



Bozeman milk and cream distribution : an analysis of the costs of distributing market milk and fluid cream in the Bozeman market milk area with suggestions for improving marketing methods  
by Werner Allmendinger

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirements for the Degree of Master of Science in Agricultural Economics  
Montana State University  
© Copyright by Werner Allmendinger (1940)

Abstract:

The purpose of this study is to analyse and evaluate the system now being used in the marketing of fluid milk products in the Bozeman market area to determine its efficiency in marketing these products at a reasonable price and with good service, and to offer suggestions for improvement.

The data used in this study represent complete cost of distribution information provided by 10 operators in the market. The sample is such that what is typical of the group is typical of the whole market. These data were used to determine the costs of distribution of each operator per unit of fluid sales and per quart equivalent, as well as the weighted average cost for the group of 10 operators. An analysis of the cost data was made to determine the effect of various factors, such as volume of sales, labor efficiency, character of the route, etc., on unit costs in order to determine the reasons for the large differences in the unit costs of distribution which were found to exist. It was found that the following factors are the most important in causing the higher costs of distribution. First, low yearly volume of sales; second, low volume of sales per mile of route; third, the use of labor rather than power-driven equipment; fourth, laxity in handling credit and securing bottle returns; fifth, failure to perform labor efficiently; and sixth, excess capacity of plant and equipment.

The outstanding factors which make it impossible for a producer-distributor market to effect lower costs of distribution are; first, duplication of services and facilities; and secondly, inability to realize the economies of large scale distribution. Furthermore, price fixing, as it is found in this market, deadens the incentive for decreasing costs and incorporates inefficiencies within the price structure.

However, competition on a price basis would probably not result in any lasting improvement insofar as the consumer is concerned.

The possible types of market reorganisations that could result in effecting lasting improvements in marketing were briefly discussed. Reorganisation of the market structure could conceivably be the result of, first, cooperative action by producer-distributors; second, cooperative action by consumers; third, public regulation; and fourth, public ownership.

However, it appears that many conditions exist in the market which would hinder any attempts at market reorganisation. Briefly stated, the chief objection to change is that producer-distributors have organised their enterprises on that basis and are afraid that any reorganisation will result in "squeezing" them from the market, giving a greater advantage to competitors, or involve giving up a fancied vested interest in the industry.

BOZEMAN MILK AND CREAM DISTRIBUTION

An Analysis of the Costs of Distributing Market Milk and  
Fluid Cream in the Bozeman Market Milk Area with  
Suggestions for Improving Marketing Methods

by

Werner Allmendinger

A THESIS

Submitted to the Graduate Committee  
in partial fulfillment of the requirements  
for the Degree of Master of Science  
in Agricultural Economics at  
Montana State College

Approved:

*H. H. Lord*

\_\_\_\_\_  
In Charge of Major Work

*R. R. Renne*

\_\_\_\_\_  
Chairman, Examining Committee

*J. B. Owen*

\_\_\_\_\_  
Chairman, Graduate Committee

Bozeman, Montana  
June, 1949

1001111111

1001111111

1001111111

N 378  
AL 576  
cop. 2

TABLE OF CONTENTS

	Page
LIST OF ILLUSTRATIONS.....	4
ABSTRACT.....	9
PART I: INTRODUCTION.....	10
<u>Historical Background</u> .....	10
<u>Purposes of the Study</u> .....	12
<u>Definition of Texas</u> .....	14
<u>The Bozeman Market Milk Area</u> .....	16
<u>Sources of the Data</u> .....	22
<u>Qualifications of the Data</u> .....	24
<u>Method of Analysis</u> .....	25
PART II: COSTS OF DISTRIBUTION.....	28
<u>Volume of Sales</u> .....	28
<u>Determination of Costs</u> .....	34
<u>Classification of Costs</u> .....	38
<u>Analysis of Costs of Distribution</u> .....	50
Volume of Sales.....	50
Investment.....	52
Labor Efficiency.....	54
Bottle Costs.....	62
Truck Operating Cost.....	64
Supplies.....	67
Power and Fuel.....	70
Bad Debts.....	70
Repairs.....	72
Depreciation.....	72
Other Fixed Costs.....	73
Summary of Analysis.....	74

89-40 Thesis - Grad. Committee cop. 2

	Page
<u>Comparison with Costs of Other Areas</u> .....	77
<b>PART III: IMPROVING THE MARKETING SYSTEM</b> .....	81
<u>Basis of Improvement</u> .....	81
Objectives of Improvement.....	81
Reasons for Present Inefficiencies.....	82
<u>Improvements Within the Existing Market Structure</u> .....	84
Limitations.....	84
Effect of Volume of Sales.....	85
Effect of Investment.....	88
Effect of Character of the Route.....	89
Effect of Managerial Policy.....	89
Effect of Collective Action.....	94
Effect of Labor.....	96
Conclusions.....	97
<u>Reorganization of the Market Structure to Effect</u>	
<u>Improvement</u> .....	101
Producer Cooperatives.....	101
Limitations of Cooperative Action.....	109
Consumer Cooperation.....	110
Public Regulation.....	118
Public Ownership.....	118
Conclusions.....	119
Difficulty of Market Reorganization.....	120
<b>SUMMARY AND CONCLUSIONS</b> .....	124
<b>APPENDIX A: Supplementary Tables</b> .....	128
<b>APPENDIX B: Supplementary Figures</b> .....	142
<b>ACKNOWLEDGMENTS</b> .....	161
<b>BIBLIOGRAPHY</b> .....	162

LIST OF ILLUSTRATIONS

	Page
Figure 1.—Map showing the location of Bozeman, Montana.....	17
Figure 2.—The proportionate amount plant, delivery, and administrative costs are of the weighted average unit cost of distributing fluid milk products, 10 operators, Bozeman market area, 1939.....	45
Figure 3.—The proportionate amount each item of cost is of the weighted average unit cost of distributing fluid milk products, 10 operators, Bozeman market area, 1939.....	49
Figure 4.—Relation between distribution cost per unit of fluid sales and total units of fluid sales, 10 operators.....	51
Figure 5.—Relation between distribution cost per quart equivalent and total quart equivalents, 10 operators.....	51
Figure 6.—Relation between investment per unit of fluid sales and total units of fluid sales, 10 operators.....	53
Figure 7.—Relation between investment per quart equivalent and total quart equivalents, 10 operators.....	53
Figure 8.—Relation between labor cost per unit of fluid sales and total units of fluid sales, 10 operators.....	56
Figure 9.—Relation between labor cost per quart equivalent and total quart equivalents, 10 operators.....	56
Figure 10.—Relation between truck operating cost per unit of fluid sales and total units of fluid sales, 10 operators...	66
Figure 11.—Relation between truck operating cost per quart equivalent and total quart equivalents, 10 operators.....	66
Figure 12.—Relation between truck operating cost per unit of fluid sales and units of fluid sales per mile of total route mileage, 10 operators.....	68
Figure 13.—Relation between truck operating cost per quart equivalent and quart equivalents per mile of total route mileage, 10 operators.....	68

	Page
Figure 14.—Relation between cost of plant supplies per unit of fluid sales and total units of fluid sales, 10 operators...	69
Figure 15.—Relation between cost of plant supplies per quart equivalent and total quart equivalents, 10 operators.....	69
Figure 16.—Duplication of milk routes in Bozeman.....	85
Figure 17.—Relation between plant cost per unit of fluid sales and total units of fluid sales, 10 operators.....	142
Figure 18.—Relation between plant cost per quart equivalent and total quart equivalents, 10 operators.....	142
Figure 19.—Relation between delivery cost per unit of fluid sales and total units of fluid sales, 10 operators.....	145
Figure 20.—Relation between delivery cost per quart equivalent and total quart equivalents, 10 operators.....	145
Figure 21.—Relation between administrative cost per unit of fluid sales and total units of fluid sales, 10 operators...	144
Figure 22.—Relation between administrative cost per quart equivalent and total quart equivalents, 10 operators.....	144
Figure 23.—Relation between plant investment per unit of fluid sales and total units of fluid sales, 10 operators.....	145
Figure 24.—Relation between plant investment per quart equivalent and total quart equivalents, 10 operators.....	145
Figure 25.—Relation between delivery investment per unit of fluid sales and total units of fluid sales, 10 operators...	146
Figure 26.—Relation between delivery investment per quart equivalent and total quart equivalents, 10 operators.....	146
Figure 27.—Relation between plant labor cost per unit of fluid sales and total units of fluid sales, 10 operators,.....	147
Figure 28.—Relation between plant labor cost per quart equivalent and total quart equivalents, 10 operators.....	147

Figure 29.—Relation between delivery labor cost per unit of fluid sales and total units of fluid sales, 10 operators....	148
Figure 30.—Relation between delivery labor cost per quart equivalent and total quart equivalents, 10 operators.....	148
Figure 31.—Relation between cost of distribution per unit of fluid sales and administrative labor cost per unit of fluid sales, 10 operators.....	149
Figure 32.—Relation between distribution cost per quart equivalent and administrative labor cost per quart equivalent, 10 operators.....	149
Figure 33.—Relation between labor cost per unit of fluid sales and investment per unit of fluid sales, 10 operators.....	150
Figure 34.—Relation between labor cost per quart equivalent and investment per quart equivalent, 10 operators.....	150
Figure 35.—Relation between cost of plant supplies per unit of fluid sales and plant labor cost per unit of fluid sales, 10 operators.....	151
Figure 36.—Relation between cost of plant supplies per quart equivalent and plant labor cost per quart equivalent, 10 operators.....	151
Figure 37.—Relation between bottle cost per unit of fluid sales and total units of fluid sales, 10 operators.....	152
Figure 38.—Relation between bottle cost per unit of fluid sales and labor cost per unit of fluid sales, 10 operators.....	152
Figure 39.—Relation between plant labor cost per unit of fluid sales and cost of power and fuel per unit of fluid sales, 10 operators.....	153
Figure 40.—Relation between plant labor cost per quart equivalent and cost of power and fuel per quart equivalent, 10 operators.....	153
Figure 41.—Relation between delivery labor cost per unit of fluid sales and loss from bad debts per unit of fluid sales, 10 operators.....	154

Figure 42.--Relation between delivery labor cost per quart equivalent and loss from bad debts per quart equivalent, 10 operators.....	154
Figure 43.--Relation between delivery labor cost per unit of fluid sales and units of fluid sales per mile of town route mileage, 10 operators.....	155
Figure 44.--Relation between delivery labor cost per quart equivalent and quart equivalents per mile of town route mileage, 10 operators.....	155
Figure 45.--Relation between units of fluid sales per mile of town route mileage and total units of fluid sales, 10 operators.....	156
Figure 46.--Relation between quart equivalents per mile of town route mileage and total quart equivalents, 10 operators....	156
Figure 47.--Relation between truck operating cost per unit of fluid sales and units of fluid sales per mile of town route mileage, 10 operators.....	157
Figure 48.--Relation between truck operating cost per quart equivalent and quart equivalents per mile of town route mileage, 10 operators.....	157
Figure 49.--Relation between truck operating cost per unit of fluid sales and customers per mile of town route mileage, 10 operators.....	158
Figure 50.--Relation between truck operating cost per quart equivalent and customers per mile of town route mileage, 10 operators.....	158
Figure 51.--Relation between truck operating cost per unit of fluid sales and customers per mile of total route mileage, 10 operators.....	159
Figure 52.--Relation between truck operating cost per quart equivalent and customers per mile of total route mileage, 10 operators.....	159
Figure 53.--Relation between cost of power and fuel per unit of fluid sales and total units of fluid sales, 10 operators...	160



Figure 54.--Relation between cost of power and fuel per quart  
equivalent and total quart equivalents, 10 operators..... 160

## BOZEMAN MILK AND CREAM DISTRIBUTION

### An Analysis of the Costs of Distributing Market Milk and Fluid Cream in the Bozeman Market Milk Area with Suggestions for Improving Marketing Methods

#### ABSTRACT

The purpose of this study is to analyze and evaluate the system now being used in the marketing of fluid milk products in the Bozeman market area to determine its efficiency in marketing these products at a reasonable price and with good service, and to offer suggestions for improvement.

The data used in this study represent complete cost of distribution information provided by 10 operators in the market. The sample is such that what is typical of the group is typical of the whole market. These data were used to determine the costs of distribution of each operator per unit of fluid sales and per quart equivalent, as well as the weighted average cost for the group of 10 operators. An analysis of the cost data was made to determine the effect of various factors, such as volume of sales, labor efficiency, character of the route, etc., on unit costs in order to determine the reasons for the large differences in the unit costs of distribution which were found to exist. It was found that the following factors are the most important in causing the higher costs of distribution. First, low yearly volume of sales; second, low volume of sales per mile of route; third, the use of labor rather than power-driven equipment; fourth, laxity in handling credit and securing bottle returns; fifth, failure to perform labor efficiently; and sixth, excess capacity of plant and equipment.

The outstanding factors which make it impossible for a producer-distributor market to effect lower costs of distribution are; first, duplication of services and facilities; and secondly, inability to realize the economies of large scale distribution. Furthermore, price fixing, as it is found in this market, deadens the incentive for decreasing costs and incorporates inefficiencies within the price structure. However, competition on a price basis would probably not result in any lasting improvement insofar as the consumer is concerned.

The possible types of market reorganizations that could result in effecting lasting improvements in marketing were briefly discussed. Reorganization of the market structure could conceivably be the result of, first, cooperative action by producer-distributors; second, cooperative action by consumers; third, public regulation; and fourth, public ownership. However, it appears that many conditions exist in the market which would hinder any attempts at market reorganization. Briefly stated, the chief objection to change is that producer-distributors have organized their enterprises on that basis and are afraid that any reorganization will result in "squeezing" them from the market, giving a greater advantage to competitors, or involve giving up a fancied vested interest in the industry.

## PART I. INTRODUCTION

### Historical Background

The realization of the dietetic value of milk and milk products has resulted in a great deal of public interest in the milk industry in recent years. The first direction of this interest was toward the institution of requirements for sanitation in the production, handling, and distribution of fluid milk products.

Such efforts have been highly successful and although improvements are still possible and necessary with respect to sanitation, we find that the result of such requirements for sanitation has been a much higher grade of milk than could otherwise have been expected. It appears that in general the consumer is now satisfied with the quality of milk he receives and in the past few years he has become very much interested in its price.

It is widely believed that the milk marketing mechanism has become so complex that no longer is the consumer able to purchase fluid milk products at their lowest possible prices <sup>1/</sup> nor is the producer always receiving a fair return for his product. <sup>2/</sup> Primarily this condition was blamed upon the distributors, and often rightfully so. <sup>3/</sup> However, further investigation has shown that it is not altogether the action of the

---

<sup>1/</sup> This is indicated by the widespread consumer movements in New York and other large cities.

<sup>2/</sup> Various studies indicate that at times the farm price of fluid milk is considerably below costs of production. See Ulrey, Orion, "The Kalamazoo Milk Market", Mich. Agr. Exp. Sta. Special Bul. 500, 1939, p. 28.

<sup>3/</sup> Federal Trade Commission, "Summary Report on Conditions with Respect to the Sale and Distribution of Milk and Dairy Products", 1957, p. 1, "...distributors in four of the largest milksheds in the United States, for the five years ending December 31, 1933, make a net profit of 25.71 per centum on their net plant investment,...."

distributors that results in maladjustments in the fluid milk industry but rather, that the market structure utilized for the sale of milk has inherent weaknesses.

It has been found that these weaknesses are prevalent in the distributive system and involve considerable wastes and inefficiencies. <sup>4/</sup> Primarily this condition prevails because of the presence of a great many firms involved in the distribution of fluid milk in any one market area. Because of the nature of milk distribution, which involves doorstep delivery of a large percentage of the milk and cream sold in fluid form, it has been found that there often exists a needless duplication of facilities utilized for distribution. Consequently, costs of distribution are often considerably greater than necessary, which can have no result other than either a high retail price to the consumer, a low return to the producer, or both. This condition has been further aggravated by the presence of monopolistic conditions in distribution which have enabled the distributor to not only receive a large margin to cover the costs involved in an inefficient distributive system but also to reap an abnormal profit on his investment. <sup>5/</sup>

---

<sup>4/</sup> Refer to conclusions in: Stelzer, M. O., and Thurston, L. M., "Milk Distribution Costs in West Virginia", W. Va. Agr. Exp. Sta. Bul. 288, 1935; Armentrout, W. W., and Stelzer, M. O., "Milk Distribution Costs in West Virginia", W. Va. Agr. Exp. Sta. Bul. 270, 1936; Herrman, L. F., "Milk Distribution Costs in West Virginia", W. Va. Agr. Exp. Sta. Bul. 282, 1937; Maxton, J. L., and Taylor, C. C., "Marketing Milk in Four Virginia Cities", Va. Agr. Exp. Sta. Bul. 275, 1930; Rinear, E. H., "Milk Distribution Costs of Producer Distributors and Subdealers in New Jersey", N. J. Agr. Exp. Sta. Bul. 663, 1939. For further reference to milk distribution cost studies in small cities see bibliography.

<sup>5/</sup> Federal Trade Commission, "Summary Report on Conditions with Respect to the Sale and Distribution of Milk and Dairy Products", 1937, p. 9.

The distribution of milk in the larger cities is characterized by a definite division of the functions involved in the marketing of milk. Usually the functions of production, transportation, and bottling and delivery are performed by different agencies. However, in the smaller cities, such as the one involved in this study, this division of functions has not yet occurred to any great extent. In Bozeman there are several individuals performing the function of bottling and delivering only, but by far the largest portion of the milk and cream is marketed by producer-distributors. The existence of this type of market structure does not result in all the problems prevailing in the large markets but nevertheless studies of markets of this size have indicated that the maximum of efficiency is not reached even in these smaller markets. 6/

#### Purposes of the Study.

For many years attention has been directed time and time again to the wastes in milk distribution but very little has been done to remedy the situation.

The purpose of this study is to determine how milk is now being marketed in the City of Bozeman, to determine if inefficiencies exist in marketing, and to determine and analyze those factors contributing to any inefficiencies of the present method of distribution. The results of such analysis will be used to ascertain whether it would be possible to effect any economies in, or reorganization of, the present methods of handling

---

6/ See publications listed in footnote 4.

milk which would lead to an immediate and lasting improvement of milk marketing conditions in Bozeman.

Such information should be of benefit to producers, producer-distributors, distributors, and consumers. It should be valuable to producers and producer-distributors who must choose between selling their milk to distributors or distributing it themselves; of value to distributors who are often threatened with excessive competition from producer-distributors; and of primary interest to consumers who desire assurance of a high quality milk available at a reasonably stable and moderate price.

Further evidence of the need of studying milk distribution is indicated by a review of the general trends in milk consumption. The per capita consumption of evaporated milk was 11.1 pounds in 1925 and 16.6 pounds in 1936, or the equivalent of 2.6 and 3.9 gallons respectively of fresh milk. On the other hand, the consumption of fresh milk in cities and villages decreased from 58.9 gallons per capita in 1925 to 36.2 gallons per capita in 1936. 7/ Also, studies have shown that the milk consumption of rural people keeping cows is from two to three times as great as the consumption of milk of those not keeping cows. 8/ This condition would indicate that the added cost of distribution or ease of availability did effect the amounts consumed. A study by the Bureau of Home Economics indicates that there is a positive correlation between

---

7/ United States Department of Agriculture, "Agricultural Statistics", 1936, p. 46, table 476.

8/ Howe, C. B., "The Consumption of Dairy Products in Six New Jersey Townships", New Jersey Agr. Exp. Sta. Bul. 506, 1930, p. 10.

the total amount spent for food per person and the amount of milk consumed. 9/

In a similar study, Rinear concludes that, although because of differences in taste, consumers generally prefer to drink fresh milk instead of evaporated milk, there has been an increased consumption of evaporated milk because the price of fluid milk has increased relatively to the price of evaporated milk. 10/

This would seem to indicate that those with low incomes believe they cannot afford to pay for the extra services involved in the distribution of fresh milk, and during the last decade we find that this group has increased. Because of the importance of milk in the diet, it is in the interest of public welfare that milk be made available to our population at a reasonable price. The consumer should be aware of any conditions in the market which force him to pay an unjustifiably high price for his milk and cream. It is only if consumers have adequate knowledge of existing conditions and then make a concerted effort towards the correction or alleviation of any inequities that their interests will be protected.

#### Definition of Terms

Certain terms are used in this study that have not been standardized

---

9/ Agricultural Adjustment Administration, "Consumers' Guide", June 6 and June 20, 1938, pp. 12-13. The results of this study covering a million native white non-relief families for the year 1935 shows the following: When 8 cents a meal for all food for each person was spent, the consumption of milk by urban families was 2.5 quarts per week per person; and when 17 cents a meal for all food for each person was spent, the consumption of milk for urban families increased to 4 quarts per person per week.

10/ Rinear, E. R., Op. cit., p. 6.



















































































































































































































































































































































