CHARACTERISTICS AND COST OF OPERATION OF NORTH DAKOTA'S FARM TRUCKS

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In comparison with the other modes of transporting North Dakota's agricultural products (e.g., railroads) transportation via farm truck has received little analytic attention. However, in light of transport deregulation, rising fuel prices, the introduction of new grain marketing techniques, etc., research of farm truck operations is imperative. The results of this study can be used by government policy-makers, private industry, and farmers for making appropriate decisions in each of their interrelated activities.

The general overall objective of this study was to review and evaluate the present performance and role of farm trucks in the marketing of North Dakota's agricultural products. More specifically, this overall objective includes analysis of costs, various operating characteristics, as well as providing managerial information to farmers in North Dakota.

To fulfill these objectives, 25 percent or 5,000 of the estimated 40,000 farmers in North Dakota were randomly sampled. The survey form included several questions relating to both cost and operation of farm trucks. Of the 5,000 farmers sampled, 988 returned survey forms which comprises the data base of this study. The data was divided in two general forms–by type of truck and by size of farm. With respect to the former there were three possibilities: 1) farms with only single axle trucks; 2) farms with only tandem axle trucks; and 3) farms with both single and tandem axle trucks. As shown in Table 1, farms with only tandem axle utilized trucks substantially more than either farms with only single axle trucks or farms with both single and tandem trucks. As expected, the average payload of tandem axle trucks was much higher than either single axle or mixed operations. Finally, tandem axle trucks were significantly "newer" than were the averages of either solely single axle or mixed operations.

TABLE 1. CHARACTERISTICS OF THE INDUSTRY, BY TYPE OF FARM TRUCK OPERATION					
VEHICLE TYPE	MILES TRAVELED	AVG. LENGTH OF HAUL	AVG. PAYLOAD (BUSHELS)	# OF TRUCKS	YR. OF TRUCKS
Industry	5,162	11.7	312	1.94	61.6
Single axle	4,270	11.5	278	1.83	59.9
Tandem axle	11,979	10.6	543	2.00	70.6
Mixed Operations	8,170	12.7	434	2.46	68.1

The data segmented by size of farm was subdivided into five categories as shown in Table 2. As one might expect there is a steady progression between size of farm and both total annual miles and the number of trucks. In addition, there exists positive relationships between size of farm and both the average manufacturing year and average payload of the trucks used in the farm operation. However, there appears to be no relationship between the one-way distance to the elevator and the size of farm.

TABLE 2. CHARACTERISTICS OF THE INDUSTRY, BY SIZE OF FARM					
FARM SIZE IN ACRES	MILES TRAVELED	AVG. LENGTH OF HAUL	AVG. PAYLOAD (BUSHELS)	# OF TRUCKS	YEAR OF TRUCKS
0- 250	3,005	12.7	235.8	1.43	55.3
251- 500	3,599	11.9	271.8	1.73	60.5
501- 750	4,800	11.5	316.7	2.00	61.3
751-1,000	5,392	11.1	339.6	2.04	62.1
OVER 1,000	9,193	11.2	397.9	2.48	67.7

Average total costs per mile were estimated using a statistical procedure (regression analysis) whereby the estimated costs were obtained through their relationships to total annual miles, one-way distance to elevator, average payload, number of trucks used in the farm operation, and age of equipment. In addition, statistical procedures were used to distinguish among solely single, solely tandem, and mixed operations. The results indicated that there was significant relationships between average total costs per mile and all variables above except the one-way distance to the elevator. These relationships are summarized in Table 3.

TABLE 3. EXPECTED AND OBSERVED RELATIONSHIPS OF OPERATING CHARACTERISTICS AND AVERAGE TOTAL COSTS PER MILE

VARIABLE	EXPECTED	OBSERVED
Total annual miles	–	–
Distance to elevator	–	–
Average payload	+	+
Number of trucks	+	+
Age of equipment (60, 61, . . .)	+	+

Estimated costs for type of truck categories and farm size categories are depicted below in Table 4. The most notable disparity of estimated costs by type of operation was the 23 cent difference between solely tandem and solely single axle truck operations. However, this can be resolved by an analysis of several factors. For example, the dependent variable is average total cost **per mile** not **bushel mile**. Since tandem axle trucks carry about twice the payload of single axle trucks, one could infer the average total cost per bushel is less for tandem truck operations than for single truck operations.

In addition, it appears that average total costs per mile for tandem axle trucks is higher than solely single axle trucks due partially to age of equipment. Single axle trucks are about ten years older on the average than tandem axle trucks. Old equipment may have higher operating costs but capital costs are substantially lower than newer equipment.

TABLE 4. ESTIMATED PER MILE COSTS FOR THE INDUSTRY BY TYPE OF FARM TRUCK OPERATION AND BY FARM SIZE

VEHICLE TYPE		COST PER MILE	
Industry		$1.038	
Single axle		1.013	
Tandem axle		1.266	
Mixed operations		1.215	
1973 Survey		72¢	
FARM SIZE IN ACRES	**# OF FARMS**	**%**	**COST PER MILE**
0- 250	70	14	$ .992
251- 500	140	29	1.088
500- 750	100	21	1.099
751-1,000	82	16	1.104
Over 1,000	96	20	1.041

In short, larger firms tend to travel more and have newer equipment. There appears to be a movement toward newer tandem trucks which on the surface appears to be less efficient but in fact could be more efficient. Finally, with the cost evidence provided here and in the paper it is hoped farmers can make appropriate managerial decisions; e.g., equipment purchasing decisions, and time, cost tradeoffs with elevators' price quotes.