

# Milk Delivery Costs and Pricing

adequacy in reflecting cost differences, simplicity in both application and enforcement vital factors in pricing systems

D. A. Clarke, Jr.

**Labor** is the major component of milk delivery costs—in wholesale and in retail route operation.

Engineering-type analyses of labor requirements and accounting records of truck operating costs have provided the basic information for the determination of the underlying relationships between costs and the volume served per customer.

These cost-volume relationships emphasize the fact that unit costs are not constant but decrease rapidly with increases in volume per customer. Thus wholesale delivery costs per labor unit—a measure used to express the various products and container sizes handled on milk routes, in terms of the labor equivalent of a quart of milk—of 5¢, with a volume of 10 labor units per customer delivery, dropped to about 1¼¢ per unit with a volume of 100 units. Wholesale delivery costs continued to decline, but at a decreasing rate, to approximately ½¢ per unit with a volume averaging 1,000 units per customer. Retail delivery costs decreased from over 11½¢, when one quart is delivered, to slightly more than 4½¢ per unit for a three-unit serve, or delivery, and further declined to approximately 2.2¢ when 10 units are delivered.

Delivery costs account for only a part of the expenses of providing milk, and its associated services, to the customer. The nondelivery costs—raw product cost to the distributor, processing costs, overhead and administrative costs plus allowable profits—are assumed for the purpose of this article to be 16.17¢ per quart for milk sold on wholesale routes and 16.74¢ on retail routes. These particular prices reflect current cost and price levels in the Los Angeles marketing area—assuming currently effective price levels in that market are in line with costs.

Three of several possible plans—each considering cost-volume relationships—illustrate the problem of milk pricing.

## Flat Pricing

Under the system of flat pricing—currently in use in virtually every California market—all customers are charged a uniform price per quart of milk, regardless of the size of the delivery. Con-

sequently, because of variations in delivery costs, costs are in excess of price for all customers who receive less than the average volume per delivery. Conversely, where customers are served volumes larger than the average, costs fall below price. Under conditions of differential costs, flat pricing means that small volume customers are subsidized by those receiving relatively large volumes and therefore are served at low cost. The flat pricing system does have the advantage of simplicity and familiarity—although in most milk markets, the established prices are merely nominal as they are frequently coupled with open or hidden discount schedules.

## Service Charges

The cost of servicing a customer tends to be fixed, or constant, regardless of the volume delivered, and sometimes that fact has been the basis for a pricing plan involving a fixed service charge per delivery plus a flat price per quart delivered. A system of this type is now in effect in the Alameda-Contra Costa marketing area, where a 3¢ charge is made for each retail delivery. Although plans of this kind have been used exclusively for home-delivery operations, the essential idea is equally well adapted to wholesale pricing.

According to the delivery cost-volume per serve relationships developed in this study, delivery costs per serve on wholesale routes can be represented very closely by a fixed cost of 42¢ plus a variable cost of 85¢ per unit in the volume range below 210 units. Adding the 16.17¢ per unit for other costs and margins, a pricing plan is derived, with a service charge of 42¢ per delivery and a flat price of about 17¢ per quart. Because total costs per serve on wholesale routes increase at a decreasing rate in the higher volumes, the ranges above 210 units would be overpriced relative to costs by this plan, but these costs could be approximated quite closely by a service charge of \$1.50 with a flat price of 16.5¢ per quart. A plan determined in a similar manner for retail deliveries would involve a flat charge of 10.5¢ per delivery and a uniform price of about 18¢ per quart. These prices, while reflecting cost differences to individual

customers, would return the same total revenues to distributors as the present system involving flat prices of 17.5¢ per quart retail and 21.5¢ wholesale, provided that no changes occur in the average size of delivery.

Since they merely involve lower flat prices plus fixed service charges per delivery, service charge pricing plans do not present significant complication in billing customers.

## Volume Discounts

A system of volume discounts is used almost universally in the dairy industry as well as by all other types of wholesale marketing agencies. It consists simply of a schedule of percentage discounts on quoted prices that will be allowed for purchases of specified quantities. The important question is one of determining a base price and discount schedule that will reflect—at least approximately—the cost relationships. Costs can be reflected with any desired degree of accuracy if complicated schedules with large numbers of volume classes were permitted. As a practical matter, however, the schedule will need to be limited to relatively few classes.

With a system of discounts on a base price, the average price will be lower than the base. Consequently, the base

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## SHADE

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on the east and south—because vertical shade control is necessary during the morning and afternoon. Low-branching trees planted on the west and northwest would provide horizontal shade in late afternoon and early evening. Such plantings would provide good cooling shade during the entire day.

By planting deciduous trees on the east and south, the benefit of the sun could be had in winter when the trees have dropped the leaves. Evergreen trees—broadleaved or conifer—on the west or northwest would not interfere with the winter sun but would provide green foliage and protection from the winter winds.

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## MILK

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price must be high relative to a flat price to yield the same average returns. Practical considerations of public price administration preclude the use of a price considered too high—even though consistent with costs for very small volume deliveries. Such plans would probably underprice milk for small serves and, to average out, would require overpricing certain volume groups near the end of the discount bracket.

One discount schedule for wholesale sales has been arbitrarily selected for four classes with a base price of 19¢.

Arbitrary Volume Discount Schedule

Volume per delivery (labor units)	Percentage discount	Effective prices
0-74 .....	0	\$0.1900
75-224 .....	8	.1748
225-449 .....	10	.1710
450 and over .....	12	.1672

With a base price of 19¢, the schedule must fail to reflect completely the actual costs involved in servicing very small volumes per delivery, but the general nature of the price changes tends to follow costs. This type of a schedule is not very complicated nor does it involve radical departures in billing methods.

Some of the major limitations of a volume discount system which brackets several delivery volumes are made clearer in the case of retail deliveries. Costs for a one-unit retail delivery are about 28.5¢ while for two units, the unit cost is

about 5¢ lower. If, for example, one- and two-unit deliveries are bracketed at 26¢ per unit, the price would more closely reflect costs for these small deliveries than does the present uniform price system which involves a 21.5¢ price for all delivery sizes. However, there would be the obvious disadvantage of underpricing one-quart serves by 2.5¢ while overpricing the two-quart serves by slightly more than 2.5¢. Furthermore, it would provide no price incentive for one-quart customers to increase their volume per serve through a reduction in the number of deliveries or by consolidating store and home-delivered purchases.

## Reducing Costs of Distribution

Pricing plans which reflect cost differences would encourage both wholesale and retail customers—by the lower net prices—to consolidate their orders and to limit the number of distributors from which they purchase milk.

Such consolidations would increase the efficiency of the market as a whole. That increased efficiency would be reflected in lower average costs of distribution and in correspondingly lower average gross incomes for distributors. These changes would affect individual distributors according to the changes in the number and average size of their customers which, in turn, would require immediate route reorganization and would permit route consolidations to take advantage of the increased load sizes possible with larger customers.

## Wholesale Distribution

Volume pricing systems provide the customer with an incentive to limit purchases to a single distributor.

In the Los Angeles market, the existing duplication is the smallest and the average volume per customer is the largest of all California markets studied. Therefore, estimates based on the Los Angeles market conditions will be the most conservative. In this area, wholesale customers received dairy products from an average of 1.71 distributors and the average volume per delivery was 77 labor units. Under conditions where each customer is supplied by a single distributor, the average size of delivery would be increased to 132 units. On the basis of the developed cost relationships, this would mean that a 26% increase could be made in route volumes which would result in a 19% saving in unit delivery costs. This 26% increase in route volume would permit a 20% decrease in the number of routes, if it is assumed that the total volume of wholesale sales remains constant.

In other markets, such as Fresno, a complete reorganization based on one

distributor serving each customer would permit increases in load sizes of as high as 65%.

## Retail Distribution

There is no currently available data that would indicate the probable effects of a volume pricing system on the average volume per serve and therefore on the costs of retail delivery. If the average volume per customer was increased by one labor unit per serve—an increase from three to four units—that increase in average deliveries would allow an increase of 25% in route volumes at a corresponding reduction of about 20% in the number of routes operated and in the unit costs of retail delivery. In such a case, under current cost levels, the saving would amount to nearly 1¢ per quart.

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## STRAWBERRIES

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years duration in the probable presence of strains of *Verticillium* different from the one used in the greenhouse tests. They also, with few exceptions, withstood the combined inoculations of fifty different clonal lines of the *Verticillium* fungus isolated from diseased strawberries from the major strawberry growing areas of California.

## Resistance

The *Verticillium* wilt resistant strawberries obtained in these studies with few exceptions have glossy, dark green leaves and are also highly resistant to powdery mildew. Not all of the mildew resistant seedlings proved to be resistant to *Verticillium* wilt, but approximately 95% of the *Verticillium* resistant seedlings have proved to be also resistant to mildew. Since powdery mildew is a troublesome disease of strawberry in California, this may prove to be an exceedingly useful genetical linkage and may enable the plant breeder to develop a variety of strawberry completely resistant to both diseases.

There is no indication thus far in this work that any desirable qualities are lost in this rigorous selection for resistance to *Verticillium* wilt.

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*The U. C. soil mix was developed by K. F. Baker, Professor of Plant Pathology, University of California, Los Angeles, and his coworkers.*