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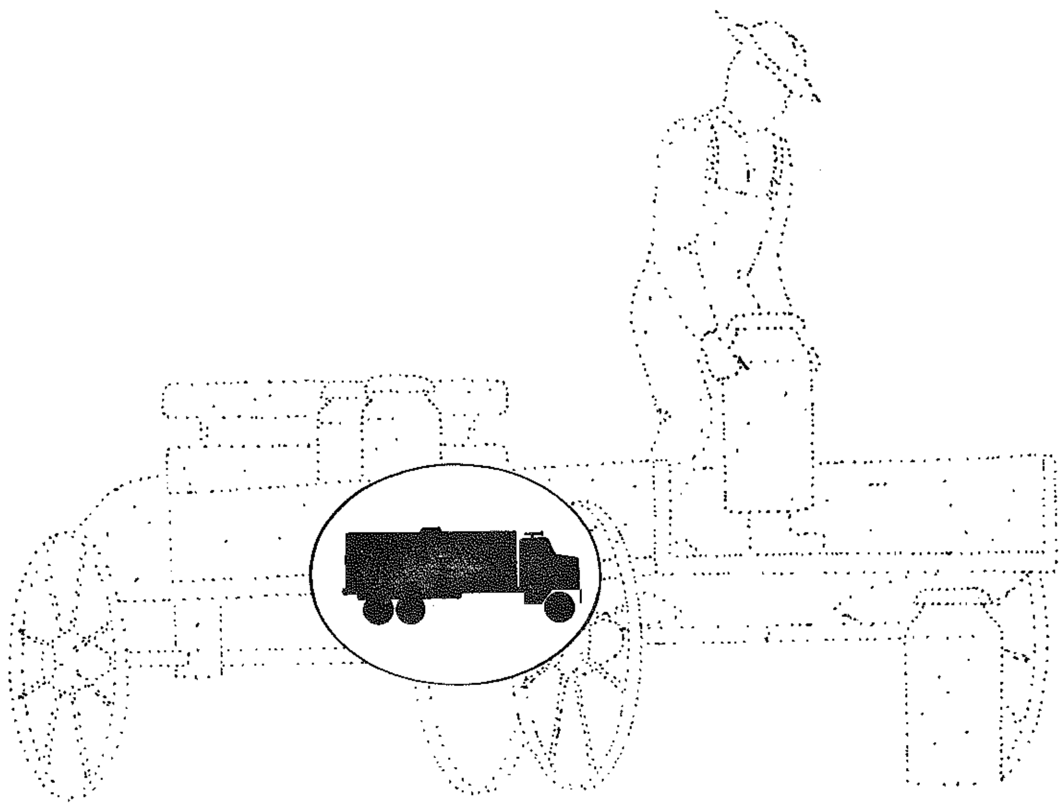
AN ANALYSIS OF THE ORGANIZATION AND STRUCTURE OF BULK MILK ASSEMBLY IN THE WESTERN NEW YORK STATE ORDER MARKETS WITH RECOMMENDATIONS FOR IMPROVING TRUCK PRODUCTIVITY



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INTRODUCTION

Following several decades of rapid technological change in agriculture, it is possible to gain some perspective on the current system by looking at the past. Milk assembly is an example of how this retrospective can be useful. The evolution of milk assembly in New York including the eras of farm separation and delivery, can routes and finally bulk assembly has been very recent, and well within the memory of many dairymen. In fact, the final conversion to bulk assembly was completed in New York State only within the past three years. Thus it is not surprising that the assembly routes used today in Western New York have their origins with can routes.

The gradual transition from system to system has made it possible to operate without any dislocations. However, there has been little effort in recent years to reorganize the bulk milk assembly routes with the aim of achieving a least-cost assembly system (see Roof and Tucker pp. 1-2). During the 20-year transition period the efficiencies realized through the conversion from cans to bulk milk assembly made it possible to keep hauling costs relatively low. Thus for a considerable period the rate was approximately 25 cents per hundredweight.

The OPEC price increases for oil in 1973-74 and 1979-80 and the concurrent rounds of general inflation have changed this situation. The general transportation cost has moved up sharply - 23 percentage points from 1975-78 (Bur. Lab. Stat.). Because of the higher fuel usage and abnormal stress put on trucks used in milk assembly due to the frequent stops and varying road conditions, actual cost increases for this industry may exceed the level of the general index. In fact, partial cost figures from Western New York indicated an increase of 42 percent between 1972-76 (Western New York Hauling Committee). In some cases these cost increases have been instrumental in the loss of a market for some small and/or remote producers. In other instances where the actual costs are not yet totally reflected in hauling rates, the day of reckoning may still be coming when a hauler lacking sufficient reserves to replace worn out equipment withdraws from the industry.

In all cases it is clear that inefficiencies which existed in the bulk milk assembly system in past years can no longer be tolerated. These inefficiencies may be large. For Wisconsin an efficient assembly system was estimated to reduce route miles for all milk by 21.8 percent of actual route miles in 1977 (Lamb p. 21). If the average cost for driving the excess miles under the current route system is fifty cents to one dollar per mile, then the additional cost borne by the industry is in the range of $2.5 - 5 million annually. This estimate provides only an approximation, but it does suggest the scope of the inefficiencies currently tolerated within the bulk-milk assembly system, at least in Wisconsin. No similar study has been completed in areas other than Wisconsin, so the degree of routing efficiency or inefficiency for other dairy areas is unknown. The Wisconsin figures may or may not be representative on a national basis. There is, however, no reason to believe that Wisconsin has a substantially less efficient system. In fact, a two-day survey of bulk-hauling routes in the New York State order markets of Buffalo and Rochester during July and August of 1966 concluded that: "There is a wide variation in the productivity of bulk-milk routes in both the Rochester and Niagara Frontier markets. Some haulers in both markets had highly productive routes while other haulers in both makrets had relatively unproductive routes (Committee for the Study of Milk Orders p. 32).

Why is there such variability in the efficiencies of these routes? What types of changes would provide the greatest and quickest benefits? How can changes best be instituted by restructuring, new hauling policies, rate incentives or a combination of these? Answering these questions requires a detailed knowledge of the existing system, identification and evaluation of hauling bottlenecks, and an analysis of the feasibility of correcting them. The purpose of this report is to provide preliminary answers for these issues for Western New York. It is composed of two parts. The first part reports the results of two surveys in the New York State order areas, while the second part analyzes the survey results, identifying the principal inefficiencies in the system and recommending improvements.

The average volume per pickup and the distance between the farm are indicators of the density of milk production in an area. Generally higher densities of production favor the potential for greater route productivity. Additional factors influencing the degree of productivity are seasonality of the milk supply, the transport distance to the plant after completion of assembly and the dispersion of farms among competing handlers. Western New York has several of these characteristics which favor relatively high assembly productivity. For example, during 1978 the weighted average deliveries in the two New York State order markets was 2,179 pounds per day per farm (N.Y. Dept. Ag. and Mts.). This was forty percent greater than the 1,501 pound average delivery in the Federal Order 2 market which includes Eastern New York (Market Administrator's Bulletin). Nearness to the two major fluid milk markets of Rochester and Buffalo as well as the dominant market position of three cooperative handlers who account for over 95 percent of the milk supply are factors that should favor a relatively high degree of hauling efficiency. Thus the conclusions presented here are specific to the Western New York area, although they do provide a comparative basis which may be helpful in analyzing conditions in other areas.

Source of Data

The data used in this study were collected from two successive surveys made of bulk haulers in the Niagara Frontier and Rochester marketing areas. The two surveys, conducted during July 18-24, 1977 and June 6-11, 1978 are intended to provide insights into the differences in hauling patterns during the spring peak production period and the "normal" production months. Milk production in the Western New York markets over a five year period from 1970-75 rose on the average of 12 percent from the short months (August-November) to the "flush" months (March-June). The survey results are considered to be generally representative of the hauling situation given the seasonal variation that exists between these two distinct periods. Year-to-year and month-to-month variations in producton can bias data collected over a one-week period in two successive years. Thus, while the survey data appears to be representative of the hauling situation during 1977 and 1978, consideration should be given to the 3.5 percent increase in production from 1977 to 1978, and judgment should be used in interpreting the results.

All of the haulers in the state order areas were asked to participate in the surveys, which were conducted jointly by the Western New York Dairy Cooperatives (Dairylea, Upstate and Niagara Milk Producers) and the New York State Cooperative Extension service at Cornell University. Following preliminary informational meetings with haulers, an instructional session was held with cooperative field staff who provided direct assistance in the distribution, collection and general supervision of the survey over the seven-day periods.

Each truck was provided a packet of 7 cards (one for each day) on which the driver recorded route odometer miles and time for various portions of the route (Appendix 1). The route segments included time and mileage when leaving garage, arrival at first farm, leaving last farm, arrival at plant, leaving plant and arrival home or at first farm of second route. In addition the participating haulers provided data on the equipment used, including age, chassis and tank size, number of axles, pumping rate and type of fuel, and on milk volume delivered. By comparing the tank size and delivery data it was possible to calculate capacity utilization for each route.

Approximately 90 percent of the returned data cards were sufficiently complete to be useable for most data categories while 10 percent of the cards were excluded from the analysis because of incomplete or questionable information. There is no reason to believe that the routes with incomplete data differ in any systematic manner from routes which were completely documented.

OVERVIEW OF THE HAULING SYSTEM

The assembly of bulk milk consists of traveling to a producer's farm, positioning the truck at the milkhouse, connecting the hose, agitating the milk in the bulk tank, sampling the milk, pumping from the bulk tank into the truck, and transporting to the milk plant for processing or reloading for long-distance hauling. Route operations may be expressed in terms of time spent or miles driven in performing specific functions. A daily routine of the driver may be categorized into four functions: (1) time spent assembling the milk, (2) loading and unloading, (3) travel time to and from the plant called transport time, and (4) plant time. Also included in transport time is travel to the first farm and from the plant back to the garage, or to the first farm on the next route if more than one route is run daily. Assembly time covers travel between farms, including routine chores associated with stopping at a farm and pumping time. Finally, plant time is the period from arrival at the plant until leaving it. It includes time spent waiting to pull into the unloading bay as well as pumping out the milk and washing the tank after the last load. Tanks are generally not washed between loads on the same day. Personal time for the driver such as meals and rest stops are included in the normal daily routine and are allocated to transport or assembly time when they occurred during those phases of the operation.

On occassion, drivers held a load overnight due to congestion at the plant and unloaded and washed the tank first thing the following morning. In these instances, plant time was allocated arbitrarily between the overlapping routes.

A similar classification of transport and assembly components was used in allocating route miles.

Handler Characteristics

The principal handlers receiving milk within the two market areas included Dairylea Cooperative, Upstate Milk Producers Cooperative and Niagara Milk Producers Cooperative. Cooperative producers accounted for all the milk in the Niagara Frontier market and 90 percent in the Rochester market. Milk also moved to several proprietary manufacturing plants within and outside the production area. Participating haulers moved milk to a total of 32 individual locations over the period of the study.

Hauler Characteristics

There were 41 haulers at the beginning of the study in 1977 and 40 in 1978 who had trucks that were included in the surveyed. Several haulers had trucks in addition to those operating within the surveyed area. Eighteen (44 percent) of the haulers operated only 1 truck, while 8 operated 2 trucks. These two sizes accounted for 62 percent of the haulers within the survey area. Additionally, twelve (29 percent) operated either three or four trucks and three (8 percent) were operating more than four trucks.

Truck Characteristics

In July 1977 truck data were received for 87 trucks. Tank capacity ranged from 2,000 to 5,600 gallons, with 64 percent of the tanks between 3,500 and 4,000 gallons.

Distribution of Tank Size Ranges, July 1977

Capacity	(gal.)	No. of Trucks	Percent
Less than	3,500	18	21
	3,500-3,749	10	11
	3,750-3,999	12	14
	4,000	34	39
More than	4,000	13	15
		87	100

The average age of the truck fleet was 4.3 years in 1977 and 4.7 years in 1978, and they ranged from new to 18 years old. In 1977, 53 trucks were fueled with gas and 34 with diesel. By 1978, 38 trucks were diesel and 48 gas fueled. There is an ongoing trend toward diesel and away from gas, particularly for trucks in the 4,000 gallon plus category (Appendix 2).

ROUTE CHARACTERISTICS

The route characteristics that are identified and surveyed in this study are those that directly impact on the productivity of a truck and can be useful in identifying inefficient, high-cost situations.

Total Route Time

This includes all of the functions associated with milk assembly and delivery. It begins when the truck leaves the garage and is completed when the truck either returns to the garage or begins a second route. The combined average route time for the two survey periods was 6 hours with two-thirds of the routes falling between 4 and 6 hours (Figure 1). The range in total route time was from less than one hour to more than ten hours.

Analyzing the two periods separately, the mean average route time was 6.5 hours for July and 5.75 for June (Table 1). The difference in route time may also be expressed as the variability in frequency of the groupings in the figure. During July 57 percent of the routes were less than 6 hours, while in June only 44 percent fell into this category. It should be noted however that there was a greater incidence of loads in the 1 to 3 hour range during the flush which can be attributed to an increase in the number of partial or slop loads during this time of year when a truck often has insufficient capacity to collect all the milk on a route in one trip. All trucks running more than 6.5 hours per route picked up only one route per day. Those running multiple routes tended to average less than 6 hours per route.

In July, 27 percent of the routes averaged more than 6.5 hours while 36 percent operated this long in June. In total for the two periods less than one-third of the routes took longer than 6.5 hours. Average route time below 6.5 hours is significant because operating times greater than this normally precludes multiple routes-per-day operations. Over the two periods the average number of

Table 1: Summary of Western New York Hauling Surveys

Item	July 1977	June 1978	Survey Averages	Per Route	Per Day
Number of Loads	769	702	736		105.1
Number of Trucks	90	86	88		88
Average Age of Truck	4.3 years	4.7 years	4.5		
Percent Utililization	80.0	92.3		84.4	101.3
Loads/Day	1.2	1.17	1.185	1.0	1.2
Total Route Time	6.5 hours	5.75 hours		6.125	7.35
Number of Stops	8.6	8.1	8.35	8.35	10
Lbs./Route	27,139	30,847	29,043	29,043	34,851
Assembly Time Hours	3.56	3.8		3.68	4.41
Wait Time (minutes)	3.15	15.00		9	10.8
Total Miles	86.8	101.6	92.4	92.4	112.0
Assembly Miles	31.8	43.5	37.65	37.65	45.18
Lbs./Stop	3,156	3,821	3,489	3,478	3,485
Lbs./Day	32,567	36,208	34,387		34,851

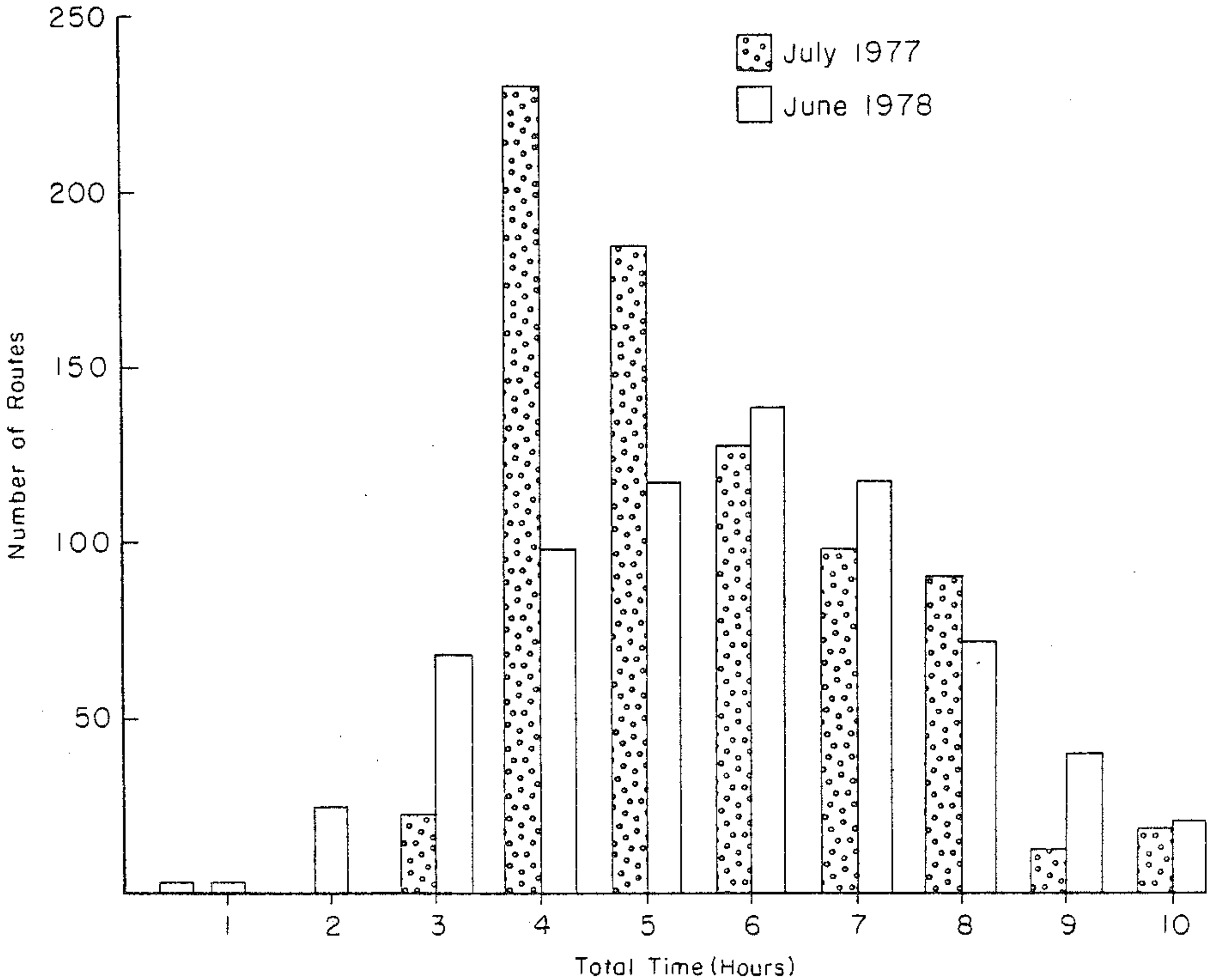

FIGURE 1. TOTAL ROUTE TIME

routes per day was 1.2 (Table 1), suggesting that there is an unrealized potential for increasing the number of routes per day for many trucks. Trucks hauling only one load per day and operating less than 7 hours are high-cost operations because the fixed costs are allocated across too few pounds of milk as the truck is being underutilized.

Assembly Time

This time begins when the truck pulls into the driveway at the first farm and ends when it leaves the last farm. The assembly function for the combined periods took an average of 3.7 hours of the total 6 hours route time over the combined periods. The two periods were remarkably uniform in assembly time, averaging 3.6 hours in July and 3.8 hours in June (Table 1). Fewer stops, more milk per stop and increased assembly miles were offsetting factors during June producing the similar average between the two periods even though the range in June was greater than in July (Figure 2).

Assembly time appears not to be a major factor in explaining differences in total route time between the peak and normal production periods.

Total Route and Assembly Miles

Total route miles varied considerably for the two periods, from an average of 87 miles in July to 102 miles in June (Figure 3). Much of this difference can be attributed to the difference in average assembly miles over the two periods: 32 in July and 43.5 in June (Figure 4). An increased number of everyday pickups during the heavy production period disrupted regular routings and made it more difficult to put together low mileage routes. This has the effect of increasing the variable costs per pound delivered, while the greater volume during this period reduces the unit fixed costs.

The higher total route mileage also reflects greater transport mileage resulting from diversions to alternate fluid or balancing plants. Short mileage,

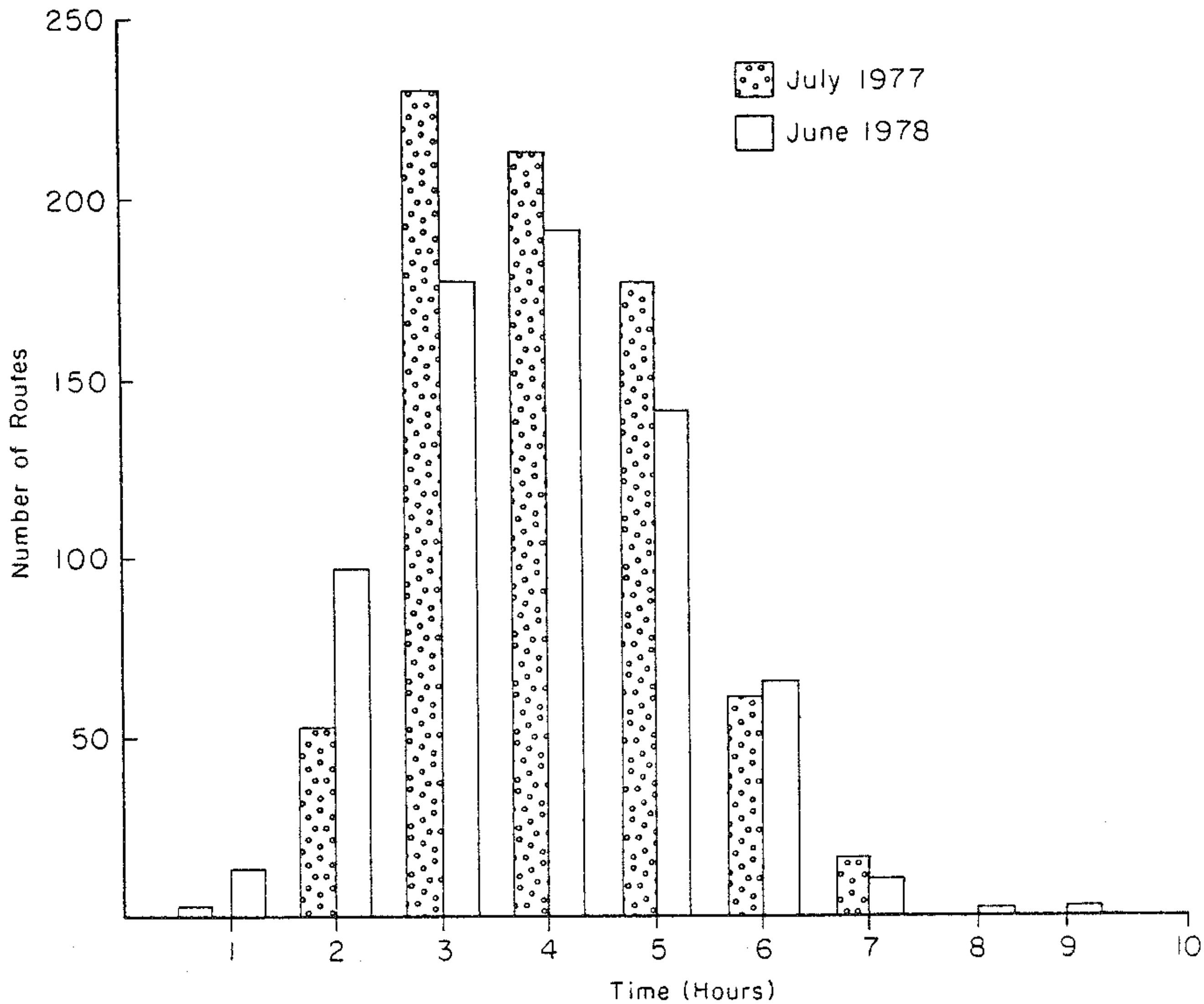

FIGURE 2. ASSEMBLY TIME PER ROUTE

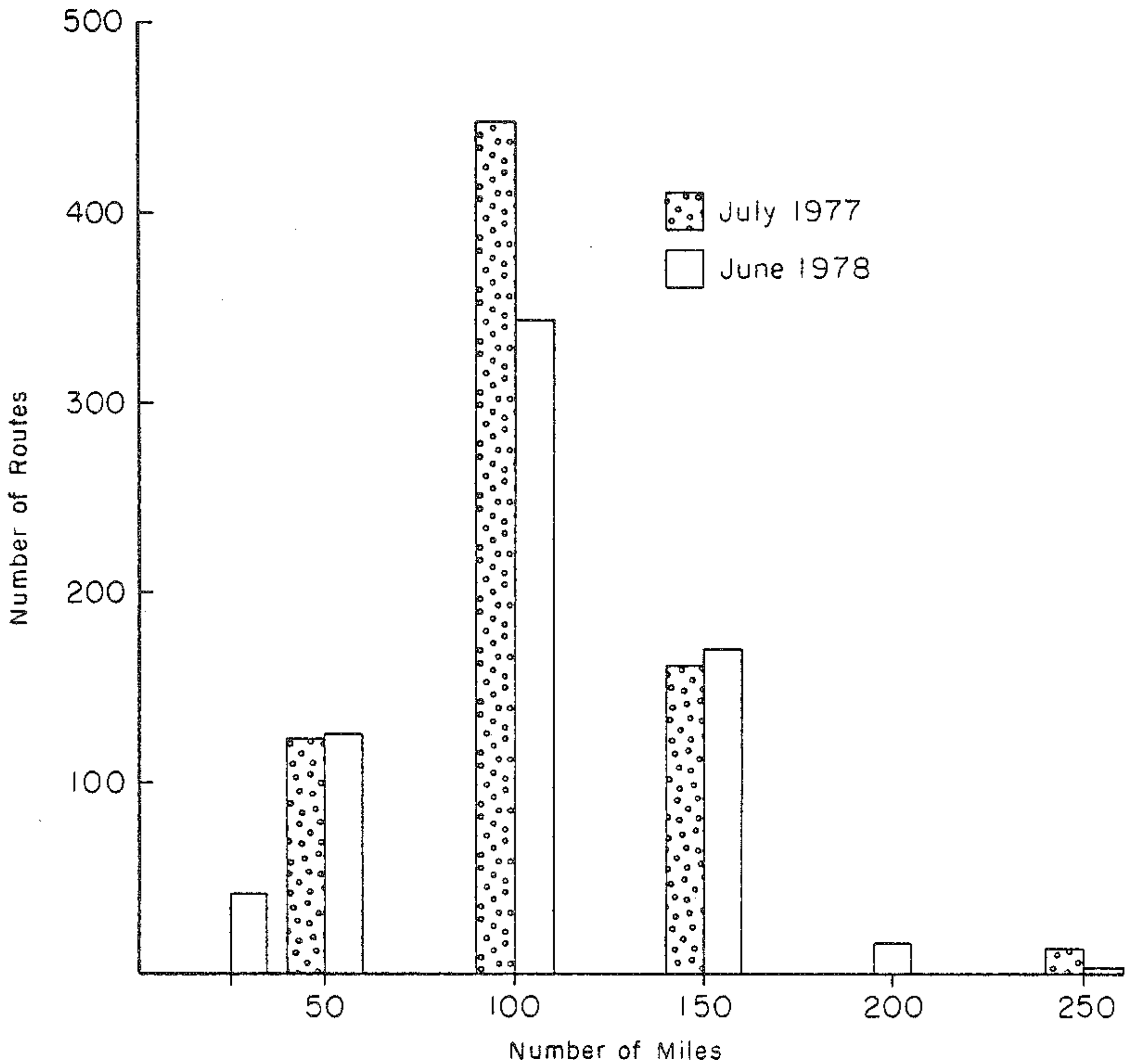

FIGURE 3. TOTAL ROUTE MILES

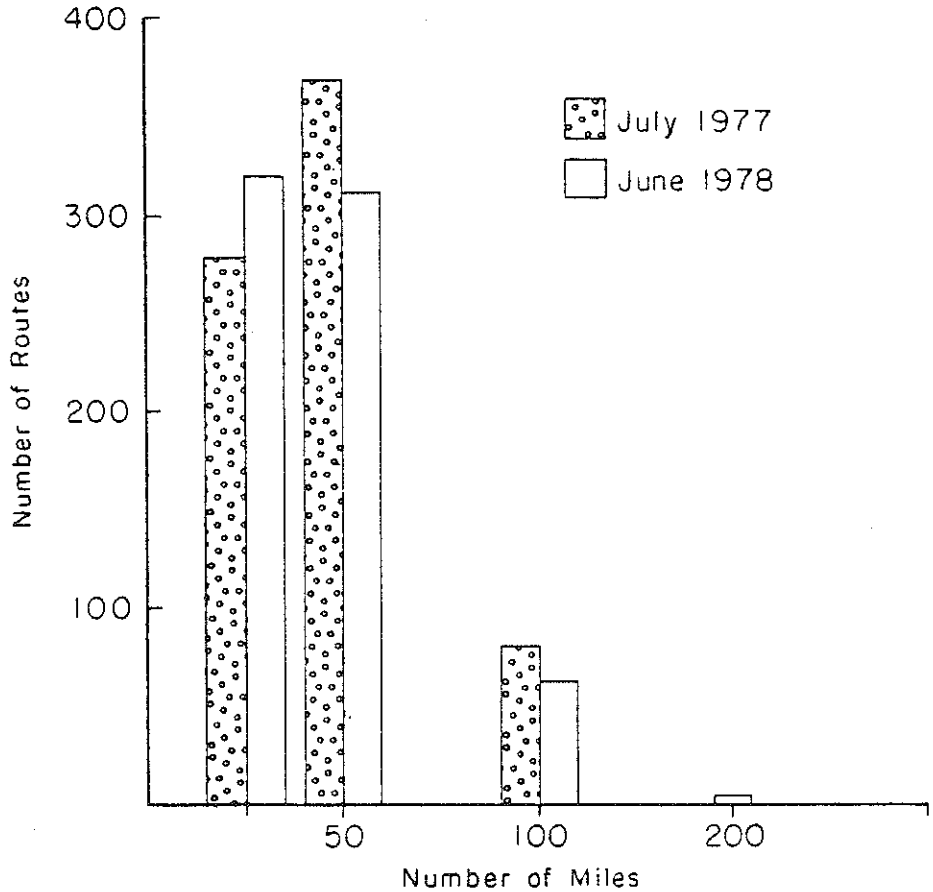

FIGURE 4. ASSEMBLY MILES

partial loads during the "flush" season tend to mask in the average the increased mileage resulting from hauls to more distant plants.

Pounds Delivered and Capacity Utilization

The average delivery per route for the combined survey periods was 29,043 pounds which represented an average capacity utilization of 84 percent The seasonal variation in deliveries between the two periods was considerable. During July the average load was 27,139 pounds, increasing to 31,000 pounds during June (Figure 5), giving average capacity utilizations of 80 and 92 percent, The need for additional hauling capacity during the peak production period is often given as a major factor for the generally low capacity utilization figures of many trucks throughout the remainder of the year.

Number of Loads Per Day Per Truck

The average loads per day per truck was 1.2 during July and 1.17 in June. The decline in routes per day during June can be attributed to inefficiencies associated with route organization and waiting time at the plant during the peak production period. The number of routes per day during both periods was substantially below the state-wide average for comparable equipment of 1.8 in 1980 (Anderson p.21). During July, 62 percent of the trucks hauled one load or less per day, and about half of the trucks hauled only one load per day. Of the remainder, 18 percent hauled 2 loads or more per day (Table 2). In June, multiple loads were indicated for 26 percent of the routes.

Table 2: Number of Loads Per Truck Per Day, July 1977

Average Loads/Day	No. of Trucks	%
3	1	1
2	15	17
1.5	18	20
1	50	55
.5	6	7
	90	100

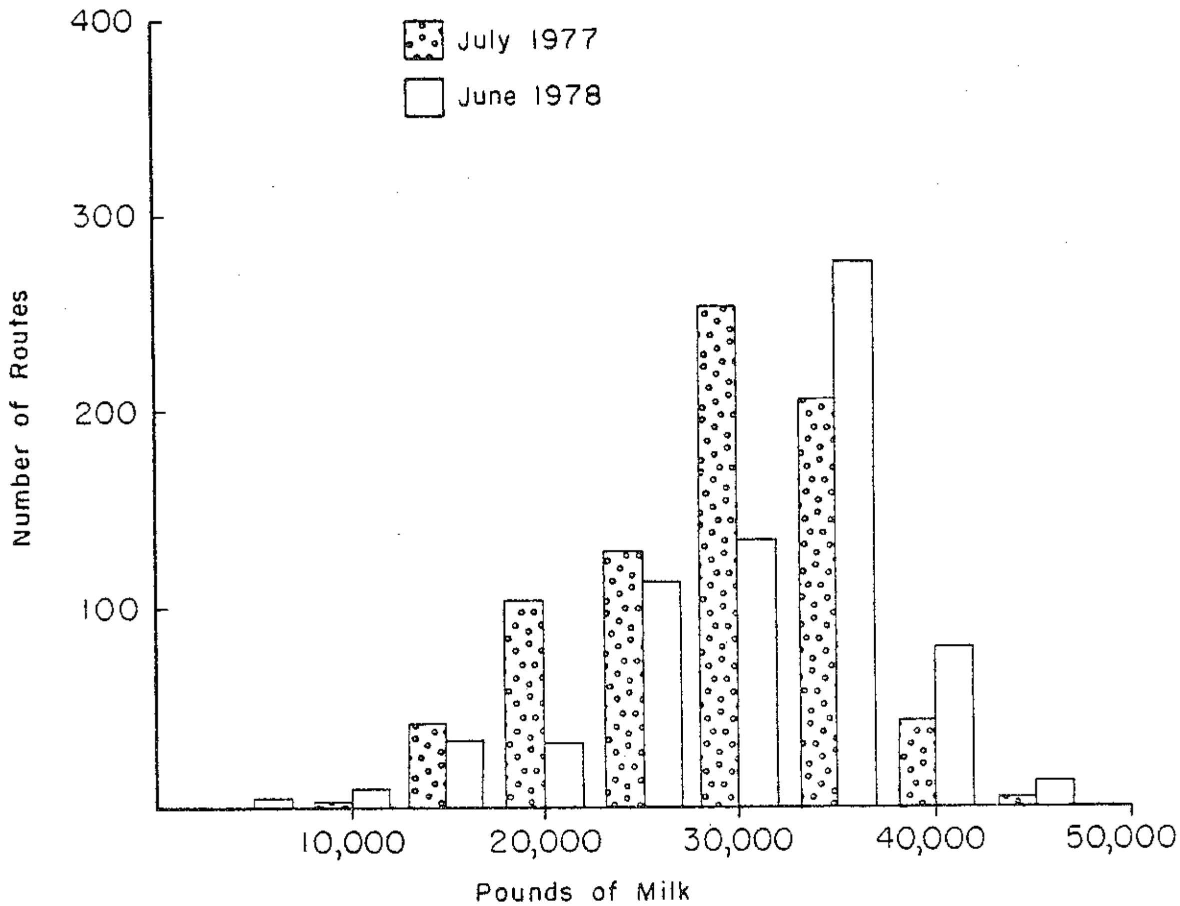

FIGURE 5. POUNDS OF MILK DELIVERED PER ROUTE

Waiting Time at Plant

Waiting time at the plant was determined as a residual from total plant time after allowing an average of 30 minutes for unloading and 30 minutes for washing the tank for a total working plant time of one hour. The 60 minute average per load working plant time is somewhat more than needed because trucks carrying multiple loads are washed only once after the last load. Thus the survey's waiting time calculations are underestimates. During July, average plant time was 63 minutes with 72 percent of the routes spending from 45 to 75 minutes at the plant. After subtracting the 60 minute working time there was no significant waiting time apparent during this period of the year. The June survey, however, indicated significant amounts of truck time spent waiting at the plant. Twenty-six percent of the routes waited 30 minutes or more to get unloaded during this period. Waiting time in June varied considerable between plants, with some plants having virtually no waiting problem. The most serious problem existed at the O-AT-KA plant in Batavia. At this plant 39 percent of the loads waited 30 minutes or more before unloading. Twenty-eight percent waited more than 1 hour and 9 percent waited more than 2 hours, and there were several occassions when trucks waited 4 to 5 hours. As previously noted long and unpredictable waiting times limited the opportunities for multiple daily routes in June.

ANALYSIS OF HAULING SYSTEM INEFFICIENCIES

The analysis of the current assembly system in Western New York led to the identification of the following sources and symptoms of inefficiencies in the system:

1. Underutilization of truck capacity,
2. Excessive waiting time at some milk plants during the flush period,
3. Excessive number of trucks operating a single route per day,
4. High seasonal variations in the milk supply,
5. Small size of many contract hauling firms,
6. Travel impediments on the highway or in the farmstead, and
7. Route scheduling.

Many of these factors are interrelated. For example, capacity is often underutilized because of the number of single daily route trucks in the system and the need to maintain sufficient capacity for the flush period. The limited number of daily routes is in turn related to delays at the milk plant, the number of everyday farm stops and delays at the farm. Shorter operating days are also attributable to the number of smaller firms which do not have specialized managers and mechanics and must reserve a portion of each day to perform these functions. Thus, improvements in the efficiency of the existing system will require changes in several aspects of its organization and management.

Recommendations

1. Differential Hauling Fees: Hauling policy should encourage the movement to every-other-day pickup as rapidly as possible. This can be accomplished by incorporating additional financial incentives, such as a two-tier stop-charge for everyday and every-other-day shippers, in the hauling fees schedule.
2. Plant Waiting Time: Extended waiting periods at plants occur during heavy production periods and over holidays when additional milk is diverted to balancing plants where there are insufficient unloading bays to handle the additional traffic. This often happens between the hours of 11 a.m. and 3 p.m. when many trucks complete their routes. It is difficult to assess what costs these delays impose on the system. Much of the direct cost is borne by the contract hauler who is paid by the hundredweight and receives no additional compensation for waiting time. However, a waiting truck is obviously unavailable for hauling purposes, so additional truck capacity is maintained to insure the completion of assembly during these periods. This constitutes a substantial but unspecified expense for the system. One possible solution to the waiting

time problem is the addition of unloading bays if they can be cost justified. At present, the plant cannot justify them because the hauling system is absorbing the cost. One way of providing a reasonable cost allocation and incentive to improve efficiency would be to charge the plant demurrage when a truck is detained beyond a reasonable agreed upon period. Unloading capacity would then be expanded until the point where additional capacity cost equal the aggregate of waiting penalties. A less costly alternative for the plant and the system, if it is not already in use, is the scheduling of trucks into the plant over an extended day. This would involve the reorganization of farm pickup schedules to include evening or night pickups, an unpopular practice with some producers and haulers.

3. Length of the Day: Limitation on the length of the pickup day are imposed by producer milking schedules, habit, availability of additional hauling labor and road conditions. Extending the pickup day to permit evening and night pickups will become a necessity if greater flexibility in hauling schedules is to be achieved. This will require better communication between the producer, hauler and handler, and a more organized approach to route management.

4. Size of Hauling Operation: A structural characteristic of the Western New York hauling system and those in many other areas is the high percentage of one-and two-truck operations. The responsibility of the owner-operator to drive the route, service and maintain the truck on a seven-days-a-week basis takes up all the available time and opportunities to improve efficiency are severely limited. Spare equipment and relief labor may be more costly than the route can justify. Single-truck haulers need to consider some form of formal cooperative working arrangement such as a truck pooling with other haulers to permit route

flexibility and cost savings that multitruck operations normally enjoy. Cooperative handlers could work with haulers to maintain the integrity of the small operation by providing assistance with truck and route management.

5. Farm Related Time Restrictions: Haulers were requested during the surveys to note problems encountered at the farm. Many reported blocked driveways, waiting for farmers to finish milking and an assortment of other occurrences which increased stop time at the farm. While these are not general throughout the system, there are some producers who are habitual offenders and who thus severely limit efforts to improve efficiency on some routes. Isolated occurrences of this nature cannot be avoided and the cost is generally borne by the system. However, in situations where the hauler is obviously providing an additional service beyond what is normally expected, such as a late pickup when he has already driven past the farm, an additional charge should be applied that is commensurate with the time and mileage involved.

   The isolated, remote pickup that requires driving an additional distance beyond the norm presents another situation that may become very costly and for which a special charge may need to be levied. This solution although painful is preferable to refusing to pickup that milk altogether or raising everyone's rates to the point where efficiently located producers look for another outlet for their milk.

6. Route Management Limitations: Organizing and managing a hauling system for optimum productivity requires the time and skills of an experienced professional. The independent owner/operator of one or two bulk trucks is hard pressed to find time to analyze routes. In fact, as truck costs increase more rapidly, the smaller operator is finding it difficult

even to keep up with basic management and record keeping functions. In addition, the optimality of the entire system may not be assured by optimizing the efficiency of each route. What is required is a capability to make adjustments across routes, and this can be done only by the handler. Thus the cooperative or propretary handler must employ transportation managers who can both assist haulers and make needed adjustments in the entire system.

7. Seasonality of Supply: The seasonal supply increase of 12 percent imposes a substantial burden on the assembly and processing system. Extra capacity must be developed to carry this additional volume. One approach is to extend the length of the operating day, but due to several practical and preferential limits this has had limited application in the past. A second commonly used approach is to maintain excess capacity in the form of older trucks or partially filled trucks throughout most of the year. The cost of either method is substantial. One form of corrective action would be to impose on producers a special fee for seasonal volumes above their rest-of-year-average. This would help to discourage seasonal increases as well as educate the producer about how the costs of the hauling system are actually incurred.

CONCLUSION

Milk assembly is an essential part of the marketing process. The independent contract hauler who presently bears the burden for performing this function is under severe economic pressure. An annual average increase of 10 percent per year in capital requirements for trucks, a near doubling of interest rates and spare parts prices as well as energy related costs may put many truck operators in financial difficulties in the near future. Higher hauling rates will clearly be required in the future to cover these costs. But moderately higher rates themselves will not eliminate the threat imposed by inefficient routes and unproductive trucks to the overall stability of the industry.

The Western New York Dairy Industry should work toward a goal of two daily loads per truck or at least the 1.8 loads state average. While this may not always be feasible it should be implemented to the extent possible. As an indication of the per route potential savings, a cost analysis using the most recent cost data available for a 4,000 gallon straight-chassis truck operating a representative route in Western New York with one load per day had a total cost of 44.8 cents per hundredweight delivered. If a second load is run each day, total costs increase by approximately $21,000 annually, but through larger volumes the total cost per hundredweight is reduced by almost 13 cents and the total cost per mile by 10 cents, reductions of 29 and 8 percent, respectively (Figure 6).

This example may not be relevant for any particular route, but it does provide some insight into the potential cost savings at current prices that are inherent with improving the productivity of the hauling system. These savings will become even greater as transportation costs continue to climb.

Figure 6: Estimates Costs of Operating Single and Double Daily Routes

Cost Item	Single Route Value	Double Route Value
Fixed Costs		
Average Daily Route Miles	110	170
Average CWT Delivered Per Day	299	598
Truck Chassis Cost ($)	46000	*
Chassis Expected Life (years)	7	*
Chassis Salvage Value ($)	9200	*
Tank Cost ($)	18000	*
Tank Expected Life (years)	10	*
Tank Salvage Value ($)	3600	*
Insurance	1400	*
Registration Fees	280	*
Highway Tax	120	*
Interest Rate	.12	*
Miscellaneous Costs	1000	*
Driver Hourly Wage ($/hr.)	7.50	*
Hours/Day for Driver(s)	8	12
Variable Costs		
Miles Per Gallon	5	*
Fuel Cost ($/gallon)	1.10	*
Cost New Tire	200	*
Cost Recapped Tire	85	*
Number of Tires	10	*
Bias or Radial Ply Tires - Enter 1 if Radial, 0 if Bias	0	*
Ton-Mile Tax Rage	.017	*
Annual Maintenance	600	1200
Average Annual Repair in $/Mile	.075	.10
Miscellaneous Variable Costs	0	*

OUTPUT

Value Output	Single Route	Double Route
Total Annual Fixed Costs (TFC)	33885.96	44836
TFC/Mile	.844	.72
TFC/CWT	.310	.205
TFC/Minute	.193	.17
Total Annual Variable Costs (TVC)	15033	25058
Total Annual Costs (TC)**	48919.88	69894
TC/CWT	.448	.32
TC/Mile	1.22	1.12
TVC/CWT	.138	.115
TVC/Mile	.374	.40

*Indicates no change in input value.

**TC = TFC + TVC.

Source: Lesser and Wasserman, p. 5.

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APPENDIX I

Survey Forms

Instructions for Conducting
Western New York Milk Hauling Survey

1. There is one set of 8 cards per truck.

2. The cover card containing truck information on the back should be completed by the field supervisor.

3. The remaining seven cards are daily route records, one for each day of the survey. The packet of cards should remain in the designated truck and the regular or relief driver should complete the route information pertaining to each daily run.

4. It is important that drivers complete both sides of the daily route record.

   a. Mileage entries should be the complete odometer reading.

   b. In the event that milk from one load is delivered to more than one location, an additional entry can be made in the space designated (2nd Plant Name & Location). Pounds of milk delivered should be indicated in appropriate space as 1 & 2, if necessary.

   c. The information on the back of the daily route record describing problems that result in more than the usual stop or driving time is particularly important. Please provide as much detail as possible!

5. A copy of the daily weight slip should be attached to each daily route record.

6. Upon completion of the 7th day of the survey, the field supervisor should make arrangements for collecting all surveys and checking the information for completeness and readability.

7. The records will be picked up by Walt Wasserman on July 25 or 26 for tabulation and analyses.

8. A survey report will be made to all parties concerned by early fall.

MANY THANKS FOR YOUR HELP!

Milk Hauling Survey
Western New York
July 18-24, 1977

This study is being conducted by the Western New York Dairy Cooperatives in cooperation with Cornell University to determine the existing structure and organization of milk assembly in Western New York.

A similar study made more than 10 years ago is no longer appropriate.

We hope that an understanding of the existing system, its strengths and weaknesses, will permit haulers and producers to move towards a more efficient hauling system that will remain competitive in the face of continued cost inflation.

The study will be conducted over a period of 7 days in order to cover as many delivery points as possible in both the Niagara Frontier and Rochester Markets.

We sincerely appreciate your cooperation in collecting this information.

(over)

W.N.Y. MILK HAULING SURVEY
Daily Route Time and Mileage Record

Route ID:________________ Driver's Name:________________ Date:____________
(Name or No.)

Item	1st Load		2nd Load	
	Time	Mileage	Time	Mileage
Lv. Garage				
Ar. 1st Farm				
Lv. Last Farm				
Ar. Plant				
Waiting Time at Plant				
Lv. Plant				
Ar. Garage				
Plant Name				
Plant Location				
2nd Plant Name & Loc.				
Lbs. of Milk Delivered				
No. of Farm Stops/Load				
No. of Everyday Stops				

Note anything that added to time and/or mileage-lunch stops, breakdowns, detours, etc.

(over)

W.N.Y. MILK HAULING SURVEY

Truck and Tank Information: (To be filled in by office or fieldman)

Owner's name: ____________________ Address: ____________________

Make: ______________ Model Year: __________ Truck ID. No. ______________
(Ford, Chevy, etc.)

No. of axles: __________ Kind of fuel used: ____________________

Type of truck: __________ Straight; __________ Semi

Truck tank cap.: __________ gals.; Milk pump cap. __________ gals./min.

Weight of truck and tank ______________ lbs.
(empty)

Number of routes: (loads) __________ first day; __________ second day

No. of spare trucks owned: __________

If none, where does spare truck come from when needed? ______________

Route Characteristics: (cl. k those that apply)

Mostly Hilly: __________ Mostly Level: __________ Mostly Main Roads: __________ Mostly Secondary Roads: __________

Describe unusual conditions of driveway, gates, access to milk house, etc.:

____

____

____

____

Describe and identify stops with unusually long waiting time, delays, or late milkers that were passed by, and had to be returned to for pickup. Give cause for delay and if it was usual or unusual for this stop. Amount of additional time and/or miles involved.

____

____

____

____

Milk Hauling Survey
Western New York
June 6-11, 1978

Part II

Dear Hauler:

Last July most of you cooperated in a study of the milk assembly system conducted by the Western New York Dairy Coops in cooperation with Cornell University. As a result of your efforts, we were able to put together some very useful baseline information on how and where milk was being hauled during that week, and some of the problems that you encountered in getting the job done. A preliminary summary of that information has been made.

At that time many of you suggested that we should run another survey during the flush period to get a better feel for the conditions that exist then. We are following-up on that suggestion.

We realize that this maybe a more difficult time for you to assist us with a study, but the information is badly needed. In time, it will hopefully lead to improvements that will make your job easier and more rewarding.

Your help is greatly appreciated!

	1	2	3
Route I.D. No.	☐	☐	☐
Plant No.	☐	☐	☐

Daily Route Time and Mileage Record
(Please do not write in shaded areas)

Route I.D.:________________ Driver's Name:____________ Date: June____, 1978
(Name or No.)

Item	1st Load				2nd Load			
	Time		Mileage		Time		Mileage	
Leave Garage								
Arrive 1st Farm								
Leave Last Farm								
Arrive Plant								
Plant Pump & Wash Time								
Leave Plant								
Arrive Garage								
Plant Name								
Plant Location								
2nd Plant Name & Loc.								
Lbs. of Milk Delivered								
No. of Farm Stops/Load								
No. of Everyday Stops								

Comments on route conditions:

Time for meals, other/rest (1) stops from____to____ ☐ (2) from____to____ ☐

Route characteristics mostly: (1) Hilly ☐ (1) Main Roads ☐
(2) Level ☐ (2) Secondary Roads ☐

Place information on 3rd load or other occurrences that added to route time in the above space.

I.D. 1 2 3
Route J.O. No. ☐ ☐ ☐
Plant No. ☐ ☐ ☐

Daily Route Time and Mileage Record
(Please do not write in shaded areas)

Route I.D.:__________ Driver's Name:__________ Date: June_____, 1978
(Name or No.)

Item	1st Load Time		1st Load Mileage		2nd Load Time		2nd Load Mileage	
Leave Garage		21		27				
Arrive 1st Farm		33		84				
Leave Last Farm		44		69				
Arrive Plant		29		53				
Plant Pump & Wash Time								
Leave Plant								
Arrive Garage								
Plant Name								
Plant Location								
2nd Plant Name & Loc.								
Lbs. of Milk Delivered								
No. of Farm Stops/Load								
No. of Everyday Stops								

Comments on route conditions:

Place information on 3rd load or other occurrences that added to route time in above space.

Time for meals, other/rest (1) stops from____to____ ☐ (2) from____to____ ☐

Route characteristics mostly: (1) Hilly ☐ (2) Level ☐ (1) Main Roads ☐ (2) Secondary Roads ☐

Western New York Milk Hauling Survey

Truck and Tank Information (to be filled in by office or fieldmen):

Owner's Name: ______________________ Address: ______________________

Truck I.D. No.: ______________ Make: ______________ Model Year: ______________
(Ford, Chevy, Etc.)

Type of chassis: Straight 1 ☐ Semi 2 ☐

Kind of Fuel Used: Gas 1 ☐ Diesel 2 ☐

Number of Axles: (1) ☐ Single (2) ☐ Tandem (3) ☐ Tri (4) ☐ Tractor

Milk Tank Capacity: ☐ (gals.)

CCN ☐

APPENDIX 2

Truck Characteristics

SUMMARY OF TRUCK DATA

July 1977
41 Handlers - Total 94 Trucks

Size of Tank (Gal.)	No. Trucks
2,000	2
2,200	1
2,400	1
2,500	4
2,600	5
2,800	1
3,000	1
3,200	3
3,500	10
3,600	3
3,750	12
3,800	3
3,900	1
4,000	34
4,200	5
4,500	5
4,600	1
5,200	1
5,600	1
Total	94

Age of Truck (Yrs.)	No. Trucks
1960	1
1965	1
1966	3
1967	2
1968	3
1969	3
1970	4
1971	6
1972	13
1973	11
1974	13
1975	17
1976	5
1977	7
Total	89

Avg. 4.3 yrs.
Range 17 yrs.

Make of Truck	No. Trucks
Ford	21
GMC	7
Int.	30
Mack	9
Brock	7
Chev.	7
Reo	6
Auto Car	2
Total	89

Milk Pump Capacity

60 responses -
50 to 65 gal./min. - 80%
70 to 95 gal./min. - 20%

Type of Truck

86 - straight chassis
8 - tractor-trailer
87%- double axle

Fuel Used

gas - 52
diesel -34
Total 86

JUNE 1978 MILK ASSEMBLY SURVEY

MAKE	MODEL YEAR	AGE	FUEL USED
Chevy	72	6	Gas
Brockway	74	4	Diesel
Brockway	69	9	Gas
International	68	10	Gas
International	70	8	Diesel
International	70	8	Diesel
Brockway	66	12	Diesel
Brockway	74	4	Diesel
International	66	12	Gas
International	70	8	Diesel
Dia Reo	71	7	Gas
GMC	78	0	Diesel
GMC	78	0	Diesel
International	75	3	Gas
International	72	6	Gas
International	72	6	Gas
Chevy	70	8	Gas
GMC	77	1	Gas
International	75	3	Gas
Mack	74	4	Diesel
Mack	74	4	Diesel
Mack	76	2	Diesel
International	73	5	Diesel
International	72	6	Gas
International	75	3	Diesel
Mack	78	0	Diesel
GMC	75	3	Gas
International	75	3	Diesel
International	72	6	Gas
International	76	2	Diesel
International	66	12	Gas
International	73	5	Gas
Brockway	75	3	Diesel
Ford	77	1	Gas
Ford	70	8	Gas
Ford	76	2	Gas
Ford	71	7	Gas
Ford	75	3	Gas
Ford	71	7	Gas
International	77	1	Gas
International	75	3	Gas
International	77	1	Gas
GMC	74	4	Diesel
GMC	77	1	Diesel
GMC	78	0	Diesel
GMC	73	5	Gas
Dia Reo	72	6	Diesel
Mack	60	18	Gas
Mack	77	1	Diesel
GMC	75	3	Gas

MAKE	MODEL YEAR	AGE	FUEL USED
International	67	11	Gas
Ford	74	4	Gas
GMC	72	6	Gas
Ford	66	12	Gas
Mack	71	7	Diesel
Mack	74	4	Diesel
Mack	75	3	Diesel
GMC	77	1	Diesel
GMC	74	4	Gas
Chevy	71	7	Gas
Chevy	77	1	Diesel
International	73	5	Gas
Ford	74	4	Diesel
Ford	75	3	Gas
International	69	9	Gas
International	77	1	Diesel
Dia Reo	72	6	Gas
Ford	73	5	Gas
Ford	75	3	Gas
International	69	9	Diesel
Ford	77	1	Diesel
Ford	75	3	Diesel
Ford	74	4	Gas
Ford	73	5	Diesel
International	--	--	Gas
International	--	--	Gas
International	--	--	Gas
Ford	74	4	Diesel
Auto Car	78	0	Diesel
GMC	73	5	Gas
Ford	74	4	Diesel
International	75	3	Diesel
Brock Rowan	73	5	Diesel
International	77	1	Gas
Ford	75	3	Gas
International	74	4	Gas