Effectiveness of selected methods for increasing the consumption of dairy products in Montana
by Wallace A Rehberg

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Economics
Montana State University

Abstract:
This study is concerned with the structure of and promotional methods used by the dairy distributing industry in Montana. Analysis of the structure relates the scope of operations and number of products carried to pounds of milk equivalent handled annually. Analysis of promotional techniques determines the extent of use and appraisal of two areas — retail selling and advertising. Use of pricing policies for promotion is also analyzed for extent of use and method of determination.

More than one third of the dairies in Montana are local enterprises handling less than 800 thousand pounds of milk equivalent annually. The area covered by dairies in their own trucks increased as their volume increased. Some dairies handling over 3,200 thousand pounds of milk equivalent distribute milk more than 200 miles from the community where the plant is located. The number of products handled increased with the increase in the size of the firms.

Three broad areas have been suggested as avenues for increasing dairy consumption. These areas include retail selling, pricing, and advertising. The dairies in Montana mostly train their drivers on the route layout and neglect the training on product promotion. This training does not create milk salesmen. Pricing is not a competitive factor as it is set by the Montana Milk Control Board. Quantity discounts are used by some dairies to get larger containers of milk into the home. One of the major problems encountered in Montana is the lack of coordination between promotional methods. No dairy had a coordinated program including all their products and encompassing all the media they used.

This study pointed to the need for more research to measure the effectiveness of promotional methods. A recommended field for more research would be to study consumer response to various promotional schemes.

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Any errors or omissions in this study are the responsibility of the author.

ABSTRACT

This study is concerned with the structure of and promotional methods used by the dairy distributing industry in Montana. Analysis of the structure relates the scope of operations and number of products carried to pounds of milk equivalent handled annually. Analysis of promotional techniques determines the extent of use and appraisal of two areas -- retail selling and advertising. Use of pricing policies for promotion is also analyzed for extent of use and method of determination.

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PART I

INTRODUCTION

The Dairy Situation

In terms of marketable products the dairy industry is the largest single component of American agriculture. It is an important element in the economy of all 48 states. Throughout the nation the composition of the dairy industry is characterized by significant changes. The entire industry is reflecting similar changes to those taking place in other phases of the agricultural economy.

The number of farms with milk cows declined 4 to 6 percent per year from 1949 to 1958.[1] The farms remaining in milk production have shown a tendency to become larger in number of cows per farm. In the last 14 years the number of dairy cows declined every year, with the exception of 1953. Counterbalancing the decrease in cow population, however, has been an increase in milk production per cow. This increase in milk production has been generated by better management, feeding, and breeding advances.

Montana has been no exception to the above trend. In Montana dairying is an important industry, ranking fourth in farm income. It follows food grains, meat animals and feed crops. The dairy industry in Montana has followed the general trend of fewer but larger and more

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1/ National Milk Producers Federation, Dairy Producers Highlights, Washington, D. C., 1957, p. 12.

efficient producing units. Total milk production in Montana in 1957 was 504 million pounds and the gross income from dairy products was approximately $18 million.[1] If we also include the income to dairy farmers from the sale of their dairy livestock we need to add about another $6 million.[2] However, production of milk in Montana is declining as illustrated by the fact that production in 1948 was 609 million pounds.

At the same time that changes have been taking place in milk production techniques there have been correspondingly dynamic changes in milk marketing. Even though total production has been declining in Montana, milk sold to plants and dealers for fluid and manufacturing use has nearly doubled in the last 10 years. During this same period the amount of butterfat sold to plants and dealers in the form of cream has declined from 11 million pounds to slightly over 6 million pounds annually. Coupled with this trend the amount of milk retailed by farmers has decreased by two-thirds.[3] These shifts also reflect the national trend. Some of these changes in the dairy industry may be attributed to

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1/ Montana Department of Agriculture, Montana Agricultural Statistics, Helena, Montana, 1958, pp. 29-30.

2/ National Milk Producers Federation, op.cit. This $6 million was was arrived at by taking the estimated marketings of animals from milk herds as a percentage for the nation. This percentage (38.3) was then used to determine the value of dairy stock sold in Montana.

3/ Montana Department of Agriculture, op.cit., pp. 29-30.

industry technological advances. Farmers also are making adjustments to take advantage of alternative opportunities as well as changing cost-price relationships in livestock enterprises. In Montana there has been a definite shift in dairying from the plains region to the comparatively more favorable producing areas of the mountain region. These changes in the method milk is sold by the producer to the distributor have generated a marketing problem in the dairy industry.

The dairy situation in Montana has been seriously disrupted by the lack of equilibrium between the amount of milk supplied to distributors and the amount demanded for whole milk and whole milk products. The demand from consumers has not kept pace with the increased amount sold to distributors. The per capita demand has actually declined. Data for Montana are not available but for the nation, consumption of fluid milk declined 1 percent per capita in 1958.[1/] Offsetting this has been an increase of 1.8 percent in population. Population increases have actually increased the total amount of fluid milk demanded. This increase is one of the major factors causing the lethargy of dairy distributors towards increasing consumption through promotional means.

To alleviate the resulting surpluses and their effects on prices, the government has been purchasing large amounts of milk products under the support program for several years. In recent years the percentage

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1/ National Milk Producers Federation, News for Dairy Co-ops, Vol. 17, No. 10, Washington, D. C., March 6, 1959, p. 3.

of total production purchased by the government has dropped from a high of 8.3 percent in 1953 to 3.8 percent in 1958.[1] The industry has developed a self-help attitude toward the solution of this problem and is attempting to reverse the shift in demand. As an indication of what a reversal of the demand would do, I quote Secretary of Agriculture Benson.

> "If farmers and the dairy industry could team up to recapture the market for the 130 pounds of milk per person which has been lost in the last 13 years, they could turn milk surpluses into scarcities. . ."[2]

Montana Dairy Control

The Montana Milk Control Board is an agency enacted into being by law to regulate and police the dairy industry. Two of its powers, resale price control and fair trade regulations, directly affect the industry's efforts to increase consumption of dairy products.

Price Establishment by the Montana Milk Control Board

The Montana Milk Control Board is obligated to set the minimum resale price, as specified in the following paragraphs of the Revised Codes of 1947 and Chapter 192 Session Laws of 1959:

> "The board, after consideration of the evidence produced at such hearings, shall make written findings and conclusions and shall fix by official order:

1/ National Milk Producers Federation, News for Dairy Co-ops, Vol. 16, No. 51, Washington, D. C., December 19, 1958, p. 4.

2/ F. V. Waugh, Readings on Agricultural Marketing, The Iowa State College Press, Ames, Iowa, Section 8.1, 1954, p. 417.

"The minimum wholesale prices to be charged for milk in its various forms, classes, grades, and uses when sold by distributors or producer-distributors to retail stores, restaurants, boarding houses, fraternities, sororities, confectionaries, public and private schools, including colleges and universities, and instrumentalities of all types and description.

"The minimum retail prices to be charged for milk in its various forms, classes, grades, and uses when sold by distributors, producer-distributors, and retail stores to consumers."1/

The difficulties encountered by the board in maintaining minimum resale prices are legion. Montana distributors have resorted to non-price competition due to these laws. Hours of delivery, special delivery, equipment supplied (refrigerated milk display cases, restaurant dispensers, home dispensers), and rebates or outright gifts of non-price controlled products of the dairy industry to larger consumers are some examples of this competition. Large wholesale accounts in some of the larger urban areas are benefited by this type of competition.

If any complaints arise among competing distributors as to resale violation the board is obligated to investigate these charges. Yet the cost of maintaining price regulation in the numerous markets of Montana takes a large proportion of the funds and time of the board and sometimes these hearings are inadequate due to lack of funds and cooperation by the distributors.

The methods for fixing prices as followed by the board are laid down in the following orders:

1/ State of Montana, Montana Milk Control Law, Helena, Montana, 1959, p. 2.

"Prior to the fixing of prices in any market the board shall conduct a public hearing and admit evidence under oath relative to the matters of its inquiry, at which hearing the consuming public shall be entitled to offer evidence and be heard the same as persons engaged in the milk industry. The board shall by means of such hearing or from facts within its own knowledge, investigate and determine what are reasonable costs and charges for producing, hauling, handling, processing, and/or other services performed in respect to milk and what prices for milk in the several localities and markets of the State, and under varying conditions, will best protect the milk industry in the State and insure a sufficient quantity of pure and wholesome milk to adults and minors in the State, and be most in the public interest.

"The board shall take into consideration the balance between production and consumption of milk, the costs of production and distribution and prices in adjacent and neighboring areas and states, so that minimum prices which are fair and equitable to producers, distributors and consumers may result.

"The board shall, at least ten (10) days prior to the date set for any public hearing on minimum prices, cause notice to be given to the consuming public and the milk industry of the specific factors which shall be taken into consideration in determining costs of production and distribution and of the actual dollars and cents costs of production and distribution which preliminary studies and investigations of auditors or accountants in its employment indicate will or should be shown at the hearing, so that all interested parties will have opportunity to be heard and to question or rebut such considerations as a matter of record.

"If the board at any time proposes to base all or any part of an official order fixing minimum prices upon facts within its own knowledge, as distinguished from evidence which may be presented to it at a public hearing by the consuming public or the milk industry, the board shall, at least ten (10) days prior to the date set for any public hearing on minimum prices cause notice to be given to the consuming public and the milk industry of the specific facts within its own knowledge which it will consider, so that all interested parties will have opportunity to be heard and to question or rebut such facts as a matter of record."1/

1/ Ibid., p. 5.

After making such investigation the board shall fix by official order:

"The minimum prices to be paid by the milk dealers to producers and others for milk. Each order fixing minimum prices shall classify milk by forms, classes, grades or uses as the board may deem advisable and shall specify the minimum prices therefor.

"The milk produced in one natural marketing area and sold in another natural marketing area shall be paid for by a distributor or dealer in accordance with the pricing order of the area where produced at the price therein specified of the class or use in which it is ultimately used or sold.

"No allowance for freight, other than freight for transportation of milk from the farm to plant, shall be charged to a producer by a distributor or dealer unless it is found and ordered by the board, after notice and hearing as hereinbefore specified, that such an additional freight allowance is necessary to permit the movement of milk in the public interest.

"All milk purchased within a natural marketing area by a distributor shall be purchased on a uniform basis of either butterfat or hundredweight. The basis to be used will be established by the board after the producers and the distributors of the area have been consulted.

"The minimum wholesale prices to be charged for milk in its various forms, classes, grades, and uses when sold by distributors or producer-distributors to retail stores, restaurants, boarding houses, fraternities, sororities, confectionaries, public and private schools, including colleges and universities, and both public and private institutions and instrumentalities of all types and description.

"The minimum retail prices to be charged for milk in its various forms, classes, grades, and uses when sold by distributors, producer-distributors, and retail stores to consumers.

"A minimum producer, wholesale or retail price to be charged for milk shall not be fixed higher than is necessary to cover the costs of ordinarily efficient and economical milk dealers, including a reasonable return upon necessary investment.

"The board may, upon its own motion, or upon application in writing from any market, or from any party at interest, alter, revise, or amend any official order theretofore made by the board, provided that before making, revising, or amending any order fixing prices to be charged or paid for milk in any of its forms, classes, grades or uses, the board shall hold a public hearing on such matter in the one manner provided herein for the original fixing of prices."1/

There are several reasons why this basis for price formation is difficult to use. In order to determine the cost of production, it is necessary to judge what is a fair value for the fixed factors of production. Since the market values for these items depend to a large extent on current and expected prices of their product, it is easy to become involved in a situation where increased product prices cause increased production costs. This may lead to a further increase in product prices. If cost of production is to be the basis for establishing price, it is necessary to decide whose costs are to govern market price. It is obvious that each farm will not be equally efficient and therefore will not have the same costs of production.

The ability to correctly translate accurate accounting records into unit costs of production are a necessity for this system of establishing prices. Regarding those records Dr. E. H. Ward comments:

"Farmers who are members of Dairy Herd Improvement Associations have records of the variable costs of production. Members of DHIA own only about 5 percent of the milk cows in

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1/ Ibid., pp. 5-6.

> Montana. . .experience. . .indicates that records kept by non-DHIA farmers are usually not adequate to determine unit costs of production. Experience also indicates that even when records are available most farmers do not have enough training in business analysis to properly translate their figures into unit costs of production."1/

One of the consequences of using costs of production as a basis for price has been that milk prices in various cities have on occasion been set without consideration of nearby competitive markets. In Butte, for example, the price was raised to the point where it was profitable for distributors from outside the marketing area to sell milk in Butte. Now the bulk of the milk consumed in Butte is produced and processed elsewhere, even though the price is competitive with other markets in Montana.

The board recognizes two classes of milk. Class I, all fluid milk that is purchased from the producer and sold for fluid use, and Class II, all milk or cream that is purchased by the distributor from the producer and used for fluid cream purposes. At present in Bozeman, the differential between these two classes is 40 cents a pound of butterfat.2/ The board sets the price of butterfat only.

1/ E. H. Ward, The Influence of Technological and Legal Changes on the Montana Milk Control Board, Montana Agricultural Experiment Station, Circular No. 90, Bozeman, Montana, July, 1955, p. 25.

2/ State of Montana, Montana Milk Control Board, Official Order No. 193, October 15, 1957.

The board also has no provisions for base-excess plans of pricing. The Montana dairy producer has little assurance of a just price for production in excess of his base. Each producer must take what the distributor will pay or keep his excess at home. If a distributor purchases enough milk in the months of low production he usually has an excess of milk during the period of high production that must be utilized in products of lower value. This leads to the problem of surplus milk which is the cause of most marketing problems. This excess was the basic cause of instituting the Montana Milk Control Board. Excess milk does not command the fluid milk price. It is destined for use in the lower priced manufactured products.

"The surplus problem causes more trouble in pricing, production, and distribution than anything else."[1/] This problem was recognized in the writing of the Montana Milk Control Act.

> ". . .it is necessary to invoke the police powers of the State to provide a constant supervision and regulation of the milk industry of the State. . ."
>
> "That due to the nature of milk and the conditions surrounding its production and distribution the natural law of supply and demand has been found inadequate to protect the industry. . .and in the public interest it is necessary to provide state supervision and regulation of the fluid milk industry in this State.
>
> "That the demand for this perishable commodity fluctuates from day to day and from time to time making it necessary that the producers and distributors shall produce and carry on hand a surplus of milk in order to guarantee and insure to the

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1/ Helmer C. Holje, Marketing Milk in Montana, an unpublished thesis, Montana State College, June, 1950, p. 39.

consuming public an adequate supply at all times, which surplus must of necessity be converted into by-products of milk at great expense and ofttimes at a loss to the producer and distributor.

"That this surplus of milk, though necessary and unavoidable, unless regulated, tends to undermine and destroy the fluid milk industry. . ."[1]

This operational surplus is licensed milk that is required to supply fluctuating market demands and the secondary products of the dairy industry (see Figure 1). The operational surplus plus the quantity required for fluid sales is the licensed milk that a plant must receive daily to supply the consumer demand. To supply the demand for secondary products and allow for the variable daily demand of consumers requires a quantity of milk equal from 10 to 20 percent of the fluid milk sales. If a distributor does not receive this amount of surplus his customers must turn elsewhere for milk products and probably their milk.

Fair Trade Practices

The following standards of fair trade practices as promulgated by the Montana Milk Control Board affect promotion of dairy products in Montana.

"It shall be considered an unfair practice for any dealer to give away any milk or dairy products, or distribute any samples of milk or cream, but this section is not intended to prevent the giving of a sample of milk or cream at the plant, to be consumed on the premises. Further, this section is not intended to prohibit the use of advertising devices, other than milk and cream or samples thereof given directly to the consumer. The

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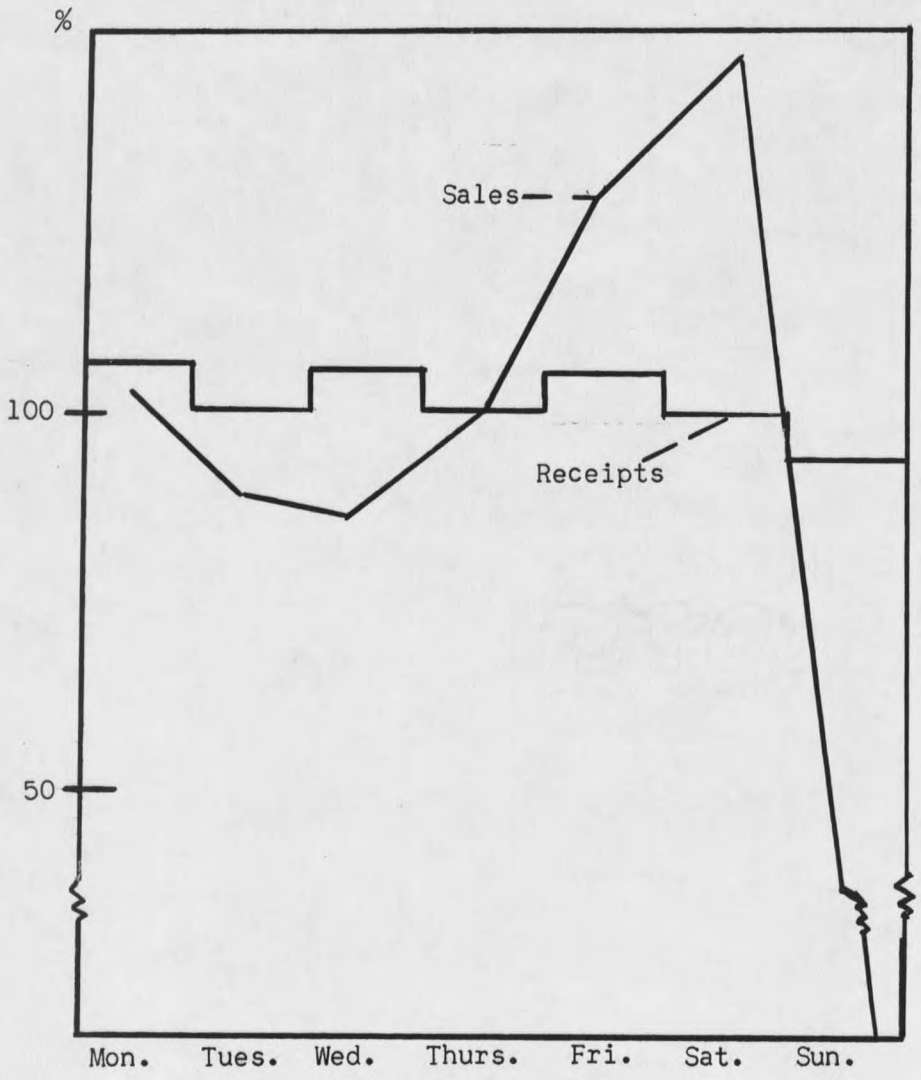
[1] State of Montana, Montana Milk Control Law, op.cit., p. 1.



Thursday = 100

Figure 1. Sales and Receipts of Dairy Distributors as a Percentage of Thursday Sales and Receipts.a/

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a/ Several developments in the dairy industry in recent years -- such as elimination of Sunday milk deliveries and the larger volume of milk sold in stores -- have resulted in wider day-to-day variation in consumer requirements.

Source: National Milk Producers Federation, Why Regulate Fluid Milk Prices, Washington 6, D. C., 1956, p. 6.

expenditure for such advertising devices by any dealer must not exceed $1.00 for any one customer in any one calendar year.

"It shall be considered an unfair practice to pay premiums or allow discounts or rebates of any sort to customers, but discounts to employees are permissible.

"It shall be considered an unfair practice to give, loan or furnish to customers under any circumstances, ice, ice boxes, milk dispensers, or other devices or means for refrigeration or insulation.

"Solicitors: It shall be considered unfair practice to use any person as a solicitor unless he is a regular employee of the company. The solicitation or securing of business through the medium of vote getting or vote giving, or other devices for prizes or other awards shall be deemed an unfair trade practice.

"It shall be unfair practice to furnish milk, or cream of higher test billed to a customer.

"It shall be unfair practice for any person to deliver milk or cream to any person who sells the same at less than the established schedule of prices.

"It shall be considered an unfair practice to advertise the sale of fluid milk and its fluid products at prices less than the prices set by the board."1/

The Research Problem

A consequence of the lack of equilibrium between the amount of milk supplied to distributors and the amount demanded for whole milk and whole milk products has been the development of legalized voluntary deductions from producers' milk and cream checks to pay for the advertising of dairy products. As another consequence of this lack of equilibrium

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1/ State of Montana, Montana Milk Control Board, Standards of Fair Practice. These standards went into effect August 1, 1949. Sections 1, 4, 5, 7, 9, 10, 15.

individual firms have introduced quantity discounts, multi-unit containers, and other measures to increase their sales.

New products that are expected to be partial substitutes for fresh fluid milk have been developed or are in the developmental stage by commercial and public laboratories. The market for fresh fluid milk and the producers who supply milk for fluid products may be expected to be considerably disrupted by the introduction of these new products. It is desirable that adjustments demanded by the impact of these products be determined. One adjustment may be the raising of consumer demand for fluid dairy products.

Considerable amounts of money are now being spent for the promotion of fluid milk and other dairy products. Many distributors, small milk handlers in particular, need help in planning sound promotional techniques. These techniques may be expected to become increasingly important in view of the changing marketing conditions.

This research problem is the first phase of a two part study concerned with the measurement of the effectiveness of selected methods for increasing dairy consumption in Montana.[1/] Little public research has been conducted testing the effectiveness of promotional techniques. There has been no previous work in Montana on any aspect of this problem. Before a measurement may be applied to ascertain the effect of a new product or promotional technique the existing conditions in the

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1/ This research problem is part of a WM-36 Regional and Montana Project MS-1055.

dairy industry must be defined. The existing conditions are then a base from which to conduct measurements. This problem has been divided into two phases. The first phase will define the existing dairy distributing structure and the promotional techniques now being utilized. The second phase will measure their effectiveness.

Theoretical Considerations

Dairy processors fit into the economic world in the monopolistic competition category. Few firms are so small in their own market that they are unable to affect the amount of milk demanded from them. Advertising has been advocated as a means to increase the consumption of dairy products without a reduction in price.

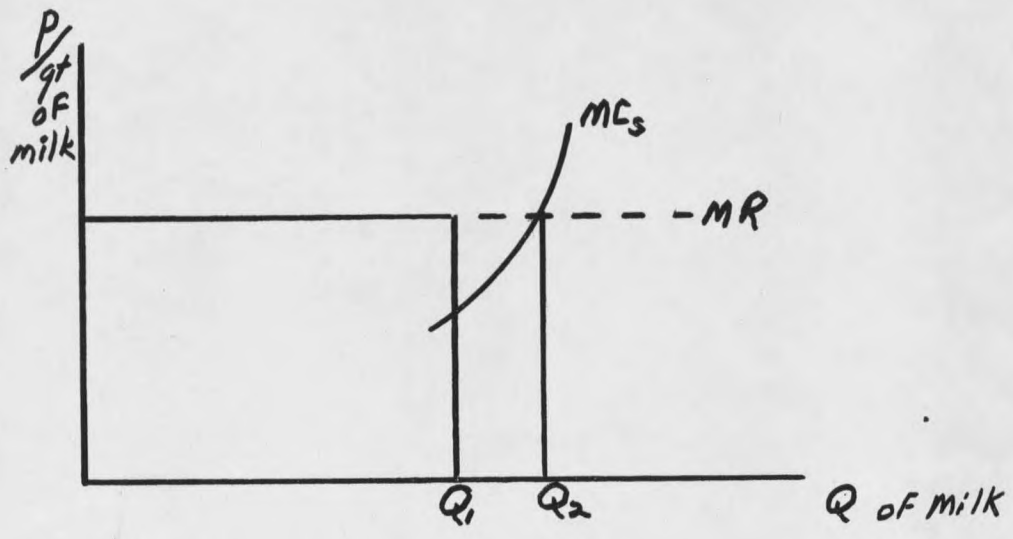

Figure 2. Increasing Quantity of Milk Sold by Increasing Sales Costs.

To illustrate this in the dairy market, assume that Marginal Revenue (MR) equals price. In a case of price control this is the case. Assume also that the marginal cost of production is constant. The firm desires to sell dairy products at Q_2 where the Marginal Cost of Selling (MC_s) equals MR. Before the amount of advertising is increased the dairy can sell only at Q_1. This is the maximum consumers will buy at this price. The dairy can increase consumption by increasing advertising to the point where MC_s equals MR.

The dairy will increase advertising up to the point where the value of the marginal product of advertising equals the price of advertising.

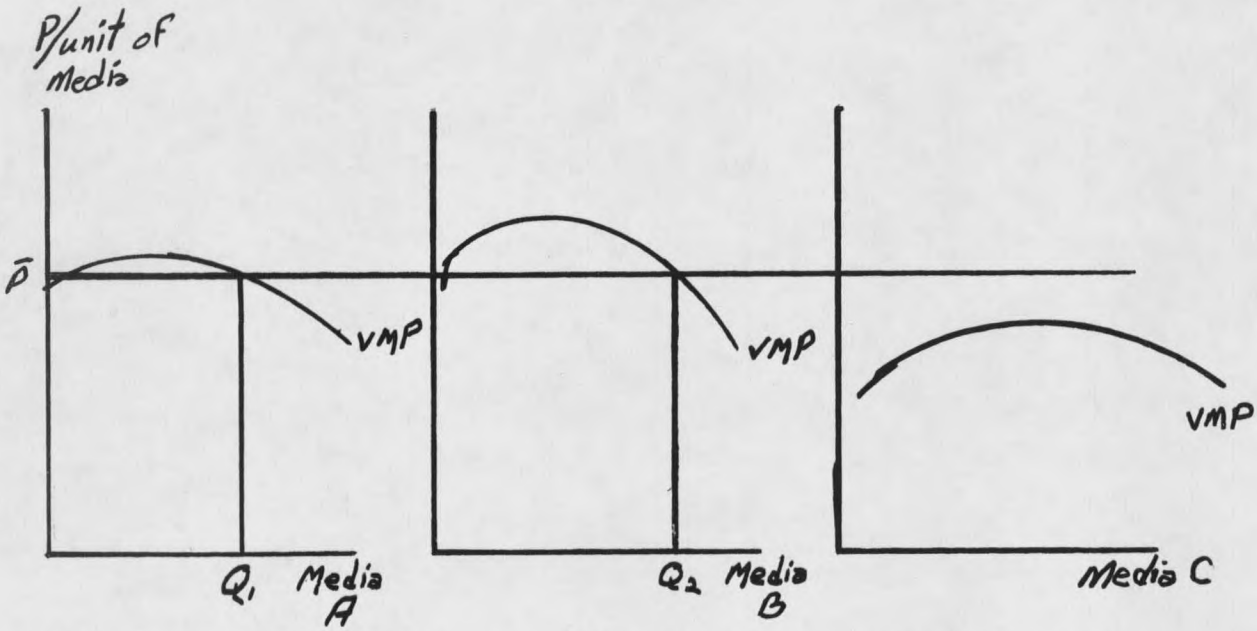

Figure 3. Demonstration of the Quantities of Different Advertising Media to Use.

Assume the price of three advertising media to be $\bar{P}$. The dairy will use each media to the point where the Value Marginal Product (VMP)

of each media equals the cost of the media. In Figure 3 the dairy will use Q_1 of media A and Q_2 of media B. This firm will not use any of media C as the price of C is greater than the VMP created by C.

The advent of many relatively good substitutes for milk has led to the belief that milk has a relatively elastic demand curve within a short price range. At the present time this price range has not been determined. With the demand curve having this shape dairies can increase consumption and also increase total revenue by charging multiple prices for fluid milk. Two markets with differing demand elasticities are necessary for the firm to charge two prices. The firm must be able to prevent the flow of the product from one market to the other or milk will be purchased at the lower price and resold in the other market at the higher price. Fluid milk has several uses with different demand elasticities but the problem of preventing the change in use after purchase is obvious. To keep milk from being purchased at the low price and sold at the higher price, the price difference must be small enough to be overweighed by the inconvenience incurred.

In Figure 4 the theory of charging two prices for milk is presented. The total demand for fluid milk is D D' D". Between points D' D" the demand faced by the firm is elastic while between D D' it is inelastic. The marginal revenue of D D' is shown as MR_1, and the marginal revenue of D D" is shown as MR_2. The horizontal summation of these two marginal revenue curves is shown as ΣMR. The firm operates where marginal cost (MC) equals ΣMR. At this point the dairy is selling (Q) quarts of milk.