DELIVERY PRACTICES AND COSTS

FOR

WHOLESALE MILK ROUTES

IN ALABAMA

AGRICULTURAL EXPERIMENT STATION
OF AUBURN UNIVERSITY

E. V. Smith, Director   Auburn, Alabama
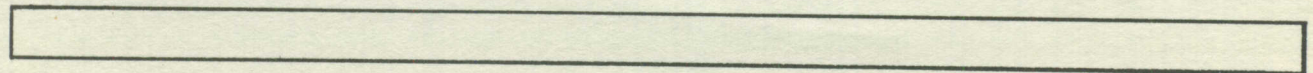
Preface

This study was initiated in 1961 under Alabama Research Project 592, Practices and Costs of Wholesale Milk Delivery in Alabama. Information describing wholesale milk delivery operations was obtained from milk distributors in late 1961 and early 1962. Thus, the time lapse between the field work and publication of results was about six years. Changing conditions may cause economic information such as presented in this report to become outdated. However, operation and characteristics of wholesale milk routes in Alabama have not changed so much as to outdate this report. Wholesale milk delivery information collected in 1966 for 122 routes in the Birmingham and Montgomery market areas show similar load characteristics as found in 1961. Some marketing changes occurring since 1961 affecting distribution practices and costs include: increases in milk product prices, increases in commission rates for some firms, growth of milk sales through convenience stores, and reduction in delivery days per week from 6 to 5. The general level of prices has continued upward during this period.

Market regulation and pricing practices administered by the Alabama Milk Control Board changed little since 1961.

Cooperation of wholesale milk distributing firms and their route operators in providing information for the study is gratefuly appreciated.

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DELIVERY PRACTICES AND COSTS FOR
WHOLESALE MILK ROUTES IN ALABAMA[*]

Norman R. McDaniel[**]
Lowell E. Wilson
Department of Agricultural Economics and Rural Sociology

More than three-fourths of all fluid milk products sold in Alabama is distributed on wholesale routes, primarily to grocery stores, school, and eating places. The remaining volume is distributed on retail routes to homes. In 1966, approximately 40 milk processing plants sold fluid milk products in the State; four processing plants located in adjoining states sold milk products in Alabama. The 20 largest plants reported in excess of 85 per cent of the total sales and had practically all of the whole-sale milk distribution.

Since World War II the shift from home delivery to wholesale distribution of fluid milk products brought about a large market adjustment in Alabama's dairy industry. A competitive struggle developed among milk distributors for wholesale volume. This competition plus loss of home delivery sales forced most small distributors and producer-distributors out of business. The rapid growth of wholesale volume resulted from the rise of mass distribution of food through supermarkets and the shift to store purchases of milk by consumers. Adoption of the single service

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[**]Former Graduate Assistant and Associate Professor in Agricultural Economics.

paper container and improved refrigeration methods contributed to the change.

Cost of milk distribution on wholesale routes is less than the cost incurred by retail delivery to homes. In most markets throughout the United States, retail prices for milk sold in stores are below home delivery prices. In Alabama markets, however, growth of store sales of milk developed despite no price incentive to the consumer. The Alabama Milk Control Board fixed only one retail price level for milk products. In a pricing order dated March 10, 1967, the Board permitted an optimal price for home delivered milk of 1 cent per unit above the fixed store prices.

One research project at this Agricultural Experiment Station has dealt with fluid milk distribution. Williams made an analysis of costs and returns for Alabama milk distributors in 1948 and 1949 (7). Cost data were obtained from 35 milk distributors located throughout the State. Considerable variation was found among firms in delivery costs for both wholesale and retail routes. Major factors contributing to differences in unit costs of delivery were variations in pay rates for delivery workers and differences in physical factors affecting efficiency. For wholesale routes, differences in size of route loads were the main physical factor affecting efficiency. At the time of Williams' study, wholesale distribution appeared to be one of the least efficient phases of Alabama's fluid milk industry.

Purposes of the study reported here were (1) to describe the characteristics and practices of wholesale milk delivery in Alabama, (2) to determine costs of delivering milk products and measure effects of major variable factors on delivery costs, and (3) to suggest potential ways of reducing wholesale delivery costs.

METHOD OF STUDY

Most of the data reported in this study were collected from milk distributors in 1961. Although these data are several years old, it is believed that physical factors affecting efficiency of wholesale milk distribution in the State have not changed materially and results of the study are still relevant to Alabama's dairy industry. Also, market regulation by the Alabama Milk Control Board, which might affect milk distribution practices, has been relatively unchanged since 1961. Labor and truck costs, which account for practically all of the delivery costs have risen somewhat since the field work was completed.

In June 1961, 17 milk distributors handling over 80 per cent of all fluid milk products sold in the State were asked to cooperate in the study. These distributors sold milk on wholesale routes in all major market areas in Alabama. Wholesale value of products delivered on 234 routes were obtained from 14 firms for May 1961. Average sales of all products per route were $7,560, Table 1. Approximately 45 per cent of the routes had sales from $5,000 to $7,500, and 42 per cent sold more than $7,500. Only 13 per cent handled less than $5,000 of products in May 1961. Three firms had no routes with sales less than $5,000, while four firms had no routes with a value of sales exceeding $10,000 for the month.

Based on the wholesale value of products for the 234 routes, a sample of 45 routes, which were apparently representative of the total group, was selected for further study. Questionnaires were sent to each firm requesting information about the characteristics of the selected routes. Fourteen distributors cooperated in this phase of the study and information was obtained for 39 wholesale routes.

Table 1. Number of Routes, Total Sales and Average Sales Per Route by
Sales Per Route, 234 Wholesale Routes, Alabama, May 1961

Sales per route	Number of routes	Percentage of all routes	Total sales volume	Average sales per route	Percentage of total sales
	Number	Per cent	Dollars	Dollars	Per cent
Under $5,000	30	12.8	122,305	4,077	6.9
$5,000-$7,499	105	44.9	656,915	6,256	37.2
$7,500-$9,999	60	25.6	506,286	8,438	28.6
$10,000 & over	39	16.7	483,521	12,398	27.3
Total	234	100.0	1,769,027	7,560	100.0

Routes studied delivered milk in the following markets, nearby small towns,
and rural areas: Anniston and Gadsden, Birmingham, Huntsville, Mobile,
Montgomery, and Tuscaloosa. In 1961 these 14 distributors sold about two-
thirds of all fluid milk products in the State.

Survey information was taken for the week of November 13 through 18,
1961. Route drivers estimated the route time requirements. No attempt
was made to obtain time requirements for specific stops or delivery pro-
cesses. For each route, information was requested relative to labor costs
and practices, route mileage, number of customers, number and type of milk
and other products delivered. Types of trucks used and costs of operation
were obtained for some routes.

Information about individual customer deliveries was obtained for 15
of the study routes. A total of 683 customers was served by the 15 routes.
Value of products delivered to each account was recorded for each deli-
very during the study week. Type of account, second deliveries per day,
number of distributors serving each account, method of payment, and other
services were obtained for each customer.

LOAD CHARACTERISTICS

Among the routes loads differed as to number of items carried, kinds of products, and types and sizes of containers. For example, some milk products were sold in half-gallon, quart, pint, and half-pint containers in both paper and glass.

The average daily load was 1,286 quart equivalents of milk products: 46 pint equivalents of cream products; and 192 units of other products, Table 2. Routes handled an average of 14 different types of dairy and non dairy products. Types of items handled ranged from 11 to 16 among the routes.

Measurement of Load

For the sake of simplicity in relating cost to size of route load and in studying the different route loads, all items delivered were converted into a common or standard unit of measurement. Because of the wide assortment of sizes, products, and containers on the different routes, conversion of the load make-up into a meaningful standard unit was difficult. Several different standards of measurements could be used in the analysis, but in each case some type conversion was required. These different measurements include: (1) number of container units; (2) number of quart equivalents; (3) a point system where each container size was rated as a certain number of points; (4) a dollar value basis; and (5) a combination of any of the above. All milk units were converted into quart equivalents. For example, two pints of milk were counted as one quart equivalent and one half-gallon was counted as two quart equivalents. Cream products were converted into pint equivalents and all other products were simply counted by the actual number of container units.

Table 2. Average Daily Load Delivered By Type of Product in Equivalent
          Units, 39 Wholesale Routes, November 13-18, 1961

Product group	Equivalent units delivered	Percentage of product group
Milk, quart equivalent	Number	Per cent
Creamline sweet milk	33.3	2.6
Multi. vit. & breed milk . . .	8.3	.7
Homogenized milk	953.8	74.1
Chocolate milk	99.3	7.7
Buttermilk	147.6	11.5
Chocolate drink.	9.3	.7
Skim milk	24.5	1.9
Fortified skim milk	4.8	.4
Whole milk buttermilk	5.4	.4
Total.	1,286.5	100.0
Cream, pint equivalent		
Half and half.	31.3	68.5
Coffee cream	3.6	7.9
Whipping cream	6.2	13.6
Sour cream	4.6	10.0
Total	45.7	100.0
Other products, product units		
Fruit drinks (½ pt.-qt.) . . .	155.1	80.6
Orange juice (qt.)	11.8	6.1
Cottage cheese (carton). . . .	18.0	9.4
Margarine (lb.).	1.5	.8
Butter (lb.)	1.6	.8
Dairy whip (can)	.5	.3
Ice cream & ice milk mix (gal.)	2.1	1.1
Egg nog (qt.).	1.6	.8
Eggs (doz.)	.2	.1
Total	192.4	100.0

Type of Container Used and Products Delivered

Approximately 75 per cent of the milk delivered was homogenized milk, Table 3, 4, and 5. Homogenized milk was sold mainly in half-gallon, half-pint, and pint paper containers. About one per cent of the homogenized milk sold was in glass containers, and in a few instances milk was sold in bulk. Slightly over 50 per cent of homogenized milk was sold in half-gallon paper containers. The next largest percentage of sales was in half-pint containers followed by quart and pint containers. Because of a large volume milk sales to schools, more milk was sold in half-pint containers than in pint and quart containers.

Cultured buttermilk accounted for 11.5 per cent of the total amount of milk delivered while chocolate milk made up approximately eight per cent of the milk delivered. Most of the cultured buttermilk was sold in quart containers, while the largest portion of the chocolate milk was sold in half-pint containers, mainly to schools. Pasteurized creamline sweet milk, multi-vitamin and breed milk, chocolate drink, skim milk, fortified milk, and whole buttermilk together accounted for the remaining milk products.

Approximately 96 per cent of the total amount of milk delivered during the study period was delivered in paper containers while the remaining four per cent was divided among glass and bulk containers.

Half and half blend of cream and milk accounted for nearly 69 per cent of the total cream delivered during the study period. Whipping cream amounted to 14 per cent, sour cream 10 per cent, and coffee cream 7.9 per cent, respectively, of the total amount of cream products delivered.

Table 3. Average Daily Load Delivered by Type of Fluid Milk Product and Container, 39 Wholesale Routes, Alabama, November 13-18, 1961

Milk	Container size					Total quart equivalents	
	One-half pint	Pint	Quart	One-half gal.	Bulk in gal.		
	No.	No.	No.	No.	No.	No.	Pct.
Past. Cr. S.M.							
Paper	---	---	8.7	12.0	---	32.7	2.5
Glass	---	---	.6	---	---	.6	1/
Multi. vit. & breed milk							
Paper	---	---	1.4	3.4	---	8.2	.6
Glass	---	---	---	2/	---	.1	1/
Homogenized milk							
Paper	843.9	70.1	182.1	238.8	---	905.7	70.4
Glass	23.8	6.9	3.3	.3	---	13.3	1.0
Chocolate milk							
Paper	309.0	21.6	8.1	---	---	96.2	7.5
Glass	2.3	1.3	---	---	---	1.2	.1
Cultured buttermilk							
Paper	8.8	13.2	89.1	24.9	---	147.7	11.5
Glass	.2	---	---	---	---	.1	1/
Chocolate drink							
Paper	4.4	10.6	2.9	---	---	9.3	.7
Glass	---	---	---	---	---	---	---
Skim milk							
Paper	6.7	---	19.0	1.8	---	24.3	1.9
Glass	---	---	---	.1	---	.2	1/
Fortified skim milk							
Paper	.8	---	4.6	---	---	4.8	.4
Glass	---	---	---	---	---	2/	---
Whole milk buttermilk							
Paper	.5	1.3	4.7	---	---	5.4	.4
Glass	---	---	---	---	---	2/	1/
Total.	1,200.4	125.0	324.5	281.3	9.2 3/	1,286.5	100.0

1/Less than 0.05 per cent.

2/Less than 0.05 unit.

3/Bulk sales in cans: homogenized milk 8.7 gallons and choclate milk 5 gallons.

Table 4. Average Daily Load Delivered by Type of Cream Product and Container, 39 Wholesale Routes, Alabama, November 13-18, 1961

Cream	Container size			Total pint equivalents	
	One-half pint	Pint	Quart		
	No.	No.	No.	No.	Pct.
Half and half					
Paper	---	19.3	5.8	30.9	67.6
Glass	---	---	.2	.4	.9
Coffee cream					
Paper	.4	.4	1.5	3.6	7.9
Glass	---	---	---	---	---
Whipping cream					
Paper	7.1	.2	.5	4.8	10.5
Glass	---	---	.7	1.4	3.1
Sour cream					
Paper	7.1	---	---	3.6	7.9
Glass	---	---	---	---	---
Total.	14.6	19.9	8.7	45.7[1]/	100.0

[1]/ Includes an average of one pint of sour cream distributed in bulk quantity.

Cream products were packaged in different container sizes. For instance, the greatest portion of the half and half blend was sold in pint containers, while most of the whipping and sour cream was sold in half-pint containers. Coffee cream was mainly in quart containers. Approximately 94 per cent of the cream was delivered in paper containers and 4 per cent was in glass containers. The remaining amount of cream was sold in bulk.

A number of other dairy and non-dairy products were handled by the routes studied. About 80 per cent of these products were fruit drinks, mainly orange. Cottage cheese and orange juice made up most of the remainder of this product group.

Table 5. Average Daily Load Delivered by Type of Other Products and Container, 39 Wholesale Routes, Alabama, November 13-18, 1961

Other products	Container size	Units
		No.
Orangeade and orange drink. . . .	½ pint	104.3
	pint	39.9
	quart	9.4
Grapeade and grape drink	½ pint	1.2
	pint	.3
	quart	1/
Pure orange juice	quart	11.8
Cottage cheese	12 oz. carton	14.5
	1 pound carton	0.0
	2 pound carton	.2
	bulk (pound)	3.3
Margarine	1 pound package	1.5
Butter	1 pound package	1.6
Dairy whip	can	.5
Ice cream & ice milk mix	gallon	2.1
Egg nog	quart	1.6
Eggs	dozen	.2
Total		192.4

1/Less than 0.05 units

Load Value

Wholesale value of milk and other products delivered on the 39 wholesale routes averaged $2,149.90 for the week and $358.31 daily. Seven routes had sales values of less than $1,500 per week, 22 routes from $1,500 to $2,500, 7 from $2,500 to $3,500, and 3 routes had more than $3,500 of sales

per week for the study period. Value of products delivered on the 39

routes ranged from $1,195.65 to $4,551.83.

Average value of load for the routes varied by day of week, Table 6.

Largest deliveries were made on Friday and Saturday, whereas the smallest

deliveries were on Wednesday.

Table 6. Average Value of Load Delivered by Day of Week, 39 Wholesale
Routes, Alabama, November 13-18, 1961

Day of week	Average value of load	Index (Percentage of weekly average)
	Dollars	Per cent
Monday	372.89	104
Tuesday	329.56	92
Wednesday	295.15	82
Thursday	347.77	97
Friday	408.10	114
Saturday	396.41	111
Average	358.31	100

Table 7 lists the average value of sales per delivery by type of account

and day of week for 683 wholesale accounts. Customer data show that

schools and supermarkets were the largest accounts, averaging $32.35 and

and $28.39 daily, respectively. Vending machine accounts were next

largest with an average of $19.99 per service. Following vending machines,

in order were eating places, small grocery stores, country stores and

service stations, and drug stores. Average value of deliveries ranged

from $5.79 to $3.08 daily.

Although supermarkets made up less than 10 per cent of the total

accounts, they were responsible for nearly one-third of the total sales,

Table 8. Volume of sales to school accounts made up 22 per cent of total

Table 7. Average Value of Sales Per Delivery by Type of Account and Day of Week, 683 Wholesale Accounts, Alabama, November 13-18, 1961

Day of week	Type of Account								
	Super-markets	Small grocery stores	Country stores & service stations	Eating places	Schools	Drug stores	Vending machines	Others	Average
	- - - - - - - - - - - - - - - - - - Dollars -								
Monday	28.39	5.27	4.81	5.31	31.86	3.95	17.53	7.49	9.40
Tuesday.	18.66	4.71	4.48	6.84	30.20	2.40	21.53	10.10	9.49
Wednesday. . . .	21.90	4.17	4.22	3.90	33.56	2.25	30.64	7.79	9.17
Thursday	23.94	4.65	4.84	5.75	31.90	2.93	13.70	8.13	9.69
Friday	39.18	5.24	4.41	5.60	31.36	2.10	25.30	9.35	11.45
Saturday	43.13	6.87	4.61	6.90	1/	4.61	4.08	15.08	11.76
Average. . . .	28.39	5.20	4.57	5.79	32.35	3.08	19.99	9.65	10.21

1/Excludes Saturday deliveries made to three schools.

Table 8. Number and Percentage of Wholesale Customers and Value of Sales by Type of Account, 683 Wholesale Accounts, Alabama, November 13-18, 1961

Type of account	Accounts		Value of products delivered.	
	Number	Per cent	Dollars	Per cent
Supermarkets	61	8.9	9,339.98	30.3
Small grocery stores .	203	29.7	5,057.98	16.4
Country stores & service stations. . .	118	17.3	1,919.94	6.2
Eating places.	157	23.0	4,264.35	13.8
Schools.	48	7.0	6,923.58	22.4
Drug stores.	22	3.2	276.80	.9
Vending machines . . .	13	1.9	879.52	2.8
Others	61	9.0	2,219.45	7.2
Total.	683	100.0	30,881.60	100.0

sales but were only seven per cent of the total accounts. In contrast, small grocery stores, country stores and service stations made up approximately 50 per cent of the total accounts but were responsible for less than 25 per cent of total sales.

DESCRIPTION OF WHOLESALE ROUTES

The 39 wholesale routes consisted of 18 city and 21 country and small town routes. In addition to data collected from the 39 routes, individual customer data were obtained from 15 of these routes. Customer data consisted of information in regard to value of milk products delivered to each stop daily and certain characteristics of each customer.

There was an average of 53 stops per route for the 39 routes. Many routes had customers who were not served daily. Usually these customers made small purchases and could be adequately served by two or three deliveries per week. City customers were served more frequently than

were rural customers. The average country and small town route had 64 accounts and an average daily sales of $5.62 per account, while the average city route had 40 accounts and average daily sales of $9.16 per account.

Route Mileage

Average daily round-trip mileage on the 39 routes was about 80 miles, Table 9. Average daily distance from the plant to the first stop was 10.4

Table 9. Average Number of Miles Traveled Per Delivery Day for City and Country Routes, 39 wholesale Routes, Alabama, November 13-18, 1961

Type & segment of routes	Routes	Mileage from:			
		Loading point to first stop	First stop to last stop	Last stop to loading point	Total distance
	Number	Miles	Miles	Miles	Miles
City routes	18				
Average distance		6.0	33.7	6.3	46.0
Range in distance		0.1-25.0	2.5-69.0	0.2-15.0	5.0-105.0
Country and small town routes	21				
Average distance		14.7	87.4	11.9	114.0
Range in distance		0.2-60.0	36.0-138.0	0.5-50.0	38.0-175.0
All routes	39				
Average distance		10.4	60.6	9.1	80.1
Range in distance		0.1-60.0	2.5-138.0	0.2-50.0	5.0-175.0

miles, from the first stop to the last stop 60.6 miles, and from the last stop to the plant 9.1 miles per day. Miles traveled on country and small

town routes were much greater than the miles traveled on city routes.

Distance traveled per day for city routes ranged from 5 to 105 miles

with a daily average of 46 miles, whereas the total distance traveled

daily for country and small town routes ranged from 38 to 175 miles with

a daily average of 114 miles.

Type of Customer

The 15 routes for which customer data were obtained had a total of

683 customers or about 46 customers per route. Different types of busi-

nesses served are shown in Table 10. Small grocery stores, country stores

and service stations, and eating places were the most frequent types of

stops, making up 70 per cent of the total stops.

Table 10. Number and Percentage of Wholesale Customers by Type of
Account, 683 Wholesale Accounts, Alabama, November 13-18,
1961

Type of account	Number	Per cent
Supermarkets	61	8.9
Small grocery stores	203	29.7
Country store & service stations . .	118	17.3
Eating places.	157	23.0
Schools	48	7.0
Drug stores.	22	3.2
Vending machines	13	1.9
Others[1]/	61	9.0
Total	683	100.0

[1]/Includes taverns, theaters, bakeries, laundries, fruit stands,
fishing camps, motel, hospitals, convents, feed stores, and recreation
centers.

Frequency of Deliveries

Deliveries to each of the 683 accounts were not made daily. Data

indicated that larger accounts such as supermarkets and schools were

Table 11. Percentage of Accounts with Daily Deliveries by Type of Account and Day of Week, 683 Wholesale Accounts, Alabama, November 13-18, 1961

Day of week	Super-markets	Grocery store	Country stores & service stations	Eating places	Schools	Drug stores	Vending machines	Others	Average
				- - -Per cent- - -					
Monday.	89	84	74	80	96	59	85	78	77
Tuesday	97	81	52	81	88	82	77	66	76
Wednesday . . .	70	67	52	66	83	45	33	44	62
Thursday. . . .	93	83	49	77	88	77	77	73	76
Friday.	93	78	70	77	85	68	54	64	76
Saturday. . . .	97	87	59	88	1/	77	8	64	80
Average	90	80	59	78	88 1/	68	66	65	75

1/Excludes Saturday deliveries to three schools.

served most frequently. Ninety per cent of the supermarkets and 88 per cent of the schools received milk daily, while 59 per cent of the smaller accounts such as country stores and service stations were serviced on a daily basis, Table 11. A larger percentage of customers were served on Monday and Saturday than on other days. Saturday deliveries were necessary to meet the large weekend demand for milk products. Deliveries to most accounts were required on Monday so that routemen could pick up empty cases and rearrange and fill display cases after large weekend sales. The lowest percentage of customers was served on Wednesday. In fact, two firms did not deliver milk products on Wednesday.

While some of the accounts were not served daily, others required a second delivery of milk products the same day. Table 12 shows the percentage of accounts requiring second delivery. Such large accounts as

Table 12. Number and Percentage of Accounts Requiring Second Delivery of Milk Products by Type of Account, 683 Wholesale Accounts, Alabama, November 13-18, 1961

Type of account	Accounts	Number with second delivery	Percentage with second delivery
	Number	Number	Per cent
Supermarkets.	61	21	34.4
Small grocery stores. . . .	203	4	2.0
Country stores and service stations	118	2	1.7
Eating places	157	1	0.6
Schools	48	1	2.1
Drug stores	22	0	0.0
Vending machines.	13	2	15.4
Others.	61	0	0.0
Total	683	31	4.5

supermarkets had the highest percentage of second deliveries. The 13 vending machine accounts were the second largest group that required second deliveries. Generally, drug stores, schools, and eating places had adequate space for milk storage and did not require many second deliveries. Route drivers often returned in the afternoon to large supermarket customers to service the display case even though additional milk was not delivered to the store.

Type of Milk Display and Services Performed

The type and amount of service performed by a driver on a wholesale milk route varied among customers. Most customers preferred that the routeman service display cases. Approximately 92 per cent of the display cases on the premises of 683 stops was serviced by the routeman.

All wholesale customers had refrigeration facilities. Approximately 54 per cent of the accounts had some type of milk product display case. The remaining 46 per cent used other facilities for milk storage. In a few instances household type refrigerators were used in place of display cases. The display cases consisted of two types - open and closed. About 35 per cent of the display cases was the open type. Number and type of display case used by customers on the 15 individual routes are shown by type of account in Table 13. All supermarket accounts and all but one of the small grocery store accounts had some type of display case. Usually display cases found in supermarkets were the open type, whereas most of those in small grocery stores were the closed type. Many closed cases had glass doors for visibility of customers. Seventy-five per cent of the country store and service station accounts had display cases - mostly

Table 13. Number of Accounts and Type of Display Case by Type of Account, 677 Wholesale Accounts, Alabama, November 13-18, 1961[1]

Type of account	Accounts	Accounts with display cases	Accounts having no display cases	Open display case	Closed display case
			- - - Number - - -		
Supermarkets. . . .	61	61	0	59	2
Small grocery stores	199	198	1	57	141
Country stores and service stations	116	87	29	7	80
Eating places . . .	157	3	154	1	2
Schools	48	0	48	0	0
Drug stores	22	2	20	1	1
Vending machines. .	13	0	13	0	0
Others.	61	16	45	5	11
Total	677	367	310	130	237

[1] Based on 683 customers served by 15 routes. No information was received for six accounts.

closed type. The accounts not usually having display cases consisted mainly of eating places, schools, and drug stores.

A routeman usually performed several duties at each stop. These duties differed among the drivers; however, at a typical wholesale stop, a routeman first walked into the customer's establishment where he determined the amount of products to be delivered. The order may have been determined by the driver observing the amount of products on hand or by obtaining an order from the manager. While in the store, the driver checked and removed all damaged and outdated products. If any of the products were outdated or damaged, they were removed and returned to the plant.

After quantity was determined, the driver returned to the truck to

assemble and make delivery of the order. In most cases the driver stamped

the price on the different products and arranged them in the display case.

Each distributor was often allowed a certain amount of a space in a dis-

play case; the routeman made certain that the allotted space was filled;

otherwise competitors might place their products in his space. If there

was no display case, the driver placed the products in the storage faci-

lity provided. After delivery, financial settlement was made by cash or

signing the sales slip of the delivered order by an authorized person.

Collection of Bills

Wholesale customers pay cash on delivery or charge the products and

pay at a later date. The greatest percentage of cash customers were smaller

accounts such as country stores, eating places and small grocery stores,

Table 14. Charge account customers consisted mainly of larger accounts

Table 14. Number of Customers and Method of Payment by Type of Account,
674 Wholesale Accounts, Alabama, November 13-18, 1961[1]

Type of account	Account	Method of payment		Total
		Cash	Charge	
	No.	Pct.	Pct.	Pct.
Supermarkets	61	26	74	100
Small grocery stores. . . .	202	93	7	100
Country stores and service stations	116	95	5	100
Eating places	155	81	19	100
Schools	47	4	96	100
Drug stores	21	81	19	100
Vending machines.	13	0	100	100
Others	59	61	39	100
Total	674	--	--	100

[1] Based on 683 customers served by 15 routes. No information was
received for nine accounts.

such as supermarkets and schools. Collection of bills on a cash basis involved a settlement each time a delivery is made. Although each cash settlement ensures 100 per cent collection of receivables, it may cause the driver to spend additional time at the stop during busy store hours when an authorized person or cashier is busy waiting on store customers. Normally when a charge account was used, the routeman was relieved of having to make a daily collection. Collection of the bill in this case was usually done by the plant.

Number of Milk Distributors Per Account

Fifty-nine per cent of the customers on which individual stop data were gathered bought milk products from only one distributor. From 2 to 5 dairies served each of the remaining 41 per cent of the accounts. Sixty per cent of the supermarkets handled two or three brands of milk products; 75 per cent of the small groceries handled 1 or 2 brands. Almost a third of the supermarkets were served by four and five milk distributors, and a fourth of the small grocery stores carried three or four brands of milk. Supermarkets and small grocery stores had the largest average number of dairies per account, while schools and vending machine accounts had the smallest number of milk distributors, Table 15. Schools and supermarkets had the largest total dollar sales.

Delivery Time

Length of the work day was divided into two time components. One component was the amount of time spent at the plant, that included loading and unloading the trucks and checking at the plant on the amount of sales for the day. The second component was the time spent on the route that

Table 15. Number of Dairy Firms Serving Each Account by Type of Account, 664 Wholesale Accounts, Alabama, November 13-18, 1961[1]/

Type of account	Number of accounts	Number of dairies serving account					Average Number of dairies
		1	2	3	4	5	
		----------------------Number----------------------					
Supermarkets. . . .	61	5	18	19	13	6	3.0
Small grocery stores	196	67	79	40	10	0	2.0
Country stores & service stations .	112	66	34	10	2	0	1.5
Eating places . . .	155	140	14	1	0	0	1.1
Schools	48	46	2	0	0	0	1.0
Drug stores	20	14	6	0	0	0	1.3
Vending machines. .	13	13	0	0	0	0	1.0
Others.	59	44	11	4	0	0	1.3
Total.	664	395	164	74	25	6	1.6

[1]/Based on 683 customers served by 15 routes. No information was received on 19 accounts.

included the total time spent driving and servicing each account. Total time was the sum of the time spent at the plant and time spent on the route. Time spent in each of the above time components by day of the week is given in Table 16. Approximately 87 per cent of the total time was spent in driving and servicing accounts, and 13 per cent was at the plant loading and unloading trucks and performing bookkeeping responsibilities.

Normally the first thing the driver did upon returning to the plant after completion of the route was to unload the truck. Unloading empty cases (and glass containers in some instances) and outdated and damaged products usually required from 10 to 30 minutes. Undelivered products were usually left on the delivery truck. After completing unloading, the truck was loaded for the next day's delivery. The load-out process

Table 16. Average Delivery Time by Day of Week, 39 Wholesale Routes, Alabama, November 13-18, 1961

Day of week	Time at plant	Time on route	Total time
	---------------Minutes---------------		
Monday.	89	574	663
Tuesday	84	555	639
Wednesday	79	522	601
Thursday.	90	534	624
Friday.	86	619	705
Saturday.	87	594	681
Average.	87	566	652

normally required from 20 to 45 minutes depending on size of load and loading facilities. Once the truck had been loaded, it was parked at a specific location and was refrigerated until time for the next day's delivery. The driver then completed bookkeeping for that particular day. Amount of products sold was totaled and checked against load-out, products left on the truck, and returned items. At that time a settlement was also made with the plant for the amount of sales on route for that day. Bookkeeping time required from 30 minutes to 2 hours depending upon the individual route driver, bookkeeping requirements of the different firms, and volume of sales.

Fridays and Saturdays required the most time to complete the delivery process. This was the result of a larger volume of milk and milk products required to meet weekend sales by grocery stores. Also a larger percentage of all accounts was serviced on these days. Because of larger volume required, second deliveries were more frequent on Fridays and Saturdays.

The least amount of delivery time was required on Wednesday when milk product sales were lowest. Milk sales on Wednesday were 18 per cent

lower than the average daily milk sales and 29 per cent below those made

on Saturday. Because Wednesday's milk sales were lower than the rest of

the week, it was possible for two particular firms, not to make deliveries

on Wednesday.[1]

Small town and rural routes required considerably more route time than

did the city routes. An average of approximately 6 hours was required for

the rural routes as compared with that of about 5 hours for city routes.

Since customers on rural routes were spread out over a much greater area

than were those on city routes, small town and rural routes were longer

and route men spent more time driving between stops than did city route

drivers. Average miles for the small town and rural routes was about 114

miles as compared with 46 for the city routes. Small town and rural routes

had almost 24 more accounts per route than did the city routes, but accounts

on the rural routes were smaller than those on city routes.

DELIVERY COSTS

Distribution is the most costly phase of the milk marketing process.

The two basic components of wholesale milk distribution costs are labor

and truck costs. Size of these costs depend on: (1) levels of inputs of

truck and labor resources, and (2) cost rates appropriate for each input

for the time period studied. Of the two costs, labor costs are the most

important. In this study average labor costs constituted 76.5 per cent

of the total wholesale milk delivery costs; truck costs accounted for the

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[1] Since this study was made, a number of additional distributors have
discontinued milk delivery on Wednesdays.

remaining 23.5 per cent.

Labor Costs

The basis on which the 39 wholesale delivery route men were paid varied among firms and in some cases within firms. In this analysis, total labor costs were divided into direct and indirect labor costs.

Direct labor costs were defined to include wages and commissions paid to deliverymen and wages and commissions paid route supervisors and route relief drivers. In some cases, wages paid route helpers were considered to a direct labor cost of the firm; however, in a majority of the cases, the helper's wage was paid by the route driver.

Indirect labor costs incurred on the wholesale milk routes included the fringe benefits received by the route deliverymen. These nonwage benefits were additional costs for the dairy firms. Indirect labor costs included such things as allowances for clothing, insurance plans, bonuses, vacations, and various other benefits for the route driver.

Direct Labor Costs. Wage payments to route deliverymen consisted of two different methods. The first method consisted of a certain percentage commission paid the deliveryman on part of the sales or in some cases on total sales. The second method consisted of a base wage per week or per month plus a percentage commission of sales.

Various methods of determining deliverymen's earnings used by some of the 14 distributors cooperating in this study included the following:

I. Commission:

(1) Commission of 9.25% on all sales.

(2) Commission of 8.25% on all sales.

(3) Commission of 7.15% on all sales.

II. Commission plus base salary:

(1) Commission of 7.00% on all sales, plus base salary of $75.00 per week.

(2) Commission of 5.25% on all sales, plus base salary of $20.00 per week. .

(3) Commission of 5.00 % on all daily sales above $85.00, plus base salary of $85.00 per week

(4) Commission of 4.00 % on all sales, plus base salary of $54.00 per week.   ·.

(5) Commission of 4.00% on all daily sales above $189.00, plus base salary of $40.00 per week.

(6) Commission of 3.00% on all sales, plus base salary of $68.75 per week.

(7) Commission of 2.00% on all collections, plus base salary of $73.08 per week.

Some of the preceding methods of determining deliverymen's earnings were used by more than 1 of the 14 distributors. In addition, other methods, not listed, were used in some instances.

All deliverymen were paid on a commission basis. Commission percentages ranged from 2 to 9.5 per cent of wholesale sales. In addition, approximately half of the 39 deliverymen received a base wage, ranging from $20 to $85 per week.

In cases where variations in pay rates existed among routes operated within a particular firm, route drivers were not unionized. Usually deliverymen receiving a high commission percentage had a smaller base wage and likewise deliverymen receiving a high base wage had a smaller commission.

percentage. Thus, differences in total wages were less than indicated by different wage and commission rates.

Most deliverymen had someone who assisted with the route work. The helper assisted in loading, delivery and unloading chores, and was usually paid by the route driver. Many helpers were employed under conditions of day labor under which they were paid only by the hour or by the day. Usually the indirect or fringe benefits received by route drivers did not apply to helpers. Apparently, a large turnover existed among helpers.

In cases of sickness, death in the immediate family, jury duty and vacations, route supervisors or relief drivers operated the routes for regular deliverymen.

Indirect Labor Costs. Some indirect labor costs such as social security and unemployment and workmen's compensation were required of all firms. Other indirect labor costs varied from firm to firm. Such costs included allowances for clothing, insurance plans, retirement plans, bonuses, vacations, and profit-sharing plans. Some firms paid the entire cost of drivers' delivery uniform and laundry bill, while others paid only a portion of it.

Most of the 14 distributors operating the study routes had some type of hospital and life insurance policies for their employees. Usually firms would pay part of the cost of the policy and employees would pay the remaining amount. Twelve firms had hospital insurance programs and 11 firms had various life insurance benefits for route deliverymen. All firms were required to pay state unemployment and social security tax on each route driver. Two firms had retirement plans and two other firms had profit sharing plans. One firm gave deliverymen Christmas bonuses.

Vacation time with pay varied among firms and among deliverymen by length of service. Normally, drivers earned one week vacation during the first year of employment, and then after 2 or 3 years, vacation was increased to 2 weeks. The amount of sick leave varied from 4 to 7 days after 1 year of continuous work and unused sick leave was accumulative. The number of holidays ranged from none to 6 days per year. In most cases, route drivers received regular wages during vacations, sick leaves, and holidays. Vacation pay was usually based on an average percentage of earnings on the route.

Every state has enacted workmen's compensation laws for benefit and protection of employees. Workmen's compensation relieves an employer of the danger of large judgments resulting from on-the-job injuries to employees. Under workmen's compensation, an employee does not have to prove negligence on the part of the employer or lack of contributory negligence on his part. He is paid for accidental injuries arising out of and in the course of his employment. Workmen's compensation insurance policies can be purchased from private casualty insurance companies qualified to write such insurance and the premiums must be paid by the employer. It is illegal to make the employees pay the premiums (5).

The unemployment insurance program required of all employers in commerce and industry, who employ four or more workers during 20 or more work weeks of the year, provides partial income replacement for a limited period of time to persons who become unemployed. It is a state administered program with federal participation (6).

<u>Labor Costs Per Week</u>. Average weekly labor costs per route, including
direct and indirect labor costs, were $184.83. Total labor costs ranged
from $97.67 to $278.17 weekly, Table 17. For six routes, labor costs

Table 17. Labor Costs Related to Physical Factors and Values, 39 Whole-
sale Routes, Alabama, November 13-18, 1961

Average and range	Labor cost per week	Labor cost per quart equivalent	Labor cost per customer[1]	Labor cost per dollar sales
	------------------------------Dollars------------------------------			
Average. . . .	184.83	0.022	.94	0.086
Range.	97.67- 278.17	0.011- 0.032	0.56- 1.58	0.047- 0.127

[1] Labor costs per customer were determined for 15 routes.

were less than $150.00 per week, 24 routes had labor costs ranging from
$150.00 to $220.00, and nine routes had labor costs more than $220.00
per week.

Since all route men were paid commissions, variations in total labor
costs were closely related to value of sales. Twenty-four routes had
labor costs in a range of approximately $30.00 above or below the average
weekly labor costs. In the six cases, where the routes had relatively
low labor costs when compared with the average, total sales were below
the average. Eight of the nine routes reporting relatively high labor
costs had total sales considerably greater than average.

<u>Labor Costs Per Dollar of Sales</u>. Labor costs per dollar of sales of
all products were determined by dividing total labor cost by the whole-
sale value of the route load. Average labor costs per dollar of sales
were 8.6 cents ranging from 4.7 to 12.7 cents among the routes. Labor

costs per dollar of sales were below 7 cents for 7 routes; 20 routes had

labor costs within a range of 1.6 cents (7.0-10.2 cents) above or below

the average, and 12 routes had labor costs above 10.2 cents.

Variation in labor costs per dollar sales resulted mainly from dif-

ferences in commission rates and base salaries among routes. Labor cost

per dollar of sales can be decreased by increasing the value of the load

if a portion of the labor cost were fixed such as base salaries. If only

a commission on sales were paid, direct labor cost per dollar sales for

a route does not vary by changes in load value.

Labor Costs Per Customer. Average labor costs per customer were $0.94,

and ranged from $0.56 to $1.64 among routes, Table 18. Routes with a high

Table 18. Average Daily Value of Sales Per Customer and Daily Labor Costs
Per Customer by Routes, 15 Wholesale Accounts, Alabama, November
13-18, 1961

Route Number	Average daily sales	Average number of customers served daily	Average sales per customer	Average labor cost	Labor cost per customer
	Dollars	Number	Dollars	Dollars	Dollars
1	569.21	42.0	13.55	40.62	.97
2	503.11	41.0	12.27	25.49	.62
3	478.68	26.0	18.41	41.10	1.58
4	434.27	29.0	14.97	47.63	1.64
5	403.50	29.0	13.91	43.82	1.51
6	358.04	31.0	11.55	18.11	.58
7	339.71	30.0	11.32	36.83	1.23
8	307.84	31.0	9.93	30.84	1.00
9	305.53	35.0	8.73	33.85	.97
10	300.49	45.0	6.68	25.30	.56
11	282.26	44.0	6.42	28.51	.65
12	275.77	37.0	7.45	28.00	.76
13	267.78	40.0	6.69	25.92	.65
14	237.44	25.0	9.50	32.95	1.32
15	210.95	36.0	5.86	29.54	.82
Average. .	351.64	35.0	10.48	32.57	.94

labor cost per customer were usually characterized by having large deliveries and/or a relatively small number of customers. Value of the customer's order was the main factor affecting labor costs per customer.

Value of products delivered per customer was determined by dividing total sales by number of customers served daily. Wholesale value of average delivery per customer was $10.48, ranging from $5.86 to $18.44 among the routes.

Labor Costs Per Quart Equivalent. Labor costs per quart equivalent of milk products averaged 2.3 cents, ranging from 1.1 to 3.2 cents among the routes. Labor costs per quart equivalent was determined by dividing labor cost per route by the quart equivalent of milk products, pint equivalents of cream, and units of other products. Twenty-six of the 39 routes had labor costs per quart within a range of 0.5 cents above or below the average (1.8-2.8 cents). Eight routes had labor costs per quart greater than 2.8 cents and labor costs per quart were less than 1.8 cents for five routes. Seven of the eight routes with high labor costs per quart delivered smaller than average loads; only one of the five routes with low labor cost delivered less than an average load.

Truck Costs

The type of trucks used by firms participating in the wholesale milk study were cab and refrigerated van-type, which are widely used in Alabama to deliver milk. Most of the trucks had a 1½-ton capacity although in a few cases 2-ton capacity trucks were used.

Estimates of truck costs were based on truck operating data obtained from some participating firms that kept cost records for each vehicle used. For purposes of analysis, truck costs were divided into two major

components--fixed and variable costs. Fixed costs were those costs that
did not vary with mileage. Fixed costs included depreciation, interest
on investment, taxes, licenses, and insurance. Variable costs were those
that varied according to mileage. Such costs included gasoline, oil,
tires, repairs, and maintenance.

Fixed Costs. The fixed costs for trucks were estimated on the basis
of current replacement cost. Depreciation was allocated on a straight
line basis for an estimated 8-year life. It was assumed that both the
truck and van depreciated in an 8-year period. Interest costs on capital
investment were estimated on the basis of 3 per cent of the initial pur-
chase price of the truck. Tax, license, and insurance costs on capital
investment were estimated on the basis of 3 per cent of the initial pur-
chase price of the truck. Tax, license, and insurance costs were obtained
from actual data furnished by one of the firms participating in the study.
The annual and daily fixed costs for the operation of one wholesale deli-
very truck, based on a purchase price of $5,500 with a salvage value of
$100, are given in Table 19.

Variable Costs. In most cases, gasoline consumption per mile was
inversely related to length of route. This probably can be accounted for
by the fact that routes with lower annual mileages were usually city
routes, which have shorter distances between stops and more congested dri-
ving conditions than do the country and small town routes. Estimation of
gasoline costs per mile was determined in such a way as to allow for this
variation in driving conditions. Gasoline consumption was estimated by
the mathematical relationship: $C = 0.179 - 0.00000061 R$, Where $C =$
consumption of gasoline in gallons per mile, and $R =$ mileage driven per
year.

Table 19. Estimated Fixed Costs for Trucks Operated on Wholesale Milk
Delivery Routes, Alabama, 1961[1/]

Annual fixed costs	Dollars
Depreciation (8-year life)[2/]	$675.00
Interest (3% on purchase price)[3/]	165.00
License & taxes[4/]	51.42
Insurance[5/]	100.00
Annual total	$991.42
Daily total (312 delivery days)	3.18
Cost per mile	0.0398

[1/]Generally, methods used in obtaining fixed costs in this table
were obtained from a study by Richard L. Simmons entitled Wholesale
Milk Distribution Practices, Costs and Pricing in North Carolina,
North Carolina Agricultural Economics Information Series No. 88, 1962.

[2/]Based on an estimated initial truck cost of $5,500 and depreciated
over an 8-year period with a trade in or salvage value of $100.

[3/]This rate is equivalent to approximately 5½ per cent on the unamor-
tized value.

[4/]Obtained from data furnished by one firm participating in the
study.

[5/]Included fire, theft, and liability.

Costs for the remaining variable items, oil, tires, parts, and

repairs, were determined from data furnished by one firm that kept yearly

truck maintenance records. These costs per mile are given in Table 20.

Total Truck Costs. Since it would have been extremely difficult if

not practically impossible to allocate truck costs among individual stops

on the basis of volume delivered or upon the amount of sales, truck costs

were allocated among all stops on an equal basis. Total truck costs per

route, per mile, and per stop are shown in Table 21.

Table 20. Estimated Variable Truck Costs Per Mile for Wholesale Milk Delivery, Alabama, 1961

Variable costs	Dollars
Gasoline[1]	.0410
Oil[2]	.0011
Tires, parts, & repairs[2]	.0364
Total cost per mile.	.0785

[1]Estimated from the equation $C = 0.179 - 0.00000061 R$ where C = gas consumption in gallons per mile, and R = annual mileage.

[2]Obtained from data furnished by one firm participating in the study.

Table 21. Fixed, Variable, and Total Truck Costs Per Mile, Stop and Route, 39 Wholesale Routes, Alabama, 1961[1]

Unit	Fixed costs	Variable costs	Total costs
	---------------Dollars---------------		
Per mile	0.040	0.078	0.118
Per stop	0.060	0.119	0.179
Per route	3.178	6.280	9.458

[1]This table was based on the following assumptions: (1) The average length of the 39 wholesale routes was 80 miles. It was assumed that the route was served 312 times during the period of a year (milk delivered six days a week for 52 weeks). Thus, annual mileage was determined to be 24,960 miles. (2) The average gasoline consumption per mile for a route of this length was computed from the equation $C = .179 - 0.00000061 R$ to be 0.164 gallons per mile. A price of $0.25 per gallon of gasoline was assumed. This gave a cost of $0.0410 (0.164 x 0.25) per mile. (3) Total variable costs were found by adding other variable costs to the gasoline cost. This gave a total variable truck cost of $0.0785 per mile or $6.28 ($0.0785 x 80 miles) per route day. (4) Next, by adding the daily fixed costs to the daily variable costs, total truck costs were found to be $9.46 per route day. This gave a total truck cost of $0.1183 ($9.4576 ÷ 80) per mile. (5) With an average of 53 stops for each route, total truck costs per stop was $0.1785.

Truck costs for wholesale milk delivery routes have been reported in studies made in other states (2,3). Table 22 shows a comparison of fixed and variable truck costs on wholesale milk delivery routes in Alabama, North Carolina and Virginia.

Table 22. A Comparison of Fixed and Variable Truck Costs on Wholeslae Delivery Routes in Alabama, North Carolina, and Virginia, 1958-1961

Cost items	Alabama[1] (1-year study period)	North Carolina[2] (2-year study period)	Virginia (12-year study period)
	------------Dollars------------		
Fixed costs			
Depreciation	675.00	625.00	581.00
Interest	165.00	150.00	132.60
Taxes & license.	51.42	195.00	51.17
Insurance.	100.00	100.00	40.35
Storage	---	50.00	---
Garage labor	---	460.00	---
Antifreeze	---	---	3.00
Annual total	991.42	1,585.00	811.12
Daily total[3]	3.18	5.05	2.60
Variable costs			
Gasoline	0.0410	0.0455	0.0420
Oil	0.0011	0.0023	0.0040
Tires, parts & repairs[4]	0.0364	0.0239	0.0370
Total cost per mile[5].	0.0785	0.0717	0.0830

[1] Data from one firm were used in determining certain truck costs.

[2] Certain truck costs were determined from data made available by two different firms for a 2-year period; costs were, in part, estimated.

[3] Total delivery days assumed were 312 for Alabama and Virginia while 313 delivery days were assumed in the North Carolina study.

[4] The North Carolina study considered labor to be a fixed cost.

[5] Annual total cost and daily total cost depend upon the number of miles driven annually.

Total fixed costs per day for wholesale delivery routes in Alabama were $3.18 as compared with a daily total of $4.05 in North Carolina and a daily total of $2.60 in Virginia. Variable costs per mile for wholesale delivery routes in Alabama were 7.85 cents as compared with 7.17 cents in North Carolina and to 8.3 cents in Virginia.

Total Delivery Costs

Total delivery costs consisting of both labor costs and truck costs are shown in Table 23. Labor costs were slightly more than three times

Table 23. Truck Costs, Labor Costs, and Total Costs by Mile, Stop, Dollar Sales, and Route, 39 Wholesale Routes, Alabama, November 13-18, 1961[1]

Unit of measurement	Truck costs	Labor costs	Total costs
	----------------Dollars----------------		
Mile	0.118	0.385	0.503
Stop-39 routes	0.178	0.581	0.759
Stop-15 routes[2]	0.248	0.990	1.238
Dollar sales	0.026	0.086	0.112
Route per day	9.458	30.80	40.26

[1] In figuring cost it was assumed that daily labor cost was $30.80, average daily total mileage was 80 miles, average number daily stops were 53, and average daily sales were $358.31.

[2] Based on 15 wholesale routes on which individial stop data were obtained. Actual number of daily stops was used in figuring costs, whereas the number of accounts on the route was used in figuring costs for the 39 routes.

truck costs. By using total costs per route it was found that labor costs made up 76.5 per cent of total costs, while truck costs accounted for 23.5 per cent of costs.

Total delivery costs averaged approximately 11.2 per cent of total dollar sales.

COST REDUCTION ALTERNATIVES

The State Milk Control Board determines to a large degree the competitive structure of Alabama's fluid milk industry. In addition to establishing producer prices for milk, the Board fixes wholesale and retail prices for fluid milk products, defines fair trade practices, and otherwise stabilizes the State's milk industry. Minimum and maximum wholesale and retail prices for specific milk products are fixed by the Board and no other prices are legal. Trade practices are defined and certain practices, such as rebates and discounts, are prohibited. Other business practices are permitted, but are supervised by the Board. The Board must regulate transactions among milk handlers to prevent circumvention of pricing orders. Thus, price competition among milk distributors is illegal in Alabama. The Milk Control Board has made no provisions for discounts or other allowances for differential costs involved in sales of different volumes of products. Neither are price provisions made to reflect cost differences for various methods of distribution.[2]

Large volume customers were required to pay the same unit price for milk products as small volume customers. Since price rebates and volume discounts were prohibited by the Milk Control Board, individual wholesale customers had no legal monetary incentive to place their total order with only one or two distributors. Instead, wholesale customers, particularly supermarkets and small grocery stores, would tend to divide their trade

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[2] In pricing orders issued in March 1967, the Board provided for a permissive differential between home-delivered and store-purchased milk products.

among several distributors and provided a variety of brand choices from
which consumers would choose. Sixty-two per cent of the supermarkets
carried three or more brands of milk products. As long as wholesale cus-
tomers are not permitted to receive monetary incentives in the form of
volume discounts resulting from trading with fewer distributors, whole-
sale customers probably will continue to divide their business among
several distributors. Duplication in wholesale milk delivery reduced the
average value and volume of delivery per route and per wholesale customer
in the market. As a result of the uniform pricing system, distribution
costs for both the firm and the industry were not as low as they could
otherwise be.[3]

Increase Volume and Value of Route Load

Low labor costs per dollar of sales were usually associated with lar-
ger total sales per route, while high labor costs per dollar sales were
associated with low total sales. The relationship between value of sales
and labor cost per dollar of sales for the 39 routes is shown in Figure 1.

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[3]Where flat or uniform prices are fixed, there is great incentive
for milk distributors to by-pass the pricing system. Assume prices were
established based on costs of delivery to average-sized customers. The
average is made up of some customers smaller than average and others lar-
ger than average. Unit cost of delivery per customer can be expected to
be higher for the small customer and the flat price would be inadequate
to cover delivery costs. To cover distribution costs to small customers,
wholesale and retail prices would have to be increased. For large volume
customers, the flat price would be more than adequate and could be
decreased. To gain business with large volume customers, discriminatory
pricing practices, such as secret rebates, discounts, and price advanta-
ges on nonpriced items may be granted by distributors. Benefits from
these price concessions are not passed on by the pricing system to the
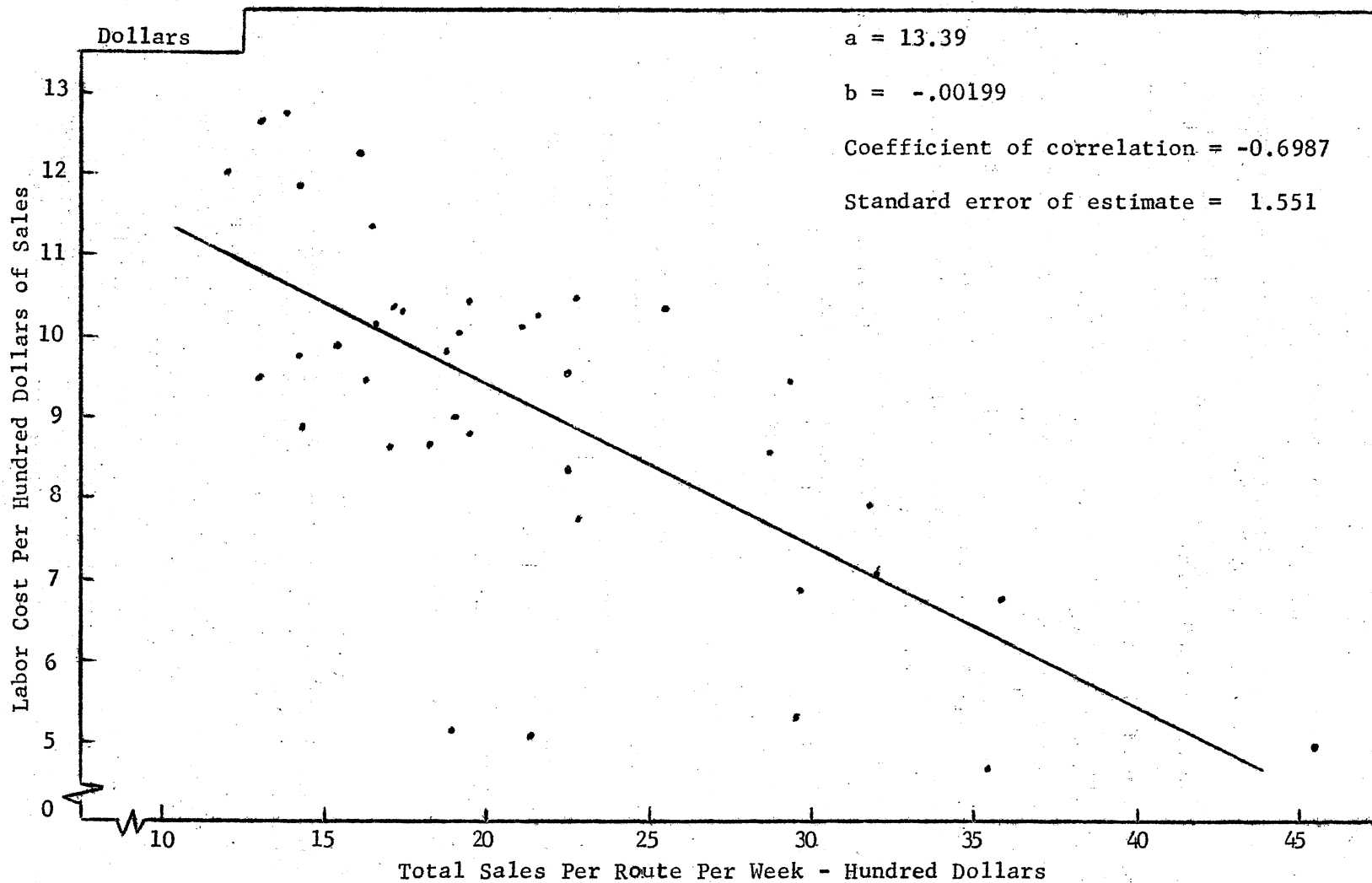segments of the dairy industry and the consumer.

Figure 1. Relationship of labor costs per hundred dollars of sales to total sales per route, 39 wholesale routes, Alabama, November 13-18, 1961.

Each dot represents an observation for a route. A linear cost equation, $Y_c = 13.39 - .00199 X$, describing the relationship between sales value and labor cost , was derived from the observations. By substituting total sales for X, labor costs per \$100 of sales, (Y_c) can be estimated for the amount of sales represented by X. The regression line shows that an increase in sales of \$500 within the range observed resulted in a labor cost reduction of \$2 per \$100 of sales. For a particular milk distributing firm, however, the relationship shown in Figure 1 is not valid. The coefficients were calculated from a sample of routes operated by 14 firms using different wage rates. Another sample of routes would likely yield different coefficients. Also, since elements of labor costs are both fixed and variable, the appropriate functional relationship between value of deliveries and labor cost is curvilinear rather than linear.[4]

For an individual milk distributing firm, the effect on labor cost of increases in sales of product depends largely on the method used in calculating wage rates. Tables 24, 25, and Figure 2 illustrate the relationship between value of sales and labor cost (base wages and commissions) per \$100 of sales for four firms participating in the study. Cost of supervisory personnel and fringe benefits, as a part of labor costs, were

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[4] The level of unit costs for a firm is determined by base wages, commissions, other delivery costs, and number and value of units delivered. For the 39 routes, 79 per cent of the variation in labor cost per \$100 of sales was explained by variation in wholesale value of sales and labor cost per week. A multiple regression relationship between labor cost per \$100 of sales (Y_c), wholesale value of sales (X_s) and labor cost per route per week (X_1) was calculated. Labor cost per route per week included only base wages and commissions paid route deliverymen. The equation, $Y_c = 10.67 - .00309X_s + .03385X_1$, shows the relationship. The multiple correlation coefficient was .889. While these figures give some indication of cost relationships and reliability of these relationships, they should not be interpreted to apply to a particular firm.
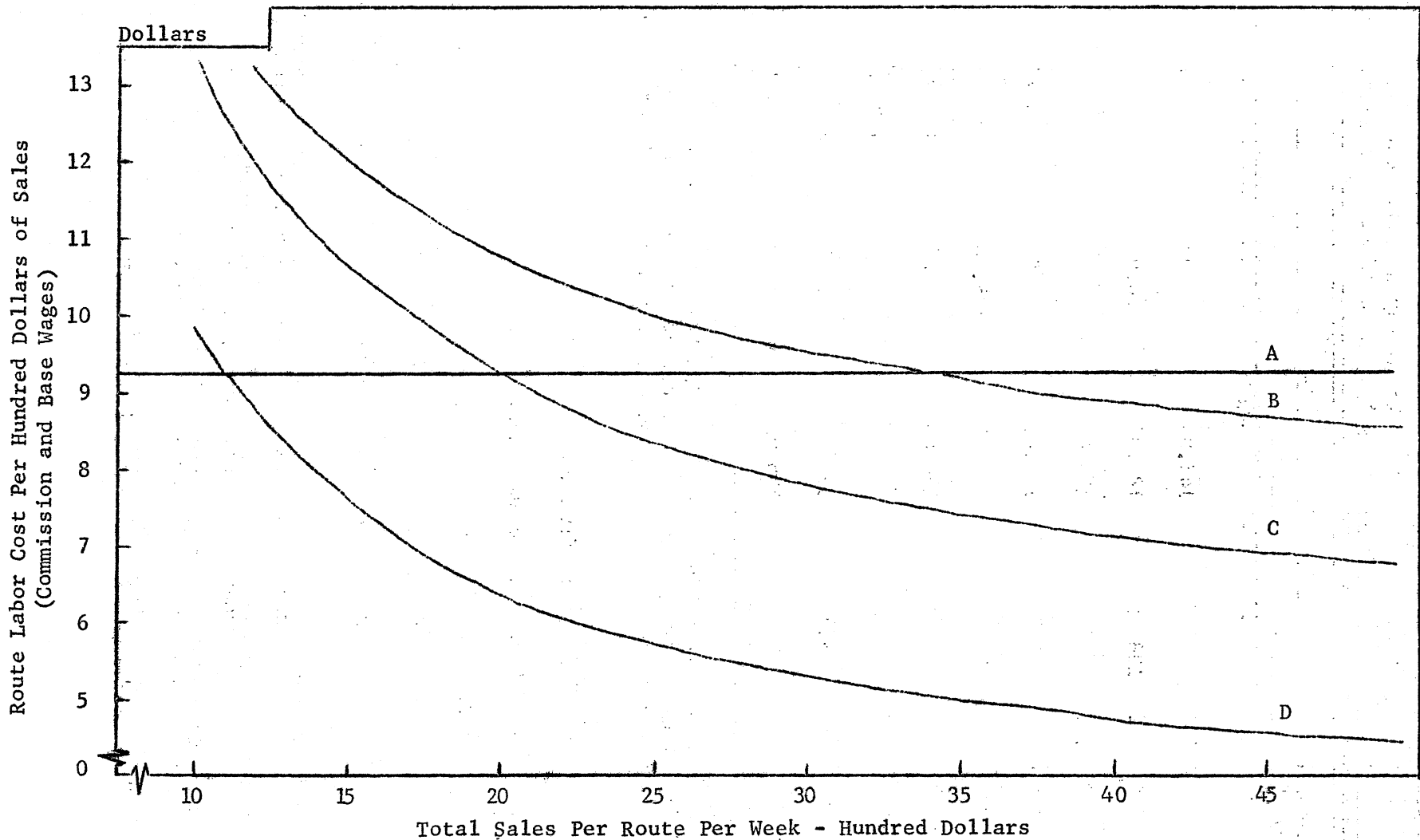
Figure 2. Relationship of labor costs per hundred dollars of sales to total sales per route for four firms paying different wage rates, Alabama, 1961.

Source: Table 23

Table 24. Weekly Labor Costs for Four Firms Paying Different Wage Rates[1]
for Wholesale Milk Delivery by Volume of Sales, Alabama, 1961[1]

Sales per week	Firm[2]			
	A	B	C	D
	----------------Dollars----------------------------			
1000 . . .	92.50	145.00	135.00	98.75
1500 . . .	138.75	180.00	160.00	113.75
2000 . . .	185.00	215.00	185.00	128.75
2500 · · ·	231.25	250.00	210.00	143.75
3000 · · ·	277.50	285.00	235.00	158.75
3500 . . .	323.75	320.00	260.00	173.75
4000 · · ·	370.00	355.00	285.00	188.75
4500 · · ·	416.25	390.00	310.00	203.75
5000 · · ·	462.56	425.00	335.00	218.75

[1] Wage rates illustrated were selected from actual wages paid wholesale deliverymen at time of study. Labor costs for wholesale milk distribution other than commissions and base wages were excluded in the comparison.

[2] Wage rates for each firm were as follows:

A = 9.25 per cent commission, no base wage.

B = 7.00 per cent commission, plus $75.00 per week base wage.

C = 5.00 per cent commission, plus $85.00 per week base wage.

D = 3.00 per cent commission, plus $68.75 per week base wage.

excluded in this comparison. In all cases, increases in total product sales resulted in increases in weekly wages paid deliverymen. For the firm that paid a flat commission only, direct labor cost per $100 of sales remained unchanged at different sales levels, as in the case of Firm A.

Table 25. Average Labor Costs Per Hundred Dollars of Sales for Four
Firms Paying Different Wage Rates for Wholesale Milk
Delivery by Volume of Sales, Alabama, 1961[1]/

| Sales per | Firm | | | |
week	A	B	C	D
	----------------------Dollars---------------------			
1000 · · · ·	9.25	14.50	13.50	9.88
1500 · · · ·	9.25	12.00	10.67	7.58
2000 · · · ·	9.25	10.75	9.25	6.44
2500 · · · ·	9.25	10.00	8.40	5.75
3000 · · · ·	9.25	9.50	7.83	5.29
3500 · · · ·	9.25	9.14	7.43	4.95
4000 · · · ·	9.25	8.88	7.12	4.72
4500 · · · ·	9.25	8.67	6.89	4.53
5000 · · · ·	9.25	8.50	6.70	4.38

[1]/Calculated from Table 24.

Where a base wage plus commission was paid, labor cost per $100 of sales declined sharply until sales reached about $2,000 per week. If cost of supervisory labor and fringe benefits, both of which tend to be relatively fixed at different levels of sales, were added to commission and base wages, the economy of large volume sales becomes even greater.

The economy of increasing sales per route on delivery costs can be illustrated by examining labor costs per dollar sales for the four firms. Wholesale deliverymen employed by Firm B were paid a 7 per cent commission on sales, plus a fixed wage of $75 per week. With sales increases, the marginal cost, or extra cost, was constant at 7 per cent of the sales

increase. Average cost of delivery declined rapidly from low volumes of sales and approached 7 per cent at large volumes of sales. For Firm A both the marginal labor cost and average labor cost were 9.25 per cent at all levels of sales.

If a fixed base wage is paid deliverymen, labor costs for low volumes of sales may be greater than for another firm with higher commission rates but no base wages; for example, Firms B, C, and D as compared with Firm A. Firms B, C, and D can make larger delivery cost savings per dollar of product by increasing sales than can Firm A.

In a study of labor costs on wholesale milk routes in Massachusetts, it was reported that larger loads permitted both lower than average unit costs and higher than average weekly wages (4). Likewise, results of this study showed that larger loads resulted in lower than average unit costs.

The need to reduce distribution costs is especially important to Alabama milk distributors because product costs, as well as wholesale and retail prices, are fixed by regulation and because labor costs are a large share of total distribution costs. The magnitude of this need can be shown by examining the value of loads sold on 234 wholesale routes operated by the 14 distributors in May 1961. Average value of products sold per route was about $1,850 per week. Two-thirds of the routes sold less than $2000 of products per week. As given in Table 25 and illustrated in Figure 2, large savings in distribution costs could be achieved by increases in sales, especially the smaller routes.

Consolidation of Deliveries

Delivery costs can be reduced by increasing volume of products delivered per customer. Increased volume per customer can be achieved by reducing the duplication involved when a wholesale customer is served by more than one distributor. Wholesale customers in this study received dairy products from an average of 1.6 distributors. Average value of sales per delivery was $10.21. If each customer were supplied by a single distributor, the average value of delivery would be increased to $16.35. For example, consider the cost effect on a wholesale route that serves 30 customers daily with sales of $10.21 per customer. The average daily value per customer is increased to $16.35 because of elimination of duplication in wholesale milk delivery. Average weekly sales per route would increase from $1,838 prior to elimination of duplication to $2,941. On a weekly basis this amounts to an increase of $1,103.

From the estimating equation illustrated in Figure 1, it was found that labor cost per $100 of sales would be decreased from $9.73 to $7.54 as a result of increased sales. On a weekly sales volume of $2,941, the savings in direct labor costs would be $64. Additional savings accruing to the industry would result from increased volume of sale per route. Fewer routes, both deliverymen and trucks, would be required for the industry to serve wholesale customers.

The greatest amount of duplication of distributors per customer was found in supermarkets (three) and small grocery stores (two). Since a large portion of all milk sales are made to supermarkets and small grocery stores, substantial increases in distribution efficiency could be made by

reduced duplication. Average number of distributors serving schools, eating places, and drug stores were from 1.04 to 1.30 distributors. In addition to the possibility of achieving savings through elimination of wholesale duplication, additional savings in delivery could be obtained through less frequent deliveries where storage facilities are available.

The wholesale customer decides the preference of products and number of brands to be displayed. Consolidation of deliveries to customers occur only when there is economic incentive for the wholesale customer to reduce the number of brands he will sell.

Reduced Services

A reduction of the number of services provided by deliverymen is a potential way of reducing costs per unit delivered. In a California study of milk delivery costs, substantial savings in truck and delivery labor costs could be accomplished through a reduction in the amounts of services provided (1). In that study, milk delivery processes were divided into three different delivery types. The first type of delivery represented the steps usually performed by the route driver at a typical wholesale stop. Such steps normally include securing the order, assembling the desired order, delivering and arranging the order, removing "damaged" products, and collecting. The second type of delivery was one in which "securing the order" and "collecting" were eliminated. The route man knew the order in advance and all collections were made by mail. The third type of delivery was one in which the delivery time was reduced by using a sidewalk delivery process. Desired products were left on the customer's sidewalk and thus number of delivery steps was minimized.

For the average stop in the California study, a 37 per cent reduction in costs occurred when the second type delivery process was used. This is where the order was known in advance and collection was made by mail. Savings were increased to 52 per cent when the third type or sidewalk delivery process was used. Such cost reductions were possible, however, only when delivery costs were considered to be a function of time required in the delivery process, i.e., hourly wage rates were paid. Net savings would depend upon the additional costs brought about by reduced services. Such costs would include phoning in the order by a customer, bookkeeping costs required for the collection by mail, and additional labor on the part of a customer to bring products into the store from the sidewalk.

The potential savings, suggested in the California study are not currently possible in Alabama because of different methods of wage payments. In Alabama wholesale milk route labor wages are paid on a percentage of sales commission basis and in some cases additional wages are paid in the form of a base or fixed salary, whereas hourly wages were paid in California. However, results of both studies suggest opportunities of cost savings by paying labor costs involved in the distribution of wholesale milk products on an hourly basis instead of using the present Alabama wage and commission payment methods.

SUMMARY AND CONCLUSIONS

Distribution is the most costly function in the marketing of fluid milk products. This marketing function is defined as the movement of milk products from processing plants to wholesale and retail customers. In 1966, about three-fourths of the total sales of fluid milk products

in Alabama were distributed on wholesale routes.

The purpose of this study was to obtain information on characteristics of wholesale milk distribution in Alabama, to determine costs involved in milk distribution, and to determine potential savings that could be realized by adopting alternative delivery practices.

Data were obtained from a sample of 39 wholesale milk routes operated by 14 fluid milk distributors in Alabama.

Average daily distance traveled on 39 routes was 80 miles. Country and small town routes were longer and had more but smaller accounts than city routes.

Small grocery stores, eating places, country stores, and service stations were the most common accounts served. Supermarkets and schools were the largest and most frequently served accounts. Largest total sales were made on Friday and Saturday while Wednesday was the day when the least volume of sales was made. Cash accounts were mainly small volume customers, whereas charge accounts were usually larger customers such as supermarkets and schools.

The average daily load size was 1,286 quart equivalents of milk products, 46 pint equivalents of cream products, and 192 units of other products. The wholesale value of milk, cream, and other products delivered on the routes during the period of a week averaged $2,149.90 and ranged from $1,195.65 to $4,551.83.

Labor costs were made up of base wages, commissions, and fringe benefits. All deliverymen were paid on a percentage of sales commission basis and in addition, approximately half of the deliverymen received a base wage. Weekly labor costs per route averaged nearly $185. Since all

deliverymen were paid commissions based on sales, variations in total labor costs were closely related to value of sales.

Labor costs per $100 of sales averaged $8.60. To the extent that these costs were fixed, a reduction in labor costs per dollar of sales could have been obtained by increasing the values of the load carried.

Average labor costs per customer were 99 cents and were usually inversely related to the number of customers served. As the number of customers served increased, labor costs per customer decreased because the fixed labor costs were spread over a larger number of customers.

The average labor costs per quart equivalent of product delivered were 2.3 cents and ranged from 1.1 to 2.2 cents among the routes. Data showed that there was an inverse relationship between labor costs per quart equivalent of milk products and number of quart equivalents delivered per route.

Labor costs made up 76.5 per cent of total delivery costs and truck costs accounted for the remaining 23.5 per cent. Total delivery costs averaged 11.2 per cent of the wholesale value of the products delivered.

Because of the nature of competition and market regulation, increases in efficiency may be difficult for Alabama wholesale milk distributors to attain. Milk distributors have strong competition from other distributors in the market place. The Alabama State Milk Control Board regulates distributors in regard to product prices and trade practices, thus eliminating price competition. To survive distributors must be able to compete with other firms, but they are limited by the Milk Control Board in the number of ways they can legally increase milk sales and efficiency.

Since the field work was completed for this study, a number of Alabama

distributors have reduced delivery from six to five days per week. Besides providing better working conditions for deliverymen, truck costs, especially variable truck costs, were substantially reduced. Also, any increases in volume and value of loads reduce fixed costs per unit of product delivered.

Because of competition among distributors to maintain their share of each wholesale customer's business, other ways of increasing size of loads are difficult to achieve. One possible way volume of deliveries may be increased is through consolidation of deliveries by wholesale customers. However, the wholesale customer will not likely reduce the number of brands he sells unless there is an economic incentive, such as quantity discount pricing. If the Milk Control Board permitted quantity discounts, the wholesale customer would tend to purchase milk products from fewer distributors. However, with increased pricing efficiency from consolidation of orders, the wholesale customer may lose some milk business because he would have fewer brands from which the retail customer could choose.

The present structure of wholesale milk distribution favors distributors that have large volume (value) routes. Data show that larger route loads resulted in lower than average unit costs. If the Milk Control Board permitted pricing practices that would encourage increased marketing efficiency, milk producers, processor-distributors, and consumers would benefit.

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