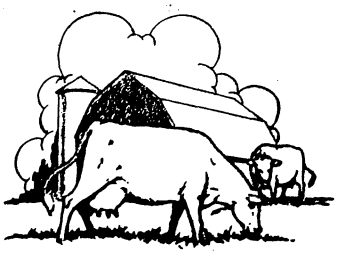

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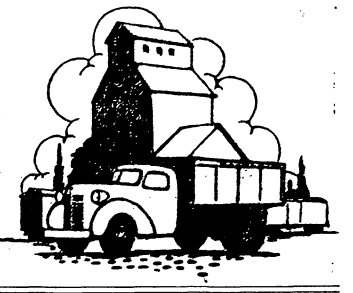

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Can We Sell More Milk with Quantity Discount Pricing?

John D. Helmberger and E. Fred Koller

There are many who believe that if more milk is to be sold there must be improved methods of pricing milk to consumers. Those who hold this position believe that consumers can be induced to step up their consumption with appropriate price incentives. They regard the widely used uniform price plans as a major deterrent to larger milk consumption.

Research in progress in the Department of Agricultural Economics indicates that a substantial increase in efficiency of milk distribution would result if customers were offered relatively large quantity discounts. This increase in efficiency could be reflected in lower consumer prices and increased consumption of milk.

Methods of Discount Pricing

Quantity discount pricing of milk involves charging a lower price per quart to larger volume customers. Such pricing usually takes one of three principal forms.

1. Charging a lower price for purchases in excess of a certain amount per month.

2. Charging a lower price for purchases in multiple-quart containers.

3. **Charging a higher price for the first quart in a delivery than for additional quarts.**

The first of these has the limitation that a customer who buys, say, 60 quarts per month gets the same discount regardless of the number of deliveries taken.

The second suffers from the weakness that costs are increased by lack of package standardization, which increases both processing and distribution costs.

The third type, which makes the price depend on the size of each individual delivery, is the most logical type of quantity discount. The customer in this case is encouraged to take delivery no more frequently than needed. The more frequently a customer takes delivery, the higher the price that must be paid. This method of quantity discount pricing will be referred to as QD pricing.

Uniform Delivery Price Prevails

The prevailing practice in urban milk markets is to charge a uniform price per quart whether the customer takes one quart at a delivery or several quarts. This amounts to discriminating against the large volume customer and subsidizing the small volume customer.

The consequence of this is that unprofitable, small volume customers are attracted to home delivery routes while profitable, large volume customers are gradually lost. As large volume customers leave the retail routes, the cost per quart for delivering milk to the remaining customers increases.

Uniform pricing ignores two important facts. The cost of delivering several quarts of milk is practically the same as the cost of deliverying one quart. The cost of delivering milk is a very substantial part of the cost of delivered milk.

Most markets which have discounts for quantity purchases of milk offer these discounts on the basis of monthly purchases or on sales in multiple-quart containers.

QD Pricing in Minneapolis

Minneapolis is one of the few markets which gives discounts on milk on the basis of the size of a delivery. This type of QD pricing was begun 15 years ago by E. S. Elwell of the Northland Milk Company in Minneapolis. The usual discount for additional quarts was two cents. In May, 1954, the size of the discount was increased to four cents. Currently the prices for regular milk in Minneapolis are 21 cents for the first quart in a delivery and 17 cents for additional quarts in the same delivery.

Early this year the Department of Agricultural Economics undertook to study current milk distribution in Minneapolis and investigate the desirability of increasing the size of quantity discounts.

The delivery operations of the two largest milk distributors were analyzed. These two firms account for about 45 per cent of the home-delivered milk in Minneapolis and suburbs. The average cost of making a delivery was found to be 24.72 cents for the period 1952-53. The delivery cost per quart was 6.47 cents.

Inasmuch as the cost of a delivery is practically the same whether one quart or six quarts are delivered, the delivery cost per quart falls as the size of delivery increases.

While Minneapolis has one of the largest quantity discounts of all urban markets in the country, examination of the table reveals its inadequacy. The difference in average prices charged one-quart customers and six-quart customers is 3⅓ cents while the difference in delivery costs per quart is 20.6 cents.

Regular Milk Prices and Delivery Costs Per Quart for Deliveries of Various Size in Minneapolis, 1954

	Number of quarts in a delivery				
	1	2	3	4	6
	cents per quart				
Home delivered price (average)	21	19	18.3	18	17.7
Delivery cost	24.7	12.4	8.2	6.2	4.1

While it might not be feasible to make the differential as large as the cost of making a delivery, it might be feasible to make it considerably larger than the current four cents per quart.

Survey Shows Consumer Reaction

A survey of 1,198 households in Minneapolis was made in the spring of 1954 to determine consumer reaction to the use of a 10-cent per quart quantity dis-

(Continued on page 2)

DOES PAPER PACKAGING PAY IN SMALL DAIRIES?

Martin K. Christiansen and
E. Fred Koller

The rapid increase in the sale of milk in paper containers has been a major development in the fluid milk industry in recent years. In 1953 about 40 per cent of the milk sold in the smaller communities of Minnesota (excluding the Twin Cities and Duluth) was put up in paper.

The earliest paper packaging equipment was large, involved large rentals or capital outlays, and required a large volume of business if per quart costs were to be kept down. In the last year or two a number of smaller paper packaging machines adapted to the needs of small volume dairies have appeared on the market. Many of these smaller machines are being installed in dairy plants over the state.

The question has arisen, "What is the cost of packaging milk with this equipment? Will it help smaller plants to compete more effectively with larger plants?"

To find answers to these questions a detailed analysis of the costs of operations in small milk plants was undertaken. In this study plants with various volumes of output and using various types of milk packaging equipment will be studied.

Study Small Plants

This preliminary report is based on three typical dairies in the state which have installed the new small paper packaging equipment. The equipment ranged in cost from about $1,700 to $5,000. Each of the plants packaged about two-thirds of their milk in glass containers. The daily volume of the plants ranged from 1,153 to 2,123 quarts as shown in the table.

Total plant costs of milk packaged in paper in the three plants ranged from 6.1 to 7.9 cents a quart. These costs included processing, packaging, and the cost of containers. The larger volume of Plant C was an important factor in its relatively low processing cost of 1.9 cents a quart.

Paper Packaging Costs

Paper packaging costs in the three plants ranged from 0.9 cent to 2.9 cents a quart. Plants A and B had hand-operated paper machines on which per unit depreciation costs were low. Plant C had a semi-automatic paper machine involving a larger capital outlay and depreciation. However, as its volume is increased Plant C's per unit packaging costs can be reduced significantly.

Container costs including the cost of the carton, freight, staples, and storage ranged from 2.8 to 3.1 cents a quart for milk packed in paper. These costs can be reduced very little with a larger volume of output.

Total Packaging Costs

Analysis of the total costs per quart of packaging milk in paper assuming a larger and larger volume of daily output showed that Plants A and B with hand-operated equipment would reach their lowest cost point at an output of about 400 to 500 quarts a day. Plant C with semi-automatic equipment of a little larger capacity would reach its lowest cost per unit near the 1,000-quart level.

At their best operating volume Plants A and B would be operating at a total cost of about 5.75 cents a quart packaged in paper while costs in Plant C would average about 5 cents.

Total plant costs of milk packaged in glass ranged from 3.6 cents in Plant A to 2.8 cents in Plant C. Both the packaging and container costs for milk in glass were significantly below the corresponding costs for milk in paper.

Insofar as plants sell milk in glass in their local markets they should have an advantage over milk which is brought in from outside sources. In contrast, their costs for milk packaged in cartons are high relative to those of plants packaging a large volume of milk on large-capacity automatic paper machines. Small local plants will need to operate their paper lines very efficiently if they are to compete with the larger plants.

Plant Costs by Type of Container in Three Minnesota Dairies, 1954

	Plant A		Plant B		Plant C	
	Paper	Glass	Paper	Glass	Paper	Glass
Cost items	cents per quart					
Processing	2.7	2.7	2.4	2.4	1.9	1.9
Packaging	1.1	.3	.9	.2	2.9	.4
Container	2.8	.7	2.8	.7	3.1	.5
Total*	6.6	3.6	6.1	3.3	7.9	2.8
Average daily volume, quarts	1,379		1,153		2,123	
Per cent packed in paper	20.7%		28.0%		13.4%	
Per cent packed in glass	68.9%		67.7%		68.0%	
Per cent packed in bulk	10.4%		4.3%		18.6%	

* Costs do not include price of raw milk paid to farmers.

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QD PRICING OF MILK

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count or differential. A price of 25 cents for the first quart and 15 cents for all additional quarts in a delivery was proposed.

About 70 per cent of the consumers interviewed preferred a 10-cent differential to the then existing 2-cent differential. Only 12 per cent were opposed to the larger discount while 18 per cent had no opinion. Of the consumers who were buying milk from retail routemen, 72 per cent favored the larger discount. Of those who bought four quarts or more at a time, 86 per cent favored the 10-cent discount.

The survey indicates that the use of a 10-cent differential would increase both the customer and sales density on retail routes. Consumers were asked where they currently bought milk and where they would buy it if a 10-cent differential were used.

Analysis of their replies indicates that the number of consumers who would buy milk at the doorstep would increase 4.1 per cent. The number of one-quart customers would decrease 23 per cent while the number of larger volume customers would increase more than enough to offset this drop. The average size of delivery would increase from 3.38 quarts to 3.75 quarts.

Volume May Increase

The volume of milk bought by those who indicated they would buy milk on retail routes under the 10-cent discount plan would be 15.2 per cent larger than the volume bought by those currently patronizing retail routes. This assumes that consumption remains the same. Actually, sales to home delivery customers can be expected to increase more than 15.2 per cent. Many would increase their purchases because they could buy at lower prices by taking larger deliveries.

In July of this year the Northland Milk Company of Des Moines started a 10-cent per quart quantity discount plan, charging 26 cents for the first quart in a delivery and 16 cents for additional quarts. During the third month under this price plan milk sales on their retail routes were 13 per cent higher than the month before the plan started. In the same three months a year ago, sales increased only 1 per cent. The 13 per cent increase in Des Moines corresponds closely with the 15.2 per cent survey estimate for Minneapolis.

Effect on Milk Route Drivers

Milk route drivers have fears that there may be fewer jobs if QD pricing is adopted. While use of the 10-cent discount could be expected to increase both the number of customers and the volume of sales on retail routes, the number of customers served on a given day might decline. Many consumers would take less frequent delivery to take advantage of the lower prices available with larger deliveries.

In the event that the number of customers served per day did decrease, route reorganization would be necessary to get the maximum efficiency. The work on a route depends primarily on the number of customers served, so some routemen might be laid off.

However, under this plan, the trend toward fewer home delivery sales and more store sales may be slowed down or even reversed. If this occurs, deliverymen would be more secure in their jobs than at present and there may even be more jobs.

Some consumers object to QD pricing on the grounds that it works a hardship on small volume users. This hardship can be avoided, however, if these customers will take larger, less frequent deliveries. Small volume users also have the alternative of buying milk in stores where they may be served more efficiently.

Food Fats and Oils Situation

Rex W. Cox

Minnesota contributes an important part to the total supply of food fats and oils in the United States. For example, this state is an important producer of butter, lard, and soybeans. In consequence, the over-all supply and demand situation of food fats and oils and competition among them regarding their utilization is of concern to Minnesota farmers.

Peak Supplies in 1954-55

Peak supplies of food fats and oils are likely in 1954-55 because total stocks were about the same as a year earlier and production will be slightly larger. Production is expected to be moderately in excess of domestic use and commercial exports.

Prices of most fats and oils during a large part of the crop year probably will average near present levels but somewhat lower than last year.

Exports have become an increasingly important market for food fats. The current outlook for exports is quite favorable. This is fortunate in view of our large current supplies.

Soybeans—A Record Crop

Production of soybeans in 1954 set a record of 331 million bushels. Yield per acre was down but acreage harvested for beans was at a peak, primarily reflecting a shift from corn, cotton, and wheat which were under allotments.

Last year prices of soybeans tended upward from $2.41 per bushel in October to $3.55 in May, reflecting the short crop and peak exports. During the first part of October this year, farmers received about $2.50 per bushel. The advance in 1954-55 likely will be much less than last year.

Cottonseed oil is the main competitor of soybean oil in the manufacture of shortenings and margarine. Consequently, the supply of this oil is an important factor affecting the demand for soybean oil and, therefore, the demand for soybeans. Output of cottonseed in 1954 was 24 per cent less than in the previous year. Large quantities of cottonseed oil, however, are in the hands of the Commodity Credit Corporation. This will not become available for the domestic market unless prices rise toward the C.C.C. resale price of 15 cents per pound.

There has been a marked increase in the use of soybean oil relative to cottonseed oil in the manufacture of food products. In 1953, soybean oil supplied about 56 per cent and cottonseed oil about 24 per cent of all fats and oils used in shortenings. Also, soybean oil made up around 71 per cent and cottonseed oil about 27 per cent of all fats and oils used in margarine.

These proportions vary from year to year depending on relative supplies and prices. They can be substituted within limits and, therefore, are competitive in their use to a high degree.

Increase in Lard Supplies

Supplies of lard have been the lowest in years. Supplies will be larger this year and prices lower.

Lard prices exceeded the prices of edible vegetable oils most of last year but the spread is likely to be reduced in 1954-55 as more lard becomes available in relation to other edible supplies. Total use of lard and shortenings amounted to 21.5 pounds per person in the past crop year. Although combined disappearance in 1954-55 will not vary greatly from this level, more lard will be used reflecting increased production.

Production of butter will be down slightly but beginning stocks are substantially greater. Butter prices are lower and will continue so at least through March reflecting the reduced support prices of milk and butterfat. Prices after March will depend on the level of support to be established for the dairy marketing year beginning April 1. This level may be anywhere from 75 to 90 per cent of parity.

Some Government Sales of Butter

The government ceased buying butter about the middle of September. This was possible because the market price of butter had risen sufficiently above the support level to permit some sales. With the flush season of milk production approaching it is not at all unlikely that the government may have to resume its purchasing activities some time after the first of the year. We still have a long way to go before getting supplies in line with demand.

Consumption of butter in 1953-54 averaged 8.9 pounds per person, up .3 pounds from the year before. Margarine consumption per person increased .2 pounds and totaled 8.1 pounds. Consumption of these products apparently is leveling off and little change in either of them is expected in 1954-55.

Minnesota Farm Prices, September, October 1954

Prepared by Harlan C. Lampe

Average Farm Prices for Minnesota September and October 1954*

	Sept. 1954	Sept. 1953	Oct. 1954	Oct. 1953
Wheat	$ 2.29	$ 2.09	$ 2.26	$ 2.11
Corn	1.43	1.36	1.36	1.21
Oats	.66	.64	.67	.65
Barley	1.08	1.04	1.11	1.07
Rye	1.23	.93	1.11	.97
Flax	3.12	3.53	3.10	3.56
Potatoes	.90	.90	.70	.75
Hay	16.00	14.40	15.50	14.20
Hogs	19.20	23.40	18.20	20.70
Cattle	16.40	16.30	15.30	15.00
Calves	16.70	18.00	15.30	16.00
Sheep-lambs	17.10	17.56	16.74	16.17
Chickens	.116	.184	.105	.163
Eggs	.24	.465	.22	.495
Butterfat	.61	.71	.62	.72
Milk	3.25	3.60	3.35	3.70
Wool†	.50	.48	.49	.48

* As reported by USDA.

† Not included in Minnesota Farm Price Indexes below.

After an abrupt drop from August the Minnesota farm price index declined only slightly in October. A year ago the indexes were considerably higher with September at 226.2 and October at 221.1. Hog, egg, butterfat, and milk prices declined sharply.

The price movement of all commodities from September to October is about normal. Most prices are down, with milk showing a gain. The ratios were mostly steady but below 1953.

The purchasing power of Minnesota farm products reached the lowest level since October 1940 with its steady decline from July 1953.

The Outlook Corner - - - Milk Production

Milk production in the U. S. will set a new record this year—124 billion pounds. This compares with:

1925-39 av. ..... 100 billion
1940 ..... 109 billion
1945 (high year) ..... 120 billion
1951 (low year) ..... 115 billion
1953 ..... 121 billion

The long time increase—from 1925-39 to 1954—is due entirely to higher rates of production. Production per cow is up from 4,379 pounds to about 5,500 pounds, or 25 per cent. The number of cows is down slightly, from 23 million milked in 1925-39 to 22.6 million in 1954.

The increase from 1951 is due about equally to more cows and to higher production per cow.

Heavier feeding and better breeding account for most of the increase in production per cow. Dairymen reporting to the USDA are feeding 6.50 pounds of grain per cow per day this year compared with 6.45 last year, and 5.90 as an average for the preceding 10 years.

Trends in numbers of cows for the next few years are hard to predict. On January 1, 1954 farmers had 24.4 yearling heifers and 27.6 heifers under one year for every 100 cows. This is about two more than normal.

Culling, however, is a more important factor. Culling was low in 1952 and 1953—only 21.4 and 22.1 per cent were eliminated. The heaviest culling was in 1945-48, averaging 25.8 per cent.

Even though milk production has increased, population has increased still more. Milk consumption has been:

1925-29—798 pounds per capita
1935-39—791 pounds per capita
1940-44—782 pounds per capita
1945-49—750 pounds per capita
1950-54—703 pounds per capita

Along with this drop in consumption has come this shift in the types of products used:

	1954 per cent	1942 per cent
Fluid milk and cream	46.3	39.9
Butter	26.6	35.3
Cheese	10.9	9.3
Evaporated, condensed, dried milk	5.8	7.2
Ice cream	6.2	4.5
Other uses	4.2	3.8
Total	100.0	100.0

There has been a shift away from butter and evaporated milk to using the milk in other forms. Along with the drop in butter consumption has come a rise in margarine consumption. This use of margarine is almost equal to the drop in per capita use of milk.

What about the future? The population will increase. Increased production per cow probably will take care of part of this demand. It looks as if butter will not regain the market it lost to margarine. Educational work probably will increase the demand for milk, but its effect will be slow.

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Indexes and Ratios for Minnesota Agriculture*

	Sept. 1954	Average, Sept. 1935-39	Oct. 1954	Average, Oct. 1935-39
U. S. farm price index	229.5	100	227.9	100
Minnesota farm price index	206.2	100	203.1	100
Minnesota crop price index	222.8	100	221.9	100
Minnesota livestock price index	215.8	100	215.5	100
Minnesota livestock products price index	174.5	100	167.0	100
Purchasing power of farm products				
United States	102.3	100	101.9	100
Minnesota	91.9	100	90.9	100
Minnesota farmers' share of consumers' food dollar	53.8†	48.6	††	47.6
U. S. hog-corn ratio	12.9	12.6	12.7	14.1
Minnesota hog-corn ratio	13.4	14.9	13.4	17.8
Minnesota beef-corn ratio	11.5	11.9	11.2	14.7
Minnesota egg-grain ratio	8.1	17.3	7.6	20.9
Minnesota butterfat-farm-grain ratio	27.3	32.4	27.8	36.4

* Minnesota index weights are the average sales of the five corresponding months of 1935-39. U. S. index weights are the average sales for 60 months of 1935-39. † Preliminary. †† Not available.

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