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B637: Reducing the Frequency of Home Delivery of Milk

Homer Metzger

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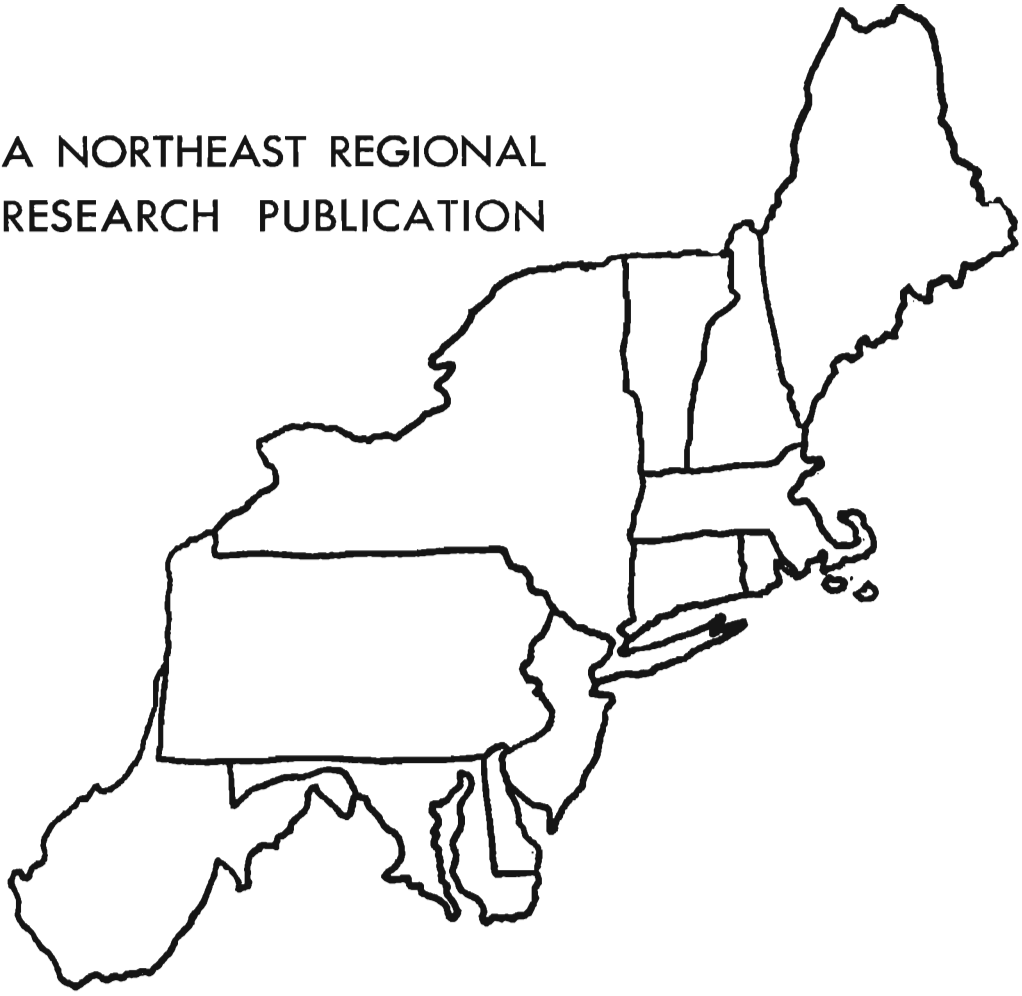

REDUCING THE FREQUENCY OF HOME DELIVERY OF MILK

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Foreword and Acknowledgments

This study is a contribution to the northeast regional dairy marketing research project NEM-25, "Adapting Milk Distribution Systems and Practices to Changing Conditions," involving agricultural experiment stations in the northeast region and supported in part by regional funds. This phase of the regional project was initiated by the Maine and West Virginia Agricultural Experiment Stations and was carried out under the general supervision of the Technical Committee.

Assisting with the field interviewing, tabulations and analysis were: for the Maine Agricultural Experiment Station, Carole Hardy, Charles Merchant and Raymond Taylor; for the West Virginia Agricultural Experiment Station, Adrian L. Haught, Charles N. Shaw and Thomas R. Whelan.

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Northeast Regional Research Publication

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Summary

Home delivery of milk is faced with rising costs and price competition from stores. To remain in business the retail route operator must sell more product per customer or provide a minimum amount of service for customers. This report is concerned with the feasibility of providing a minimum amount of service through reducing the frequency of delivery on home delivery routes. Information on experience with and attitudes toward reduced delivery was obtained by personal and mail interviews from distributors in the northeast and from households in Kentucky, Maine and West Virginia during the period 1960 to 1963.

Eighty-five percent of the routes of firms offering home delivery service in the northeast provided three times weekly service in 1963. Thirteen percent of the routes provided every other day service, while 1% provided twice-weekly service and 1% four times weekly service. Seventy-three percent of the distributors expressed the opinion that it was not feasible to adopt the practice of providing only two deliveries per week on home delivery routes. However, 43% of the firms were providing this frequency of service to some customers.

Most customers interviewed in Kentucky, Maine and West Virginia did not want more frequent delivery service or additional products from their deliveryman. Many route customers were willing to pay more for route delivered than for store purchased milk. The amount customers were willing to pay above store prices varied from one to over five cents per quart. The majority would pay a premium of two cents per quart for delivery. Few indicated they would pay over five cents. From 20 to 40% of the households surveyed in four cities were buying milk from stores.

Budgets prepared to show relative costs of three deliveries and two deliveries per customer per week showed savings of from one cent to one and one-third cents per unit. Savings are influenced greatly by the method of paying route drivers and the opportunity to reduce truck mileage. The major impact of twice-weekly delivery is to increase the volume of milk delivered per customer. Savings in labor of about one man day per route per week are indicated. Opportunities for route reorganization could release one routeman and his relief for every three routemen employed. A potential exists for reducing the number of trucks required or the number of days they operate.

In expressing the belief that twice-weekly delivery was not feasible, distributors not providing this service gave most fre-

quently the reason that customers lacked refrigeration space. Other reasons were customer resistance, loss of business to stores, competition from other distributors, and reduction in route sales.

Of seven distributors who adopted the twice-weekly delivery practice, most reported reduced mileage, reduced labor hours for routemen, and no change in sales.

An analysis of purchases by route customers of one distributor in Ashland, Kentucky, made before, during and after adoption of twice-weekly delivery, showed no significant difference in sales with reduced delivery.

From 25 to 30% of the route customers interviewed in four cities in Kentucky, Maine and West Virginia indicated a willingness to accept twice-weekly delivery service. The major reason given for opposing this reduction in service was the lack of freshness and keeping quality of the milk. Other reasons given which varied in importance among the cities included lack of storage space, resistance to change, inconvenience, and difficulty in planning. The amount of milk delivered per week, the size of the household, and the number of children in the family were closely associated with acceptance of twice-weekly delivery. There was not a relationship between size of refrigerator or family income and willingness to accept reduced delivery service.

Neither the concern over milk freshness and keeping quality nor the lack of refrigeration space were, in fact, valid reasons for customers refusing to accept twice-weekly service. From 94 to 98% of the householders interviewed in Kentucky, Maine and West Virginia had no problem with keeping quality. Even for those reporting problems the troubles were of infrequent occurrence. From 65 to 79% reported keeping milk four or more days without trouble. In Houlton, Maine only 1% of the route customers in a special test reported milk off flavor after being kept four days.

When route customers were asked if they could store the specific quantity of milk which would be delivered under twice-weekly service, from 78 to 93% said they could. The ability to store the quantity of milk varied almost directly with the quantity of current delivery. In Ashland and Wheeling it was found that 86% of the customers would need to take three quarts or less each delivery under the twice-weekly system.

REDUCING THE FREQUENCY OF HOME DELIVERY OF MILK

Homer B. Metzger and James H. Clarke[1]

Introduction

In the 1930's daily delivery of milk to homes was commonplace; in the 1940's every-other-day delivery was initiated; and in the 1950's every-other-day delivery gave way to three deliveries weekly. Will the 1960's see still further reductions in delivery services on home delivery milk routes? There are two reasons to believe the answer is yes: (1) the persistent trend to low-priced milk sold through supermarkets and dairy stores, and (2) the persistent rise in wages and associated payroll expenses for delivery labor.

If retail home delivery is to be patronized, it must provide the service at prices within a few cents per quart of store prices—especially to customers with medium to large-size orders. Faced with rising costs and low-price competition, the retail route operator has two alternatives. He may attempt to reduce his unit costs by (1) selling more products per customer, or (2) providing a minimum amount of service to each customer.

A minimum amount of service may take the form of a reduction in the number of deliveries per week. It may be achieved in several ways. Customers may be served only twice a week. They may be served twice one week and three times the next week. Or some customers may receive one, some two, some three or more deliveries per week, depending upon the volume they purchase.

This report presents the results of research which has been undertaken to determine the feasibility of reducing the frequency of delivery on home delivery routes. It was undertaken without prejudice against the possibilities of increasing per customer sales on routes which to many is a more attractive solution to the cost-price squeeze.

Method and Scope of Study

Data for this report were obtained from original studies by the authors and information from published research. The major original studies were those described below. The results from these studies have been reported in state experiment station publications and two master's degree theses.[2]

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[1] Professor and Head Department of Agricultural Business and Economics, University of Maine, and Agricultural Economist, West Virginia University, respectively.

[2] See list of publications in appendix.

A random sample of 25% of retail milk distributors located throughout the northeast was surveyed using mail questionnaires in the fall of 1963. Information obtained included frequency of home delivery route operations, actual frequency of delivery to customers, and experience with twice-weekly service.

Household surveys among home milk delivery customers were conducted using personal interviews in the cities of Ashland, Kentucky; Wheeling, West Virginia; Houlton and Portland, Maine. The Houlton survey was made in the fall of 1960, the Ashland and Wheeling surveys were made in the summer of 1961 and the Portland survey was conducted in the spring of 1962. Block sampling of the metropolitan areas was used in the Maine cities to solicit households except in Houlton where only customers of the principal distributor were interviewed. In Ashland a systematic sample of one-fifth of the households occupying residences served or formerly served by one dairy which had earlier operated retail routes on a twice-a-week basis were selected for interview. A similar systematic sample of households in Wheeling was selected for interview from the retail route records of two principal distributors in that market. Many Ashland households had experienced twice-weekly delivery service during the previous year but had returned to three times weekly service six months prior to the survey. All households in the other cities had three times weekly delivery service available at least since 1955. Information obtained from the households included frequency of actual service, volume of purchases, attitudes toward reduction in frequency of service with reasons for these attitudes, and facilities for refrigerated milk storage. A total of 1,893 useable interview records was available for analysis. Of these 298 were from Ashland, 399 from Wheeling, 667 from Houlton, and 529 from Portland.

Information was also collected on route purchases covering a three-year period before, during, and after adoption of twice-weekly service in Ashland. Only customers remaining with the distributor continuously over the three year period, 1958-1960, were included in the analysis.

An analysis of route operating costs under three times weekly delivery was made for routes of one distributor in Houlton in 1960 and costs were synthesized assuming routes were operated twice-weekly.

A household test of milk keeping quality was conducted among 129 route customers in Houlton, Maine during the fall of 1960. A quart of milk was delivered to the home where it was sampled daily until a taste or flavor defect was detected.

Present Status of Home Delivery

Frequency of home delivery route operations

Based upon information provided by 264 milk distributors in the northeast, representing a 25% sample of firms with home delivery routes, the prevailing practice in delivery to homes in 1963 was three times weekly service. Eighty-four percent of the firms reported this service. Only 3% of the firms reported twice-weekly service while 15% provided every-other-day service and 4% served customers four or more times per week. As these totals indicate, some firms followed more than one delivery practice. Of 3,492 routes providing home delivery service, 85% were operated three times weekly, 13% every-other-day, 1% four times weekly, and 1% twice-weekly, table 1. Wide variations existed among states in route delivery frequency.

TABLE 1
Number of Home-Delivery Routes Providing Specified Delivery Frequency, by States, Fall, 1963

Delivery frequency	Me.	N. H.	Vt.	Conn.	Mass.	R. I.	N. Y.	Pa.	N. J.	Md.	W. Va.	Total
						Number of routes						
Twice-weekly	0	0	0	0	7	0	0	4	0	0	32	43
Three times	57	110	47	114	214	72	292	1772	177	78	47	2980
Every-other-day	9	0	4	18	61	0	41	20	294	0	0	447
Four or more	2	0	0	5	0	0	6	9	0	0	0	22
Total	68	110	51	137	282	72	339	1805	471	78	79	3492
						Percent of routes						
Twice-weekly	—	—	—	—	2	—	—	*	—	—	41	1
Three times	84	100	92	83	76	100	86	98	38	100	59	85
Every-other-day	13	—	8	13	22	—	12	1	62	—	—	13
Four or more	3	—	—	4	—	—	2	1	—	—	—	1
Total	100	100	100	100	100	100	100	100	100	100	100	100

* Less than .5 %

A large majority—73%—of distributors expressed the opinion that it was not feasible to adopt the practice of only two deliveries per week on home delivery routes, table 2. Those indicating it was feasible had not adopted the practice previously because of competition of other distributors with more frequent service.

Frequency of customer's actual service

While it was not believed to be feasible to operate routes on the basis of twice-weekly services, this frequency of service was provided a portion of the customers by 43% of the firms, table 3. The practice

TABLE 2

Attitude of Processor-Distributors to Reducing Home Delivery Service to Twice-Weekly, by States, Fall, 1963

Feasible to reduce service?	Me.	N. H.	Vt.	Conn.	Mass.	R. I.	N. Y.	Pa.	N. J.	Md.	W. Va.	Total
						Number of firms[1]						
Yes	2	3	2	2	7	4	13	19	5	2	2	61
No	8	6	9	14	25	3	35	60	18	1	7	186
Undecided	—	1	—	1	2	—	1	3	—	—	—	8
Total	10	10	11	17	34	7	49	82	23	3	9	255
						Percent of firms						
Yes	20	30	18	12	21	57	27	23	22	67	22	24
No	80	60	82	82	73	43	71	73	78	33	78	73
Undecided	—	10	—	6	6	—	2	4	—	—	—	3
Total	100	100	100	100	100	100	100	100	100	100	100	100

[1] Firms providing three or more deliveries per week.

affected 1 to 5% of the customers served by 60% of these firms. Thirteen percent of the firms served 6 to 10% of their customers this frequently, while 17% of the firms served from 11 to 40% of their customers this frequently. The practice of less frequent service was more prevalent among large-size than small-size firms.

Four or more deliveries per week was not an important standard route delivery practice yet 18% of the firms provided this service to a small percentage of their customers.

TABLE 3

Number of Firms Providing Various Frequencies of Actual Service to Customers on Home-Delivery Routes, by States, Fall, 1963

Delivery frequency	Me.	N. H.	Vt.	Conn.	Mass.	R. I.	N. Y.	Pa.	N. J.	Md.	W. Va.	Total
						Number of firms providing service						
Once weekly	3	2	2	3	7	0	17	14	2	1	2	53
Twice weekly	6	6	7	5	15	4	27	26	6	2	9	113
Three times	8	10	10	14	33	7	46	74	15	4	9	230
Every-other-day	3	1	1	3	6	0	7	7	10	0	0	38
Four or more	3	1	1	1	8	2	6	17	7	0	1	47
						Percent of firms providing service[1]						
Once weekly	1	1	1	1	3	0	6	5	1	*	1	20
Twice weekly	2	2	3	2	6	2	10	10	2	1	3	43
Three times	3	4	4	5	12	3	17	28	6	2	3	87
Every-other-day	1	*	*	1	2	0	3	3	4	0	0	14
Four or more	1	*	*	*	3	1	2	6	3	0	*	18

* Less than .5 %

[1] Percentages are based upon 264 firms; most firms provided more than one delivery frequency.

Customer desire for home delivery service

Delivery frequency desired. Most route customers did not want more frequent milk delivery service. Only 7% of the interviewees in 1,893 households in Wheeling, Ashland, Portland and Houlton who received home delivery expressed a desire for more frequent service than was being received. No differences were found among the areas surveyed. None of the route customers who received one or two deliveries per week expressed a desire for more service. From 7 to 9% of those who received three deliveries per week wanted more service. From none up to one-third of the customers who were receiving four or more deliveries per week wanted added service, table 4.

TABLE 4
Additional Weekly Deliveries of Milk Desired

Present deliveries per week	Wheeling		Ashland		Portland		Houlton	
	Total	Desire added delivery	Total	Desire added delivery	Total	Desire added delivery	Total	Desire added delivery
				Number households				
1	26	0	19	0	7	0	6	0
2	61	0	42	0	10	0	26	0
3	294	27	222	18	498	39	618	42
4	6	0	1	0	9	3	10	3
5	3	0	11	2	1	0	0	0
6	9	0	3	0	4	0	7	1
Total	399	27	298	20	529	42	667	46
				Percent of households				
1		0		0		0		0
2		0		0		0		0
3		9		8		8		7
4		0		0		33		33
5		0		19		0		0
6		0		0		0		14
Average		7		7		7		7

Added products or services desired. Most route customers did not want additional products from their deliveryman. From 2 to 7% of the households in the cities studied expressed interest in additional products or services, table 5. This would indicate general satisfaction with the products offered and the type of service received. It would also mean that increasing the volume of products sold on retail milk routes would require considerable development effort in order to be effective. It does not preclude the potential for developing some latent demand.

Willingness to pay more for home delivery than store purchased milk. Many route customers were willing to pay more for route delivered milk than for store purchased milk. Two-thirds of those inter-

TABLE 5
Households Desiring Additional Products or Services on Retail Milk Routes

Additional products or service desired?	Wheeling	Ashland	Portland	Houlton
		Number of households		
Yes	21	10	32	12
No	377	287	495	654
Don't know	1	1	2	1
Total	399	298	529	667
		Percentage of households		
Yes	5	3	7	2
No	95	97	93	98
Don't know	*	*	*	*
Total	100	100	100	100

* 0.5% or less.

viewed in Portland were so inclined while 44% in Houlton indicated they would be willing to pay more for milk delivered to the home. In Ashland and Wheeling, 78 and 81%, respectively, would be willing to pay more for home-delivered than for store-purchased milk, table 6.

TABLE 6
Willingness to Pay More for Home Delivered than Store Purchased Milk

Will pay more for home delivered milk?	Wheeling	Ashland	Portland	Houlton
		Number of households		
Yes	288	213	357	293
No	82	49	172	374
Total	370*	262**	529	667
		Percent of households		
Yes	78	81	67	44
No	22	19	33	56
Total	100	100	100	100

* 29 did not answer this question.
** 36 did not answer this question.

The amount customers were willing to pay above store prices for home delivery ranged from one to over five cents. The amounts which customers were willing to pay varied from city to city. Two percent of the households in Houlton and 42% in Ashland would pay from three to five cents more per quart. Differences reflected, in part, the presence of a store differential in the Ashland area. From 7 to 36% of the house-

holds would pay two cents more per quart, depending on the city. The percentage of customers willing to pay from nothing to one cent per quart varied from 22% in Ashland to 91% in Houlton, table 7.

Prevalence of store purchasing. While a majority of households used home delivery to obtain milk, a substantial proportion of households purchased milk only from stores in the three cities surveyed. The proportion of households making store purchases ranged from 20% in Wheeling to 40% in Ashland, table 8. The addresses of interviewees surveyed in Ashland and Wheeling were selected from lists of customers who had once received home milk delivery. It is likely, therefore, that an even larger proportion of all milk customers bought milk exclusively from stores in these cities. In addition to these households, a substantial number of households with route delivery also made store purchases.

For all households purchasing some milk from stores, the most important reason for doing so was that they ran out of milk. From 41 to 63% of the families surveyed gave this reason, table 9. Second in importance was one group of families who apparently purchased exclusively from stores, and who indicated that they were "not at home enough for delivery."

Next in overall importance was the reason that they didn't like a milk bill. Another reason of importance was that store purchases were cheaper and more convenient, table 9. Apparently the family living

TABLE 7
Amount that Customers Were Willing to Pay Per Quart Above Store Prices for Home Delivery

Additional payment per quart?	Wheeling*	Ashland*	Portland	Houlton
(cents)		Number of households		
0 - 1	138	64	238	610
2	142	69	140	46
3 - 5	90	124	79	11
Over 5	0	5	14	0
No answer	29	36	58	0
Total	399	298	529	667
		Percent of households		
0 - 1	34	22	46	91
2	36	23	25	7
3 - 5	23	42	15	2
Over 5	0	1	3	0
No answer	7	12	11	0
Total	100	100	100	100

* Include replies from only those customers receiving home delivery at the time of interview.

patterns of the people had a more important influence on store buying of milk than price or finance. This helps to explain the trend to store buying in markets where store differentials are small.

TABLE 8
Households Which did not Receive Home Delivery of Milk

Source of milk	Wheeling*	Ashland*	Portland**
	Number of households		
Home delivery	399	298	529
Stores only	101	206	209
Total	500	504	738
	Percent of households		
Home delivery	80	60	72
Stores only	20	40	28
Total	100	100	100

* Addresses of interviewees selected from group which had home delivery at some time prior to interview.
** Block samples selected for interview.

TABLE 9
Reasons for Purchasing Milk from Stores

Reasons	Wheeling	Ashland	Portland
	Number of households		
Ran out of milk	161	142	367
Not home enough for delivery	34	72	22
Don't take enough for delivery	0	0	38
Prefer to buy as needed	0	0	25
Cheaper	17	38	0
More convenient	22	25	29
Don't like a milk bill	17	28	53
Poor service on home delivery	2	10	8
Like store products	6	3	0
Other reasons	10	24	42
Don't know	0	2	0
Total	269	344	584
	Percent of households		
Ran out of milk	60	41	63
Not home enough for delivery	13	21	4
Don't take enough for delivery	0	0	7
Prefer to buy as needed	0	0	4
Cheaper	6	11	0
More convenient	8	7	5
Don't like a milk bill	6	8	9
Poor service on home delivery	1	3	1
Like store products	2	1	0
Other reasons	4	7	7
Don't know	0	1	0
Total	100	100	100

Economies From Twice-Weekly Home-Delivery

The extent of adoption of twice-weekly delivery will be determined ultimately by the benefits derived by the customer through a reduced price, by the benefit to distributors in reduced delivery expenses, by benefits to the deliveryman in enhanced earnings, or by some combination of these benefits.

Delivery costs lowered

Budgets prepared in two separate studies show the relative costs of three deliveries and two deliveries per customer per week. One study indicates savings of one cent per unit from reduced delivery service where routemen are paid on a base wage plus commission. The other study shows savings of one and one-third cents per unit when routemen are paid on a flat wage basis, table 10. These two studies are based upon somewhat different assumptions as to miles traveled, customers served, and truck costs but are based upon truck loads which are quite similar. The first study is of route operations in Houlton, Maine.[3] It assumed a one-third reduction in truck miles under twice-weekly delivery. The reduced mileage accounts for about half the one cent saving in delivery cost per unit delivered. The second study is of route operations in Danville and Lynchburg, Virginia.[4] It assumed no reduction in route miles under twice-weekly delivery. It is apparent that the method of paying route drivers influences substantially the savings from reduced delivery service. Substantial economies are achieved where a flat wage is paid drivers. Where commissions are a major part of driver's wages there is about one-half cent per quart to be saved in labor expense by reducing the delivery frequency. Both these analyses assumed all customers received twice-weekly delivery. If large-volume route customers continue to receive three deliveries and small-volume customers two deliveries, savings are reduced by 0.1 cent per unit according to the Virginia study.

Labor hours saved

Since the time required to deliver three quarts of milk to the home each trip is insignificantly different from that to deliver two quarts, a potential exists for saving in hours of route labor under twice-weekly service. The major impact of twice-weekly delivery is to increase by one-third the volume of milk delivered per customer on the route. In

[3] Metzger, H. B., "Twice-Weekly Delivery on Retail Milk Route," Me. Agr. Exp. Sta. Bul. 612, March 1963.

[4] Conner, M. C. and Giles, E. J., "Milk Delivery Practices—Alternatives and Costs," Va. Agr. Exp. Sta. Bul. 515, July 1960.

TABLE 10

Specified Route Characteristics and Costs for Home Delivery Routes with Three-Day and Two-Day Delivery Per Week, Maine and Virginia

Items	Houlton, Maine[1], 1960		Danville & Lynchburg[2] Virginia, 1958	
	Three day delivery	Two day delivery	Three day delivery	Two day delivery
Route miles	20	15	37	37
No. customers	127	127	180	180
Units/stop	3.7	5.5	2.6	3.8
Daily load (units)	465	698	462	692
Route time (hrs./day)	5.4	6.3	6.5	7.3
Daily costs				
labor[3]	$18.48	$24.25	$15.11	$16.50
truck	7.85	8.25	6.00	6.00
Total	$26.33	$32.50	$21.11	$22.50
Cost per units	$ .057	$ .047	$ .046	$ .033
Net change		$ – .010		$ – .013

[1] Computed from *Twice-Weekly Delivery on Retail Milk Routes*, H. B. Metzger, Me. Agr. Exp. Sta. Bul. 612, March 1963, p. 11-14.
[2] From *Milk Delivery Practices—Alternatives and Costs*, M. C. Conner and E. J. Giles, Vir. Agr. Exp. Sta. Bul. 515, July 1960.
[3] Routemen received base pay plus commission in Houlton, and a flat wage in Danville and Lynchburg.

the Maine study, 1,395 quarts of milk were delivered in 16.2 hours under three deliveries per week. Under twice-weekly delivery it was estimated this could be delivered in 12.6 hours. In the Virginia study, comparable times were 19.5 hours and 14.6 hours, respectively. Thus, savings of 3.6 to 4.9 man hours per week are indicated for each route section, or about one man day per route per week.

Of considerably more importance than hours saved, is the opportunity which exists for route reorganization and thereby reduction in number of route men and relief drivers. For example, two men could handle the route three men handled before adoption of twice-weekly delivery, thus freeing a route man and his relief man. Or, if twice-weekly delivery were made one week and three the next week, a five day week would result, thus eliminating the need for relief drivers.

Truck miles reduced

The potential exists for cutting truck mileage by one-third. This potential may seldom be realized because of the need to service some customers on each route three times weekly. However, as with labor savings, the reorganization of routes under twice-weekly delivery may provide important advantages over and above mileage considerations. These advantages result from reducing the number of trucks required

and the number of maintenance personnel needed to serve them. A five-day delivery schedule would mean trucks would not operate two days per week with obvious savings.

Dealer Attitudes Toward and Experience With Twice-Weekly Home-Delivery of Milk

Feasibility of adoption

A majority of northeastern distributors were of the opinion twice-weekly delivery was not feasible. Seventy-four percent of the firms making three or more deliveries per week expressed this opinion. Twenty-four percent indicated the reduced delivery frequency was feasible, while 3% were undecided. Distributors in different states showed wide differences in opinion as to feasibility of twice-weekly delivery.

Reasons for non-adoption. Those distributors who indicated twice-weekly delivery was feasible did not adopt the practice primarily because of competition from other distributors, table 11. Other important reasons advanced included labor union objection, large customer problem and need for more study. Seven percent of the distributors were in the process of conversion, however.

TABLE 11
Reasons Given for not Adopting Twice-Weekly Delivery Practice by Those Indicating it Feasible, by States, Fall, 1963

Reason	Me.	N.H.	Vt.	Conn.	Mass.	R.I.	N.Y.	Pa.	N.J.	Md.	Va.	Total
Competition	2	3	2	2	3	2	3	10	3	2	—	32
Larbor union	—	—	—	—	1	—	3	1	1		—	6
Large customers	—	—	—	1	—	—	—	3	1	—	—	5
Employee resistance	—	—	—	—	1	—	1	—	—	—	—	2
Needs more study	—	—	—	—	1	1	1	5	—	—	—	8
Converting now	—	—	—	—	1	—	2	2	—	—	—	5
Other reasons	—	—	—	—	—	1	4	1	—	—	2	8
No reply	—	1	—	—	2	—	—	—	—	—	—	3
Total	2	4	2	3	9	4	14	22	5	2	2	69

The reason most frequently given by those distributors who believed twice-weekly delivery was not feasible was that customers lacked refrigeration space. Other important reasons advanced were customer resistance, loss of business to stores, competition from other distributors and reduction in route sales.

Characteristics of adopters. Seven distributors reported that they provided twice-weekly service on home-delivery routes. Four operated five routes or less, two operated six to ten routes and one operated 18

routes. Three distributors had operated routes on a twice-weekly basis less than a year, one had been operating more than a year, and one had operated for two years. Two distributors did not indicate the length of time.

Changes resulting from adopting twice-weekly service varied with distributors. Three of four distributors responding indicated they experienced a reduction in truck mileage while one distributor reported no change. Two distributors indicated a reduction in labor hours of route men while two indicated no change. Of two distributors reporting on delivery costs, one said costs were reduced, the other said there was no change. Of three distributors reporting on route sales, two indicated there was no change while one indicated they were reduced.

Experiences with twice-weekly delivery

Sales before, during, and after adoption. The influence of twice-weekly delivery on the amount of milk and by-products purchased by route customers is a crucial factor in adopting the practice. The fears of loss of sales to stores is uppermost in dealers' minds. In 1961, Ashland route customers receiving one or two deliveries per week had lower total milk purchases per capita than those with three or four deliveries per week. These customers also purchased a somewhat larger percentage of their milk supply from stores than did the customers with more frequent delivery. Route customers in Wheeling followed a similar, although not as strongly differentiated, pattern of purchases. For both markets, the three-member family with one delivery per week purchased 1.5 quarts per capita per week, while the family with two deliveries per week purchased 2.3 quarts. These compare with 3.1 quarts and 3.6 quarts per capita for the families with three and four deliveries per week respectively, table 12. Milk purchased from stores as a percent of total milk purchases for these same families was 20%, 15%, 10%, and 8%, respectively. The customers receiving one and two deliveries per week were the lower volume customers. The volume of purchases likely accounted for their frequency of service.

The quantity purchased was apparently a cause for the delivery frequency, rather than the effect. This is supported by the purchase record of customers before, during and after adoption of twice-weekly delivery on retail routes in Ashland. An Ashland distributor's customers were furnished twice-weekly service during 1959. Over 90% of the purchases by these customers were delivered twice-weekly. In 1960, the majority of customers returned to a three delivery per week basis; however, 21% of the purchases were still delivered on one or two deliveries per week, table 13. Purchases of customers receiving

TABLE 12

Milk Purchases Per Week Per Capita for Customers Receiving Retail Delivery by Size of Family and Frequency of Delivery—Ashland, Kentucky and Wheeling, West Virginia, Summer, 1961

Size of family	Families	Milk delivered	Milk purchased from stores	Total milk purchased
Number	Number	Quarts	Quarts	Quarts
(One delivery per week)				
1	5	2.20	.09	2.29
2	23	1.52	.15	1.67
3	10	1.20	.28	1.48
4	4	1.25	.16	1.41
5	2	.60	.80	1.40
6	—	—	—	—
7	—	—	—	—
8	1	.50	1.00	1.50
9 or more	—	—	—	—
(Two deliveries per week)				
1	10	3.00	.09	3.09
2	40	2.45	.31	2.76
3	19	1.965	.314	2.279
4	21	1.74	.64	2.38
5	8	1.50	.98	2.48
6	4	1.83	.16	1.99
7	1	.57	.14	.71
8	—	—	—	—
9 or more	—	—	—	—
(Three deliveries per week)				
1	8	3.87	.06	3.93
2	112	2.93	.22	3.15
3	101	2.79	.32	3.11
4	137	2.67	.28	2.95
5	87	2.708	.266	2.974
6	41	2.60	.28	2.88
7	11	2.727	.176	2.903
8	7	2.04	.60	2.64
9 or more	3	2.25	.00	2.25
(Four or more deliveries per week)				
1	—	—	—	—
2	4	2.50	.00	2.50
3	5	3.267	.297	3.564
4	9	3.83	.06	3.89
5	9	3.20	.98	4.18
6	4	3.67	.14	3.81
7	2	3.71	.00	3.71
8	—	—	—	—
9 or more	—	—	—	—
(Total, all delivery frequencies)				
1	23	3.13	.08	3.21
2	179	2.63	.23	2.86
3	135	2.57	.32	2.89
4	171	2.58	.31	2.89
5	106	2.62	.39	3.01
6	49	2.62	.26	2.88
7	14	2.72	.14	2.86
8	8	1.85	.65	2.50
9 or more	3	2.25	.00	2.25
Grand Total	688			

TABLE 13
Percentage of Total Milk Purchases* Made with Various Frequencies of Milk Delivery During Three Consecutive Years, Ashland, Kentucky, 1958, 1959, 1960

Deliveries per week	1958	1959	1960
	Percentage of milk purchases		
1	1.6	1.9	4.1
2	3.7	90.4	16.7
3	94.7	7.6	79.2
4	—	.1	—
Total	100.0	100.0	100.0

*Made by the same 735 customers in each of the years shown.

TABLE 14
Milk Delivered to Customers Receiving Retail Delivery During Three Consecutive Years, by Product and Frequency of Delivery, Ashland, Kentucky, During Selected Week, Month of October 1958, 1959, and 1960

Deliveries per week	Product	1958		1959		1960	
		Customers	Amount delivered	Customers	Amount delivered	Customers	Amount delivered
Number	Type	Number*	Quarts	Number*	Quarts	Number*	Quarts
1	Homogenized	11	24	15	36	28	86
	Regular (Past.)	—	—	1	2	3	5
	Skim	2	4	1	6	3	6
	Buttermilk	2	3	1	1	4	5
	Chocolate milk	—	—	—	—	—	—
2	Homogenized	26	104	640	4737	128	613
	Regular (Past.)	3	8	60	436	4	10
	Skim	1	4	56	276	11	46
	Buttermilk	6	12	77	148	12	22
	Chocolate milk	—	—	17	33	2	2
3	Homogenized	667	5401	51	673	557	4583
	Regular (Past.)	85	587	4	51	48	374
	Skim	42	234	8	56	71	422
	Buttermilk	97	172	7	14	54	99
	Chocolate milk	25	42	1	1	14	26
4	Homogenized	—	—	1	24	—	—
	Regular (Past.)	—	—	—	—	—	—
	Skim	—	—	—	—	—	—
	Buttermilk	—	—	—	—	—	—
	Chocolate milk	—	—	—	—	—	—
Total all	Homogenized		5529		5470		5282
	Regular (Past.)		595		489		389
	Skim		242		338		474
	Buttermilk		187		163		126
	Chocolate milk		42		34		28
			6595		6494		6299

* Number of customers shown in this column exceeds the total number of retail milk route customers (735) on which this table is based because some customers bought more than one product. The difference in customers during the three years shown above is also accounted for by this fact. The number and identity of customers were the same in each of the three years.

TABLE 15

Products Other Than Milk Delivered Per Week for Three-Year Customers Receiving Retail Delivery By Product and Frequency of Delivery, Ashland, Kentucky, During Selected Week, Month of October 1958, 1959, 1960

Deliveries per week	Product	1958		1959		1960	
		Customers	Amount delivered	Customers	Amount delivered	Customers	Amount delivered
Number	Type	Number	Units	Number	Units	Number	Units
1	Reddi-Whip	1	.5 qt.	—	—	—	—
	Mel-O-Rich	1	.5 qt.	—	—	—	—
	Ice Cream	2	2.5 qt.	—	—	—	—
	Butter	1	1.0 lb.	—	—	—	—
	Frozerta	1	2.0 qt.	1	2.0 qt.	—	—
	12% Cream (including ½ & ½	—	—	1	.5 qt.	1	.5 qt.
	Cream	—	—	1	.5 qt.	—	—
	Reddi-Whip	—	—	1	.5 qt.	—	—
2	Mel-O-Rich	2	1.5 qt.	—	—	—	—
	Cottage Cheese	2	2.0 lb.	9	26.0 lb.	1	1.0 lb.
	Cottage Cheese	1	1.0 (12 oz.)	7	9.0 (12 oz.)	3	3.0 (12 oz.)
	Butter	1	1.0 lb.	15	15.0 lb.	1	1.0 lb.
	12% Cream (including ½ & ½	—	—	23	20.5 qt	5	3.5 qt.
	Ice Cream	—	—	10	22.0 qt.	2	4.0 qt.
	Orange Drink	—	—	10	22.0 qt.	2	3.0 qt.
	Margarine	—	—	37	39.0 lb.	2	2.0 lb.
	Frozerta	—	—	12	28.0 qt.	2	24.0 qt.
3	Cream	2	1.0 qt.	—	—	—	—
	Reddi-Whip	3	2.0 qt.	—	—	1	.5 qt.
	Mel-O-Rich	29	25.0 qt.	—	—	—	—
	Sour Cream	2	2.0 (pkg.)	—	—	—	—
	Ice Cream	11	26.0 qt.	4	8.0 qt.	11	24.0 qt.
	Cottage Cheese	5	8.0 lb.	—	—	6	12.0 lb.
	Cottage Cheese	16	18.0 (12 oz.)	2	3.0 (12 oz)	10	13.0 (12 oz.)
	Butter	24	27.0 lb.	2	2.0 lb.	15	15.0 lb.
	Ice Cream	1	1.0 (doz. bars)	3	6.0 (doz. bars)	4	19.0 (doz. bars)
	Orange Drink	18	38.0 qt.	1	1.0 qt.	9	20.0 qt.
	Frozerta	10	34.0 qt.	2	8.0 qt.	25	50.0 qt.
	12% Cream (including ½ & ½	—	—	5	7.5 qt.	24	24.0 qt.
	Margarine	—	—	4	6.0 lb.	13	13.0 lb.
4	Margarine	—	—	1	2.0 lb.	—	—
Total All Delivery Frequencies	Cream	2	1.0 qt.	1	.5 qt.	—	—
	Reddi-Whip	4	2.5 qt.	1	.5 qt	1	.5 qt.
	Mel-O-Rich	32	27.0 qt.	—	—	—	—
	Sour Cream	2	2.0 (pkg.)	—	—	—	—
	Ice Cream	14	29.5 qt.	17	36.0 qt.	17	47.0 qt.
	Cottage Cheese	24	24.2 lb.	18	35.0 lb.	20	25.0 lb.
	Butter	26	29.0 lb.	17	17.0 lb.	16	16.0 lb.
	Orange Drink	18	38.0 qt.	11	23.0 qt.	11	23.0 qt.
	Frozerta	11	36.0 qt.	15	38.0 qt.	27	74.0 qt.
	Margarine	—	—	42	47.0 lb.	15	15.0 lb.
	12% Cream (including ½ & ½	—	—	29	28.5 qt.	30	28.0 qt.
	Total, all Products		189.2		225.5		228.5

route delivery continuously during the three year period were summarized. Total milk sales for 735 customers amounted to 6,595 quarts during a selected week in October 1958, table 14. In the corresponding week of 1959, the year most customers received twice-weekly service, total route sales were 6,494 quarts. In 1960 sales amounted to 6,299 quarts during the corresponding week. The small decline in route sales during the year when twice-weekly delivery was in effect is not considered significant[5] in view of the downward trend in sales which followed a return to more frequent delivery. A breakdown of the milk sales by product indicated that the decline in sales was due to all milk items except skim milk, which showed a substantial increase. By-product sales showed an increase from 189 to 226 units per week between 1958 and 1959, while 228 units were sold in 1960, table 15. These data indicate that total route sales are not appreciably affected by the adoption of twice-weekly delivery; neither are by-product sales likely to be reduced. The return to three times weekly delivery practice was prompted because the practice of twice-weekly delivery was not adopted on a market-wide basis.

Consumer Attitudes Toward and Experiences with Twice-Weekly Home-Delivery

Acceptance of twice-weekly delivery (Wheeling, Ashland, Portland, Houlton)

From 25 to 30% of the households receiving home-delivery in the four cities surveyed indicated a willingness to accept twice-weekly delivery service, table 16.

Willingness to accept. A reduction in service was agreed to without concession of any type being offered when the question was posed. While the number of customers agreeing to reduced service is sufficient to effect some economies in delivery service it is not likely to cause distributors to press for this change, without careful examination of the reasons for opposing the reduction in service.

Reasons for Opposing. The major reason given by interviewees for opposing twice-weekly delivery was the lack of freshness and keeping quality of the milk. From 38 to 48% of the households gave this reason. Proportionately more route customers in Ashland and Wheeling were opposed for this reason than customers in Portland and Houlton. Other reasons for opposing twice-weekly delivery varied in order of importance among the cities studied. In Maine cities, "lack of stor-

[5] No statistically significant difference was found in the quantities sold during the periods studied.

age space" was next in importance. "Inconvenient" and "difficulty in planning" were other reasons for opposing twice-weekly service, table 17. Whether "freshness or keeping quality" and "lack of storage space" are valid reasons for opposing twice-weekly delivery is examined in some detail in a subsequent section.

TABLE 16

Consumer Willingness to Accept Twice-Weekly Delivery

Item	Ashland	Wheeling	Portland	Houlton
		Number of households		
Would accept	65	81	130	190
Would refuse	170	230	373	444
No answer	3	0	26	1
TOTAL	238	311	529	635
		Percent of households		
Would accept	27.3	26.0	24.6	29.8
Would refuse	71.4	74.0	70.5	70.0
No answer	1.3	0.0	4.9	0.2
TOTAL	100.0	100.0	100.0	100.0

TABLE 17

Reasons for Opposing Twice-Weekly Delivery of Milk

Reasons	Ashland	Wheeling	Portland	Houlton
		Number of households opposing		
Lack of freshness and keeping quality	81	108	140	177
Lack of storage space	24	28	116	72
Inconvenient	11	21	37	41
Difficulty in planning	4	11	33	39
Resistant to change	30	36	26	51
Other	20	24	10	51
No reason given	0	2	11	33
Total	170	230	373	444
		Percent of households opposing		
Lack of freshness and keeping quality	48.0	47.0	37.7	40.0
Lack of storage space	14.0	12.0	31.1	16.0
Inconvenient	6.0	9.0	9.9	9.2
Difficulty in planning	2.0	5.0	8.8	9.0
Resistant to change	18.0	15.0	7.0	11.5
Other	12.0	11.0	2.6	6.9
No reason given	0.0	1.0	2.9	7.4
Total	100.0	100.0	100.0	100.0

Household characteristics affecting acceptance

Refrigerator size. The size of the household refrigerator had no important influence on acceptance of twice-weekly service. While households with small 5-6 cu. ft. refrigerators had low acceptance percentages and some increase in acceptance occurred up to the 9-10 cu. ft., households with the largest refrigerators had the lowest acceptance rate, table 18. Other factors than refrigerator space—such as number of members in the household—apparently were important.

Size of household. Families with three or less members were more willing to accept twice-weekly delivery than families with four or more members. In the cities studied, from 19 to 24% of the families with four or more members would accept twice-weekly delivery compared with 31 to 39% acceptance by families with three members or less, table 19. While not conclusive, these data indicate that small households are more receptive to reduced service than are large households. Nevertheless, a large percentage of small households are opposed to twice-weekly delivery.

Family income. Weekly family income showed no consistent relationship to acceptance of twice-weekly delivery. Families with incomes of $200 per week were less willing to accept twice-weekly delivery than those with incomes under $50 per week, table 20. However, families

TABLE 18

Influence of Capacity of Refrigeration On Acceptance of Twice-Weekly Delivery

Size (Cubic feet)	Ashland & Wheeling		Portland		Houlton	
	Accept	Refuse	Accept	Refuse	Accept	Refuse
	Number of households					
5 - 6	3	10	10	37	7	30
7 - 8	17	45	34	93	63	134
9 - 10	41	96	37	112	77	179
11 - 12	54	139	32	82	39	79
13 & Over	31	108	13	39	4	20
Unknown*	0	2	4	10	0	2
Total	146	400	130	373	190	444
	Percent of households					
5 - 6	23	77	21	79	20	80
7 - 8	27	73	27	73	32	68
9 - 10	30	70	25	75	30	70
11 - 12	28	72	28	72	33	67
13 & Over	22	78	25	75	17	83
Unknown	0	100	29	71	0	100
Average	27	73	26	74	30	70

*Includes one household in Portland and two in Houlton with no refrigeration.

in the mid-income groups were equally or more opposed to reduced services than were the high income families.

Size of delivery per week. The amount of milk delivered per week to the household was closely associated with acceptance of twice-weekly delivery in Houlton and Portland, table 21. In Ashland and Wheeling, 28 to 40% of the households receiving less than 13 quarts per week were willing to accept twice-weekly delivery while very few receiving 13 quarts or more would accept a reduction in service. However, the very-small-volume customer in Ashland and Wheeling was slightly less

TABLE 19
Size of Household and Its Influence On
Acceptance of Twice-Weekly Delivery

Members in family	Ashland & Wheeling		Portland		Houlton	
	Accept	Refuse	Accept	Refuse	Accept	Refuse
	Number of households					
Three or less	87	151	78	174	100	155
Four or more	59	249	51	199	90	289
Total	146	400	129[1]	373	190	444
	Percent of households					
Three or less	37	63	31	69	39	61
Four or more	19	81	20	80	24	76
Total	27	73	26	74	30	70

[1] One household which did not report number of members is excluded.

TABLE 20
Influence of Weekly Family Income on
Acceptance of Twice-Weekly Delivery

Income	Ashland & Wheeling		Portland		Houlton	
	Accept	Refuse	Accept	Refuse	Accept	Refuse
	Number of households					
Under $50	19	31	11	33	23	27
$50-$99	46	82	45	124	80	204
$100-$149	35	146	39	135	58	132
$150-$199	18	59	12	26	9	23
$200 and over	17	48	4	14	5	10
Not reported	11	34	19	41	15	48
Total	146	400	130	373	190	444
	Percent of households					
Under $50	38	62	25	75	46	54
$50-$99	36	64	27	73	28	72
$100-$149	19	81	22	78	30	70
$150-$199	23	77	32	68	28	72
$200 and over	26	74	22	78	33	67
Not reported	24	76	32	68	24	76
Average	27	73	26	74	30	70

TABLE 21
Amount of Milk Delivered Per Week and
Acceptance of Twice-Weekly Delivery

Quarts delivered per week	Ashland & Wheeling*		Portland		Houlton	
	Accept	Refuse	Accept	Refuse	Accept	Refuse
	Number of households					
0 - 4	36	53	33	56	21	37
5 - 8	47	107	56	124	86	165
9 - 12	49	129	26	85	52	123
13 - 16	8	48	7	53	25	61
17 - 20	3	28	6	29	4	32
21 and over	3	35	2	26	2	26
Total	146	400	130	373	190	444
	Percent of households					
0 - 4	40	60	37	63	36	64
5 - 8	31	69	31	69	34	66
9 - 12	28	72	24	76	30	70
13 - 16	14	86	12	88	29	71
17 - 20	10	90	17	83	11	89
21 and over	8	92	7	93	7	93
Average	27	73	26	74	30	70

* Only those households then receiving retail delivery were asked this question. Also answers for those receiving less than three deliveries per week were not included in this tabulation for Ashland and Wheeling.

willing than the average-volume customer to accept the twice-weekly service.

Number of children in family. Among all families studied, those with three or more children were much less willing to accept twice-weekly delivery than those with two children or less. Only 14% of the households in Portland, and 15% in Ashland and Wheeling, with three or more children, would accept twice-weekly delivery compared with 28 and 30% acceptance of families with less than three children, table 22.

Experience with milk freshness

A major factor in consumer acceptance of twice-weekly delivery of milk is the concern over milk freshness and keeping quality under the longer time intervals between delivery. Several aspects of consumer experience were studied to test the validity of this concern.

Under current delivery practices. Interviewees indicated that, under three-times-weekly delivery during the previous year, they had experienced very little trouble with milk keeping its quality. Two percent of the householders in Houlton and 6% in Portland indicated they had trouble during the year keeping milk delivered to the door. Among Wheeling and Ashland households 4% and 5% respectively reported

milk keeping problems, table 23. Thus under prevailing delivery practices, milk could be kept for up to four days before use. With 94 to 98% of the households, keeping quality appeared to be no problem. Even for those reporting trouble with keeping quality at some time during the year preceding the interview it was obvious that the problem was one of infrequent occurrence.

TABLE 22
Number of Children in Family and Acceptance of Twice-Weekly Delivery

Number of children in family	Number of Households		Would accept twice-weekly delivery	
	Ashland & Wheeling	Portland	Ashland & Wheeling	Portland
	Number of households			
Under three	410	401	125	111
Three or more	136	126	21	18
Total	546[1]	527[2]	146	129
	Percent of households			
Under three	75	76	30	28
Three or more	25	24	15	14
Total or average	100	100	27	25

[1] Three families did not report number of children. Families not receiving retail delivery and those receiving less than three deliveries per week excluded.
[2] Two families did not report number of children.

TABLE 23
Experience of Households With Milk Keeping Quality During a One-Year Period

Item	Wheeling	Ashland	Portland	Houlton
		Number of households		
Trouble experienced	21	23	31	13
No trouble experienced	479	481	498	654
Total	500	504	529	667
		Percent of households		
Trouble experienced	4.2	4.6	6.0	2.0
No trouble experienced	95.8	95.4	94.0	98.0
Total	100.0	100.0	100.0	100.0

When asked how long they had kept milk satisfactorily, 21 to 37% of the households in the four cities reported keeping milk satisfactorily for seven days or more, table 24. From 6 to 11% reported keeping milk satisfactorily for two days or less, while 15 to 28% kept it satisfactorily for three days. From 65 to 79% reported keeping milk four

or more days without trouble. Thus, while experiences of different households vary considerably, the experience of a large majority was that milk could be kept for four or more days satisfactorily.

Under test conditions. Samples of milk were given to households on their regular delivery in a test of milk keeping quality in Houlton, Maine. The milk was delivered in refrigerated trucks in the month of October with instructions to taste a portion each day. After four days, only 1% of the samples was reported by the household to be off flavor. In five days another 1% was reported off flavor, table 25. Thus 98% of the milk was kept for longer periods than required under twice-weekly delivery with acceptable flavor. Eighty-eight percent of the samples were kept one week without flavor defects reported.

Household storage capacity

A reason frequently mentioned for not accepting twice-weekly delivery was lack of refrigeration space. Additional analysis was undertaken to test the validity of this reason. This was accomplished by asking the householder whether or not she could store the number of quarts represented by a 50% increase in the maximum quantity of milk received at a single delivery under three-times-weekly delivery service. In response to the question, 93% of the households in Ashland and

TABLE 24
Period Consumers Have Stored (Refrigerated) Milk Satisfactorily

Storage period	Wheeling	Ashland	Portland	Houlton
		Number of households		
2 Days or less	40	32	57	42
3 Days	97	73	131	187
4 Days	130	106	140	126
5 Days	87	77	66	79
6 Days	28	32	23	20
7 Days	93	128	83	173
Over 7 days	25	56	21	26
No answer	0	0	8	14
Total	500	504	529	667
		Percent of households		
2 Days or less	8.0	6.3	10.8	6.3
3 Days	19.4	14.5	24.8	28.1
4 Days	26.0	21.0	26.4	18.9
5 Days	17.4	15.3	12.5	11.8
6 Days	5.6	6.3	4.3	3.0
7 Days	18.6	25.5	15.7	25.9
Over 7 days	5.0	11.1	4.0	3.9
No answer	0	0	1.5	2.1
Total	100.0	100.0	100.0	100.0

Wheeling, 83% in Houlton and 78% in Portland said they could store the amount mentioned, table 26. Apparently storage space is not a crucial factor for most households.

TABLE 25
Number and Percentage of Milk Samples Reported Off-Flavor After Specified Days Under Test at Houlton, Maine

Days under test	Number of samples	Samples reported off flavor (percent)
1-3	126	0
4	122	1
5	116	1
6	110	5
7	88	5
8	47	6
10	27	7
12	16	6
14	8	13

TABLE 26
Ability to Store (Refrigerate) Quantity of Milk Delivered Twice-Weekly[1]

Item	Ashland & Wheeling	Portland	Houlton
		Number of households	
Able to store	645	397	539
Unable to store	50	111	111
No answer	2	0	0
Total	697	508	650
		Percent of households	
Able to store	93	78	83
Unable to store	7	22	17
No answer	*	0	0
Total	100	100	100

[1] Based upon ability to refrigerate 50% more than the largest daily quantity of milk received under three or more deliveries per week.

* Less than 0.5%.

The ability to store the quantity of milk which would be delivered twice-weekly varied almost directly with the quantity of the current delivery. In Houlton 95% of the four-quart customers (6-quart under twice-weekly) could store the milk; in Portland 87% could do so. Thirty-nine percent and 43%, respectively, of those receiving eight quarts on the day of their largest delivery could store the 12 quarts which would be received under twice-weekly service, table 27.

In Ashland and Wheeling it was found that 93% of those receiv-

TABLE 27
Ability to Store (Refrigerate) Quantity of
Milk Delivered Twice Weekly
By Size of Current Delivery

Quantity of largest day's delivery (qts.)*	Portland		Houlton	
	Total	Able to store	Total	Able to store
	Number of households			
1	80	78	62	62
2	115	111	149	148
3	76	68	113	111
4	63	55	131	124
5	51	33	45	33
6	42	23	68	32
7	18	7	18	13
8	35	15	36	14
9	10	3	5	1
10 or over	18	4	23	1
Total	508	397	650	539
		Percent of households able to store		
1		98		100
2		97		99
3		90		97
4		87		95
5		65		73
6		55		47
7		39		72
8		43		39
9		30		20
10 or over		22		4
Average		78		83

* Quantity under three deliveries per week. This quantity would be increased 50% under twice-weekly service.

APPENDIX TABLE 1
Number of Firms Providing Various Frequencies
of Service on Home-Delivery Routes, by States, Fall, 1963

Delivery frequency	Me.	N. H.	Vt.	Conn.	Mass.	R. I.	N. Y.	Pa.	N. J.	Md.	W. Va.	Total
	Number of firms											
Twice-weekly					1			2			4	7
Three times weekly	8	10	10	14	31	7	42	75	13	4	9	223
Every other day	3		2	3	7		7	7	11			40
Four or more times weekly	1			1			2	5				9
Total firms*	11	10	11	18	37	7	51	83	24	4	9	264
	Percent of firms											
Twice-weekly	0	0	0	0	3	0	0	2	0	0	44	3
Three times weekly	72	100	91	78	84	100	82	90	54	100	100	84
Every other day	27	0	18	17	19	0	14	8	46	0	0	15
Four or more times weekly	9	0	0	6	0	0	4	6	0	0	0	3

*Note: Some firms provided more than one delivery frequency.

ing retail route delivery could store one and one-half times the largest quantity of milk delivered on one day while receiving three deliveries per week. Using current deliveries at the time of the interview as a base, it was found that 86% of the customers in these markets would need to take three quarts or less per delivery under the twice-a-week delivery system. Only one of 697 interviewees took more than 8 quarts per delivery. Thus, it is obvious that adequate storage space would be available under a twice-a-week delivery system to provide the same weekly quantities of milk customers were then having delivered.

APPENDIX TABLE 2

First Reasons Given for Believing Reduction in Home-Delivery Service to Twice-Weekly is Not Feasible by States, Fall, 1963

Reason	Me.	N. H.	Vt.	Conn.	Mass.	R. I.	N. Y.	Pa.	N. J.	Md.	W. Va.	Total
	Number of firms											
Customers lack of refrigerator space	2	2	3	2	5	—	9	13	7	—	3	46
Customer resistance	2	3	1	3	7	1	7	10	2	—	1	37
Drive customers to store	1	—	3	4	3	—	4	12	2	—	—	29
Competition of other distributors	1	1	—	—	4	—	3	11	3	—	—	23
Reduce route sales	1	—	1	4	3	—	1	7	2	1	1	21
Violate service principle	—	—	—	—	—	—	5	4	—	—	1	10
Other reasons	1	—	1	1	3	1	6	3	2	—	1	19
No reply	—	1	—	1	2	1	1	3	—	—	—	9
Total	8	7	9	15	27	3	36	63	18	1	7	194

APPENDIX TABLE 3

Milk Purchases Per Week Per Capita for Customers Receiving Retail Delivery by Size of Family and Frequency of Delivery Ashland, Kentucky, Summer, 1961

Size of family	Families	Milk delivered	Milk purchased from stores	Total milk purchased
Number	Number	Quarts	Quarts	Quarts
(One delivery per week)				
1	3	2.00	.15	2.15
2	8	1.75	.13	1.88
3	4	1.167	.277	1.444
4	3	1.00	.05	1.05
5	1	.80	1.60	2.40
6	—	—	—	—
7	—	—	—	—
8	—	—	—	—
9 or more	—	—	—	—
(Two deliveries per week)				
1	3	2.00	.08	2.08
2	14	2.68	.44	3.12
3	6	1.89	.44	2.33
4	12	1.92	.85	2.77
5	4	1.40	.05	1.45
6	2	2.00	.17	2.17
7	1	.57	.14	.71
8	—	—	—	—
9 or more	—	—	—	—
(Three deliveries per week)				
1	3	3.00	.00	3.00
2	44	3.24	.22	3.46
3	42	2.83	.30	3.13
4	64	2.805	.243	3.048
5	39	2.89	.19	3.08
6	17	2.54	.36	2.90
7	5	2.63	.18	2.81
8	3	1.75	.37	2.12
9 or more	1	1.85	.00	1.85
(Four or more deliveries per week)				
1	—	—	—	—
2	2	2.25	.00	2.25
3	3	3.89	.44	4.33
4	3	4.08	.00	4.08
5	5	3.52	.56	4.08
6	2	4.00	.28	4.28
7	—	—	—	—
8	—	—	—	—
9 or more	—	—	—	—
(Total, all delivery frequencies)				
1	9	2.33	.08	2.41
2	68	2.92	.25	3.17
3	55	2.66	.32	2.98
4	82	2.652	.313	2.965
5	49	2.79	.25	3.04
6	21	2.63	.33	2.96
7	6	2.29	.17	2.46
8	3	1.75	.37	2.12
9 or more	1	1.85	.00	1.85
Grand Total	294			

APPENDIX TABLE 4

Milk Purchases Per Week Per Capita for Customers Receiving Retail Delivery By Size of Family and Frequency of Delivery, Wheeling, West Virginia, Summer, 1961

Size of family	Families	Milk delivered	Milk purchased from stores	Total milk purchased
Number	Number	Quarts	Quarts	Quarts
(One delivery per week)				
1	2	2.50	.00	2.50
2	15	1.40	.15	1.55
3	6	1.222	.274	1.496
4	1	2.00	.50	2.50
5	1	.40	.00	.40
6	—	—	—	—
7	—	—	—	—
8	1	.50	1.00	1.50
9 or more	—	—	—	—
(Two deliveries per week)				
1	7	3.43	.10	3.53
2	26	2.327	.236	2.563
3	13	2.00	.25	2.25
4	9	1.50	.36	1.86
5	4	1.60	1.90	3.50
6	2	1.67	.16	1.83
7	—	—	—	—
8	—	—	—	—
9 or more	—	—	—	—
(Three deliveries per week)				
1	5	4.40	.09	4.49
2	68	2.73	.21	2.94
3	59	2.763	.334	3.097
4	73	2.55	.31	2.86
5	48	2.56	.33	2.89
6	24	2.64	.22	2.86
7	6	2.81	.17	2.98
8	4	2.25	.78	3.03
9 or more	2	2.53	.00	2.53
(Four or more deliveries per week)				
1	—	—	—	—
2	2	2.75	.00	2.75
3	2	2.33	.08	2.41
4	6	3.71	.08	3.79
5	4	2.80	1.50	4.30
6	2	3.33	.00	3.33
7	2	3.71	.00	
8	—	—	—	—
9 or more	—	—	—	—
(Total, all delivery frequencies)				
1	14	3.64	.08	3.72
2	111	2.46	.20	2.66
3	80	2.51	.31	2.82
4	89	2.52	.30	2.82
5	57	2.47	.52	2.99
6	28	2.62	.20	2.82
7	8	3.03	.13	3.16
8	5	1.90	.82	2.72
9 or more	2	2.53	.00	2.53
Grand Total 394				

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