10	6.2	96.9	15	6.7	97.8
24 and over	0	0.0		5	3.1	100.0	5	2.2	100.0
Total	62	100.0		162	100.0		224	100.0	

Return Loads

As a part of this study, a record of one week's operations by commercial trucks was obtained. The loads reported for the week included:

^{1/} This, in comparison with 62.3 percent for Douglas County (AE1982).

^{2/} In the Douglas County survey only 20.8 percent of farm truck tires were expected to be worn out within a year. Hills and graveled roads probably caused more rapid wear on tires in Henderson County.

14 livestock to Chicago--average, 230 miles one way
7 backhauls from Chicago--average, 230 miles one way
4 livestock to Peoria--average, 85 miles one way
2 backhauls from Peoria
6 coal (no load going)--average, 115 miles one way
7 livestock to Galesburg--average, 36 miles one way
3 backhauls from Galesburg--average, 45 miles one way
68 livestock to local points--average, 8 miles one way
141 grain to local points--average, 7.5 miles one way
83 limestone to local points--average, 14.5 miles one way

The livestock loads to Chicago involved an average of 12 extra miles for pickups; the Peoria loads, 10 miles for pickups. The two backhauls from Peoria required 26 miles additional driving to pick up the return loads; the three Galesburg backhauls required nine extra miles for the return loads.

There were backhauls from both Chicago and Peoria on 50 percent of the trips; feed was hauled from Chicago and coal from Peoria.

The importance of local hauling is indicated by the 141 loads of grain and 68 of livestock to local points.

Trucking Rates

Questions are frequently asked as to whether truckers have raised their rates. On the basis of information from truckers interviewed in this study, it appears that rates in Henderson County have been increased slightly during this year--livestock rates to Chicago are up $2\frac{1}{2}$ cents per cwt.; to Peoria, 3 cents; and to Galesburg, $2\frac{1}{2}$ cents. Charges for local livestock hauling are reported to be 25 to 50 cents higher per trip. Rates for grain hauling have been increased very little and are considered none too high in view of increased trucking costs.

Saving Truck Mileage

Data for 12 months' operations in Henderson County are too general to permit specific suggestions as to possible reductions in truck mileage. Doubtless all coal could be moved into the county by rail. Likewise, all livestock moving out of the county could go by rail, although this procedure would entail inconvenience for the northern third of the county.

Analysis of information covering the one week of truck operation (page 11) furnishes certain indications, although the trucking pattern may well differ for every week of the year. For that week, trucking of livestock to Chicago, Peoria, and Galesburg represented 52.6 percent of the total mileage by Henderson County commercial trucks, while hauling coal from the Peoria area (no loads going) represented 9.4 percent--a combined total of 62.0 percent of the total mileage. So if the tire shortage became extremely acute, a considerable saving could be made by limiting Henderson County trucks to operations within the county. Mileage reductions for a year could not be estimated without having data for other seasons.

A County Transportation Program

The necessity for tire conservation and truck conservation is obvious. The problem is how to accomplish them. Federal officers can issue orders and establish the over-all pattern, but how effectively tires are conserved will depend upon local initiative and cooperation.

A functioning transportation committee in a county, representing all groups interested in the transport of farm commodities, should:

1. Meet regularly.
2. Keep informed on all important matters affecting transportation of farm products within and to and from the county.
3. Seek efficient use of trucks by farmers.
4. Discourage hauling of part loads by farm trucks; encourage joining with a neighbor to make up a full load, or having the part load hauled by a commercial trucker who can handle it.
5. Urge farmers to list livestock with truckers 48 hours in advance (or more in the case of single animals or odd lots) to enable truckers to plan their loads.
6. Encourage truckers to insist on more efficient use of trucks by:
 - a. Hauling full loads. (Too many trucks are now hauling part loads to local markets and to auctions.)
 - b. Minimum driving in making pickups.
 - (1) Pick up only when enough is available to make up a full load.
 - (2) Do no out-of-way driving for any pickup of less than 1,000 pounds. Ask farmers to bring smaller lots to the trucker's route.
 - c. Absolutely avoid overloading tires--especially with grain, limestone, and coal.
7. Inform truckers as to ODT tire-load capacity ratings.
8. Publicize careless use or abuse of trucks or tires in local newspapers and by radio. It is not necessary to mention names. Just tell what was done, when, and the other circumstances. Public opinion is the most effective enforcer; help it to operate.
9. Make recommendations for more effective use of existing transportation setups.
10. Encourage coordination between rail and truck transportation wherever and whenever practicable.
11. Anticipate inadequacies in the county's transportation service because of shifts or changes and be prepared to meet them effectively.

As stated previously, federal agencies can give information as to the facts of the situation, can make suggestions as to what should be done, and can issue orders. How successfully their suggestions and orders are carried out will depend upon local understanding, initiative, and cooperation.

Summary and Conclusions

1. Henderson County is primarily a farming area.
2. This survey included data on 53 commercial trucks and on 211 farm trucks.
3. The trucks, both commercial and farm, were in relatively good condition.
4. Trucks show a broad use pattern. Throughout the year, both commercial and farm trucks hauled a variety of farm products.
5. Of the total truck tire miles used in hauling commodities from and to Henderson County farms during the past year, commercial trucks accounted for nearly 53 percent, or 10 $\frac{3}{4}$ million, tire miles and farm trucks for 47 percent, or 9 $\frac{2}{3}$ million, tire miles.
6. On-the-road tires on commercial trucks were not too good-- 43.2 percent were expected to be worn out within 3 months; 69.4 percent within 12 months.
7. On farm trucks only 17.6 percent of on-the-road tires were expected to be worn out within 6 months and 43.3 percent within 12 months.
8. Trucks hauling to Chicago and to Peoria reported return loads on half the trips.
9. Trucking charges have been raised but little during the past year.
10. About 15 percent of the total truck tire miles were used to haul livestock to points outside the county.
11. Undoubtedly economies could be effected in the use of farm trucks, which used 47.3 percent of the total truck tire miles, by cutting out nonessential driving and by better planning of essential driving.
12. Although truck and tire conservation must be carried out by individual truck owners and operators, such conservation can be stimulated by effective county transportation programs.