January 1983

A.E. Res. 83-9

AN ANALYSIS OF STEM-HAUL WHOLESALE MILK ROUTE COSTS INSIDE AND OUTSIDE THE FEDERAL ORDER NO. 2 70-MILE ZONE

by

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Preface

Richard Aplin is a Professor in the Department of Agricultural Economics at Cornell University and Colette Hoffman was an Agricultural Economist in the Office of the Market Administrator, New York-New Jersey Milk Marketing Area.

The research reported herein has been funded by the Market Administrator's Office, New York-New Jersey Milk Marketing Area. We wish to express our gratitude to Erik Rasmussen, Assistant Market Administrator, and Robert Wellington, Senior Agricultural Economist, who provided us with technical assistance.

We are also grateful for the helpful reviews of Dr. Norman Garber, Mae Liss, Elaine Moy, R. D. Aplin, Dr. Andrew Novakovic, Dr. Robert Story, and Jean Sehulster. Jean Sehulster also contributed significantly by doing a very thorough editing job. The authors extend grateful thanks also to Wendy Barrett and Darlene Jennings for their excellent work in typing successive drafts of this manuscript.

The contents of this paper are the responsibility of the authors and should not be interpreted as reflecting the views or opinions of the Office of the Market Administrator, New York-New Jersey Milk Marketing Area.

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TABLE OF CONTENTS

DIGEST AND HIGHLIGHTS

Major Objective of the Research

The primary purpose of the study was to determine whether the changes in Federal Order No. 2 pricing provisions effective September 1, 1981 created a transportation cost advantage for plants outside the 1-70 mile zone which ship packaged milk into the 1-70 mile zone, compared to plants inside the 1-70 mile zone which ship bulk milk into the zone for packaging and distribution.

Important Points About Our Approach to Costs and Cost Comparisons

1. Differences in "stem-haul" costs incurred by handlers in transporting packaged milk were compared to differences in the Federal Order transportation differentials to see if a transportation-related advantage existed for hauling packaged milk into the 1-70 mile zone. "Stem-haul" begins after the packaged milk is loaded onto the delivery vehicle and ends when the delivery vehicle reaches the sales area. Only cost differences caused by location or distance were considered in the cost comparisons. Limiting the analysis to stem-haul costs eliminated, or at least reduced, the impact of any institutional complexities that are not transportation-related. Factors such as plant-cost differences, delivery labor contract provisions, customer service decisions and management skills were not included in the cost estimates.

2. A differential approach was used to budget cost components for the stem-haul portion of the various delivery routes studied. Using only differences in the stem-haul costs due to location isolated the impact of the Order provisions. The differential approach allowed for accurate cost comparisons to be made and eliminated arbitrary decisions such as what portion of fixed costs not distance-related should be allocated to the stem-haul. Each cost item was studied. A cost that did not differ significantly (that is, the difference in cost was too small to affect stem-haul costs for either handler) between the inside and the outside handler was not included in the stem-haul cost comparisons. If the cost varied significantly between the inside and the outside handler, the difference in the cost item was added to the stem-haul cost of the handler bearing the higher cost.

3. Stem-haul costs were estimated for fluid processing plants at four different locations within the 1-70 mile zone (so-called "inside" plants) and for seven processing plants located outside the 1-70 mile zone (so-called "outside" plants). One inside plant is located in New York and three in New Jersey. Four outside plants are located in Pennsylvania (two in the Order No. 2 76-80 mile zone which were pooled in Order No. 4; one in the 111-120 mile zone and one in the 121-125 mile zone). The other three outside plants are located in New York (one in the 131-140 mile zone; one in the 151-160 mile zone and one in the 171-175 mile zone). Furthermore, a cost estimate was made for each of these eleven plants relevant to each of seven different sales areas (two in South-Central New Jersey, three in North-Central New Jersey and two in Suburban New York). The appropriate Federal Order No. 2 transportation differentials or Federal Order No. 4 location adjustments for each of the eleven plants were added to the estimated stem-haul costs to provide the cost comparisons needed.

4. Stem-haul costs were developed using budgetary analysis of representative "prototype" routes which would serve large supermarket accounts (routes serving 5 or 6 customers with an average of 100 to 130 cases per delivery). To make realistic operating assumptions and cost estimates, data were obtained from the managements of three plants located inside the 1-70 mile zone and six plants located outside the 1-70 mile zone. In addition, the results of other Cornell research and the judgment of Cornell personnel were used.

5. Cost estimates were based on costs and prices paid during the winter of 1981-82.

6. Today's technology and currently-used handling methods were assumed. That is, the product was assumed to be unloaded by the routeman at the store, using a hand truck.

These additional points should be kept in mind in studying the summary tables presented in the following section:

1. Cost comparisons reflect the stem-haul transportation costs for packaged milk plus Order No. 2 transportation differentials or Order No. 4 location adjustments for the outside plants vs. the stem-haul transportation costs plus Order No. 2 transportation differentials for the inside plants.

2. The summary cost comparisons reflect the following assumptions:
   a. Use of single-bottom tractor-trailers for delivery.
   b. Hourly routemen at $14.90 per hour including fringes for all handlers. (Using only one labor cost allowed cost comparisons that were neutral with respect to institutional factors.)
   c. Estimates of representative average costs for vehicles.
   d. A real cost of capital of 9%.
   e. Federal Order No. 2 transportation differentials, or Federal Order No. 4 location adjustments, in the case of two plants presently pooled under Order No. 4, were added to the differential stem-haul cost calculations for comparison.
   f. Only budgeted routes which met U.S. Department of Transportation Bureau of Motor Carrier Safety regulations for driving and total work day hours are included in the comparison.
   g. The stem-haul costs for routes originating in Fultonville, New York, with more than 680 cases were calculated assuming one driver and one helper on each route (as required by the union contract). If we had assumed one driver, these routes would have been eliminated from the analysis, because they would exceed Department of Transportation regulations of 15 hours per day. Fultonville is the only location, to our knowledge, that employs this type of delivery practice; therefore, assuming two men per route for this handler allowed us to include this type of milk movement in the comparisons.

Results of Basic Comparison, Tables 1 to 4

The results of the basic stem-haul cost analysis are presented in Tables 1 through 4 which follow. For a detailed discussion of these results, see page 28.

Table 1. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of Advantage or Disadvantage, By Load Size, 1992

Highlights: In 72% of the cases studied, the inside handler had a transportation-cost advantage in serving large supermarket accounts with an average advantage of approximately 21.0 cents per hundredweight. However, if all plants were priced in Federal Order No. 2, inside handlers would have a transportation-cost advantage in only 61% of the route comparisons with an average advantage of only 10.0 cents per hundredweight.

Generally, the larger the load size, the smaller the proportion of situations in which the inside handler has an advantage, the smaller the advantage or the larger the disadvantage. Although total stem haul costs rise as load size increases, the cost on a per hundredweight basis declines for bigger loads while the applicable order differentials per hundredweight are constant. However, as load size increases, there are fewer feasible routes.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
Yonkers, NY	39	79	22.6	-23.7 to 79.0	36	69	18.8	-26.7 to 62.5	33	67	15.9	-27.2 to 58.5	19.3
Wallington, NJ	39	82	26.3	-11.9 to 83.0	36	75	21.9	-17.9 to 63.6	33	73	18.4	-19.4 to 57.5	22.4
Flemington, NJ	39	79	22.1	-12.1 to 61.6	36	64	21.1	-16.6 to 77.2	33	58	18.8	-17.6 to 67.7	20.8
Union, NJ	39	92	24.4	-13.2 to 68.0	36	64	22.1	-18.7 to 72.6	33	58	17.7	-19.7 to 64.6	21.6
Overall	156	83	23.9		144	68	21.0		132	64	17.7		21.0
					Inside Advantage on 312/432 Routes = 72%								

NOTES:

1. The total number of routes includes comparisons between each inside plant and each outside plant for all sales areas. Since there are 7 outside plants and 7 sales areas, the maximum number of comparisons is 49. Any total less than 49 is due to the elimination of infeasible routes (i.e., routes requiring more than 15 hours per day).

2. Ranges represent the largest disadvantage(-) to the largest advantage.

3. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

Table 2. Percent of Routes On Which Inside Handler Has A Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of Advantage or Disadvantage, by Distance From the Outside Plant to the Sales Area, and Load Size, 1982

Highlights:

Generally, the weighted average transportation cost advantage for the inside handlers increases with the distance of the outside plant to the sales area. The advantage ranges from 13.7 to 37.5 cents per hundredweight, except for those sales areas that are between 76 and 107 miles from the outside plants. In sales areas 76 to 107 miles from the outside plants, the outside handlers have a transportation-cost advantage in a majority of the situations. In this distance range, most sales areas are located between the outside plant and the inside plant. That is, the inside handler must move milk away from the city zone to serve these sales areas, and therefore insiders have a locational disadvantage. However, only 60 of the possible 432 routes (14%) fall in this distance range.

If all plants were priced in Order No. 2, the average advantage of the inside handler also increases with distance. However the advantage only applies to those sales areas located more than 107 miles from the outside plant (Table 9), because the two Order No. 4 plants are located in the 76-80 mile zone and are therefore within 107 miles of most sales areas. When the distance from the outside plant to the sales area was less than 75 miles, the inside handlers had an advantage of only 1 out of 48 routes and an average transportation cost disadvantage of 16.7 cents per hundredweight.

One-way from Outside Plant to Sales Area*	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	Of all 432 Feasible Rts. % In Distance Range
(miles)			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
75 or fewer	16	94	16.0	- 2.0 to 34.1	16	94	13.4	- 1.0 to 28.6	16	94	11.8	- 1.0 to 26.6	13.7	11.1
76 - 107	20	40	1.8	-23.7 to 43.0	20	20	- 4.7	-26.7 to 34.5	20	20	- 6.7	-27.2 to 32.5	- 3.2	13.9
108 - 150	76	86	26.8	-18.4 to 77.5	68	60	17.7	-22.9 to 62.5	64	55	16.0	-23.9 to 58.5	20.5	48.1
more than 150	44	95	31.7	- 1.4 to 83.0	40	95	42.3	- 7.8 to 77.2	32	94	39.3	- 7.8 to 67.7	37.5	26.9
														100.0

*One-way mileages listed do not correspond to Federal Order Transportation Zones.

NOTES: 1. Ranges given represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of routes.

Table 3. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location of Sales Area, and Load Size, 1982

Highlights: The transportation-cost advantage or disadvantage of the inside handler varies widely depending on the relative location of the sales area and the inside plant. The weighted average advantages for the inside handlers range from 0.7 cents to 36.8 cents per hundredweight, the smallest advantages being for sales area locations in South-Central New Jersey, because these sales locations are more distant than North Central Jersey or Suburban New York for most insiders (especially Yonkers). On the other hand, inside plants have the largest locational advantage in serving Suburban New York because those two sales areas are the most distant from most outside plants.

South Central New Jersey sales areas would pose the largest problem for inside handlers if the two Order No. 4 plants were priced in Order No. 2. There is an average disadvantage of 0.1 cents per hundredweight in that sales area (see Table 10, under this assumption, as compared with an average inside handler advantage of approximately 12.1 cents per hundredweight in the basic analysis.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
					SOUTH-CENTRAL NEW JERSEY								
Yonkers, NY	10	50	- 2.3	-18.7 to 28.4	10	50	3.2	-23.4 to 56.1	10	50	1.2	-24.4 to 49.6	0.7
Wallington, NJ	10	60	6.9	-11.9 to 39.4	10	60	10.2	-17.9 to 63.6	10	60	7.4	-19.4 to 54.1	8.2
Flemington, NJ	10	100	22.5	3.7 to 55.0	10	70	24.0	- 3.8 to 77.2	10	60	20.8	- 5.8 to 67.7	22.4
Union, NJ	10	100	17.7	1.3 to 48.4	10	60	19.4	- 7.4 to 72.6	10	60	13.9	-13.9 to 64.6	17.0
OVERALL SOUTH CENTRAL NEW JERSEY			11.2				14.2				10.8		12.1
							Inside Advantage on 78/120 routes = 65%						

continued

Table 3 continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
NORTH-CENTRAL NEW JERSEY													
Yonkers, NY	17	82	22.9	-23.7 to 67.5	17	65	18.9	-26.7 to 55.6	15	60	18.9	-27.2 to 50.0	20.3
Wallington, NJ	17	82	28.9	- 9.7 to 77.0	17	76	24.5	-15.7 to 62.0	15	73	23.4	-17.7 to 57.5	25.7
Flemington, NJ	17	76	24.4	-12.1 to 61.6	17	65	21.7	-16.6 to 57.7	15	60	21.8	-17.6 to 51.7	22.7
Union, NJ	17	82	26.5	-13.2 to 68.0	17	65	22.2	-18.7 to 56.6	15	60	21.4	-19.7 to 50.0	23.4
OVERALL NORTH CENTRAL NEW JERSEY			25.7				21.8				21.4		23.0
Inside Advantage on 140/196 routes = 71%													
SUBURBAN NEW YORK													
Yonkers, NY	12	100	42.9	15.3 to 79.0	9	100	35.8	4.8 to 62.5	8	100	28.7	1.3 to 58.5	36.8
Wallington, NJ	12	100	38.8	8.3 to 83.0	9	89	30.2	- 0.7 to 62.5	8	88	22.6	- 2.7 to 47.0	31.7
Flemington, NJ	12	67	18.5	- 7.1 to 56.6	9	56	16.7	-12.1 to 42.6	8	50	10.7	-13.6 to 38.6	15.8
Union, NJ	12	100	27.0	2.3 to 66.0	9	67	22.2	- 5.7 to 49.0	8	50	15.4	- 8.2 to 43.0	22.3
OVERALL SUBURBAN NEW YORK			31.8				26.2				19.4		26.7
Inside Advantage on 95/116 routes = 82%													

NOTES:

1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

3. South Central New Jersey includes Freehold and New Brunswick, New Jersey; North Central New Jersey includes Dover, Paterson and Hasbrouck Heights, New Jersey; and Suburban New York includes New City and Yonkers, New York. For the detailed results sales area by sales area, see Table 21 in the Appendix.

Table 4. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location of Outside Plant, and Load Size, 1982

HIGHLIGHTS: The cost comparisons by location of the outside plant reveal two plants, Schuykill Haven and Scranton, for which the inside handler disadvantage is significant. For the Schuykill Haven plant, a disadvantage for the inside handlers exists for both load sizes above 600 cases; the average disadvantage for the three load sizes is 2.0 cents per hundredweight. On the other hand, inside plants have an average 40.9 cent advantage (on 100% of the routes) compared to the Lansdale plant.

However, the two Order No. 4 plants were priced in Order No. 2, (see Table 11), the average advantage for inside handlers drops from approximately 36.8 cents to 6.4 cents per hundredweight relative to the Fort Washington plant; and from 40.9 cents to 10.5 cents per hundredweight for the Lansdale plant due to a change in the location adjustments of 30.4 cents per hundredweight.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	% of Inside Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
FORT WASHINGTON, PENNSYLVANIA												OVERALL	36.8	96%
Yonkers, NY	7	86	41.9	- 2.0 to 74.0	7	86	33.8	- 1.0 to 59.5	6	83	27.7	- 1.0 to 55.0	34.8	
Wallingron, NJ	7	100	45.5	4.5 to 78.0	7	100	36.6	4.0 to 62.5	6	100	30.2	3.5 to 54.5	37.8	
Flemington, NJ	7	100	42.6	20.1 to 56.1	7	100	35.5	18.1 to 46.6	6	100	32.4	17.1 to 44.1	37.1	
Union, NJ	7	100	44.6	18.0 to 63.0	7	100	36.0	15.5 to 51.0	6	100	30.7	12.0 to 47.0	37.4	
LANDSDALE, PENNSYLVANIA												OVERALL	40.9	100%
Yonkers, NY	7	100	47.8	3.0 to 79.0	6	100	34.2	2.5 to 62.5	6	100	32.1	2.5 to 58.5	38.5	
Wallington, NJ	7	100	51.4	9.5 to 83.0	6	100	36.9	7.5 to 62.0	6	100	34.5	7.0 to 57.5	41.5	
Flemington, NJ	7	100	48.5	25.1 to 61.6	6	100	39.0	21.6 to 50.1	6	100	36.8	20.6 to 47.6	41.8	
Union, NJ	7	100	50.5	23.0 to 68.0	6	100	38.5	19.0 to 54.5	6	100	35.0	16.0 to 50.0	41.8	

continued

Table 4. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	% of Inside Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
SCHUYLKILL HAVEN, PENNSYLVANIA												OVERALL	- 2.0	39%
Yonkers, NY	7	57	3.5	-18.4 to 32.6	7	43	- 6.2	-23.4 to 16.1	7	39	- 8.0	-24.4 to 12.6	- 3.6	
Wallington, NJ	7	57	7.1	-11.9 to 28.1	7	43	- 3.4	-17.9 to 12.1	7	43	- 5.5	-19.4 to 10.1	- 0.6	
Flemington, NJ	7	86	4.2	- 1.3 to 8.2	7	0	- 4.4	- 7.8 to -0.8	7	0	- 6.1	- 9.8 to -3.3	- 2.1	
Union, NJ	7	86	6.2	- 2.4 to 13.1	7	29	- 4.0	- 9.9 to 1.6	7	0	- 6.8	-13.9 to -1.4	- 1.5	
SCRANTON, PENNSYLVANIA												OVERALL	- 6.4	26%
Yonkers, NY	7	43	- 2.6	-23.7 to 23.8	7	29	- 9.8	-26.7 to 11.8	7	29	-11.6	-27.2 to 8.8	- 8.0	
Wallington, NJ	7	43	1.0	- 9.7 to 19.3	7	29	- 7.0	-15.7 to 7.8	7	29	- 9.1	-17.7 to 4.3	- 5.0	
Flemington, NJ	7	29	- 1.9	-12.1 to 8.9	7	14	- 8.0	-16.6 to 0.4	7	0	- 9.7	-17.6 to -1.6	- 6.5	
Union, NJ	7	71	0.1	-13.2 to 6.8	7	0	- 7.6	-18.7 to -2.2	7	0	-10.4	-19.7 to -4.7	- 6.0	
BINGHAMTON, NEW YORK												OVERALL	13.0	82%
Yonkers, NY	5	100	13.9	2.0 to 22.0	2	50	- 1.5	- 8.0 to 5.0	*	—	—	— —	9.5	
Wallington, NJ	5	100	20.8	17.0 to 27.5	2	50	8.2	3.5 to 13.0	*	—	—	— —	17.2	
Flemington, NJ	5	80	16.0	- 1.4 to 33.1	2	50	1.6	1.1 to 2.1	*	—	—	— —	11.9	
Union, NJ	5	100	17.7	8.0 to 26.5	2	50	2.7	0.0 to 5.5	*	—	—	— —	13.4	

continued

Table 4. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd Avg. Dis.(-) or Adv. for all load sizes	% of Inside Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
FULTONVILLE, NEW YORK												OVERALL	44.2	99%
Yonkers, NY	3	100	33.6	22.1 to 48.1	7	100	49.8	34.6 to 62.1	7	100	43.2	30.1 to 54.6	44.2	
Wallington, NJ	3	100	32.9	26.1 to 40.1	7	100	52.6	41.1 to 63.6	7	100	45.7	34.6 to 54.1	46.3	
Flemington, NJ	3	67	14.9	- 0.3 to 24.2	7	100	51.6	21.2 to 77.2	7	100	45.1	16.7 to 67.7	42.4	
Union, NJ	3	100	22.8	9.1 to 31.1	7	100	52.0	27.6 to 72.6	7	100	44.4	22.1 to 64.6	43.7	
ROXBURY, NEW YORK												OVERALL	28.0	100%
Yonkers, NY	3	100	26.1	24.9 to 28.4	*	—	—	—	—	*	—	—	—	—	26.1	
Wallington, NJ	3	100	29.4	19.9 to 39.4	*	—	—	—	—	*	—	—	—	—	29.4	
Flemington, NJ	3	100	27.8	2.5 to 55.0	*	—	—	—	—	*	—	—	—	—	27.8	
Union, NJ	3	100	28.7	11.9 to 48.4	*	—	—	—	—	*	—	—	—	—	28.7	

*Routes eliminated based on feasibility standards.

NOTES: 1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

In Summary

The results of the basic analysis generally show that the amendment provisions in Order No. 2, effective September 1, 1981, have not placed handlers within the 1-70 mile zone at a disadvantage vis-a-vis the outside plants in delivering packaged milk to large supermarkets within the zone.

Outside plants were in a better competitive position to serve inside sales areas on only 28% of all routes. Only the handlers in Scranton and Schuylkill Haven, Pennsylvania, had a transportation-cost advantage over the inside handlers in serving large supermarket accounts in the 1-70 mile zone of Order No. 2.

Sensitivity Analysis

Some sensitivity analysis was performed to determine the effect on the results of some of the assumptions made for the basic comparisons. Several of the assumptions were relaxed. For each sensitivity analysis, only one assumption was relaxed. A summary of the results follows.

Federal Order Transportation Differentials. To examine the competitive situation which would prevail if the two plants currently in Federal Order No. 4 were pooled in Federal Order No. 2, appropriate Order No. 2 transportation differentials were used in the cost comparisons for those two plants. The results of this phase of the sensitivity analysis were significant:

(a) The percentage of route situations where the outside handler has an advantage over the insider increases from 28% to 39%.

(b) Generally, inside plants would be at a transportation-cost disadvantage in competing with plants located within 107 miles of the sales areas, particularly with plants located less than 75 miles from the sales area.

For a detailed discussion, see page 37.

Plant Specific Labor Costs. In the basic analysis, a common hourly labor rate of $14.90 including fringes (with an overtime cost per hour of $16.28) was assumed for both inside and outside handlers. These "common" wage rates were used so that the comparisons would be "neutral" with respect to institutional differences. This assumption was relaxed and actual labor costs were budgeted for each handler's routes. These "plant-specific labor costs" were based on each plant's labor contract and fringe benefit package.

Highlights of using the plant-specific labor costs rather than a common hourly labor cost for all plants are:

1. The percentage of routes on which the inside handler held an advantage decreased slightly--from 72 to 68 percent.

2. Weighted-average advantages for inside handlers remained significant but decreased an average of 4.0 cents per hundredweight.

3. For the plant located in Schuylkill Haven, Pennsylvania, there were increases in the weighted-average advantages over the inside plants of 4.0 to 6.0 cents per hundredweight; for the plant located in Scranton, Pennsylvania, the increases were 1.5 to 3.5 cents per hundredweight. The inside plants' advantages over the Fultonville, New York plant location declined significantly (approximately 19.4 cents per hundredweight) under the plant-specific labor costs scenarios. The delivery-labor costs of these three plants were significantly lower than the average.

4. The weighted-average advantage for the inside plants relative to the Lansdale, Pennsylvania location increased by approximately 2.5 cents per hundredweight; the advantage of inside plants relative to the Fort Washington, Pennsylvania plant location increased by approximately 3.6 cents per hundredweight.

Inside Routes with Straight-Chassis Vehicles and Commission Routemen. The basic analysis assumed all handlers used tractor-trailers and hourly routemen for delivery since most large supermarkets were served in this manner. Actually, some large supermarkets are served by inside handlers with straight-chassis delivery vehicles and commission routemen. Therefore, commission routes were budgeted for inside handlers and compared to the outside handlers' tractor-trailer routes. For all sales areas, 600-case straight-chassis commission routes were compared to 600- 750- and 800-case tractor-trailer routes for all sales areas.

Highlights of the comparisons assuming inside handlers served supermarkets with straight-chassis commission routes while outside handlers used hourly tractor-trailer routes are:

1. Inside handlers have a transportation-cost advantage in serving large supermarket accounts in 76% of the routes studied. This increase over the results of the basic analysis (72% inside-handler advantage) is due largely to the difference between operating costs for a tractor-trailer and a straight-chassis delivery vehicle. While the average labor cost of commission routes ($23.33 per hour including fringes and commissions) is significantly higher than the hourly labor cost of outside tractor-trailer drivers ($14.76 including fringes), the higher tractor-trailer operating costs and longer distances involved for outsiders outweigh the labor-cost differences.

2. The transportation-cost advantage of inside handlers increased an average of 4.2 cents per hundredweight for all load sizes.

3. The weighted-average disadvantage of the inside handlers relative to the Schuylkill Haven, Pennsylvania plant, 2.0 cents per hundredweight, changed to a weighted-average advantage for inside plants of 2.3 cents per hundredweight if straight-chassis are used.

Differences in Cost of Capital. The basic cost comparisons were made using 9% as the real, inflation-free, cost of capital. Raising the assumed cost-of-capital level to 14% produced no significant change in the results.

Double-Bottom Tractor-Trailers. Double-bottom tractor-trailer rigs can only be used on the New York Thruway. Moreover, using them is not related to federal order differences, and in the basic analysis, single-bottoms were assumed. However, double-bottoms can be used from Fultonville to Suffern, New York. Therefore double-bottom routes were budgeted for the Fultonville handler location.

Highlights of the results of assuming the use of double-bottom tractor-trailers on the New York State Thruway are:

1. Inside handlers still held an advantage in 72% of the routes compared.

2. The weighted-average advantages for insiders for all load sizes and all sales areas decreased by 2.0 to 5.0 cents per hundredweight depending on inside plant location.

3. The Fultonville plant saved an average of 14.0 cents per hundredweight over inside plants for all load sizes.

Summary. The proportion of routes for which the inside handler has a transportation-cost advantage in serving large supermarket accounts, for each set of assumptions, are as follows:

Assumptions	Percent of Routes with Inside Handler Advantage
Basic Analysis Assumptions	72
Order No. 2 Transportation Differentials	61
Plant-Specific Labor Costs	68
Commission Routes vs. Tractor-Trailer Routes	76
14% Cost of Capital	72
Double-Bottom Tractor-Trailers	72
All Possible Route Scenarios1/	77

Regression Analysis

Regression analysis was used to estimate the total variable cost per mile of moving packaged milk into the 1-70 mile zone. While a total cost function could not be estimated, total variable cost as related to distance traveled can be estimated, using the differential stem-haul costs for outside handlers.

Using high and low vehicle-cost data for each of the three load sizes, a series of regression equations were estimated (see Table 19). The equations show total variable costs which ranged from 3.6 cents per hundredweight to 5.6 cents per hundredweight per ten-mile increment of one-way distance traveled.

1/ All route comparisons (a total of 588), including those judged to be infeasible.

DETAILED REPORT

INTRODUCTION

Provisions of the New York-New Jersey Milk Marketing Order (Federal Order No. 2) were changed, effective September 1, 1981, to realign intramarket and intermarket class prices. Marketing conditions were such that the former order provisions no longer reflected the cost of assembling milk from dairy farms and transporting it to plants for processing. Transportation allowances in Order No. 2 were increased to more accurately reflect the cost of hauling bulk milk. (For a more complete explanation see: Federal Register, Vol. 46, No. 122, pages 33008-33018.) These transportation differentials attempt to reflect general cost differences due to location. They are not intended to reflect differences in actual costs for individual situations.

The method used for aligning intramarket prices was of particular concern in this study. The cost of hauling milk from distant farms to the New York Metropolitan area can be considered to have three distinct segments: farm-to-farm assembly cost, over-the-road variable cost, and over-the-road fixed cost. Under Federal Order No. 2 as amended, the producer pays only the hauling cost to the first plant of receipt. For reloaded milk, the producer pays the hauling to the re-load plant (assembly cost) and the handler recovers a rate per 10 miles between the zone of the farm and the city plant (variable cost); however, the handler receiving reloaded milk bears the fixed cost of the over-the-road haul. For direct-delivered milk, the handler recovers the full cost of hauling, including the fixed cost, because the first plant is the final destination. Therefore, the handler receiving direct-delivered milk has an order price advantage equal to the fixed cost of the over-the-road haul. To achieve handler equity, an additional fixed transportation differential has been added to the cost of direct-delivered milk received in the 1-70 mile zone (North Jersey, New York City, and Westchester, Rockland and Orange counties in New York).

BACKGROUND

In 1979, an analysis of actual hauling rates for milk reloaded outside the 1-70 mile zone and then shipped to plants within the 1-70 mile zone revealed a variable over-the-road hauling charge of 2.2 cents per hundredweight of milk per 10 miles shipped. Variable hauling rates for milk produced beyond the 1-70 mile zone and direct-delivered to plants in the 1-70 mile zone also averaged 2.2 cents per hundredweight per 10-mile zone. Therefore the 1.8 cents per hundredweight transportation differential rate previously allowed under the Order was 0.4 cents less than the variable over-the-road cost to handlers. Raising the transportation differential to 2.2 cents per hundredweight per 10-mile zone permitted handlers to recover the distance-related, variable hauling costs of moving raw Class I milk.

The 1979 analysis also revealed a 15.26 cents per hundredweight fixed cost associated with milk reloaded outside the 1-70 mile zone and shipped to plants within the 1-70 mile zone. Handlers within the 1-70 mile zone receiving direct shipped milk do not bear that reload cost. To equalize the cost under Order No. 2 of direct-delivered and reloaded milk, the direct delivery differential

was changed to a 15-cent fixed transportation differential on Class I milk shipped to the 1-70 mile zone. Thus, the 15-cent per hundredweight fixed transportation cost of reloaded milk is reflected in the Class I price of direct-shipped milk in an attempt to equalize hauling allowances for handlers on both direct-shipped and reloaded milk.

Interested parties are concerned that although the amended transportation differentials more closely reflect actual bulk milk hauling cost, they may have altered the competitive relationship between handlers who package milk at plants beyond the 1-70 mile zone and those located within the zone. This study examines what effect, if any, these changes in Order transportation differentials have on the competitive environment of New York-New Jersey Metropolitan Area operators and distributors.

Objective

The purpose of this study was to determine whether the changes in Federal Order No. 2 provisions, effective September 1, 1981, created a transportation-related advantage to shipping packaged milk into the 1-70 mile zone as opposed to shipping bulk milk into the 1-70 mile zone for packaging and distribution.

METHODOLOGY

The raw bulk milk hauling cost differences among handlers caused by their particular locations vis-a-vis producers are represented in this analysis by the federal order transportation differentials. In this study, differences in "stem-haul" costs incurred by handlers in transporting packaged milk were compared to the amended federal order transportation differentials to determine whether a location advantage would exist for hauling packaged milk into the 1-70 mile zone from plants outside the zone. Stem-haul costs began after the packaged milk was loaded onto the truck and ended when the delivery vehicle reached the first supermarket. By comparing only the stem-haul costs for handlers at various locations, the effect of the transportation differential order provisions could be isolated from other location-related cost differences caused by institutional factors other than the Order. Factors such as plant cost differences, delivery labor contract provisions, customer service decisions and management differences were ignored in the standard cost estimates. The cost comparisons were based only on factors related to distance and/or transportation.

A differential approach was used to allocate costs to the stem-haul portion of the route. Since the objective was to examine differences for "inside" and "outside" handlers in packaged milk stem-haul costs, each cost component was examined to determine whether it differed for the inside versus the outside handler. Cost components which did not differ were not included in the stem-haul cost estimates. If a component did differ significantly, only the difference in that cost was included for the handler bearing the higher cost. This differential approach to cost allocation made the comparison of distance-related transportation costs between inside and outside handlers more accurate than a total cost approach.

An economic-engineering (or budgetary) approach was used to estimate differential transportation costs. Using this approach, rather than analyzing actual hauling costs, also made it possible to include only transportation- or distance-related costs and exclude other institutional factors that were not related to marketing order provisions. Also, with the budgetary approach, hypothetical movements of packaged milk into the 1-70 mile zone could be compared, not merely movements which were actually occurring. However, the validity of economic-engineering studies depends on the validity of the assumptions about economic conditions on which they are based. For this study, the managements of six plants located outside the 1-70 mile zone and three plants inside the zone generously provided the information, data and judgment needed to budget realistic operating conditions.

Several sales areas in which processors from inside and outside the 1-70 mile zone either were, or possibly could be, competing for packaged milk sales were identified. In addition, 11 plant locations (4 inside and 7 outside), two of which were pooled in Order No. 4, were identified. (See Table 5.) Distribution routes (route scenarios) were budgeted for each of these plants to ship packaged milk to each of these sales areas. Each route was developed in two parts: stem-haul, or that portion of the route from the platform to the first supermarket and from the last store back to the plant; and the on-route component, or the store-to-store delivery portion. Stem costs for outside plants were budgeted for various load sizes going to each of the sales areas and the appropriate federal order transportation differentials or location adjustments were added to the estimated cost. Similarly, stem-haul costs were calculated for inside plants and the appropriate differentials were added. The inside and outside estimates were compared, plant by plant and sales area by sales area, to determine where relative advantages or disadvantages might exist for hauling packaged milk.

Route Scenarios

Based on information provided by cooperating handlers, both outside and within the 1-70 mile zone, several typical route scenarios were developed for serving large stores (i.e., stores receiving at least 100 cases per delivery) with tractor-trailer delivery vehicles. Only large stores were included because handlers packaging milk outside the 1-70 mile zone probably would not compete with inside processors for small or medium-sized accounts. Smaller stores would require more driving time within the sales area, and would probably require smaller trucks. Also, it could be assumed that large supermarkets could be served with tractor-trailers because the "inside" handlers were generally using tractor-trailers to serve them. The assumptions made concerning load size, stop size, driving and delivery time standards, and delivery practices were based on information provided by handlers and on the results of previous studies made by Cornell researchers.[2/]

[2/] "Measuring and Improving Wholesale Milk Route Productivity and Profitability," Manual for Management Workshops, Cornell University, 1975.

Table 5. Locations of Inside and Outside Plants and Sales Areas Studied

Location of Plant	Federal Order No. 2 Freight Zone	Federal Order No. 2 Transportation Differential	Federal Order No. 4 Location Adjustment*	Sales Area Location
	miles	cents per hundredweight		
Located Inside the 1-70 Mile Zone				
Yonkers, NY	1 - 10	+59.0		South-Central New Jersey
Wallington, NJ	1 - 10	+59.0		Freehold
Union, NJ	1 - 10	+59.0		New Brunswick
Flemington, NJ	31 - 40	+52.4		
				North-Central New Jersey
Located Outside the 1-70 Mile Zone				Dover
				Paterson
				Hasbrouck Heights
Fort Washington, PA	76 - 80	+28.6	+59.0	Suburban New York
Lansdale, PA	76 - 80	+28.6	+59.0	New City
Scranton, PA	111 - 120	+19.8		Yonkers
Schuylkill Haven, PA	121 - 125	+17.6		
Roxbury, NY	131 - 140	+15.4		
Binghamton, NY	151 - 160	+11.0		
Fultonville, NY	171 - 175	+ 6.6		

*Since the Order No. 2 1-10 mile zone Class I price and the Class I price at these Order No. 4 plants are identical, 59.0 cents per hundredweight was used as a proxy for the Order No.4 location differential in the basic analyses.

Round-trip stem mileage was measured for each route from the plant to the sales area and the associated stem-driving time was calculated based on applicable road conditions and driving standards (Table 6). After stem driving was calculated, there were additions for personal time for the driver, for normal delays (12% of standard time) and for any at-plant work such as checking the load, doing paperwork, etc. which was attributable to the stem-haul. Each route scenario (highways used, driving time, at-plant time, and delivery time) was constructed and confirmed by the cooperating handlers.3/

On-route time (time spent serving supermarkets) was also calculated for each scenario. Time spent at stores in delivery (at-stop time) was calculated using Cornell delivery standards of 8.2 minutes fixed time per stop and .34 minutes variable time per case (which included reloading empty cases).4/ These delivery standards apply to "drop deliveries"--that is, the driver moves the milk no more than 15 to 20 feet from the truck, without help from store employees, and does not pack the dairy case or collect. The on-route driving-time standard was 1.6 minutes per mile (or 37.5 mph) and an average of 8 miles between stops was assumed (Table 7). If the calculated total route time (stem plus on-route times) for any scenario exceeded U.S. Department of Transportation Bureau of Motor Carrier Safety regulations for driving time and total hours (15 hours per day), the scenario was discarded from the analysis.

Stem-haul cost comparisons were made sales area by sales area and load size by load size for each inside/outside plant combination. For example, a 600-case load to Dover, New Jersey for a particular outside handler was compared to a 600-case load to Dover for an inside handler. Cross-comparisons mixing load sizes were not made (except for straight-chassis/tractor-trailer comparisons). Each comparison made was based on identical on-route scenarios.

Preloading or loading trailers 12 or 24 hours prior to delivery was considered a production, rather than a location or transportation, decision and, therefore, was excluded. The possibility of two trips (routes) in one day with the same delivery vehicle was not studied because this practice was not common. The possibility of backhauls was also ignored because backhauls would require a very unique situation (time or location-wise) and because few handlers operated routes with backhauls.

3/ While this analysis addresses costs associated with the stem-haul portion of a route, it was necessary to develop scenarios for the total route including store-to-store delivery, so that the time required for the routes could be checked for feasibility and so that such costs as labor overtime could be included accurately in the stem-haul cost comparisons.

4/ In instances in which there were two men on the truck, the variable time standard used was .25 minutes per case.

Table 6. Driving Standards Used to Calculate Stem Driving Time

Driving Condition	Description	Standard (minutes per mile)
Interstate	Open highways on which the highest attainable speed is 55 MPH, reflecting an average speed of 50 MPH.	1.2
Highway	Roads on which maximum attainable speed is 55 MPH. Typically there is a free flow of traffic with few delays, reflecting an average speed of 37 MPH.	1.6
Suburban	Roads on which the maximum attainable speed is 20 to 35 MPH. Typically there are some delays due to stop signs, intersections and possibly traffic, reflecting an average speed of 28 MPH.	2.1
City	Roads on which the maximum attainable speed is 15 to 20 MPH. Traffic is typically slow with frequent delays for congestion reflecting an average speed of 14 MPH.	4.4

SOURCE: "Measuring and Improving Wholesale Milk Route Productivity and Profitability", Manual for Management Workshops, Cornell University, 1975.

Table 7. Assumptions Underlying Three Load Sizes Used in Analysis

Number of 24-Quart Cases on Truck	Number of Customers Served 1/	Average Number of Cases Per Stop	Assumed Total Time Per Stop	Assumed Driving Time on Route	Total On-route Time
			minutes		
600	6	100	42.2	64	317
750	5	150	59.2	51	347
800	6	133	53.4	64	384

1/ Actual situations observed.

Labor Costs

The labor contracts for individual plants were used to calculate the labor cost per day, including fringe benefits, of a packaged-milk transport driver or route personnel. Fringes not stated in contracts, such as state and federal unemployment benefits and workmen's compensation, were added to the fringes specified. These calculations were confirmed with each cooperating handler. Some labor costs were calculated for five 8-hour days, some for four 10-hour days and some, if the contract allowed, for a three-day work week. Overtime costs per hour, including fringes, were also calculated.

These plant-specific labor costs were used to calculate an industry-wide average to estimate stem-haul costs for shipping packaged milk. The plant-specific costs were used to conduct some sensitivity analysis and to reach some of the conclusions reported herein, but none are reported in order to protect confidentiality of information. Moreover, in our judgment, results based on industry averages were more relevant for marketing order analysis.

The calculated plant-specific hourly labor costs, including fringes, ranged from approximately $11.50 to $19.00 with an average of $14.76 per hour for outside handlers, and from $14.50 to $16.50 with an average of $15.11 per hour for inside handlers. The overall average labor cost used in these comparisons for all plants was $14.90 per straight hour, including fringes, and $16.38 per overtime hour.

A differential approach was also used to calculate stem-haul labor costs for each scenario. On-route or delivery time was identical for insiders and outsiders for each scenario; therefore, the differences in the total route time were caused by differences in stem driving time. Therefore, the overtime cost incurred for the route was allocated to the stem-haul. For example, if a route required 10 hours to complete, four of which were stem hours, and the straight workday was 8 hours, the labor cost attributed to the stem-haul portion of the route would be 2 hours at the overtime rate and 2 hours at the straight-time rate. For a more detailed description of labor cost calculations, see Exhibit 3.

Delivery Vehicle Costs

To budget the vehicle costs for the route scenarios, information about vehicle-cost components and factors affecting those costs was gathered from participating handlers. Data were collected for vehicle replacement prices, tire prices, diesel fuel prices, repair and maintenance costs, highway use taxes, insurance and registration fees, as well as vehicle life, tire life and average miles per gallon of diesel fuel and reefer fuel use.

Industry averages were used for vehicle purchase price, diesel cost per gallon, tire and recap prices, and repair and maintenance cost. Actual rates were used for state highway use tax, ton-mile tax and licensing and registration fees. In the sensitivity analysis, ranges in these figures were used to estimate the stem-haul cost components. For a detailed list and description of these cost components, see Exhibit 1.

Exhibit 1. Cost Components Used in Calculating Vehicle Costs, 1982

Cost Component	Range/Average	Source of Information
Tractor Purchase Price	Range: $50,000 to $55,000	Range reported by cooperating handlers
Trailer Purchase Price	Range: $30,000 to $32,000	Range reported by cooperating handlers
Straight-Chassis Price	Range: $50,000 to $55,000	Range reported by cooperating handlers
Salvage Value Tractor and Trailer and Straight-Chassis Truck	10% of Purchase Price	Average of figures reported
Number of Spare Vehicles Needed	1 spare tractor, 1 spare trailer for every 10	Average of figures reported
Tractor Life in Miles Straight-Chassis Life in Miles	500,000 miles 300,000 miles	Average of figures reported
Tractor Life in Years Outside Plants Inside Plants Straight Chassis Trucks	 6-8 years 8-10 years 8-10 years	Range reported by cooperating handlers
Trailer Life in Years	12 years	Average of figures reported
Registration	Varies state to state	
Insurance	$2,200 a year tractor-trailer $1,300 a year straight-chassis	Average of reported figures
Federal Highway Use Tax	$210.00 a year tractor-trailer $120.00 a year straight-chassis	Calculated based on gross unloaded weight of tractor 14,000 lbs
Repair and Maintenance	$.08 - $.12 per mile	Range reported by cooperating handlers
Miles Per Gallon	4.5-5.6 miles per gallon	Range reported by cooperating handlers
Reefer Fuel Use	3/4 gallon per hour	Average of reported figures
Tire Price (new)	$273.00	Average of reported figures
Recap Price	$77.50	Average of reported figures
New Tire Life	100,000 miles tractor-trailer 70,000 miles straight-chassis	Average of reported figures
Recapped Tire Life	72,000 miles	Average of reported figures
Diesel Price Per Gallon	$1.10 gallon	Average of reported figures

Vehicle costs were allocated to the stem-haul based on the manner in which each cost was incurred. For example, repair and maintenance, tire, and fuel costs were incurred on a per-mile basis and were allocated to the stem-haul based on stem-haul miles. Applicable state highway use taxes, ton-mile taxes and fuel taxes were included in the stem-haul cost comparisons and were calculated using actual rates and stem-haul miles. All tolls associated with each route were also included in the cost comparisons.

An applicable portion of the fixed-cost components, such as registration fees, insurance, and interest and depreciation on delivery vehicles, were also allocated to the stem-haul. But, since fixed costs are not incurred on a mileage basis, they were difficult to allocate to either the on-route or stem portion of any route scenario. Therefore, a differential approach was employed. If a fixed cost component was not significantly different for inside versus outside handlers, it was not included in the stem-haul costs for either. If the cost varied significantly between the inside and the outside handler, only the difference in the cost component was included and was added to the stem cost for the handler who bore the higher cost. Licenses, registration fees, insurance, and federal highway use tax were dealt with in this manner. None of these costs were significantly different for insiders or outsiders and were ignored.

Tractor interest and depreciation costs were separated from trailer interest and depreciation. Interest and depreciation for each were based on replacement price, expected length of life in years and miles, salvage value, and cost of capital. The handlers estimated an average life of 12 years for a box trailer and stated that useful life varied with the amount of wear and tear associated with on-route delivery, not with stem mileage. Although some "fatigue" occurred during the stem haul, the limiting factor in useful life for trailers was assumed to be "on-route" stress; therefore, capital trailer costs should be allocated to on-route costs. However, on-route times and distances were assumed to be identical for inside and outside handlers in this analysis; therefore, interest and depreciation costs of trailers were ignored.

On the other hand, the stated average length of life for the tractor was 500,000 miles for all handlers; therefore, life in years depended on annual mileages for tractors. Inside handlers had experienced useful tractor lives of 8 to 10 years, while outsiders only 6 to 8. Stem-haul engine wear was largely a function of miles traveled, while on-route stress varied with driving and delivery conditions. Since the on-route conditions were the same for inside and outside handlers for each scenario, the tractor interest and depreciation costs attributable to the on-route portion were also the same. But there were, or would be, differences in stem-haul mileage for inside and outside handlers. A tractor typically would reach the end of its useful life in miles two years sooner for the outside handler than the inside one because of higher stem distances. Or, stated differently, within a given length of time, the outside handler would have to replace tractors more often; therefore, annual tractor interest and depreciation costs would be higher for the outside handler. The difference between fixed tractor interest and depreciation costs per year for the inside and outside handler was included in the stem-haul costs for outside handlers. (Exhibits 2 and 3.)

In addition, two sets of stem-haul costs were calculated for each route studied using two sets of vehicle costs; one was a low cost and the other a high cost. The low-cost calculations assumed: $50,000 tractor purchase price,

Exhibit 2. Cost Component Values Used in Hypothetical Illustration of Calculation of Stem-Haul Costs

Notes: 1. The values reported in this exhibit are the ones used in Exhibit 3 to illustrate the calculation of stem-haul cost comparisons.

2. The numbers used here are for illustration only. They are not necessarily numbers used in the actual analysis.

Cost Component	Explanation/Source	Value
Total Route Time	Driving time for stem-haul round trip, plus store-to-store delivery time plus time at store, personal time, fatigue and delay; limited to 15 hours with one man on delivery truck.	12 hours outside route 8 hours inside route
Stem Time	Stem driving hours plus percent of personal, fatigue and delay time allocable to the stem-haul; limited to 10 hours total with one man on delivery truck.	4 hours outside route 2 hours inside route
Stem Distance	Mileage from plant to "first" store of delivery plus mileage from "last" delivered store back to plant.	200 miles outside route 80 miles inside route
Vehicle Operation Time	Number of days delivery vehicle is in use; not necessarily on same route every day.	5 days
Regular Workday Length	Normal scheduled workday.	10 hours outside route 8 hours inside route
Cost of Capital	An estimate of the real, inflation-free, rate.	9 percent
Labor Cost Straight Cost	Based on either hourly rate or daily base salary plus commission, including all fringes.	$120/day (15.00/hour)
Overtime Cost	Based on cost of straight hour plus fringes at specified overtime rate, (i.e., time and a half).	$22/hour
Tractor Purchase Price	Based on industry-reported replacement costs for typical over-the-road tractor.	$50,000
Tractor Life	Outside handlers reported tractor reached 500,000 miles in 6 years. Inside handlers reported tractor reached 500,000 miles in 8 years.	6 years 8 years

Exhibit 2 (continued)

Cost Component	Explanation/Source	Value
Salvage Value Equipment	Based on reported average	10% of purchase price
Equipment Needs Per Route	Based on reported averages	1 for every 10
Fuel Mileage	Based on reported averages	5.0 MPG
Reefer Fuel Use	Based on reported averages	.75 gallon/hr.
Fuel Price	Based on reported averages	$1.10/gal.
Refrigeration Fuel Cost	Based on reported averages	$1.05/gal.
New Tire Life	Based on reported averages	100,000 miles
New Tire Price	Based on reported averages	$273.00
Recapped Tire Price	Based on reported averages	$77.50
Recap Life	Based on reported averages	72,000 miles
Recaps Per Casing	Based on reported averages, taking into account that recapped tires are not generally used as drive tires.	1
Repair Cost	Based on reported averages includes repair and maintenance over the life of the vehicle, excluding diesel and tires.	$.12/mile
Tolls	Calculated for each route	$10.00 outside $3.00 inside route
Road Use Taxes	Calculated using actual rates and actual taxable miles for route wherever applicable. (i.e., NJ handler travelling into NY State would be charged NY Ton Mile Tax)	.017/mile NY TMT -outside route all 200 stem miles in NY. -inside route 30 stem miles in NY

Exhibit 3. Detailed Hypothetical Example of Calculation of Stem-Haul Cost and Inside Handler Transportation-Cost Advantage or Disadvantage Per Hundredweight of Packaged Milk

Notes: 1. This is for example only. These calculations are not necessarily exact numbers used in the analysis.
2. Numbers used for this example can be found in Exhibit 2.
3. Both inside and outside routes assumed to be serving a sales area location in New York State, each carrying 800 24-quart cases, making 5 stops.

Cost Component	Calculation	Value
Labor Cost	Outside route: 4 stem hours, 1 @ overtime cost per hour, 2 @ straight cost per hour (2 x 22.00) + (2 x 15.00)	$74
	Inside Route: 7 stem hours @ straight cost per hour (no transfer function on this route) 7 x [illegible]	30
Interest and Depreciation on Tractor		
Salvage Value Tractor	Intelligence prices for route x Tractor Purchase Price) = Salvage Value of Equipment (1.18 x $50,000) x 10%	$ 5,500
Present Value of Salvage Value	Salvage Value Tractor x Present Value Factor[1] for n years at 9%	
Inside Handler	$5,500 x .5019 (5 years)	2,760
Outside Handler	$5,500 x .5963 (7 years)	3,279
Interest and Depreciation Cost per year	[(Equipment prices x Tractor Purchase Price) - PV Salvage] x Annuity Factor[2] for n years at 9%	
Inside Handler	[(1.18 x 50,000) - 2,760] x 5.3548	9,438
Outside Handler	[(1.18 x 50,000) - 3,279] x 4.4859	11,529
Difference in Interest and Dep. Cost per year Inside/outside	$11,529 - $9,438	2,091
Differential Cost for Outside Handler per mile	Difference in I and D Cost Year ÷ Annual miles Tractor Outside Handler 2,091 ÷ ([illegible] years)	.025/mile

Exhibit 3 (continued)

Cost Component	Calculation	Value dollars
Tire and Fuel Cost		
Fuel Cost Mile	Fuel Price Per Gallon ÷ MPG $1.10 ÷ 5.0	$.22/mile
Refrigeration Cost	Refrigeration Fuel Price/Gal. x Fuel Use per hour $1.05 x .75	.79/hour
Tire Cost Mile	[New Tire Price + (Number Recaps x Recap Price)] ÷ [New Tire Life + (Number Recaps x Recap Life)] x Number of Tires [$273 + (1 x $77.50)] ÷ [100,000 miles + (1 x 72,000 miles)] x 18 tires	.04/mile
Additional Road Taxes		
New York State Ton Mile Tax	Tax Rate x Taxable Stem Miles .017 x 200 miles outside route .017 x 30 miles inside route	3.40 .51
Tolls	All tolls added to stem	10 outside 3 inside

Total Cost of Stem Haul		Inside Route	Outside Route
Labor Cost Stem		$30.00	$ 74.00
Differential Stem Interest and Depreciation Cost Outside Handler	Differential Cost per mile x Stem Miles $.025 x 200 miles		5.00
Tire Cost Stem	Tire Cost Mile x Stem Miles $.04 x 200 miles $.04 x 80 miles	3.20	8.00

Exhibit 3 (continued)

Total Cost of Stem Haul		Inside Route	Outside Route
Fuel Cost Stem	(Fuel Cost Mile x Stem Miles) + Ref. Fuel Cost Hour x 1/2 Stem Hours		
	($.22 mile x 200 miles) + 2 hours x $.79 hour		$ 45.00
	($.22 mile x 80 miles) + 1 hour x $.79 hour	$18.39	
Repair Cost Stem	Repair Cost Mile x Stem Miles		
	$.12 x 200 miles		24.00
	$.12 x 80 miles	9.60	
Road Use Tax Stem	Tax Rate x Taxable Stem Miles		
	$.017 x 200 miles		3.40
	$.017 x 30 miles	.51	
Tolls		3.00	$10.00
Total Cost of Stem Haul		$64.70	$169.40
Total Stem-Haul Cost per Hundredweight (800 24-quart cases equal approximately 412.8 cwt.)		$ .157	$ .410
Federal Order Transportation/Location Differential		+ .590	+ .286
Stem Haul Cost per cwt including differential		$ .747	$ .696
Advantage (+)/Disadvantage(-) of Inside Handler			-.051/cwt.

[1]Present Value Factor = $(1 + r)^{-n}$; where r = rate of interest; n = years.

[2]Annuity Factor = Present value of $1 received annually at the end of each year for n years.

$$\frac{1 - (1 + r)^{-n}}{r}$$

5.6 MPG on diesel fuel and $0.08 per mile for maintenance and repairs. High vehicle costs assumed $55,000 for tractor purchase price, 4.5 MPG on diesel fuel, and $0.12 per mile for maintenance and repairs. The estimated stem-haul costs ranged from 1.0 to 3.0 cents per hundredweight for inside handlers, and from 4.0 to 6.0 cents per hundredweight for outside handlers. The higher costs for outsiders are due to higher stem mileages.

An average of the low and high stem-haul costs for all routes was used as the basis for the cost comparisons. The average cost per hundredweight for the inside handler was compared to the average cost per hundredweight for the outside handler to determine the average advantage or disadvantage per hundredweight. A detailed illustration of the computations used in the cost comparisons in this study is given in Exhibits 2 and 3. A detailed discussion of the results of the basic comparison follows.

BASIC COMPARISON RESULTS

Some of the outside plants could not operate routes to all of the sales areas, because those routes would exceed the Federal standard of 15 hours per day. Hypothetically, with seven outside plants, seven sales areas and three load sizes, there could be 147 routes from outside plants to be compared to routes from four inside plants for a total of 588 route-by-route stem-haul comparisons. However, only 108 of the 147 outside routes (73%) were feasible; therefore, only 432 stem-haul comparisons were needed.

The results of the basic comparison indicate that inside plants would have a transportation-cost advantage on 72% of the 432 feasible routes. This advantage would average 21.0 cents per hundredweight for all four inside plants and all three load sizes. However, there is a wide variation in the inside advantage among the plants and the sales areas.

Table 8 presents the transportation-cost advantage of each inside plant location versus all outside plant routes to all sales areas, by load size. As load size increases, both total hundredweight delivered and total time required to complete the route increase. And stem-haul cost increases somewhat as total route time increases. However, stem-haul cost increases less with load size than total hundredweight delivered; therefore, stem-haul cost per hundredweight, without the order differential, declines. The order differential is constant per hundredweight regardless of load size; therefore, the inside advantage declines as load size increases. However there are fewer feasible outside routes for the larger load sizes; at 600 cases 80% are feasible, while at 800 cases only 67% would meet Federal standards.

Table 9 shows the transportation-cost advantage for inside plants grouped by one-way stem distance from the outside plant to the sales area. As stem distance increases for outside plants, their total route time and stem-haul cost increase. On the other hand, as outside plant to sales area distance and stem-haul cost declines, inside plant to sales area distance and stem-haul cost does not necessarily increase. For example, on routes to sales areas within 75 miles of an outside plant, inside plants would have a 94% transportation-cost advantage, averaging 13.7 cents per hundredweight over all load sizes. Therefore, although some outside plants are relatively near some sales areas, inside plants would have a locational advantage under current Order No. 2 provisions.

Table 8. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of Advantage or Disadvantage, By Load Size, 1982

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery)				Load Size: 750 24-Qt. Cases (150 cases/delivery)				Load Size: 800 24-Qt. Cases (133 cases/delivery)				Weighted Average Disadv.(-) or Adv. for all load sizes
	Total No. of Routes	Per. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Per. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Per. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
Yonkers, NY	39	79	22.6	-23.7 to 79.0	36	69	18.8	-26.7 to 62.5	33	67	15.9	-27.2 to 58.5	19.3
Wallington, NJ	39	82	26.3	-11.9 to 83.0	36	75	21.9	-17.9 to 63.6	33	73	18.4	-19.4 to 57.5	22.4
Flemington, NJ	39	79	22.1	-12.1 to 61.6	36	64	21.1	-16.6 to 77.2	33	58	18.8	-17.6 to 67.7	20.8
Union, NJ	39	92	24.4	-13.2 to 68.0	36	64	22.1	-18.7 to 72.6	33	58	17.7	-19.7 to 64.6	21.6
Overall	156	83	23.9		144	68	21.0		132	64	17.7		21.0
					Inside Advantage on 312/432 Routes = 72%								

NOTES:

1. The total number of routes includes comparisons between each inside plant and each outside plant for all sales areas. Since there are 7 outside plants and 7 sales areas, the maximum number of comparisons is 49. Any total less than 49 is due to the elimination of infeasible routes (i.e., routes requiring more than 15 hours per day).

2. Ranges represent the largest disadvantage(-) to the largest advantage.

3. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

Table 9. Percent of Routes On Which Inside Handler Has A Transportation-Cost Advantage In Serving Large Supermarker Accounts, Amount of Advantage or Disadvantage, by Distance From the Outside Plant to the Sales Area, and Load Size, 1982

One-way from Outside Plant to Sales Area*	Load Size: 600 24-Qt. Cases (100 cases/delivery)				750 24-Qt. Cases (150 cases/delivery)				800 24-Qt. Cases (133 cases/delivery)				Wtd. Avg. Dis.(-) or Adv. for all load sizes	Of All 432 Feasible Rtes., % In Dis-tance Range
	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.		
(miles)			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
75 or fewer	16	94	16.0	- 2.0 to 34.1	16	94	13.4	- 1.0 to 28.6	16	94	11.8	- 1.0 to 26.6	13.7	11.1
76 - 107	20	40	1.8	-23.7 to 43.0	20	20	- 4.7	-26.7 to 34.5	20	20	- 6.7	-27.2 to 32.5	- 3.2	13.9
108 - 150	76	86	26.8	-18.4 to 77.5	68	60	17.7	-22.9 to 62.5	64	55	16.0	-23.9 to 58.5	20.5	48.1
more than 150	44	95	31.7	- 1.4 to 83.0	40	95	42.3	- 7.8 to 77.2	32	94	39.3	- 7.8 to 67.7	37.5	26.9
														100.0

*One-way mileages listed do not correspond to Federal Order Transportation Zones.

NOTES: 1. Ranges given represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of routes.

As outside plant to sales area distance increases above 107 miles, the inside plant advantage increases also. Inside plants would have a transportation-cost advantage on 77% of the routes requiring more than 107 miles of one-way stem for outsiders. This advantage would average 29.0 cents per hundredweight for all load sizes in these distance ranges. In addition, 75% of the feasible routes would require at least 108 one-way stem miles for outside plants.

The inside plants would be at a small disadvantage compared to outside plants in serving sales areas between 76 and 107 miles from outside plants. In this distance range, total differential stem-haul costs are similar for both outside and inside plants; however, only 14 percent of the feasible routes would fall into this distance category.

In Table 10, the transportation-cost advantage of inside plants in relation to all outside plants is presented for three sales-area groupings. Generally, as sales locations differ, stem distance for both inside and outside plants differ. Inside plants would have the smallest advantage in serving stores in South Central New Jersey (Freehold and New Brunswick) because these two sales locations are within 75 miles of two outside plants but are more distant from some insiders (e.g., Yonkers) than others (e.g., Flemington).

On the other hand, inside plants would enjoy a transportation-cost advantage on 82% of the routes serving Suburban New York sales areas (Yonkers and New City). The Suburban New York locations are more than 107 one-way stem miles from all outside plants and are closer to more inside plants. Although Flemington is more distant from either Yonkers or New City than the Yonkers plant, Flemington would still have an advantage over most outsiders.

Table 11 shows each inside plant's transportation-cost advantage compared to each outside plant. As outside plant location changes, both the applicable Order No. 2 (or Order No. 4) transportation differential or location adjustment and outside plant-to-sales area stem distances change. Inside plants would be at a small disadvantage in relation to the plant in Schuylkill Haven, Pennsylvania and at a somewhat larger disadvantage compared to the Scranton, Pennsylvania location.

If the Fort Washington and Lansdale, Pennsylvania plants continue to be pooled in Order No. 4, inside plants would have an advantage on virtually all feasible routes from those plants.

The Roxbury and Fultonville, New York plant locations are too distant from the sales areas to serve them. Roxbury could only operate 600-case load routes to three sales areas, all routes for larger loads would exceed Federal workday standards. The Fultonville plant could operate routes at all load sizes by using two routemen for the larger case loads; however, insiders would have an average advantage of 44.2 cents per hundredweight on 99% of all Fultonville routes.

In conclusion, based only on differential stem-haul costs and on the applicable order transportation differential or location adjustment, the handlers located within the Order No. 2 1-70 mile zone have an advantage in the majority of cases in serving stores within that zone compared to outside plants under current Order No. 2 provisions, amended as of September 1, 1981. However, in conducting our analysis for the basic comparison, it was necessary to make a number of assumptions in order to isolate the differences in stem-haul costs and order provisions from other non-institutional cost differences. Therefore, sensitivity analysis was performed; the results of this analysis follow.

Table 10. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location of Sales Area, and Load Size, 1982

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
					SOUTH-CENTRAL NEW JERSEY								
Yonkers, NY	10	50	- 2.3	-18.7 to 28.4	10	50	3.2	-23.4 to 56.1	10	50	1.2	-24.4 to 49.6	0.7
Wallington, NJ	10	60	6.9	-11.9 to 39.4	10	60	10.2	-17.9 to 63.6	10	60	7.4	-19.4 to 54.1	8.2
Flemington, NJ	10	100	22.5	3.7 to 55.0	10	70	24.0	- 3.8 to 77.2	10	60	20.8	- 5.8 to 67.7	22.4
Union, NJ	10	100	17.7	1.3 to 48.4	10	60	19.4	- 7.4 to 72.6	10	60	13.9	-13.9 to 64.6	17.0
OVERALL SOUTH CENTRAL NEW JERSEY			11.2				14.2				10.8		12.1
					Inside Advantage on 78/120 routes = 65%								
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
					NORTH-CENTRAL NEW JERSEY								
Yonkers, NY	17	82	22.9	-23.7 to 67.5	17	65	18.9	-26.7 to 55.6	15	60	18.9	-27.2 to 50.0	20.3
Wallington, NJ	17	82	28.9	- 9.7 to 77.0	17	76	24.5	-15.7 to 62.0	15	73	23.4	-17.7 to 57.5	25.7
Flemington, NJ	17	76	24.4	-12.1 to 61.6	17	65	21.7	-16.6 to 57.7	15	60	21.8	-17.6 to 51.7	22.7
Union, NJ	17	82	26.5	-13.2 to 68.0	17	65	22.2	-18.7 to 56.6	15	60	21.4	-19.7 to 50.0	23.4
OVERALL NORTH CENTRAL NEW JERSEY			25.7				21.8				21.4		23.0
					Inside Advantage on 140/196 routes = 71%								

continued

Table 10 continued

Location of Inside Plant	Load Size: 600 24-Qr. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qr. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
SUBURBAN NEW YORK													
Yonkers, NY	12	100	42.9	15.3 to 79.0	9	100	35.8	4.8 to 62.5	8	100	28.7	1.3 to 58.5	36.8
Wallington, NJ	12	100	38.8	8.3 to 83.0	9	89	30.2	- 0.7 to 62.5	8	88	22.6	- 2.7 to 47.0	31.7
Flemington, NJ	12	67	18.5	- 7.1 to 56.6	9	56	16.7	-12.1 to 42.6	8	50	10.7	-13.6 to 38.6	15.8
Union, NJ	12	100	27.0	2.3 to 66.0	9	67	22.2	- 5.7 to 49.0	8	50	15.4	- 8.2 to 43.0	22.3
OVERALL SUBURBAN NEW YORK			31.8				26.2				19.4		26.7
							Inside Advantage on 95/116 routes =			82%			

NOTES:

1. Ranges represent the largest disadvantage(-) to the largest advantage.
2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.
3. South Central New Jersey includes Freehold and New Brunswick, New Jersey; North Central New Jersey includes Dover, Paterson and Hasbrouck Heights, New Jersey; and Suburban New York includes New City and Yonkers, New York. For the detailed results sales area by sales area, see Table 21 in the Appendix.

Table 11. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location of Outside Plant, and Load Size, 1982

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	% of Inside Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
FORT WASHINGTON, PENNSYLVANIA												OVERALL	36.8	96%
Yonkers, NY	7	86	41.9	- 2.0 to 74.0	7	86	33.8	- 1.0 to 59.5	6	83	27.7	- 1.0 to 55.0	34.8	
Wallington, NJ	7	100	45.5	4.5 to 78.0	7	100	36.6	4.0 to 62.5	6	100	30.2	3.5 to 54.5	37.8	
Flemington, NJ	7	100	42.6	20.1 to 56.1	7	100	35.5	18.1 to 46.6	6	100	32.4	17.1 to 44.1	37.1	
Union, NJ	7	100	44.6	18.0 to 63.0	7	100	36.0	15.5 to 51.0	6	100	30.7	12.0 to 47.0	37.4	
LANDSDALE, PENNSYLVANIA												OVERALL	40.9	100%
Yonkers, NY	7	100	47.8	3.0 to 79.0	6	100	34.2	2.5 to 62.5	6	100	32.1	2.5 to 58.5	38.5	
Wallington, NJ	7	100	51.4	9.5 to 83.0	6	100	36.9	7.5 to 62.0	6	100	34.5	7.0 to 57.5	41.5	
Flemington, NJ	7	100	48.5	25.1 to 61.6	6	100	39.0	21.6 to 50.1	6	100	36.8	20.6 to 47.6	41.8	
Union, NJ	7	100	50.5	23.0 to 68.0	6	100	38.5	19.0 to 54.5	6	100	35.0	16.0 to 50.0	41.8	

continued

Table 11. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	% of Inside Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
SCHUYLKILL HAVEN, PENNSYLVANIA												OVERALL	- 2.0	39%
Yonkers, NY	7	57	3.5	-18.4 to 32.6	7	43	- 6.2	-23.4 to 16.1	7	29	- 8.0	-24.4 to 12.6	- 3.6	
Wallington, NJ	7	57	7.1	-11.9 to 28.1	7	43	- 3.4	-17.9 to 12.1	7	43	- 5.5	-19.4 to 10.1	- 0.6	
Flemington, NJ	7	86	4.2	- 1.3 to 8.2	7	0	- 4.4	- 7.8 to -0.8	7	0	- 6.1	- 9.8 to -3.3	- 2.1	
Union, NJ	7	86	6.2	- 2.4 to 13.1	7	29	- 4.0	- 9.9 to 1.6	7	0	- 6.8	-13.9 to -1.4	- 1.5	
SCRANTON, PENNSYLVANIA												OVERALL	- 6.4	26%
Yonkers, NY	7	43	- 2.6	-23.7 to 23.8	7	29	- 9.8	-26.7 to 11.8	7	29	-11.6	-27.2 to 8.8	- 8.0	
Wallington, NJ	7	43	1.0	- 9.7 to 19.3	7	29	- 7.0	-15.7 to 7.8	7	29	- 9.1	-17.7 to 4.3	- 5.0	
Flemington, NJ	7	29	- 1.9	-12.1 to 8.9	7	14	- 8.0	-16.6 to 0.4	7	0	- 9.7	-17.6 to -1.6	- 6.5	
Union, NJ	7	71	0.1	-13.2 to 6.8	7	0	- 7.6	-18.7 to -2.2	7	0	-10.4	-19.7 to -4.7	- 6.0	
BINGHAMTON, NEW YORK												OVERALL	13.0	82%
Yonkers, NY	5	100	13.9	2.0 to 22.0	2	50	- 1.5	- 8.0 to 5.0	*	--	--	--	--	9.5	
Wallington, NJ	5	100	20.8	17.0 to 27.5	2	50	8.2	3.5 to 13.0	*	--	--	--	--	17.2	
Flemington, NJ	5	80	16.0	- 1.4 to 33.1	2	50	1.6	1.1 to 2.1	*	--	--	--	--	11.9	
Union, NJ	5	100	17.7	8.0 to 26.5	2	50	2.7	0.0 to 5.5	*	--	--	--	--	13.4	

continued

Table 11. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	% of Inside Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
FULTONVILLE, NEW YORK												OVERALL	44.2	99%
Yonkers, NY	3	100	33.6	22.1 to 48.1	7	100	49.8	34.6 to 62.1	7	100	43.2	30.1 to 54.6	44.2	
Wallington, NJ	3	100	32.9	26.1 to 40.1	7	100	52.6	41.1 to 63.6	7	100	45.7	34.6 to 54.1	46.3	
Flemington, NJ	3	67	14.9	- 0.3 to 24.2	7	100	51.6	21.2 to 77.2	7	100	45.1	16.7 to 67.7	42.4	
Union, NJ	3	100	22.8	9.1 to 31.1	7	100	52.0	27.6 to 72.6	7	100	44.4	22.1 to 64.6	43.7	
ROXBURY, NEW YORK												OVERALL	28.0	100%
Yonkers, NY	3	100	26.1	24.9 to 28.4	*	--	--	--	--	*	--	--	--	--	26.1	
Wallington, NJ	3	100	29.4	19.9 to 39.4	*	--	--	--	--	*	--	--	--	--	29.4	
Flemington, NJ	3	100	27.8	2.5 to 55.0	*	--	--	--	--	*	--	--	--	--	27.8	
Union, NJ	3	100	28.7	11.9 to 48.4	*	--	--	--	--	*	--	--	--	--	28.7	

*Routes eliminated based on feasibility standards.

NOTES: 1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

SENSITIVITY ANALYSIS

Several assumptions used in the basic analysis were relaxed to examine the impact of each on the competitive environment. The following is a brief description of the methodology used to perform this sensitivity analysis with a short summary of the results of each change.

Order No. 2 Transportation Differentials

Two outside plant locations are currently pooled in Federal Order No. 4. Because the Order No. 2, 1-10 mile zone Class I price and the Class I price at these Order No. 4 plants are identical, 59.0 cents per hundredweight was used as a proxy for the Order No. 4 location adjustment for the basic analysis. However, if the plants located at Fort Washington and Lansdale were pooled in Order No. 2, their transportation differentials would be 28.6 cents per hundredweight. Sensitivity analysis was done to see the effects on the cost advantages/disadvantages of inside handlers if these two plants were priced under Order No. 2. The results are as follows.

The number of routes for which the inside handler has a transportation-cost advantage decreases from 312 in the basic analysis to 264 if the two Order No. 4 plants shifted to Order No. 2. Only 61% of all the inside plants' routes, rather than 72%, would have a cost advantage. The overall weighted average advantage for inside handlers would decrease from 21.0 cents to 10.0 cents per hundredweight (Table 12).

Table 9 shows the impact of the Order No. 2 assumption by comparing routes based on the distance of the outside plant to the sales area. When the two plants were pooled in Order No. 4, there was a significant advantage for inside handlers in sales areas that are more than 107 miles from the outside plant. That advantage is similar when all plants are pooled in Order No. 2. However, the inside handlers would have an advantage on only 2% (1 in 48) of the routes to sales areas less than 75 miles from the outside plants if all were pooled in Order No. 2. Both of the plants currently pooled in Order No. 4 are in the 76-80 mile zone, just beyond the 15-cent fixed transportation differential, and are located within 107 miles of most sales areas.

There was little change for sales areas that are 76-107 miles from the outside plant. In the basic analysis, 26% of all the routes showed an inside-handler advantage as compared to 20% for this analysis. Inside handlers have a smaller advantage in serving these particular sales areas (see Tables 20 and 21 in Appendix for results by sales area) because they are moving milk away from the city zone, while the outside handlers are moving it toward the city zone.

Sales area locations in South Central New Jersey (Table 14) would be the most significant problem area if the two Order No. 4 plants were priced in Order No. 2.

A considerable decrease in the weighted average advantages/disadvantages by outside plant location can be seen (Table 15) under this analysis; the decrease averages 30 cents per hundredweight for the Lansdale and Fort Washington plant locations.

Table 12. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Load Size, If All Plants Pooled in Order No. 2, 1982

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	Overall % Adv.
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	
Yonkers, NY	39	69	11.7	-32.4 to 48.6	36	58	7.8	-31.4 to 62.1	33	55	4.9	-31.4 to 54.6	8.3	
Wallingron, NJ	39	72	15.4	-25.9 to 52.6	36	64	11.0	-26.4 to 63.6	33	61	7.3	-26.9 to 54.1	11.5	
Flemingron, NJ	39	72	11.2	-12.1 to 55.0	36	53	10.1	-16.6 to 77.2	33	45	7.8	-17.6 to 67.7	9.8	
Union, NJ	39	82	13.5	-13.2 to 48.4	36	53	10.8	-18.7 to 72.6	33	42	6.6	-19.7 to 64.6	10.5	
OVERALL														
All Order #2		74	13.0			57	9.9			51	6.7		10.0	61
Basic Comparison		83	23.9			68	21.0			64	17.7		21.0	73

NOTES:

1. The total number of routes includes comparisons between each inside plant and each outside plant for all sales areas. Since there are 7 outside plants and 7 sales areas, the maximum number of comparisons is 49. Any total less than 49 is due to the elimination of infeasible routes (i.e., routes requiring more than 15 hours per day).

2. Ranges represent the largest disadvantage(-) to the largest advantage.

3. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

Table 13. Percent of Routes On Which Inside Handler Has A Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of Advantage or Disadvantage, by Distance From the Outside Plant to the Sales Area, and Load Size, If All Plants Pooled in Order No. 2, 1982.

One-way From Outside Plant to Sales Area*	Load Size: 600 24-Qt. Cases (100 cases/delivery)				750 24-Qt. Cases (150 cases/delivery)				800 24-Qt. Cases (133 cases/delivery)				Wtd. Avg. Dis.(-) or Adv. for all load sizes All Order 2	Results--Basic Comparison
	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.		
(miles)			¢/cwt				¢/cwt				¢/cwt		¢/cwt	¢/cwt
75 or fewer	16	6	-14.4	-32.4 to 3.7	16	0	-17.0	-31.4 to -1.8	16	0	-18.6	-31.4 to -3.8	-16.7	13.7
76 - 107	20	35	- 4.3	-23.7 to 12.6	20	15	-10.8	-26.7 to 4.1	20	10	-12.8	-27.2 to 2.1	- 9.3	- 3.2
108 - 150	76	86	15.6	-18.4 to 47.1	68	60	5.0	-22.9 to 32.1	64	55	2.7	-23.9 to 28.1	8.2	20.5
more than 150	44	95	26.2	- 1.4 to 55.0	40	95	39.3	- 7.8 to 77.2	32	94	39.3	- 7.8 to 67.7	34.3	37.5

*One-way mileages listed do not correspond to Federal Order Transportation Zones.

NOTES: 1. Ranges given represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of routes.

Table 14. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving large Supermarket Accounts, Amount of Advantage or Disadvantage, By Geographic Location of Sales Area, and Load Size, If All Plants Pooled In Order No. 2, 1982.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv. ¢/cwt	Range in Disadv.(-) To Adv. ¢/cwt	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv. ¢/cwt	Range in Disadv.(-) To Adv. ¢/cwt	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv. ¢/cwt	Range in Disadv.(-) To Adv. ¢/cwt	Wtd. Avg. Dis.(-) or Adv. for all load sizes All Order 2 ¢/cwt	Results--Basis Comparison ¢/cwt	Pct.
SOUTH-CENTRAL NEW JERSEY															
Yonkers, NY	10	20	-14.4	-32.4 to 28.4	10	20	- 9.0	-31.4 to 56.1	10	20	-11.0	-31.4 to 49.6	-11.5		
Wallington, NJ	10	20	- 5.2	-25.9 to 39.4	10	20	- 2.0	-26.4 to 63.6	10	20	- 4.7	-26.9 to 54.1	- 4.0		
Flemington, NJ	10	70	10.4	-10.3 to 55.0	10	30	11.9	-12.3 to 77.2	10	20	8.6	-13.3 to 67.7	10.3		
Union, NJ	10	60	5.6	-12.4 to 48.4	10	20	7.3	-14.9 to 72.6	10	20	1.8	-18.4 to 64.6	4.9		
OVERALL SOUTH-CENTRAL NEW JERSEY													- 0.8	12.1	65
Inside Advantage on 28% of all routes															
NORTH-CENTRAL NEW JERSEY															
Yonkers, NY	17	76	12.2	-23.7 to 37.1	17	59	8.2	-26.7 to 55.6	15	53	6.7	-27.2 to 49.6	9.1		
Wallington, NJ	17	82	18.2	- 9.7 to 46.6	17	76	13.7	-15.7 to 55.6	15	73	11.2	-17.7 to 49.1	14.5		
Flemington, NJ	17	76	13.7	-12.1 to 31.2	17	65	11.0	-16.6 to 57.7	15	60	9.7	-17.6 to 51.7	11.5		
Union, NJ	17	82	15.6	-13.2 to 37.6	17	65	11.5	-18.7 to 56.6	15	53	9.2	-19.7 to 49.6	12.3		
OVERALL NORTH-CENTRAL NEW JERSEY													11.9	23.0	71
Inside Advantage on 69% of all routes															

continued

Table 14. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes All Order 2	Results-- Basic Comparison
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	¢/cwt Pct.
					SUBURBAN NEW YORK									
Yonkers, NY	12	100	32.8	15.3 to 48.6	9	100	25.6	4.8 to 62.1	8	100	21.1	1.3 to 54.6	27.3	
Wallington, NJ	12	100	28.7	8.3 to 52.6	9	89	20.0	- 0.7 to 49.6	8	88	15.0	- 2.7 to 43.1	22.2	
Flemington, NJ	12	67	8.3	-7.1 to 26.2	9	56	6.5	-12.1 to 41.2	8	50	3.1	-13.6 to 34.7	6.3	
Union, NJ	12	100	16.9	2.3 to 35.6	9	67	12.1	- 5.7 to 46.1	8	50	7.8	- 8.2 to 39.1	12.9	
OVERALL SUBURBAN NEW YORK	Inside Advantage on 82% of all routes												17.2	26.7 82

NOTES:

1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

3. South Central New Jersey includes Freehold and New Brunswick, New Jersey; North Central New Jersey includes Dover, Paterson and Hasbrouck Heights, New Jersey; and Suburban New York includes New City and Yonkers, New York. For the detailed results sales area by sales area, see Table A1 in the Appendix.

Table 15. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location Outside Plant, and Load Size, If All Plants Pooled in Order No. 2, 1982.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes	Percent of All Routes
	¢/cwt				¢/cwt				¢/cwt				¢/cwt	
FORT WASHINGTON, PENNSYLVANIA														
OVERALL All Order No. 2													6.4	65
Basic Comparison													36.8	96
Yonkers, NY	7	57	11.5	-32.4 to 43.6	7	57	3.4	-31.4 to 29.1	6	50	- 2.6	-31.4 to 24.6	4.4	
Wallington, NJ	7	71	15.1	-25.9 to 47.6	7	71	6.2	-26.4 to 32.1	6	67	- 0.2	-26.9 to 24.1	7.4	
Flemington, NJ	7	71	12.2	-10.3 to 25.7	7	71	5.1	-12.3 to 16.2	6	67	2.0	-13.3 to 13.7	6.7	
Union, NJ	7	71	14.2	-12.4 to 32.6	7	71	5.6	-14.9 to 20.6	6	50	0.3	-18.4 to 16.6	7.0	
LANDSDALE, PENNSYLVANIA														
OVERALL All Order No. 2													10.5	70
Basic Comparison													40.9	100
Yonkers, NY	7	71	17.4	-27.4 to 48.6	6	67	3.8	-27.9 to 32.1	6	67	1.7	-27.9 to 28.1	8.1	
Wallington, NJ	7	71	21.0	-20.9 to 52.6	6	67	6.5	-22.9 to 31.6	6	67	4.1	-23.4 to 27.1	11.1	
Flemington, NJ	7	86	18.1	- 5.3 to 31.2	6	67	8.6	- 8.8 to 19.7	6	67	6.4	- 9.8 to 17.2	11.4	
Union, NJ	7	71	20.1	- 7.4 to 37.6	6	67	8.1	-11.4 to 24.1	6	67	4.6	-14.4 to 19.6	11.4	

NOTES: 1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages given are the average advantages/disadvantages for each load size weighted by the total number of feasible routes.

Plant-Specific Labor Costs

The basic stem-haul costs were calculated using an average labor cost of $14.90 per hour, including all fringe benefits, and $16.38 per overtime hour. However, the actual plant-specific labor costs ranged from approximately $11.50 per hour to $19.00 per hour, including fringes, for outside handlers; and from $14.50 to $16.50 an hour including fringes, for inside handlers. The average of actual labor costs for the inside and outside handlers differed only by 35 cents per hour.

Plant-specific labor costs were used in stem-haul calculations to determine whether or not specific differences in labor costs would change the competitive situation. In this scenario, inside handlers would have an advantage for only 68%, rather than 72%, of their routes. (See Table 16.) The weighted-average advantages were still significant for the inside handlers, but fell an average of 4.0 cents per hundredweight. The plant located in Flemington, New Jersey had the least favorable labor costs compared to outsiders (see Table 16). There was little variation in the results by distance of the sales area from outside plant except for those areas more than 150 miles from the outside plant.

The results5/ of the plant-specific labor cost analysis by location of outside plant indicate that the plant located in Schuylkill Haven gained considerably, from 4.0 to 6.0 cents per hundredweight. The same is true for the Scranton plant although its gain was smaller, from 1.5 to 3.5 cents per hundredweight. On the other hand, increases in the weighted-average advantages occurred for the inside plants over plants located in Fort Washington and Lansdale.

Inside Routes Using Straight-Chassis Vehicles and Commission Routemen

This phase of the sensitivity analysis assumes that outside plants use tractor-trailers for their routes and that inside handlers use straight-chassis commission routes.

Commission routemen's labor costs for a 600-case route were calculated for each inside handler using the base salary plus fringes as stated in each labor contract plus the commissions paid the regular routeman for that route. The cost of the route was then divided by the number of days the regular routeman worked to establish a daily cost for each route. The average cost of all inside handlers' commission routes ($186.64 per day or $23.33 per hour) was used for the stem-haul cost calculations for the inside handlers. The average hourly rate of $14.76 including fringes was used for outside handlers. Labor costs were allocated to the stem-haul as they had been for the basic analysis (see Exhibit 3).

Annual interest and depreciation costs for straight-chassis trucks were compared to that of tractors and trailers. The difference was allocated to the stem-haul of the tractor-trailer route based on stem-haul miles as illustrated

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5/ Results for plant-specific labor costs analyses by location of outside plant are not reported herein due to confidentiality considerations.

Table 16. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Load Size, Using Plant-Specific Labor Costs, 1982

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Per. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Per. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Per. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Wtd. Avg. Dis.(-) or Adv. for all load sizes Plant-Spec. Labor	Results — Basic Comparison
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	¢/cwt Per.
Yonkers, NY	39	79	21.8	-24.7 to 85.5	36	69	15.1	-27.2 to 66.5	33	70	12.3	-27.7 to 62.5	16.7	19.3
Wallington, NJ*	39	79	24.4	-18.9 to 89.0	36	69	17.4	-23.9 to 66.5	33	67	12.9	-25.4 to 62.5	18.6	22.4
Flemington, NJ	39	69%	18.9	-15.6 to 65.1	36	56	15.5	-18.6 to 53.6	33	55	13.3	-19.6 to 51.1	16.1	20.8
Union, NJ	39	79	22.5	-15.7 to 73.5	36	58	16.6	-20.7 to 58.0	33	58	12.2	-22.7 to 55.0	17.4	21.6
OVERALL													17.2	21.0
								Inside Advantage or 68% of all routes						72

* Labor costs estimated for Wallington, New Jersey routes.

NOTES:

1. The total number of routes includes comparisons between each inside plant and each outside plant for all sales areas. Since there are 7 outside plants and 7 sales areas, the maximum number of comparisons is 49. Any total less than 49 is due to the elimination of infeasible routes (i.e., routes requiring more than 15 hours per day).

2. Ranges represent the largest disadvantage(-) to the largest advantage.

3. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

Table 17. Percent of Routes On Which Inside Handler Has A Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of Advantage or Disadvantage, by Distance From the Outside Plant to the Sales Area, and Load Size, Using Plant-Specific Labor Costs, 1982.

One-way from Outside Plant to Sales Area*	Load Size: 600 24-Qt. Cases (100 cases/delivery)				750 24-Qt. Cases (150 cases/delivery)				800 24-Qt. Cases (133 cases/delivery)				Wtd. Avg. Disadv.(-) or Adv. for all load sizes Plant-Spec. Labor	Results--Basic Comparison
	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.		
(miles)			¢/cwt				¢/cwt				¢/cwt		¢/cwt	¢/cwt
less than 75	16	100	18.2	4.0 to 34.1	16	100	15.3	3.0 to 28.6	16	100	13.5	2.5 to 28.6	15.7	13.7
76 - 107	20	30	0.3	-24.7 to 48.5	20	20	- 5.8	-27.2 to 38.0	20	20	- 8.2	-27.7 to 35.0	- 4.6	- 3.2
108 - 150	76	76	26.3	-21.9 to 82.5	68	50	16.8	-25.9 to 66.5	64	52	15.4	-26.9 to 62.5	19.8	20.5
more than 150	44	91	25.6	-12.9 to 89.0	40	93	26.3	-14.3 to 66.5	32	91	19.9	-13.8 to 42.7	24.3	37.5

*One-way mileages listed do not correspond to Federal Order Transportation Zones.

NOTES: 1. Ranges given represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of routes.

in Exhibit 3. Differences in fixed fees such as registration, insurance and federal highway use taxes were also examined and allocated to the stem-haul for the route which had the higher cost.

Straight-chassis routes for 600-case loads were developed for inside handlers and the stem-haul costs for these routes to each sales area were compared to the stem-haul costs of 600-, 750-, and 800-case tractor-trailer routes. If inside handlers used smaller trucks and commission routemen, they would have an advantage for 76% of the routes compared to 72% if they used tractor-trailers. The weighted-average advantage increased for all load sizes and the overall average increased from 21.0 cents to 25.1 cents per hundredweight. The larger advantages are due to delivery-vehicle cost differences. Tractor trailers are more expensive to operate than straight-chassis trucks. (See Table 18.)

Differences in the Cost of Capital

Using 14% as the cost of capital, rather than 9%, did not alter the results of the stem-haul cost comparisons. The proportion of routes for which inside handlers had a transportation-cost advantage remained 72%. On the average, the differential cost per mile was only one-tenth of one cent higher per mile with a 14% cost of capital, indicating results are not sensitive within the selected cost-of-capital range.

Double-Bottom Tractor-Trailers

Sensitivity analysis was performed by assuming that double-bottom tractor-trailers were used on routes originating in Fultonville. It was assumed that a double-bottom tractor-trailer was used from Fultonville to Suffern, New York, and back on the New York State Thruway.

It was assumed that using double-bottoms results in a cost savings because one tractor and one driver could be saved, and some of the cost savings of double-bottoms should be allocated to the stem-haul cost for the milk trailer. Therefore, one-half of the basic stem-haul costs related to the tractor and the round-trip mileage from Fultonville to Suffern were deducted from the original stem-haul costs for Fultonville routes. For example, the fuel cost per mile for a single-bottom route was 22 cents; so 11 cents a mile was used for the double-bottom stem mileages. Similarly, half the cost of a single-bottom tractor-trailer driver (not a delivery routeman) was used for the double-bottom costs.

The calculated savings were 17.0, 14.0 and 13.0 cents per hundredweight for 600-, 750-, and 800-case double-bottom loads, respectively. However, this phase of the analysis was only a limited attempt to examine the double-bottom issue. The approach used here was not as rigorous as those used for the other analyses. Subtracting half of the relevant mileage costs was a generous assumption because the cost of operating a double-bottom is actually higher than the single-bottom costs used here. Therefore, the cost savings from using a double-bottom would be less than 50% of single-bottom costs as used here.

Table 18. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Load Size, Insiders Use Straight Chassis' and Commissions, 1982

Location of Inside Plant	Load Size: 600 24-Qt. Case Commission Routes Compared to 600-24 Qt. Case Hourly Routes: Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range In Disadv.(-) To Adv.	600 24-Qt. Case Commission Routes Compared to 750 24-Qt. Case Hourly Routes: Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range In Disadv.(-) To Adv.	600 24-Qt. Case Commission Routes Compared to 800 24-Qt. Case Hourly Routes: Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range In Disadv.(-) To Adv.	Wtd.Avg. Dis.(-) or Adv. for all load sizes Straight-Chassis	Results -- Basic Comparison	
			¢/cwt				¢/cwt				¢/cwt		¢/cwt	¢/cwt	Pct.
Yonkers, NY	39	85	30.0	-13.7 to 93.5	36	67	21.3	-22.2 to 69.1	33	67	17.4	-24.7 to 64.5	23.6	19.3	
Wallington, NJ	39	90	34.4	- 7.2 to 96.0	36	78	25.2	-15.7 to 70.5	33	73	20.7	-18.2 to 66.0	27.1	22.4	
Flemington, NJ	39	97	32.5	- 7.6 to 74.6	36	67	23.5	-16.1 to 79.2	33	58	19.9	-18.6 to 70.7	25.3	20.8	
Union, NJ	39	97	30.9	- 9.2 to 77.5	36	69	22.6	-17.7 to 74.1	33	61	18.8	-20.2 to 65.6	24.4	21.6	
OVERALL: Straight Chasis and Commission					Inside Advantage on 76% of all routes								25.1	21.0	72

NOTES:

1. The total number of routes includes comparisons between each inside plant and each outside plant for all sales areas. Since there are 7 outside plants and 7 sales areas, the maximum number of comparisons is 49. Any total less than 49 is due to the elimination of infeasible routes (i.e., routes requiring more than 15 hours per day).

2. Ranges represent the largest disadvantage(-) to the largest advantage.

3. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

The resulting cost comparisons differed only slightly from the results of the basic analyses. Inside handlers still have a transportation cost advantage in 72% of the routes studied. The weighted-average advantage in the basic analysis (Table 1) decreased by 1.4 or 3.0 cents per hundredweight depending on the location of the inside plant.

Regression Analysis

The differential stem-haul costs for outside handlers were used to estimate the total variable cost per mile of moving packaged milk into the 1-70 mile zone. Since the stem-haul costs generated were not the total costs incurred by handlers, a total cost function, including fixed and variable costs, could not be estimated. However, the differential stem-haul costs did include all costs which vary with distance traveled; therefore, variable costs as related to distance can be estimated.

Ordinary least-squares regression analysis was used to estimate the variable costs. The dependent variable in the analysis was the differential stem-haul cost while the sole independent variable, excluding the intercept, was one-way mileage from an outside plant to a sales area. Costs per one-way distance traveled is also used in Federal Order transportation differential schedules.

Two regression equations were estimated for each of the three load sizes. One equation used low vehicle-cost data and the other used high vehicle-cost data. As shown in Table 19, estimates of total variable costs ranged from 3.6 cents per hundredweight to 5.6 cents per hundredweight per ten-mile increment of one-way distance traveled.

Table 19. Summary of Regression Analysis to Estimate the Variable Cost of Hauling Packaged Milk Into the 1-70 Mile Zone

Load Size	Variable Cost Per 10-Mile Increment of Distance (cents/cwt.)	t-statistic	R^2
600 cases low vehicle costs (309.6 cwt.)	4.9	18.86	.90
600 cases high vehicle costs (309.6 cwt.)	5.6	20.78	.92
600 cases - average	5.3	22.27	.87
750 cases low vehicle costs (387 cwt.)	4.1	21.83	.93
750 cases high vehicle costs (387 cwt.)	4.6	23.07	.94
750 cases - average	4.4	25.43	.90
800 cases low vehicle cost (412.8 cwt.)	3.6	22.56	.94
800 cases high vehicle cost (412.8 cwt.)	4.1	25.84	.95
800 cases - average	3.9	25.85	.91
600-, 750-, 800-case loads low vehicle costs average	4.2	17.81	.75
600-, 750-, 800-case loads high vehicle costs average	4.6	18.17	.75

APPENDIX TABLES

Table 20. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Large Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location of Sales Area and Load Size, 1982

NOTES: 1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery)				Load Size: 750 24-Qt. Cases (150 cases/delivery)				Load Size: 800 24-Qt. Cases (133 cases/delivery)				Weighted Average Disadv.(-) or Adv. for all load sizes
	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
					DOVER, NEW JERSEY								
Yonkers, NY	5	60	6.6	-23.7 to 39.5	6	50	6.2	-26.7 to 34.6	5	60	7.2	-27.2 to 30.5	6.6
Wallington, NJ	5	80	21.6	- 8.7 to 54.5	6	67	17.7	-15.2 to 46.1	5	60	17.7	-16.7 to 41.0	18.9
Flemington, NJ	5	60	18.2	-12.1 to 51.1	6	67	16.3	-16.6 to 44.7	5	60	16.8	-17.6 to 40.1	17.1
Union, NJ	5	60	17.1	-13.2 to 50.0	6	50	14.2	-18.7 to 42.6	5	60	14.7	-19.7 to 38.0	15.3
					FREEHOLD, NEW JERSEY								
Yonkers, NY	4	25	- 7.6	-18.4 to 3.0	5	40	3.2	-22.9 to 56.1	5	40	1.5	-23.9 to 49.6	- 0.5
Wallington, NJ	4	50	- 1.2	-11.9 to 9.5	5	60	8.2	-17.9 to 61.1	5	60	6.0	-19.4 to 54.1	4.7
Flemington, NJ	4	100	14.4	3.7 to 25.1	5	80	22.3	- 3.8 to 75.2	5	60	19.6	- 5.8 to 67.7	19.1
Union, NJ	4	100	12.3	1.6 to 23.0	5	60	19.7	- 6.4 to 72.6	5	60	16.5	- 8.9 to 64.6	16.4
					NEW BRUNSWICK, NEW JERSEY								
Yonkers, NY	6	67	1.3	-18.7 to 28.4	5	60	3.2	-23.4 to 54.6	5	60	0.9	-24.4 to 45.6	1.8
Wallington, NJ	6	67	12.3	- 7.7 to 39.4	5	60	12.2	-14.4 to 63.6	5	60	8.9	-16.4 to 53.6	11.2
Flemington, NJ	6	100	27.9	7.9 to 55.0	5	60	25.8	- 0.8 to 77.2	5	60	22.0	- 3.3 to 66.7	25.4
Union, NJ	6	100	21.3	1.3 to 48.4	5	60	19.2	- 7.4 to 70.6	5	60	11.4	-13.9 to 56.1	17.6

continued

Table 20. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
					PATERSON, NEW JERSEY								
Yonkers, NY	6	83	27.0	- 4.7 to 60.5	5	60	26.3	-11.2 to 55.6	5	60	23.5	-13.2 to 49.6	25.7
Wallington, NJ	6	67	22.0	- 9.7 to 55.5	5	60	21.8	-15.7 to 51.1	5	60	19.0	-17.7 to 45.1	21.0
Flemington, NJ	6	83	28.1	- 3.6 to 61.6	5	60	28.4	- 9.1 to 57.7	5	60	25.6	-11.1 to 51.7	27.4
Union, NJ	6	83	28.0	- 3.7 to 61.5	5	60	27.3	-10.2 to 56.6	5	60	23.5	-13.2 to 49.6	26.4
					YONKERS, NEW YORK								
Yonkers, NY	5	100	51.0	23.8 to 77.5	5	100	42.1	11.8 to 62.5	5	100	37.9	8.8 to 58.5	43.7
Wallington, NJ	5	100	35.5	8.3 to 62.0	5	80	29.6	- 0.7 to 50.0	5	80	26.4	- 2.7 to 47.0	30.5
Flemington, NJ	5	80	23.6	- 3.6 to 50.1	5	60	21.2	- 9.1 to 41.6	5	60	18.0	-11.1 to 38.6	20.9
Union, NJ	5	100	31.0	3.8 to 57.5	5	80	26.1	- 4.2 to 46.5	5	60	22.4	- 6.7 to 43.0	26.5
					NEW CITY, NEW YORK								
Yonkers, NY	7	100	37.2	15.3 to 79.0	4	100	27.9	4.8 to 59.5	3	100	13.3	1.3 to 31.6	29.4
Wallington, NJ	7	100	41.2	19.3 to 83.0	4	100	30.9	7.8 to 62.5	3	100	16.3	4.3 to 34.6	32.9
Flemington, NJ	7	57	14.8	- 7.1 to 56.6	4	50	11.0	-12.1 to 42.6	3	33	- 1.6	-13.6 to 16.7	10.2
Union, NJ	7	100	24.2	2.3 to 66.0	4	50	17.4	- 5.7 to 49.0	3	33	3.8	- 8.2 to 22.1	17.9
					RASBROUCK HEIGHTS, NEW JERSEY								
Yonkers, NY	6	100	32.3	2.8 to 67.5	6	83	25.5	- 5.2 to 54.0	5	60	26.0	- 7.2 to 50.0	28.0
Wallington, NJ	6	100	41.8	12.3 to 77.0	6	100	33.5	2.8 to 62.0	5	100	33.5	0.3 to 57.5	36.4
Flemington, NJ	6	83	25.9	- 3.6 to 61.1	6	67	21.6	- 9.1 to 50.1	5	60	23.1	-10.1 to 47.1	23.6
Union, NJ	6	100	32.8	3.3 to 68.0	6	83	26.0	- 4.7 to 54.5	5	60	26.0	- 7.2 to 50.0	28.4

Table 21. Percent of Routes On Which Inside Handler Has a Transportation-Cost Advantage in Serving Larke Supermarket Accounts, Amount of the Advantage or Disadvantage, By Location of Sales Area and Load Size, If All Plants Pooled in Order No. 2, 1982.

NOTES: 1. Ranges represent the largest disadvantage(-) to the largest advantage.

2. The weighted averages are the average advantages/disadvantages for each load size weighted by the total number of feasible routes for each load size.

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
							DOVER, NEW JERSEY						
Yonkers, NY	5	40	- 5.6	-23.7 to 9.1	6	33	- 4.0	-26.7 to 34.6	5	40	- 5.0	-27.2 to 30.1	- 4.8
Wallington, NJ	5	80	9.4	- 8.7 to 24.1	6	67	7.5	-15.2 to 46.1	5	60	5.5	-16.7 to 40.6	7.5
Flemington, NJ	5	60	6.0	-12.1 to 20.7	6	67	6.1	-16.6 to 44.7	5	60	4.6	-17.6 to 39.7	5.6
Union, NJ	5	60	4.9	-13.2 to 19.6	6	50	4.0	-18.7 to 42.6	5	40	2.5	-19.7 to 37.6	3.8
							FREEHOLD, NEW JERSEY						
Yonkers, NY	4	0	-22.9	-32.4 to 13.2	5	20	- 9.0	-31.4 to 56.1	5	20	-10.7	-31.4 to 49.6	-13.6
Wallington, NJ	4	0	-16.3	-25.9 to 6.7	5	20	- 4.0	-26.4 to 61.1	5	20	- 6.2	-26.9 to 54.1	- 8.3
Flemington, NJ	4	50	- 0.7	-10.3 to 8.9	5	40	10.1	-12.3 to 75.2	5	20	7.4	-13.3 to 67.7	6.0
Union, NJ	4	50	- 2.8	-12.4 to 6.8	5	20	7.5	-14.9 to 72.6	5	20	4.3	-16.4 to 64.6	3.4
							NEW BRUNSWICK, NEW JERSEY						
Yonkers, NY	6	33	- 8.8	-27.9 to 28.4	5	20	- 9.0	-28.4 to 54.6	5	20	-11.3	-28.9 to 45.6	- 9.6
Wallington, NJ	6	33	2.2	-16.9 to 39.4	5	20	0.0	-19.4 to 63.6	5	20	- 3.3	-20.9 to 53.6	- 0.2
Flemington, NJ	6	83	17.8	- 1.3 to 55.0	5	20	13.6	- 5.8 to 77.2	5	20	9.8	- 7.8 to 66.7	14.0
Union, NJ	6	67	11.2	- 7.9 to 48.4	5	20	7.0	-12.4 to 70.6	5	20	- 0.8	-18.4 to 56.1	6.1

continued

Table 21. Continued

Location of Inside Plant	Load Size: 600 24-Qt. Cases (100 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	750 24-Qt. Cases (150 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	800 24-Qt. Cases (133 cases/delivery) Total No. of Routes	Pct. of Advs.	Average Dis.(-) or Adv.	Range in Disadv.(-) To Adv.	Weighted Average Disadv.(-) or Adv. for all load sizes
			¢/cwt				¢/cwt				¢/cwt		¢/cwt
							PATERSON, NEW JERSEY						
Yonkers, NY	6	83	16.9	- 4.7 to 30.1	5	60	14.1	-11.2 to 55.6	5	60	11.3	-13.2 to 49.6	14.3
Wallington, NJ	6	67	11.9	- 9.7 to 25.1	5	60	9.6	-15.7 to 51.1	5	60	6.8	-17.7 to 45.1	9.6
Flemington, NJ	6	83	18.0	- 3.6 to 31.2	5	60	16.2	- 9.1 to 57.7	5	60	13.4	-11.1 to 51.7	16.0
Union, NJ	6	83	17.9	- 3.7 to 31.1	5	60	15.1	-10.2 to 56.6	5	60	11.3	-13.2 to 49.6	15.0
							YONKERS, NEW YORK						
Yonkers, NY	5	100	38.8	23.8 to 48.1	5	100	29.9	11.8 to 62.1	5	100	25.7	8.8 to 54.6	31.5
Wallington, NJ	5	100	23.3	8.3 to 32.6	5	80	17.4	- 0.7 to 49.6	5	80	14.2	- 2.7 to 43.1	18.3
Flemington, NJ	5	80	11.4	- 3.6 to 20.7	5	60	9.0	- 9.1 to 41.2	5	60	5.8	-11.1 to 34.7	8.7
Union, NJ	5	100	18.8	3.8 to 28.1	5	80	13.9	- 4.2 to 46.1	5	60	10.2	- 6.7 to 39.1	14.3
							NEW CITY, NEW YORK						
Yonkers, NY	7	100	28.5	15.3 to 48.6	4	100	20.3	4.8 to 38.1	3	100	13.3	1.3 to 31.6	22.9
Wallington, NJ	7	100	32.5	19.3 to 52.6	4	100	23.3	7.8 to 41.1	3	100	16.3	4.3 to 34.6	26.4
Flemington, NJ	7	57	6.1	- 7.1 to 26.2	4	50	3.4	-12.1 to 21.2	3	33	- 1.6	-13.6 to 16.7	3.7
Union, NJ	7	100	15.5	2.3 to 35.6	4	50	9.8	- 5.7 to 27.6	3	33	3.8	- 8.2 to 22.1	11.4
							HASBROUCK HEIGHTS, NEW JERSEY						
Yonkers, NY	6	100	22.2	2.8 to 37.1	6	83	15.4	- 5.2 to 47.6	5	60	13.8	- 7.2 to 41.6	17.3
Wallington, NJ	6	100	31.7	12.3 to 46.6	6	100	23.4	2.8 to 55.6	5	100	21.3	0.3 to 49.1	25.7
Flemington, NJ	6	83	15.8	- 3.6 to 30.7	6	67	11.5	- 9.1 to 43.7	5	60	10.9	-10.1 to 38.7	12.8
Union, NJ	6	100	22.7	3.3 to 37.6	6	83	15.9	- 4.7 to 48.1	5	60	13.8	- 7.2 to 41.6	17.7